

TECHNICAL MANUAL

FMS-500-350

Flush Mounted Spider



SPECIFICATIONS | OPERATION | MAINTENANCE | PARTS

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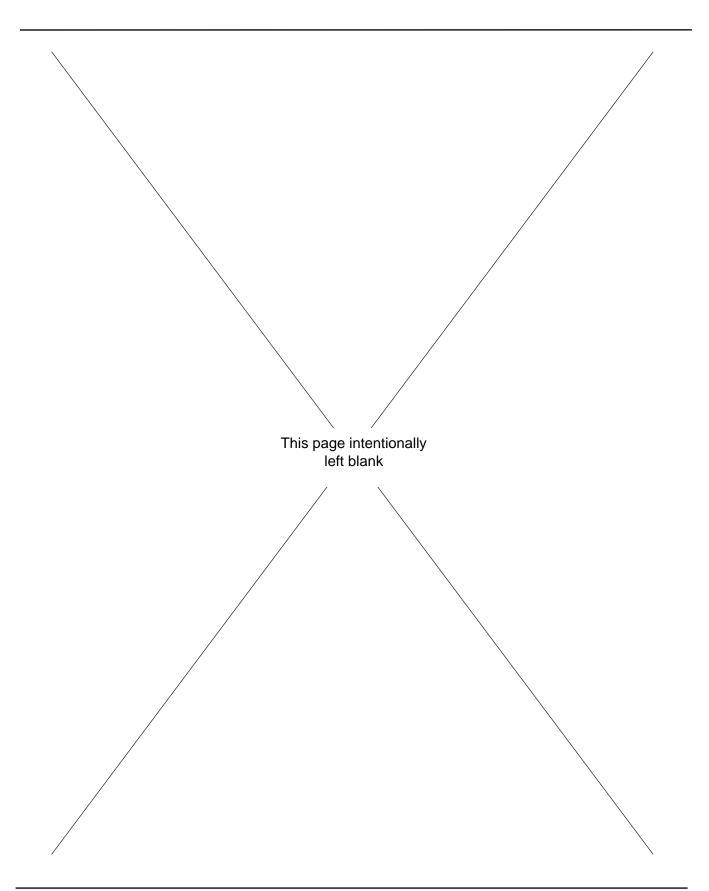
The user of the manual shall protect, indemnify, and hold harmless McCoy and its directors, officers, employees, and agents from and against all liability for personal injury, death, or property damage resulting directly or indirectly from the use of the information contained in this manual.

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, which may overrule the content of this documentation.

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







Summary of Revisions			
Revision Date Description of Revision			
00	SEPT 2025	Initial Release.	
01	DEC 2025 Updated Assembly steps and Dressing Chart		



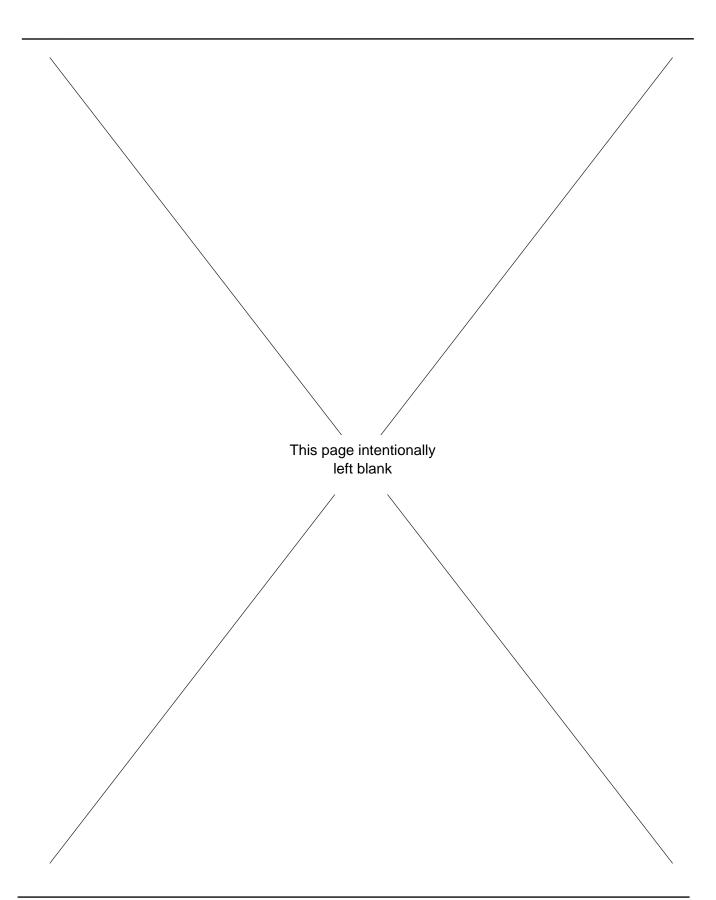
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SECTION 1: INTRODUCTION, SAFETY GUIDELINES & PRODUCT DESCRIPTION



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:

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

https://www.mccoyglobal.com/download/terms-conditions-sales/



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.

Hazard Labels

McCoy Global uses four levels of hazard/notice labels to indicate four levels of importance: Danger, Warning, Caution, and Notice.

DANGER is identified by a hazard symbol combined with the word "**DANGER**" and signifies the highest level of risk. Ignoring information marked with 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 indicated by a hazard symbol paired with the word "WARNING" and denotes items of medium risk. Ignoring information marked with a WARNING symbol may result in significant injury to personnel, catastrophic equipment failure, or harmful environmental contamination.

! WARNING

THIS IDENTIFIES A WARNING ABOUT POTENTIAL INJURY OR CATASTROPHIC EQUIPMENT DAMAGE.

A CAUTION is indicated by a hazard symbol paired with the word "CAUTION" and represents items of low risk. Ignoring information marked with a CAUTION symbol may result in injury to personnel or equipment damage.

CAUTION

THIS IDENTIFIES A CAUTION ABOUT SAFE OPERATION OR THE POTENTIAL FOR EQUIPMENT DAMAGE.

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

NOTICE

THIS HIGHLIGHTS ITEMS OF IMPORTANCE THAT ARE UNRELATED TO PERSONAL INJURY.



GENERAL SAFE OPERATING GUIDELINES

Only authorized personnel shall operate equipment delivered by McCoy Global. Prior to use, the equipment must be in proper technical condition and used solely for its intended purpose. Any malfunctions or damage must be addressed and rectified before operation to ensure personnel safety and prevent equipment and/or property damage.

Users are accountable for ensuring the safety of all personnel when operating any McCoy Global product. It is recommended that a safety representative conducts a hazard assessment of the work area before starting operations. This representative is tasked with confirming that all operators possess the necessary equipment and have undergone the required safety training. McCoy Global bears no responsibility for injuries, equipment damage, or property damage resulting from the improper use of the equipment.

CAUTION

IT IS CRITICAL FOR THE END USER TO CONDUCT A RISK ASSESSMENT AND MITIGATION PLAN FOR THE ENTIRE INTEGRATED SYSTEM, INCLUDING ALL ASPECTS SUCH AS COMMISSIONING AND OPERATION. PLEASE NOTE THAT THIS MANUAL ONLY CONTAINS INFORMATION RELEVANT TO THE SYSTEM SHOWN.

The area surrounding the equipment operating area must remain free of clutter, tripping hazards, and protruding objects that could snag hoses or cables. Ensure that the operating surface or drill floor remains clear of slipping risks such as grease, oil, and water.

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

Equipment components painted green are deemed safe for continuous handling. Areas painted yellow, along with any other equipment components that rotate, or move, are designated as hazardous areas. During operation, contact with those areas must be avoided.







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

Never attempt to clamp to a tubular using incorrectly sized dies. Operators must always use the correct carrier size equipped with the correct dies. Use of incorrectly sized dies poses a hazard to personnel and potentially damaged equipment.



Tools should not be clamped onto any tubular without being in either the rotary or the shipping stand.

! WARNING

NEVER ATTEMPT TO CLAMP ONTO TUBULARS WITH INCORRECTLY SIZED DIES.

! WARNING

FAILURE TO FOLLOW THE EQUIPMENT PLACEMENT AND RIG-UP PROCEDURES OUTLINED IN THIS MANUAL CAN LEAVE EQUIPMENT UNGROUNDED AND AT RISK FOR BUILDING A STATIC CHARGE. BEFORE OPERATING, AN ASSESSMENT FOR PROPER GROUNDING MUST BE CONDUCTED TO MINIMIZE THE RISKS OF SPARKS ASSOCIATED WITH STATIC DISCHARGE.

WARNING

TOOLS SHOULD NOT BE CLAMPED ON ANY TUBULAR WITHOUT BEING INSTALLED INTO EITHER THE ROTARY TABLE OR SHIPPING STAND.

McCoy Global recommends adhering to recognized industry standards such as OSHA, ASME B30.9-2006, or manufacturer's guidelines when performing any rigging and overhead lifting. The use of this equipment by untrained people 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 not properly maintained. Never stand beneath a suspended load.

DANGER

NEVER STAND BENEATH A SUSPENDED LOAD

WARNING

AREAS OF THIS EQUIPMENT THAT ARE COATED YELLOW ARE HAZARDOUS WHEN THE EQUIPMENT IS ACTIVE. KEEP HANDS CLEAR WHEN EQUIPMENT IS ENERGIZED.

MAINTENANCE SAFETY

All personnel are responsible for performing maintenance tasks that prioritize worker, equipment, and environmental safety. This may involve taking additional precautions that are not identified in this section.

Maintenance of equipment shall only be performed by qualified maintenance personnel. Prior to initiating any maintenance task ensure you have the necessary tools, materials, drawings, and documentation.

To safeguard personnel from inadvertent exposure to a hazard, isolate the maintenance area underway using tape, rope, or signage to clearly indicate an 'off limits' area.



Where applicable, ensure electrical circuits within the affected equipment are deactivated or deenergized by an authorized and qualified person. If necessary, the circuit should be locked out. Do not disconnect a live electrical circuit unless you are certain that the area is free from hazards.

A DANGER

DISCONNECT POWER SUPPLY AND RETURN HOSES BEFORE PROCEEDING WITH MAINTENANCE – ALWAYS DISCONNECT SUPPLY FIRST AND CONNECT IT LAST.

! WARNING

WHEN REPAINTING EQUIPMENT, THE PAINT COAT APPLIED SHOULD NEVER EXCEED 2MM IN THICKNESS. EXCESS THICKNESS COULD LEAD TO THE ACCUMULATION OF STATIC CHARGE, INCREASING THE RISK OF SPARKS DUE TO STATIC DISCHARGE.

Replacement Parts

All consumable and replacement parts must meet or surpass OEM specifications to maintain equipment integrity. Do not replace protective equipment such as hydraulic switches, circuit breakers, and fuses without first consulting McCoy Global. Do not replace electrical or control hardware without consulting McCoy Global. The use of non-OEM replacement parts without the approval of McCoy Global could invalidate the equipment warranty.

Environmental Impact

McCoy Global equipment incorporates materials that could be environmentally harmful if not disposed of correctly, such as hydraulic fluid, grease, fuel, electrical components, and more. Ensure that all materials are disposed of in accordance with established environmental protection regulations and in compliance with applicable federal, state, provincial, and local legislation.

The user is fully responsible for adhering to the following:

- All descriptions, information, and instructions are within this manual.
- Any regulation or requirement issued by a relevant authority or agency that pertains to the operation, safety, or integrity of the equipment takes precedence over the content provided in this manual.
- All legal or other mandatory regulations in force governing accident prevention or environmental protection.



PRODUCT DESCRIPTION

The FMS 500 Hydraulic Flush Mounted Spider, is a rotary tool specifically designed to handle casing or drill pipe, accommodating sizes ranging from 4" to 20" using replaceable die carriers. Developed to meet the demand for larger and higher-capacity casing tools, the FMS 500 increases both safety and efficiency. Depending on the tubular size and weight, it is capable of handling casing string weights up to 500 Tons. In addition, it provides back-up torque of up to 1000,000 ft. lbs. from the first pipe joint, eliminating the need for manual backup tongs.



Illustration: Product Description



PRODUCT DESCRIPTION CONTINUED, OPTIONAL EQUIPMENT

FMS Set Indicator Box

An FMS Set Indicator Box provides a visual representation of the FMS set and unset status, based on the SET PRESSURE and FMS POSITION. Please refer to Section 3- Safe Work Procedures for instructions on function testing the FMS prior to starting operations. For additional information, contact McCoy.



Illustration: FMS Set Indicator Box

Bi-Directional Combo Dies

Bi-Directional Combo Dies are available as replacements for the Handling dies. They feature an enhanced bite for improved grip on the pipe, resulting in better overall operational performance. For more details, please refer to the FMS die chart in the appendix section. For additional information, please contact McCoy.

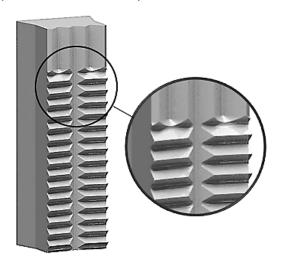


Illustration: Bi-Directional Dies



PRODUCT DESCRIPTION CONTINUED, OPTIONAL EQUIPMENT

Rotary Adapter for EMSCO 3750, P/N 1009635

Note: The FMS 500 comes equipped with the National Rotary Adapter



Illustration: Rotary Adapter for EMSCO 3750

Kit, Accessories, FMS P/N 1010899 includes - Spreader Bar Assembly & Lifting Basket.

Note the Spreader Bar Assembly, Spreader Bar and Lifting Basket can also be purchased separately.

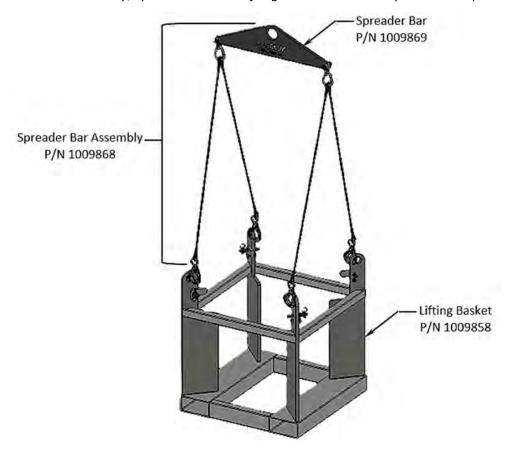
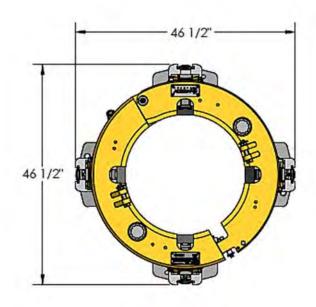
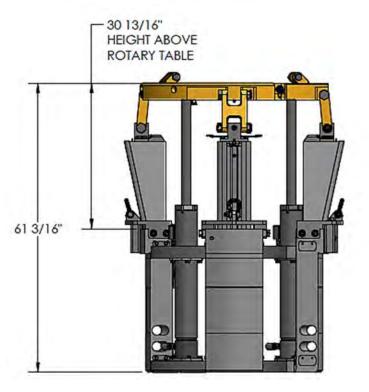


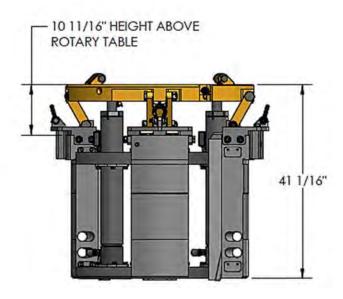
Illustration: Kit, Accessories, FMS P/N 1010899



PRODUCT DESCRIPTION CONTINUED







FULLY EXTENDED

FULLY RETRACTED

Illustration: FMS-30-275 Dimensions:



PRODUCT DETAILS

FLUSH MOUNT SPIDER SPECIFICATIONS			
MAXIMUM TENSION RATING	500 TONS	454 TONNES	
MAXIMUM WORKING PRESSURE	3000 PSI	207 BAR	
RECOMMENDED FLOW RATE	30 GPM	114 LPM	
MASS (TOOL ONLY)	4033 LBS	1829 KG	
MASS RANGE (CARRIERS AND GUIDE PLATES INCLUDED)	4285 - 5960 LBS	1944 - 2703 KG	
TIME TO EXTEND AND RETRACT	6 SE(CONDS	
COMPATIBLE ROTARY TABLE	NATIONAL 37 1/2" is built into the FMS	EMSCO 3750 *Offered as an option	
PIPE SIZE RANGE	4"	20"	

TENSION RATING FOR CARRIERS		
PIPE SIZE (INCHES)	MAX TENSIONS (TONS)	
5.500 - 20.000	500	
4.000 – 5.000	350	

MAXIMUM TORQUE AT 3000 PSI WORKING PRESSURE ON A SINGLE JOINT		
PIPE SIZE (INCHES)	TORQUE (FT-LB)	
9.625 – 20.000	100,000	
5.500 – 9.625	60,000	
4.500 – 5.000	45,000	
4.000	40,000	
*TORQUE VALUES ARE DETERMINED BY SLIP UPON THE PIPE AND NOT THE		

LIMITATIONS OF THE TOOL.



PRODUCT DETAILS Continued

Safety Devices and Standards:

- Designed Safety Factor API 7K
- Reduces "Red Zone" Exposure
- Removes crew from possible pinch points

Features of FMS 500

- Capable of handling both casing and drill pipe
- Delivering up to 100,000 ft-lbs. of back-up torque from the first joint eliminating the need for manual backup tongs.
- Fits into NATIONAL and EMSCO 37 1/2" rotary tables
- Carriers are easily interchangeable, utilizing a spring latch to hold the carrier secure

Benefits of the FMS 500

- Integrates into the McCoy smarTR package (optional)
- Remote operation via belly pack (optional)
- Real-Time Drillers Data with Sensor Package (optional)



RECOMMENDED LUBRICANT SPECIFICATIONS

Hydraulic Fluid

McCoy Global recommends using high-quality hydraulic fluid that contains rust & oxidation inhibitors, as well as foam suppressant, meeting specific requirements listed below. Operating this equipment using hydraulic fluid that does not meet the requirements significantly 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)		
	86° - 140°F (30° - 60°C)		
HYDRAULIC FLUID OPERATING TEMPERATURE RANGE	MEASURED IN MAIN RESERVOIR		
MAXIMUM FLUID TEMPERATURE	180°f (82°C)		
FLUID CLEANLINESS	FILTERED TO ISO 4406:1999 (18/16/13)		

Hydraulic fluid selection should consider the expected climactic conditions and equipment load. Note that this equipment may have undergone testing using hydraulic fluid that does not exceed the operational requirements outlined in the above table. Therefore, McCoy Global recommends purging and flushing the equipment's hydraulic system before connecting it to a hydraulic supply.

NOTICE

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



Grease

McCoy Global recommends using the lubrication or grease listed below and thoroughly applying to the equipment before first use, following the lubrication instructions outlined in the Maintenance Section. Using alternative lubricants can compromise performance and accelerate wear on critical components, thereby reducing the lifespan of the parts and/or effectiveness of the tool.

Avec	Product	
Area	Lubrication, Grease, Loctite	
Slips and Bowl Corners Taper Surfaces (-20C – 60C)	Lithium Grease (EP 2 or EP 3)	
Bolts and Set Screw Threads	Loctite 76764 (McCoy P/N: 700093)	
Pins, latch mechanism, grease fittings	NLGI No. 2 Lithium equivalent	
Die Carrier Slots and between the dies	CRC 3-36 Multi-Purpose Lubricant & Corrosion Inhibitor	



INSTALLATION AND COMMISSIONING

RECEIPT, INSPECTION, AND HANDLING OF EQUIPMENT

! CAUTION

EQUIPMENT SHOULD BE INSPECTED FOR SHIPPING DAMAGE UPON RECEIPT AND TESTED BEFORE BEING RELEASING TO AN OPERATIONAL ENVIRONMENT.

Upon receipt, inspect packaging materials for shipping damage. Record all shipping damage on the shipping manifest and immediately notify both the shipping company and McCoy Global.

Next, remove all protective shipping materials and perform a visual inspection of the equipment. If any damage is detected, ensure repairs are completed before connecting the equipment to a hydraulic power source.

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

/! CAUTION

MCCOY GLOBAL RECOMMENDS TESTING 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. Variances in ambient temperature could affect factory adjusted components. McCoy Global recommends purging and flushing the hydraulic system before connecting to third-party hydraulic power units.

Perform the following steps as a general functionality test:

- 1. Perform a complete lubrication of the equipment.
- 2. Confirm the spring latch carrier retainer mechanism operates correctly.
- 3. Perform a complete functional test of the equipment.



DANGER

A "LOAD-BEARING DEVICE" IS A WIRE 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 DOES NOT GUARANTEE THE ABILITY OF THE LOAD BEARING DEVICE TO SUPPORT ANY OTHER PART, ASSEMBLY OR COMBINATION OF PARTS AND ASSEMBLIES. ALSO, MCCOY GLOBAL DOES 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 SUCH AS WIRE SLINGS, SPREADER BAR ASSEMBLIES, FRAMES, ETC., THE ASSOCIATED FASTENERS MUST BE TIGHTENED TO THE CORRECT TORQUE SPECIFIED FOR THAT SIZE OF FASTENER (SEE MAINTENANCE SECTION). FOR ANY THREADED FASTENER WITHIN A LOAD-BEARING DEVICE MUST BE SECURED WITH RED OR BLUE LOCTITE™.

REPLACEMENT FASTENERS INCLUDING 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 recognized industry standards such as OSHA, ASME B30.9-2006, or the manufacturer's guidelines when performing any rigging and overhead lifting. Use by untrained persons in these operations is hazardous and poses significant risks, including the potential for serious injury or death. Do not exceed the rated capacity of the equipment. Slings will fail if damaged, abused, misused, overused, or inadequately maintained.

- Use only appropriately rated chains for overhead lifting applications.
- Working Load Limit (WLL) is the maximum allowable load in pounds or kilograms that
 can be applied to the load-bearing device. This limit is applicable 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 modifications, sharp corner cutting actions, and other use conditions.
- Shock loading and extraordinary conditions must be considered when selecting alloy chain slings.



For further information and related safety guidelines, please refer to the following resources:

- OSHA Regulation for Slings: 1910.184
- ANSI/ASME B30.9: "Slings"
- ANSI/ASME B30.10: "Hooks"
- ANSI/ASME B30.26: "Rigging Hardware"

Inspection of Load-Bearing Devices and Structures

- 1. Initial Inspection: Prior to initial use, a qualified person shall conduct a thorough inspection of new load-bearing devices and attachments. Each component shall be examined individually, ensuring to expose and examine all surfaces including the inner link surface.
- 2. Daily inspection: A qualified person of fastenings and attachments shall be performed by a designated person. If any damage or defects are detected at either inspection, the damaged or defective component shall be quarantined from service. It should remain out of service until it undergoes proper repair or replacement.

A load-bearing device shall be removed from service if any of the following conditions are observed:

- Presence of cracks or breaks.
- Visible evidence of tampering, such as missing tamper-proof nuts.
- Signs of impact on load-bearing components, including but limited to spreader bars,

lifting lugs, rigid slings & their weldments, legs & leg mounts.

- Broken or damaged welds.
- Excessive wear, nicks, or gouges.
- Excessive pitting of the components due to rust and/or corrosion.

Inspect all lugs and fixing points for signs of elongation and/or bending, or for material build-up around the holes. Repair or replace components that appear distorted. Confirm that all hardware is securely tightened and is in good condition. If any hardware is missing, promptly replace it. All hardware must be free of rust and corrosion.

Additional inspections shall be performed where service conditions warrant, such as a maritime environment.

Periodic inspection intervals shall not exceed one year. The frequency of periodic inspections should be based on:

- The frequency of use of the load-bearing device.
- Severity of service conditions.
- In sights gained from the service life of load-bearing devices used in similar circumstances.

General inspection interval guidelines:

- Normal Service: Conduct inspections on an annual basis.
- Severe Service Inspections should occur monthly to quarterly.
- Special Service Inspections as recommended by a qualified person.



McCoy Global advises all users of lifting or load-bearing assemblies to establish inspection criteria or adopt a relevant inspection standard assigned to a competent inspection body. NDE should be performed per ASTM E165 and ASTM E709 standards. After conducting Magnetic Particle Inspection, ensure that all parts are free of metal shavings. McCoy Global recommends an inspection schedule similar to the one outlined in the following table.

TIME / INTERVAL	PROOF LOAD TEST(s)	NON-DESTRUCTIVE EXAMINATION (NDE) OF LIFTING POINTS	THROUGH VISUAL EXAMINATION
Initial certification by McCoy Global	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	YES	YES	YES

1. Load Testing Procedures:

Load tests should align with the inspection criteria established by the end user.
 McCoy Global performs the initial load test at 1.5 times the rated load. This value
 is recommended following a substantial repair. A subsequent load test at 1 times
 the rated load is recommended by McCoy Global every two years.

2. Definition of Substantial Repair or Modification:

 For the context of this standard, a substantial repair or modification is defined as any repair and/or modification that, in regard to the inspection body, could impact the load-bearing elements of the container or lifting device, or any elements that contribute directly to its structural integrity.

MARNING

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 loadbearing equipment. To prevent confusion, only list the most recent inspection date, do not list the date of the next test or examination.

DANGER

THIS INFORMATION SERVES AS A GENERAL GUIDELINE ONLY. THE DETERMINATION OF SITE-SPECIFIC INSPECTION FREQUENCY AND METHODOLOGY IS ULTIMATELY THE RESPONSIBILITY OF THE END USER.



Proper Use of Load-Bearing Devices

When utilizing any load-bearing device, adhere to the following practices:

- 1. Do not use Load-bearing devices that are damaged or defective.
- 2. Slings shall not be shortened with knots or bolts or other makeshift devices.
- 3. Ensure Sling legs are not kinked.
- 4. Never exceed the rated capacities of load-bearing devices.
- 5. Confirm Slings are securely attached to their load.
- 6. Protect load-bearing devices from snagging and avoid further obstruction by objects. object.
- 7. Keep suspended loads clear of any obstructions.
- 8. Ensure all employees remain clear of loads about to be lifted and of suspended loads.
- 9. Avoid placing hands or fingers between the sling and its load while tightening around the load.
- 10. Shock loading is prohibited.
- 11. Never stand directly under a load while lifting.

Storage Of Load-Bearing Devices

Ensuring the proper storage of out-of-service load bearing devices is important for preserving the full integrity of the device once it is returned to service. McCoy Global recommends observing the following practices:

- Degreasing: Remove all excess grease from the device's external surfaces using solvent-based cleaners on rags to wipe all external surfaces to remove residual grease or hydraulic fluid. After degreasing, wipe all external surfaces with clean water to remove residual solvent.
- Anti-Corrosion Treatment: McCoy Global recommends applying an anti-corrosive agent, such as Tectyl® 506, to all external surfaces of the device. 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.
- **Storage:** Store the device in a clean and dry environment. Prior to the device returning to service, a full inspection of the device must be performed.



FMS LIFTING ACCESSORIES

The FMS comes equipped with four swivel hoist rings. These can be used to help lift the unit out of the rotary table by installing them into the bowl corners.

The FMS also includes a lifting basket, P/N 1009858, and a spreader bar assembly, P/N 1009868, used for transporting the FMS.

See the Appendix section for additional information.

FMS LIFTING PROCEDURE

When lifting the FMS, use the swivel hoist rings installed on the bowl corners of the Unit. Do not use the threaded holes in the top plate to lift the entire FMS unit. These threaded holes are intended solely for the manual release of the tool from the pipe.

WARNING

DO NOT LIFT FMS USING THREADED HOLES IN TOP PLATES.

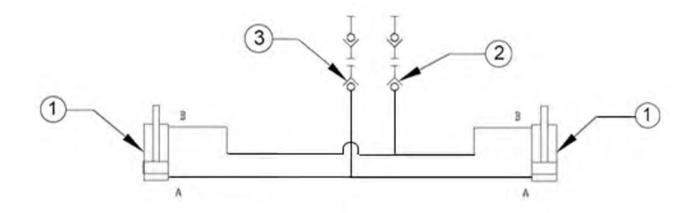
GENERAL HPU/CONSOLE REQUIREMENTS (Supplied by Customer)

- 1. Pressure: Maximum 3000 PSI
- 2. Flow: The FMS requires 35 GPM to achieve a 6-second cycle time.
- 3. **Independent Pressure Adjustment:** Pressure in both directions shall be independently adjusted.
- 4. **Pressure Bleed-off:** If the elevators and pipes are lowered onto the top plate of the FMS, the system needs to quickly bleed off the pressure building on the bore side of the cylinders that would build on the bore side for the cylinders being forcibly retracted by external forces. Bleed off flow rate at **34 GPM.**
- 5. **Safety Mechanism:** The control panel must incorporate a safety mechanism preventing accidental opening of the slips. This can include options like a two-hand operational release or a dual-function lever.
- 6. **Float Position:** The joystick must include three distinct positions: Set, Neutral, and Unset. Please refer to the work instructions for specific operations.
- 7. **Set Position:** Implement a detent lever that will maintain the adjusted pressure between 500-2000 psi.
- 8. **Lower Extension Pressure:** The lower extension pressure and regen circuit is used to prevent accidental slip opening by limiting upward force. You will need to reduce the extension force with the pressure given.



HYDRAULIC DETAILS

FMS 500 SCHEMATIC



ITEM	QTY	P/N	DESCRIPTION
1	2	1009640	ASSEMBLY, CYLINDER, 3 1/2 BORE X 2 ROD X 20.15 STROKE
2	2	1006348	FITTING, QUICK DISCONNECT, FEMALE, STUCCHI 801301014
3	2	1006349	FITTING, QUICK DISCONNECT, MALE, STUCCHI 801301013

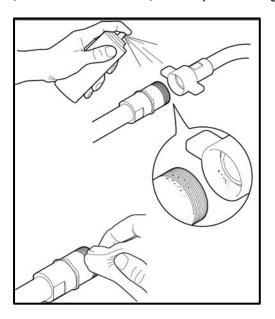


MAIN HYDRAULIC CONNECTIONS

- For cylinder extension, use ¾ SAE female stainless steel connectors.
- For cylinder retraction, use ¾ SAE male stainless-steel connectors.

Before making any hydraulic connections, Inspect all connectors for potential damage, debris, or contaminants. Clean the connectors using compressed air, or an approved cleaning solvent with a 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.



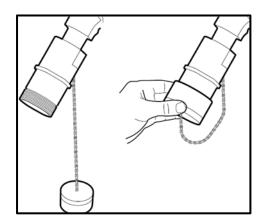


Illustration: Main Hydraulic Connections

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 the Product Description Section. 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 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.

N WARNING

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

Inspect all connections upon activation of the power unit. Leaking components must be repaired before releasing the FMS to the operational environment. Prior to disconnecting the main hydraulic connections, deactivate the power unit and de-pressurize the hydraulic system. Disconnect the main hydraulic connections and inspect all four connectors: two male and two female for signs of damage or debris. If the connectors cannot be cleaned or easily repaired, McCoy Global recommends replacing any leaking connector. Note: Damage to one connector may also affect its corresponding mate.

