

Rolling 412 & 618 Fusion Machines



McELROY

www.mcelroy.com



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Operator's Manual

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have necessary training, skills and tools to perform these functions properly.

Advanced training is offered through McElroy University. Course offerings are meant to enhance your efficiency, productivity and safety in the proper use of McElroy equipment.

Improper operation, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate this product until you have carefully read and understand all the sections of this manual and all other equipment manuals that will be used with it.

Follow all applicable federal, state, local, and industry specific regulations.

The hazards are identified by the "Safety Alert Symbol" and followed by a "Signal Word" such as "DANGER", "WARNING" or "CAUTION". The Safety Alerts are shown below.

The meaning of these safety alert symbols are as follows:

 **DANGER** - Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** - Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION** - Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

Signal words "NOTICE" and "IMPORTANT" are used to bring attention to important information.

The meaning of these signal words are as follows:

"NOTICE" - Can keep you from doing something that might damage the machine or someone's property. It may also be used to alert against unsafe practices.

"IMPORTANT" - Can help you do a better job or make your job easier in some way.

McElroy cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by McElroy is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in the publication are on the basis of information that was available at the time that the publication was written. The specifications, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. The most current information is available at our website

www.mcelroy.com.

TX05337-04-18

 WARNING	Cancer and Reproductive Harm - www.P65warnings.ca.gov
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8163361

WARNING

When replacement parts are required for this product McElroy recommends using McElroy replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material. Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

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FOREWORD

Literature Information

This manual should be stored in a protected location for future reference. Use the literature holder if provided with the product. Digital copy contains hyperlinks. Press Alt + Left Arrow to return to the selected hyperlink.

This manual contains safety information, operation instructions, transportation information, lubrication information and maintenance information.

Some photographs or illustrations in this publication show details or equipment that can be different from your machine. Guards and covers might have been removed for illustrative purposes.

Continuing improvement and advancement of product design might have caused changes to your machine which are not included in this publication. Read, study and keep this manual with the machine.

Whenever a question arises regarding your machine, or this publication, please contact your McElroy distributor. Find your closest distributor on our website at www.mcelroy.com.

Safety

The safety section lists basic safety precautions. In addition, this section identifies the text and locations of warning signs and labels used on the machine.

Read and understand the basic precautions listed in the safety section before operating or performing maintenance and repair on this machine.

Operation

The operation section is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of gauges, switches, machine controls, accessories and transportation.

Photographs and illustrations guide the operator through correct procedures of setting up, checking and operating the machine.

Operating techniques outlined in this publication are basic. Proficiency develops as the operator gains knowledge and experience with the machine and its capabilities.

Maintenance

The maintenance section is a guide to equipment care. The maintenance schedule lists the items to be maintained at a specific service interval. Items without specific intervals are listed under the "As Needed" service interval. The schedule lists the page for the step-by-step instructions required to accomplish the scheduled maintenance. Use the schedule as an index for all maintenance procedures.

Some maintenance procedures may be referenced in a manual pertaining to that component of the machine. For example, maintenance for an engine component would have its intervals and procedures in the engine operator's manual.

Use the hour meter (if equipped) to determine servicing intervals. Calendar intervals will be used instead of hour meter intervals if no hour meter is equipped on a machine. Recommended service should always be performed at the interval that occurs first.

Under extremely severe, dusty or wet operating conditions, more frequent lubrication than is specified in the maintenance schedule might be necessary.

McElroy University



For more than 30 years, McElroy has been the only pipe fusion machine manufacturer to continuously offer advanced training. Course offerings are meant to enhance your efficiency, productivity and safety in the proper use of McElroy machines. McElroy University classes are structured so that the skills learned and the machines used in each class closely match the machines found on pipelining jobsites. We offer training at our facility or yours. Our uniquely qualified McElroy University course instructors offer years of industry experience.

Tuition for each course includes lunches, course materials and a certificate of completion. Online registration, as well as up-to-date course offerings and dates, is available at www.mcelroy.com/university

This manual is intended as a guide only and does not take the place of proper training by qualified instructors. The information in this manual is not all inclusive and can not encompass all possible situations that can be encountered during various operations.

Patent Information

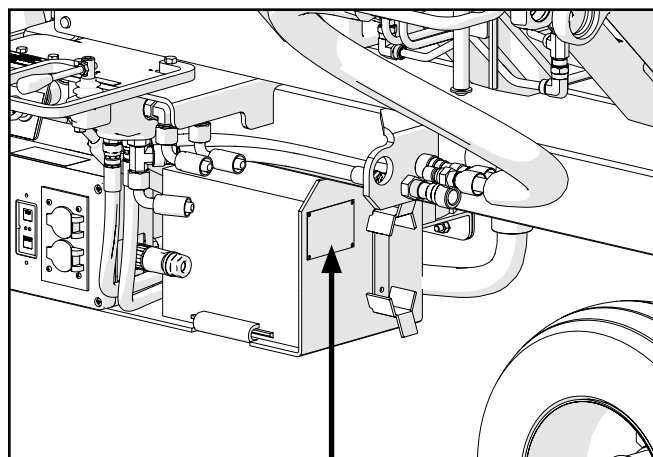
This product and other products could be protected by patents or have patents pending. All the latest patent information is available at patent.mcelroy.com

Replacement Literature

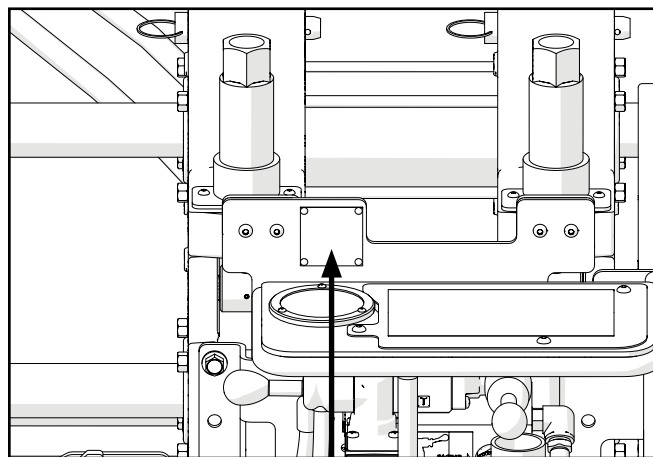
This product is shipped with a printed operator's manual. If the manual becomes lost or damaged, order a replacement manual or download and print a copy of the manual at www.mcelroy.com.

Nameplate Location

Every machine has a nameplate that includes the machine's model number, serial number, and power requirements. The model and serial numbers can be used to register the machine online and activate the warranty. Reference the warranty card for information on registering your product.



Vehicle Nameplate



Carriage Nameplate

Replacement Parts

Refer to the McElroy parts finder at www.mcelroy.com to locate parts for purchase. Reference the model number on the nameplate of the machine when using the parts finder.

Contact your McElroy distributor to order replacement parts. Find your closest distributor on our website at www.mcelroy.com.

Legacy Equipment

Refer to the Pit Bull® Operator's Manual (T5034102) included with your Pit Bull package for instructions on the operation of legacy carriages on a rolling vehicle.

Limited Warranty

McElroy Manufacturing, Inc. (McElroy) warrants all products manufactured, sold and repaired by it to be free from defects in materials and workmanship, its obligation under this warranty being limited to repairing or replacing at its factory and new products, within **5 years** after shipment, with the exception of purchased items (such as electronic devices, pumps, switches, etc.), in which case that manufacturer's warranty applies. Warranty applies when returned freight is prepaid and which, upon examination, shall disclose to have been defective. This warranty does not apply to any product or component which has been repaired or altered by anyone other than McElroy or has become damaged due to misuse, negligence or casualty, or has not been operated or maintained according to McElroy's printed instructions and warnings. This warranty is expressly in lieu of all other warranties expressed or implied. The remedies of the Buyer are the exclusive and sole remedies available and Buyer shall not be entitled to receive any incidental or consequential damages. Buyer waives the benefit of any rule that disclaimer of warranty shall be construed against McElroy and agrees that such disclaimers herein shall be construed liberally in favor of McElroy.

Return of Goods

Buyer agrees not to return goods for any reason except upon the written consent of McElroy obtained in advance of such return, which consent, if given, shall specify the terms and conditions and charges upon which any such return may be made. Materials returned to McElroy for warranty work, repair, etc., **must have a Return Material Authorization (RMA) number**, and be so noted on the package at time of shipment. For assistance, inquiry shall be directed to:

McElroy Manufacturing, Inc.
P.O. Box 580550
833 North Fulton Street Tulsa, Oklahoma 74158-0550
PHONE: (918) 836-8611, FAX: (918) 831-9285.
EMAIL: fusion@McElroy.com

Note: Certain repairs, warranty work and inquiries may be directed to an authorized service center or distributor.

Disclaimer of Liability

McElroy accepts no responsibility of liability for fusion joints. Operation and maintenance of the product is the responsibility of others. We recommend qualified joining procedures be followed when using McElroy fusion equipment.

McElroy makes no other warranty of any kind whatsoever, express or implied; and all implied warranties of merchantability and fitness for a particular purpose which exceed the aforestated obligation are hereby disclaimed by McElroy.

Product Improvement

McElroy reserves the right to make any changes in or improvements on its products without incurring any liability or obligation to update or change previously sold machines and/or the accessories thereto.

Information Disclosed

No information of knowledge heretofore or hereafter disclosed to McElroy in the performance of or in connection with the terms hereof, shall be deemed to be confidential or proprietary, unless otherwise expressly agreed to in writing by McElroy and any such information or knowledge shall be free from restrictions, other than a claim for patent infringement, is part of the consideration hereof.

Proprietary Rights

All proprietary rights pertaining to the equipment or the components of the equipment to be delivered by McElroy hereunder, and all patent rights therein, arising prior to, or in the course of, or as a result of the design or fabrication of the said product, are exclusively the property of McElroy.

Law Applicable

All sales shall be governed by the Uniform Commercial Code of Oklahoma, U.S.A.

Register your product online to activate your warranty: www.McElroy.com/fusion

(Copy information listed on the machine nameplate here for your records).

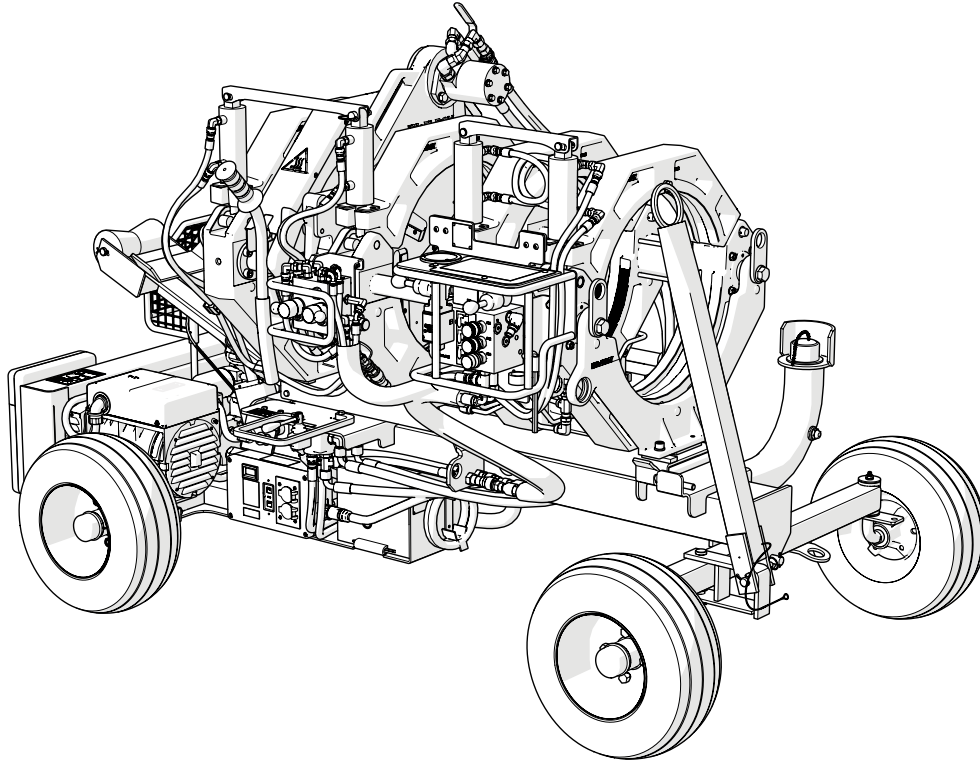
Model No. _____

Serial No. _____

Date Received _____

Distributor _____

SAFETY



CD03519-10-16-24

There can be several specific safety messages on this machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Please become familiarized with all safety messages.

Make sure that all of the safety messages on the machine are legible. Clean the safety messages or replace the safety messages if you cannot read the words. Replace if the illustrations are not legible. When you clean the safety messages, use a cloth, water and soap. Do not use solvent, gasoline, or other harsh chemicals to clean the safety messages. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the safety message or damage the print of the safety message.

Replace any safety messages that are damaged or missing. If a safety message is attached to a part that is replaced, install a safety message on the replacement part. New safety messages can be ordered from McElroy using the part number listed.

General Safety

Safety is important. Report anything unusual that you notice during set up or operation.

LISTEN for thumps, bumps, rattles, squeals, air leaks, or unusual sounds.

SMELL odors like burning insulation, hot metal, burning rubber, hot oil, or natural gas.

FEEL any changes in the way the equipment operates.

SEE problems with wiring and cables, hydraulic connections, or other equipment.

REPORT anything you see, feel, smell, or hear that is different from what you expect, or that you think may be unsafe.



SAFE1ST-5-22-23

Safety Equipment

Wear a hard hat, safety shoes, safety glasses, and other applicable personal protective equipment.

Remove jewelry and rings, and do not wear loose fitting clothing or long hair that could catch on controls or moving machinery. Remove any loose safety equipment during an operation that could be drawn into or caught in the machine.

Ensure proper fire prevention or other fire-fighting equipment is available and all personnel know how and when to use it.

Do Not Operate in a Hazardous Environment

⚠ DANGER

Electric motors and heaters are not explosion proof. Operation of these components in an explosive atmosphere will result in serious injury or death.

If operating in an explosive atmosphere, the carriage must be removed from the vehicle and the vehicle must be operated in a non-explosive atmosphere. The heater should be brought up to temperature in a non-explosive atmosphere, then unplugged before entering the explosive atmosphere for fusion.



WR00124-11-1-24

Fuel Handling

⚠ DANGER

Gasoline and diesel fuels are extremely flammable, and their vapors will explode if ignited.

Do not fill the fuel tank while the engine is hot or running as spilled fuel could ignite.

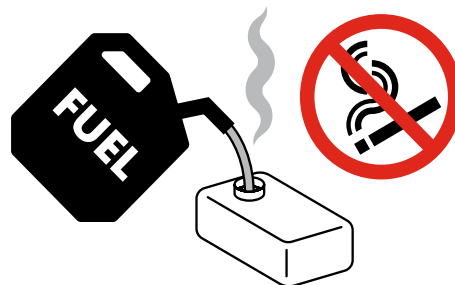
Always refuel on level ground.

Refuel in a well ventilated area. Do not smoke or allow flames or sparks in the area where the engine is refueled or where fuel is stored.

Do not start the engine near spilled fuel. Wipe up spills immediately.

Make sure the fuel tank cap is closed tightly and properly secured.

Avoid repeated or prolonged fuel contact with skin or breathing of fuel vapor.



Fuel-Handling-11-1-24

Unit With Engine

⚠ DANGER

Combustion engines can cause explosions when operated in an explosive atmosphere. Do not operate gas or diesel powered machines in an explosive atmosphere.

When operating in an explosive atmosphere, keep vehicle in a safe area by using the in-ditch kit.

Help prevent fires by keeping machine clean of accumulated trash, debris and facer shavings.

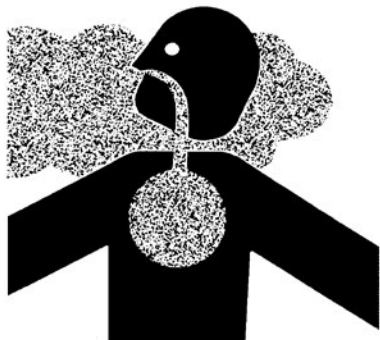


WR00124-11-1-24

Carbon Monoxide

DANGER

Engine exhaust gases contain poisonous carbon monoxide. Carbon monoxide can cause severe nausea, fainting and death. Avoid inhaling exhaust fumes, and never run the engine in a closed or confined area.



WR00093-11-1-24

Pipe Handling Safety

WARNING

Do not position yourself or any other personnel under supported or raised pipe. Pipe is heavy and could fall unexpectedly.

WARNING

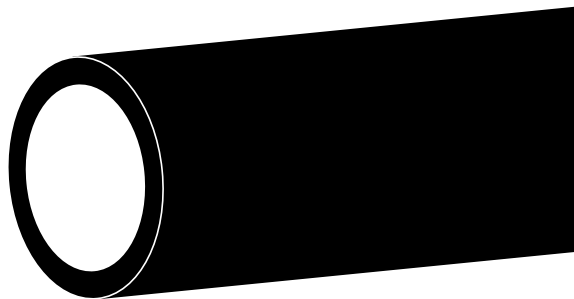
Pipe that is bent can store a great amount of energy. Do not bend and force the pipe into the machine. A bent pipe with stored energy can generate tremendous force when that energy is released.

It is recommended that the pipe is always held securely by either being clamped in the fusion machine jaws or properly attached to a lifting device.

NOTICE: Do not leave machine unattended to unauthorized personnel. Do not allow unauthorized personnel to operate the machine.

Keep persons that are not involved in handling pipe away from pipe handling operations. Keep away from the pipe when the pipe and handling equipment are in motion. When in motion, all persons involved in handling pipe should be able to see all other persons at all times. If any handling person is not in sight, immediately stop moving equipment and pipe and locate that person. Do not continue until all persons are accounted for and in sight.

Never push, roll, dump or drop pipe lengths, bundles or coils off the delivery truck, off handling equipment, or into a trench. Always use appropriate equipment to lift, move, and lower the pipe.

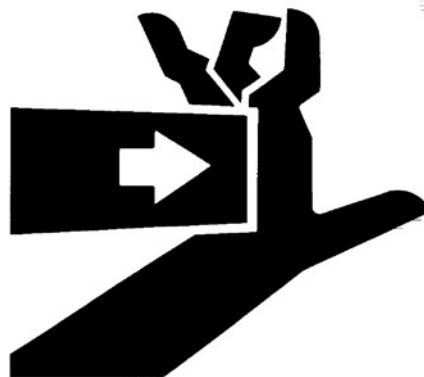


WR00123-11-1-24

Crush Points

WARNING

Hydraulically operated equipment operates under high pressure and generates extremely high forces. Anything inadvertently caught in the machine will be crushed. Keep fingers, feet, arms, legs, and head out of the machine while hydraulics are activated. Always ensure machine power is off before entering the machine for any reason.



WR00012-11-1-24

Battery

⚠ WARNING

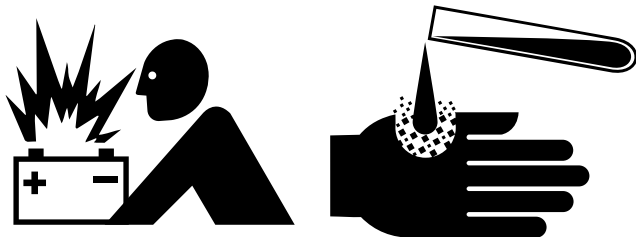
Do not expose the battery to flames or electrical sparks. Hydrogen gas generated by the battery is explosive. Serious injury can result from an exploding battery.

⚠ WARNING

The battery contains acid that can cause burns. Do not allow battery fluid to contact your skin, eyes, fabrics, or painted surfaces. After touching a battery or battery cap, do not touch or rub your eyes.

Eye Contact: Flush eyes with large amounts of water for at least 15 minutes. Seek immediate medical attention if eyes have been exposed directly to acid.

Skin Contact: Flush affected area(s) with large amounts of water using deluge emergency shower, if available, for at least 15 minutes. Remove contaminated clothing. If symptoms persist, seek medical attention.



WR00125-11-1-24

WR00126-11-1-24

Electrical Safety

⚠ WARNING

Always ensure equipment is properly grounded. It is important to remember that you are working in a wet environment with electrical devices. Proper ground connections help to minimize the chances of an electrical shock.

Frequently inspect electrical cords and unit for damage. Have damaged components replaced and service performed by a qualified electrician.

NOTICE: Always connect units to the proper power source as listed on the unit, or in the owner's manual.

NOTICE: Disconnect the machine from the power source before attempting any maintenance or adjustment.



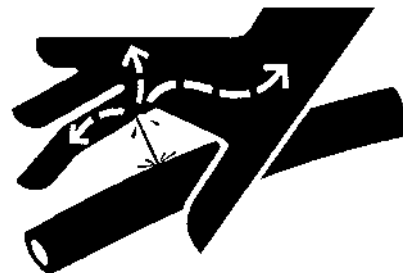
WR00065-11-1-24

Unit With Hydraulics

It is important to remember that a sudden hydraulic oil leak can cause serious injury and can even be fatal if the pressure or oil temperature is high enough.

⚠ WARNING

Escaping fluid under pressure can penetrate the skin causing serious injury. Keep hands and body away from pinholes which eject fluid under pressure. Use a piece of cardboard or paper to search for leaks. If any fluid is injected into the skin, it must be immediately removed by a doctor familiar with this type of injury.



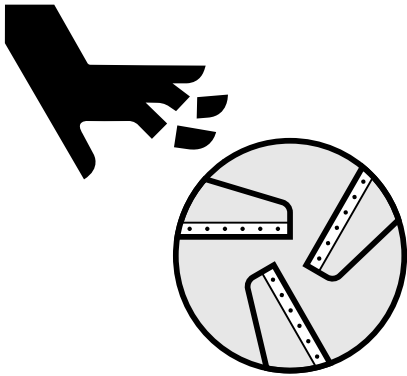
WR00078-11-1-24

Facer Blades Are Sharp

⚠ WARNING

Facer blades are sharp and can cut. Use care when operating the facer and when handling the unit.

NOTICE: Never extend the facer blades beyond the inner or outer circumference of the facer.



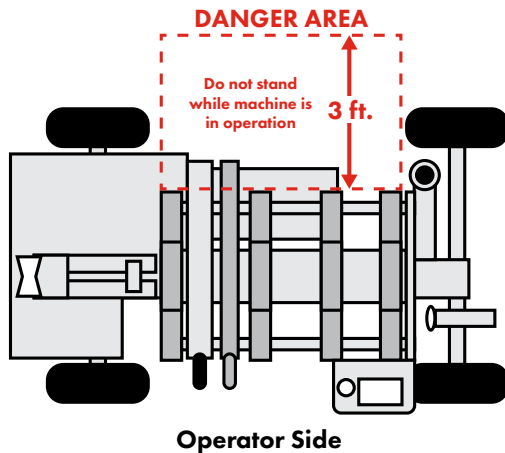
WR00122-11-1-24

Stand Clear

⚠ WARNING

Heater and facer pivot out rapidly and can cause severe bodily injury if someone is standing too close. All personnel must stand clear of the back of the machine when operating.

Be aware of yourself and others when operating this machine and when sections of pipe are being moved.

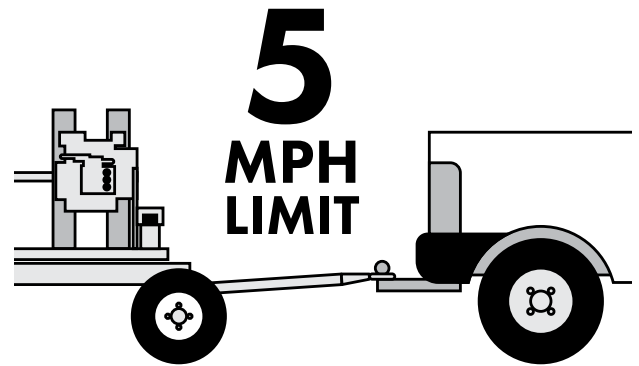


WR00128-11-1-24

Do Not Tow Fusion Machine at Speeds Greater Than 5 MPH

⚠ WARNING

The vehicle is not designed for over-the-road towing. Towing speeds greater than five miles per hour can result in machine damage as well as injury. Always transport the machine on a flat bed trailer, or by similar means, properly secured.

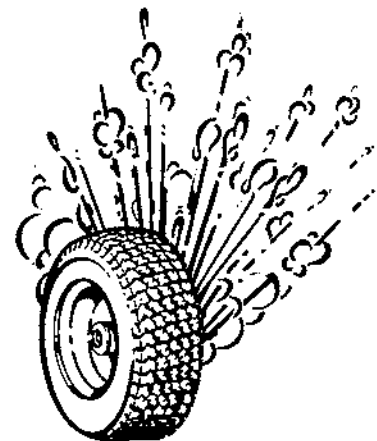


WR00129-11-1-24

Service Tires Properly

⚠ WARNING

Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion resulting in serious injury or death. Tires should be mounted by experienced personnel with access to proper equipment.

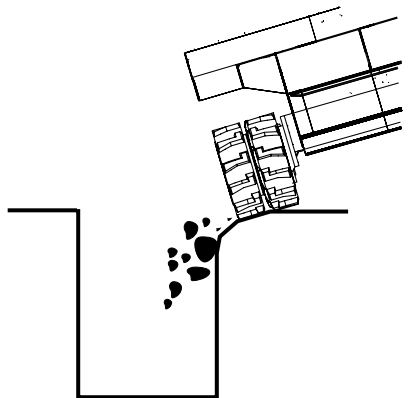


WR0083-11-1-24

Keep Machine Away From Edge of Ditch

⚠ WARNING

Heavy equipment too close to a ditch can cause the walls of the ditch to cave-in. Keep the machine far enough away from the edge of the ditch to prevent personnel injury and equipment damage resulting from a cave-in.



WR00115-11-1-24

Lifting Safety

Follow all applicable federal, state, local, and industry specific regulations when lifting.

⚠ WARNING

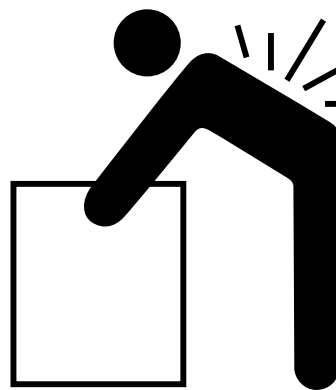
Safety warnings:

1. Do not operate a damaged or malfunctioning lifting device.
2. Do not lift persons.
3. Do not lift a suspended load over persons.
4. Do not leave a suspended load unattended.
5. Do not remove or obscure warning labels.
6. Stay clear of the suspended load.
7. Lift loads only as high as necessary.
8. Employ generally accepted safe lifting practices.

Personal Lifting Safety

⚠ CAUTION

The machine components are heavy. Using one person to lift some machine components may result in an injury. Use two people to lift those machine components.



HeavyLifting-11-1-24

Heater is Hot

⚠ CAUTION

The heater is hot and will burn clothing and skin. Keep the heater protected from personnel when not in use and use care when handling heater and heating pipe.

NOTICE: Use only a clean, dry, lint-free, non-synthetic cloth to clean the heater plates.



Heater-Is-Hot-11-1-24

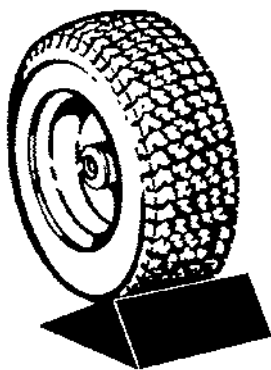
Positioning and Setting Fusion Machine

Position fusion machine on as level ground as possible.

Once the machine is in position, engage the wheel lock on the rear, operator side wheel.

If it is necessary to operate machine on unlevel grade, chock the wheels and block the unit to make it as stable as possible.

Make sure that the ground is stable. Some unstable conditions may be ice, snow, mud and loose gravel.

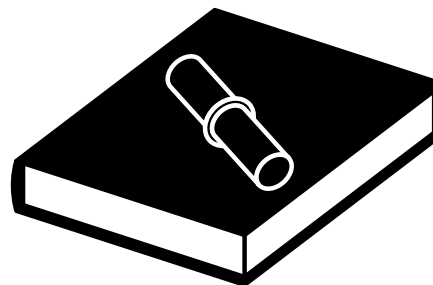


WR00076-11-1-24

Fusion Procedures

Obtain a copy of the pipe manufacturer's fusion procedures or appropriate joining standard for the pipe being fused. Follow the procedure carefully, and adhere to all specified parameters.

NOTICE: Failure to follow the pipe manufacturer's fusion procedures or appropriate joining standard could result in a bad fusion joint.



FusionStandard-11-1-24

Do Not Modify Machine

Make no modifications to your equipment unless specifically recommended or requested by McElroy.

Sound Information

The operator position Equivalent Sound Pressure Level for a gas-powered unit is 90 dB(A) max at full engine RPM. This is measured from the operator location at the carriage of the machine.

The operator position Equivalent Sound Pressure Level for an electric unit is 70 dB(A) max at full engine RPM. This is measured from the operator location at the carriage of the machine.