Under standard operational conditions, always turn off the power unit and de-pressurize the hydraulic system before disconnecting the main hydraulic lines. McCoy Global recommends covering exposed connectors with protective caps to protect them from water and impact damage.

! WARNING

ALWAYS TURN OFF HYDRAULIC POWER AND DE-PRESSURIZE THE HYDRAULIC SYSTEM BEFORE DISCONNECTING THE MAIN HYDRAULIC LINES.



FMS AIR OVER HYDRAULIC CONSOLE 1007792

See the Appendix Section for the data sheet.

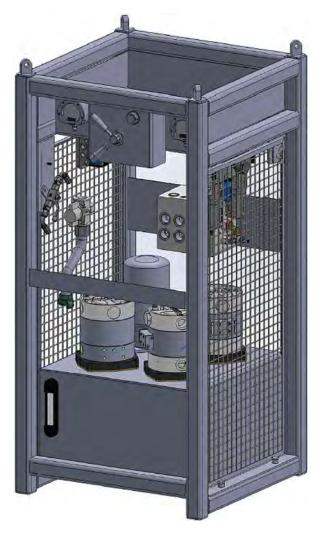


Illustration: FMS Air Over Hydraulic Console, P/N 1007792



CONSOLE, HYDRAULIC, FMS 1007798

See the Appendix Section for the data sheet.

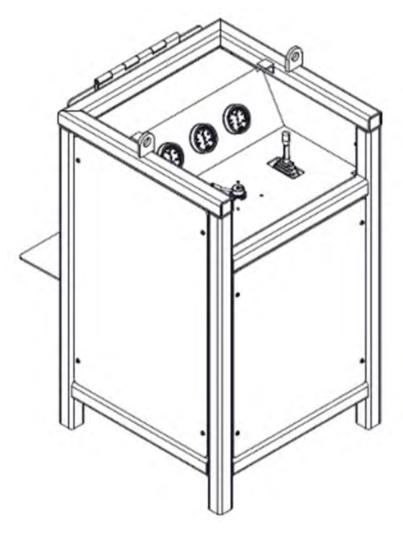
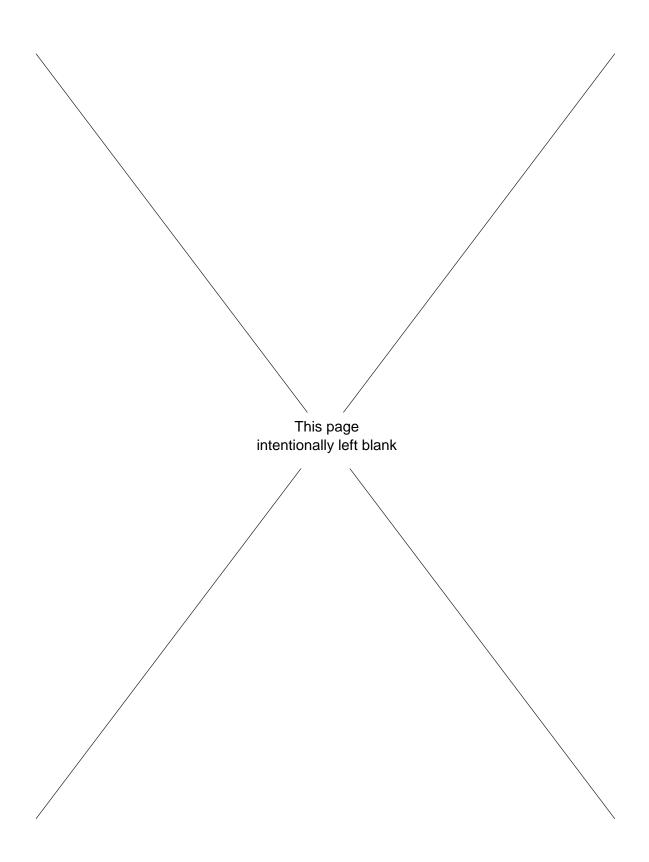


Illustration: FMS Console, Hydraulic, P/N 1007798









SECTION 2: MAINTENANCE, LUBRICATION, INSPECTION GUIDELINES AND CRITERIA



MAINTENANCE

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 include:

- Replacement of damaged hoses, cables, and fittings
- 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, i.e., 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.

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 eyewear 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.

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

CLEANING

After every usage, internal/external parts of the tool and slips need to be power washed with water. McCoy Global recommends that the equipment be periodically partially disassembled so that internal components can be properly cleaned.

CLEAN 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.

McCoy Global recommends tracking all maintenance activities 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.

Tool documentation should be kept by the user and updated as the tool components are changed out on the tools. It is recommended to establish a serial or asset number to tie all documentation to. The serial or asset number will contain all the individual parts and serial numbers. The documentation is the responsibility of the user and should be checked prior to the job in the event documentation needs to be provided prior to rigging up.



MAINTENANCE CHECKLISTS

The following maintenance checklists are intended as a guideline rather than a definitive maintenance schedule. More or less maintenance may be required depending upon the frequency of use and the field conditions under which the equipment operates.

Category I (Per Use Inspection)

McCoy recommends the following inspection as Category I Inspection which is to be performed during the job.

- 1. \square Check latch mechanism for functionality.
- 2. \square Check that the correct sizes of insert carriers, inserts, and top guides are installed.
- 3. \square Check that the insert carriers and top guides are installed correctly.
- 4. ☐ Visually inspect Dies & Inserts for wear and debris.
- 5.
 Apply lithium grease (EP 2 or EP 3) to the back of the slips at least every 30 cycles or 2 hours with whichever comes first. Continue at the interval through the completion of the job.

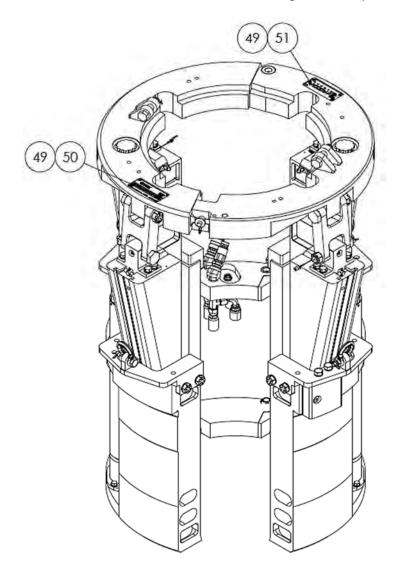


Illustration: Maintenance Checklist Category I



Category II (Post Use Inspection)

McCoy recommends that the following inspection and maintenance procedures be performed before and after each job, and at least once per day when the FMS is in steady use. The following procedures are to be performed in addition to Category I.

- 1. \square Wash and remove any excess dirt and grease.
- 2.

 Extend the cylinders fully. Check the back of slip for wear. Please note that the back of the slip has two grooves in it that are the maximum allowable wear depth. When these slots are no longer present, it is time to replace the slips.
- 3.

 Inspect all QDs and hydraulic fittings.
- 4. ☐ Check dies and carriers for wear. Replace dies if there are broken or dies have flat teeth. Replace carriers if the rear lugs and/or die slots appear damaged.
- 5. \square Check cylinder rods for wear.
- 6. ☐ Check hoses inside of the tool for wear.
- 7. Check for proper locking of all bolts and nuts, slotted nuts & cotter pins, lock wire, and retaining pins.
- 8. ☐ Inspect linkage pins for wear.
- 9. \square Grease all pins and the latch mechanism and steel mating areas(slips).
- 10. ☐ Visually Inspect all guide plates that have been used in the past six months for wear according to the wear limits that proceed to Appendix section. (Pages 90-95).

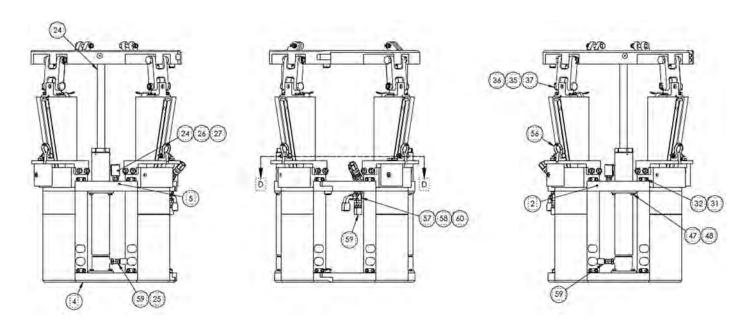


Illustration: Maintenance Checklist Category II



Category III (Biannual Inspection)

McCoy Global recommends that the following inspection and maintenance procedures be performed every six months under normal operating conditions in addition to all Category I & II actions.

A. (6) Month Inspection

- 1. ☐ Visually Inspect External weld of both cylinders.
- 2. \square Visually inspect carrier mid load plates and bottom of carrier die slot for deformation.
- 3. \square Activate cylinders and monitor hydraulic seals and replace any that are damaged.
- 4. □ Visually Inspect linkage pins, linkage, and latch housing for wear according to the wear limits that proceed to Appendix section. (Pages 90-95).
- 5. □ Visually Inspect top plates, bowl corners, slips, carriers, and load plates for wear according to the wear limits that proceed to Appendix section. (Pages 90-95).

B. Yearly Inspection

McCoy Global recommends that the following inspection and maintenance procedures be performed when the tool is disassembled, every year under normal operating conditions in addition to all Category I, II, III actions. NDE load bearing components per the critical area drawings in this manual for the following parts. See the Appendix Section for reference.

- 1. ☐ Inspect External weld of both cylinders.
- 2.

 ☐ Visually inspect carrier mid load plates and bottom of carrier die slot for deformation.
- 3. \square Activate cylinders and monitor hydraulic seals and replace any that are damaged.
- 4. ☐ Inspect linkage pins, linkage, and latch housing for wear according to the wear limits that proceed to Appendix section. (Pages 90-95).
- 5. \square Inspect top plates, bowl corners, slips, carriers, and load plates for wear according to the wear limits that proceed to Appendix section. (Pages 90-95).
- 6. ☐ Inspect all guide plates that have been used in the past six months for wear according to the wear limits that proceed to Appendix section. (Pages 90-95).



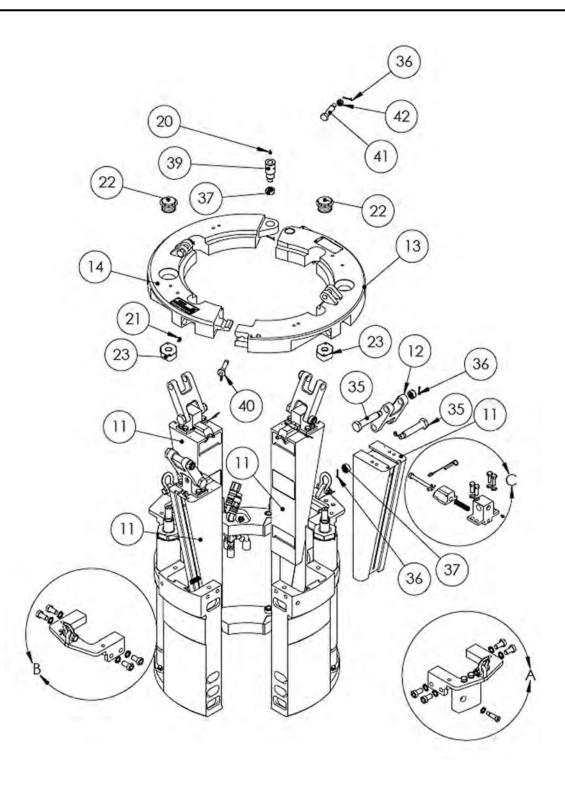


Illustration: Maintenance Checklist Category III, Yearly Inspection



Category IV (Load Testing, frequency - yearly)

McCoy Global recommends that the following inspection and maintenance procedures be performed every two years under normal operating conditions in addition to all Category I, II, & III actions.

- 3.

 NDE load bearing components per the critical area drawings in this manual for the following parts. See the Appendix Section for reference.
- a.

 Bowl Corner.
- b. ☐ Slips.
- c. ☐ All carriers used in the past 2 years.
- d. ☐ All carrier load plates used in the past 2 years.

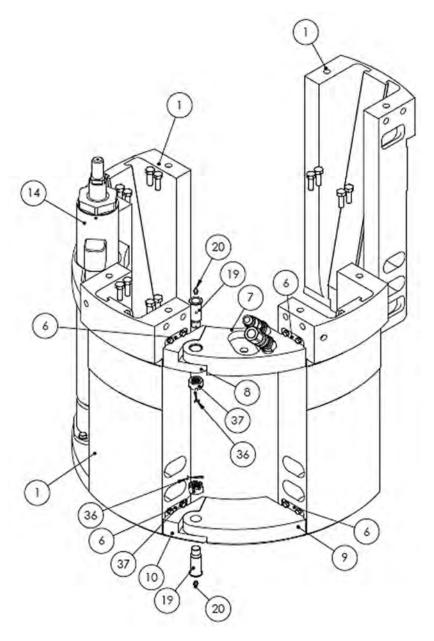


Illustration: Maintenance Checklist Category IV, Load Testing



LUBRICATION INSTRUCTIONS

Use a quality multipurpose bearing lubricant that will remain within its viscosity range at expected operating temperatures.

McCoy recommends the following lubrication procedure below, and at the completion of each job prior to storage.

Refer to the grease specification chart on page 21 for the recommended lubricant type for each component.

Lubrication Points:

- *Apply grease every 125 cycles:
 - Slip Assembly Fittings
- *After every job, apply grease to the hinge & linkage pins at the specified locations:
 - Upper & lower linkage Pins & Slip Assemblies
 - Leveling Beam Weldment Hinge Pin
 - Upper & Lower Connector Plate Hinge Pins

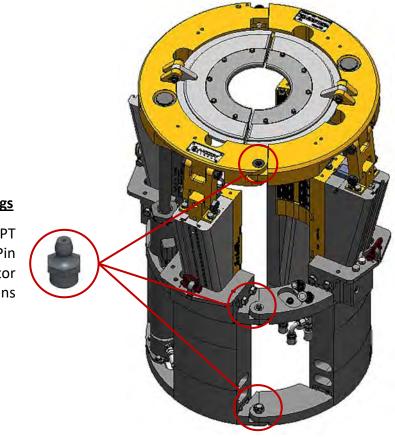
Refer to illustrations below for detailed lubrication points.

*90° 1/8 MNPT-Upper Linkage Pins *Straight, 1/8 NPT-Lower Linkage Pins & Slip Assemblies

Illustration: Lubrication points, grease fittings



LUBRICATION INSTRUCTIONS CONTINUED



Grease Fittings

Straight, 1/8 NPT
*Leveling Beam Weldment Pin
*Upper & Lower Connector
Plate Hinge Pins





LUBRICATION INSTRUCTIONS CONTINUED

Lubrication Instructions prior to assembly

Slips:

- Before assembly, apply lithium grease (EP 2 or EP 3) or an equivalent product to the highlighted areas below for each slip assembly.
- Refer to the lubrication chart on page 21 for the recommended grease types specific to each component.

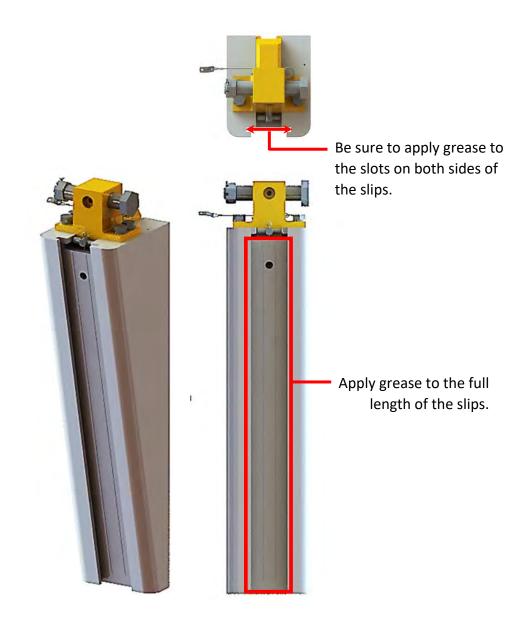


Illustration: Lubricating Slips Prior to Assembly



Lubrication Instructions during operation

Use Lithium Grease (EP 2 or EP 3) or an equivalent product that maintains viscosity within the expected operating temperature range (-20C – 60C).

- a. With the FMS in the open position, apply the grease to the (4) slips in the designated areas highlighted in the illustration below.
- b. Lubricate at least every **30 cycles** or **2 hours,** whichever occurs first. Continue at this interval through the completion of the job.

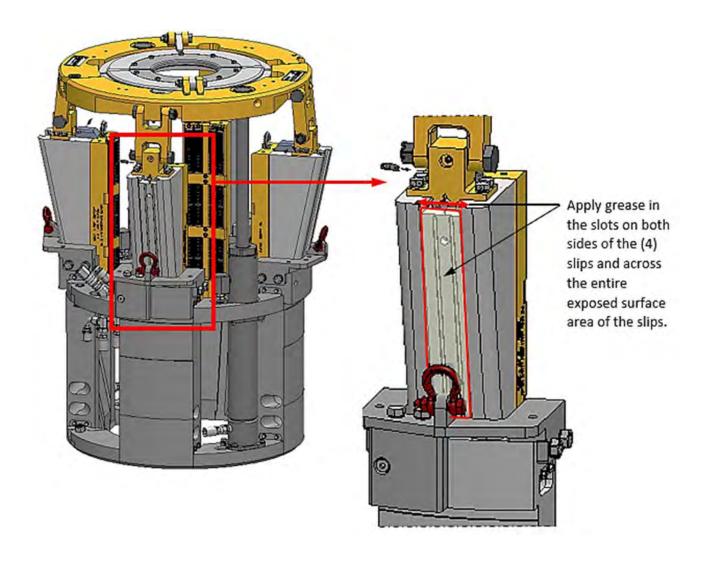


Illustration: Lubricating Slips During Assembly Illustration



PREVENTIVIE MEASURES FOR BOWL CORNERS & SLIPS

Do not blast or apply paint to the Bowl Corners or slips in areas identified below.

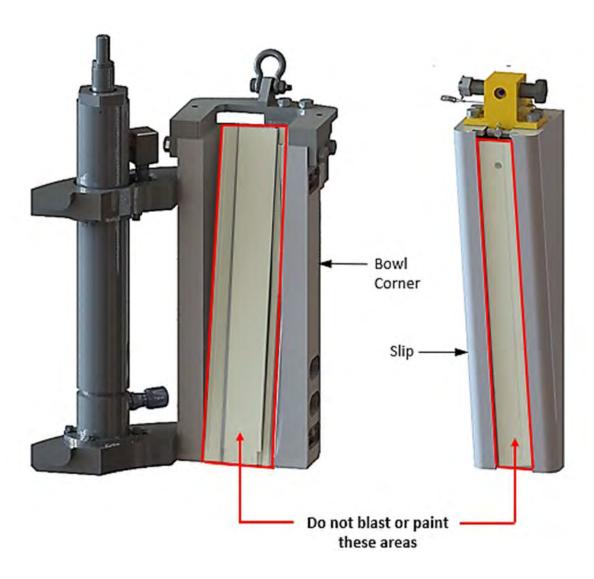


Illustration: Preventative Measures for Bowl Corners & Slips



SLIP TEETH INSPECTION CRITERIA

Maintaining Sharp Die Teeth

To ensure efficient operation and extend equipment longevity, it is essential that the die teeth remain sharp throughout the job. Regularly inspect the die teeth for wear and debris to maintain peak performance and prevent unnecessary wear.

Dies with worn-flat or broken teeth must be replaced. Inspect the die teeth and measure tooth flatness to determine the extent of wear.

Operating with damaged or worn-flat dies increases the risk of failure and may result in operational downtime.

Die Tooth Flatness Inspection

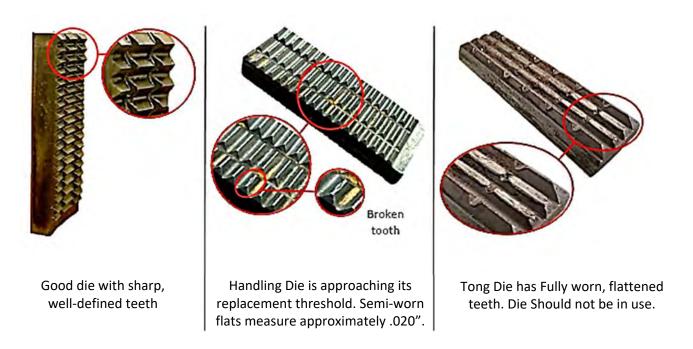


Illustration: Handling & Tong Dies inspection



Follow the steps below to determine if die replacement is necessary:

- 1. Inspect the Die Teeth
 - Visually inspect the condition of the die teeth across the entire surface area.
- 2. Count the Total Number of Teeth
- 3. Identify and Count Damaged Teeth
 - Examine for signs of wear, flattening, or breakage.
 - Use the following replacement criteria:
 - ➤ Handling Dies: Replace if 10% or more of the teeth in the central column are damaged.
 - ➤ Tong Dies: Replace if 10% or more of the teeth in the two central columns are damaged.

^{*}Note: Ensure die teeth remain sharp and intact throughout the entire job to avoid equipment damage and operational delays.

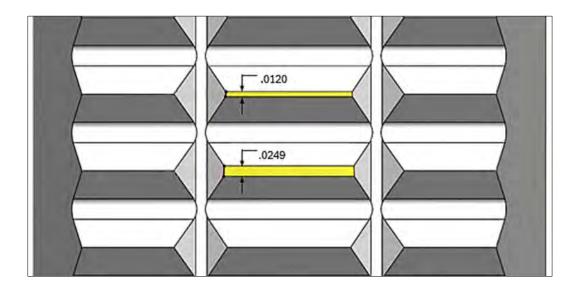
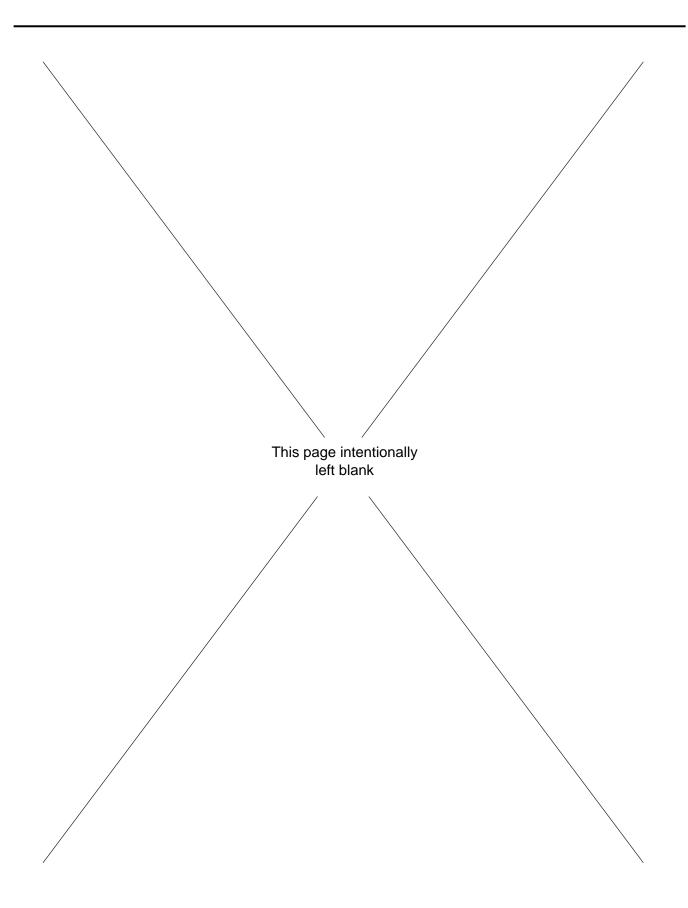


Illustration: Die Teeth Inspection









SECTION 3: SAFE WORK PROCEDURES



OPERATION

Operator Safety

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

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

Areas painted yellow indicate hazardous zones. Operators must avoid contact with these areas during operations. Always wear all required personal protective equipment (PPE) specified in established HSE guidelines.

! CAUTION

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

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

WARNING

DEPRESSURIZE EQUIPMENT BEFORE DISCONNECTING MAIN HYDRAULIC LINES.

PRE- JOB MEASURE UP & PLANNING

FMS Control Panel Position

PRE-JOB EQUIPMENT CHECK

Confirm:

- Connection torque data
- Tubular OD
- String weight

LOADING THE FMS PACKAGE

- 1. Secure the FMS to the cradle using securement pins, this is so that when it is hoisted using either the crane or the forklift it cannot move or fall out.
- 2. If using an overhead crane or other method that requires a sling, ensure that the FMS and Control Panel are hoisted evenly so that it does not slide or tilt during the lift. Using a forklift to hoist it ensures that the forks are level or lilted back.
- 3. Hoist the FMS and Control Panel using the crane or forklift and place it in the appropriate position on the truck.



- 4. Stand clear of the tool being hoisted before and ensure not to place yourself or anyone else under a suspended load.
 - Secure all items.
 - 6. Load all the other accessories needed for the job and secure to the transportation vehicle.

/ CAUTION

ALWAYS ENSURE THE LOAD IS SECURELY STRAPPED DOWN AND CANNOT MOVE. IN THE EVENT OF AN ACCIDENT ANY TOOLS IN THE BACK OF YOUR VEHICLE UNSECURED CAN BECOME A PROJECTILE.

7. Complete the pre-job load out sheet to ensure that each item is loaded and accounted for.

ARRIVAL TO LOCATION

Discuss FMS, Control Panel & operation with onsite representative as needed.

- Casing Stencil, weight, grade, and connection check
- Torque data to be cross checked by rep.
- Confirm table configuration FMS.
- Communicate with rig personnel on operations and specification needs.

Order:

- Control Panel
- FMS
- Hoses

! CAUTION

FOR ITEMS IN CRADLES, REMOVE THEM AND LEAVE THEM ON THE TRUCK OR SET THEM BESIDE THE CATWALK PRIOR TO LIFTING THEM AND SETTING THEM ON THE CATWALK TO BE HOISTED TO THE RIG FLOOR.

1. Keep your hands clear of all pinch points while the equipment operator is getting the equipment into position to make the lift.

CAUTION

GIVE CLEAR AND CONCISE DIRECTIONS AND DO NOT "TRY AND FIX SOMETHING" WITH THE LIFTING EQUIPMENT AS THE LIFT IS IN PROGRESS. STOP THE OPERATOR, FIX THE ERROR, AND CONTINUE THE LIFT.

2. Use a tagline to keep the tool from swinging or spinning and never place yourself under a suspended load.

! CAUTION

ENSURE THE SLING IS SECURE ON THE FORK OF THE VEHICLE BEING USED TO MOVE EACH COMPONENT OF THE SMARTR FROM THE TRUCK TO THE CATWALK. IF A STINGER WITH A SAFETY HOOK IS AVAILABLE USE IT AS IT IS THE SAFEST METHOD.

- 3. Ensure the area on the catwalk you are setting each component is free of other items and ensure the set each component gently.
- 4. Set the tool on the catwalk and connect the slings to the floor tugger to be hoisted in the order outlined.



RIGGING-UP THE FMS

- 1. Complete a Pre-Job Safety Meeting (PJSM) and review the Job Safety Analysis (JSA) documents to ensure that everyone knows the steps that need to be taken to complete the task safely.
- 2. Order of lift operations:
 - Control Panel
 - ➤ Place the Control Panel so that you are out of the view of the driller, out of the line of fire and so that the normal casing operation can commence around you.
 - Hoses
 - ➤ Route the hoses so that they are not a tripping hazard and out of the line of fire, should something be dropped.

/ CAUTION

FOR ALL LIFTS CLEAR THE SWING PATH ON THE RIG FLOOR AND THE CATWALK IN CASE SOMETHING GOES WRONG, AND THE TOOL IS DROPPED OR SWINGS ONTO THE RIG FLOOR ONCE THE TOOL REACHES THE TOP OF THE V-DOOR.

/ CAUTION

ALWAYS LEAVE THE ITEM BEING LIFTED AS CLOSE TO THE FLOOR AS POSSIBLE. THIS WILL ALLOW IT TO DRAG ALONG THE FLOOR INSTEAD OF SWINGING IN.

- 3. Connect hydraulic hoses.
- 4. Lift HPU hoses to the rig floor and connect them to the Control Panel If using a Power Tong, connect hoses and Power Tong now.
- 5. Start the HPU and apply pressure to the system.



Note: If equipped with the optional FMS Indicator Box, perform a full function test of the indicator system to verify proper operation.

- 6. Function test FMS (Power Tong as well)
 - Unset FMS
 - Float FMS
 - Set FMS
 - Confirm all pressures
 - For customers using the FMS Set Indicator Box: Please test the notification system before starting operations.



*The FMS Indicator Box provides a visual representation of the FMS set and unset status based on the SET PRESSURE and FMS POSITION. *It is important to note that it is NOT an INTERLOCK system and will not stop the operator from inadvertently releasing the FMS or other tubular handling components, if the light indicates it is unset. It was developed to aid rig floor personnel in determining when the FMS is set or unset with a red light / green light indication system.

Illustration: FMS Indicator Box

- 7. Ensure the FMS is in the unset position and lower the tubular through.
- 8. Set the FMS when the tubular is at the desired stump height.
- 9. Normal running operations can now be carried out.

SETTING CONNECTION MAKE-UP TORQUE WITH THE FMS

The FMS can be used from Joint #1 to carry out normal torquing capabilities on the tubular OD. Consult the Manual for specific restriction via tubular OD (torque values per size).

MAKING UP CONNECTIONS WITH THE FMS

- 1. Complete a Pre-Job Safety Meeting (PJSM) and review the Job / Hazard Safety Analysis (JSA / HSA) documents to ensure that everyone knows the steps that need to be taken to complete the task safely.
- 2. Latch the elevators (ensure safety latch or pin is activated) on casing joint in the V-Door (whether they are SJE's and slings or bails and conventional elevators). Watch hand and body placement and keep them clear of all pinch points.
- 3. Hoist the joint off of the V door, into the derrick (using a hold back rope if necessary for larger or heavier pipe).
- 4. Remove the thread protector and wait for the driller to link in the bails.



/ CAUTION

WHEN REMOVING THE PROTECTOR, KEEP YOUR HANDS, FEET, AND BODY OUT FROM UNDER THE TUBULAR BECAUSE IT IS NOW A SUSPENDED LOAD.

- 5. Lower the tubular to the rig floor and install the float shoe & thread locking compound.
- 6. Once secure, clear the floor and open the FMS using the Control Panel.

! CAUTION

THE FMS LEVELING BEAMS RAISE WHEN OPENING, SO ENSURE NOT TO OPEN THEM INTO THE FLOAT SHOE ASSEMBLY AS THIS COULD DAMAGE BOTH ITEMS.

- 7. Set the FMS by using the procedures outlined in the Control Panel manual.
- 8. Applying Torque and make-up connection.
- 9. Confirm connection is properly made-up and float the slips.
- 10. Unset the FMS by using the procedures outlined in the Control Panel manual.

!CAUTION

THE HANDLE MUST REMAIN IN SET AT ALL TIMES, OR THE SYSTEM WILL BUILD HEAT.

11. Lower the tubular to the desired stump height and using visual communication with the driller set the slips as he slows to a stop.

/ CAUTION

FOR ANY ELONGATED CIRCULATING TIME, USE THE MANUAL VENT VALVE ON THE TOP OF THE CONTROL PANEL TO VENT THE SYSTEM TO THE POWER TONG. YOU WILL HAVE TO CLOSE THIS TO RESUME NORMAL OPERATION.

- 12. Release the Elevators once the slack off and Repeat steps 2-11.
- 13. Ensure that there are no obstructions preventing the FMS from fully seating into the rotary. There must be no less than 30" of overall clearance below the rig floor.

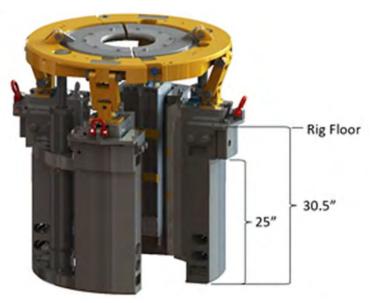
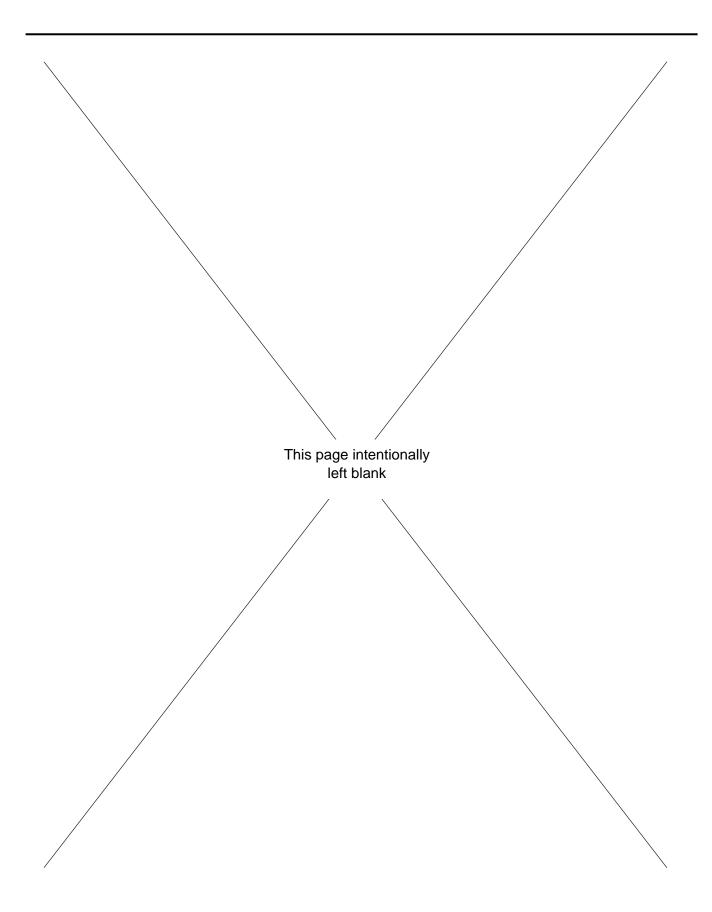


Illustration: FMS Fully Seating into the Rotary



- 14. Ensure the slips are fully open and released before lifting the coupling through the opening.
- 15. If any unintended movement or collision occurs, stop work immediately to inspect the FMS for damage.
- 16. Ensure the FMS is secure before lifting and inspect for damage before continuing use.









SECTION 4: DISASSEMBLY AND ASSEMBLY PROCEDURES



DISASSEMBLY PROCEDURES - CARRIER INSTALLATION & REMOVAL

Wear guide plates, clam shells, and die carrier assemblies for reference.

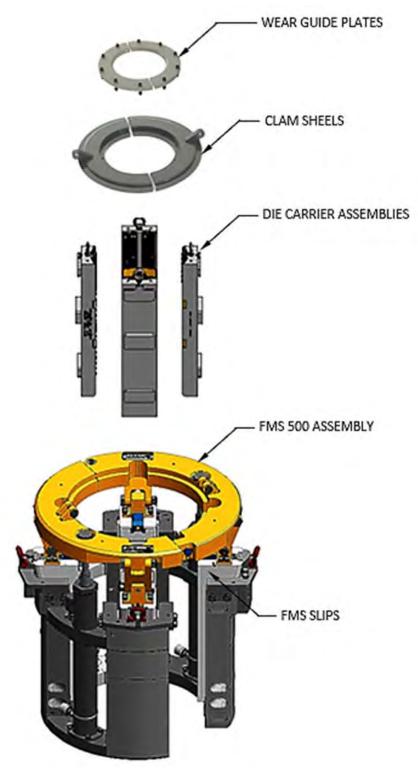


Illustration: Carrier Installation & Removal

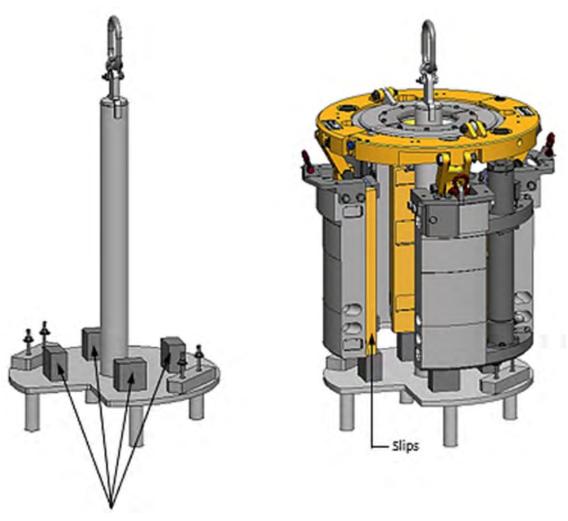


A Base Stand (P/N 1010378) is required to safely support both the disassembly and assembly of the FMS. Using the Base Stand:

- Minimizes safety risks
- Provides a secure, and stable workspace
- Reduces disassembly and assembly time

Note: The die carrier assemblies must be removed prior to using the base stand.

For detailed instructions, refer to the carrier removal procedure on the following page or the quick-change procedure starting on page 92.



The (4) blocks on the base stand are used to support the slips during disassembly & assembly procedures. The support blocks are not fixed to the base stand. Position each block in the correct position to provide stable support throughout the procedure.

Illustration: Base Stand with the FMS assembled.



! CAUTION

WHEN HANDLING DIES AND CARRIERS, BE AWARE THAT THEY MAY PRODUCE METAL SLIVERS. ALWAYS WEAR STURDY WORK GLOVES FOR PROTECTION.

1. Extend the cylinders to fully open the slips. This removes any axial load in the rotary table.

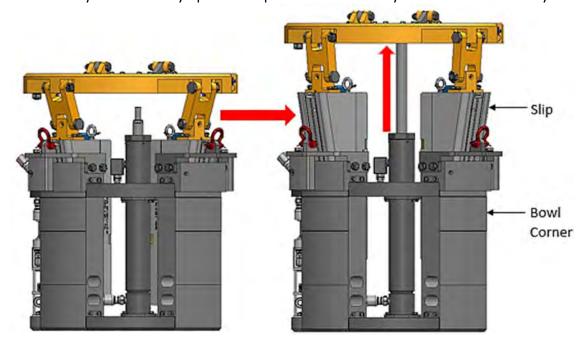


Illustration: Opening & Hinging the FMS, Step 1

2. Remove the top plate latch pin (P/N 700049) and spread open the tool to remove the guide plates and carrier die assembly.

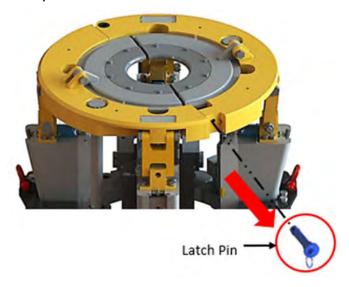


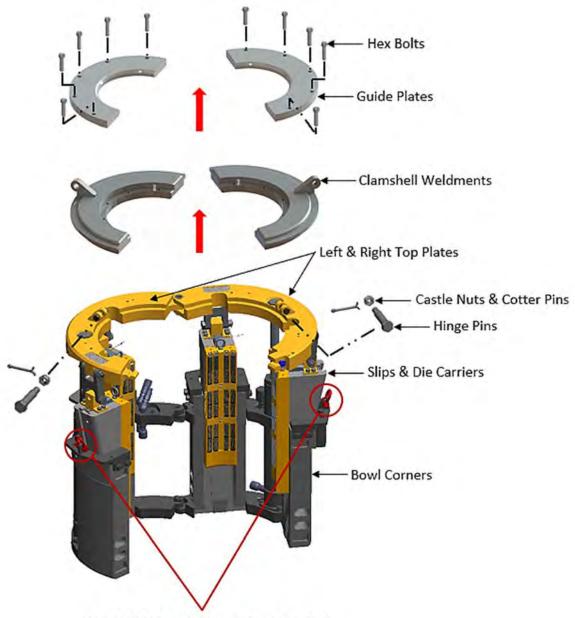
Illustration: Opening & Hinging the FMS, Step 2



- 3. Remove the 1/2-13, 2-1/4" Hex Bolts (P/N 1009593) and Guide Plates from the Clamshell Weldments. Note: Part numbers for the Guide Plates & Clamshell Weldments vary depending on the pipe size being run.
- 4. Remove the (2) Hing Pins (P/N 1009681), Castle Nuts, & Cotter Pins from the Clamshell Weldments to remove the Clamshells from the left & right Top Plates (P/N 1009637 & 1009638).

Note: When changing Carriers, ensure the Slips are open and the FMS is swung open.

Quick -Change Feature- The FMS is designed for quick and efficient carrier replacement. For detailed instructions, refer to page 92.



Use the lifting points to remove the FMS from the rotary table & open the slips.

Illustration: Carrier Removal



- 5. Install the lifting eye bolt, 5/8" -11, into the tapped hole on top of the carrier.
- 6. Secure the lifting eye with a sling & lifting device.
- 7. Remove the quick release pin (P/N 1006229) from the latch (P/N 1009740).

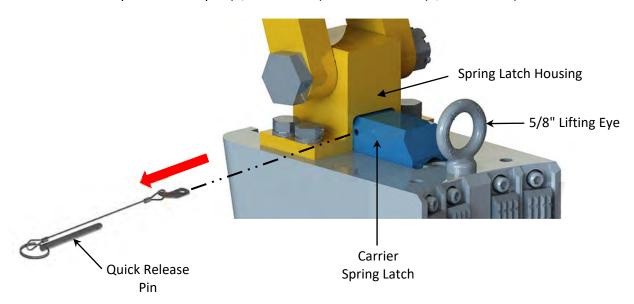
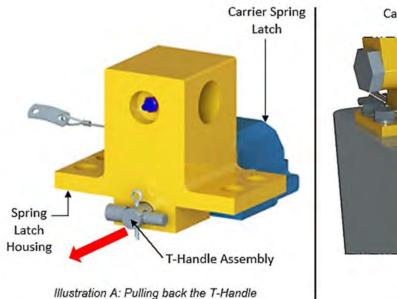


Illustration: Carrier Removal, Removing the Quick Release Pin

- 8. To release the Carrier Assembly:
 - Pull the T-Handle Assembly (P/N 11009619) slightly backward to depress the latch.



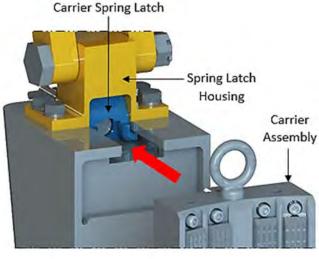


Illustration B: Releasing the Carrier

! CAUTION

USE A TOOL SUCH AS A BAR TO DEPRESS THE LATCH. DO NOT USE HANDS OR FINGERS, AS THIS IS A PINCH POINT.



- 9. Hoist the die carrier upward to lift out of the bowl corner pockets. Then, pull the carrier forward free it from the pockets and lift the die carrier upward to remove it.
- 10. Move the carriers aside to proceed with changing/disassembling the dies.
- 11. Repeat steps 5-9 to remove the remaining carriers.

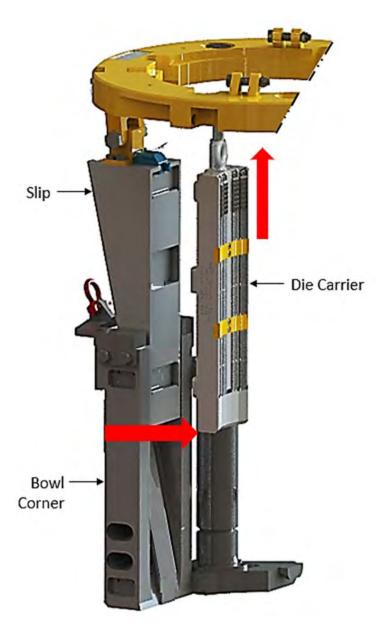


Illustration: Lifting the Carriers from the Bowl Corners



CARRIER AND DIE REMOVAL

- 1. Before disassembly or changing die carries & dies, identify the part numbers for carriers, & the die retainers (SHCS).
- 2. With the die carriers removed from the FMS, remove the die retainer socket head cap screws (P/N1040-A), 3/8 16, 1" long steel, located at the top of each die column.

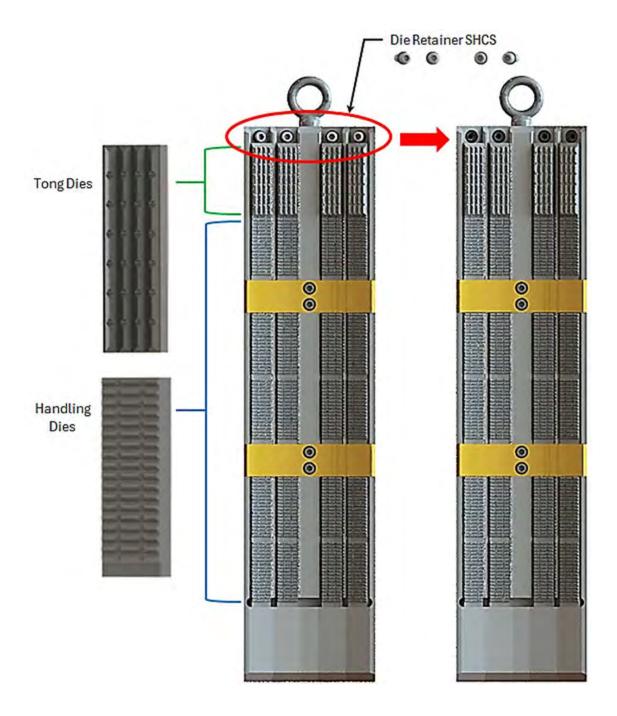


Illustration: Carrier & Die Removal



3. Remove the Socket Head Cap Screws, 3/8 - 16, 1" long steel, to detach the (2) carrier plates. Note: The carrier plate configuration varies depending on the pipe size being run. The quantity of the socket head cap screws will also vary based on the specific carrier plates used.

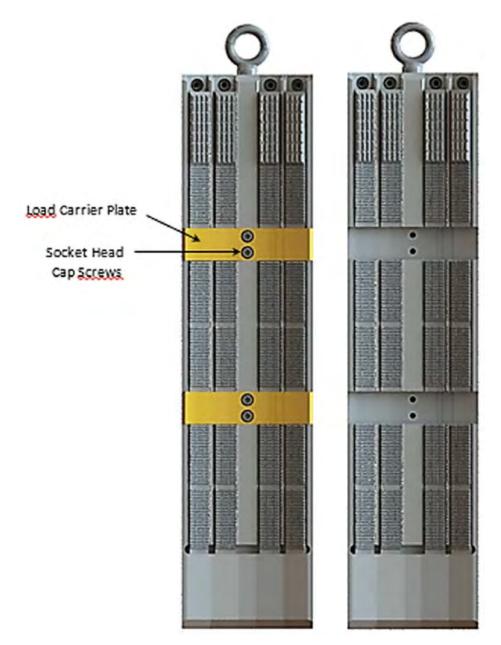


Illustration: Load Carrier Plate Removal

4. Remove dies from the carrier. If necessary, gently tap the worn dies from the bottom using a brass or low impact hammer and a similar bar to remove them.

WARNING

CLEAN UP ANY SHARP, FLATTENED OR DAMAGED EDGES TO REMOVE THE DIES. ENSURE THAT IF ANY DAMAGE OCCURS WHILE REMOVING DIES, IT MUST BE REPAIRED BEFORE REASSEMBLY.



FMS DISASSEMBLY INSTRUCTIONS

Preparation steps prior to continuing disassembly:

- 1. Choose an area that is relatively clean, free of any slip/trip/fall hazards, and have access to an overhead crane capable of lifting the FMS.
- 2. The area will also need pallets or a large worktable for storing the FMS components. Inspect all the rigging, fasteners, and flat bars for signs of compromised integrity.
- 3. The disassembly process and sequence may vary depending on whether the Assembly Base Stand (P/N 1010378) is being used or not.
- 4. Always verify all components secure and supported during disassembly.
- 5. Ensure there is no trapped hydraulic pressure in the system.

FMS disassembly steps:

1. Close the tool and reinsert the latch pin (P/N 700049) before continuing with disassembly.

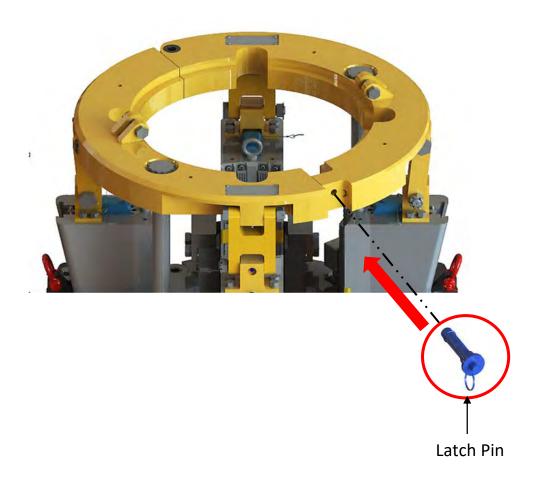


Illustration: FMS Disassembly, Closing the Tool



2. Fully thread the (4) swivel hoist rings into the 5/8" holes in the left & right top plates.

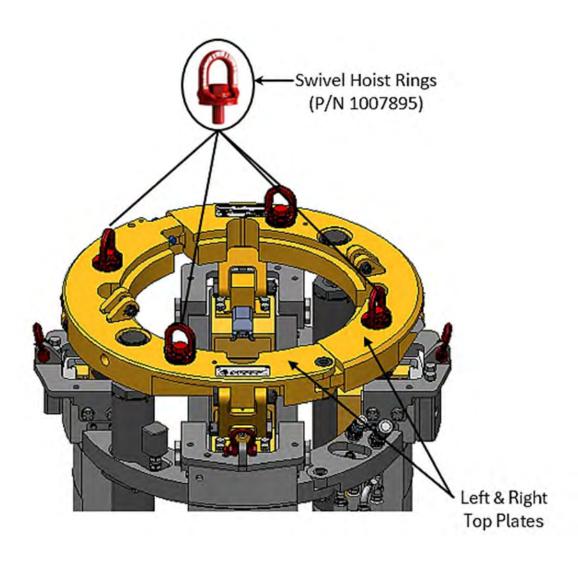


Illustration: Lifting the Top Plate Assembly off of the Tool



3. Remove the (4) upper linkage pins (P/N 1009585), castle nuts (P/N 1009590) & cotter pin (P/N 10043) from the top position of the linkages.

! CAUTION

REMOVING THE LINKAGE PINS & NUTS WILL CAUSE THE SLIPS TO SLIDE TO THE FLOOR. ENSURE THE ALUMINUM BLOCKS WITH THE PROPER DISASSEMBLY STAND IS BEING USED BEFORE REMOVING THE PINS.

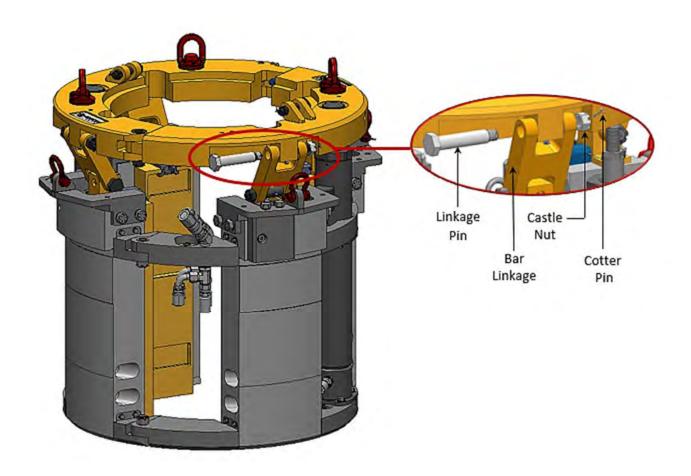
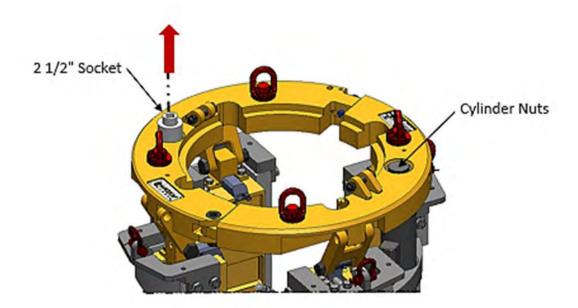


Illustration: Removing the Linage Pins



4. Remove the (2) cylinder nuts (P/N 1009580) from both top plates using the 2-1/2" square drive socket (P/N 1006424), provided with the FMS kit.



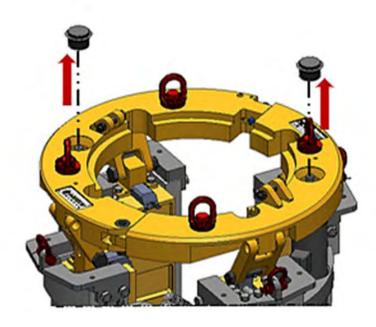
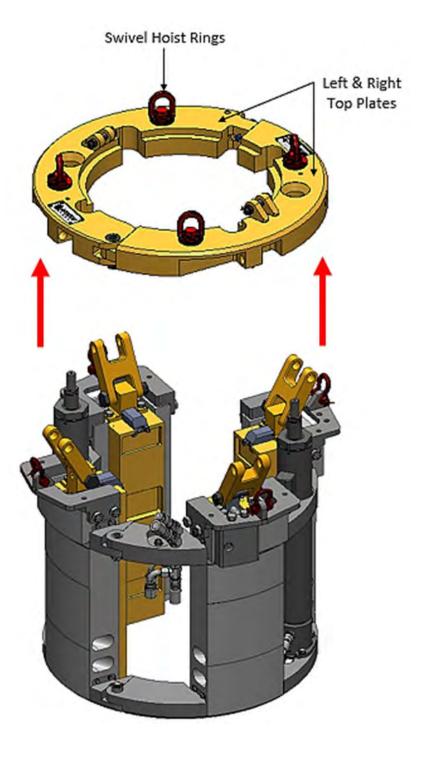


Illustration: Removing the Cylinder Nuts



- 5. Attached attach a lifting strap to the (4) swivel hoist rings on top of the left & right top plates.
- 6. Lift the top plate assembly off the tool and move off to the side to proceed with disassembly.

 Note: Do not attempt to lift the entire FMS assembly using the hoist rings when they are installed onto the top plates.





7. Turn the top plates over to inspect the (2) rod bushings (1009576); replace if damaged or deformed.

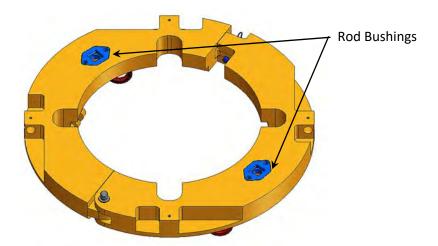


Illustration: Inspecting the Rod Bushings

8. Reinstall the cylinder nuts onto the rod threads, to protect them from potential damage.

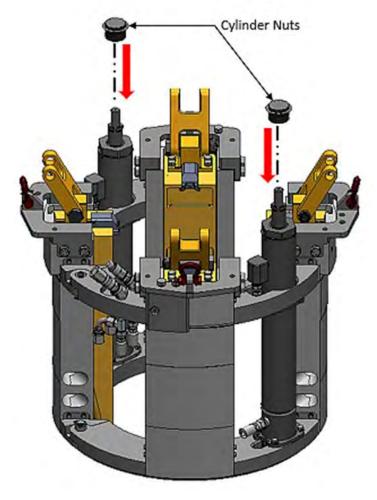


Illustration: Reinstalling the Cylinder Nuts



- 9. Reinstall the Linkage Bar (P/N 1009581) using the upper pin (P/N 1009585), castle Nut (P/N 1009590), & cotter pin (P/N 1009612).
- 10. Secure a lifting strap to the linkage bar.
- 11. Hoist the slip assembly off the bowl corner. Place off to the side to continue disassembly of the slip.

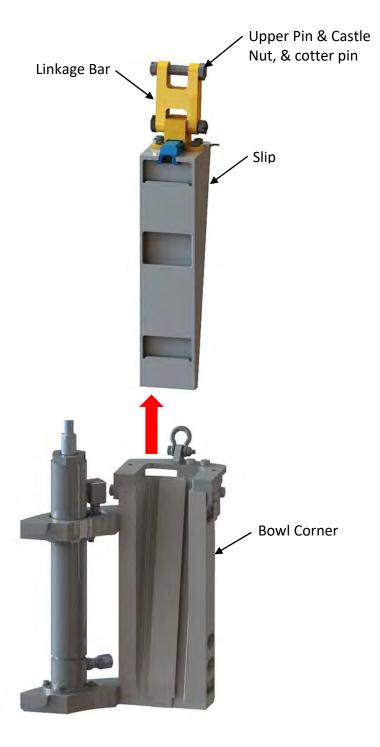


Illustration: Removing the Slip Assemblies



12. Start disassembling the slip by removing the cotter pin (P/N 10043), 5/32 x 1-1/2, followed by unscrewing the castle nut (P/N 1009590), 3/4"-10 grade 5.

Next, remove the linkage pin (P/N 1009585) and linkage Bar (P/N 1009581) from Spring Latch Housing.

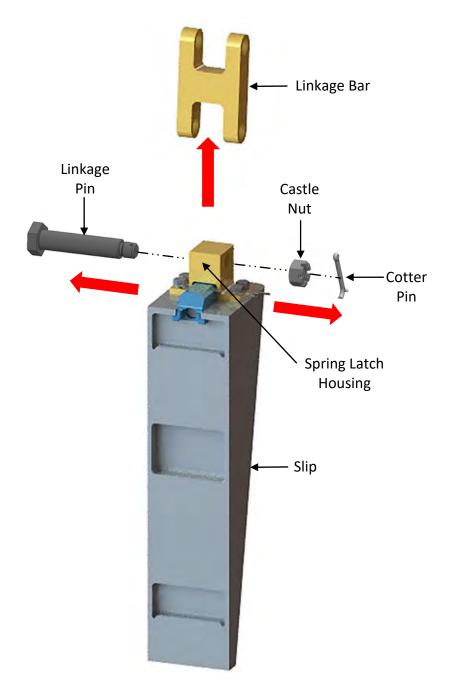


Illustration: Disassembling the Slips



13. Remove the (4) 5/8"-11 hex bolts, GR08, steel, P/N 1158) that secure the spring latch housing (P/N 1009588) to the slip (P/N 1009623).

! CAUTION

BE AWARE THAT THERE IS A SPRING IINSIDE OF THE MECHANISM THAT WILL RELEASE TOWARDS THE BACK OF THE SLIP DURING REMOVAL.

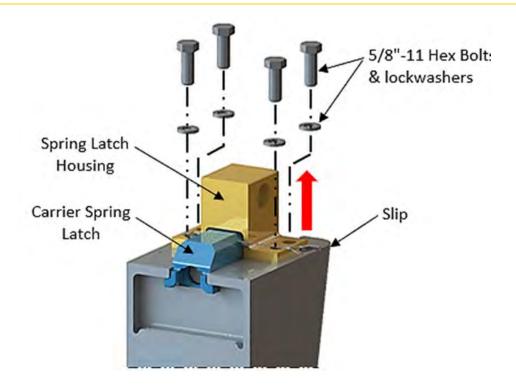


Illustration: Latch Disassembly, Removing the Hex Bolts

14. Remove the spring latch Housing assembly (P/N 1009588) from the slip (P/N 1005994). Repeat steps for each slip.

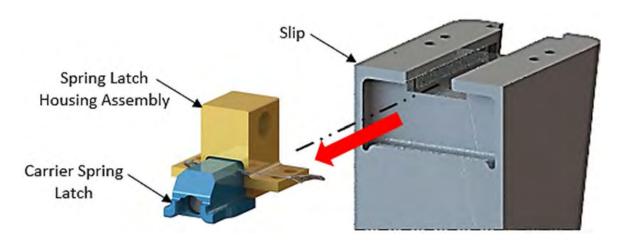


Illustration: Latch Disassembly, Removing the Spring Latch Assembly



15. Remove the Cotter Pin, then disassemble the T-Handle Pin assembly (P/N 1009619) by removing the Crossbar Pin (P/N 1009622), & the Quick Release Pin (P/N 1006229).

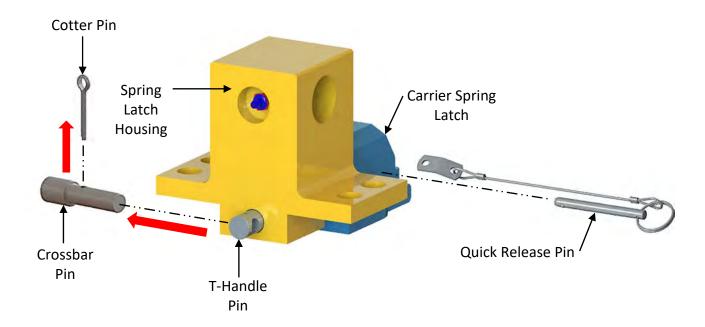


Illustration: Latch Disassembly, Removing the Cotter Pin

16. Remove the T-Handle Pin (P/N 1009621), Compression Spring (P/N 1006068), & Latch (P/N 1009740).

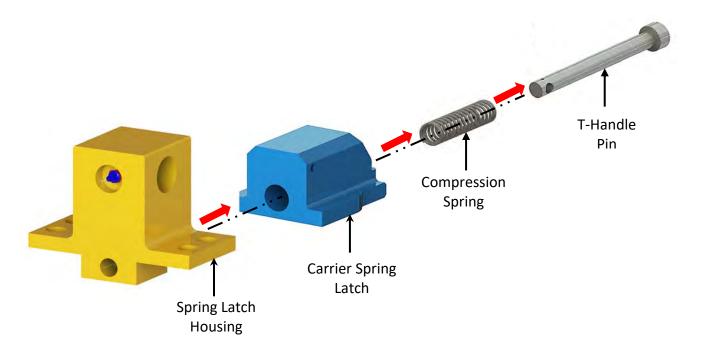


Illustration: Latch Disassembly, Removing the T-Handle



17. Remove hoses from FMS cylinders. Plug and cap hydraulic fittings.

! CAUTION

ENSURE TO BLEED HOSES BEFORE REMOVING THEM TO AVOID TRAPPED PRESSURE.