Hearing protection may be needed when this machine is operated or when in a noisy environment.

GENERAL INFORMATION

Theory of Butt Fusion

The principle of heat fusion is to heat two pipe surfaces to a designated temperature, and then fuse them together by application of force. This develops pressure which causes flow of the melted materials which causes mixing, and thus, fusion. When the thermoplastic material is heated, the molecular structure is transformed into an amorphous condition. When fusion pressure is applied, the molecules from each thermoplastic part mix. As the joint cools, the molecules return to their form, the original interfaces are gone, and the fitting and pipe have become one monolithic unit. A strong, fully leak tight connection is the result.

The principal operations include:

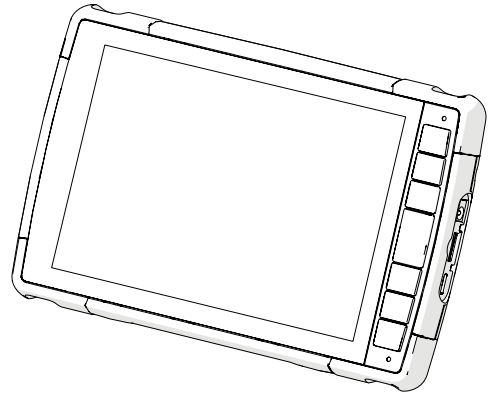
- | | |
|-------------------|--|
| Clamping | The pipe pieces are held axially and radially to allow all subsequent operations to take place. |
| Facing | The pipe ends are faced to establish clean, parallel mating surfaces perpendicular to the centerline of the pipes. |
| Aligning | The pipe ends are aligned with each other to minimize mismatch of the pipe walls. |
| Heating | A melt pattern that penetrates into the pipe is formed around both pipe ends. |
| Fusing | The melt patterns are joined with a specified force, which is constant around the pipe interfacial area. |
| Cooling | The fusion joint is held immobile with a specified force until adequately cooled. |
| Inspecting | Visually examine the entire circumference of the joint for compliance with the standard or fusion procedure used. |



PH01269-2-1-98

DataLogger® Integration

The DataLogger 7 can be integrated into the operation of this machine as an optional accessory to determine fusion pressure, log fusion joints and store fusion joint data in the Vault™.



The DataLogger can be connected to the carriage using the DataLogger port located on the carriage manifold. See [Carriage Assembly](#) for exact location.

Items needed for DataLogger integration:

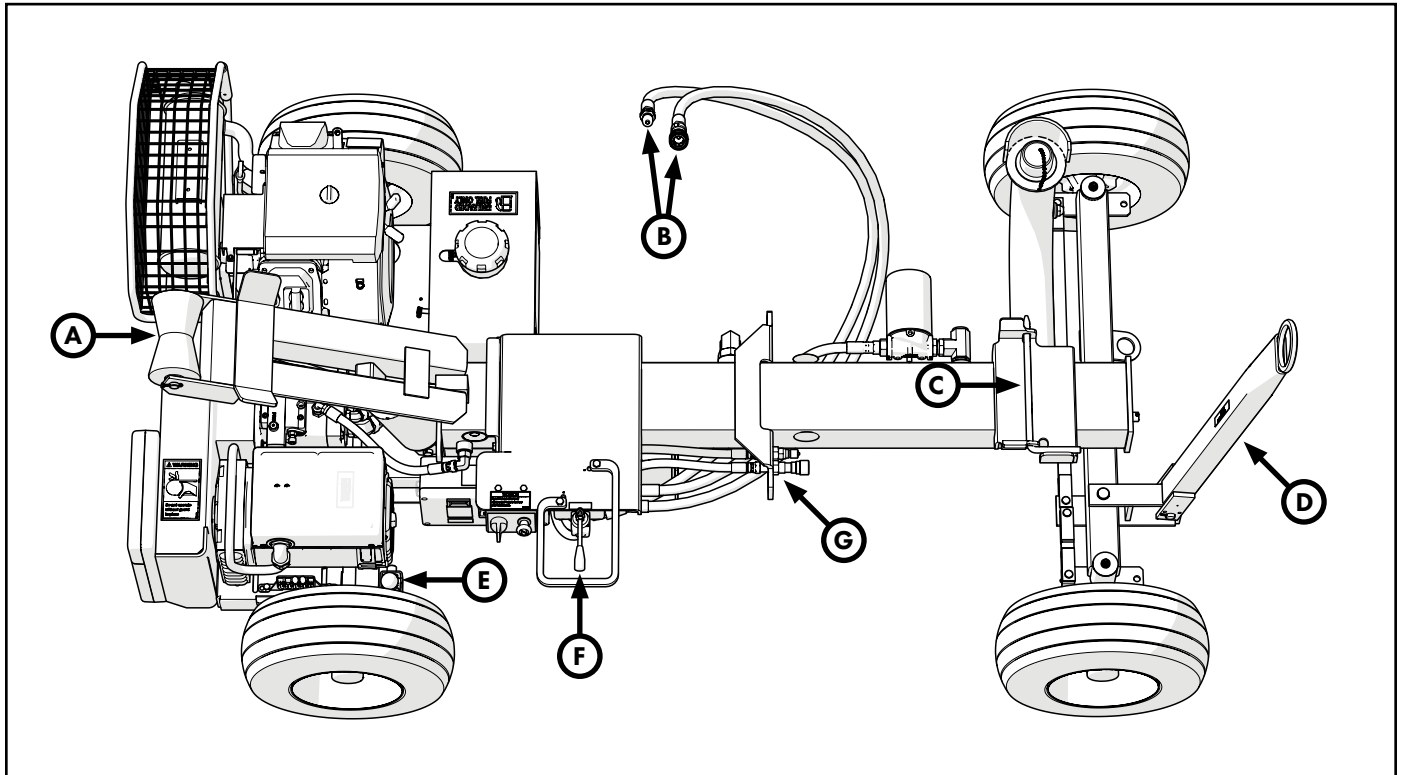
- DataLogger 7 Package (DLP0857716)
- DataLogger Tablet Mounting Assembly (T18P1012951)

NOTICE: A DataLogger is required for performing firmware updates on the heater control module.

Items needed for HCM firmware updates:

- DataLogger 7 Package (DLP0857716)
- TracStar iSeries Tablet Cable (MLEP0853263)

See [Guided Firmware Update](#) for more information regarding the HCM firmware update process.



CD03518-10-16-24

Nomenclature

Vehicle

The carriage assembly is mounted on a four-wheel vehicle for mobility around a job site and along a pipeline.

NOTICE: The vehicle is not designed for over-the-road towing.

A - Pipe Lift

Used to raise and lower pipe.

B - Facer Hydraulic Quick Disconnects

Connects the pressure and return tank lines to supply hydraulic fluid to the facer.

C - Carriage Skid Mounting Pin

Secures 4-jaw carriage skid to the vehicle.

D - Tow Bar

Used to tow machine for positioning on-site.

E - Wheel Lock

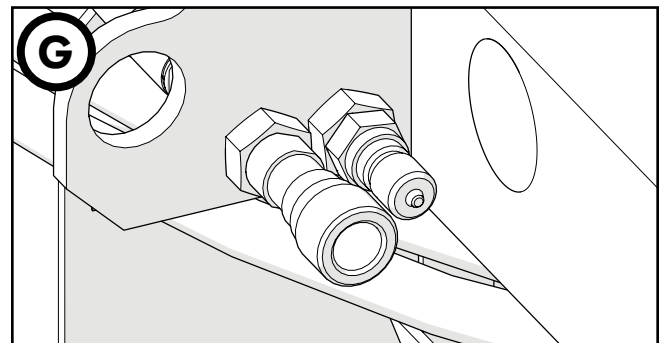
Used to prevent rolling and keep the machine stationary during fusion operation and transport.

F - Pipe Lift Control

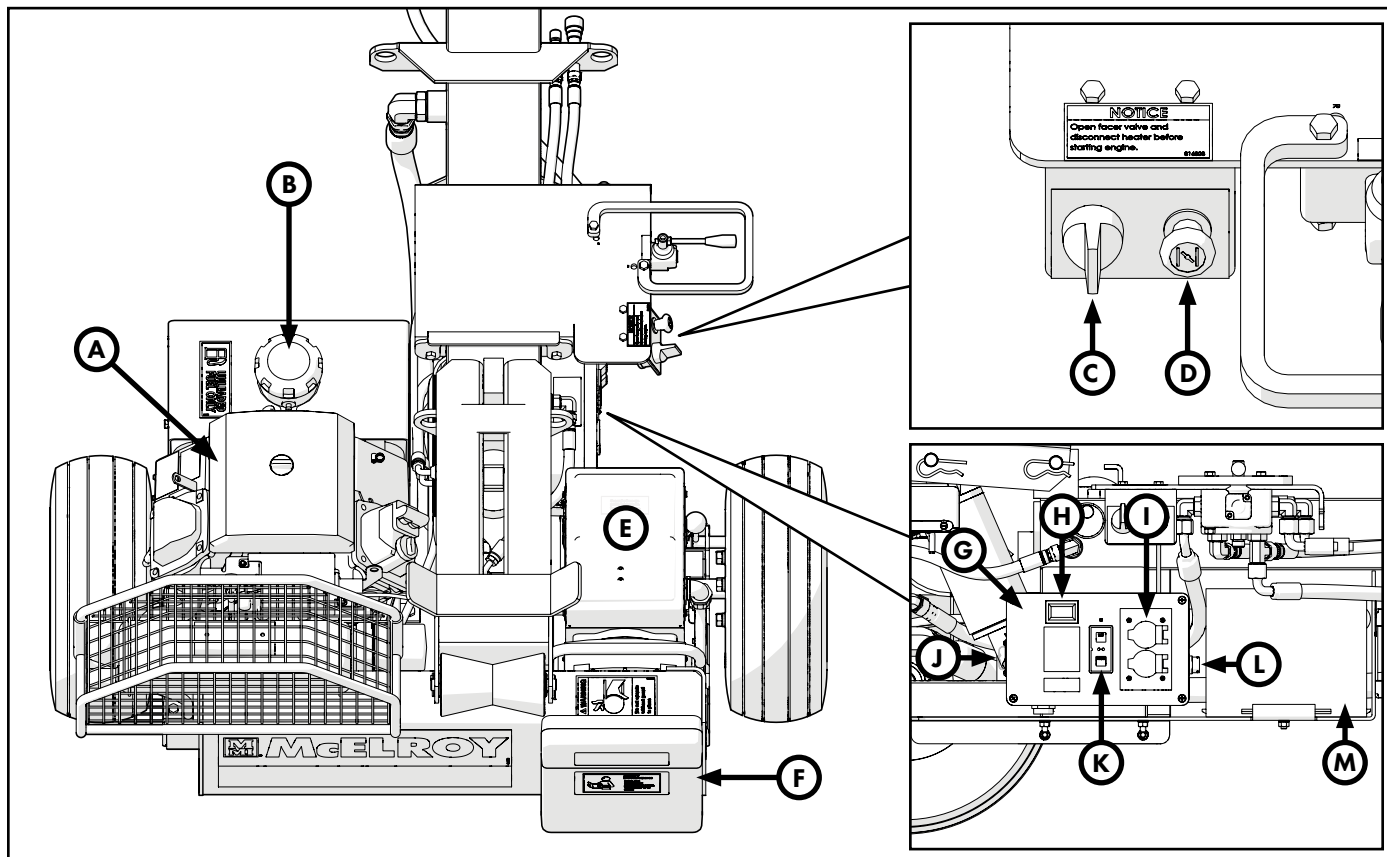
Lever used to raise and lower the pipe lift.

G - Carriage Bulkhead

Contains the carriage hydraulic quick disconnects.



CD03517-10-15-24



CD03523-10-16-24

Gas-Powered Units

⚠ DANGER

Combustion engines can cause explosions and other unmanaged behavior when operated in an explosive atmosphere. Do not operate gas or diesel powered machines in an explosive atmosphere.

When operating in an explosive atmosphere, keep the vehicle in a safe area by using the in-ditch kit.

The following components are specific to gas-powered units.

A - Gas Engine

Powers machine. See [Gas Engine](#) for more information.

B - Unleaded Fuel Cap

Unleaded fuel tank cap. Use unleaded fuel only.

C - Engine Key Switch

Used to start and stop the engine.

D - Engine Choke Control

Manual choke control for starting engine.

E - Generator

Generator fuses are located underneath the generator cover. Spare fuses are stored behind the rear, operator side tire.

F - Literature Compartment

Stores the operator's manual, engine service manual and other important documents pertaining to the machine.

G - GFCI Box

Supplies power to the heater.

H - Voltmeter

Displays AC generator voltage.

I - NEMA Receptacles

Used to power hand-held heaters.

J - GFCI Box 25A Breaker Switch

Provides overcurrent protection.

K - GFCI Sensing Module

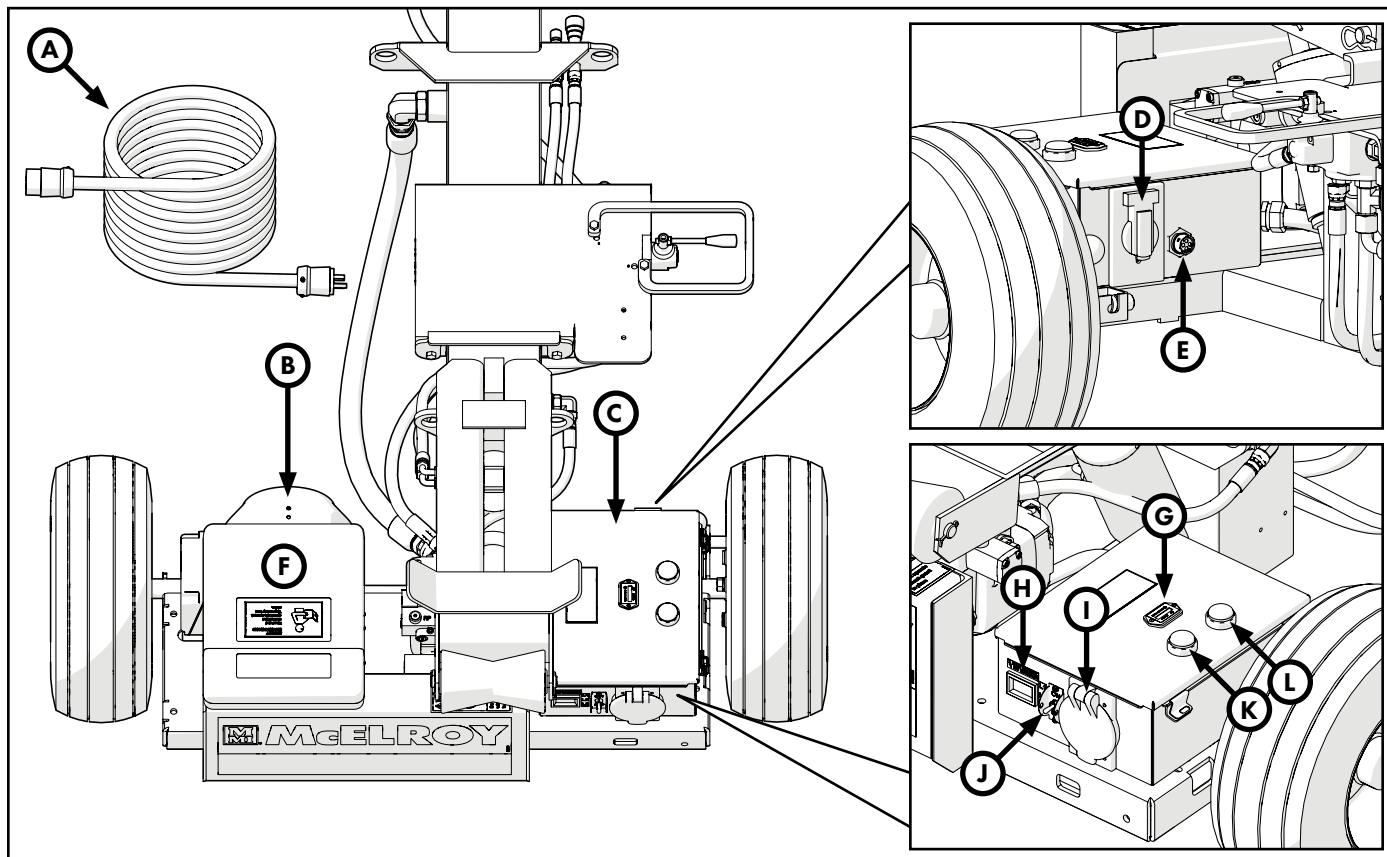
Senses leakage current to ground. Contains a test and reset button.

L - Heater Power Connector

Connects heater power to the carriage.

M - 12 Volt Battery

Provides power for starting engine.



CD03527-10-17-24

Electric Units

⚠ WARNING

Always ensure equipment is properly grounded. It is important to remember that you are working in a wet environment with electrical devices. Proper ground connections help to minimize the chances of an electrical shock.

Frequently inspect electrical cords and unit for damage. Have damaged components replaced and service performed by a qualified electrician.

The following components are specific to electric units.

A - Power Cable

Connects machine to power source.

B - Electric Motor

Powers hydraulic pump.

C - Electrical Box

Provides power to electric motor. Fuses and relays are located underneath the electrical box cover. Spare fuses are stored behind the rear, operator side tire.

D - NEMA Receptacle

Used to power hand-held heaters.

E - Heater Power Connector

Connects heater power to the carriage.

F - Literature Compartment

Stores the operator's manual and other important documents pertaining to the machine.

G - Hour Meter

Displays total hours of operation.

H - Voltmeter

Displays incoming voltage.

I - Main Power Receptacle

Receives power cable from external power source.

J - Voltmeter Selector Switch

Allows selection between the three incoming phases of the electrical system.

K - Power On Button

Powers machine on.

L - Power Off Button

Powers machine off.

Carriage Assembly

The Pit Bull® 412 and 618 carriage assemblies consist of two fixed jaws and two hydraulically operated movable jaws.

The carriage assemblies can be removed from the vehicle in a 3-Jaw or 4-Jaw configuration.

The carriage assemblies are equipped with manual jaw clamp knobs or hydraulic jaw clamps.

A - Fixed Jaws

Two fixed jaws. The outer fixed jaw can be removed to allow more area for fusing tees and fittings.

B - Movable Jaws

Two hydraulically operated movable jaws.

C - Jaw Clamp Knobs

Used to clamp and unclamp the upper jaws. Use the speed wrench to tighten and loosen jaw clamp knobs.

D - Lift Point Brackets

Used to lift the carriage when needed. The brackets on the outer fixed jaw can be removed and installed on the inner fixed jaw for lifting the carriage in a 3-jaw configuration.

Refer to the ["Lifting and Transport"](#) section for procedure.

E - Speed Wrench

Used to quickly tighten and loosen jaw clamp knobs.

F - 3/8" Hex Key

Hex key used to remove 3-jaw carriage, outer fixed jaw, jaw brace mounting bolts and lift point bracket mounting bolts.

G - Crossbar Quick Pin

Used to quickly unpin the crossbar from the inner fixed clamping cylinder to allow the pivoting of the heater and facer between the fixed jaws and removal of the outer fixed jaw on machines equipped with hydraulic jaw clamps.

H - Hydraulic Jaw Clamps

Hydraulic jaw clamps are hydraulically operated for clamping and unclamping the upper jaws. There are crossbars connecting both clamping cylinder sets (fixed jaws and movable jaws) that are used for supporting the clamping cylinders while clamping and unclamping.

I - Hydraulic Jaw Clamp Control Knobs

Used to extend and retract hydraulic jaw clamping cylinders. The right knob controls the movable jaw clamps and the left controls the fixed jaw clamps.

J - Control Assembly Cover

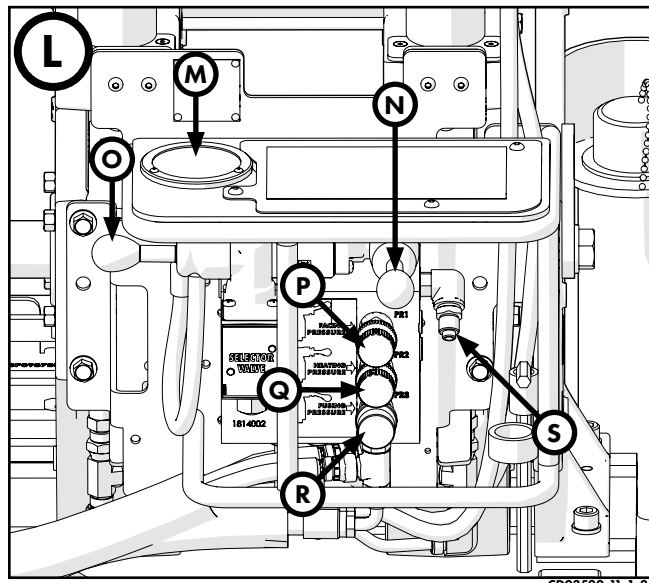
The control assembly cover is removed to reveal a mounting point for a DataLogger.

K - Fixed Jaw Braces

Two jaw braces are installed between the outer fixed jaw and the inner fixed jaw and are removed for outer fixed jaw removal and 3-jaw carriage removal.

L - Three-Position Carriage Manifold

Used to adjust facing, heating and fusion pressure and control the opening and closing of the carriage.



M - Carriage Pressure Gauge

A 2000 psi pressure gauge.

N - Carriage Directional Valve

Used to open and close the carriage at the selected pressure and put the carriage in neutral.

O - Selector Valve

Used to switch between the three pressures set by the pressure adjustment valves.

P - Facing Pressure Reducing Valve

Used to adjust facing pressure - Max: 400 psi.

Q - Heating Pressure Reducing Valve

Used to adjust heating pressure - Max: 400 psi.

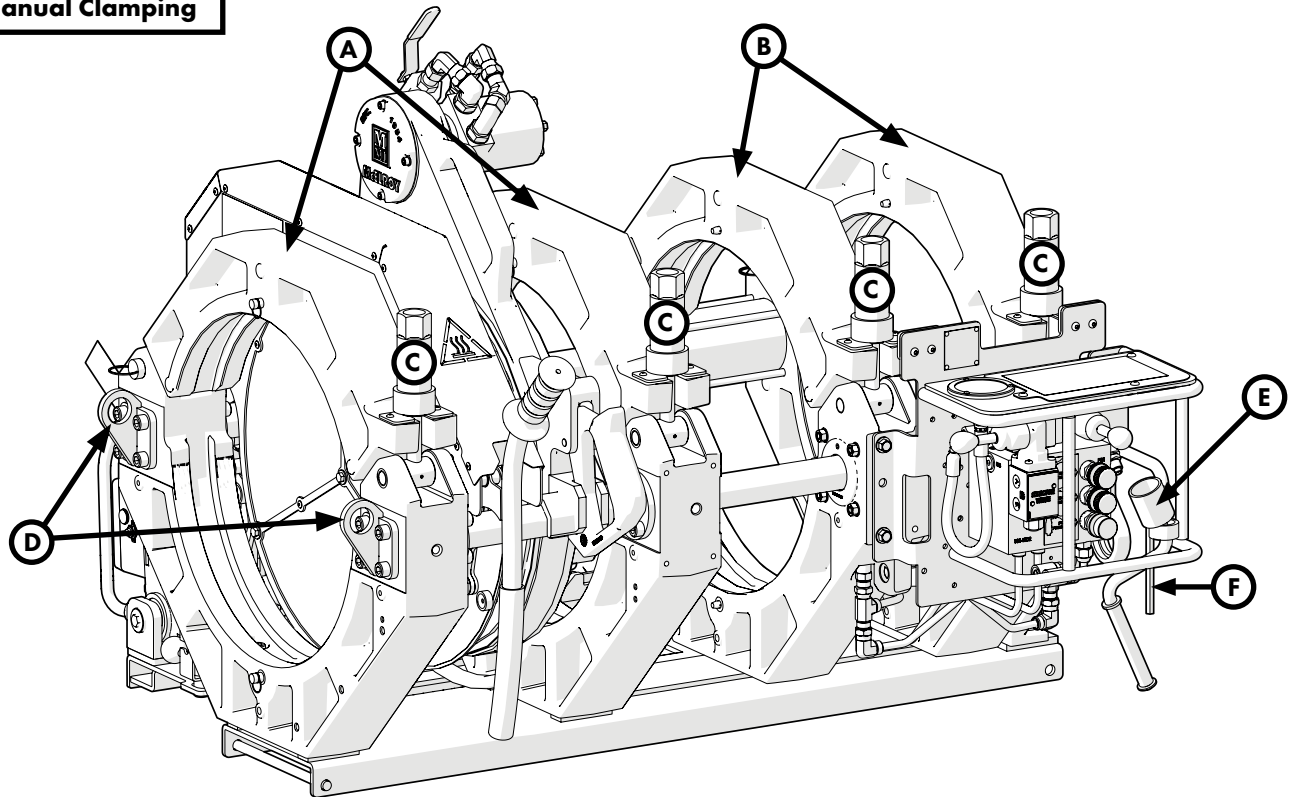
R - Fusion Pressure Reducing Valve

Used to adjust fusion pressure - Max: 1200 psi.

S - DataLogger Port

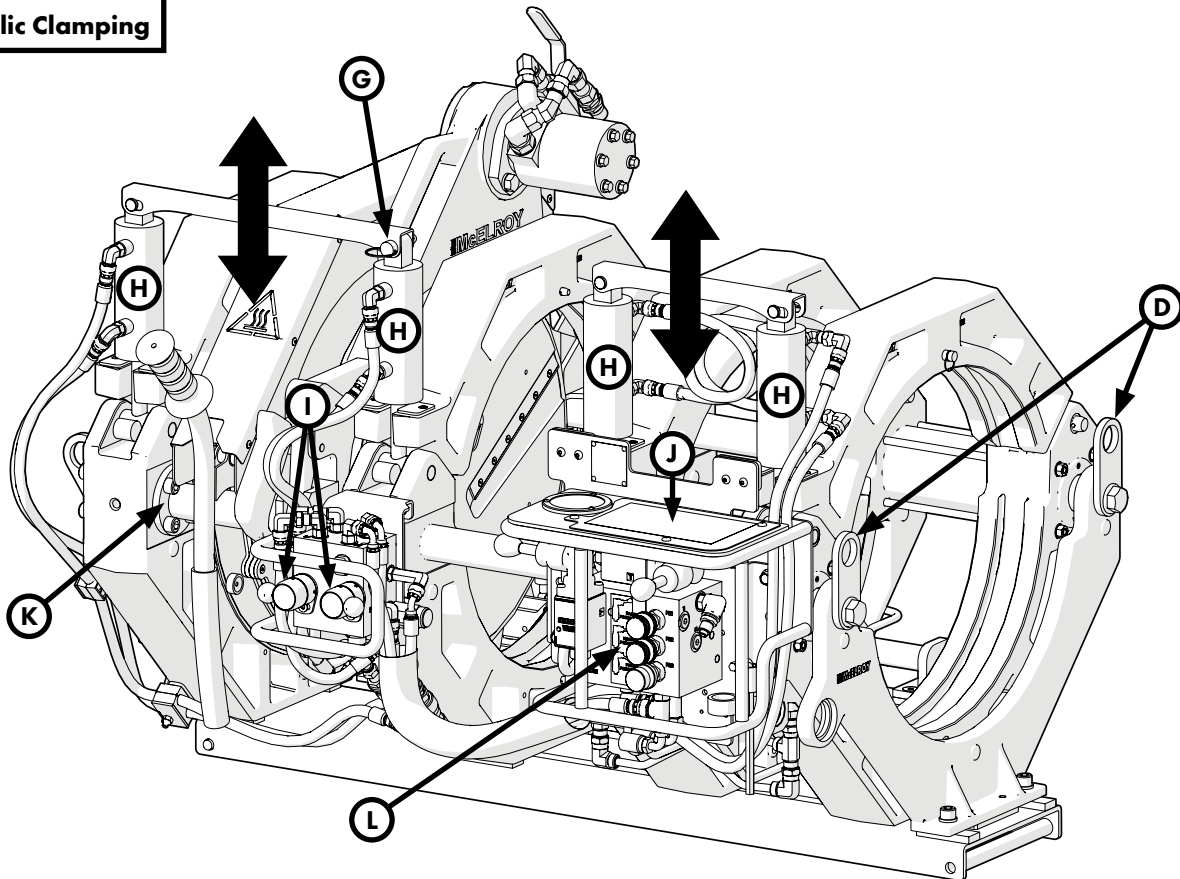
Used to connect a DataLogger for logging fusion joints.