- 18. Remove the (4) Lift Lug Weldments (P/N 1009634) by removing the Hex Bolts (P/N 1009591, $7/8 9 \times 1 3/4$, GR8) & NORD-LOCK washers.
 - Note (2) of Lift Lug Weldments include the Anti-Rotation component (P/N 1009635).
- 19. Remove the Mini Booster (P/N 1009628) by removing the Hex Bolts (P/N 1112, 1/2" 13, 1 ½") & NORD-LOCK washers.

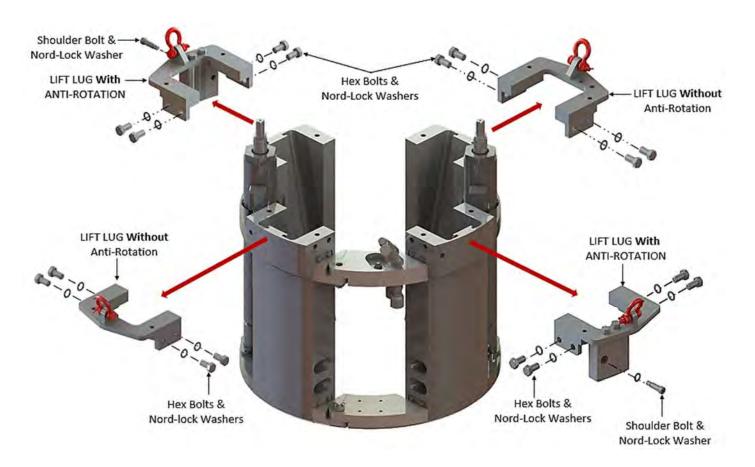


Illustration: Removing Lug Weldments



- 20. Remove the Bottom & Top Spacers (P/N 1009584) by removing the hex bolts (P/N 1049, $3/8 16 \times 1-1/2 \times 10^{-10}$ % NORD-LOCK washers. Use a tool such as needle nose pliers or a magnetic probe remove the spacers.
- 21. Remove the Top & Bottom Hing Pins (P/N 1009662), Castle Nuts (P/N 1009560, 1-8, GR5), & Cotter Pins (P/N 10043), 5/32" X 1 ½".

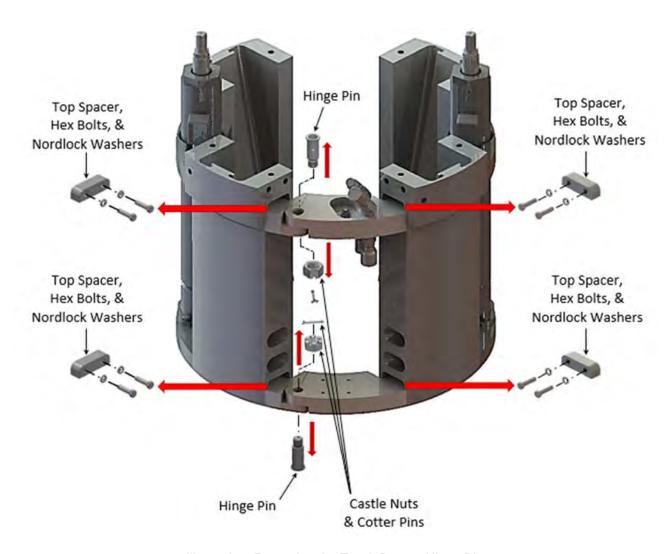


Illustration: Removing the Top & Bottom Hinge Pins

WARNING

AS COMPONENTS ARE REMOVED, THE REMAINING COMPONENTS CAN BECOME UNSTABLE. ENSURE ALL REMAINING COMPONENTS ARE SECURE TO PREVENT THEM FROM FALLING AND TO AVOID INJURIES OR DAMAGE TO EQUIPMENT, BE AWARE OF THE HAZARD.



- 22. Remove the Upper Connecter Plate 1 (P/N 1009616) by lifting & tilting it upward to clear the pocket in the Bowl Corner (P/N 1009682).
- 23. Repeat the process to remove the Upper Connecter Plate 2 (P/N 1009617) & the Lower Connecter Plates (P/Ns 1009630 & 1009631). The tool now consists of two distinct halves.

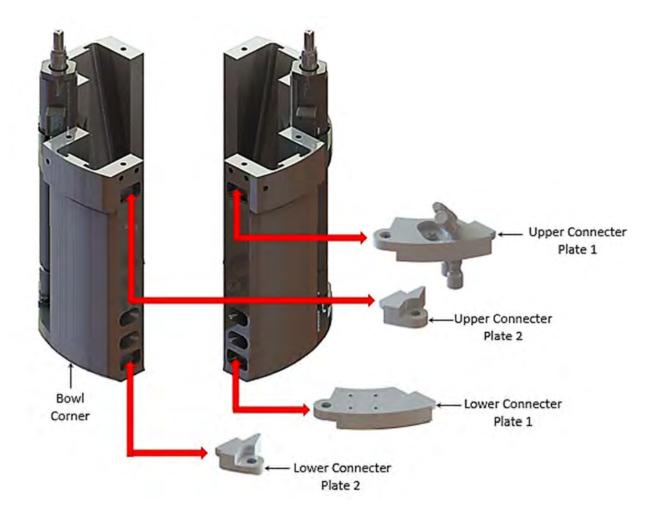


Illustration: Removing the Upper & Lower Connector Plates

/!\ CAUTION

REMOVAL OF CONNECTOR PLATES WITH HANDS MAY LEAD TO HAND INJURY.

! CAUTION

BE AWARE OF HAND PLACEMENT IN RELATION TO RIGGING WHEN HOISTING, AS RIGGING FAILURE MAY LEAD TO POTENTIAL HAND INJURY.



- 24. Remove the Bottom & Top Spacers (P/N 1009584) by removing the hex bolts (P/N 1049, 3/8 16 X 1-1/2 GR08) & NORD-LOCK washers. Use a tool such as needle nose pliers or a magnetic probe remove the spacers.
- 25. Maneuver / adjust the bowl corner to ensure it moves freely from the cylinder assembly. Once the cylinder assembly tab is clear of the spacer pockets, pull the bowl corner away to remove it. Adjusting the strap or using a rubber mallet sometimes is needed.
- 26. Prior to removing the first bowl corner (P/N 1009682), attach a lifting strap to the swivel hoist ring on top of the bowl corner.
- 27. Secure the bowl corner on flat level surface for inspection or storage.
- 28. Before removing the opposing bowl corner, ensure the cylinder is secured by placing a single lifting strap around the cylinder, creating a choker position with the single leg rising in front of the center of the cylinder barrel, Or, by using a C-clamp to secure it.

/!\ CAUTION

THE BOWL CORNER IS LARGE AND CUMBERSOME. KEEP HANDS CLEAR, AS IT MAY ROTATE OR SWING ONCE FREE OF THE CYLINDER ASSEMBLY.

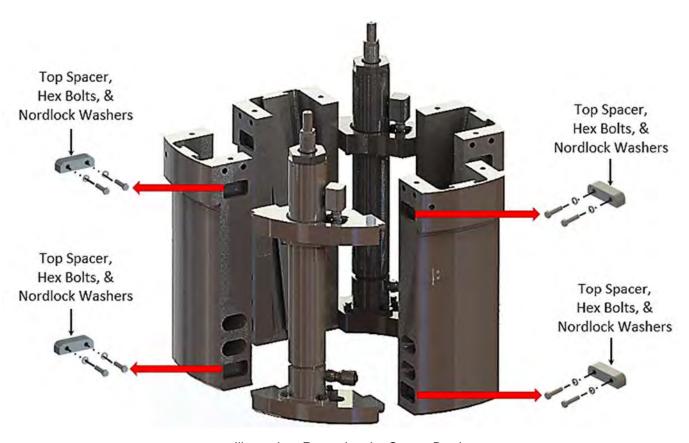


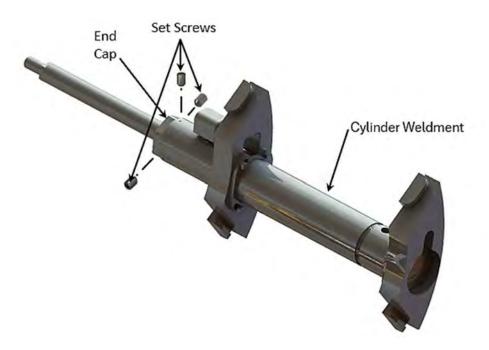
Illustration: Removing the Corner Bowl

- 29. Repeat steps 19-22 for the remaining bowl corners.
- 30. After removing all bowl corners, hoist the cylinder assembly and place it on a secure, flat, level surface for inspection or storage.

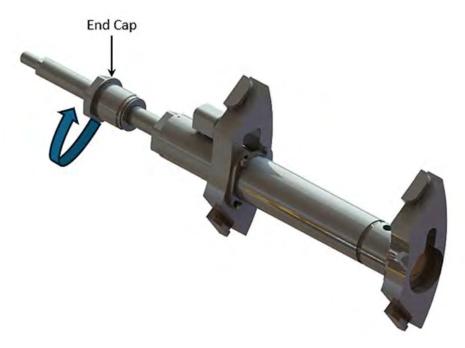


CYLINDER DISASSEMBLY (P/N 1009640)

1. Remove the (3) set screws 5/16"-18, 7/16" that are retaining the end cap (P/N 1009650) in place.



2. Unscrew the end cap from the cylinder barrel weldment



Illustrations: Cylinder Disassembly



- 3. Pull the rod cylinder (P/N 109653) from the cylinder weldment (P/N 1009642).
- 4. Ensure proper installation of the Rota Sensor Magnet (P/N 1006101) & Rota Sensor Snap Ring (P/N 1007569) as shown in the bottom image.

Note: Failure to secure the snap ring may lead to the magnet falling out, potentially causing damage to the cylinder and cylinder weldment.

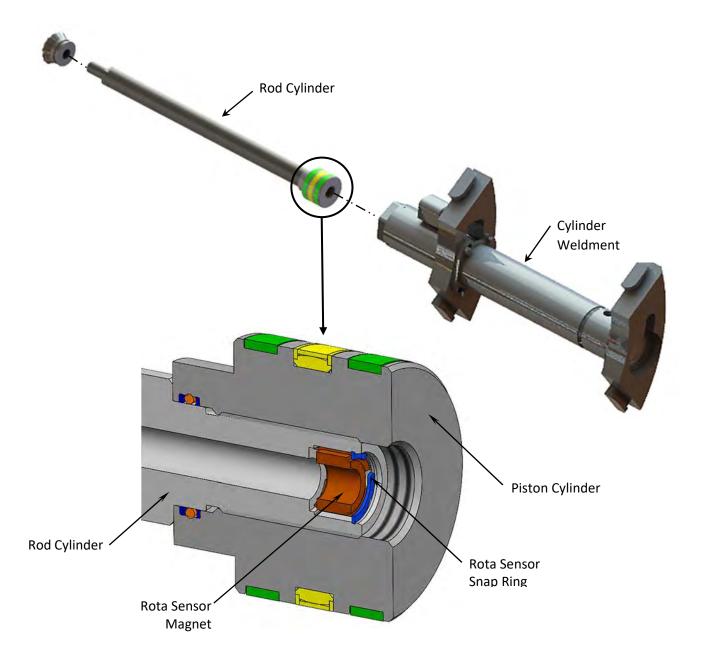


Illustration: Pulling the Rod Cylinder from the Cylinder Welldment



1. Unscrew the piston cylinder (P/N 1009657) to disassemble it from the rod cylinder (P/N 1009653).

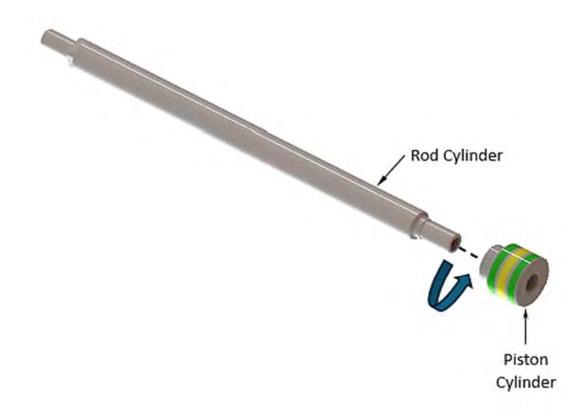
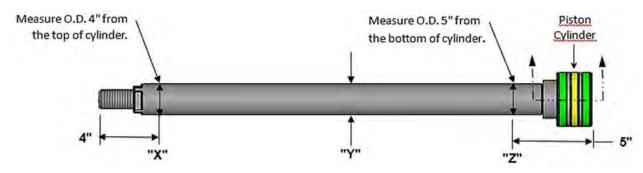


Illustration: Removing the Piston Cylinder



ROD CYLINDER (P/N 1009653) WITH THE PISTON CYLINDER ATTACHED (P/N 1009657)

 Measure the diameter of the Rod Cylinder at the (3) locations identified below: "X," "Y," "Z."



WEAR LIMITS			
FEATURE	FEATURE MANUFACTURED TOLERANCE		
ROD DIAMETER	1.998 / 2.000	1.993	
PISTON DIAMETER	3.483	3.476	

Piston Cylinder (P/N 1009657)

- 1. Install the:
- (2) Piston Guides, P/N 1009888
- Piston Seal, P/N 1009656
- O-ring, P/N
- Backup O-ring, P/N 1009659

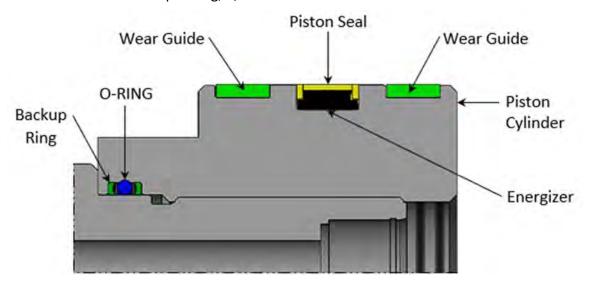


Illustration: Measuring the Rod Cylinder & Installing O-Rings

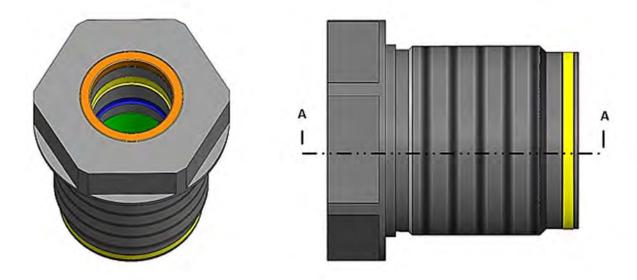
Notes:

- 1. Install the (2) piston guides; they can be placed in either up or down orientation.
- 2. The energizer is placed in position first, prior to installing the piston seal. The energizer is flat and does not have a specific up or down orientation.
- 3. Install the piston seal on top of the energizer with the flat side facing downwards.



END CAP, ROD, P/N 1009650

Installation of the O-rings & seals as shown below.



Notes:

1. Position the wiper seal with the flat side facing downwards in the bottom of the pocket.

2" ID X 2.50"

- 2. The rod seal (Poly-Pak) is installed with the flare facing outward, towards the direction of the oil.
- 3. The rod guide is split, allowing for easy installation inside the end cap and can be oriented either upwards or downwards.
- 4. First, position the energizer, followed by placing the O-ring on top of it. Both the energizer and O-ring can be oriented either upwards or downwards.

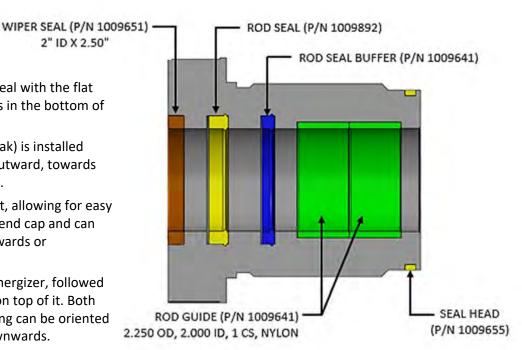


Illustration: End Cap, Installing O-rings & Seals



CYLINDER WELDMENT, P/N 1009642

- 1. Measure inside diameter of the cylinder body (P/N 1009644) in the (3) locations identified below: "X", "Y", "Z".
- 2. Check the (3) thread holes for damage or burrs in the locations depicted below. Repair as needed before reassembly, using a proper deburring tool or emery cloth.

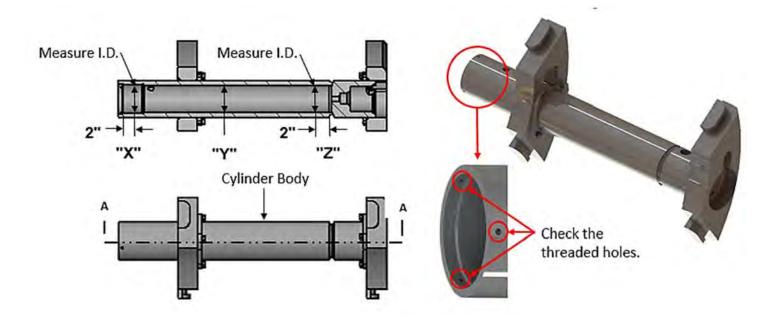


Illustration: Measuring the Cylinder Weldment

	WEAR LIMITS	
FEATURE	MANUFACTURED TOLERANCE	WEAR MAXIMUM
BORE DIAMETER	3.500 / 3.504	3.510



REASSEMBLY PROCEDURES

1. Reinstall the Cylinders, hinge assembly, and FMS components using the disassembly sections as your guide for the process steps.

DIE INSTALLATION

- 1. Set up a safe, secure, and level work area to install the dies.
- 2. Inspect the carrier slots and dies for sharp, flattened, or damaged edges. Repair any damage using Emory cloth or a file.
- 3. Select carrier size and use a metal brush to clean any debris from the die slots. Repeat steps for each carrier.



Illustration: Prepping the Die Carrier to Prior to installing Dies

4. McCoy recommends applying CRC 3-36 Multi-Purpose Lubricant & Corrosion Inhibitor in the die slots before installing the dies.

N WARNING

DO NOT APPY GREASE OR ANTI SEIZE COMPOUNDS TO THE DIE CARRIER SLOTS OR THE DIESWHEN INSTALLING.

APPLYING GREASE CAUSES REDUCED FRICTION, LEADING TO THE INCREASED LOADING ON THE SLOT AND REDUCES CARRIER LIFESPAN.



- 5. Verify the carrier assembly number and part number for the handling dies.
- 6. Prior to installation, verify the carrier assembly number and part number for the handling dies.
- 7. Install (4) handling dies into the (4) bottom rows of the (4) carrier slots, with part numbers starting with "JJ" and ending with "-G".
 - *Optional Bi-Directional Dies starting in "FMS" & ending in" G."

Please refer to the FMS die chart in the appendix section.

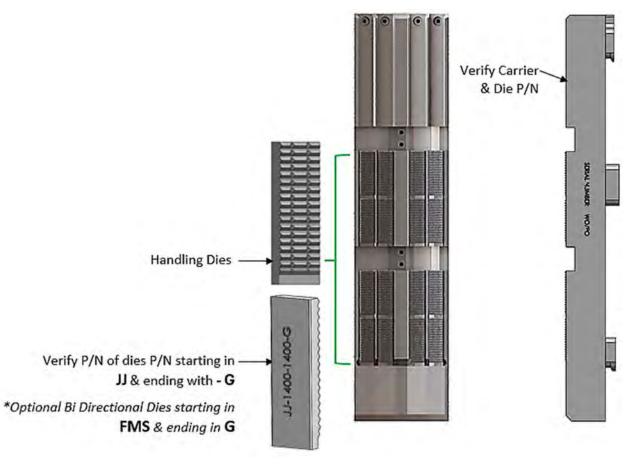


Illustration: Installing the Handling Dies

! WARNING

NON-STANDARD POWER TONG DIES ARE USED IN THE FMS. STANDARD DIES DO NOT APPLY THE PROPER BITE POFILE / DEPTH THEREFORE CANNOT BE USED IN THE FMS.

! CAUTION

ONLY BI-DIRECTIONAL SLIP DIES ARE TO BE USED ON THE (4) BOTTOM ROWS OF THE FMS DIE CARRIERS.



- Reinsert the Carrier Load Plate and secure it in place using (2) socket head cap screws (P/N 1041), 3/8" – 16, 1" long, steel & 3/8" NORD-LOCK washers.
 Note:
 - The part number for the Carrier Load Plate varies depending on the pipe size being
 - Ensure the 3/8" NORD-LOCK washers (P/N MDC1002100) are installed in the correct orientation.
- 9. Repeat step 7 & 8 for the middle row of handling dies.
- 10. Apply copper coat high-temperature anti-Seize compound and torque the bolts to 33 ft-lbs.

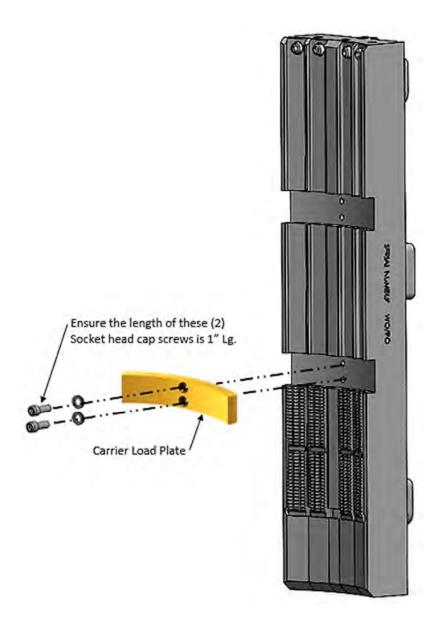


Illustration: Installing the Carrier Load Plate



- 11. Prior to installation, verify the part number for the tong dies.
- 12. Install (1) tong die into the top row of each carrier slot, with part numbers ending with "-0".

Please refer to FMS Die Chart in the appendix section.

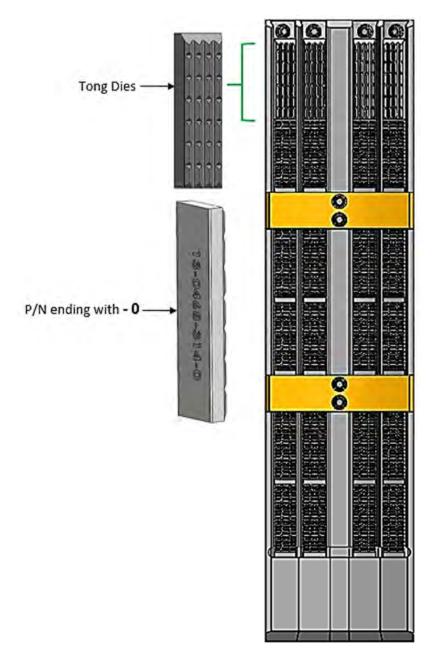


Illustration: Installing the Tong Dies



TONG DIE PART NUMBER DECODER

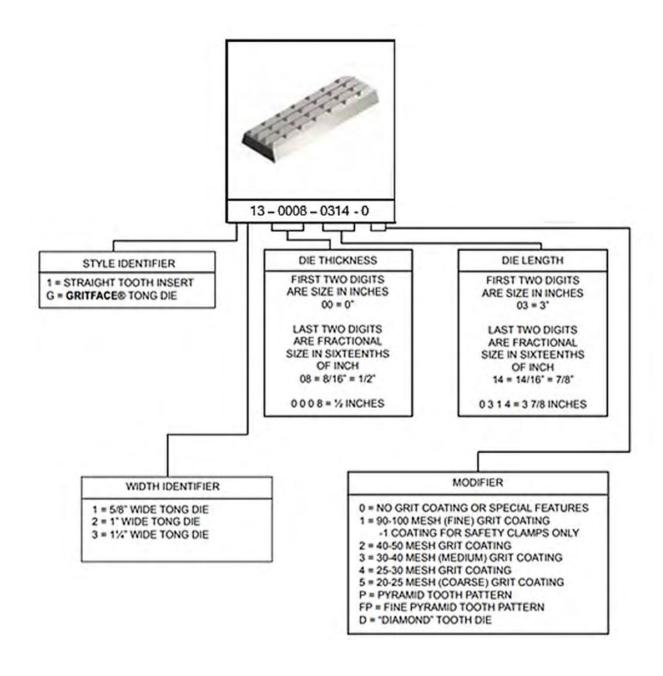


Illustration: Tong Die Part Number Decoder



CARRIER REMOVAL AND INSTALLATION PROCEDURE

! WARNING

WHEN INSTALLING AND REMOVING CARRIERS, USE A POSITIVE STOP TO PREVENT THE CYLINDER FROM RETRACTING DUE TO HYDRAULIC POWER LOSS. THE STOP CAN BE INSTALLED UNDERNEATH THE SLIPS OR BETWEEN THE TOP PLATES AND CYLINDERS.

Note: This step is intended to be completed when the tool is out of the Rotary Table.

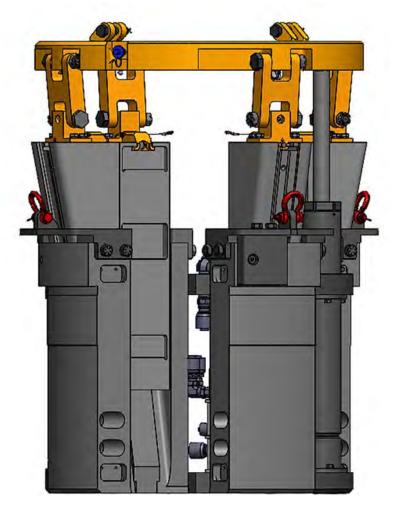


Illustration: Carrier Installation Procedures



The FMS is designed for quick and efficient carrier assembly replacement.

Note: Before changing Carriers, ensure the Slips are in the **open** position.

To remove the carrier assemblies:

- 1. Rotate the Clamshells & Guide Plates backwards to gain access inside the FMS.
- 2. Attach a lifting hook and the appropriate lifting device to each hoisting ring located on top of the carrier assemblies.

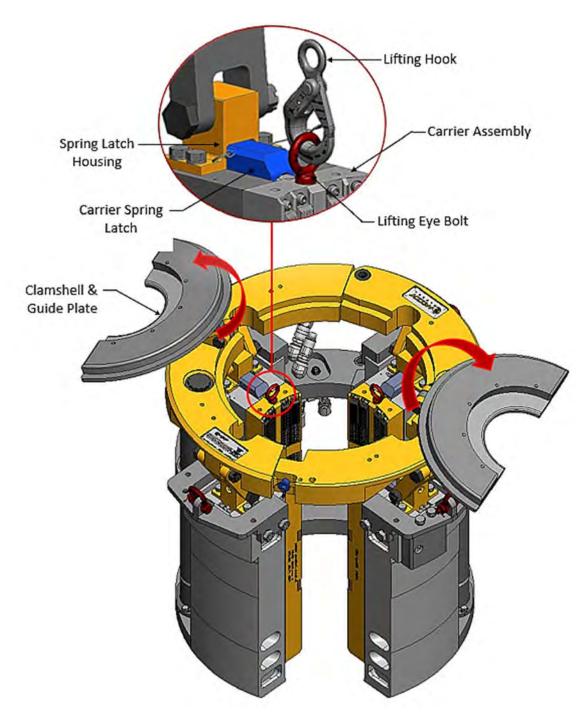


Illustration: Quick Change Procedures for the Carrier Assembly



- 2. Remove the quick release pin (P/N 1006229) from the Carrier Spring Latch (P/N 1009740).
- 3. Depress the Carrier Spring Latch to release the carrier assembly.

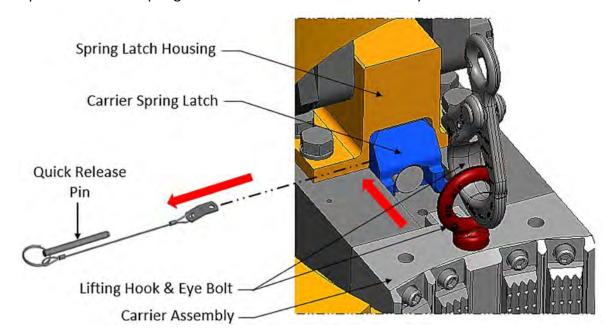


Illustration: Removing the Carriers, Depressing the Carrier Spring Latch

- 4. Hoist the carrier upward to lift out of the bowl corner pockets. Then, pull the carrier forward free it from the pockets, and lift the die carrier upward to remove it.
- 5. Move the carrier aside to proceed with changing out the carrier assembly.
- 6. Repeat steps 2-5 to remove the remaining carriers.

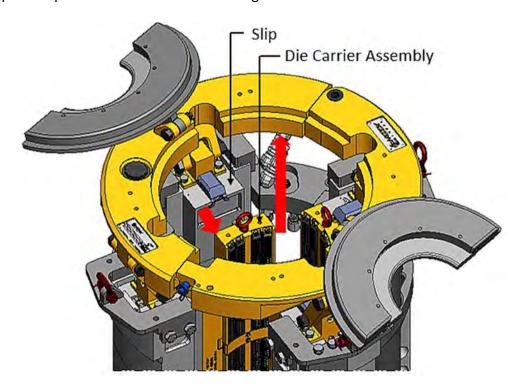


Illustration: Lifting the Carriers out of the Tool



To install the carrier assemblies:

- 1. Select a carrier assembly, with the dies already inserted, and install a lifting eye into the top of the carrier.
- 2. Attach a lifting hook with a lifting device to each lifting eye on the top of the carrier assembly and position the carrier to attach to the bowl corner.
- 3. Lubricate the back of the die carriers and the front slots and face of the slips with a thin coat of Lithium Grease (EP 2 or EP 3) or equivalent product that maintains its viscosity within the expected operating temperature range (-20C 60C).
- 4. Insert the carrier into the bowl corner, making sure the bottom pocket engages with the carrier's bottom ledge first. Once aligned, push the carrier towards the slip assembly to complete installation.

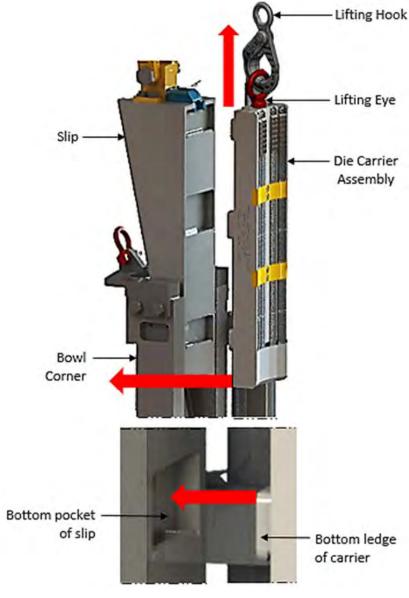


Illustration: Reinstalling the Carriers



5. Push the carrier spring latch (P/N 1009740) back to install the carrier. The latch will spring forward locking the carrier in place.

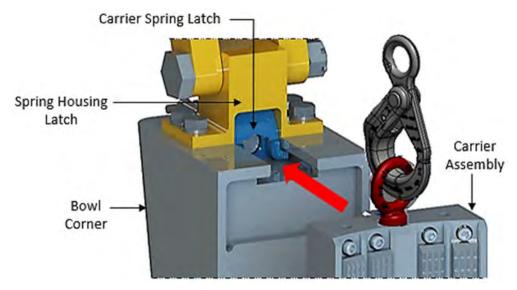


Illustration: Locking the Carriers in Place

/!\ CAUTION

USE A TOOL SUCH AS A BAR TO DEPRESS THE LATCH. DO NOT USE HANDS OR FINGERS, AS THIS IS A PINCH POINT.

- 6. Once the carrier spring latch secures the carrier (latch springs back into place), install the quick release pin (P/N 1006229) to lock the carrier. Next, remove the lifting hook & eye bolt.
- 7. Repeat the steps to install the remaining carrier assemblies to the Bowl Corners.

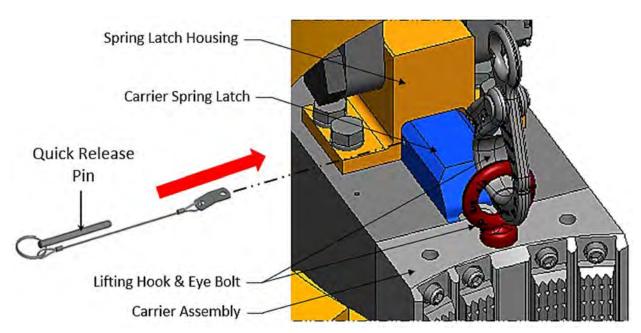


Illustration: Installing the Quick Release Pin



- 8. Prior to installation of the Guide Plates & Clamshell Weldments, verify the proper ID & size of the carrier is Installed.
- 9. Install the Guide Plates (using the (10) hex bolts, 1/2-13, 2-1/4") & Clamshell Weldments (P/N determined by the sizing chart) that match the Carrier and dies that are being used. Refer to the die chart in the Appendix section for proper part number selection.

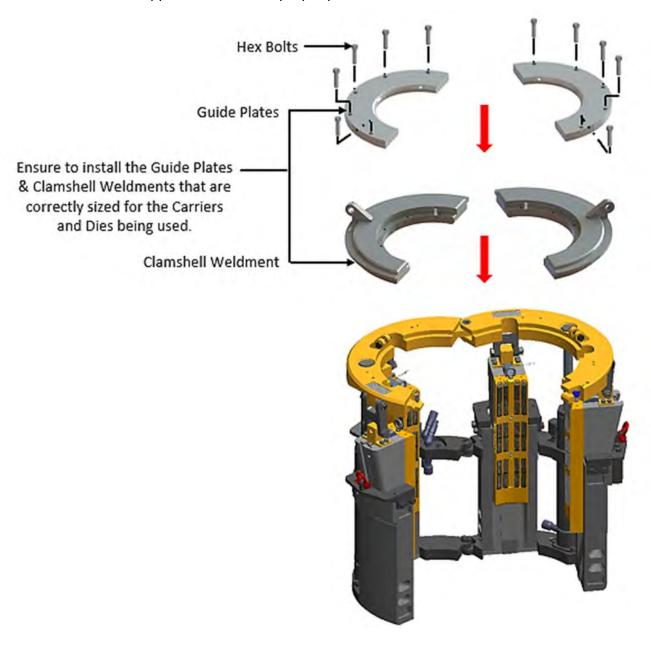


Illustration: Installing the Guide Plates & Clamshells

CAUTION

INCORRECT TOP GUIDE PLATES CAN CAUSE DAMAGE ON THE TOOL, PLEASE REFER TO THE CHART IN APPENDIX SECTION FOR THE CORRECT TOP GUIDE PLATE INFORMATION DEPENDING ON CASING SIZES.



10. Ensure all pinch points are avoided and swing close the FMS using a bar or an overhead lifting device. Install the latch pin (P/N 700049).

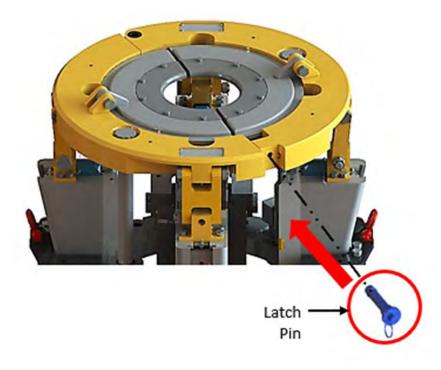


Illustration: Installing the Latch Pin

11. Function test the slips to ensure proper fit.

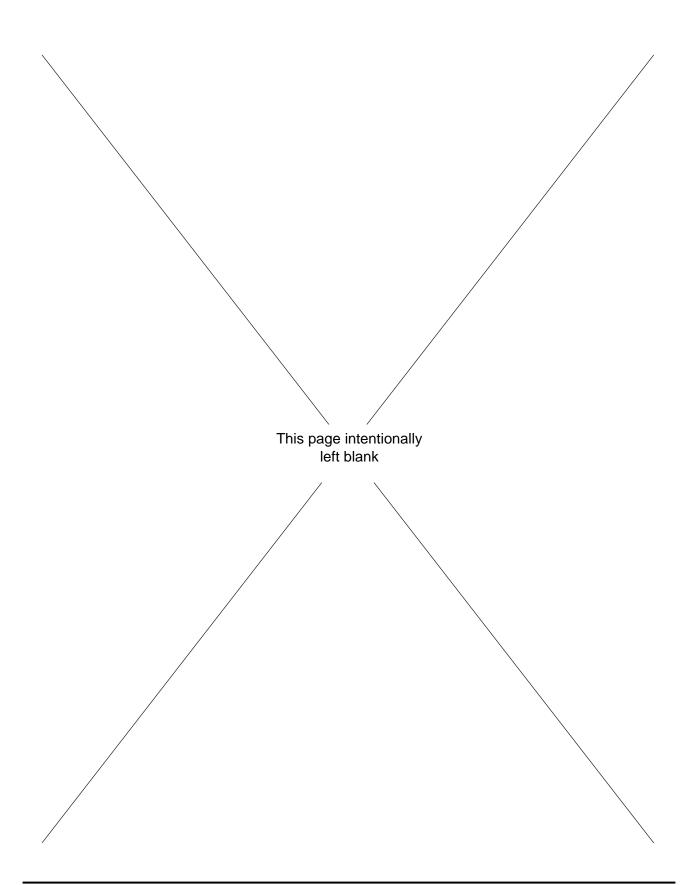
! CAUTION

DO NOT APPLY AXIAL LOAD TO THE FMS, UNLESS IT IS INSTALLED IN THE TEST STAND.

! WARNING

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









SECTION 5: TROUBLESHOOTING



TROUBLESHOOTING

Adequate maintenance and proper fluid selection are 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 evaluation and recommendations.

- 1. In the event of power loss, the slips will need to be removed from the pipe manually. Install lifting eyes into the 5/8-11 holes on the top plates near the cylinder nut, then attach the lifting straps and use a crane to release the pipe.
- 2. In the event of pipe slippage, please verify that the correct dies and/or carriers are installed for the pipe being clamped.

1.0 - FMS Not Holding Torque/Pipe slipping through the inserts

	Possible Problem	Solution	
1	Dies Slipping on Pipe Due to tong dies not properly installed	Ensure tong dies are installed in the top row of each carrier column and both correct carriers and dies are the correct size for the application	
2	Dies slipping on Tubular	Ensure tong dies are not worn to the point that they cannot grip. Ensure that the correct tong dies are installed to ensure proper die penetration Debris or other material build-up can cause issues with proper die engagement. Ice in cold climates can affect this as well. Ensure the tubulars are free of debris where the FMS is contacting, and that	
	Dower unit is not producing	proper penetration is occurring.	
3	Power unit is not producing adequate pressure for beginning of string (2,000 psi minimum)	Troubleshoot power unit (see user's manual for power unit)	
4	Poor hydraulic pressure at the FMS cylinder despite adequate pressure at the power unit.	Restrictions exist in line between power unit and FMS. Inspect the integrity of self-sealing couplings to ensure they are allowing full fluid flow. Check to ensure no other restrictions exist	
-	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	
5		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	Adequate Pressure/Flow not being provided through console	Troubleshoot console (see user's manual for console)	



2.0- Slips are traveling too slow

	Possible Problem	Solution
1	Cylinder nuts too loose	Confirm cylinder nuts are properly torqued
2	Slips and other surfaces of FMS are not properly lubricated	Please lubricate the tool. Refer to SECTION 2: MAINTENANCE, LUBRICATION, INSPECTION GUIDELINES AND CRITERIA
3	FMS cylinders leaking or damaged	Confirm that the pressure supplied is to the maximum working pressure of the cylinder. Replace any damaged seals.

3.0 - Latch mechanism not functioning properly

	Possible Problem	Solution
1	Spring is not installed, is incorrect or is damaged	Ensure proper spring is installed and functional
2	Proper Lifting eyes not installed	Use specified lifting eye to retract the latch.
3	Mechanical interference (sticking) between the housing and the latch as it is retracted	Filing or adding a slight radius to the back of the latch (if not already done) removes the interference and prevents the latch from interfering.

4.1 - FMS cylinders are not functioning together

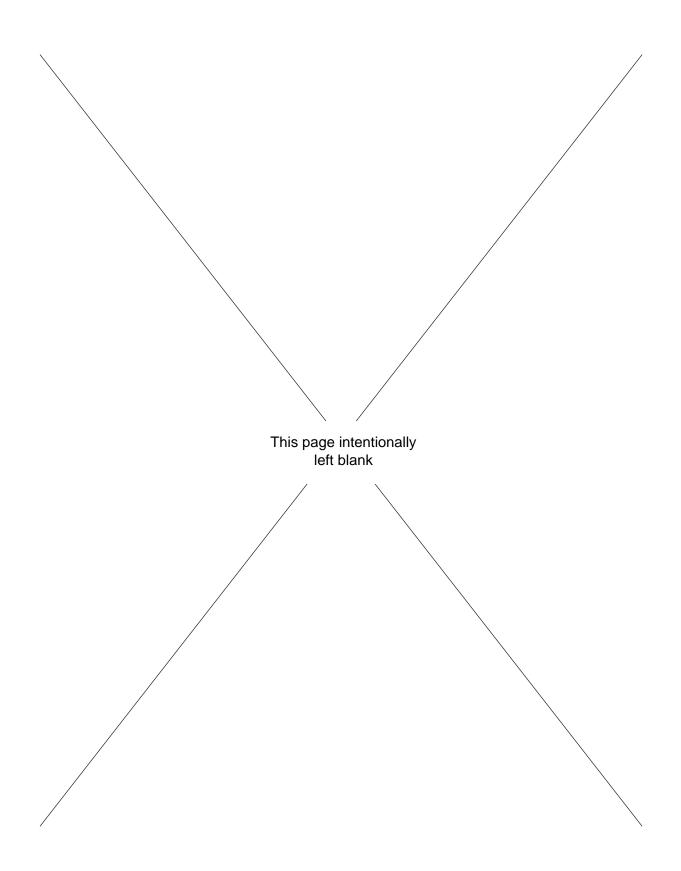
Possible Problem		Solution
1	Console not supplying adequate flow	Troubleshoot Console
2	Hydraulic Pressure supply too low	Troubleshoot Console and then troubleshoot power unit
3	Piston rod seals are leaking	Disassemble the cylinder and inspect the rod seals for damage (cut, melted, rolled etc.).

4.2 - Cylinders leaking

_			
		Possible Problem	Solution
	1	Cylinder leaking during operation	Disassemble the cylinder and check for the proper durometer rubber (90) or damaged seals (cut, melted, rolled etc.).
	2	Cylinder leaking during operation	Disassemble the cylinder and confirm proper seals or the proper seal assembly order has been carried out on the Rod End Cap. (Ring & Spacer installed).



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SECTION 6: SALES, MARKETING & SPECIFICATION SHEET





smartFMS 500 Ton Casing & Drill Pipe

Patent US14/226541 Patent CA2943038 Patent MYPI2016703458

Applications

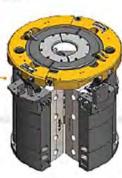
McCoy's FMS 500 Ton is the first in the world that is capable of handling both casing and drill pipe, replaceable die carners and provides back-up torque of up to 100,000 ft.lbs. from the first pipe joint, hence removing the need for manual backup tongs.

- » Can be used with both casing and drill pipe
- » Reacts backup torque
- » Holds weight of casing or drill pipe string
- » Removes crew from the possible pinch points
- » Fits inside of rotary with a relatively low profile

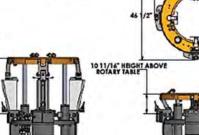
Performance Specifications

- » Maximum Tension Rating 500 tons
- » Fitsinside 37 1/2' rotary table
- » Total cylinder cycle time is 6 seconds
- » Tool Grip Range Casing sizes 4" 20"

FLUSH MOUNT SPIDER SPECIFI	CATIONS	
MAXIMUMTBNSION RATING	500 TONS	454 TONNES
MAXIMUM WORKING PRESSURE	3000 PSI	207 BAR
RECOMMENDED FLOWRATE	30 GPM	114 LPM
MASS(TOOL ONLY)	4033 LBS	1929 KG
MASS PANGE (CAPRIERS AND GUIDE PLATES INCLUDED	4295 - 5960 LBS	1944 - 2703 KG
TIMETO EXTEND AND RETRACT	6SECONDS	
COMPATIBLE POTARY TABLE	37 1/2" / EMSCO 3750	
CASING SIZE RANGE	4.000°	20.000*







WORKING PRESSURE ON A SINGLE JOINT PIPE SIZE TORQUE (FT-LB) 9.625 - 20.000 100,000 5.500 - 9.625 60,000 4.500 - 5.000 45,000 40,000

HOPAL MANY

TORQUE VALUES ARE DETERMINED BY SUP UPON THE PIPEAND NOT THE UMITATIONS

MAXIMUM TORQUE AT 3000 PSI

4.000

in mccoyglobal.com |

FULLY EXTENDED

sales@mccoyglobal.com

FULLY RETRACTED

Contact a McCoy sales representative today for a full presentation



41 1/16



smartFMS 500 Ton

Casing & Drill Pipe

Leading-Edge Solutions for Optimal Performance

Interchangeable Parts

Insert Carriers

- » Multiple sizes of insert carriers to cover the full range of gripping
- » Carrier utilize a combination of tong dies and handling tool dies that need to be changed out to grip different sizes without needing to open the FMS
- » Carriers are easily interchangeable, utilizing a spring latch to hold the carriers secure
- » Due to geometry, the tension rating for carriers decreases for the smaller pipe sizes

Wear Guides

- » Need to be changed for individual sizes of casing or drill pipe in order to help ensure a good bite
- » Sized to allow common centralizer sizes through without need to remove them

TENSION RATING FOR CARRIERS	
PIPE SIZE	MAX TENSION IN TONS (TONNES)
5.500-20.000	500
4.000 - 5.000	350

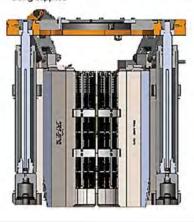






FMS Sensor Package

- » Includes two linear sensors inside of cylinders
- » Includes two pressure transducers included inside of control console (sold separately)
- » Both sensors work with McCoys Edge Server
- Linear Sensors determine if the casing or drill pipe is appropriately gripped before releasing the slips
- Pressure transducer determines if adequate pressure is being supplied



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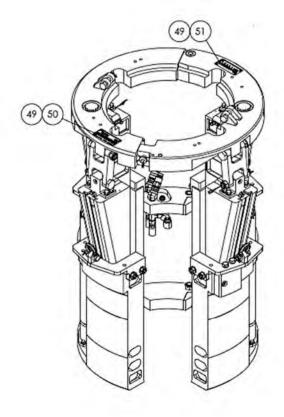
SECTION 7: APPENDIX



FMS-500-350-C ASSEMBLY BOM General Arrangement

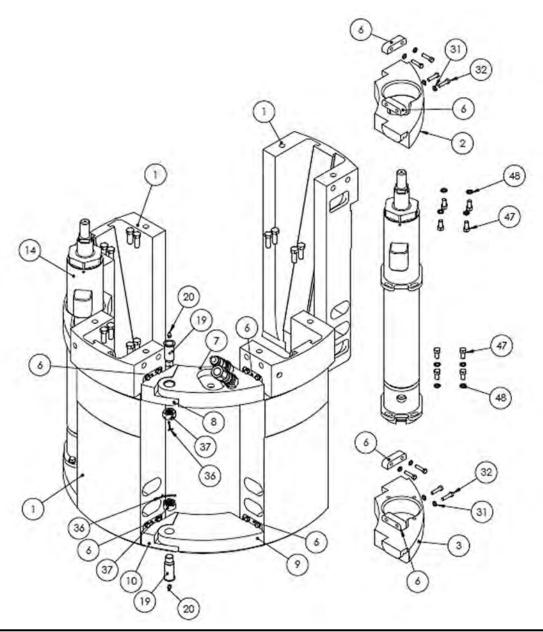
NO.	PART NUMBER	DESCRIPTION	QTY
1	1009682	CORNER, BOWL, FMS-500	4
2	1009615	UPPER CONNECTOR PLATE A	1
3	1009629	LOWER CONNECTOR PLATE	1
4	1009632	LOWER CONNECTOR PLATE B.	1
5	1009618	UPPER CONNECTOR PLATE B	1
6	1009584	SPACER, BOTTOM CONNECTOR	12
7	1009616	UPPER CONNECTOR PLATE WITH HINGE	1
8	1009617	UPPER CONNECTOR PLATE WITH HINGE 2	1
9	1009630	LOWER CONNECTOR PLATE WITH HINGE	1
10	1009631	LOWER CONNECTOR PLATE WITH HINGE 2	1
11	1009623	SLIP, FMS-S00	4
12	1009581	BAR, LINKAGE	4
13	1009637	WELDMENT, LEVELING BEAM 1, FMS-500	1
14	1009638	WELDMENT, LEVELING BEAM 2, FMS-500	1
15	1009588	SPRING HOUSING, LATCH	4
16	1009740	LATCH	4
17	1006068	SPRING, COMPRESSION, CENTURY SPRING S-1136	4
18	1009619	ASSEMBLY, T-HANDLE	4
19	1009662	PIN, HINGE, CONNECTOR PLATE	2
20	1001	FITTING, GREASE, STRAIGHT, 1/8 NPT	7
21	1002	FITTING, GREASE, 1/8 MNPT, 90 DEGREE	4
22	1009580	NUT, CYLINDER	2
23	1009576	BUSHING, ROD MOUNT, FMS	2
24	1009640	ASSEMBLY, CYLINDER, 3 1/2 BORE X 2 ROD X 20.15 STROKE	2
25	12-16FTX	FITTING, STRAIGHT, 1" MNPT X 3/4" MJIC	2
26	1009608	FITTING, HOSE, 3/4 FJIC, 1/2 CRIMP	2
27	1003791	FITTING, 3/4 MORB, 3/4 MJIC, STRAIGHT	2
28	1009572	CONNECTOR, 5 POLE	1
29	1009634	WELDMENT, UFT LUG	2
30	1009885	ASSEMBLY, LIFT LUG WITH NATIONAL ANTI-ROTATION	2
31	MDC1002100	NORDLOCK WASHER, 3/8"	24
32	1049	SCREW, HEX, 3/8 - 16, 1 1/2, GR08	24
33	1005998	BOLT, HEX, 5/8-11, 1 3/4, GR8, DRILLED HEAD	16
34	1151	LOCKWASHER, 5/8, STEEL, GR8	16
35	1009585	PIN, HEX, UFT UNK	8
36	100/383	PIN, COTTER 5/32 X 1 1/2	13
37	1009590	CASTLE NUT, 1-8, GRS	11
38	1006229	PIN, QUICK RELEASE, 1/4 X 2.2. STAINLESS STEEL	4
39	1009583	PIN, HINGE, TOP PLATE	1
40	700049	PIN, POSITIVE LOCKING, PL2X25008—X0	1
41	1009681	CLAMSHELL GUIDE HINGE PIN	2
42	1006226	NUT, CASTLE, 3/4-10, GRADE 5	2
43	1008228	WASHER, NORD-LOCK, .79, .1.21, .12, STEEL, ZINC	2
44	1009600	BOLT, SHOULDER, SOCKET HEAD, 3/4 SHOULDER, 13/4", 5/8-11	2
45	1009596	WASHER, NORD-LOCK, 7/8", 1.360" OD	16
46	1009591		16
47		BOLT, HEX, 7/8-9, 1 3/4, GR8	_
_	1110	SCREW, HEX, 1/2-13, 1, STEEL, GR8	16
48	1002546 1007697	WASHER, NORD-LOCK, .1/2, STEEL, ZINC	16
50	TAG-CLINCHER	SCREW, FLAT HEAD, PHILLIPS, #10-24, 3/8, STEEL PLATE. SERIAL NUMBER	1

NO.	PART NUMBER	DESCRIPTION	QTY.
51	1006200	PLATE, TEXT, MCCOY	1
52	1006348	FITTING, QUICK DISCONNECT, FEMALE, STUCCHI 801301014	1
53	1006349	FITTING, QUICK DISCONNECT, MALE, STUCCHI 801301013	1
54	1604	FITING, 1 MNPT, 1 FNPT, 45	2
55	1 X 3_4 FF-S	ADAPTER, 1 MNPT X 3/4 MNPT STRAIGHT	2
56	CROSBY_G- 2130_0.63_1019490	SHACKLE, 0.63IN 3.25T CROSBY 1019490	4
57	12_RTX-S	FITTING, 3/4 MNPT, 3/4 MJIC, 3/4 MJIC, RUN TEE	2
58	13943_12_12_3	FITTING, 3/4 FJIC X 3/4 CRIMP X 90	2
59	1AA12FJ12	FITTING, CRIMP, 3/4 FJIC	4
60	1 X 3/4 PTR-S	BUSHING, REDUCER, 1 MNPT X 3/4 FNPT, STEEL	2



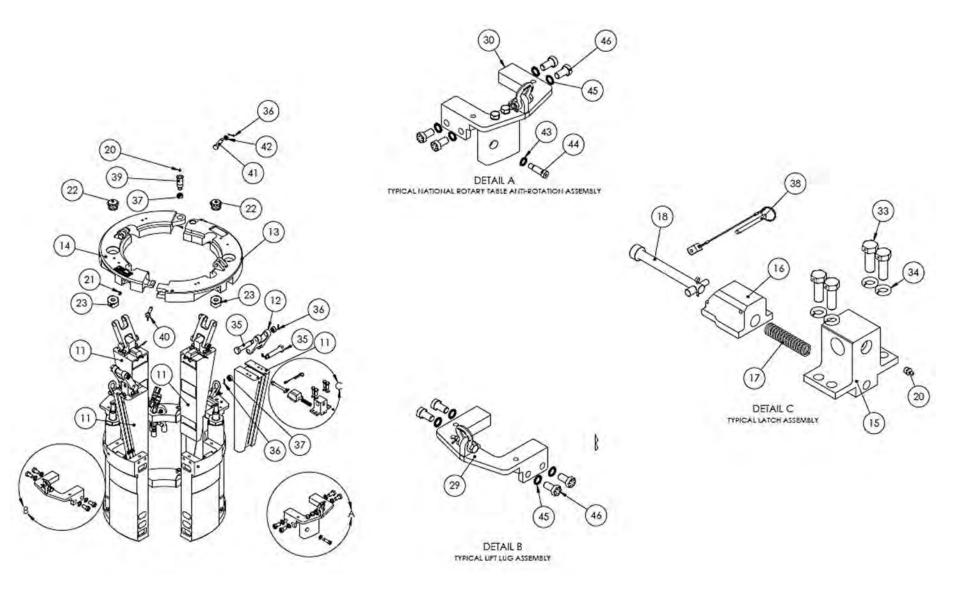


FMS-500-350-C ASSEMBLY BOM General Arrangement Continued



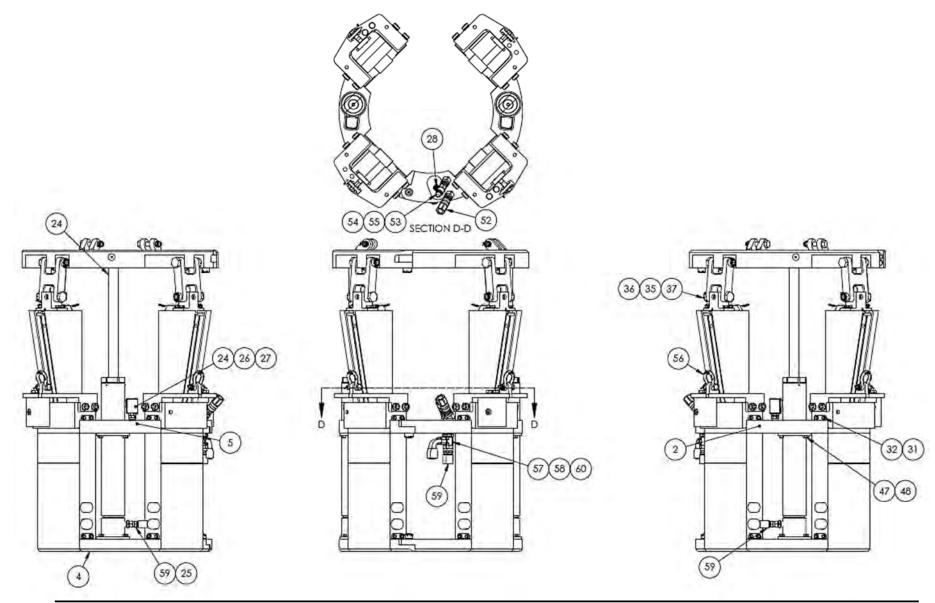


FMS-500-350-C ASSEMBLY BOM General Arrangement Continued





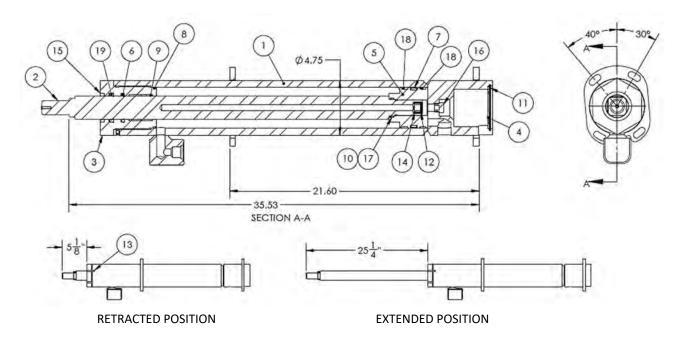
FMS-500-350-C ASSEMBLY BOM General Arrangement Continued





GENERAL CYLINDER INFORMATION

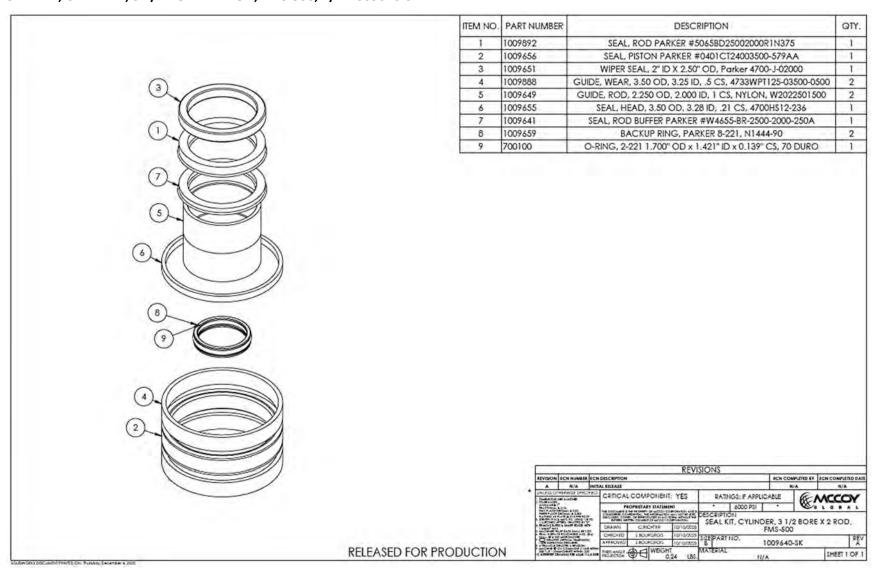
ASSEMBLY, CYLINDER, 3 1/2 BORE X 2 ROD X 20.15 STROKE, P/N 1009640



ITEM NO.	PART NUMBER	DESCRIPTION	
1	1009642	WELDMENT, CYLINDER, A, 3.5 BORE X 2 ROD X 20.15 STROKE	1
2	1009653	ROD, CYLINDER	1
3	1009650	END CAP, ROD	1
4	1006090	PLATE, COVER, CYLINDER	1
5	1009657	PISTON, CYLINDER	1
6	1009641	SEAL, ROD BUFFER PARKER #W4655-BR-2500-2000-250A	1
7	1009656	SEAL, PISTON PARKER #0401CT24003500-579AA	1
8	1009655	SEAL, HEAD, 3.50 OD, 3.28 ID, .21 CS, 4700HS12-236	1
9	1009649	GUIDE, ROD, 2.250 OD, 2.000 ID, 1 CS, NYLON, W2022501500	2
10	1009659	BACKUP RING, PARKER 8-221, N1444-90	2
11	1006097	RING, RETAINING, INTERNAL, 3 3/4 ID	1
12	1007569	SNAP RING, SENSOR, ROTA, PN: 251477	1
13	700068	Set Screw, 5/16-18, 7/16	3
14	1006101	MAGNET, SENSOR, ROTA, LJ1234	1
15	1009651	WIPER SEAL, 2" ID X 2.50" OD, Parker 4700-J-02000	1
16	8P5ON-S	FITTING, PLUG, 1/2 MORB	1
17	700100	O-RING, 2-221 1.700" OD x 1.421" ID x 0.139" CS, 70 DURO	1
18	1009888	GUIDE, WEAR, 3.50 OD, 3.25 ID, .5 CS, 4733WPT125-03500-0500	2
19	1009892	SEAL, ROD PARKER #5065BD25002000R1N375	1