Manual Clamping

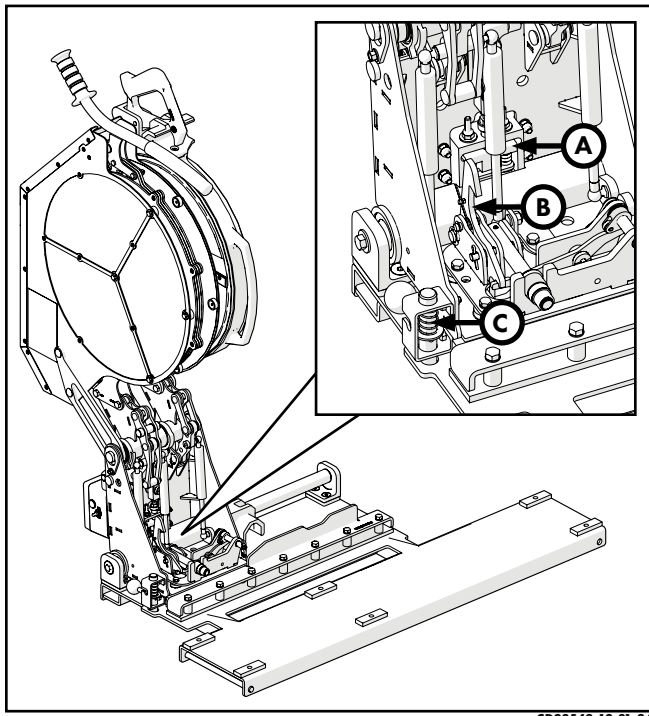


CD03522-10-16-24

Hydraulic Clamping



CD03521-10-16-24



CD03542-10-31-24

Indexer Assembly

The indexer assembly allows facer and heater movement along a guide rod for fusion operation.

The indexer assembly is attached to the 4-jaw carriage skid and can be removed from the vehicle along with the 4-jaw carriage for off-vehicle fusion operation.

A - Indexer Brake

Prevents free indexer motion while towing the vehicle or operating on an incline.

B - Heater Latch Release Lever

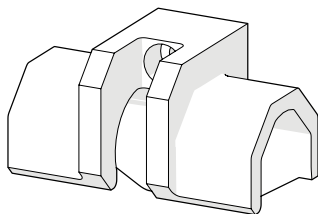
Allows heater retention and disengages the heater latch for automatic heater removal during fusion operation.

C - Indexer Stowage Lock

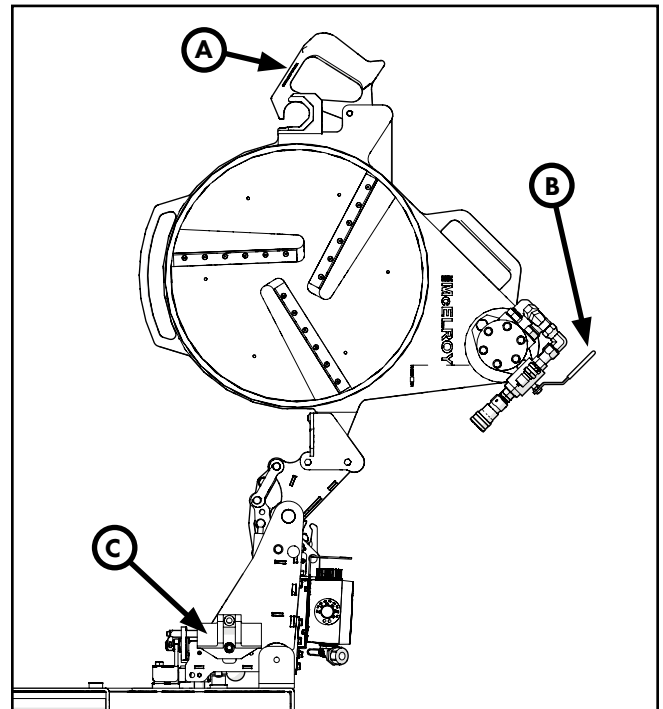
Used to secure the indexer in the stowage position for transport.

Refer to the ["Indexer Operation"](#) section for further information on operating the indexer.

The facers in-ditch guide rod bracket is stored on the indexer when not in use.



See [Facer](#) for in-ditch guide rod bracket storage location.



CD03543-10-31-24

Facer

The facer is a rotating planer-block design. The blade holders each contain three blades and are chain driven (enclosed in lubricant) by a hydraulic motor.

⚠ WARNING

Facer blades are sharp and can cut. Use care when operating the facer and when handling the unit.

NOTICE: Never extend the facer blades beyond the inner or outer circumference of the facer.

A - Facer Latch Handle

Used to latch the facer to the guide rod for facing and unlatch the facer from the guide rod.

B - Facer Valve

Used to turn the facer on and off. Open the valve to turn the facer on and close the valve to turn the facer off.

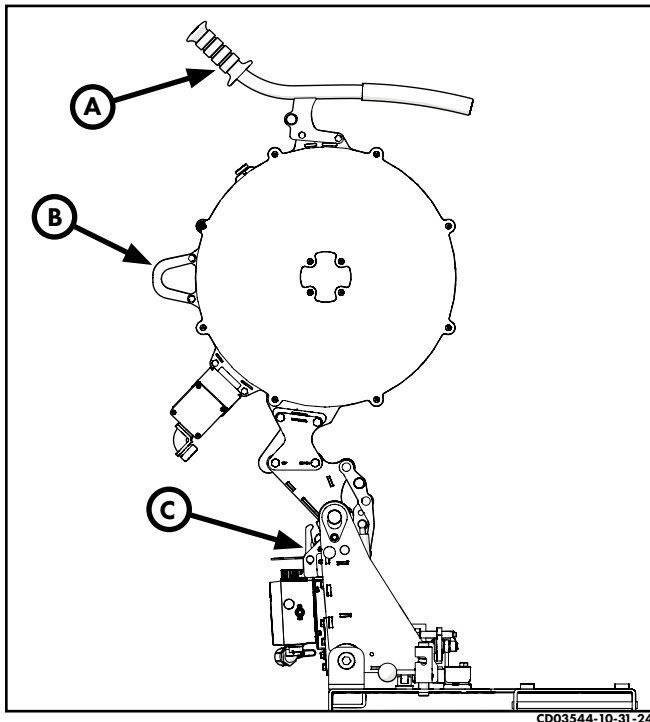
C - In-Ditch Guide Rod Bracket

Installed onto the facer for 3-jaw facing. Stored on the indexer assembly when not in use.

When needed for 3-jaw operation, the facer can be removed from its indexer pivot arm.

The optional in-ditch kit is needed for off-vehicle fusion operation.

See [Facer Removal](#) in the Special Operations section for facer removal procedure.



CD03544-10-31-24

Heater

The heater is equipped with heater butt plates coated with an anti-stick coating.

⚠ DANGER

This heater is not explosion proof. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

⚠ CAUTION

The heater is hot and will burn clothing and skin. Keep the heater protected from personnel when not in use and use care when handling heater and heating pipe.

A - Heater Handle

Used to pivot the heater in and out of the carriage.

B - Lift Point

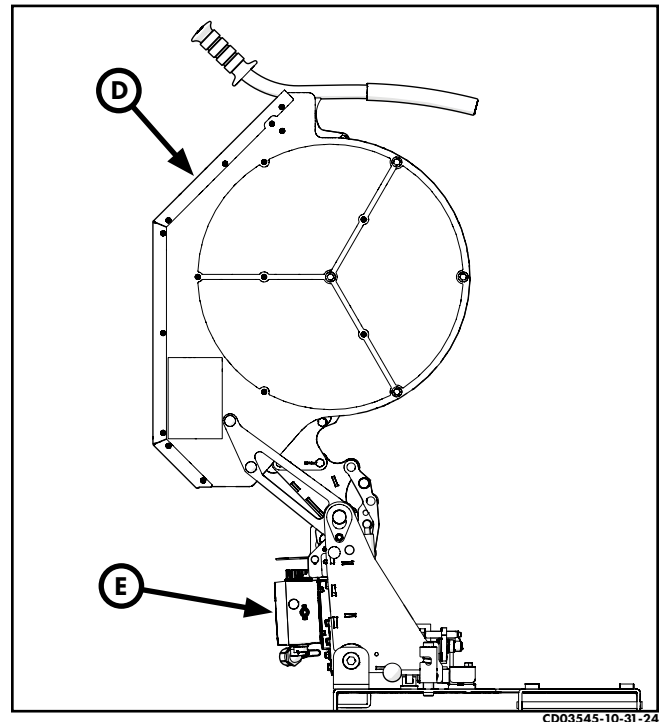
Used to hoist the heater for heater removal.

C - Heater Retention Mechanism

Used for mid-stroke heater retention and can be used to disengage the heater from mid-stroke latch positions.

D - Heater Bag Frame

Protects and insulates the heater. The heater bag frame can be pivoted out by hand independently or simultaneously with the heater when stowed. The heater bag frame must be manually pivoted onto the heater for stowage.



CD03545-10-31-24

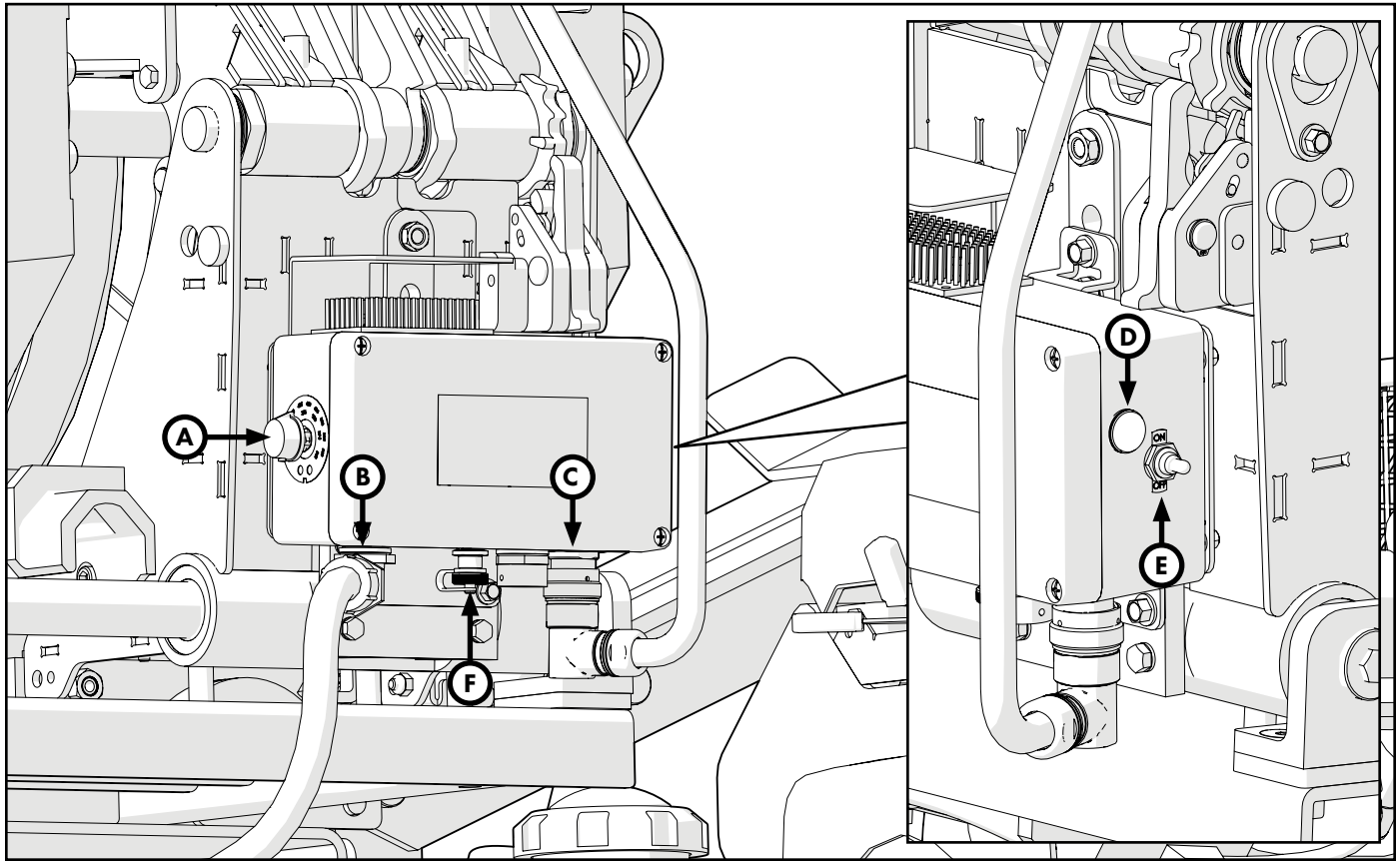
E - Heater Control Module

Used to turn the heater on and off and control heater temperature. See [Heater Control Module \(HCM\)](#) for more information.

When needed for 3-jaw operation, the heater can be removed from its indexer pivot arm.

The optional in-ditch kit is needed for off-vehicle fusion operation.

See [Heater Removal](#) in the Special Operations section for heater removal procedure.



CD03541-10-31-24

Heater Control Module (HCM)

The heater control module is mounted to the back of the indexer assembly and allows heater temperature adjustment.

⚠ WARNING

Ensure heater power is off before connecting or disconnecting heater power cables. Failure to do so may result in electrical shock.

A - Temperature Adjustment Dial

Used to increase and decrease heater temperature.

B - Power Connector

Connects the HCM to the machines power source.

C - Heater Connector

Connects the heater to the HCM.

D - Indicator Light

Indicates heater and heater controller status. A steady red light indicates the heater is preheating. A steady green light indicates the heater has reached set temperature. The indicator light also indicates any present faults with blink codes.

Refer to the "[Faults](#)" section of this manual for more information on indicator light blink codes.

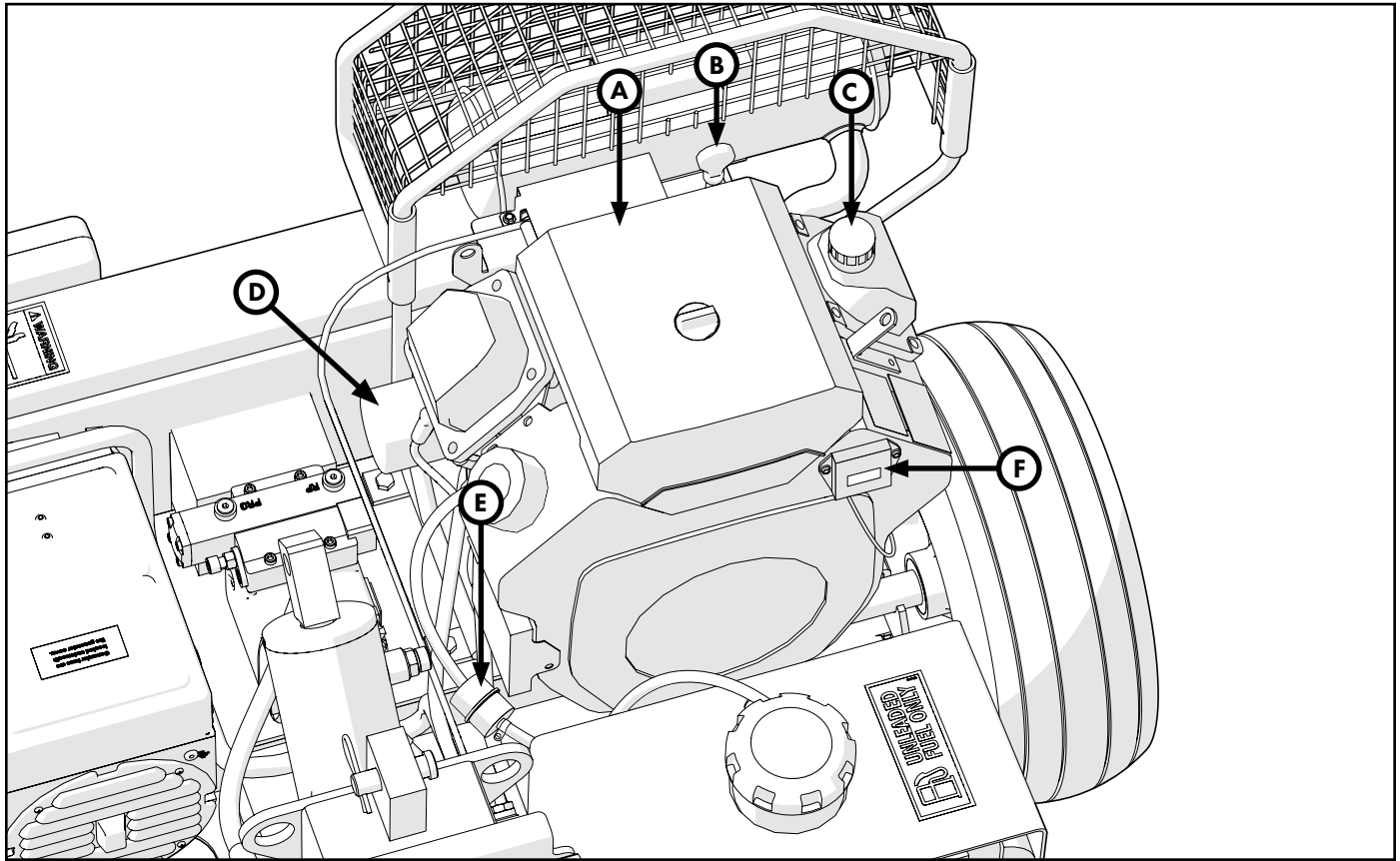
E - Heater On/Off Switch

Turns heater on and off.

F - HCM Programming Port

Connects the DataLogger to the heater control module for firmware updates. Located on the bottom of the HCM.

See [Guided Firmware Update](#) for more information regarding the HCM update process.



CD03538-10-30-24

Gas Engine

Read and understand the engine service manual before operating. The engine service manual is included with this machine and can be found inside the literature box.

A machine with an Unleaded Fuel Only label has an engine capable of using unleaded fuel only.



⚠ DANGER

Combustion engines can cause explosions and other unmanaged behavior when operated in an explosive atmosphere. Do not operate gas or diesel powered machines in an explosive atmosphere.

When operating in an explosive atmosphere, keep vehicle in a safe area by using the in-ditch kit.

The following components are specific to gas-powered units.

A - Air Filter Housing

Houses engine air filter. Open to replace air filter.

B - Engine Oil Dipstick

Used to check the oil level of the engine. Refer to engine operator's manual for checking oil and oil recommendations.

C - Engine Oil Fill

Filler neck for engine oil. Refer to engine operator's manual for checking oil and oil recommendations.

NOTICE: Only use API, SF, SG or SH 10W30 engine oil.

D - Engine Oil Filter

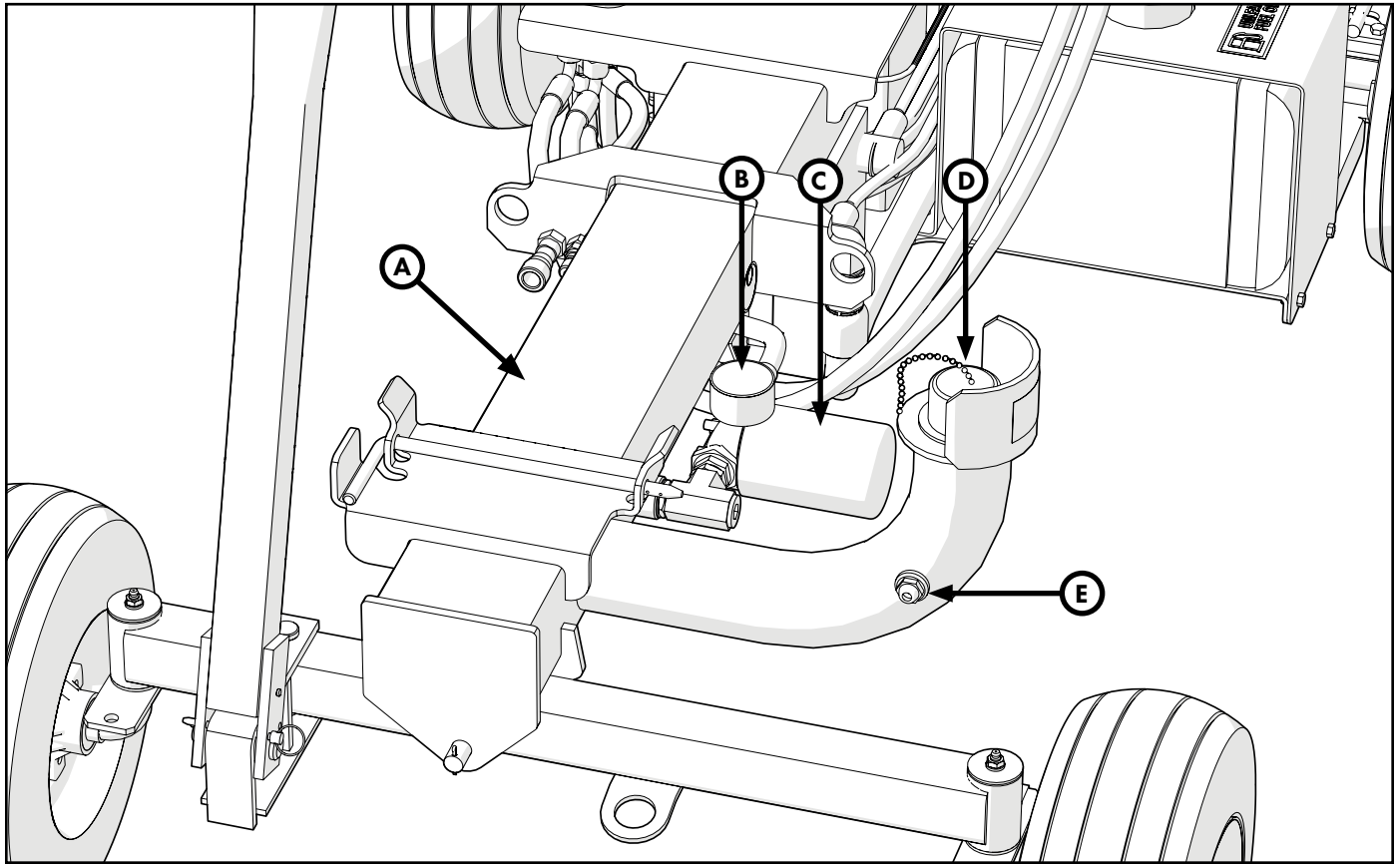
Filters engine oil.

E - Engine Fuel Filter

Filters fuel.

F - Tach and Hour Meter

Displays engine RPM when engine is running and total hours of operation when not running.



CD03535-10-22-24

Hydraulic System

Components such as the pipe lift, carriage and facer are operated by the hydraulic system.

A - Hydraulic Fluid Reservoir

Retains hydraulic fluid.

B - Filter Restriction Gauge

Displays hydraulic filter restriction and is used to indicate hydraulic filter replacement.

C - Hydraulic Filter

10 Micron hydraulic filter. Filters hydraulic fluid.

D - Hydraulic Fill Cap

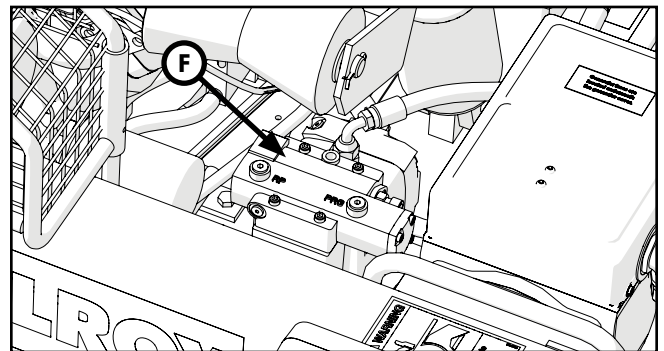
Refill hydraulic fluid by removing the hydraulic fill cap.

E - Hydraulic Fluid Level Sight Glass

Sight glass for ensuring hydraulic fluid is at the appropriate level.

F - Hydraulic Pump

Supplies hydraulic fluid to hydraulically operated components.



CD03536-10-30-24

Refer to the "[Maintenance](#)" section for hydraulic filter and fluid procedures.

Refer to the "[Hydraulic Fluids](#)" section for hydraulic fluid recommendations.

IMPORTANT: Drain hydraulic fluid before removing any component of the hydraulic system. A large amount of hydraulic fluid will leak from the system.

INDEXER OPERATION

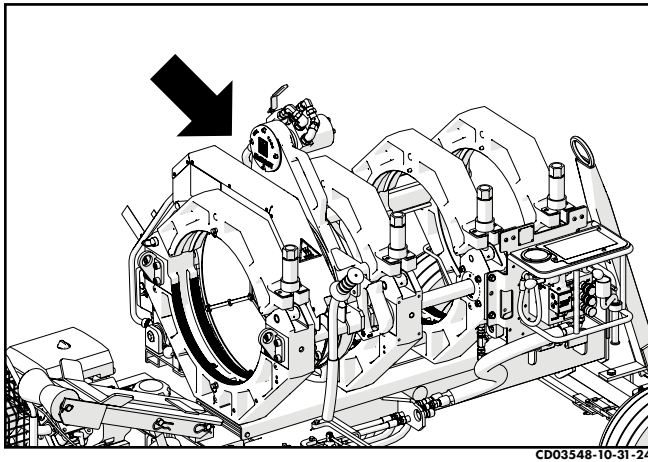
Overview

The indexer is mechanically operated to allow for automatic heater removal when performing fusions.

This section outlines the operation, functionality and recommended usage of the indexer.

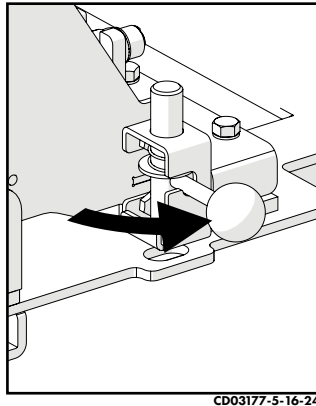
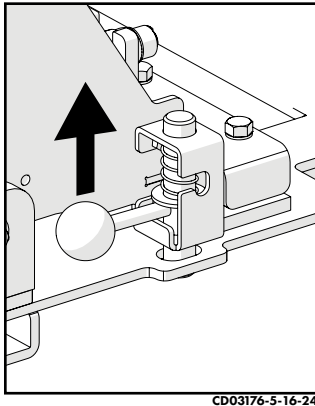
Unstowing Indexer

Upon arrival, the indexer will be secured in the stowage position between the fixed jaws. Return the indexer to the stowage position for transport and when not in use. See [Stowing Indexer](#) for stowing procedure.



To release the indexer from the stowage position, the indexer stowage lock must be disengaged.

To disengage the indexer stowage lock, lift the lock knob and rotate it into the retaining slot as shown.

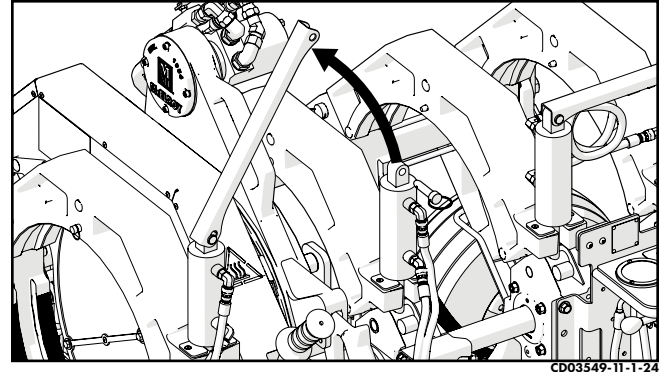


Once the stowage lock is disengaged, the facer, heater and heater bag frame must be pivoted out from between the fixed jaws.

The facer must be pivoted out first in order to unlatch and pivot the heater out from the stowage position.

If the machine is equipped with hydraulic jaw clamps, remove the crossbar quick pin and raise the crossbar to allow clearance for the heater and facer to be pivoted out of the carriage.

NOTICE: Retain all hardware for reinstallation of removed components.



As an alternative to this step, the fixed jaw hydraulic clamping cylinders can be extended and rotated out away from the upper jaws to allow clearance for the heater and facer.

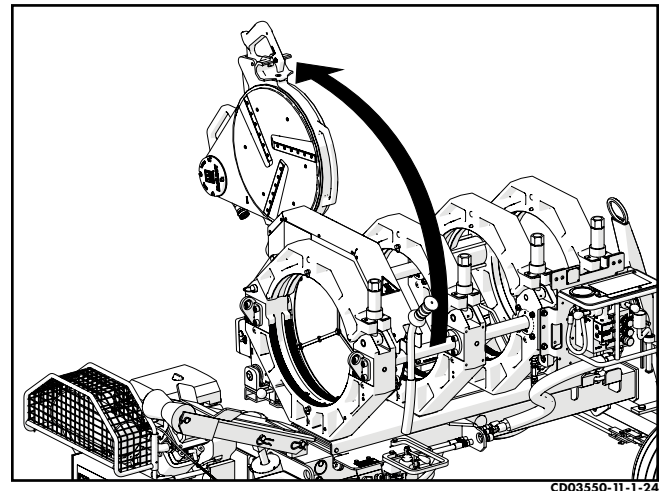
Refer to the ["Operation - Butt Fusion"](#) section for hydraulic jaw clamp operation.

Pivoting Facer Out:

⚠ WARNING

Heater and facer pivot out rapidly and can cause severe bodily injury if someone is standing too close. All personnel must stand clear of the back of the machine when operating.

Unlatch the facer latch handle from the jaw brace and pivot the facer out from between the fixed jaws until it rests in the "out" position.



The heater and heater bag frame can now be unlatched and pivoted out.