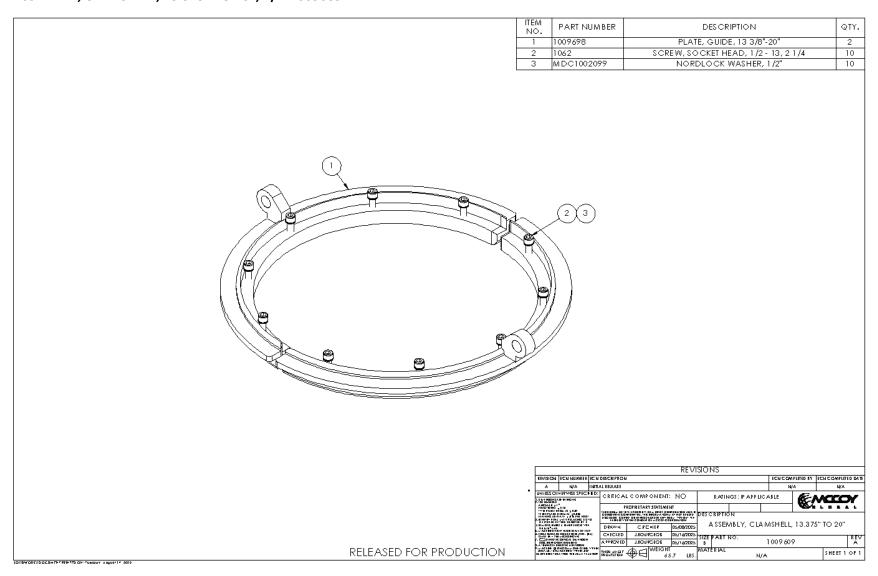


SEAL KIT, CYLINDER, 3 1/2 BORE X 2 ROD, FMS-500, P/N 1009640-SK

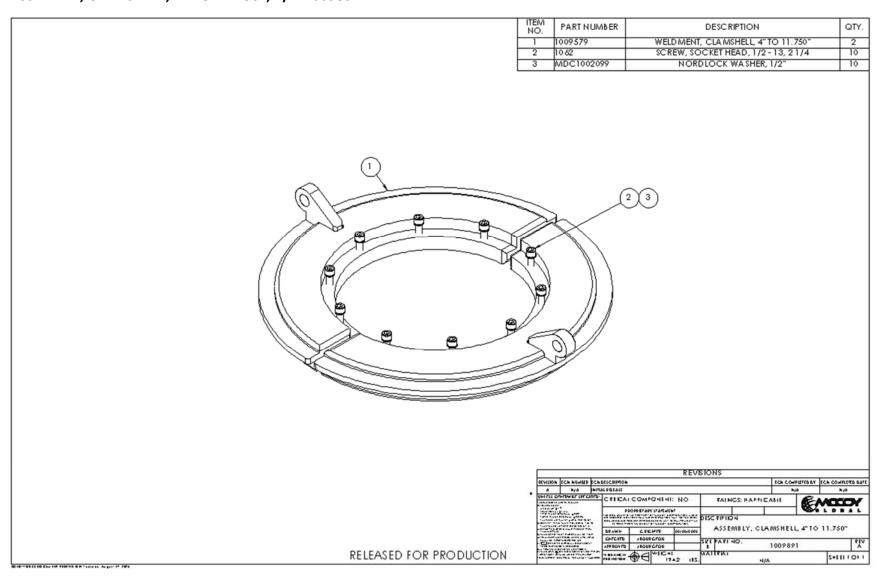




ASSEMBLY, CLAMSHELL, 13.375" TO 20", P/N 1009609

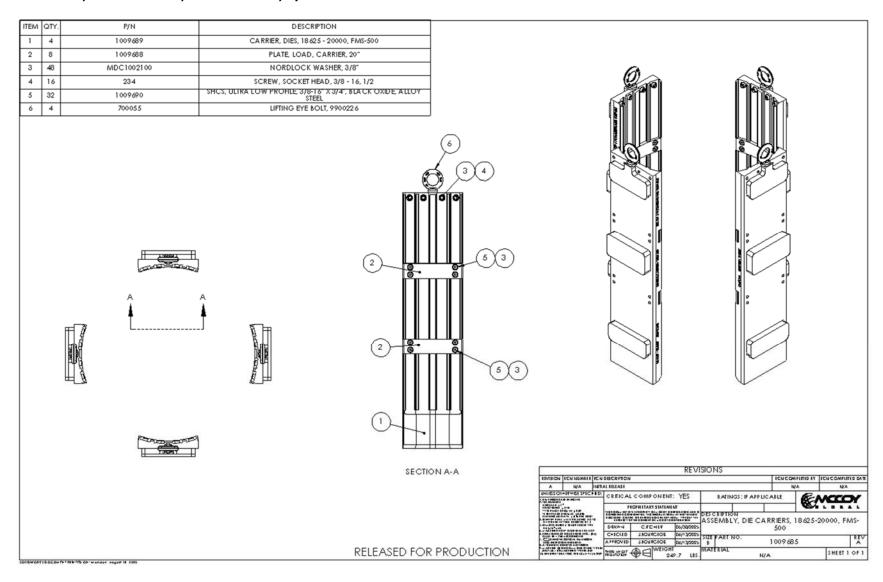


ASSEMBLY, CLAMSHELL, 4" TO 11.750", P/N 1009891





ASSEMBLY, DIE CARRIERS, 18.625-20000, P/N 1009685



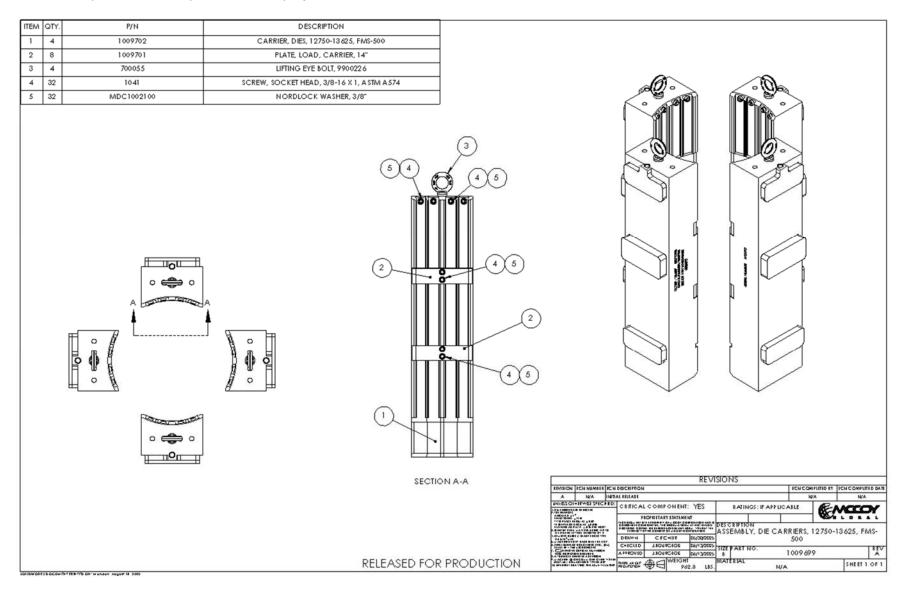


ASSEMBLY, DIE CARRIERS, 16.000-16.750, P/N 1009694

The state of the s	ITEN	4 G	ΩTY.	P/N	DESCRIPTION		
3 20	1	†	4	1009696	CARRIER, DIES, 1 6000-1 6750, FMS-500		
SECTION A-A Section A-A	2	\top	8	1009695	PLATE, LOAD, CARRIER, 163/4"		
SECTION A-A THIS CHARMING THE BOLT, 9990226 SECTION A-A THIS CHARMING THE SHARM TO SHARM THE SHARW THE	3	1	32	MDC1002100	NORDLOCK WASHER, 3/8"		
SECTION A-A MINISTRIC INSTALLATION SECTION A-A	4	- (32	1041	SCREW, SOCKET HEAD, 3/8-16 X 1, A STM A 574		
SECTION A-A THIRDS CHANNET EVISION	5		4	700055	LIFTING EYE BOLT, 9900226		
RESIDENT CONTINUES IN CHINARES						43	
						REMINDAL SCH NEWMER ICH OBSCRIPTION ICH CONT. A. N.A. INFANCE HICKAS OPERISON - TRANSPORT - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - TRANSPORT - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE PROPRIETARY SPECIAL COMPONENT: YES RATINGS: IF APPLICABLE PROPRIETARY SPECIAL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE DEBONAL CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE OPERISON - CEPTURE - SCHOOL COMPONENT: YES RATINGS: IF APPLICABLE - SCHOOL COMP	6.000-16.750, FMS-

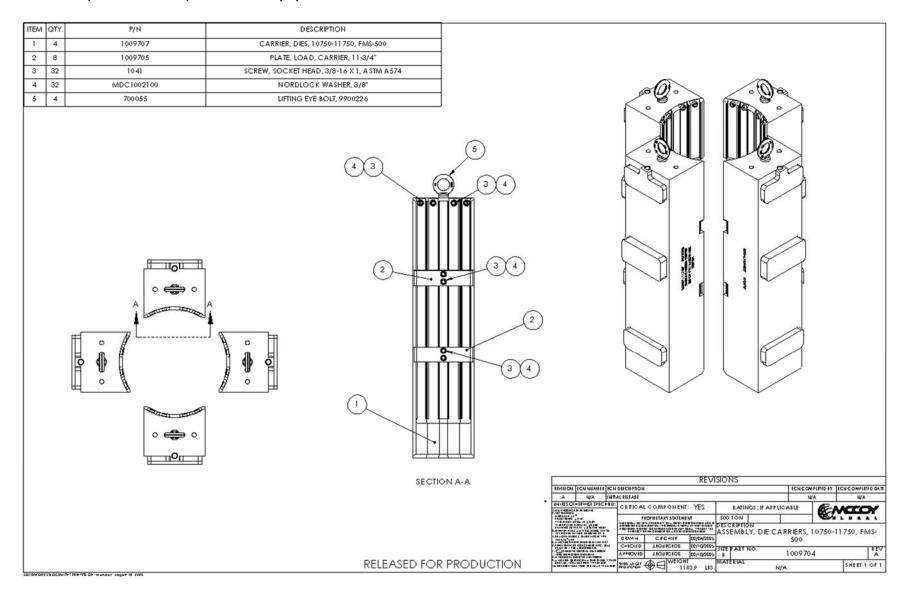


ASSEMBLY, DIE CARRIERS, 12750-13625, P/N 1009699



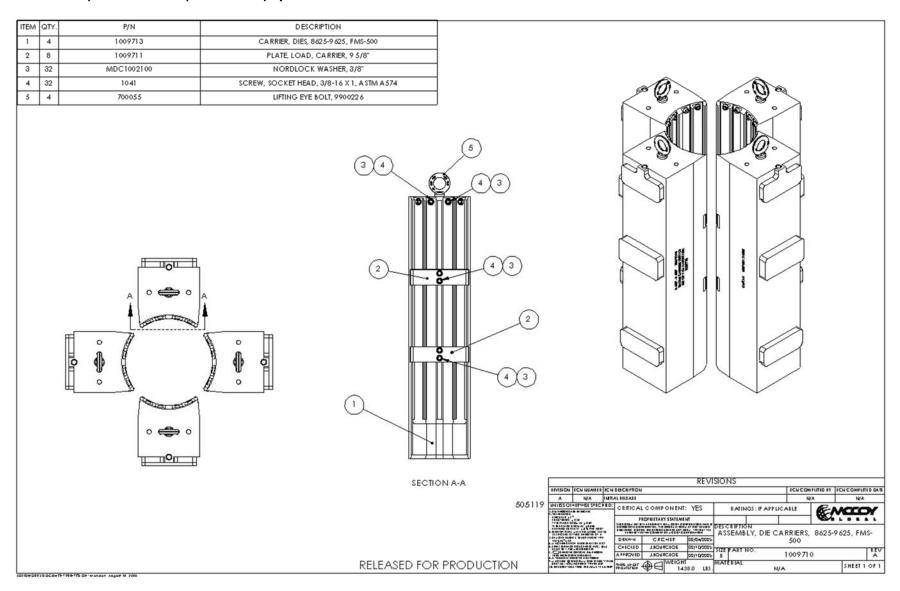


ASSEMBLY, DIE CARRIERS, 10750-11750, P/N 1009704



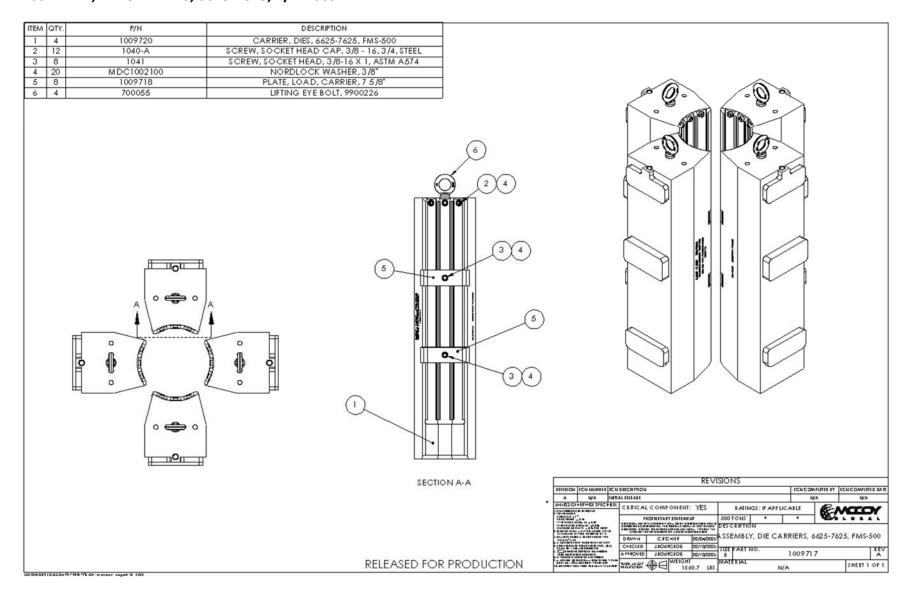


ASSEMBLY, DIE CARRIERS, 8625-9625, P/N 1009710



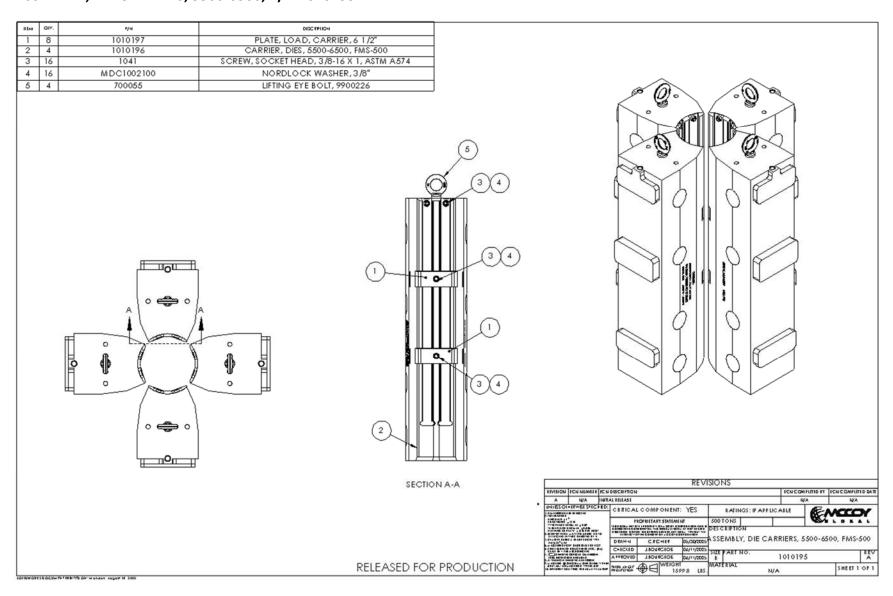


ASSEMBLY, DIE CARRIERS, 6625-7625, P/N 1009717



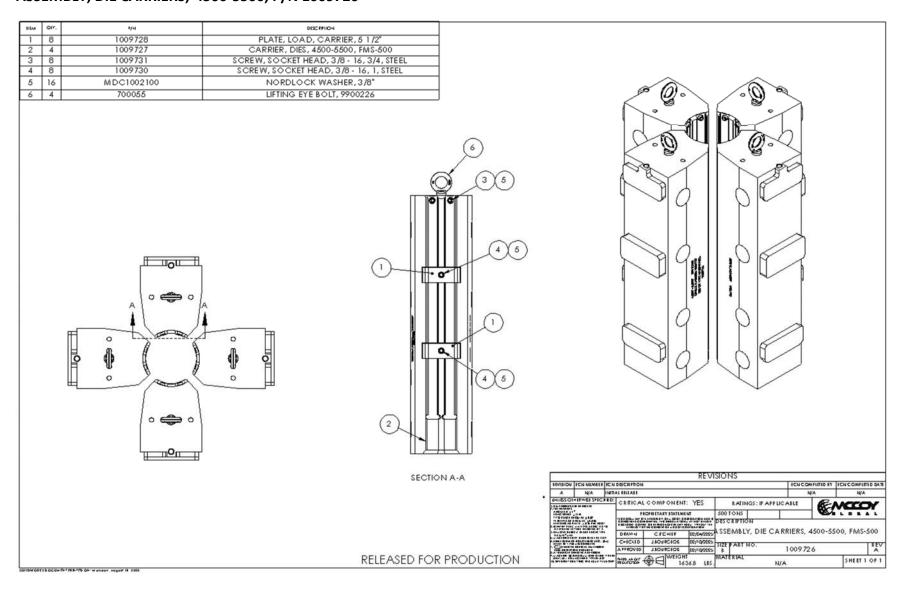


ASSEMBLY, DIE CARRIERS, 5500-6500, P/N 1010195





ASSEMBLY, DIE CARRIERS, 4500-5500, P/N 1009726





GUIDANCE OF INSPECTION AND MAINTENANCE OF FLUSH MOUNTED SPIDER

This section is intended to provide recommended guidance for an overhaul event, which consists of specific inspection and maintenance items.

1) PRECAUTIONS

PRACTICE SAFETY PROCEDURES AT ALL TIMES WHEN SERVICING FLUSH MOUNTED SPIDER AND USE PERSONAL PROTECTIVE EQUIPMENT.

TURN OFF HYDRAULIC POWER, DEPRESSURIZE HYDRAULIC SYSTEM, AND DISCONNECT SUPPLY TO THE FMS BEFORE PERFORMING ANY INSPECTION OR MAINTENANCE ACTIVITIES.

2) **DEFINITIONS**

- Adapter: allowing the FMS to be used inside of a 37 ½" rotary table.
- <u>Bowl Corner:</u> primary load carrying component of FMS that allow the slips to slide up and down.
- Cylinders: responsible for extending and retracting the equipment.
- <u>Die Carrier:</u> the component of FMS that holds the dies/inserts.
- <u>Bushing Rod Mount:</u> reducing friction between moving parts and absorbing shock and vibrations in the equipment. (e.g.: Bushing Rod Mount etc.)
- <u>FMS Slips:</u> primary load carrying component of FMS that holds the Die Carrier Assembly.
- <u>Grease Fitting:</u> A metal fitting used in FMS to feed lubricants, usually lubricating grease, into a pin or hinge surface under moderate or high pressure using a grease gun.
- <u>High Stress Component:</u> Parts of the tool which see a high ratio of **force** to area during operation.
- <u>Hydraulic Fitting:</u> The quick disconnects (male and female) that are used in FMS main supply and return line. (e.g.: ¾" SAE Female Quick Disconnect Fitting etc.)
- <u>Linear Indication</u>: An indication in which the length is more than three times the width.
- <u>Load Bearing Component:</u> Parts such as a chain sling, spreader bar assembly, frame, or any other device that bears the partial or total weight of the equipment.
- <u>Hydraulic Hoses:</u> allow fluid/air to flow from one component to another.
- <u>Hydraulic Supply:</u> required to operate the tool.
- <u>Inserts:</u> used to hold/grip the casing to prevent slippage or mishandling.
- Nipple Fitting: used to connect the hydraulic hoses to the supply line.
- <u>Wear Component:</u> Parts that are bound to or design to wear out or fail with repetitive use and will require periodic repair or replacements.



3) FREQUENCY

Organizations should determine and set the frequency of overhaul events based on factors such as prevention of non-productive time and ensuring safe operation of the equipment. There are many factors that will impact the frequency required such as commercial terms, utilization, in-service and post-job maintenance regimes, storage conditions, and many more. These factors are different for every case; we recommend that each organization set the frequency to meet your needs.

McCoy recommends that end users determine the intervals based on the equipment's asfound condition during previous overhaul and maintenance events. It is recommended to start with a minimum overhaul schedule of <u>1-year</u>, record the as-found condition, and functionality of the equipment. These records will illustrate the need to modify the interval time needed to match the expected performance during the set span between overhauls.

4) PREPARATION

Once the FMS has been received, preparation for inspection and maintenance begins.

The intended purpose of the preparation step is to pre-check for any visual or audial indications that the FMS is not working as intended. It is also recommended to record the 'As-Found' condition of the equipment for use in determining frequency of maintenance intervals.

- a. Visually inspect the FMS for any moving or loose parts and signs of premature wear of moving parts that are rubbing (bare metal where there used to be paint is a good indication of wear) before connecting to a supply.
- b. Visually inspect all external welds. Any weld that is cracked or separating must be repaired and repainted before returning the FMS to service.
- c. Visually inspect all fasteners, second retention devices, and protruding body pieces (example: QDs, hydraulic fittings, inlet & outlet line supports, latch pin, cotter pins, linkage pins, retaining pins, bolts & nuts). If there are any leaks, tighten to the recommended specifications or replace loose or missing fasteners. Use grade 8 bolts only unless otherwise specified. McCoy recommends that damaged or missing body parts be repaired or replaced prior to returning to service.
- d. Connect the FMS to a hydraulic power source and ensure the FMS is working as intended.
- 1. Check the condition of all hydraulic hoses and fittings. Visually inspect all hydraulic hoses fitted to the FMS for any signs of leaks, cuts, or wears. Hydraulic hoses should be replaced as per the original hose manufacturer's recommendations, and completion of a Certificate of Conformity is required.
- e. If any of the previous checks failed, turn off the hydraulic power, depressurize the hydraulic system, and disconnect the supply to the FMS and begin prepping for the additional inspection or maintenance steps.



- f. 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 top plates, bowl corner, slip, carrier, and dies if shavings or metal pieces are seen, the source must be identified during the overhaul process.
- g. Begin disassembling the FMS, and separate parts by component type.

5) INSPECTION & MAINTENANCE

Overhaul inspections and maintenance are recommended to be performed, per the following criteria. To ensure optimum performance for McCoy Flush Mounted Spider, the following checks should be performed.

- Visually inspect all parts for any surface defects such as, but not limited to, cracks, scratches, misalignments, corrosion, and other physical defects.
- Repair or replace any damaged or missing external body parts, such as guide plates, bowl corners, slips, die carriers, dies, load plates etc.

Category I (Daily Inspection)

The following inspection is Category 1 Inspection that should be performed during the job.

- a. Check latch mechanism for functionality.
- b. Check that the correct sizes of insert carriers, inserts, and top guides are installed.
- c. Check that the insert carriers and top guides are installed correctly.
- d. Grease the back of the slips. Please note this must be done every twenty cycles.

Category II (Daily Inspection)

The following inspection and maintenance procedures should be performed before and after every job in addition to Category I, at least once a day when the FMS is in steady use.

- a. Wash and remove any excess dirt and grease.
- b. Extend the cylinders fully. Check the back of slip for wear. Please note that the back of the slip has two grooves in it that are the maximum allowable wear depth. When these slots are no longer present, it is time to replace the slips.
- c. Inspect all QDs and hydraulic fittings.
- d. Check the dies and carriers for wear. Replace dies if they are broken or have flat teeth. Replace carriers if the rear lugs and/or die slots appear damaged.
- e. Check cylinder rods for wear.
- f. Check hoses inside of the tool for wear.
- g. Check for proper locking of all bolts and nuts, slotted nuts & cotter pins, lock wire, and retaining pins.
- h. Check the guide plates ID. Please note that all guide plates have a .500 wear allowance on the internal diameter.
- i. Inspect linkage pins for wear.
- j. Grease all pins and the latch mechanism.



Category III (Every 6 months)

The following inspection and maintenance procedures should be performed every six months under normal operating conditions in addition to all Category I & II actions.

- a. Inspect the external weld of both cylinders.
- b. Visually inspect carrier mid load plates and bottom of carrier die slot for deformation.
- c. Activate cylinders and monitor hydraulic seals and replace any that are damaged.
- d. Inspect linkage pins, linkage, and latch housing for wear according to the wear limits that proceed this section.
- e. Inspect top guide plates, bowl corners, slip, carrier, and leveling beams for wear according to the wear limits that proceed this section.
- f. Inspect all guide plates that have been used in the past six months for wear according to the wear limits that precede this section.

Category IV (Yearly Inspection)

The following inspection and maintenance procedures should be performed every year under normal operating conditions in addition to all Category I, II, & III actions.

- a. NDE load bearing components per the critical area drawings in this manual for the following parts
 - 1. Bowl Corners.
 - 2. Slips.
 - 3. All carriers used in the past year.
 - 4. All carrier load plates used in the past year.

Component Name	Component Type	Inspection		Acceptance
		Visually inspect bowl	PASS	No cracks or signs of wear, or damage in the bowl corner.
Bowl Corner	Wear	corners for cracks, damage, or wear according to wear limits.	FAIL	Any cracks, wear, or excessive damage that is outside of the wear limit listed on bowl Corner drawings below. Page (8 & 19).
		Visually inspect the cylinder rods for wear and corrosion. Check the external weld of both cylinders.	PASS	No signs of wear, damage, or corrosion in the cylinder. No weld damage
Cylinder	Wear		FAIL	Any signs of wear, damage, or corrosion in the cylinder. Excessive damage that is outside of wear limit listed on cylinder rod drawing below. Page (21).
BUSHING ROD MOUNT	WEAR	Visually inspect bushing rod mount. If there are any signs of wear, the bushing must be replaced.	PASS FAIL	No signs of wear on bushing rod. If there are any signs of wear, the bushing rod must be replaced.



		Visually inspect die carrier	PASS	No cracks, scratches, or damage in the die carrier
DIE CARRIER	WEAR	for cracks, damage, or wear.	FAIL	Any cracks, scratches, or damage
		Visco Illasia and Alas disa IC		in the die carrier
		Visually inspect the dies. If there are any signs of wear,	PASS	No signs of wear, no broken or no flat teeth
DIES	WEAR	broken or have flat teeth it		If there are broken or have flat
		must be replaced.	FAIL	teeth, dies should be replaced.
		Visually inspect all seals.	PASS	No visible wear or damage.
SEAL	WEAR	Check for any cracks,	FAIL	Any leaking, damaged, or worn
		glazing, loss of elasticity,		seals will need to be replaced.
		scarring, swelling, wear,		
		deterioration, etc.		
HYDRAULIC	WEAR	Visually inspect hoses	PASS	No corrosion or damage to
FITTINGS		around the fittings for		hydraulic fittings.
		leaks. Check for corrosion	FAIL	Any damaged or leaking hydraulic
		and crushed or cracked		fittings will need to be replaced.
		hydraulic fittings.		
HOSE KIT	WEAR	Visually inspect hoses	PASS	No signs of wear and damage
110021111		inside of the tool for wear	FAIL	Any signs of wear and damage,
		and damage.		the hose kit must be replaced.
LINKAGES	WEAR	Visually inspect the	PASS	No wear or damage to linkages.
		linkages for wear, damage,	FAIL	If there is wear or damage to the
		or bent.		linkages, it should be replaced.
I AMOU ODDING		Visually inspect the latch	PASS	No wear or damage to the latch
LATCH SPRING	MEAD	spring housing for wear	DAII	spring housing.
HOUSING	WEAR	limits.	FAIL	Excessive damage that is outside of the wear limit listed on latch
				spring housing drawing below.
				Page (15).
				No wear or deformation to the
CARRIER LOAD		Visually inspect the carrier	PASS	carrier load plate.
PLATE	WEAR	load plates for deformation.	FAIL	Any wear, damage, or
				deformation to carrier load plate
				will need to be replaced.
GREASE	WEAR	Visually inspect grease	PASS	No corrosion or damage to grease
FITTINGS		fittings for leaks. Check for	DATE	fittings.
		corrosion and crushed or	FAIL	Any damaged, clogged, or leaking
		cracked grease fittings. Confirm grease port is not		grease fittings will need to be replaced.
		clogged.		replaced.
PINS	WEAR	Visually inspect pins for	PASS	No signs of wear to the pins
		wear according to wear	FAIL	If there is wear or excessive
		limits.		damage that is outside of the wear
				limit listed in pins drawing below
				page (21) it should be replaced.
0		Visually inspect slips for	PASS	No damage or wear in the slips.
SLIPS	WEAR	wear according to wear	FAIL	If there is wear or excessive
		limits.		damage that is outside of the wear



				limit listed on bowl corner
				drawings below. Page (6 & 18).
		Vianally in an est and de	PASS	No damage or wear in the guide
		Visually inspect guide	11100	plates
GUIDE PLATES	WEAR	plates for wear according to wear limits.		If there is wear or damage to the
		wear iimits.	FAIL	guide plates, then it should be
				replaced.
			PASS	No damage or wear in the
Clamshell		Visually inspect guide	r Ass	clamshell weldments
Weldments	WEAR	plates for wear according to wear limits.	FAIL	If there is wear or damage to the
Weldificits				clamshell weldments, then it
				should be replaced.
	WEAR	Visually inspect top right leveling beam for wear according to wear limits.	FAIL	If there is wear or damage to the
				guide plates, then it should be
TOP RIGHT				replaced.
LEVELING BEAM				If there is wear or excessive
EEVEEHING BEILIN			FAIL	damage that is outside of the wear
				limit listed on Top Right Leveling
				Beam drawings below. Page (17).
			PASS	No signs of wear to the top left
	WEAR	Visually inspect top left	11100	leveling beam.
TOP LEFT		leveling beam for wear	FAIL	If there is wear or excessive
LEVELING BEAM		according to wear limits.		damage that is outside of the wear
		according to wear mints.		limit listed on Top Left Leveling
				Beam drawings below. Page (16).



• MPI requirements for components:

- Where instructed in the table above, MPI welds & visually inspect per ASTM E709 after load /test.
- o The following acceptance criteria shall apply:
 - Linear indications (Major dimensions at least 3 times minor dimension)
 - In base metal: no relevant linear indications with a major dimension equal to or greater than 3/16" (4.7mm).
 - In welds: no rounded indications with a major dimension greater than 1/8" (3.2mm).
 - No more than 10 relevant indications in any continuous 6 sq. in. (40 sq. cm) area.
 - No more than 3 relevant indications in a line separated by less than 1/16"
 (2mm) edge-to-edge.
 - No relevant indications in pressure-sealing areas, in the root areas of threads, or in the stress-relief features of threaded joints.