Pivoting Heater Out:

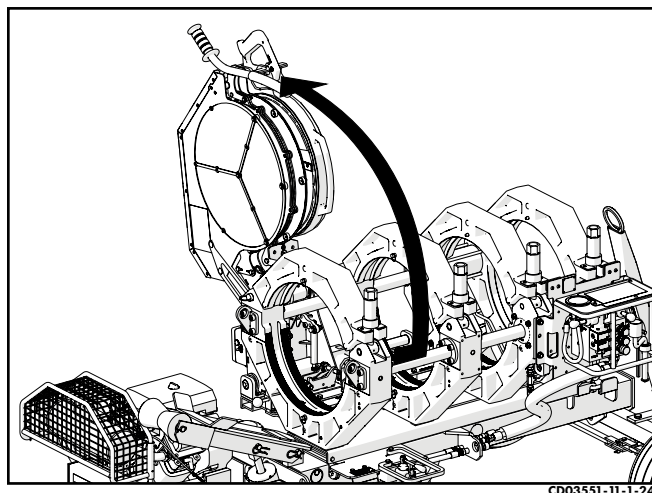
⚠ WARNING

Heater and facer pivot out rapidly and can cause severe bodily injury if someone is standing too close. All personnel must stand clear of the back of the machine when operating.

The heater bag frame can be raised by hand independently or pivoted out simultaneously with the heater.

The heater is latched in the "in" position when completely pivoted into the carriage. Using the heater handle, move the indexer to the right until the heater latch is disengaged.

Once the latch is disengaged, the heater will pivot out from between the fixed jaws. It is recommended to release the heater handle and allow the heater to pivot out on its own.

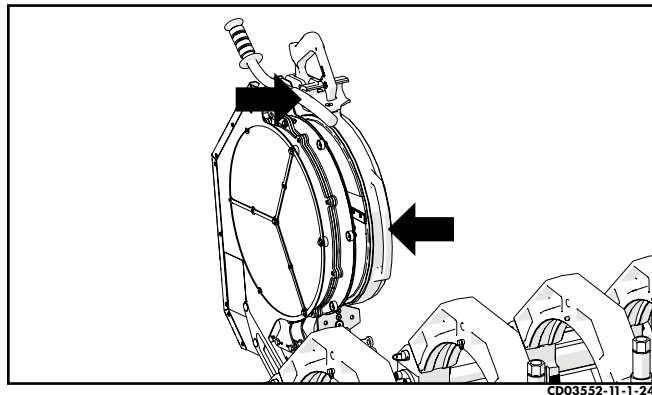


The heater, heater bag frame and facer are now in the "out" position.

Positioning Indexer

The indexer is equipped with a brake system to prevent unintentional movement along the guide rod. To move the indexer along the guide rod, the brake must be disengaged.

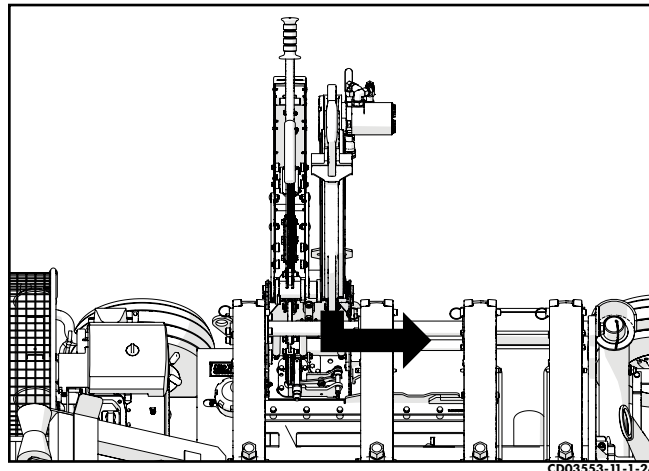
The indexer brake can be disengaged using the heater or facer handles.



To disengage the brake, pivot the heater or facer in slightly.

IMPORTANT: Pivot the component intended for use when releasing the indexer brake.

Once the brake is disengaged, the indexer will move freely along the guide rod.



Release either component to re-engage the indexer brake.

NOTICE: The indexer must be positioned between the two fixed jaws in order to open the upper jaws.

Heater Latch Point Retention

The heater has three latch point positions when being pivoted into the carriage.

Latch points 1 and 2 allow the heater to be retained in a mid-stroke position for measuring heater butt plate temperature and cleaning heater butt plate surfaces. Latch point 3 allows the heater to be retained in the carriage for heating pipe and stowage. The latch points are illustrated in the next column.

⚠ CAUTION

The heater is hot and will burn clothing and skin. Keep the heater protected from personnel when not in use and use care when handling heater and heating pipe.

NOTICE: Use only a clean, dry, lint-free, non-synthetic cloth to clean the heater plates.

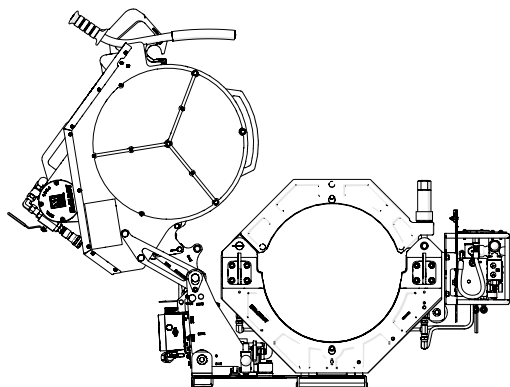
Using the heater handle, pivot the heater into the appropriate latch point.

Pivot the heater into latch point 1 to clean or measure the temperature of the lower half of the heater.

Pivot the heater into latch point 2 to clean or measure the temperature of the upper half of the heater.

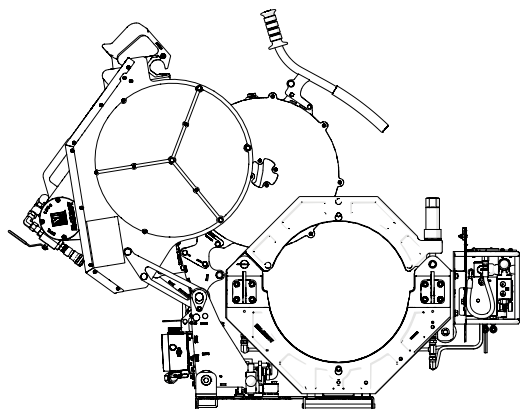
Pivot the heater into latch point 3 between pipe ends to prepare for a fusion joint or between the fixed jaws for stowage.

Heater in "Out" Position



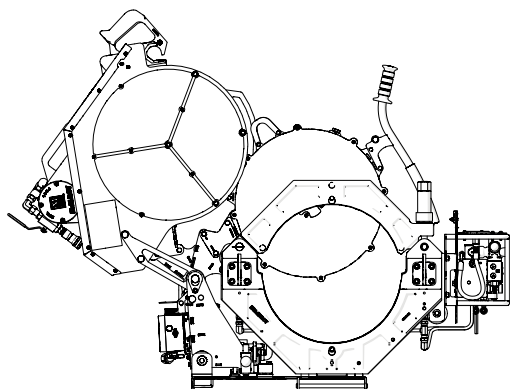
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Latch Point 1



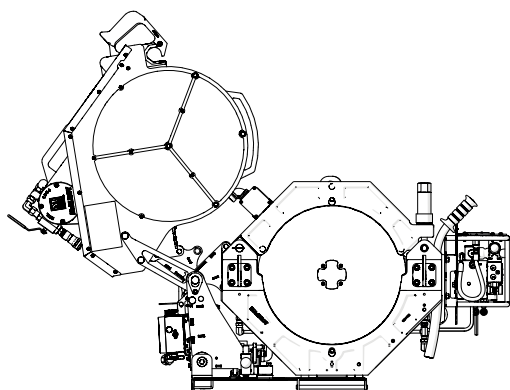
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Latch Point 2



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Latch Point 3



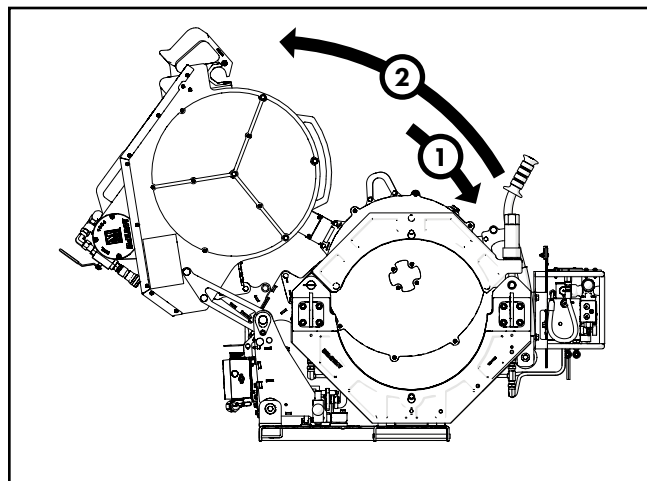
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Disengaging Heater Latch

The heater can be manually disengaged from all three latch points if needed.

To disengage the heater from latch points 1 and 2:

- 1) Pivot the heater in past latch point 2 without engaging latch point 3.
- 2) Release the heater handle to allow the heater to pivot completely out.



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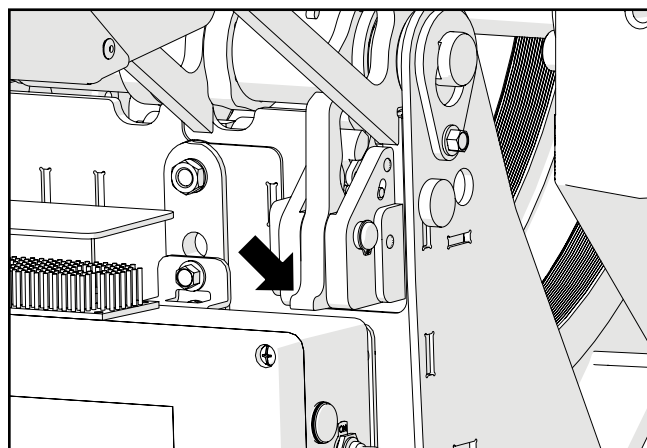
The heater retention mechanism can also be used to disengage the heater from latch points 1 and 2.

⚠ WARNING

Heater pivots out rapidly and can cause severe bodily injury if someone is standing too close. Firmly grasp the heater handle when disengaging heater latch retention mechanism.

NOTICE: Firmly grasp the heater handle before performing this step.

To disengage the heater from latch point 1 or 2, press down on the release lever as indicated below.



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To disengage the heater from latch point 3:

If the heater is fully pivoted between the fixed jaws, refer to ["Unstowing Indexer."](#)

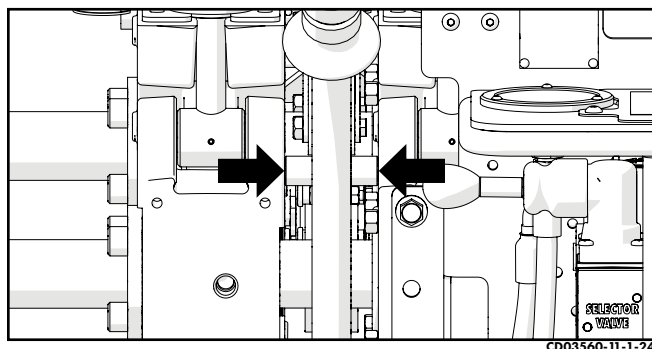
⚠ WARNING

Heater and facer pivot out rapidly and can cause severe bodily injury if someone is standing too close. All personnel must stand clear of the back of the machine when operating.

If the heater is fully pivoted between the inner fixed jaw and inner movable jaw, close the carriage until both inner jaws contact the heater stops.

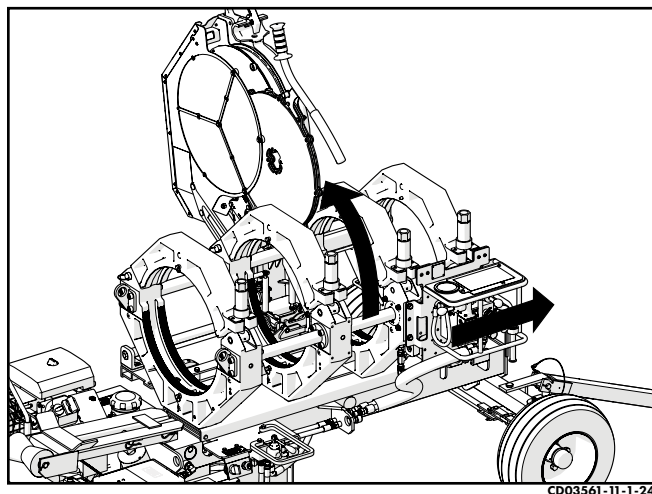
If pipe is installed, close the carriage until both pipe ends are nearly contacting the heater butt plates.

Refer to ["Operation - Butt Fusion"](#) for carriage operation.



Open the carriage completely.

The heater latch will be disengaged and the heater will automatically pivot out during carriage open travel.

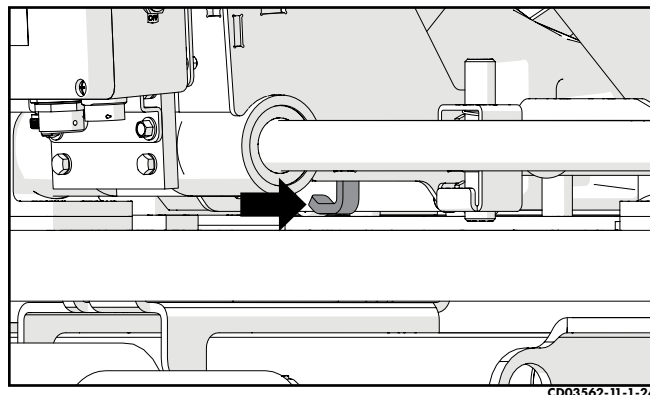


In cases where too much pipe has been installed or the machine is not operational, the heater can be manually disengaged from latch point 3 using the heater latch release lever.

The heater latch release lever only disengages the heater from latch point 3.

NOTICE: The following latch release method is intended as a last resort and should not be implemented as a regular practice.

Reach beneath the fixed jaw end of the indexer assembly and push the foot of the heater latch release lever towards the operator side of the carriage as shown below.



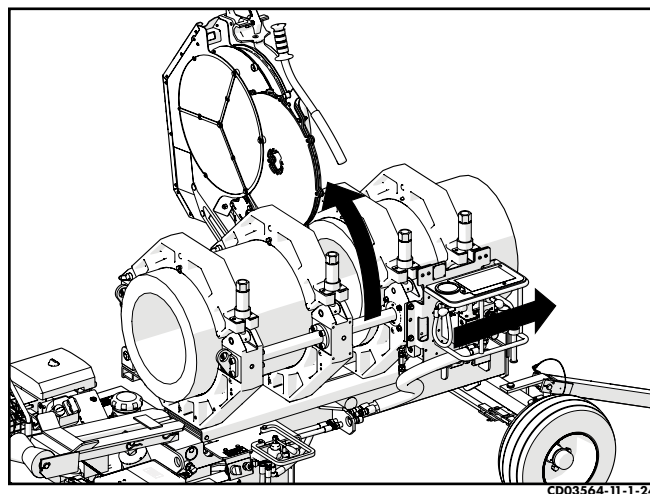
The heater latch will be disengaged and the heater will automatically pivot out.

Automatic Heater Removal During Fusion Operation

Once the heater is pivoted into latch point 3 and positioned to perform a fusion, no further interaction with the heater is necessary until the fusion joint is complete.

The indexer is designed to automatically disengage the heater latch and remove the heater from the fusion zone during the open/close cycle of the fusion process.

NOTICE: Open the carriage wide enough to allow heater removal. Ensure the heater clears the jaws before closing the carriage for a fuse/cool cycle.



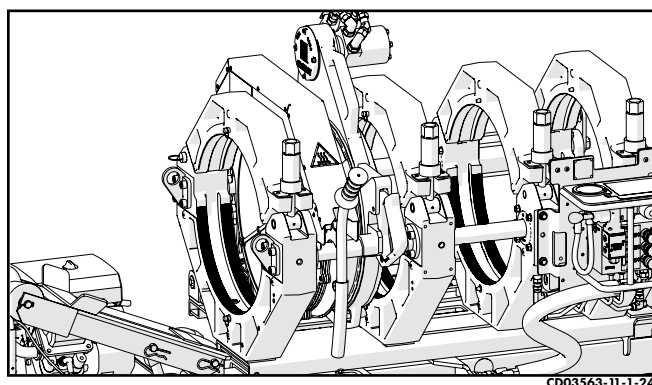
Stowing Indexer

Return the indexer to the stowage position for transport and when not in use.

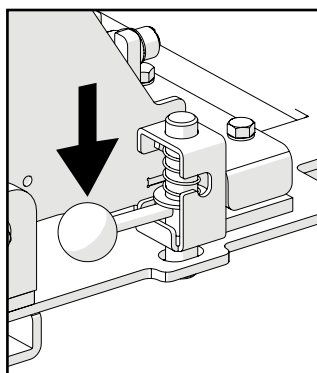
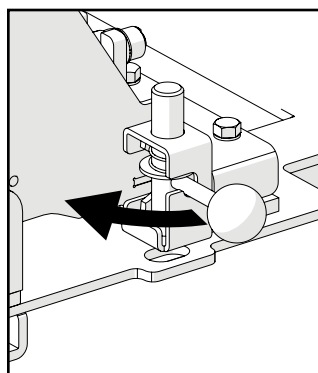
To secure the indexer in the stowage position, position the heater and facer between the fixed jaws and pivot the heater, heater bag frame and facer in between the fixed jaws.

NOTICE: If the machine is equipped with hydraulic jaw clamps, extend the clamping cylinders or remove the crossbar quick pin and raise the crossbar to allow clearance for the heater and facer to be pivoted into the carriage.

NOTICE: Ensure the heater is engaged into latch point 3.



Engage the indexer stowage lock to secure the indexer in place.



NOTICE: Do not transport the machine with a raised heater, heater bag frame or facer. Doing so may damage the machine.

Before transporting the machine, ensure that:

- The jaws are clamped closed
- The carriage is fully open
- The facer, heater and heater bag frame are pivoted into the stowage position
- The indexer stowage lock is engaged

OPERATION - BUTT FUSION

Read Before Operating



STOP-6-9-24

Before operating this machine, please read this manual thoroughly and keep a copy available for future reference.

Return manual to the literature compartment when not in use. This manual is to be considered part of the machine.

Position Machine

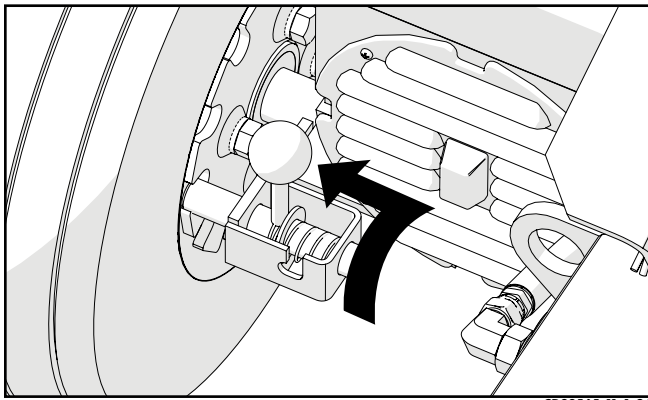
Maneuver the machine into position for fusion operation.

NOTICE: Ensure the wheel lock is disengaged before towing the machine. Refer to [General Information](#) for wheel lock location.

NOTICE: When towing the machine, do not exceed five miles per hour. Towing the machine at speeds greater than five miles per hour can result in machine damage.

Position fusion machine on as level ground as possible.

Once the machine is in position, engage the wheel lock on the rear, operator side wheel.



CD03565-11-1-24

If it is necessary to operate machine on unlevel grade, chock the wheels to make the it as stable as possible.

Starting Instructions

Read and understand the engine service manual before operating a gas-powered unit.

NOTICE: Ensure the facer valve is open, the heater is off and the carriage is set to neutral at the carriage manifold before starting the machine.

Starting a Gas-Powered Unit

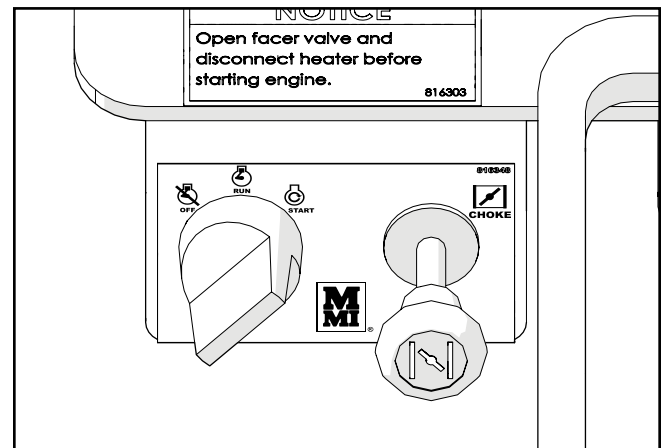
Pull the engine choke control out completely.

The ignition key switch has three positions: **OFF**, **RUN** and **START**.



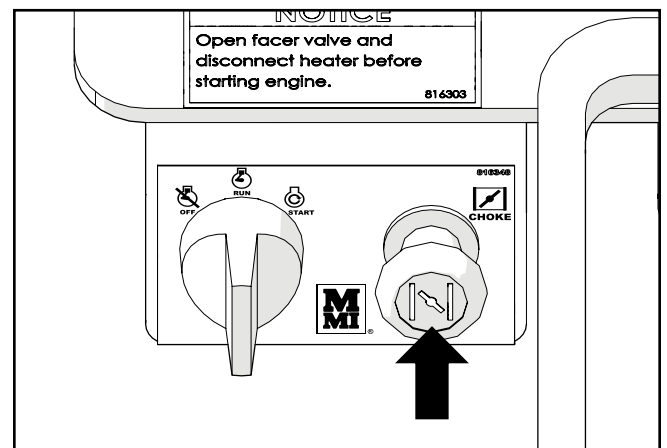
Turn the key switch to **RUN** and then to **START** to start the engine.

Release the key switch once the engine starts.



CD03566-11-4-24

Once the engine is running, gradually push the engine choke control in as the engine warms up.



CD03567-11-4-24

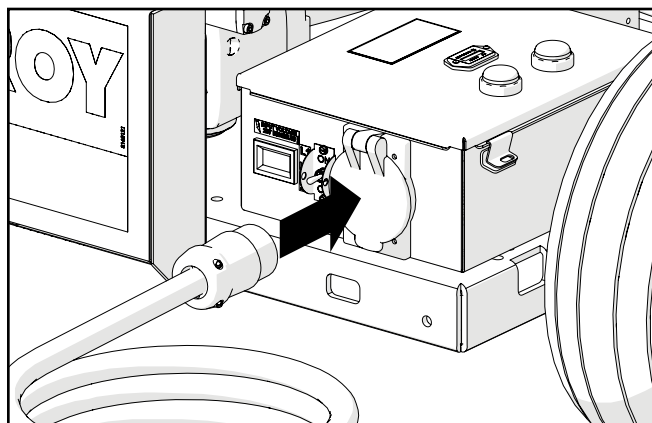
Starting an Electric Unit

Connect the machine to a proper power source using the electrical unit's power cable.

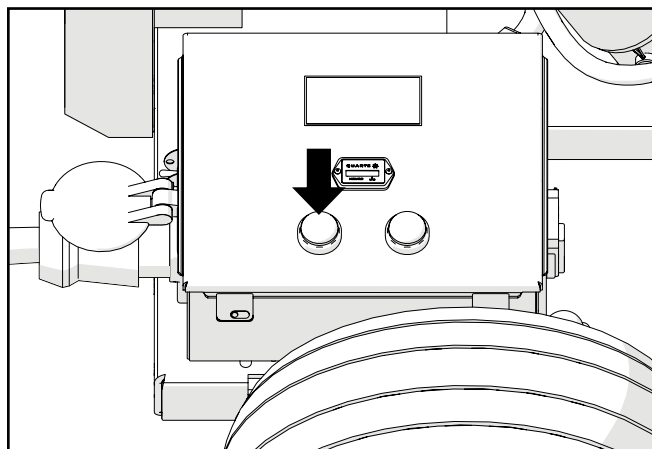
NOTICE: Always connect units to the proper power source as listed on the unit or in the operator's manual.

⚠ DANGER

All electrical equipment and power sources must be operated outside of an explosive atmosphere. Operation of these components in an explosive atmosphere will result in serious injury or death.



Once the machine is connected to an appropriate power source, press the power on button on the electrical box.



Once the machine has been started, the facer valve can be closed.

Prepare Heater

⚠ DANGER

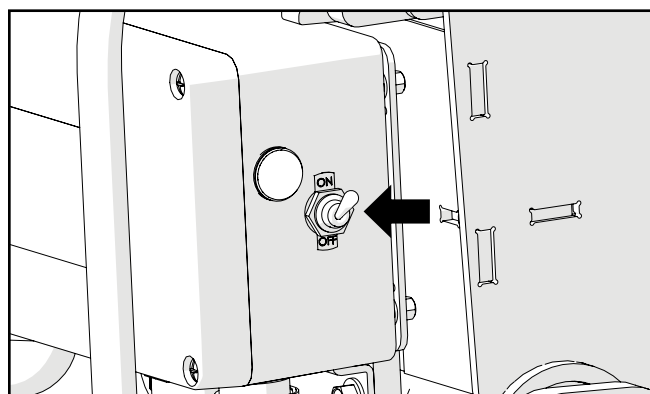
Heater is not explosion proof. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

Ensure both heater butt plates are properly installed.

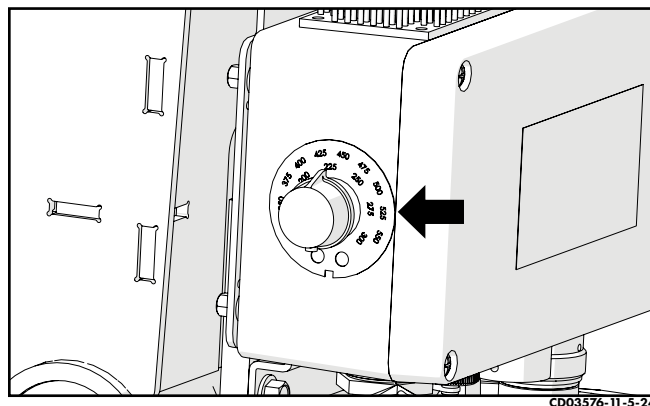
NOTICE: Non-coated heaters should never be used without both heater butt plates installed. Install heater butt plates before using the heater.

Turn the heater on by switching the heater on/off switch on the HCM to "ON."

The indicator light will glow red indicating that the heater is on and preheating to the set temperature.



Use the temperature adjustment dial on the HCM to set heater temperature according to applicable standard.



Allow time for the heater to preheat. When the indicator light glows green, the heater has reached set temperature.

NOTICE: The indicator light will alternate between red and green as heater temperature is regulated.

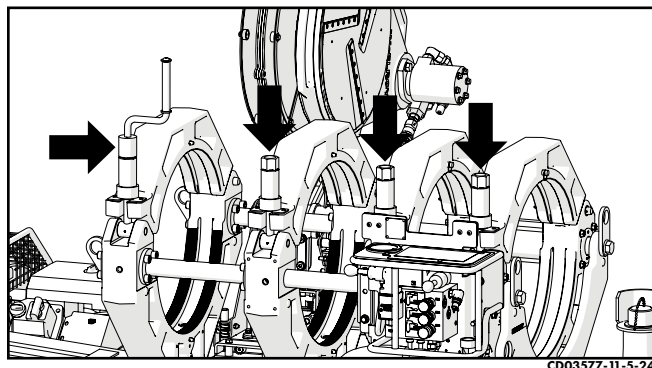
Refer to the ["Faults"](#) section of this manual for more information on indicator light blink codes.

Open Jaws

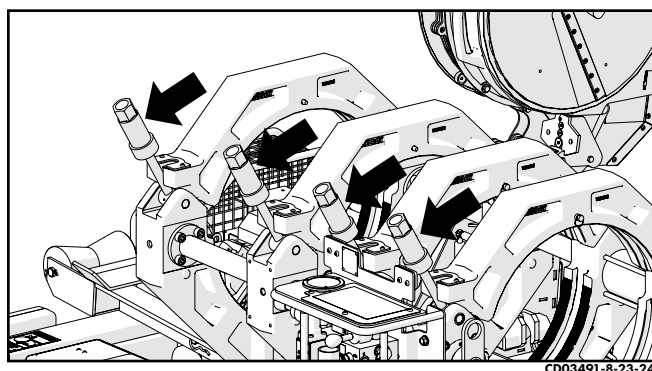
Jaw Clamp Knobs:

Loosen the clamp knobs to open the upper jaws.

NOTICE: Use the speed wrench to loosen clamp knobs. Do not use power tools to tighten or loosen clamp knobs.



Rotate the clamp knobs out away from the upper jaws.



Hydraulic Jaw Clamps:

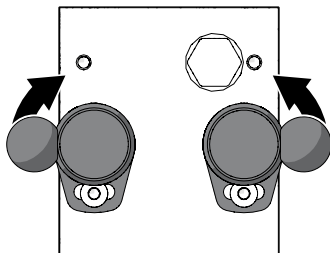
Unclamp the hydraulic jaw clamps to open the upper jaws.

Grasp the hydraulic jaw clamp handles and turn control knobs upward to unclamp hydraulic jaw clamps.

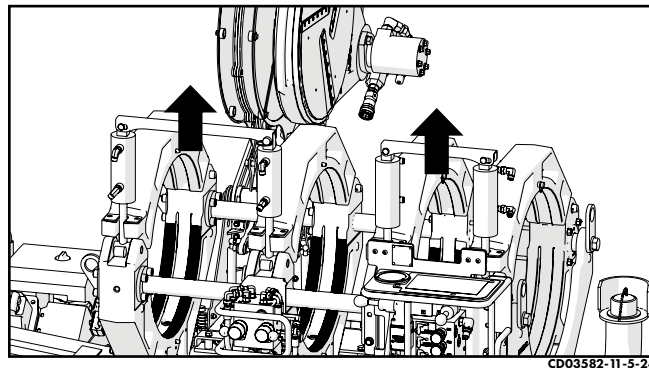
CAUTION

Support the clamping cylinders using the handles when clamping or unclamping the jaws. Clamping cylinders are heavy and could fall causing injury.

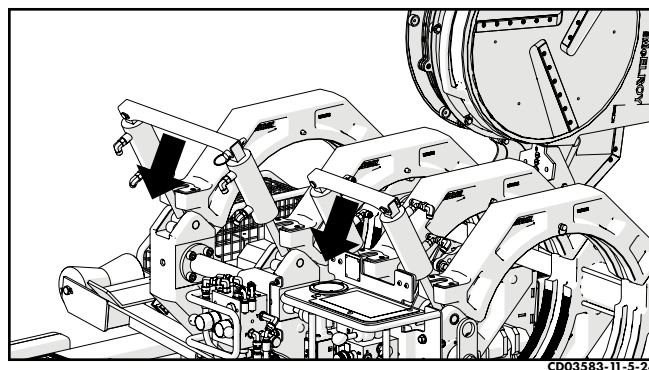
NOTICE: Do not let the clamp cylinders drop. Dropping the cylinders can damage the machine.



CD03296-6-7-24

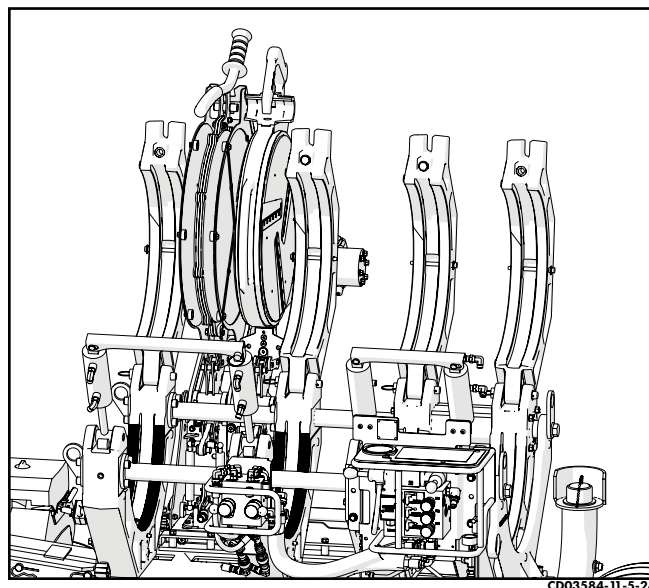


Rotate the clamping cylinders out away from the upper jaws.



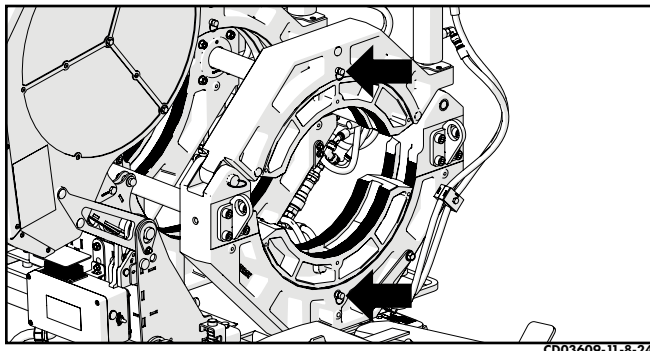
Open the upper jaws.

NOTICE: Verify the indexer is positioned between the fixed jaws as to not interfere with opening the upper jaws.



Jaw Inserts

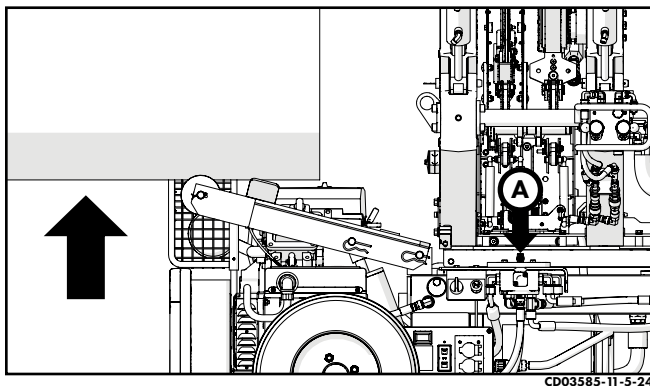
If required, install the appropriate size jaw inserts for the pipe that is being fused. Inserts are held in place by detent pins.



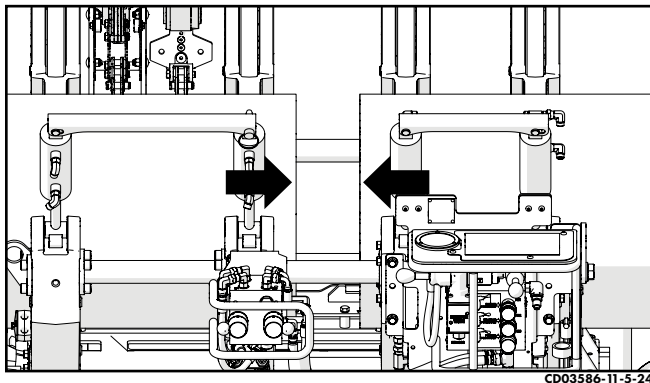
Load Pipe into Machine

Position pipe support stands slightly more than half the pipe length from each end of the machine to help support and align the pipe.

Use the pipe lift control lever (A) to raise the pipe lift on the machine to allow the pipe to roll into position in the fixed jaws.



Position pipe with enough material protruding past the jaw faces to allow for complete facing of both pipe ends.



Lower the pipe lift until the pipe rests in the lower jaws.

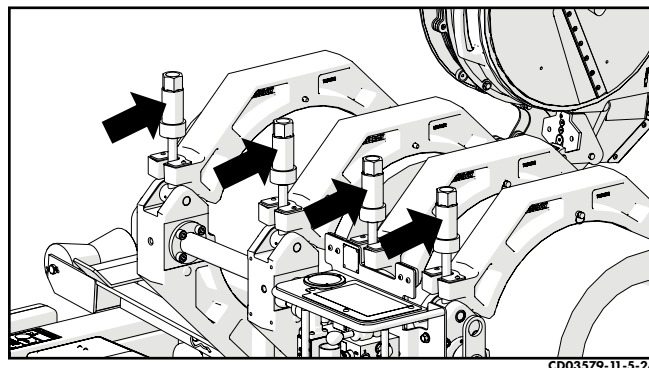
NOTICE: Ensure the pipe lift is lowered and both pipe sections rest in the lower jaws before closing the upper jaws.

Close Jaws

Once pipe is in position, close the upper jaws around the pipe.

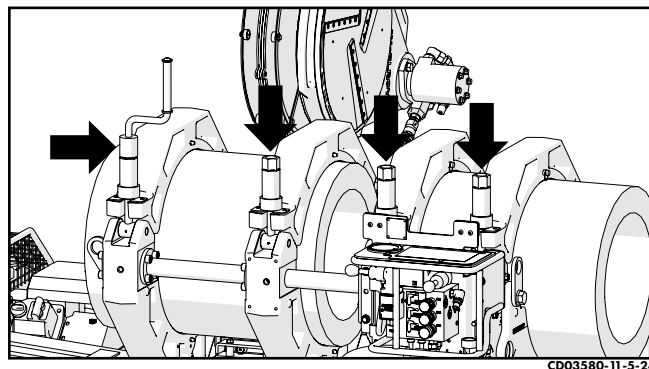
Jaw Clamp Knobs:

Rotate the clamp knobs over the upper jaw clamp pads.



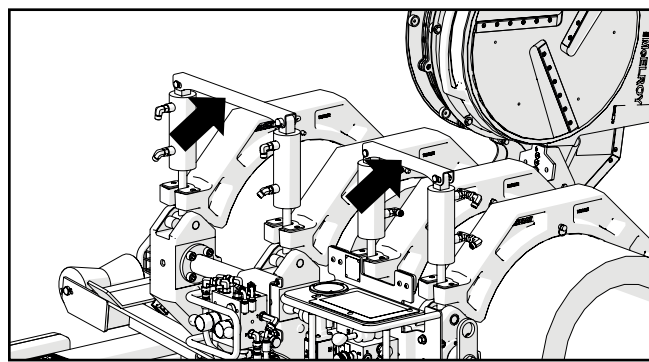
Tighten the clamp knobs to clamp the upper jaws around the pipe.

NOTICE: Use the speed wrench to tighten clamp knobs. Do not use power tools to tighten or loosen clamp knobs.

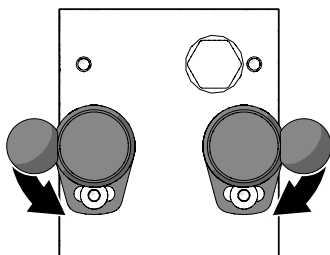


Hydraulic Jaw Clamps:

Rotate the clamping cylinders over the upper jaw clamp pads.

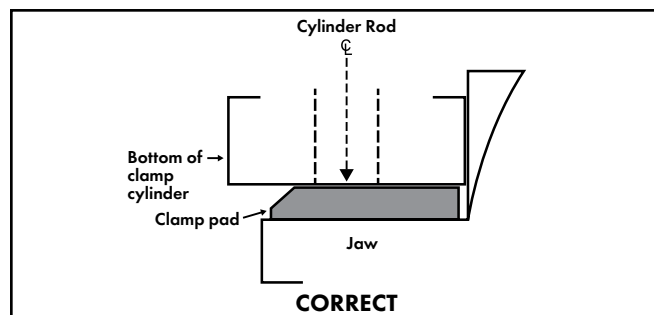


Turn the hydraulic jaw clamp control knobs downward to clamp hydraulic jaw clamps.

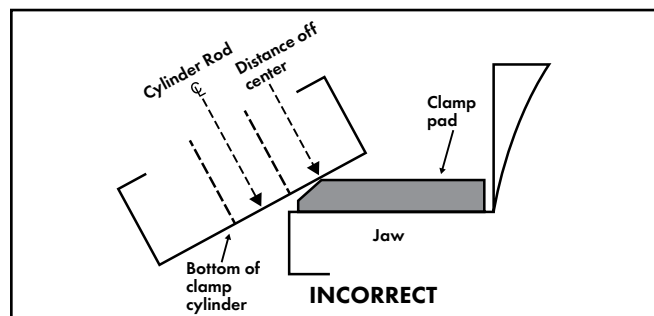


CD03297-6-7-24

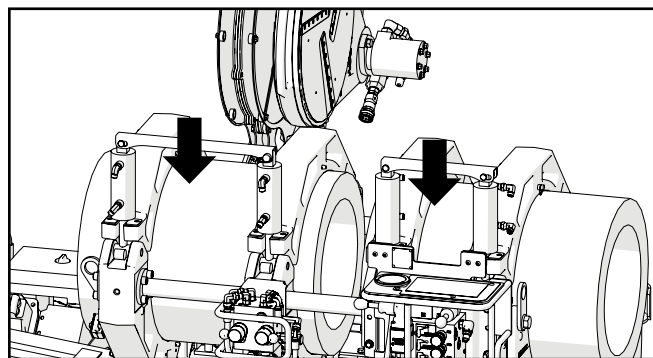
NOTICE: The hydraulic jaw clamp cylinders are designed to clamp when in the upright position, evenly applying pressure over the entire base of the cylinder. Always ensure the cylinders are upright over the clamp pads before clamping the jaws. Damage to the cylinders and jaws can occur if not clamped properly. Clamp marks on the bottom of the cylinder are an indication that the cylinder was not in the proper position when clamped down.



CD03157-5-2-24



CD03158-5-2-24



CD03588-11-5-24

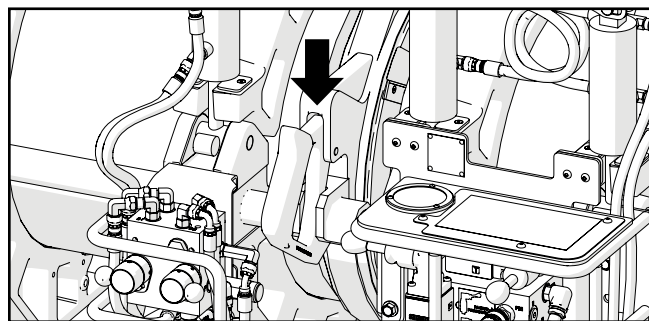
Position Facer

Once pipe has been loaded into the carriage, the facer can be moved into position for facing. The facer can be moved left and right along the indexer guide rod and pivoted into and out of the carriage. Refer to the "[Indexer Operation](#)" section of this manual for indexer operation.

NOTICE: Ensure the indexer storage lock is disengaged before positioning the heater or facer.

Position the facer over the fusion zone.

Pull the facer down between the open pipe ends until latched onto the guide rod.



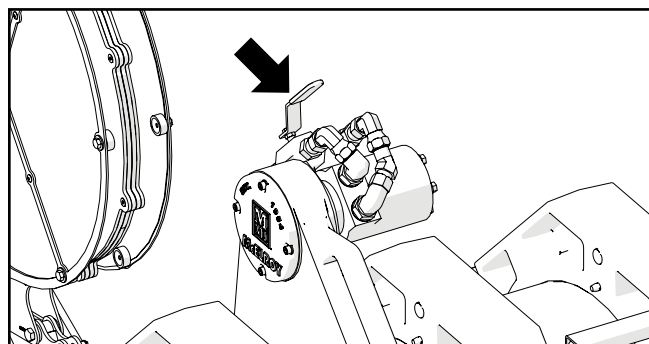
CD03598-11-6-24

Begin Facing Pipe

Turn the facer on by opening the facer valve.

⚠ WARNING

Facer blades are sharp and can cut. Never attempt to remove shavings while the facer is running or is in the facing position between the jaws. Use care when operating the facer and when handling the facer.



CD03599-11-6-24

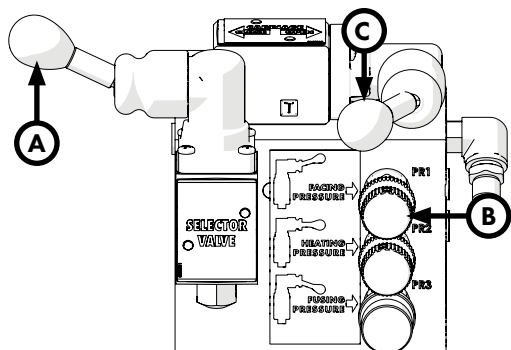
The facing pressure is adjusted at the carriage manifold by shifting the selector valve (A) to facing pressure and turning the facing pressure reducing valve (B) clockwise or counterclockwise.

Turn the valve clockwise to increase facing pressure and counterclockwise to decrease facing pressure.

Facing pressure is indicated on the carriage pressure gauge.

The facing pressure should be set as low as possible while still moving the carriage. Excessive pressure can damage the facer.

Shift the carriage directional valve (C) to **CLOSE** on the carriage manifold to begin facing.

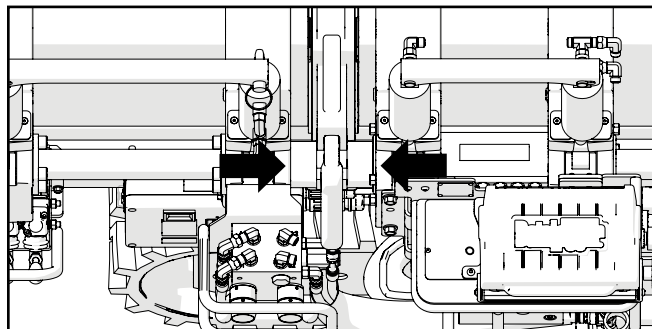


CD03590-11-6-24

⚠ WARNING

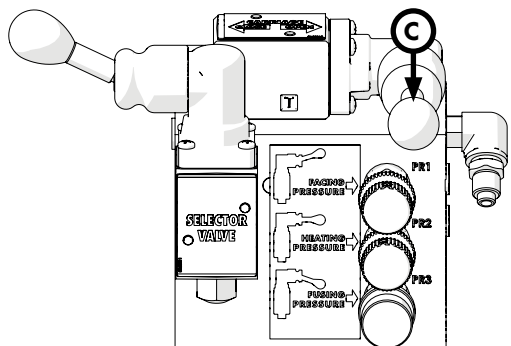
Hydraulically operated equipment operates under high pressure and generates extremely high forces. Anything inadvertently caught in the machine will be crushed. Keep fingers, feet, arms, legs, and head out of the machine while hydraulics are engaged.

Continue facing the pipe until the facer guide rod bracket contacts both the inner fixed jaw and inner movable jaw.



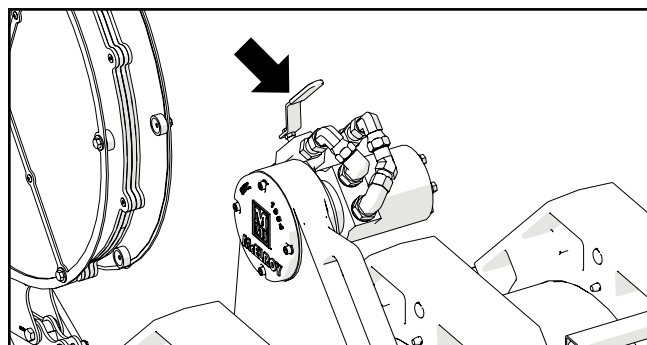
CD03489-8-23-24

Once this contact is made, shift the carriage directional valve (C) back to neutral.



CD03589-11-6-24

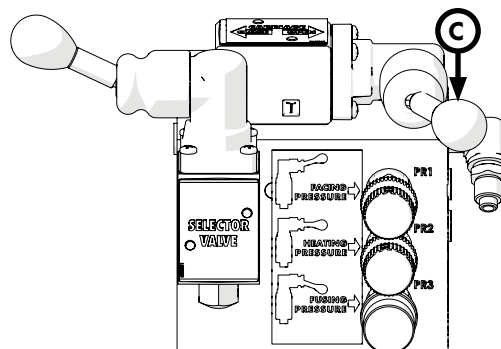
Turn the facer off by closing the facer valve.



CD03599-11-6-24

After Facing Pipe

Shift the carriage directional valve (C) to **OPEN** and allow the carriage to open completely before setting the carriage back to neutral.



CD03591-11-6-24

Move the facer to the right and center it between the pipe ends to avoid striking the facer on the pipe ends.

Unlatch the facer from the guide rod and pivot the facer out of the fusion zone.

⚠ WARNING

Turn the machine off before entering the unit for maintenance or shaving removal. Serious injury or death could result if the hydraulic power remains on and the hydraulics are activated while personnel are between movable machine parts.

Turn the machine off to disengage hydraulics for pipe shaving removal.

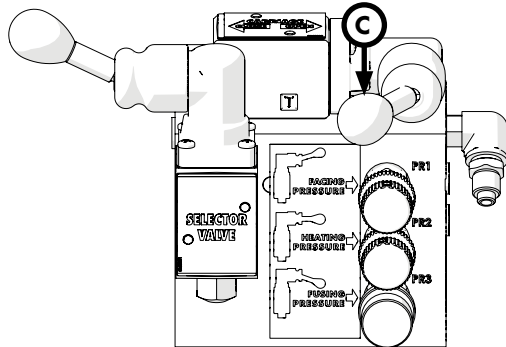
Clean shavings out of the pipe ends, indexer components and from between the jaws. Do not touch faced pipe ends.

To re-engage the hydraulics, restart the machine.

NOTICE: Ensure the facer valve is open and the carriage is set to neutral at the carriage manifold before restarting the machine.

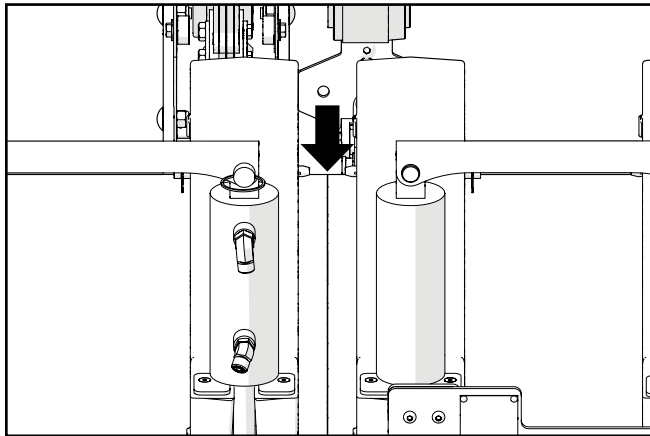
Check Pipe Alignment

On the carriage manifold, shift the carriage directional valve **(C)** to **CLOSE** at facing pressure until the pipe ends make contact.



CD03591-11-6-24

With the carriage closed completely and the pipe ends together, look across the top surface of the pipe ends to check alignment.



CD03601-11-7-24

If HI/LO alignment is acceptable, proceed to [Determine Drag Pressure](#). If there is HI/LO misalignment between pipe ends, adjustments must be made.

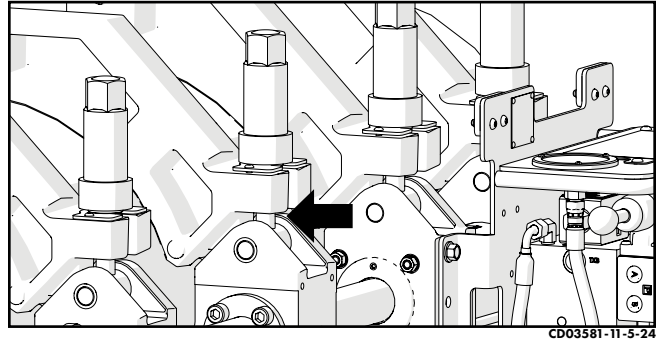
Jaw Clamp Knobs:

To correct HI/LO misalignment on a carriage with jaw clamp knobs, tighten the inner jaw clamping the high end of the pipe.

IMPORTANT: Always adjust the side that is higher, never adjust the low side.

Once the pipe ends are properly aligned, ensure all clamp knobs are tight.

NOTICE: Do not overtighten jaw clamp knobs. Machine damage can occur if clamp knobs are overtightened. Ensure there is space between the upper and lower jaws when tightening. If the upper jaw contacts the lower jaw, do not tighten clamp knobs further.

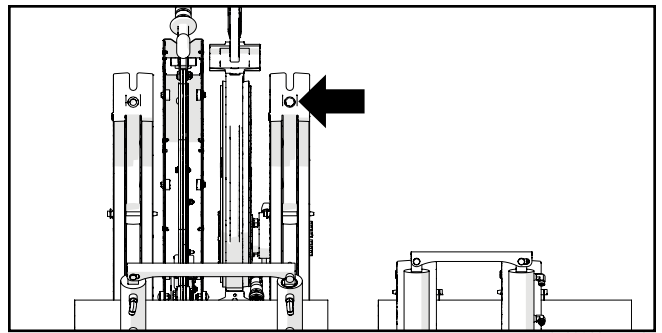


CD03581-11-5-24

Hydraulic Jaw Clamps:

To correct HI/LO misalignment on a carriage with hydraulic jaw clamps, open the carriage enough that the pipe ends are not touching. Unclamp and open the jaw holding the high end of the pipe and tighten the adjustment bolt to improve alignment.

IMPORTANT: Always adjust the side that is higher, never adjust the low side.



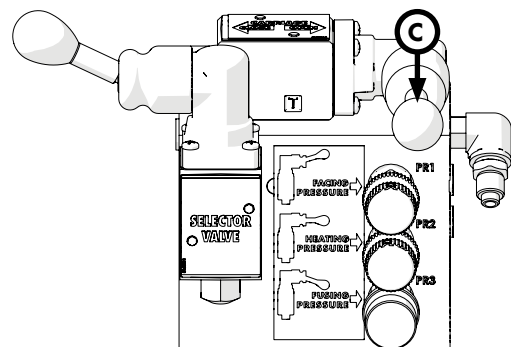
CD03602-11-7-24

Close the jaw and reclamp the pipe.

Insert the facer and reface the pipe ends if adjustments are made. Check pipe alignment again and make further adjustments if necessary.

Ensure there is no unacceptable gap between the pipe ends. If there is an unacceptable gap, return to [Load Pipe into Machine](#).

Once acceptable alignment is achieved, shift the carriage directional valve **(C)** back to neutral.



CD03589-11-6-24

Determine Drag Pressure

Use the carriage manifold to determine the drag pressure.

Use the carriage directional valve **(A)** to move the carriage at facing pressure so that the faced pipe ends are approximately 2" (50mm) apart.

Shift the carriage directional valve **(A)** to neutral.

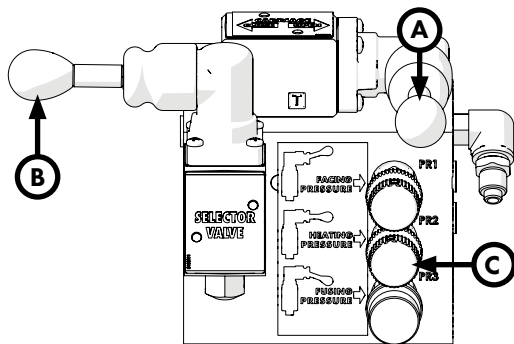
Shift the selector valve **(B)** to heating pressure and turn the heating pressure reducing valve **(C)** counterclockwise until it stops to achieve the lowest heating pressure.

Shift the carriage directional valve **(A)** to **CLOSE**.

Turn the heating pressure reducing valve **(C)** clockwise slowly to gradually increase the heating pressure. Perform this step until the carriage begins to close.

Once the carriage begins to close, quickly turn the heating pressure reducing valve **(C)** counterclockwise until the carriage is barely moving.

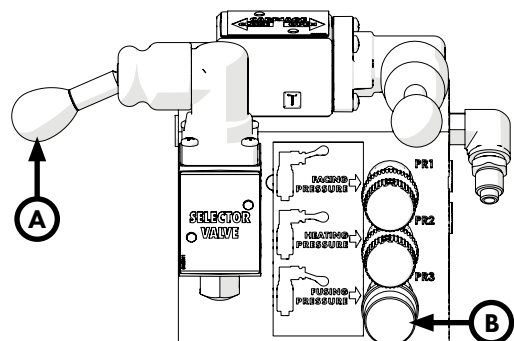
Record the pressure shown on the carriage pressure gauge. This is the actual drag pressure as well as the heating pressure used for heating pipe during the fusion process.



CD03592-11-7-24

Set Fusion Pressure

Set the fusion pressure by shifting the selector valve **(A)** to fusing pressure and adjusting the fusing pressure reducing valve **(B)**.



CD03595-11-7-24

The theoretical fusion pressure can be determined using the fusion pressure calculator included with this machine.



PH04004-11-7-24

The theoretical fusion pressure can also be determined using the McCalc® app available for iOS, Android and Windows phone and PC devices.



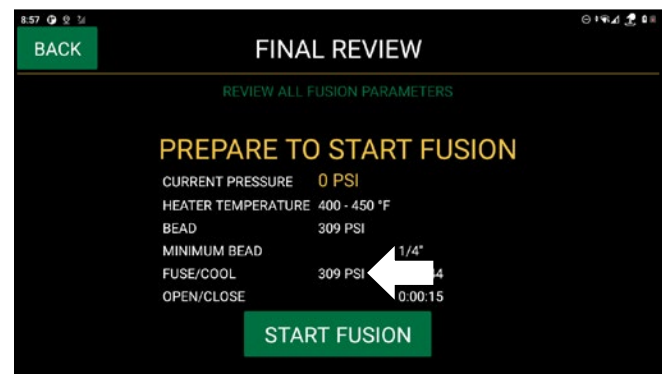
CD03603-11-7-24

Always add drag pressure to the theoretical fusion pressure when calculating fusion pressure.

Fusing Pressure (Carriage Pressure Gauge) = Theoretical Fusion Pressure + Drag Pressure.

Refer to the "[Determining Fusion Pressure](#)" section of this manual for more information on calculating fusion pressure.