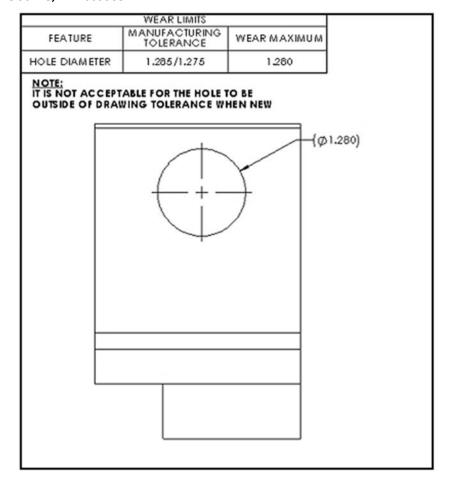


WEAR LIMITS OF KEY COMPONENTS

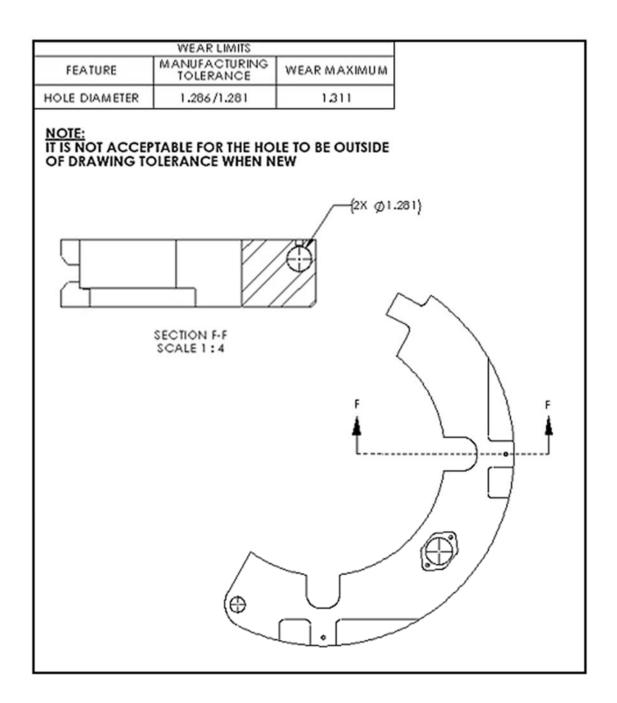
BAR, LINKAGE, P/N 1009581

	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
HOLE DIAMETER	1.285/1.275	1.270	
	TABLE FOR THE HOLE WING TOLERANCE V		(Ø1.280)
			/

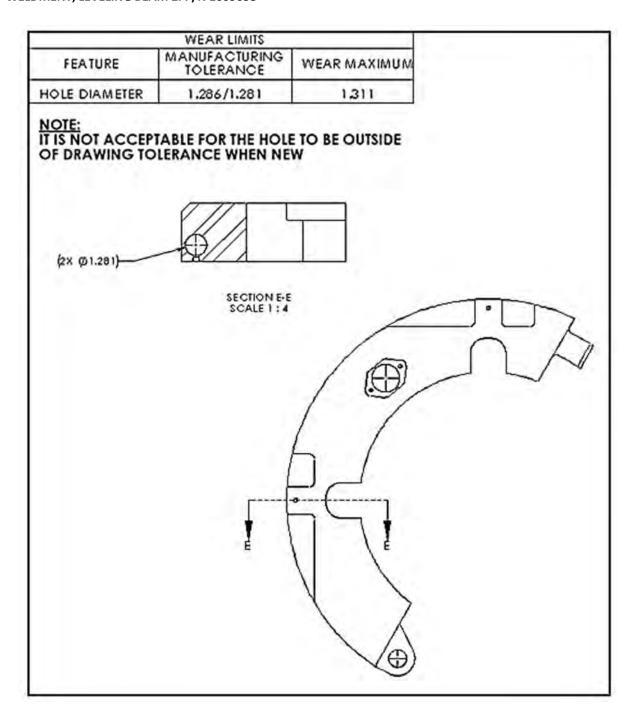
LATCH SPRING HOUSING, PN 1009588













FEATURE MANUFACTURING TOLERANCE WEAR MAXIMUM I SLOT THICKNESS .375 REF344 NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW (.375)		WEAR LIMITS	
NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW (.375)	FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM
of DRAWING TOLERANCE WHEN NEW	T SLOT THICKNESS	.375 REF.	.344
	IT IS NOT ACCEPTA	(.375)	BE OUTSIDE



	WEAR LIMITS	
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM
DIMENSION A SLOT DEPTH	.031 ±.005	0
	TABLE FOR THE HOLE LERANCE WHEN NEV	
(R.13	THRU \$\overline{\pi} .031 \pm .005 \\ DIM A.	7



	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
HOLE DIAMETER	22.00 +0/03	22.13"	
NOTE: IT IS NOT ACCEPT OF DRAWING TO	ABLE FOR THE HOLE I	TO BE OUTSIDE	
		0	
	(\$\psi_{22.00})	0	

	WEAD HAME		
	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
HOLE DIAMETER	21.12 +0/03	21.25*	
NOTE: IT IS NOT ACCEPT OF DRAWING TO	ABLE FOR THE HOLE LERANCE WHEN NEW	TO BE OUTSIDE	
		0	
•		+	
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		
	(ø21.13)	0	

WEAR UMIS MANUFACTURING TOLERANCE **FEATURE** WEAR MAXIMUM HOLE DIAMETER 18.50 +0/-.03 18.75 NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW (@18.50)



	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
HOLE DIAMETER	14.50 +0/03	14,63°	
NOTE: IT IS NOT ACCEPTA OF DRAWING TOL	ABLE FOR THE HOLE TO ERANCE WHEN NEW	O BE OUTSIDE	
6			
0	0	p14.50)



	WEAR LIMITS		
*******	MANUFACTURING	45.044.00.00	
FEATURE	TOLERANCE	WEAR MAXIMUM	
HOLE DIAMETER	15.88 +0/03	16.01*	
NOTE: IT IS NOT ACCEPTA OF DRAWING TOLE	BLE FOR THE HOLE TO RANCE WHEN NEW	BE OUTSIDE	
		5	
		+	
	(Ø15.88)	2	



FEATURE MANUFACTURING WEAR MAXIMUM		MEA DUANTS	
LE DIAMETER 15.50 +0/03 15.63" NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE		WEAR LIMITS	
NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE		TOLERANCE	
IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE	IOLE DIAMETER	15.50 +0/03	15.63"
0	IT IS NOT ACC	CEPTABLE FOR THE HO TOLERANCE WHEN N	OLE TO BE OUTSIDE NEW
// /	/ø		
``	(\$15.50)	0	



	M/EA D HAAITS		_
	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
HOLE DIAMETER	13.50 +0/03	13.63"	
NOTE: IT IS NOT ACCEPTA OF DRAWING TOL	ABLE FOR THE HOLE TO ERANCE WHEN NEW	O BE OUTSIDE	
<u></u>	, 0		
0		Ø13.5	0



WEAR LIMITS MANUFACTURING TOLERANCE **FEATURE** WEAR MAXIMUM HOLE DIAMETER 12.38 +0/-.03 12.51" NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW Ø12.38

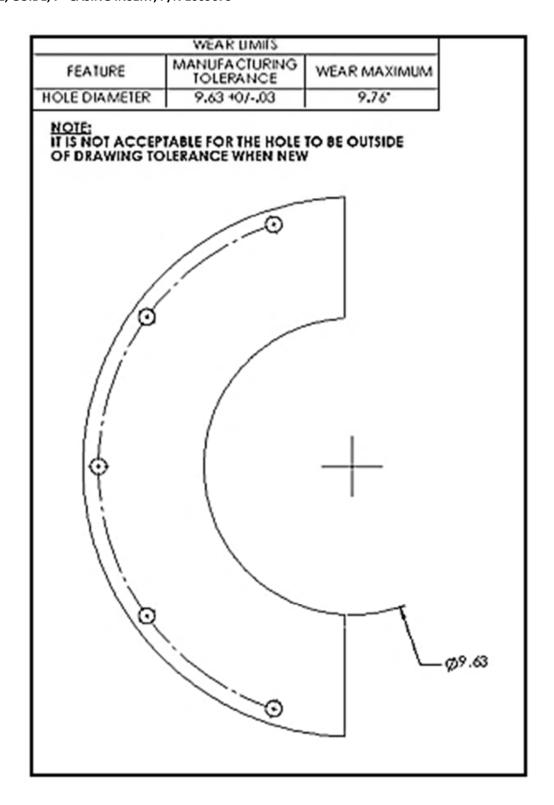


WEAR LIMITS MANUFACTURING **FEATURE** WEAR MAXIMUM TOLERANCE 11.38 +0/-.03 11.51 HOLE DIAMETER NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW Ø11.38



WEAR UMITS MANUFACTURING TOLERANCE FEATURE WEAR MAXIMUM HOLE DIAMETER 10.25 +0/-.03 10.38* NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW Ø10.25



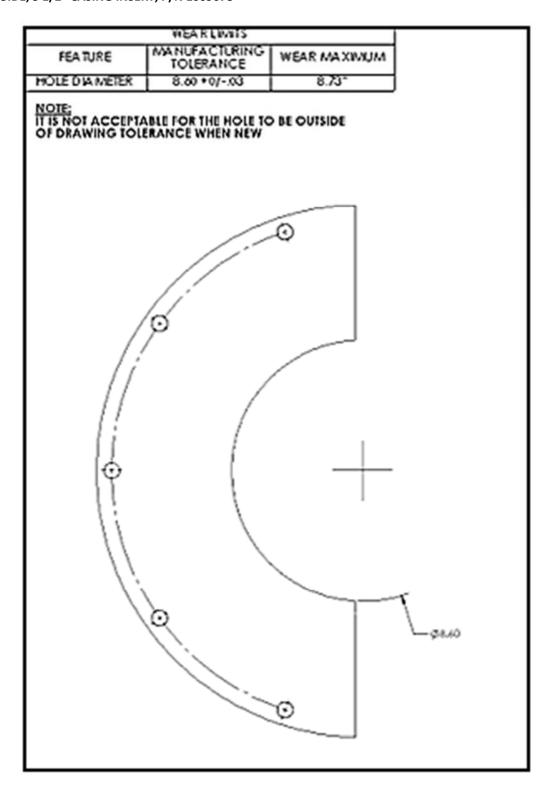


WEAR LIMITS MANUFACTURING FEATURE WEAR MAXIMUM TOLERANCE HOLE DIAMETER 9.50 +0/-.03 9.63* NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW Ø9.50



	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	₩EAR MAXIMUM	
HOLE DIAMETER	9.125 +0/03	9.25*	
NOTE: IT IS NOT ACCEPT.	ABLE FOR THE HOLE I	O BE OUTSIDE	
		+	
(@9.13)			







	WEAR LIMITS	
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM
HOLE DIAMETER	9.50 +0/03	9.63*
NOTE: IT IS NOT ACCEPTAL OF DRAWING TOLE	BLE FOR THE HOLE TO RANCE WHEN NEW	BE OUTSIDE
(29.50)		



	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
HOLE DIAMETER	8.50 +0/03	8.63*	
NOTE: IT IS NOT ACCEPTA OF DRAWING TOLE	BLE FOR THE HOLE TO RANCE WHEN NEW	BE OUTSIDE	
	0	+	
(210.00)	1.0	0	



FEATURE MANUFACTURING TOLERANCE WEAR MAXIMUM HOLE DIAMETER 8.50 +0/03 8.63* NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW				
HOLE DIAMETER 8.50 +0/03 8.63* NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW		WEAR LIMITS		
NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW		TOLERANCE		
OF DRAWING TOLERANCE WHEN NEW	HOLE DIAMETER	8.50 +0/03	8.63*]
(\$0.50)	IT IS NOT ACCEPTA	ABLE FOR THE HOLE TO ERANCE WHEN NEW	O BE OUTSIDE	
		0		
	(28.50)	1.0		



	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
HOLE DIAMETER	8.13 +0/-,03	8.25*	
NOTE: IT IS NOT ACCEPTA OF DRAWING TOL	ABLE FOR THE HOLE T ERANCE WHEN NEW	O BE OUTSIDE	
	0	0	
(49.50)			
	O	0	



WEAR LIMITS MANUFACTURING **FEATURE** WEAR MAXIMUM TOLERANCE 7.50 +0/-.03 7.63 HOLE DIAMETER NOTE: IT IS NOT ACCEPTABLE FOR THE HOLE TO BE OUTSIDE OF DRAWING TOLERANCE WHEN NEW $\{ \phi 7.50 \}$



PIN, HEX, LIFT LINK, P/N 1009585

	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE		
PIN OD	1.265/1.255	1.250	
	PTABLE FOR THE HOOLERANCE WHEN	NEW	E

CLAMSHELL GUIDE HINGE PIN, PN 1009681

CLAMSHELL GUIDE HING	SE PIN, PN 1009681		
	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
PIN OD	.982/.980	.975	
	EPTABLE FOR THE TOLERANCE WHE		IDE
	-		



WELDMENT, CYLINDER, A, 3.5 BORE X 2 ROD X 20.15 STROKE, PN 1009642

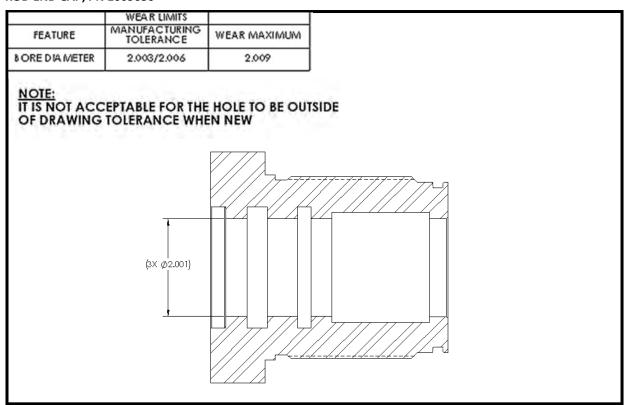
	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
BORE DIAMETER	3.500/3.504	3.510	
NOTE: IT IS NOT ACCEPTA OF DRAWING TOLE	BLE FOR THE HOLE TO E	SE OUTSIDE	
11/11/11/11			

ROD, CYLINDER, PN 1009653

	WEAR LIMITS		
FEATURE	MANUFACTURING TOLERANCE	WEAR MAXIMUM	
ROD DIA METER	1.998/2.000	1.993	
NOTE:	CEPTABLE FOR THE F	IOLE TO BE OUTSIDE	
OF DRAWING	TOLERANCE WHEN	NEW	
	(d2,000)		
	(Ø2.000)		
	{Ø2.000}		
	{@2.000}		



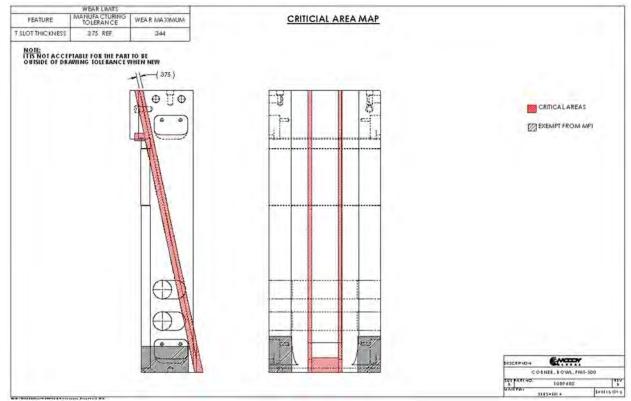
ROD END CAP, PN 1009650



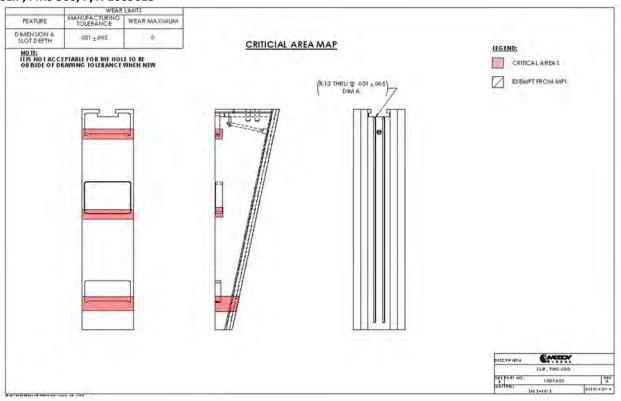


CRITICAL AREA LOAD MAPS

CORNER, BOWL, FMS-500, P/N 1009682

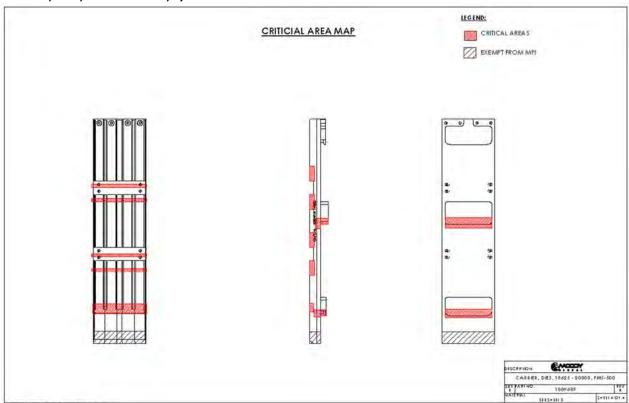


SLIP, FMS 500, P/N 1009623

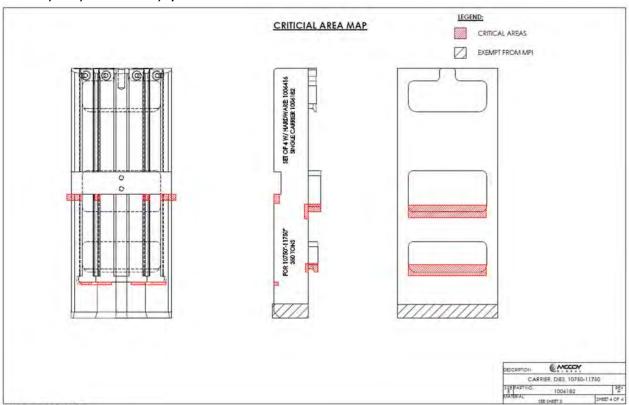




CARRIER, DIES, 18625 – 20000, P/N 1009689

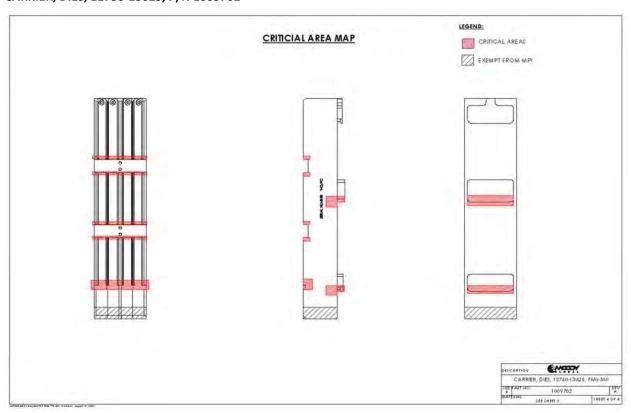


CARRIER, DIES, 16000-16750, P/N 1009696

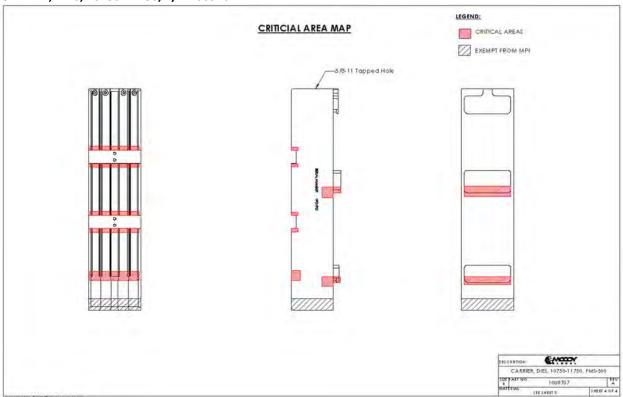




CARRIER, DIES, 12750-13625, P/N 1009702

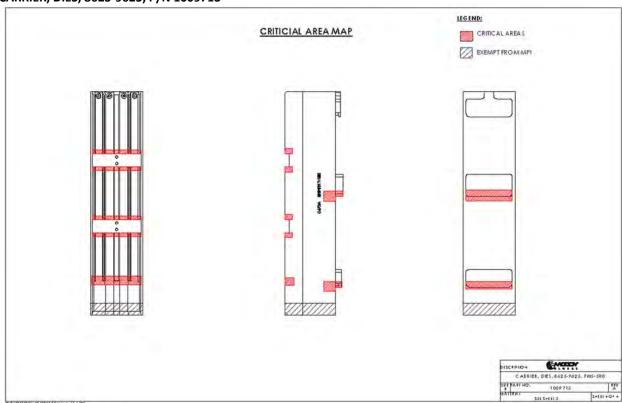


CARRIER, DIES, 10750-11750, P/N 1009707

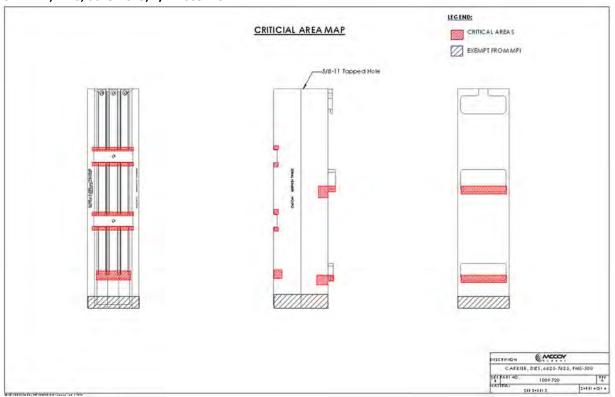




CARRIER, DIES, 8625-9625, P/N 1009713

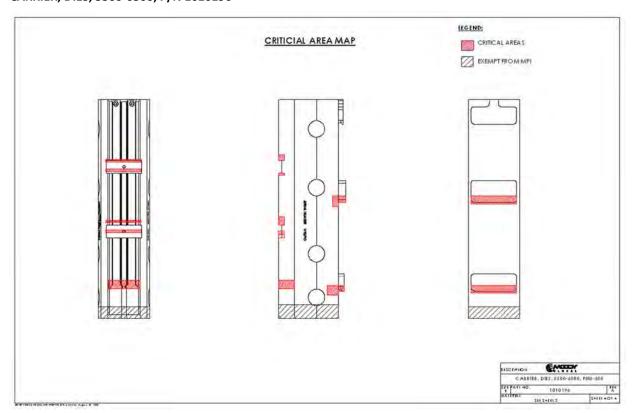


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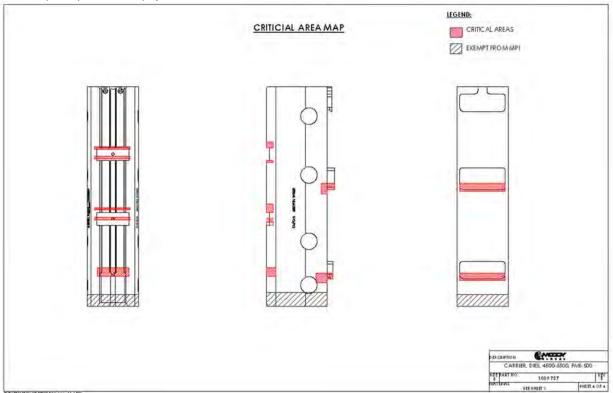




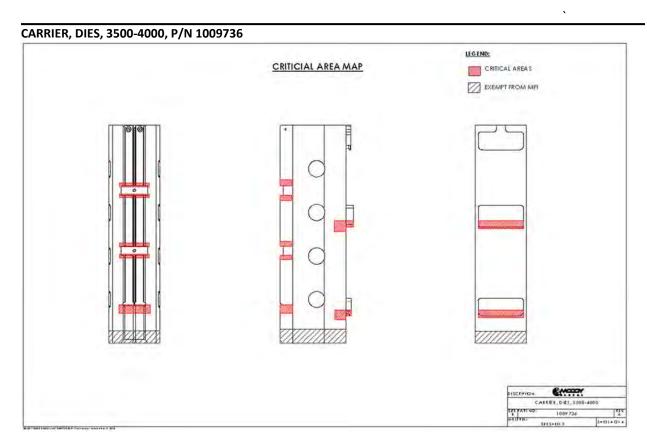
CARRIER, DIES, 5500-6500, P/N 1010196



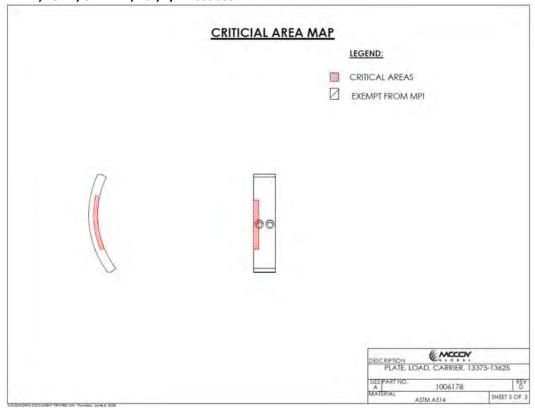
CARRIER, DIES, 4500-5500, P/N 1009727





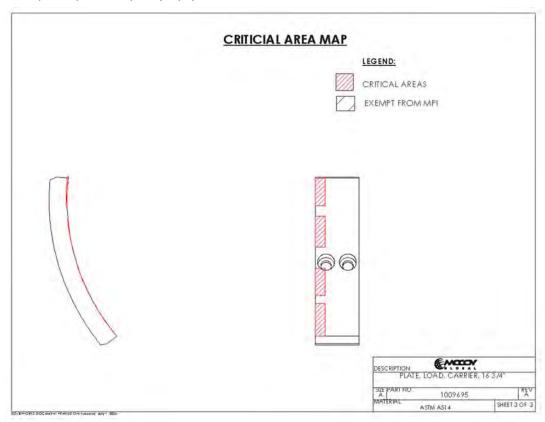


PLATE, LOAD, CARRIER, 20", P/N 1009688

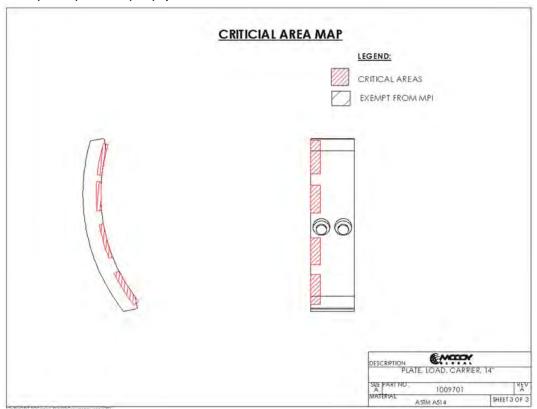




PLATE, LOAD, CARRIER, 16 3/4", P/N 1009695

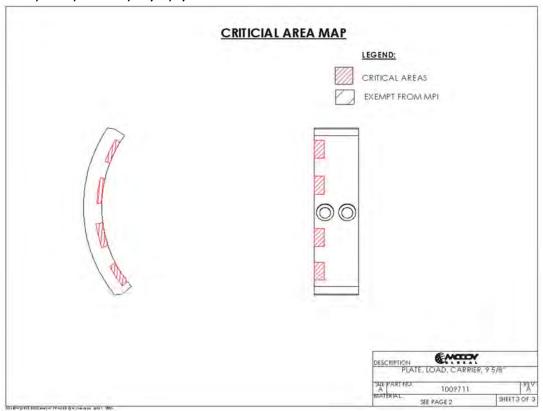


PLATE, LOAD, CARRIER,14", P/N 1009701

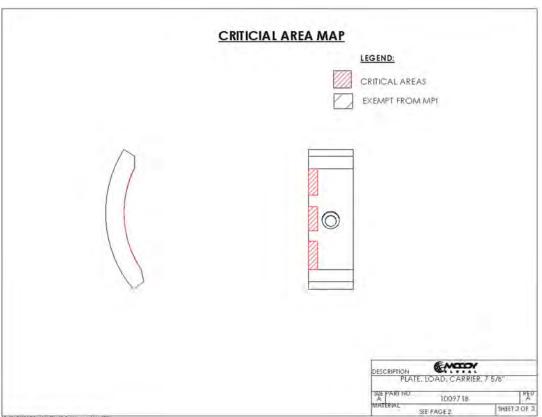




PLATE, LOAD, CARRIER, 9 5/8", P/N 1009711

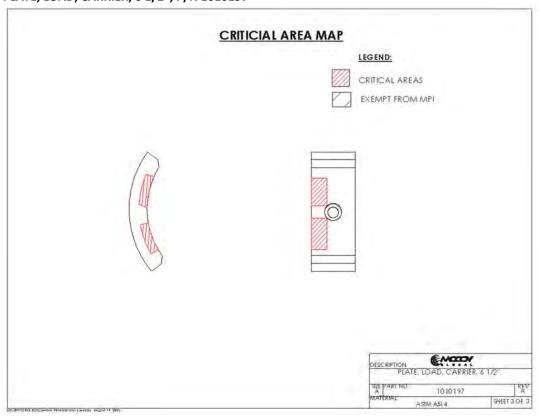


PLATE, LOAD, CARRIER, 7 5/8", P/N 1009718

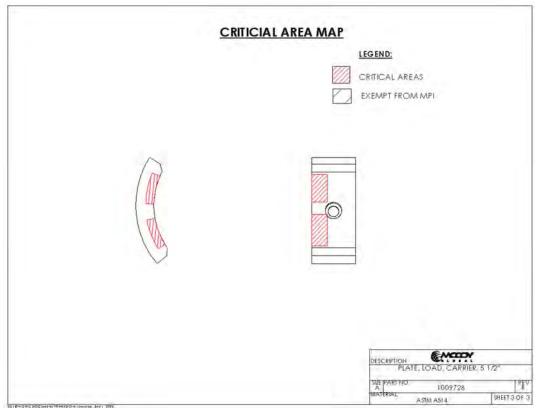




PLATE, LOAD, CARRIER, 6 1/2", P/N 1010197

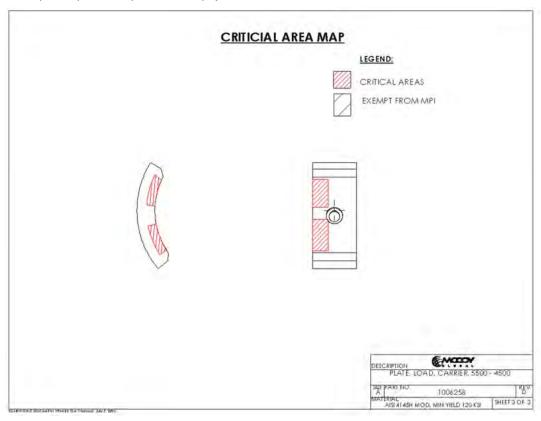


PLATE, LOAD, CARRIER, 5 1/2", P/N 1009728

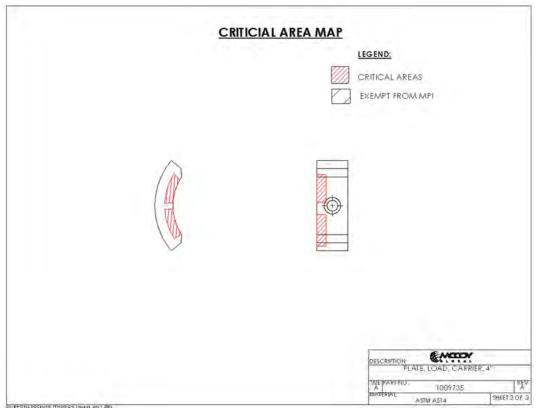




PLATE, LOAD, CARRIER, 5500 - 4500, P/N 1006258



PLATE, LOAD, CARRIER, 4", P/N 1009735





ASSEMBLY

Once the overhaul inspection and maintenance has been performed proceed to assembling the FMS.