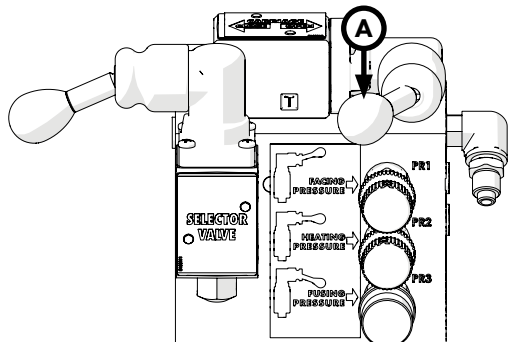
If using a DataLogger, the fusion pressure is calculated automatically on the Final Review screen using machine and pipe information input by the operator.



PH06567-11-20-24

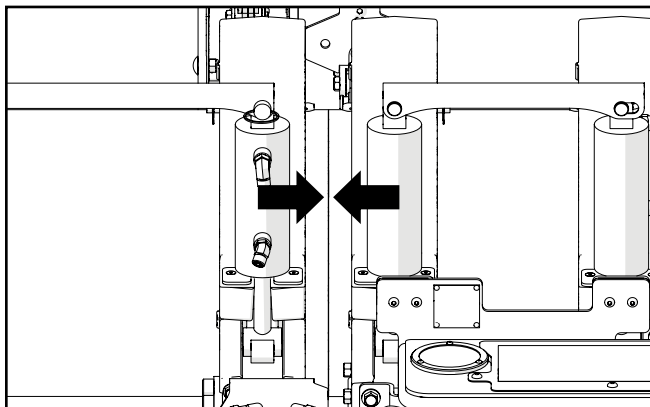
Check for Slippage

Check for slippage by shifting the carriage directional valve (A) to **CLOSE** at fusing pressure.



CD03595-11-7-24

As the pipe ends make contact, ensure neither of the pipe sections slip inside the jaws.



CD03601-11-7-24

If slippage occurs, return to [Load Pipe into Machine](#).

If no slippage occurs, open the carriage completely and proceed to Position Heater.

Position Heater

⚠ DANGER

Heater is not explosion proof. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

Ensure the carriage is completely open.

The heater can be moved left and right along the indexer guide rod and pivoted into and out of the carriage. Refer to the ["Indexer Operation"](#) section of this manual for indexer operation.

NOTICE: Ensure the indexer stowage lock is disengaged before positioning the heater or facer.

Position the heater over the fusion zone.

Check Heater Temperature

⚠ CAUTION

The heater is hot and will burn clothing and skin. Keep the heater protected from personnel when not in use and use care when handling heater and heating pipe.

NOTICE: Incorrect heating temperature can result in questionable fusion joints. Check heater plates periodically with a pyrometer and make necessary adjustments.

Pivot the heater into latch point 1.

Refer to the ["Indexer Operation"](#) section of this manual for heater latch point retention.

Check heater surface temperature where the pipe will contact the heater using a pyrometer.

The dial thermometer on the heater body is for reference only and does not indicate heater butt plate surface temperature.



WR00077-11-7-24

Refer to the pipe manufacturer's recommendations or appropriate joining standard for proper heater temperature.

Clean Heater Surfaces

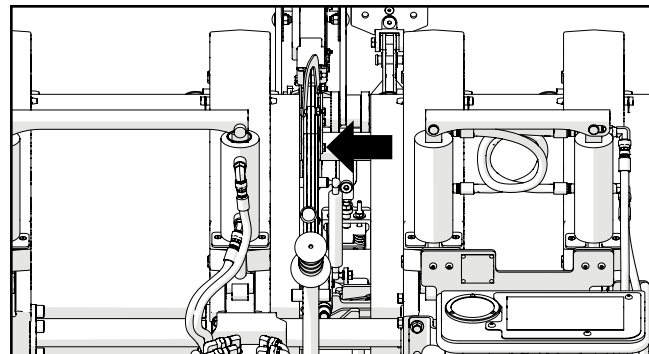
Before each fusion joint, the heater butt plate surfaces must be wiped with a clean, dry, lint-free, non-synthetic cloth.

NOTICE: Do not use any abrasive materials to clean heater butt plate surfaces. Use only a clean, dry, lint-free, non-synthetic cloth to avoid damaging heater butt plates.

Clean both sides of the lower half of the heater. Then, pivot the heater into latch point 2 and clean both sides of the upper half of the heater.

Once heater temperature has been verified and the heater surfaces have been cleaned, pivot the heater into latch point 3 between pipe ends.

Move the heater towards the pipe end clamped by the fixed jaws without making contact to prepare for a fusion joint.



CD03604-11-7-24

Heat Pipe

The heating pressure was obtained during drag pressure measurement.

Refer to the pipe manufacturer's recommendations or appropriate joining standard for proper heating procedure.

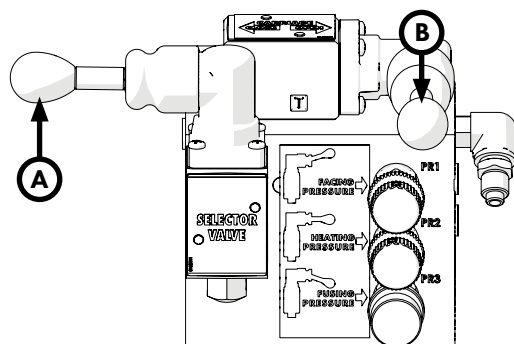
Use the carriage manifold to begin heating pipe.

Shift the selector valve **(A)** to fusing pressure and shift the carriage directional valve **(B)** to **CLOSE** to bring the pipe ends in contact with the heater at fusion pressure.

Once the appropriate bead-up conditions are met, shift the selector valve **(A)** to heating pressure for heat/soak.

If heating pressure is not required by the pipe manufacturer's recommendations or joining standard in application, or opposing forces are not great enough to move the movable jaws away from the heater, shift the carriage directional valve **(B)** to neutral after the carriage pressure drops to drag pressure for heat/soak.

IMPORTANT: Always shift the selector valve to heating pressure before shifting the carriage directional valve to neutral.



CD03592-11-7-24

Fuse Pipe

Once heat/soak conditions are met, verify that the carriage directional valve **(B)** is in neutral and shift the selector valve **(A)** to fusing pressure.

Shift the carriage directional valve **(B)** to **OPEN** to open the carriage for the open/close cycle.

⚠ WARNING

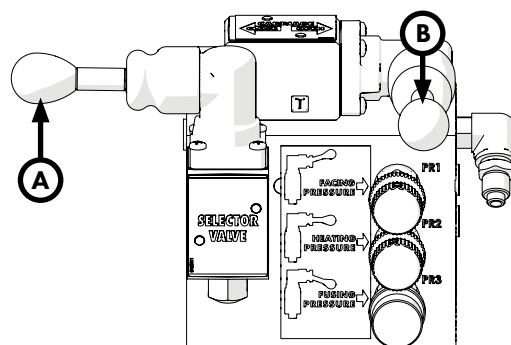
Heater and facer pivot out rapidly and can cause severe bodily injury if someone is standing too close. All personnel must stand clear of the back of the machine when operating.

The indexer is designed to automatically disengage the heater latch and remove the heater from the fusion zone during the open/close cycle of the fusion process.

NOTICE: Open the carriage wide enough to allow heater removal. Ensure the heater clears the jaws before closing the carriage for a fuse/cool cycle.

Quickly inspect the pipe ends for an appropriate melt pattern.

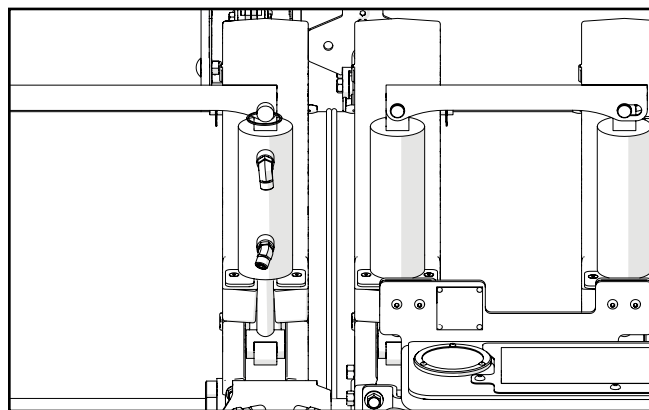
Once the heater is clear of the jaws, shift the carriage directional valve **(B)** to **CLOSE** to close the carriage for the fuse/cool cycle.



CD03592-11-7-24

Ensure the appropriate maximum open/close time is not exceeded.

Allow the fusion joint to cool under pressure according to applicable standard.

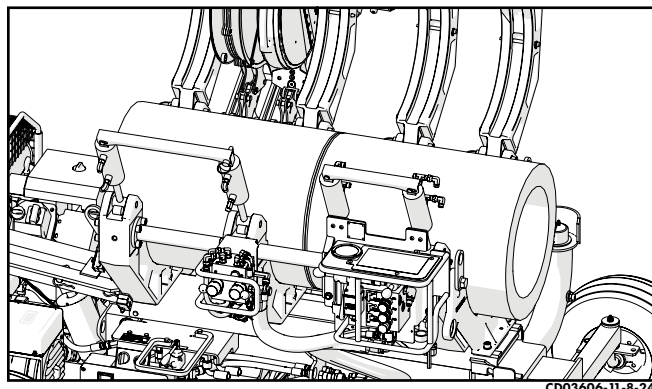


CD03605-11-7-24

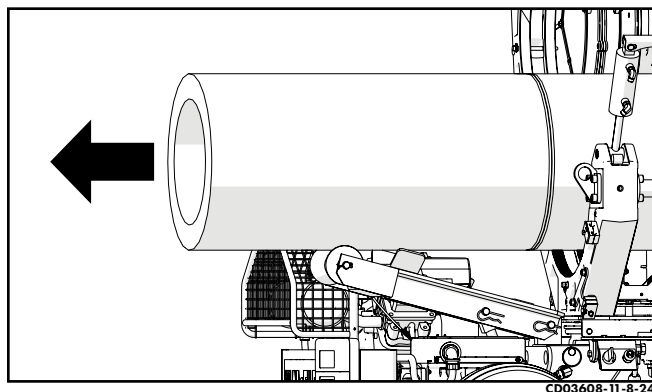
After Completed Fusion Joint

After a completed fusion joint, loosen the clamp knobs or unclamp the hydraulic jaw clamps and open the upper jaws.

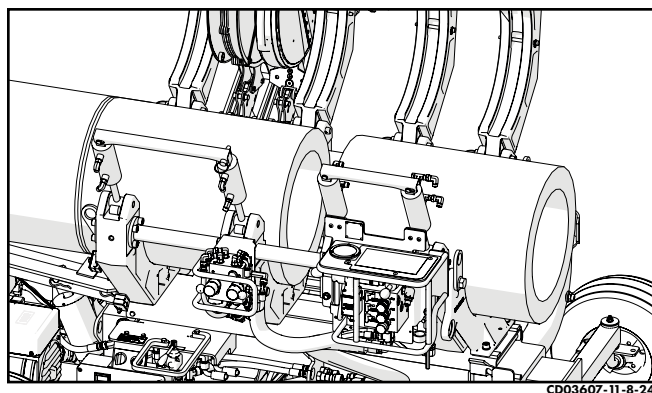
NOTICE: Verify the indexer is positioned between the fixed jaws as to not interfere with opening the upper jaws.



Using the pipe lift, raise the fused pipe high enough to clear the lower jaws.



Position pipe and prepare for the next fusion by repeating the fusion process outlined in this section.



SPECIAL OPERATIONS

Overview

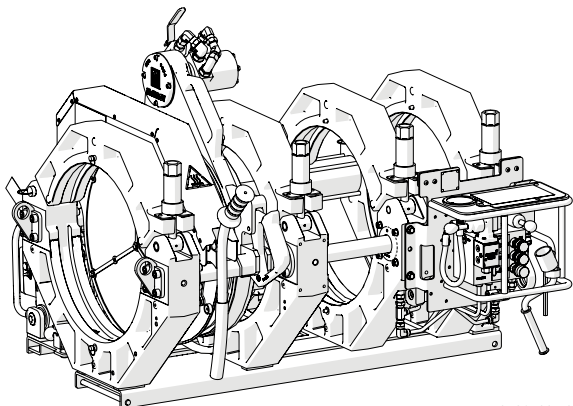
The carriage can be removed from the vehicle for in-ditch tie-ins and fusing tees or fittings that require more working space than is possible while the carriage is mounted on the vehicle.

The carriage can be removed in a 4-Jaw configuration with the indexer or as a separate unit in a 3-Jaw configuration.

All off-vehicle operations require the optional in-ditch kit which includes extension cables and hoses.

The Special Operations section is divided into:

- **4-Jaw Carriage Removal** - Includes the complete 4-jaw carriage. The heater and facer can be used attached to the indexer pivot arms or removed and top loaded.
- **Outer Fixed Jaw Removal** - Allows more area to fuse tees and fittings.
- **3-Jaw Carriage Removal** - For more compact, off-vehicle fusion operation. The 3-jaw carriage assembly (2 movable jaws and 1 fixed jaw) can be removed as a separate unit from the 4-jaw carriage skid. The heater and facer must be removed and top loaded.
- **Facer Removal** - Removal of facer for 3-jaw fusion operation.
- **Heater Removal** - Removal of heater for 3-jaw fusion operation.
- **Upper Jaw Removal** - Removal of upper jaws for easier in-ditch carriage positioning.
- **Positioning 4-Jaw Carriage for In-Ditch** - Positioning the 4-jaw carriage for an in-ditch fusion.
- **Positioning 3-Jaw Carriage for In-Ditch** - Positioning the 3-jaw carriage for an in-ditch fusion.



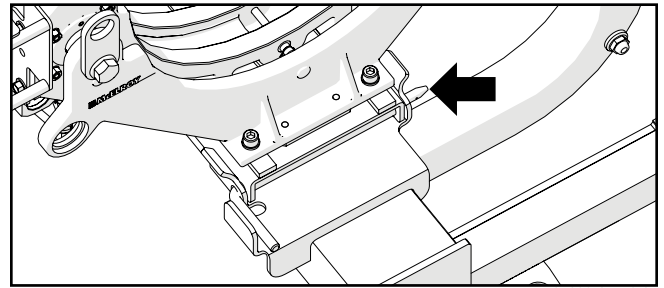
CD03522-10-17-24

4-Jaw Carriage Removal

The 4-jaw carriage and skid can be removed from the vehicle for off-vehicle fusion operation.

Turn the machine off.

Remove the carriage skid mounting pin.



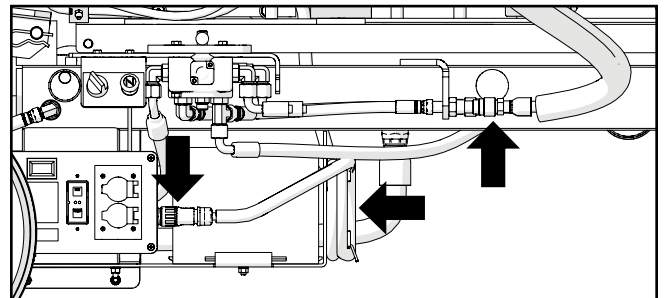
CD03610-11-8-24

⚠ WARNING

Ensure heater power is off before connecting or disconnecting heater power cables. Failure to do so may result in electrical shock.

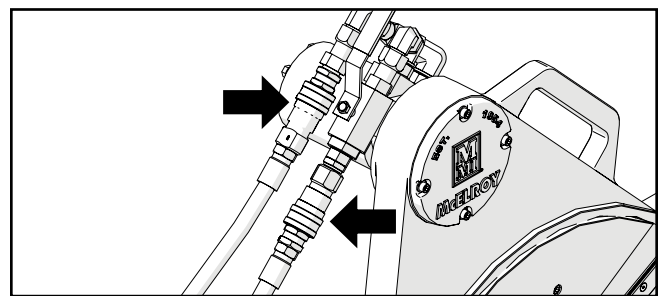
Disconnect all carriage hoses from the vehicle bulkhead, and unplug the heater power cable from the GFCI box (gas-powered unit) or the electrical box (electric unit).

Ensure to uncoil the heater power cable from the vehicle.



CD03445-8-5-24

Disconnect both hydraulic hoses from the facer motor.



CD03468-8-21-24

The 4-jaw carriage can be lifted from the vehicle.

See [Lifting 4-Jaw Carriage](#) for instructions on lifting the carriage in a 4-jaw configuration.

Perform these steps in reverse to reinstall the 4-jaw carriage onto the vehicle.

Outer Fixed Jaw Removal

Certain fusion applications require more clearance than is available in a 4-jaw carriage configuration. When needed, the outer fixed jaw can be removed from the 4-jaw carriage skid.

Before removing the outer fixed jaw, remove all inserts from the upper and lower jaws if installed.

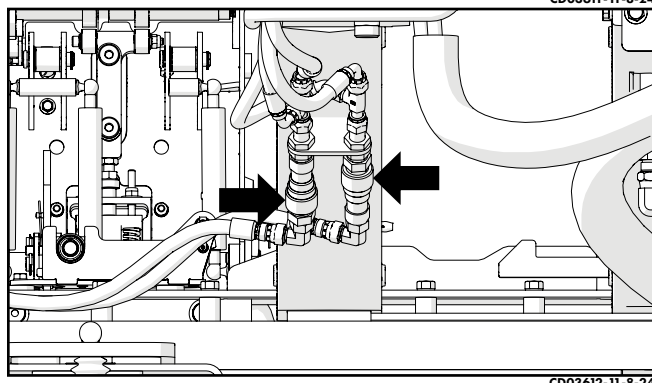
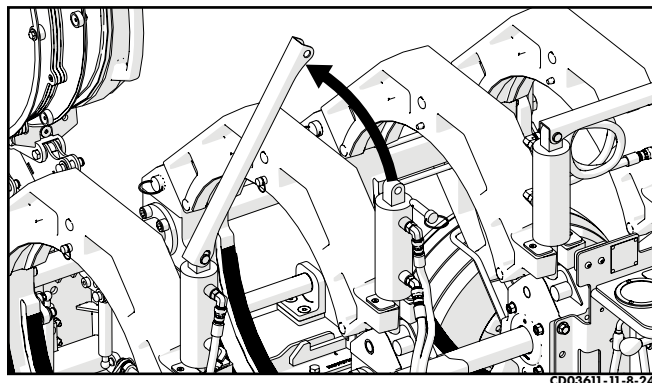
Ensure heater and facer are pivoted out and positioned between the fixed jaws.

If using a machine with hydraulic jaw clamps, unclamp the clamping cylinders halfway.

Turn the machine off.

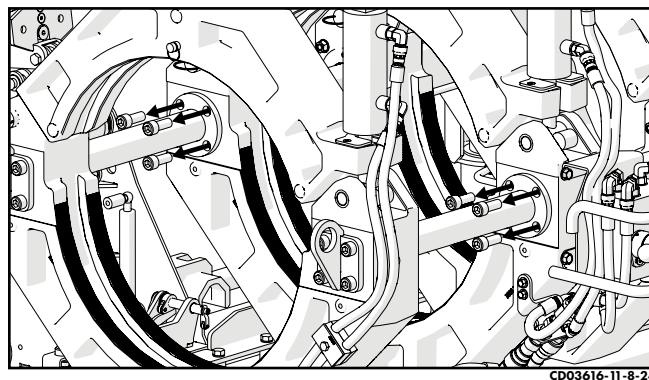
If using a machine with hydraulic jaw clamps, the crossbar joining the two fixed jaw clamping cylinders must be unpinned from the clamping cylinder on the inner fixed jaw and swung upwards. The hydraulic hoses running from the outer fixed jaw clamping cylinder must also be disconnected at the quick disconnects mounted on the inner fixed jaw.

If using a machine with jaw clamp knobs, skip this step.

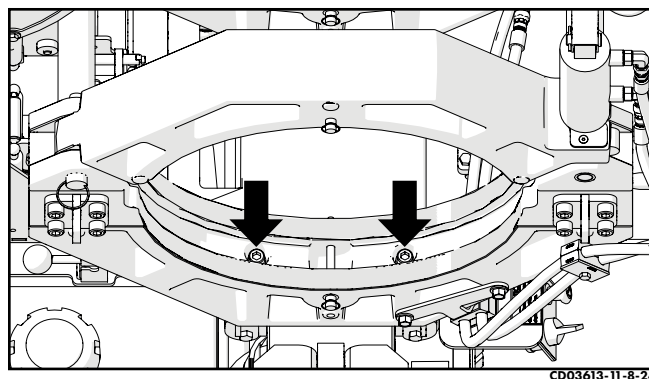


Use a 3/8" hex key to remove the eight bolts securing the two fixed jaw braces to the inner fixed jaw as shown.

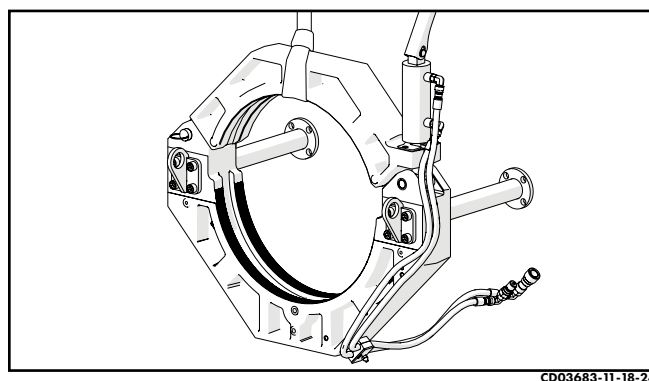
NOTICE: Retain all hardware for reinstallation of removed components.



Use a 3/8" hex key to remove the two bolts securing the outer fixed jaw to the skid and remove the jaw.



Attach a lifting sling of adequate load rating to the upper jaw as shown to lift the outer fixed jaw off of the 4-jaw carriage skid.



NOTICE: For 3-jaw carriage removal, the two lift point brackets must be removed and installed on the inner fixed jaw.

See [3-Jaw Carriage Removal](#) for lift point bracket installation.

Perform these steps in reverse to reinstall the outer fixed jaw.

3-Jaw Carriage Removal

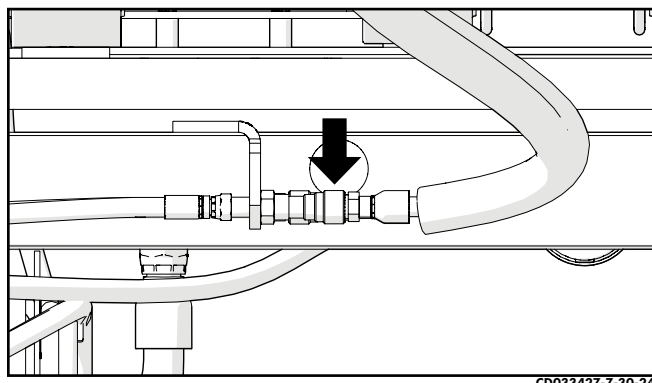
The 3-jaw carriage can be removed from the 4-jaw carriage skid for off-vehicle fusion operation.

Ensure heater and facer are pivoted out and positioned between the fixed jaws.

If using a machine with hydraulic jaw clamps, unclamp the clamping cylinders halfway.

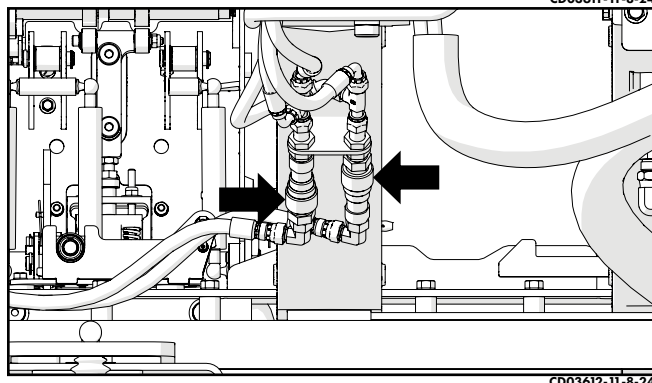
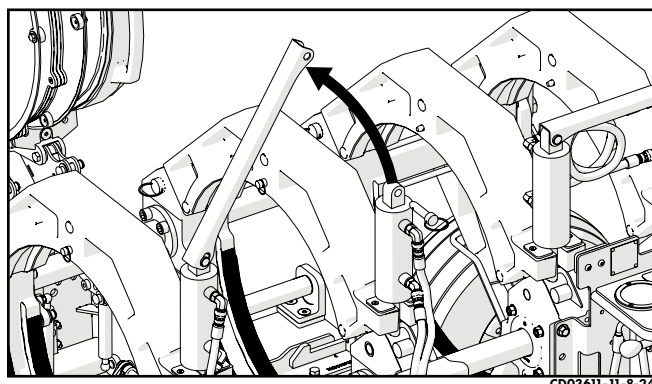
Turn the machine off.

Disconnect all carriage hoses from the vehicle bulkhead.



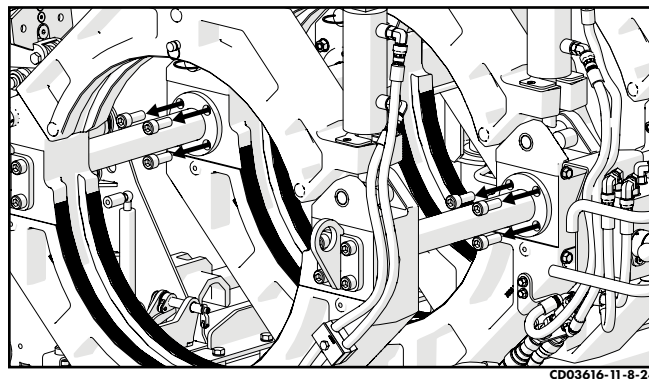
If using a machine with hydraulic jaw clamps, the crossbar joining the two fixed jaw clamping cylinders must be unpinned from the clamping cylinder on the inner fixed jaw and swung upwards. The hydraulic hoses running from the outer fixed jaw clamping cylinder must also be disconnected at the quick disconnects mounted on the inner fixed jaw.

If using a machine with jaw clamp knobs, skip this step.



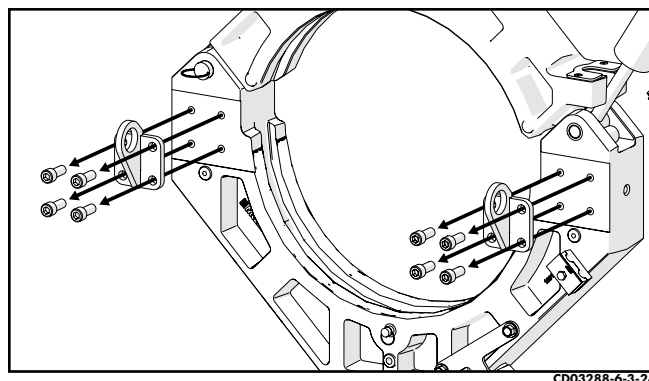
Use a 3/8" hex key to remove the sixteen bolts securing the two fixed jaw braces. Remove the fixed jaw braces from between the inner fixed jaw and the outer fixed jaw as shown.

NOTICE: Retain all hardware for reinstallation of removed components.

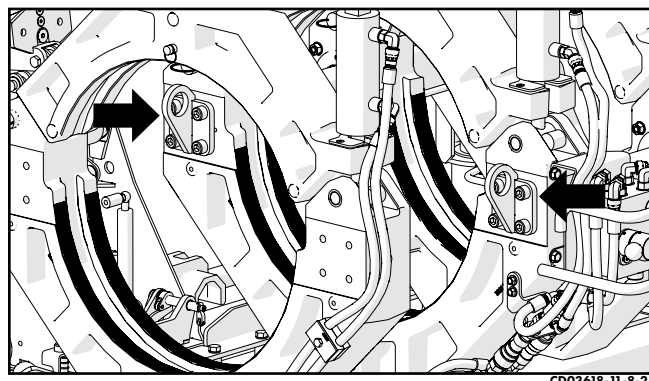


The two lift point brackets must be unbolted from the outer fixed jaw and bolted to the inner fixed jaw before lifting the carriage in a 3-jaw configuration.

Use a 3/8" hex key to remove the eight bolts securing the two lift point brackets to the outer fixed jaw as shown.



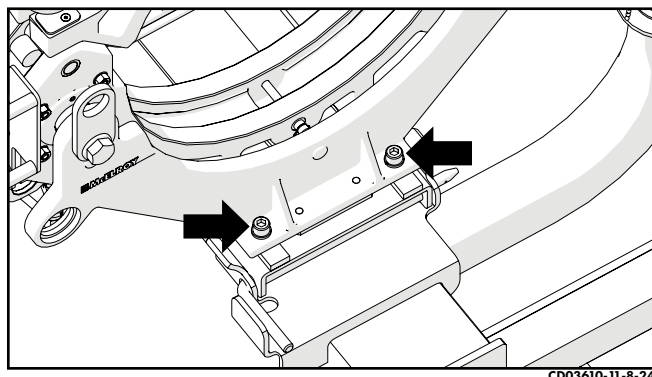
Once removed from the outer fixed jaw, install both brackets to the respective positions on the inner fixed jaw. The lift point brackets are installed using the jaw brace bolt holes.