- a) Replace any components that failed inspection with the new recommended parts.
- b) Reinstall all parts which were removed for inspection. Lubricate Equipment according to maintenance schedule located in the FMS manual.
- c) When re-assembling load bearing devices, all the associated fasteners must be tightened to the correct torque specified for that size of fastener.
- d) Any threaded fastener in a load bearing device must be secured with red or blue Loctite.
- e) Any replacement fastener (bolts, nuts, cap screws, machined screws, etc.) used during maintenance or overhaul must be grade 8 or equivalent unless otherwise specified.
- f) Visually inspect all paint locations in which the paint has been damaged must be repaired prior to the equipment being returned to service. Paint the FMS remembering to mask off surfaces not intended to paint with grease or masking tape.

Paint Repair Specification

• Touch Up

Any chip/crevice smaller than 1/8" in diameter which has not broken through to expose bare metal may be sanded to feather edges and filled without rework of the area by filling the crevice with primer and topcoat only.

Rework

Damaged/chipped areas shall be removed and the edge around the area shall be cut back to solid material. The rework areas should be sanded and edges of the tightly adhered coating reaming around the area must be feathered so that the recoated surface has a smooth appearance from the repaired area to the intact coating. Rework will be done to a depth required to reach a well adhered underlying coating and reworked area should have all affected coats restored (primer, base coat, and topcoat).

g) Complete dated inspection report giving details of all duties performed along with complete list of items replaced. A completed Certificate of Conformity is required.



SAFETY AND FINAL CHECKLIST

Preservation & Storage Recommendations

The purpose of preservation is to preserve the conformity of equipment during internal processing through delivery to the intended destination. The preservation of equipment includes all steps taken to ensure the proper identification, handling, packaging, storage, and protection of equipment.

- 1. <u>Identification:</u> The ability to identify a part or assembly during various phases of manufacture, inspection, maintenance, or storage.
- 2. <u>Handling:</u> The product is handled safely to prevent user injury and damage to equipment.
- 3. <u>Packaging:</u> The parts shipped for transport must be properly crated or palletized to avoid damage in shipping.
- 4. Storage: Proper storage of out-of-service equipment is important to ensure full integrity of the tool once it is returned to service. It is important to document the date the FMS is placed into storage, whether it is intended to be short or long term. The same efforts should be undertaken during short and long-term storage to preserve and protect the equipment. The amount of time equipment should be stored will be dependent on the customer's needs. To maintain the integrity of installed seals, McCoy recommends that the maximum storage interval does not exceed 1-year. Operating the FMS is not required during storage, but if the FMS is being recommissioned and has been in storage for more than 3-months, McCoy recommends completing the checks and tests as outlined for proper functionality, beginning on page 17.

McCoy recommends observing the following storage practices:

- a. Wipe off all excess grease. Use a solvent-based cleaner on rags to wipe all external surfaces to remove residual grease. Once the outside surfaces have been de-grease, wipe all external surfaces with clean water to remove residual solvent.
- b. Use of 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.
- c. Storage area should be clean and dry, and if possible, stored in a sealed, climate-controlled environment. If isolated storage is not available, McCoy recommends storing 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.
- d. Recommended lubrication for storage can be found in the user manual.
- e. When returning to service, note that a full inspection of the device must be performed.



- 5. <u>Protection</u>: All equipment must be protected from potential deterioration or damage. If FMS sits idle, or is expected to sit idle, for an extended period, McCoy recommends that you take steps to preserve it during storage. The decision on what constitutes an extended period varies based on many factors, all of which should be taken into consideration. Some such factors are, but are not limited to include:
 - Extreme Heat or Cold
 - Fire or Water Damage
 - High Humidity
 - Excessive Corrosion
 - Vehicle Circulation
 - Animal Activity
 - Exposure to UV light
 - Air Quality/Contamination (such as sand or dust in the air)



BOLT TORQUE SPECIFICATION

! WARNING

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

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



DETERMINING PIPE CRUSHING LOADS

The maximum pipe weight which can be lifted safely with the FMS, equals the critical hook load of the pipe MINUS the applied power down force. The effective slip-pipe contact reduction factor for different configurations can be found in the chart following the calculations. The chart represents a theoretical calculation. Friction, wear, and pipe type may alter performance.

Pipe Crush for various grades** (tons)					
Casing Size	Casing Weight (lb/ft)	55	80	110	125
	11.6	64	99	142	163
4 1/2"	13.5	76	116	165	189
	15.1	89	135	191	219
	15	86	131	186	213
5"	18	107	161	226	259
5	21.4	129	194	271	310
	23.2	141	211	295	337
	15.5	87	133	188	215
	17	97	148	208	238
E 4 /2 !!	20	117	176	246	282
5 1/2"	23	134	202	282	322
	26	154	230	321	367
	26.8	162	241	336	384
	20	113	170	239	273
6"	23	133	200	280	319
	26	152	228	318	363
	24	135	202	282	322
6 5/8"	28	160	239	333	380
	32	182	271	377	431
	23	126	190	266	304
	26	145	217	303	346
7"	29	164	244	341	389
	32	182	271	377	431
	35	200	297	413	471
	26.4	141	211	294	336
7.5.(0)	29.7	162	241	336	384
7 5/8"	33.7	186	276	384	438
	42.8	242	358	497	500*
	24	123	185	260	297
8 5/8"	36	190	282	393	449
	40	214	317	441	500*



	36	181	269	375	428
	47	244	360	500*	500*
9 5/8"	53.5	281	414	500*	500*
	59.4	313	461	500*	500*
	58.4	306	451	500*	500*
9 7/8"	62.8	327	482	500*	500*
	60.7	303	447	500*	500*
10 3/4"	55.5	276	407	500*	500*
10 5/4	65.7	331	487	500*	500*
	108.7	500*	500*	500*	500*
11 2/4"	47	221	327	455	500*
11 3/4"	71	343	500*	500*	500*
	54.5	242	358	497	500*
13 3/8"	72	329	484	500*	500*
	85	388	500*	500*	500*
13 5/8"	88.2	403	500*	500*	500*
	65	264	389	500*	500*
16	75	309	455	500*	500*
16	84	349	500*	500*	500*
	109	462	500*	500*	500*
	87.5	330	486	500*	500*
	94.5	355	500*	500*	500*
18 5/8"	97.7	369	500*	500*	500*
	106	404	500*	500*	500*
	117.5	451	500*	500*	500*
	94	343	500*	500*	500*
20	106.5	392	500*	500*	500*
	133	498	500*	500*	500*

The values above account for 2000 psi set pressure applied to the cylinders. The following is the increase in the rating for various set pressures. Please note that the rating of the tool/carriers is not to be exceeded.

Pressure (psi)	Rating increase (tons)
1500	3
1000	6
500	10

*The theoretical load is greater than the tool's capacity.

**No factor of safety is taken into account for pipe crush value.



SPARE PARTS LIST (Stocking Quantity for 1 Year)

	SPK-500-350 SPARE PARTS KIT								
ITEM	Qty	P/N	DESCRIPTION						
1	6	1001	FITTING, GREASE, STRAIGHT, 1/8 NPT						
2	2	1002	FITTING, GREASE, 1/8 MNPT, 90 DEGREE						
3	1	1009588	SPRING HOUSING, LATCH						
4	2	1009585	PIN, HEX, LIFT LINK						
5	2	1009640-SK	SEAL KIT, CYLINDER, 3 1/2 BORE X 2 ROD, FMS-500						
6	2	1009576	BUSHING, ROD MOUNT, FMS						
7	1	1009581	BAR, LINKAGE						
8	4	1006348	FITTING, QUICK DISCONNECT, FEMALE, STUCCHI 801301014						
9	4	1006349	FITTING, QUICK DISCONNECT, MALE, STUCCHI 801301013						
10	2	1009600	BOLT, SHOULDER, SOCKET HEAD, 3/4 SHOULDER, 1 3/4", 5/8-11						
11	2	1009681	CLAMSHELL GUIDE HINGE PIN						



ACCESSORY AVAILABILITY & INSTALLATION

CARRIER & GUIDE PLATE AVAILABILITY & INSTALLATION

The following table lists the standard stocked sizes for carrier assemblies available with this FMS model. Each assembly comprises four carriers tailored to suit the appropriate gripping range. However, the dies required for different pipe sizes are not included in the assemblies and must be purchased separately. Refer to the charts on the following pages that lists dies for various casing sizes.

*Note that the pass- through diameter allowed must be less than the guide plate ID.

NOTICE

MCCOY GLOBAL'S CARRIER ASSEMBLIES AND RECOMMENDED DIES ARE DESIGNED TO GRIP DESIGNATED SIZES WITHIN THE API MAXIMUM AND MINIMUM TOLERANCES ONLY.



HANDLING, TONG, & BI-DIRECTIONAL COMBO DIES

	Inse	ert Part	Numbers		Bi-Directiona	ıl							Cuida	Plate Info	Clamsh	all Info
	Handling Di	es	Tong Dies	3	Combo Dies								Guide	Piate inio	Clamsn	ieii inio
Casing Size	Part Number	QTY	Part Number	QTY	Part Number	QTY	Torque Rating (ft-lbs.) *	Tension Rating (tons)	Carrier Assembl Y Number	Carrier Number	Mid- load plate number	Weight of Total Tool- Guide plates, carriers, dies (lbs.)	Guid e Plate ID	Guide Plate Part Number	Clamshel I Set Part Number	Clamshel I Part Number
20	JJ-2000-2000-G	80	13-0468-314-0	16	FMS-2000-2000-G	N/A	100,000	500	1009685	1009689	1009688	4413	22.00	1009663		
18 5/8	JJ-2000-1810-G	80	13-1156-314-0	16	FMS-2000-1810-G	N/A	100,000	500	1009685	1009689	1009688	4461	21.13	1009665		
16 3/4	JJ-1612-1612-G	80	13-0468-314-0	16	FMS-1612-1612-G	N/A	100,000	500	1009694	1009696	1009695	4743	19.75	TBD		
16	JJ-1612-1600-G	80	13-0839-314-0	16	FMS-1612-1600-G	N/A	100,000	500	1009694	1009696	1009695	4760	18.50	1009666	1009609	1009698
13 5/8	JJ-1400-1400-G	80	13-0468-314-0	16	FMS-1400-1400-G	96	100,000	500				5125	16.00	TBD		
13 3/8	JJ-1400-1312-G	80	13-0591-314-0	16	FMS-1400-1312-G	96	100,000	500	1009699	1009702 1009701	9702 1009701	5125	15.88	1009667		
12 3/4	JJ-1400-1212-G	80	13-0904-314-0	16	FMS-1400-1212-G	96	100,000	500			5173	15.50	1009693			
11 3/4	JJ-1112-1112-G	80	13-0468-314-0	16	FMS-1112-1112-G	96	100,000	500	1009704	1009707	1009705	5411	14.50	1009668		
10 3/4	JJ-1112-1012-G	80	13-0968-314-0	16	FMS-1112-1012-G	96	100,000	500	1009704	1009707	1009705	5459	13.50	1009669		
9 5/8	JJ-0910-0910-G	80	13-0468-314-0	16	FMS-0910-0910-G	96	100,000	500	1009710	1009713	1009711	5663	12.38	1009670		
8 5/8	JJ-0910-0810-G	80	13-0968-314-0	16	FMS-0910-0810-G	96	80,000	500	1009/10	1009713	1009711	5711	11.38	1009671		
7 5/8	JJ-0710-0710-G	60	13-0468-314-0	12	FMS-0710-0710-G	72	60,000	500				5775	10.25	1009672		
7	JJ-0710-0700-G	60	13-0780-314-0	12	FMS-0710-0700-G	72	60,000	500	1009717	1009720	1009718	5779	9.63	1009673	1000001	1000570
6 5/8	JJ-0710-0610-G	60	13-0968-314-0	12	FMS-0710-0610-G	72	60,000	500				5811	9.50	1009675	1009891	1009579
6	JJ-0600-0512-G	40	13-0591-314-0	8	FMS-0600-0512-G	48	60,000	500	1010105	1010100	1010107	5790	9.63	1010632		
5 1/2	JJ-0600-0512-G	40	13-0591-314-0	8	FMS-0600-0512-G	48	60,000	500	1010195	1010196	1010197	5805	8.60	1009678		
5 1/2	JJ-0508-0508-G	40	13-0468-314-0	8	FMS-0508-0508-G	48	40,000	350				5830	8.60	1009678		
5	JJ-0508-0500-G	40	13-0719-314-0	8	FMS-0508-0500-G	48	40,000	350	1009726	1009727	1009728	5839	7.75	TBD		
4 1/2	JJ-0508-0408-G	40	13-0968-314-0	8	FMS-0508-0408-G	48	40,000	350				5863	7.25	TBD		

^{*}Torque values are determined by slip upon the pipe and not the limitations of the tool.



FMS AIR OVER HYDRAULIC CONSOLE 1007792

General arrangement drawing for the Air Over Hydraulic Console that can be used to control the FMS.

AIR OVER HYDRAULIC CONSOLE SPECIFICATIONS:

- MAXIMUM AIR PRESSURE 100 PSI/ 7 BAR
- NO HYDRAULIC INPUT INQUIRED
- OPERATES FMS ONLY
- 2 MODES OF OPERATION
 - START OF STRING OPERATION SLOWER IN ORDER TO PREVENT UNINTENDED OPENING WITH LESS WEIGHT
 - ONCE STRING WEIGHT IS IN PLACE FASTER CYCLE TIME
- 3 AIR DRIVEN RECIPROCATING HYDRAULIC PUMPS
 - TWO PUMPS HAVE AIR/OIL PRESSURE RATIO OF 5:1
 - ONE PUMP HAS AIR/OIL PRESSURE RATIO OF 30:1
 - CHANGE OVER BETWEEN THE PUMPS DEPEND ON RESISTANCE OF SLIPS; NO OPERATOR INPUT REQUIRED
- 8 GALLON/30 LITER RESERVOIR
- RETURN LINE AND SUCTION FILTERS TO ENSURE CLEANLINESS OF HYDRAULIC OIL
- SAFETY FEATURES INCLUDE
 - SLIP CONTROL REQUIRING LEVER OPERATION AND AN INTERLOCK PUSH BUTTON
 - PNUMATIC INTERLOCK
- FRAME FULLY NOT TESTED
- MAXIMUM FLOW 5.8 GPM/ 22 L/MIN
- MAX HYDRAULIC PRESSURE 3000 PSI/ 210 BAR
- MAX AIR PRESSURE 100 PSI/ 7BAR
- DIMENSIONS
 - LENGTH 23 5/8 INCHES/600 MM
 - WIDTH 23 5/8 INCHES/600 MM
 - HEIGHT 47 1/4 INCHES/1200 MM
- - EXCLUDING OIL 600 LBS/ 275 KG
 - WITH OIL 660 LBS/300 KG
- TOTAL CYCLE TIME FOR FMS- 12 SECONDS

€ MCCOY RATINGO F AFFUCABLE ROMERAN BATHANT CONSOLE, AIR OVER HYDRAULIC, FMS 1007792

RELEASED FOR PRODUCTION



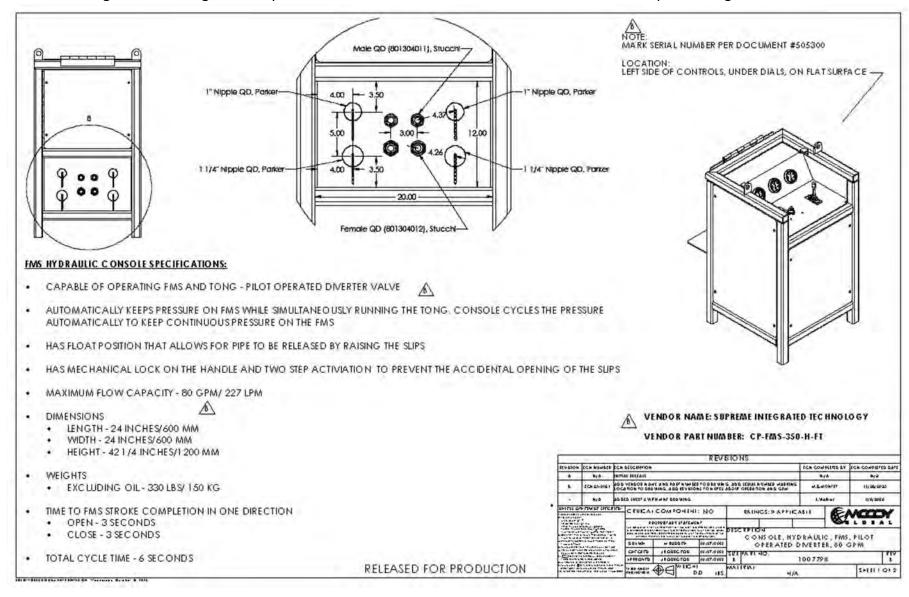
FMS-500-350-C Flush Mounted Spider

Manual No. TM-FMS-500-00



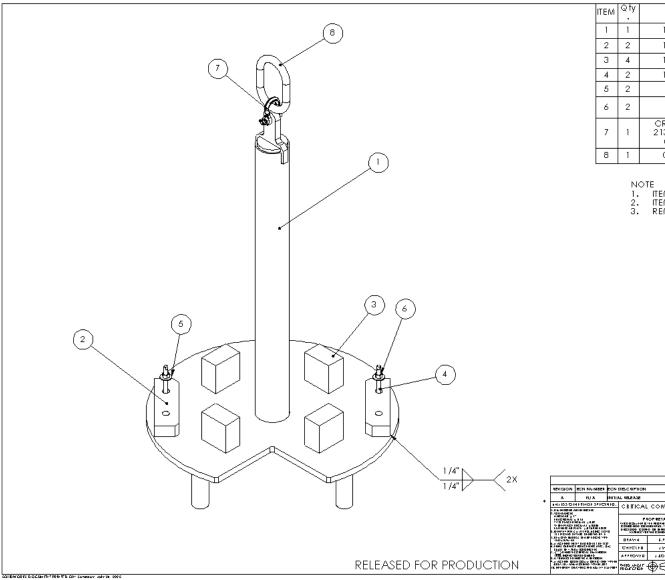
FMS HYDRAULIC CONSOLE 1007798

General arrangement drawing for the Hydraulic Console that can be used to control the FMS and a power tong.





ASSEMBLY, BASE STAND P/N 1010378



ITEM	Q ty	P/N	DESCRIPTION
1	1	1010377	WELDMENT, LIFT STAND
2	2	1010381	PLATE,BASE,LIFT
3	4	1010375	PLATE, CARRIER BLOCK
4	2	1008156	ROD, THREADED, 5/8-11, 5
5	2	195-A	FLATWASHER, 5/8
6	2	194	NUT, HEX, 5/8-11, STEEL, GR8
7	1	CROSBY_G- 2130_0.63_1 019490	SHACKLE, 0.63IN 3.25T CROSBY 1019490
8	1	02-9128	LINK, 1" MASTER

- 1. ITEM 2 WILL BE FIT IN ASSEMBLY
 2. ITEM 3 IS NOT WELDED
 3. REMOVE ITEM 3 PRIOR TO LIFITING THE ASSEMBLY

REVISIONS N/A NITIAL IGEASE

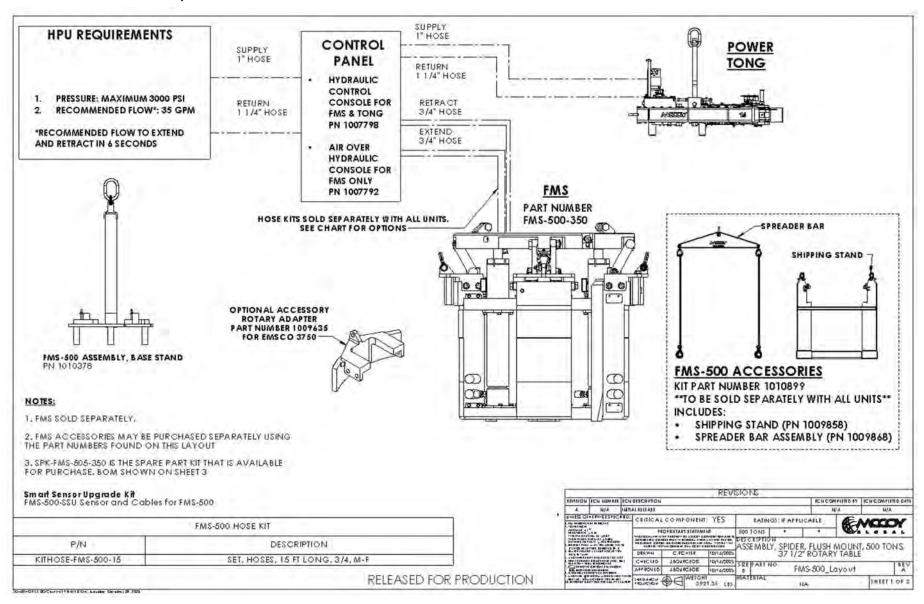
DIMERSHISE SPECIALISE. CRITICAL COMPONENT: NO RATINGS: IF APPLICABLE PROPRETARY MATERIAM ON ENGINEERING AND ENGINEE A SSEMBLY, BASE STAND CHECKS 1941EE 04047202 SEFARTIO.

AFFORD 1961EE 0407202 B B MATERIAL

476.83 LB3. 1010378 SHEET 1 OF 1



SALES LAYOUT DRAWING, SHEET 1 OF 3.

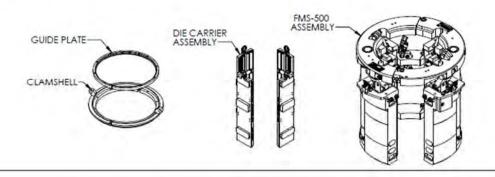




SALES LAYOUT DRAWING, SHEET 2 OF 3.

	Inse	rt Part	Numbers		Bi-Directional	1							Cuida	Plate Info	Clamak	all Infa
	Handling Dies Tong Dies			Combo Dies								Guide Flate IIIIO		Clamshell Info		
Casing Size	Part Number	QTY	Part Number	QTY	Part Number	QTY	Torque Rating (ft-lbs.) *	Tension Rating (tons)	Carrier Assembly Number	Carrier Number	Mid load plate number	Weight of Total Tool- Guide plates, carriers, dies (lbs.)	Guide Plate ID	Guide Plate Part Number	Clamshell Set Part Number	Clamshell Par Number
20	JJ-2000-2000-G	80	13-0458-314-0	16	FMS-2000-2000-G	N/A	100,000	500	1009685	S 1009689	1009688	4413	22.00	1009663		
185/8	JJ-2000-1810-G	80	13-1156-314-0	16	FMS-2000-1810-G	N/A	100,000	500	1003003		100,000	4461	21.13	1009665		
163/4	JJ-1612-1512-G	80	13-0468-314-0	15	FMS-1612-1612-G	N/A	100,000	500	1009594	1009696	1009695	4743	19.75	TED		1009698
16	JJ-1612-1600-G	80	13-0839-314-0	16	FMS-1612-1600-G	N/A	100,000	500	1009054	1003030	1007033	4760	18.50	1009666	1009609	
13 5/8	JJ-1400-1400-G	80	13-0468-314-0	15	FM5-1400-1400-G	96	100,000	500		1009702	009702 1009701	5125	16.00	TED		
133/8	JJ-1400-1312-G	80	13-0591-314-0	16	FMS-1400-1312-G	96	100,000	500	1009699			5125	15.88	1009667		
123/4	JJ-1400-1212-G	80	13-0904-314-0	16	FMS-1400-1212-G	96	100,000	500				5173	15.50	1009693		
113/4	JJ-1112-1112-G	80	13-0468-314-0	16	FMS-1112-1112-G	96	100,000	500	1009704	1009707	1009705	5411	14.50	1009668		
10 3/4	JJ-1112-1012-G	80	13-0958-314-0	16	FMS-1112-1012-G	96	100,000	500	1009704	1009/07		5459	13.50	1009669		
95/8	JJ-0910-0910-G	80	13-0468-314-0	15	FMS-0910-0910-G	96	100,000	500	1009710	1009713	1009711 5663	12.38	1009670			
85/8	JJ-0910-0810-G	80	13-0968-314-0	16	FMS-0910-0810-G	96	80,000	500	1009/10	1009/13	1009/11	5711	11.38	1009671		
75/8	JJ-0710-0710-G	60	13-0468-314-0	12	FMS-0710-0710-G	72	60,000	500				5775	10.25	5 1009672		
7	JJ-0710-0700-G	60	13-0780-314-0	12	FMS-0710-0700-G	72	60,000	500	1009717	1009720	1009718	5779	9.63	1009673	***************************************	1009579
65/8	JJ-0710-0610-G	60	13-0968-314-0	12	FMS-0710-0610-G	72	60,000	500				5811	9.50	1009675	1009891	1009579
6	JJ-0600-0512-G	40	13-0591-314-0	8	FMS-0600-0512-G	48	60,000	500	7010105	1010105	1010107	5790	9.63	1010632		
51/2	JJ-0600-0512-G	40	13-0591-314-0	8	FMS-0600-0512-G	48	60,000	503	1010195	1010196	1010197	5805	8.60	1009678		
51/2	JJ-0508-0508-G	40	13-0458-314-0	8	FMS-0508-0508-G	48	40,000	350				5830	8.60	1009678		
5	JJ-0508-0500-G	40	13-0719-314-0	8	FMS-0508-0500-G	48	40,000	350	1009726	1009727	1009728	5839	7.75	TBD		
41/2	JJ-0508-0408-G	40	13-0968-314-0	8	FMS-0508-0408-G	48	40,000	350		200000		5863	7.25	TBD		

^{*}Torque values are determined by slip upon the pipe and not the limitations of the tool.



DESCRIPTION	€ WCCO		
MUSSELVIDET, SI	PIDER, FLUSH MOUN 7 1/2" ROTARY TABLE	T, 500 TO	ONS.
SIZE PART NO.	FMS-500_Layout		REV
MATERIAL	16A	SHEET	OF 2



SALES LAYOUT DRAWING, SHEET 3 OF 3.

			SPK-500-350 SPARE PARTS KIT
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	6	1001	FITTING, GREASE, STRAIGHT, 1/8 NPT
2	2	1002	FITTING, GREASE, 1/8 MNPT, 90 DEGREE
3	1	1009588	SPRING HOUSING, LATCH
4	2	1009585	PIN, HEX, LIFT LINK
5	2	1009640-SK	SEAL KIT, CYLINDER, 3 1/2 BORE X 2 ROD, FMS-500
6	2	1009576	BUSHING, ROD MOUNT, FMS
7	1	1009581	BAR, LINKAGE
8	4	1006348	FITTING, QUICK DISCONNECT, FEMALE, STUCCHI 801301014
9	4	1006349	FITTING, QUICK DISCONNECT, MALE, STUCCHI 801301013
10	2	1009600	BOLT, SHOULDER, SOCKET HEAD, 3/4 SHOULDER, 1 3/4", 5/8-11
11	2	1009681	CLAMSHELL GUIDE HINGE PIN

DESCRIPTION

ASSEMBLY, SPIDER, FLUSH MOUNT, SOO TONS, 37 1/2" ROTARY TABLE

SZEPARTNO, FMS-500_Layout REV.

MATERIAL 114 SHEET 2 OF 2

SOLDWORKS DOCUMENT PROFITE DIS TRANSPI, ENGINEER 4, 202



Hazard Assessment & Analysis

Step No.	Description of Job Steps	Potential Hazards	Required Protective Controls	Frequency	Consequence	Risk Rank
1	Inspect equipment being used.	Equipment failure Manual handling, Pinch points	Inspect equipment prior to use. Ensure equipment has relevant Documentation and SWL has been checked. Good Body positioning. Correct PPE at all times	2	2	4
2	Lift FMS to Rig Floor.	Heavy overhead lift, Uncontrolled Load, Dropped objects, Pinch points Trapped against or in between	Ensure all parties fully understand Toolbox Talk and instructions for lifting FMS. Ensure all securing devices are in good condition and utilized. Correct Tools and Slings for Job using a communicated lift Plan, LOLER regulations. Competent Banksman and Deck Crew. Tag Lines and Stiffy Hand Tools when available. PA announcement and/or barriers as required to inform others not involved with Operation.	2	4	8
3	Positioning of FMS to Rotary Table.	Heavy overhead lift, Uncontrolled Load, dropped objects, pinch points Trapped against or in between.	Ensure all securing devices are in good condition and utilized. Correct Tools and Slings for Job using a communicated lift Plan, LOLER regulations. Competent Air Hoist Operator/s Competent person on TDS Brake. Tag Lines and Stiffy Hand Tools as required. Controlled slow movement of	2	4	8
4	Rig Down FMS.	Manual handling. Stored energy. Trip hazard. Possible working at heights. Pinch points. Dropped object. Trapped against or in between.	Use correct manual handling and lifting techniques. Correct hand tools for job Wear fall protection if working at height Awareness of surroundings (ABBI) Above, Below, Behind, and Inside.	2	4	8
5	Remove FMS from Drill floor.	Heavy overhead lift, Uncontrolled Load, dropped objects, pinch points Trapped against or in between.	Ensure all securing devices are in good condition and utilized. Correct Tools and Slings for Job using a communicated lift Plan, LOLER regulations. Competent Banksman and Deck Crew Tag Lines and Stiffy Hand Tools when available. PA announcement and/or barriers as required to inform others not involved with Operation. Ensure all Lifting devices are in good condition and secure prior to moving the CRT	2	4	8



Frequency X Consequence = Risk Ranking

		CONSEQUENCE								
FREQUENCY	Insignificant 1	Insignificant 1 Minor 2		Mod	erate 3	Major 4	Critical 5			
Almost Certain 5	5		10		15	20	25			
Likely 4	4		8		12	16	20			
Possible 3	3		6		9	12	15			
Unlikely 2	2		4		6	8	10			
Rarely 1	1		2		3	4	5			

FREQUENCY

Almost certain (Score 5)	Constant, daily, high repetition	Critical (Score 5)	Outcome of event is certain fatality or catastrophic incident
Likely (Score 4)	Expected to happen at some time, task performed on a weekly basis	Major (Score 4)	Incident would result in a lost time incident or serious damage
Possible (Score 3)	Can be expected to occur occasionally	Moderate (Score 3)	Incident would result in a recordable injury or moderate damage
Unlikely (Score 2)	Not likely to occur in normal circumstances	Minor (Score 2)	Incident would result in a minor first aid injury or light damage
Rare (Score 1)	Could possibly happen, but probably never will	Insignificant	Non-first aid required injury, near miss or no damage resulting