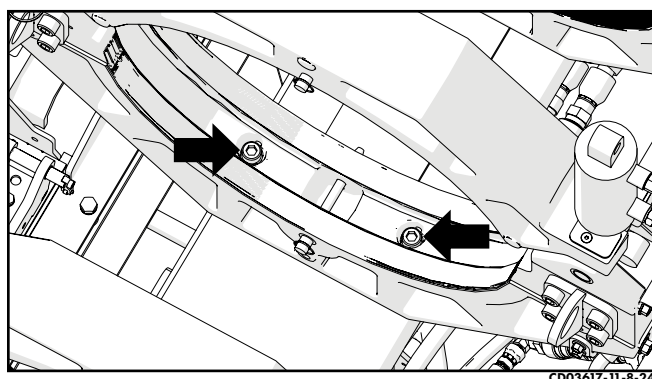
Use a 3/8" hex key to remove the four bolts holding the 3-jaw carriage assembly to the skid.

NOTICE: Retain all hardware for reinstallation of removed components.

Two of the bolts are located on the guide rod support bracket as shown below.



The remaining two bolts are located on the inner fixed jaw.



The 3-jaw carriage can be lifted from the 4-jaw carriage skid.

See [Lifting 3-Jaw Carriage](#) for instructions on lifting the carriage in a 3-jaw configuration.

Perform these steps in reverse to reinstall the 3-jaw carriage onto the 4-jaw carriage skid.

Facer Removal

The facer can be removed from its indexer pivot arm and manually lowered into the carriage for 3-jaw fusion operation.

Keep the facer clean by utilizing the optional heater/facer stand.

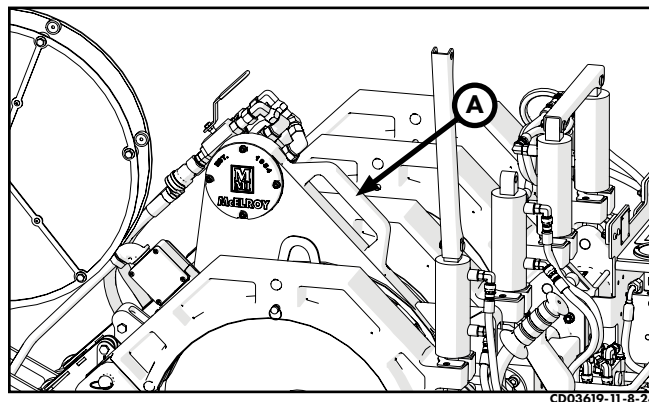
⚠ WARNING

Facer blades are sharp and can cut. Never attempt to remove shavings while the facer is running or is in the facing position between the jaws. Use care when operating the facer and when handling the facer.

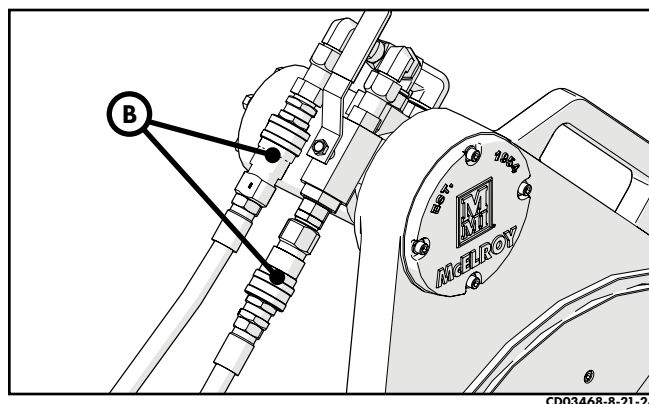
To remove the facer from the pivot arm:

Pivot the facer into the carriage and turn off the machine.

Attach a lifting sling of adequate load rating to the handle on the top of the facer (A).



Disconnect the hydraulic hoses (B) from the facer motor.



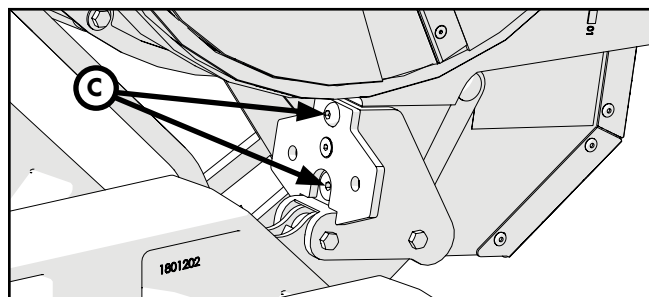
Pivot the facer out of the carriage.

NOTICE: If the machine is equipped with hydraulic jaw clamps, extend the clamping cylinders or remove the crossbar quick pin and raise the crossbar to allow clearance for the facer to be pivoted out of the carriage.

With the facer in the out position, carefully remove the slack from the lifting sling. In addition, support the facer by hand to prevent it from falling once it is unbolted.

Remove the two bolts (C) mounting the facer to the pivot arm.

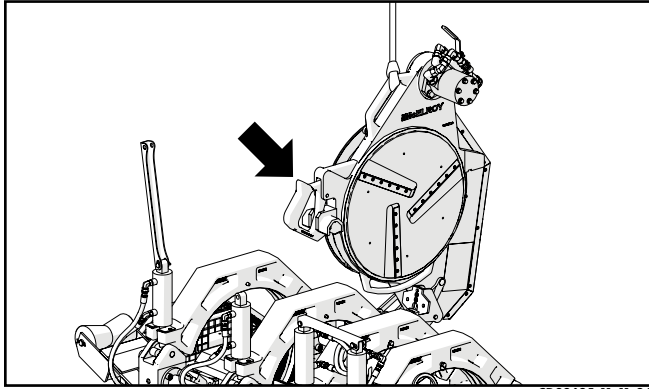
NOTICE: Retain all hardware for reinstallation of removed components.



Slowly lift the facer using an overhead lifting device.

NOTICE: If the machine is equipped with hydraulic jaw clamps, extend the clamping cylinders or remove the crossbar quick pin and raise the crossbar to allow clearance for the facer to be lifted out of the carriage.

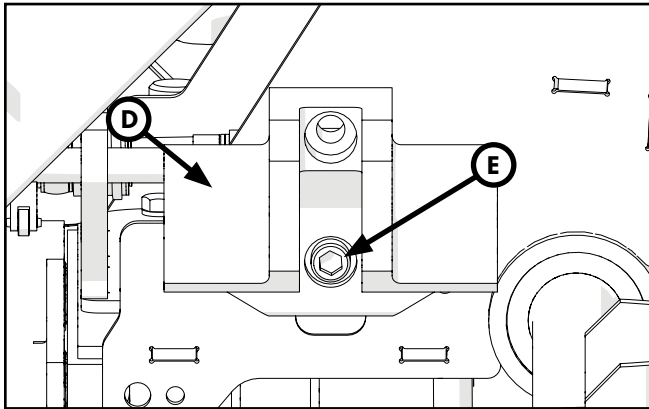
IMPORTANT: Lifting may cause the facer to spin around. Use the latch handle to assist with handling.



CD03625-11-11-24

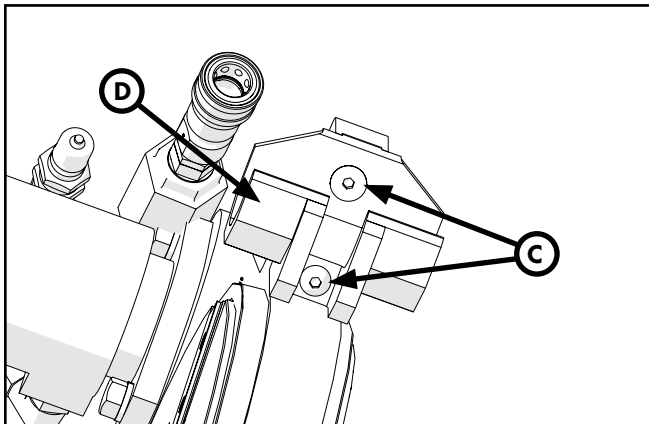
To set up facer for top loading:

Remove the in-ditch guide rod bracket (D) from the indexer by removing the bolt mounting the bracket to the indexer (E).



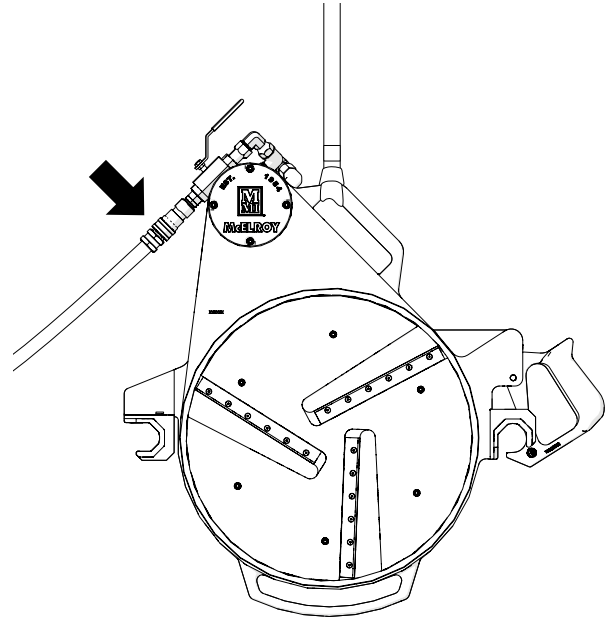
CD03626-11-11-24

Install the guide rod bracket (D) onto the in-ditch location of the facer using the facer mounting bolts (C).



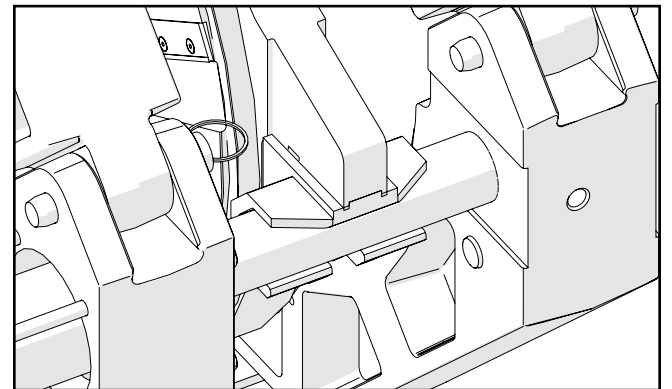
CD03261-5-30-24

Attach the hydraulic extension hoses from the in-ditch kit to the facer motor and connect the other ends to the vehicle.

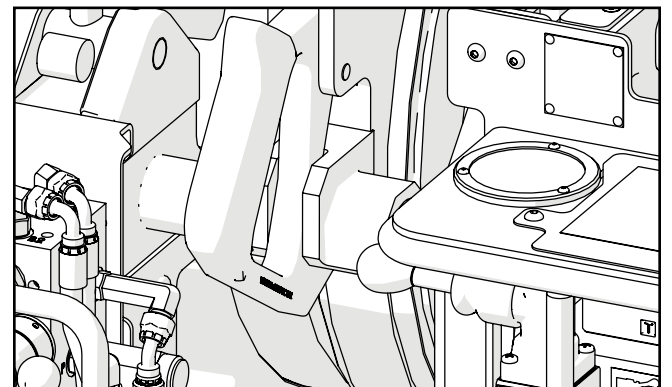


CD03357-6-25-24

When lowering the facer into a detached carriage, attach the in-ditch guide rod bracket onto the back guide rod, then latch the facer handle to the front guide rod.



CD03621-11-8-24



CD03598-11-8-24

Perform these steps in reverse to reinstall the facer onto its indexer pivot arm.

Heater Removal

The heater can be removed from its indexer pivot arm and manually lowered into the carriage for 3-jaw fusion operation.

Keep the heater clean by utilizing the optional heater/facer stand.

CAUTION

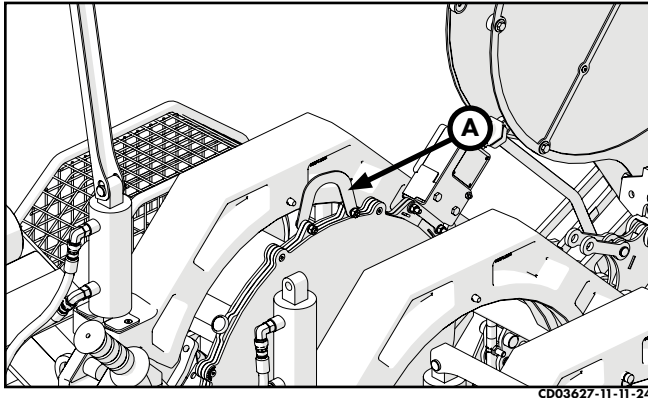
The heater is hot and will burn clothing and skin. Keep the heater protected from personnel when not in use and use care when handling heater and heating pipe.

The heater and adjacent components are hot when heater power is on. Turn the machine off and ensure the heater has cooled before beginning this process.

Ensure the heater is pivoted between the fixed jaws.

To remove the heater from the heater pivot arm:

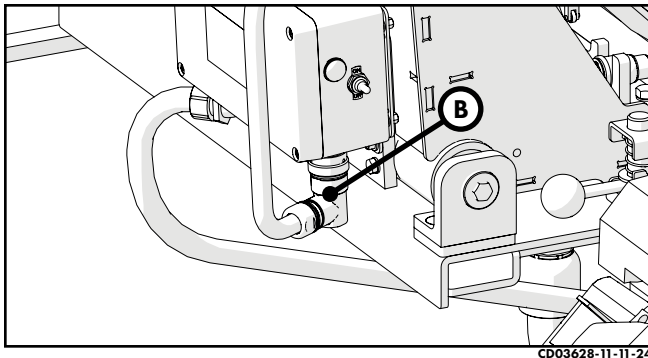
Attach a metal lifting sling of adequate load rating to the lift point on the top of the heater (**A**).



WARNING

Ensure heater power is off before connecting or disconnecting heater power cables. Failure to do so may result in electrical shock.

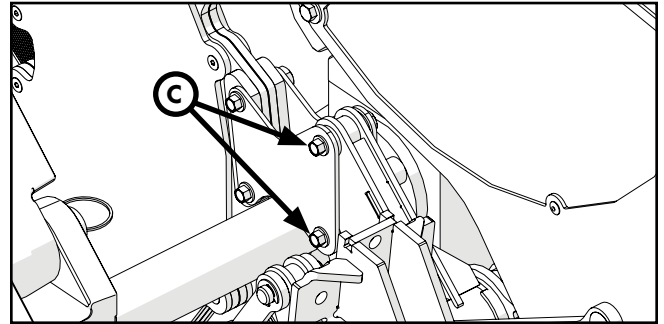
Unplug the heater power cable from the connector on the heater control module (**B**).



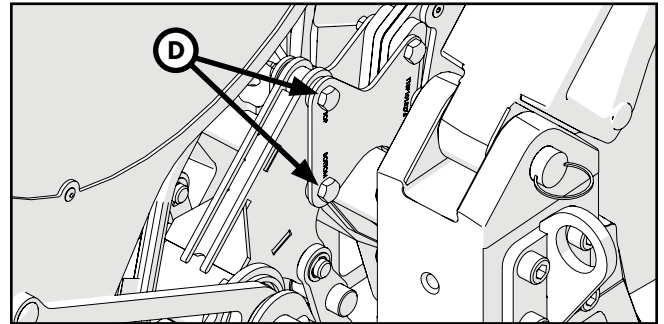
Carefully remove the slack from the lifting sling to support the heater before it is unbolted.

NOTICE: If the machine is equipped with hydraulic jaw clamps, extend the clamping cylinders or remove the crossbar quick pin and raise the crossbar to allow clearance for the heater to be pivoted out of the carriage.

Remove the two bolts (**C**) securing the heater pivot arm nuts.



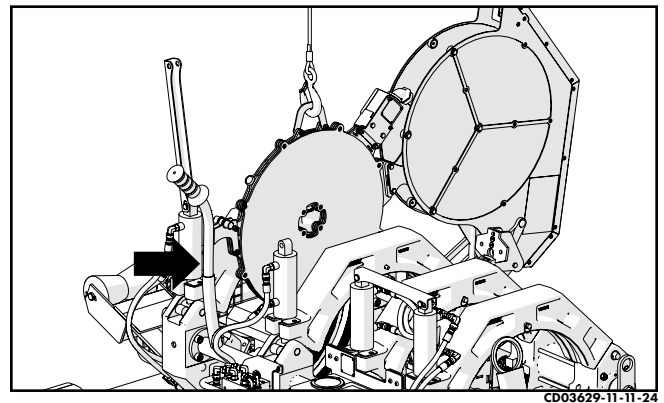
Then, remove the two nuts (**D**) mounting the heater to the pivot arm.



Slowly lift the heater using an overhead lifting device.

NOTICE: If the machine is equipped with hydraulic jaw clamps, extend the clamping cylinders or remove the crossbar quick pin and raise the crossbar to allow clearance for the heater to be lifted out of the carriage.

IMPORTANT: Lifting may cause the heater to spin around. Use the heater handle to assist with handling.

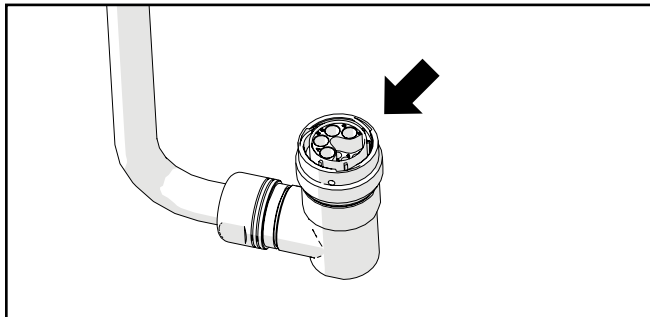


To set up heater for top loading:

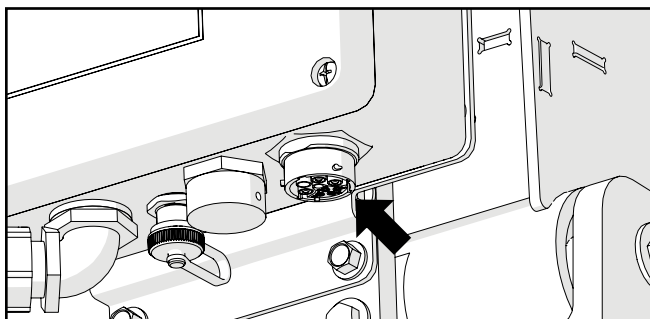
⚠ WARNING

Ensure heater power is off before connecting or disconnecting heater power cables. Failure to do so may result in electrical shock.

Attach the heater extension cable from the in-ditch kit to the heater power cable and connect the other end to the connector on the heater control module.

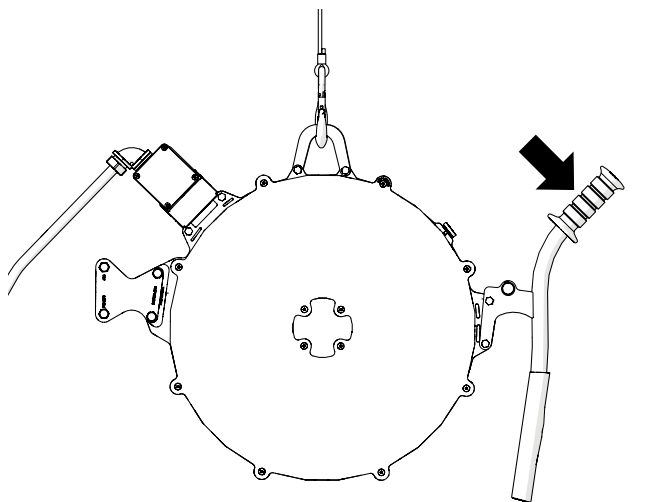


CD03378-7-3-24



CD03379-7-3-24

When lowering the heater into a detached carriage, use the heater handle to guide the heater between pipe ends as to not make premature contact with the pipe.



CD03461-8-20-24

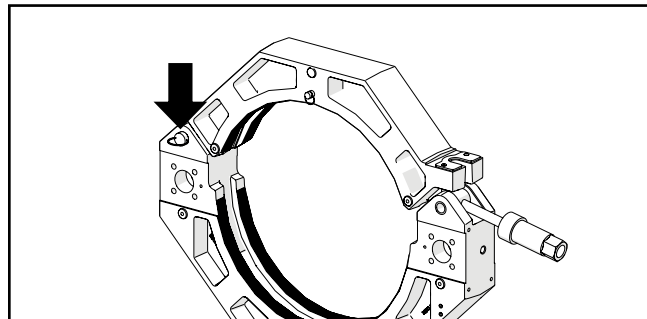
Perform these steps in reverse to reinstall the heater onto its indexer pivot arm.

Upper Jaw Removal

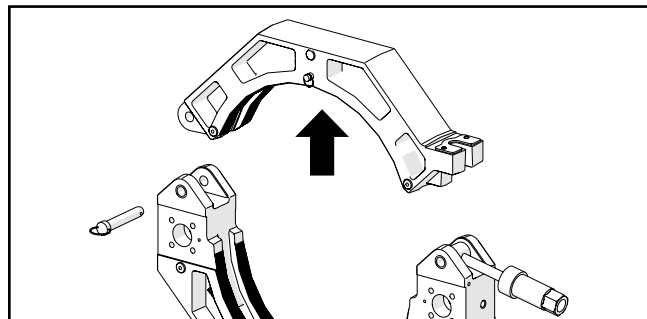
The upper jaws can be removed from the carriage to allow more room for positioning the carriage around pipe in an in-ditch situation.

Before removing the upper jaws, loosen the clamp knobs or unclamp the hydraulic jaw clamps and remove any inserts installed.

To remove the upper jaws, remove the detent pins securing the upper jaws to the lower jaws.



CD03276-5-31-24



CD03277-5-31-24

Perform this step for each jaw set.

Positioning 4-Jaw Carriage for In-Ditch Operation

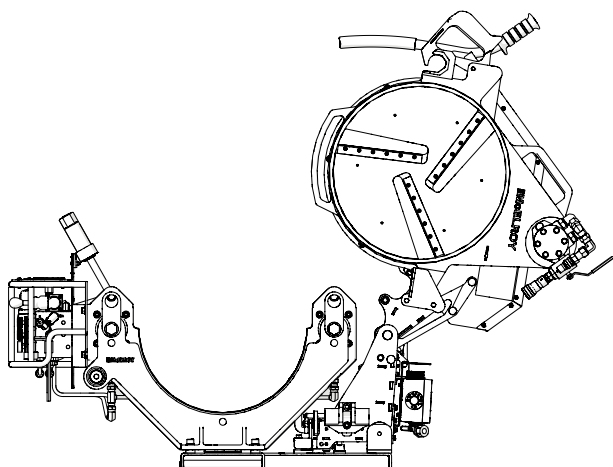
The removed 4-jaw carriage can be used for in-ditch fusion with the heater and facer attached to the indexer.

Positioning the 4-jaw carriage for in-ditch fusion requires it to be lifted. See [Lifting 4-Jaw Carriage](#) for instructions on lifting the carriage in a 4-jaw configuration.

Lower the 4-jaw carriage with the operator side facing the pipe until it is even with or below the pipe to be fused.

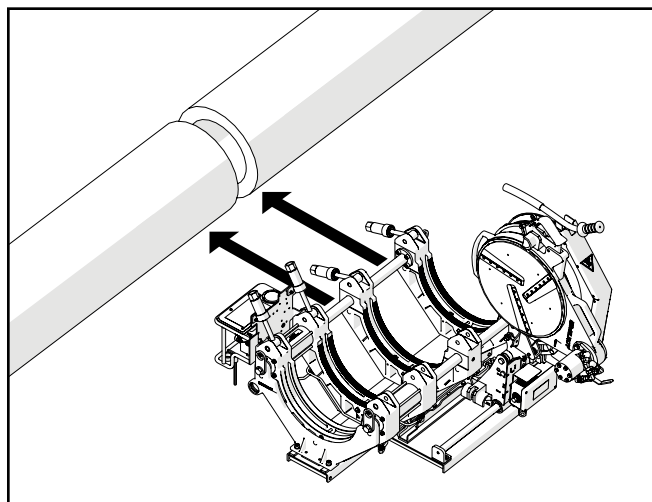
Once settled, remove the upper jaws of the carriage for easier carriage maneuvering.

Below is the recommended setup for 4-jaw carriage in-ditch positioning.



CD03630-11-11-24

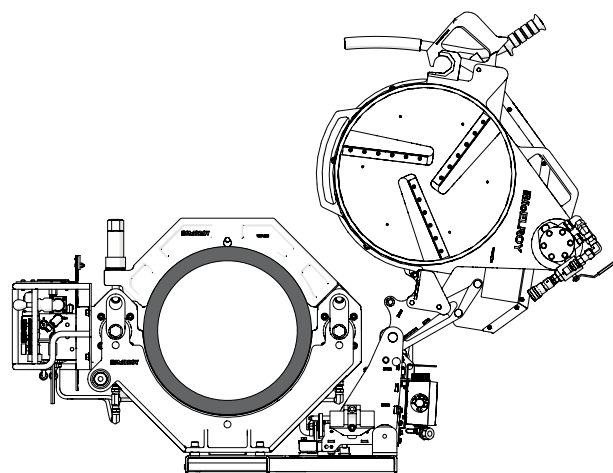
Manually position the 4-jaw carriage, operator side first, beneath the pipe to be fused as shown.



CD03637-11-11-24

Once the 4-jaw carriage is positioned beneath the pipe, reinstall the upper jaws and loosely clamp the jaws around the pipe.

The carriage must be positioned upright as shown below.



CD03632-11-11-24

Once the 4-jaw carriage has been positioned around the pipe as depicted above, connect all in-ditch kit extension hoses and cables between the vehicle, carriage, heater and facer.

Once the carriage is operational, make any necessary adjustments to prepare for fusion operation.

Proceed with normal fusion operation as outlined in ["Operation - Butt Fusion."](#)

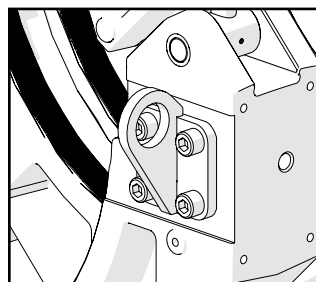
Perform these steps in reverse to remove the 4-jaw carriage from the pipe.

Positioning 3-Jaw Carriage for In-Ditch Operation

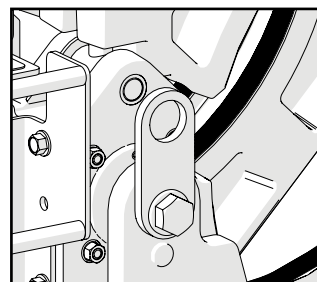
The removed 3-jaw carriage can be used for in-ditch fusion in more compact spaces. The heater and facer are top loaded when in a 3-jaw carriage configuration.

Positioning the 3-jaw carriage for in-ditch fusion requires it to be lifted. The recommended lifting and positioning method is outlined below.

To position the 3-jaw carriage for an in-ditch fusion, remove the upper jaws and attach the lifting sling to the two lift points on the operator side of the carriage.

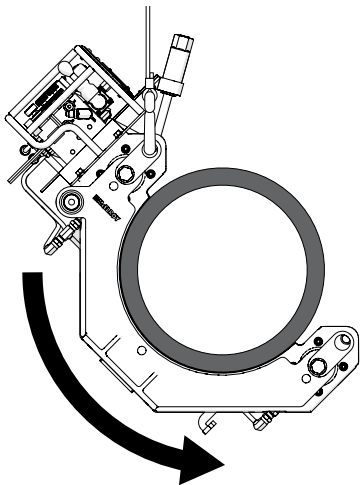


CD03633-11-11-24



CD03634-11-11-24

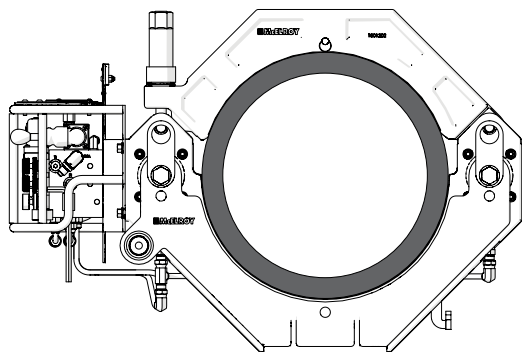
Lift and maneuver the carriage around the pipe as depicted below.



CD03635-11-11-24

Once the 3-jaw carriage is positioned around the pipe, reinstall the upper jaws and loosely clamp the jaws around the pipe.

The carriage must be positioned upright as shown below.



CD03636-11-11-24

Once the 3-jaw carriage has been positioned around the pipe as depicted above, connect all in-ditch kit extension hoses between the vehicle and carriage.

Once the carriage is operational, make any necessary adjustments to prepare for fusion operation.

Proceed with normal fusion operation as outlined in ["Operation - Butt Fusion."](#)

Perform these steps in reverse to remove the 3-jaw carriage from the pipe.

LIFTING AND TRANSPORT

Lifting Safety

Follow all applicable federal, state, local and industry specific regulations when lifting.

⚠ WARNING

Safety warnings:

1. Do not operate a damaged or malfunctioning lifting device.
2. Do not lift persons.
3. Do not lift a suspended load over persons.
4. Do not leave a suspended load unattended.
5. Do not remove or obscure warning labels.
6. Stay clear of the suspended load.
7. Lift loads only as high as necessary.
8. Employ generally accepted safe lifting practices.

Lifting Entire Machine

A 4-point lifting sling is included with this machine.



CD03705-12-4-24

To lift the entire fusion machine, attach the 4-point lifting sling to the four lift points located on the vehicle. There are two lift points located on each side of the vehicle.

NOTICE: The heater and facer must be pivoted out of the carriage and positioned between the fixed jaws in order to lift the entire machine.

The correct configuration for lifting the entire machine is shown on the next page. The back two legs of the sling should run through the outer fixed jaw and the front two legs should run through the inner fixed jaw.

Use only the 4-point lifting sling when lifting the entire machine. The use of chains, cables or any other method not stated is not recommended.

⚠ WARNING

A raised machine could fall and result in serious injury or death if a lifting device fails. Always stand clear of a machine that is being lifted.

Slowly lift the machine using an appropriate overhead lifting device.

NOTICE: The same lifting configuration is used when lifting the vehicle.

Lifting Vehicle

To lift the vehicle alone, attach the 4-point lifting sling to the four lift points located on the vehicle. There are two lift points located on each side of the vehicle.

The correct configuration for lifting the vehicle is shown on the next page.

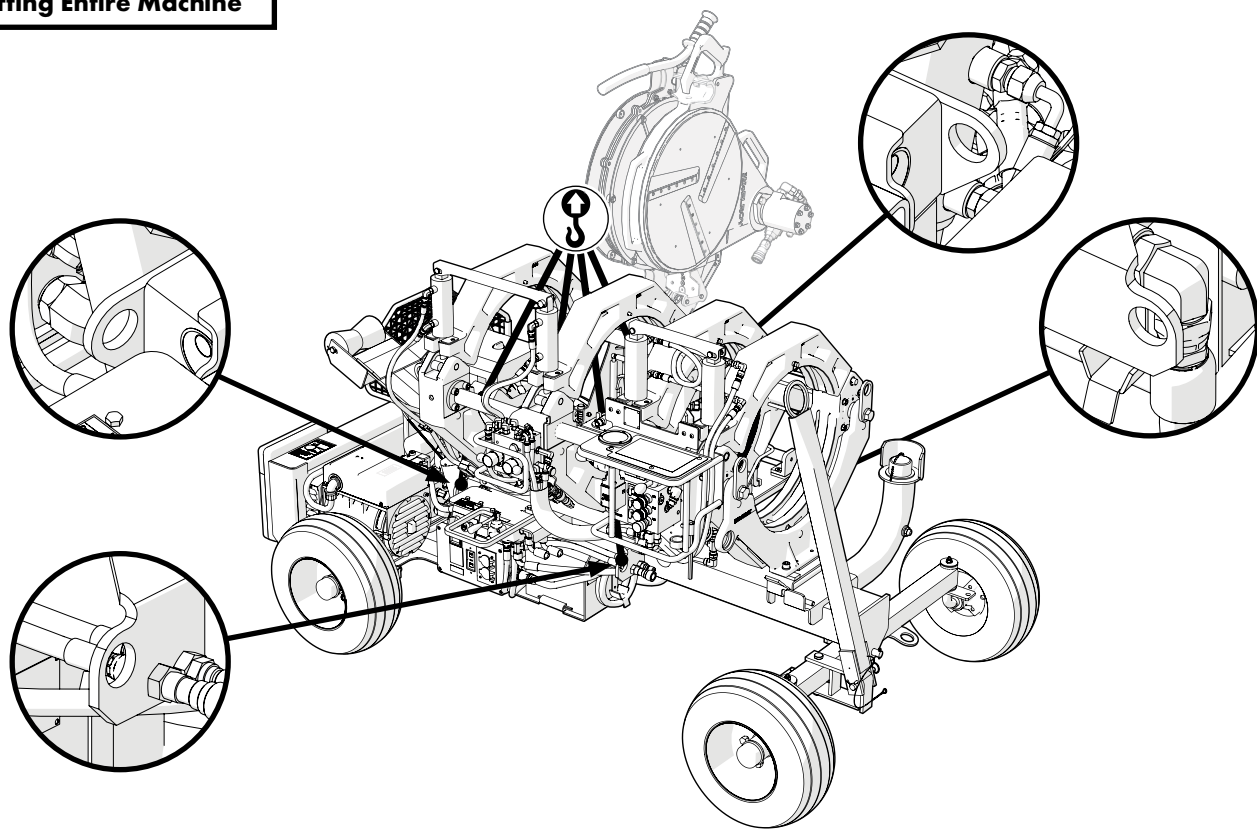
Use only the 4-point lifting sling when lifting the vehicle. The use of chains, cables or any other method not stated is not recommended.

⚠ WARNING

A raised machine could fall and result in serious injury or death if a lifting device fails. Always stand clear of a machine that is being lifted.

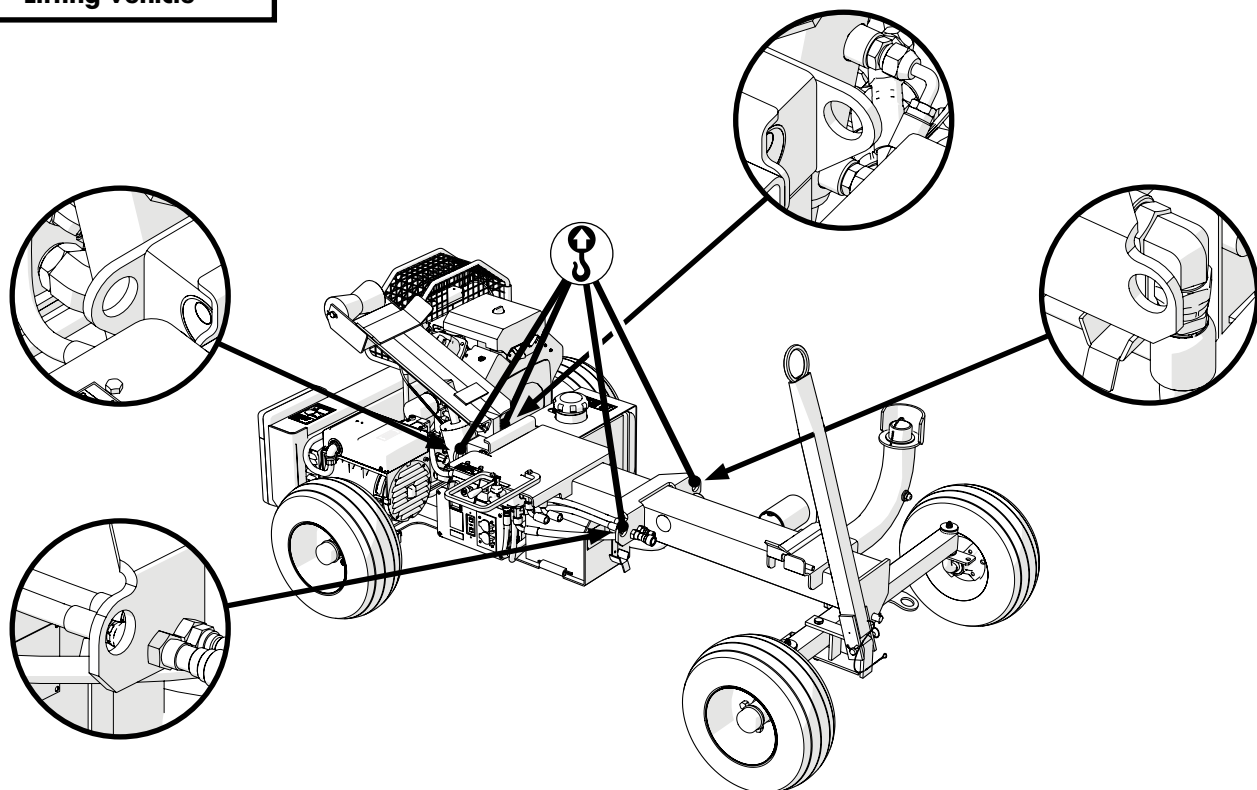
Slowly lift the vehicle using an appropriate overhead lifting device.

Lifting Entire Machine



CD03715-12-10-24

Lifting Vehicle



CD03714-12-10-24

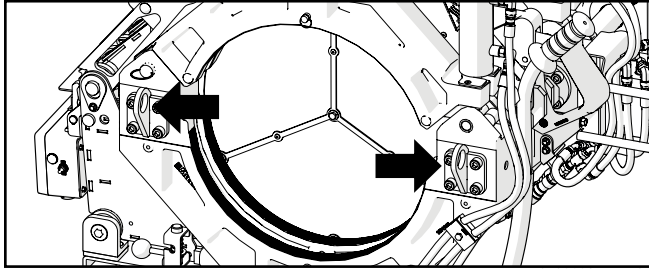
Lifting 4-Jaw Carriage

In order to remove the 4-jaw carriage from the vehicle, the carriage must be lifted using an overhead lifting device. Maneuvering and positioning the 4-jaw carriage after it has been removed from the vehicle also requires it to be lifted.

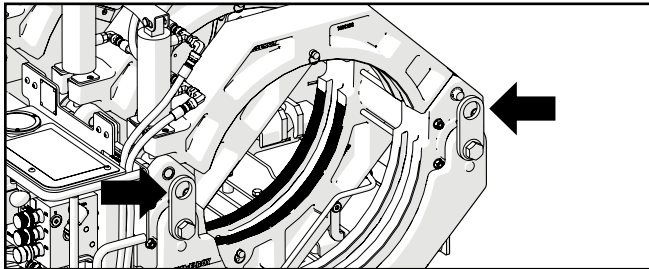
Refer to "[Special Operations](#)" for 4-jaw carriage removal.

Lifting with indexer components stowed:

Attach the 4-point lifting sling to each of the four lift points shown below.



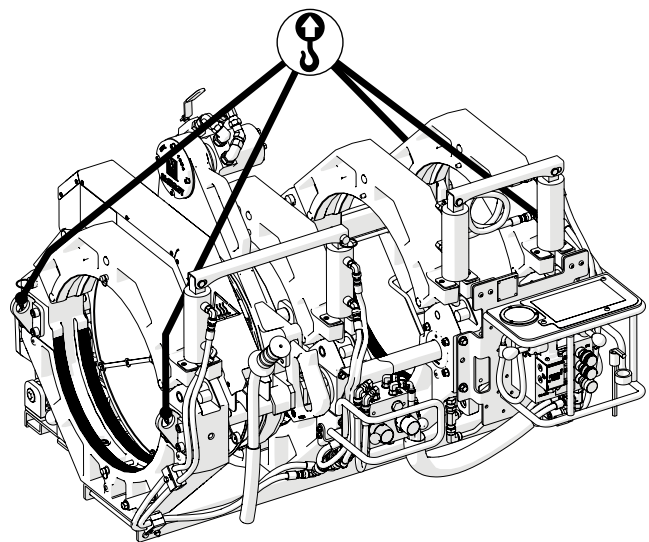
CD03639-11-11-24



CD03640-11-11-24

The correct configuration for lifting the 4-jaw carriage with the indexer components stowed is shown below.

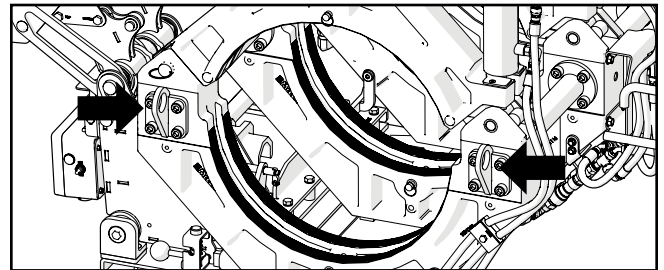
Slowly lift the carriage using an overhead lifting device.



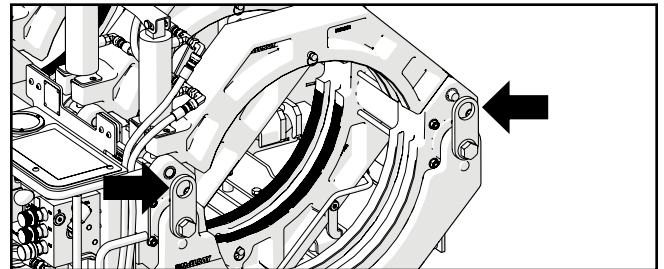
CD03710-12-4-24

Lifting with indexer components pivoted out:

Attach the 4-point lifting sling to each of the four lift points shown below.



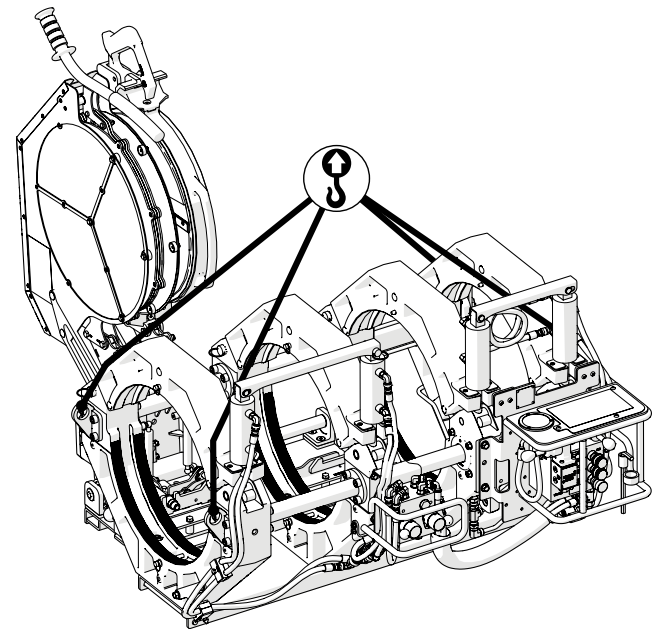
CD03642-11-11-24



CD03643-11-11-24

The correct configuration for lifting the 4-jaw carriage with the indexer components pivoted out is shown below.

Slowly lift the carriage using an overhead lifting device.



CD03711-12-4-24

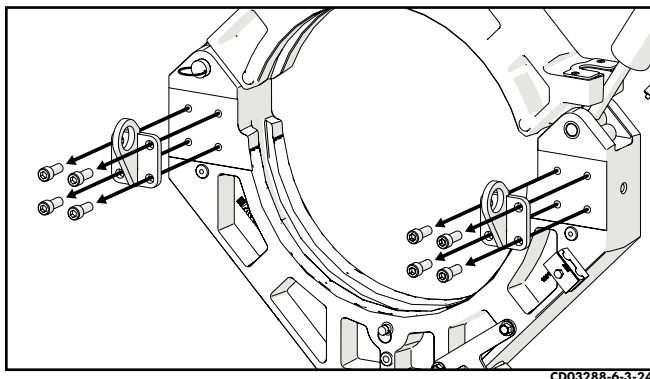
Lifting 3-Jaw Carriage

In order to remove the 3-jaw carriage from the 4-jaw carriage skid, the carriage must be lifted using an overhead lifting device. Maneuvering and positioning the 3-jaw carriage also requires it to be lifted.

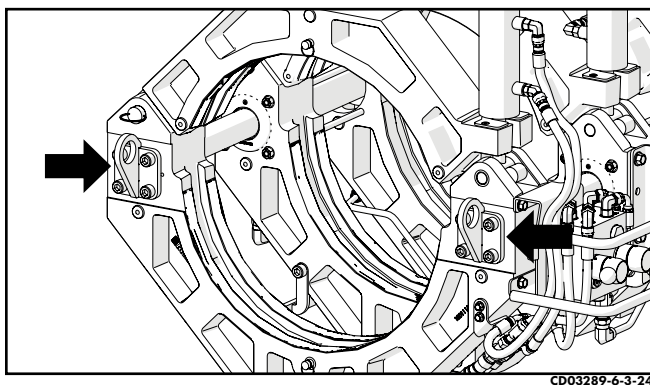
Refer to "[Special Operations](#)" for 3-jaw carriage removal.

The two lift point brackets must be unbolted from the outer fixed jaw and bolted to the inner fixed jaw before lifting the carriage in a 3-jaw configuration

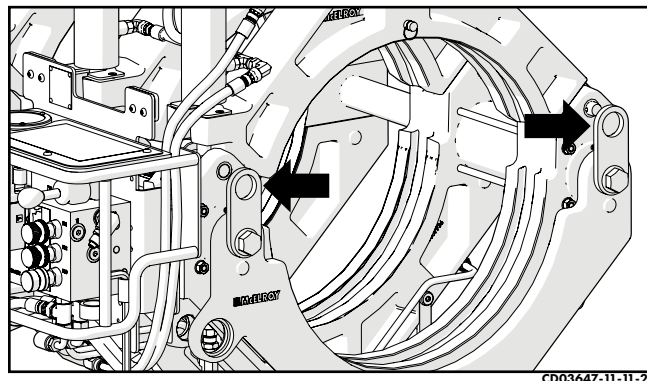
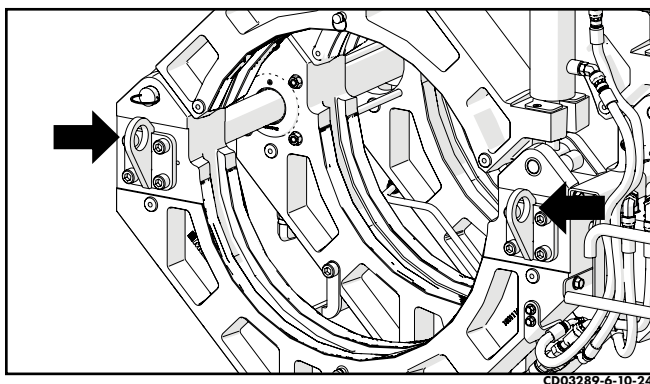
Use a 3/8" hex key to remove the two lift point brackets from the outer fixed jaw as shown.



Once removed from the outer fixed jaw, install both brackets to the respective positions on the inner fixed jaw. The lift point brackets are installed using the jaw brace bolt holes.

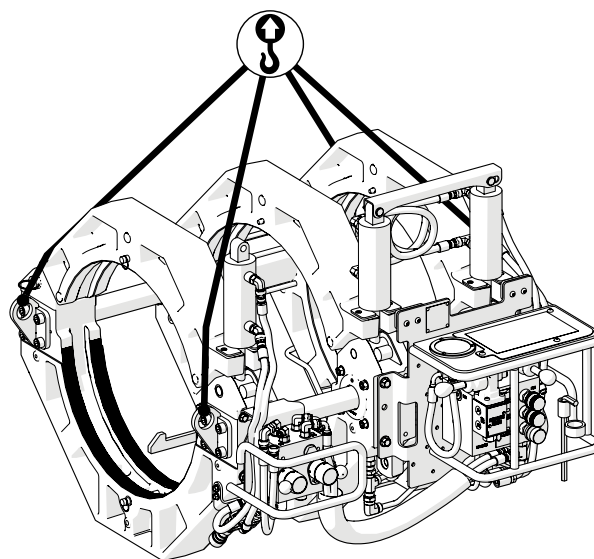


To lift the 3-jaw carriage, attach the 4-point lifting sling to each of the four lift points shown.



The correct configuration for lifting the 3-jaw carriage is shown below.

Slowly lift the carriage using an overhead lifting device.



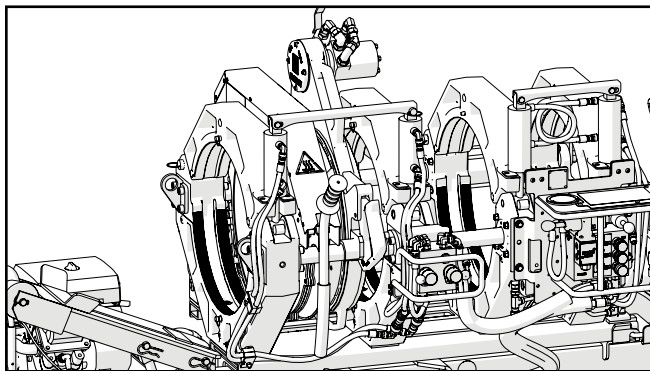
Stowing Indexer

Return the indexer to the stowage position for transport and when not in use.

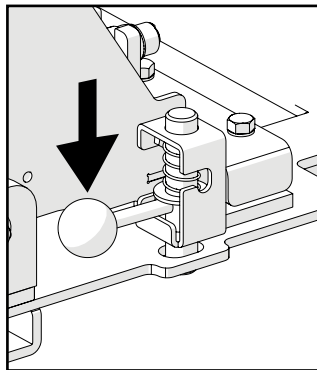
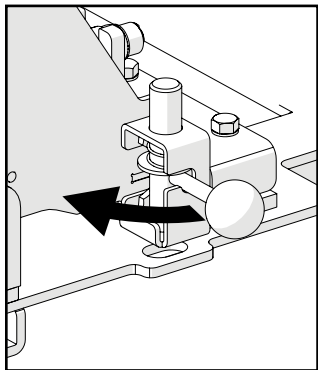
To secure the indexer in the stowage position, position the heater and facer between the fixed jaws and pivot the heater, heater bag frame and facer in between the fixed jaws.

NOTICE: If the machine is equipped with hydraulic jaw clamps, extend the clamping cylinders or remove the crossbar quick pin and raise the crossbar to allow clearance for the heater and facer to be pivoted into the carriage.

NOTICE: Ensure the heater is engaged into latch point 3.



Engage the indexer stowage lock to secure the indexer in place.



NOTICE: Do not transport the machine with a raised heater, heater bag frame or facer. Doing so may damage the machine.

Before transporting the machine, ensure that:

- The jaws are clamped closed
- The carriage is completely open
- The facer, heater and heater bag frame are pivoted into the stowage position
- The indexer stowage lock is engaged

Loading Machine for Transport

WARNING

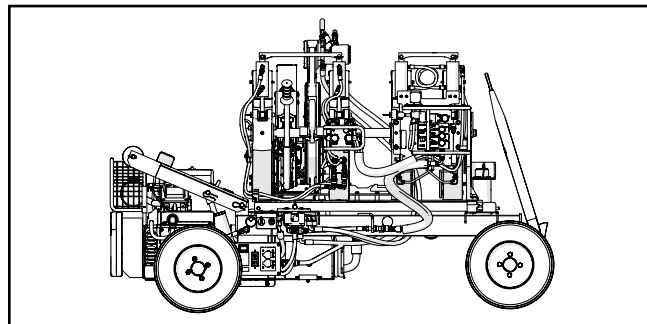
A raised machine could fall and result in serious injury or death if a lifting device fails. Always stand clear of a machine that is being lifted.

When loading onto a truck or trailer for transport, the machine must be lifted and set down into transport position.

Refer to [Lifting Entire Machine](#) in this section for instructions on lifting the entire machine.

Once the machine is in transport position, ensure that:

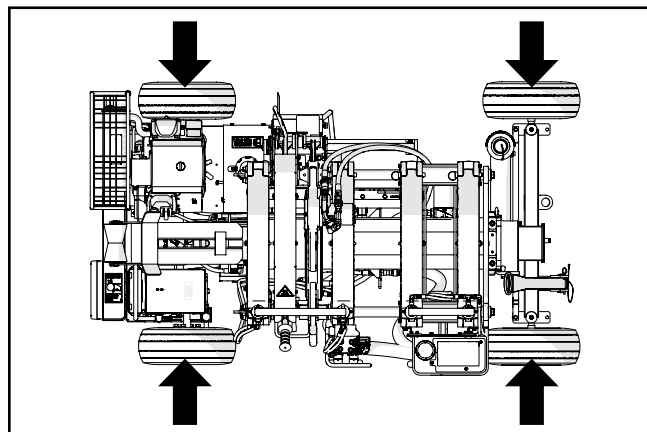
- The jaws are clamped closed
- The facer, heater and heater bag frame are secured in the stowage position
- The indexer stowage lock is engaged
- The wheel lock is engaged
- The tow bar is pinned in the upright position



Securing Machine for Transport

When securing the machine for transport, it is recommended to run tiedown straps over each tire.

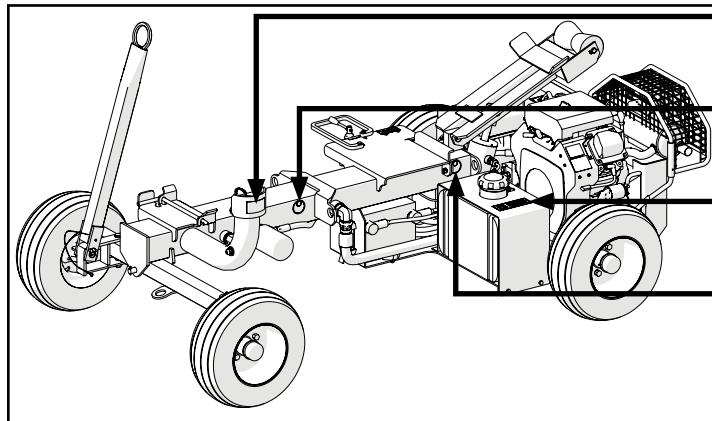
Secure the four straps to the trailer or flatbed being used for transport.



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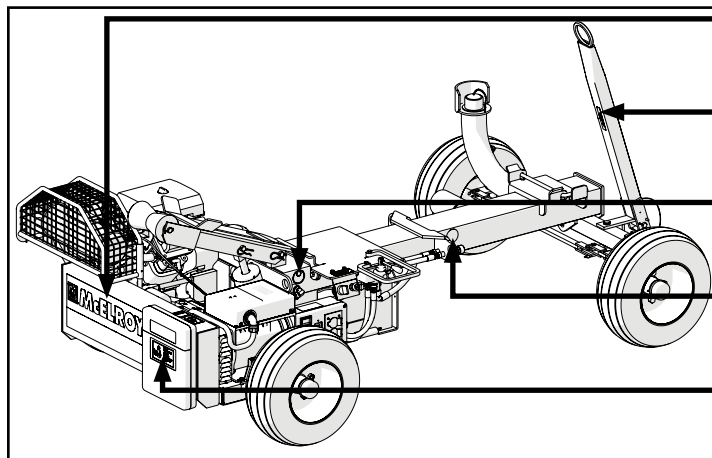
LABELS AND MARKINGS

Labels and Markings



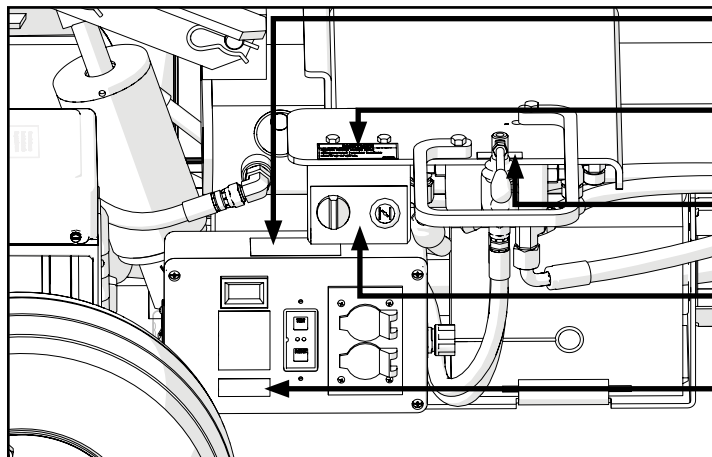
CD03652-11-13-24

- HYDRAULIC FLUID ONLY LABEL
Part Number - 8163106
- YELLOW LIFT POINT LABEL
Part Number - MJQ00379
- UNLEADED FUEL ONLY LABEL
Part Number - T804301 (Gas Only)
- YELLOW LIFT POINT LABEL
Part Number - MJQ00379



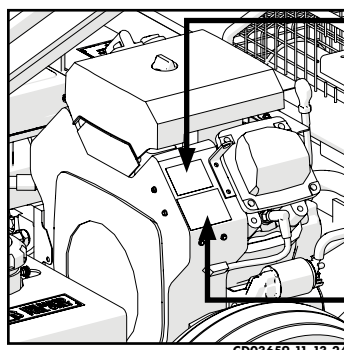
CD03653-11-13-24

- McELROY LABEL
Part Number - 8163121
- TOWING SPEED LABEL
Part Number - 8163220
- YELLOW LIFT POINT LABEL
Part Number - MJQ00379
- YELLOW LIFT POINT LABEL
Part Number - MJQ00379
- SAFETY INSTRUCTIONS MANUAL LABEL
Part Number - 816342

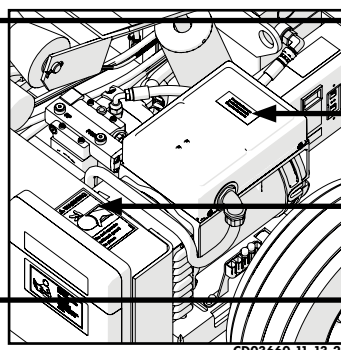


CD03658-11-13-24

- VOLTAGE LABEL
Part Number - T1201702 (Gas Only)
- ENGINE PRESTART NOTICE LABEL
Part Number - 816303
- PIPE LIFT LABEL
Part Number - 816305
- MOTOR ON/OFF/START/CHOKE LABEL
Part Number - 816348 (Gas Only)
- SENSING MODULE INPUT LABEL
Part Number - 08P0928983 (Gas Only)

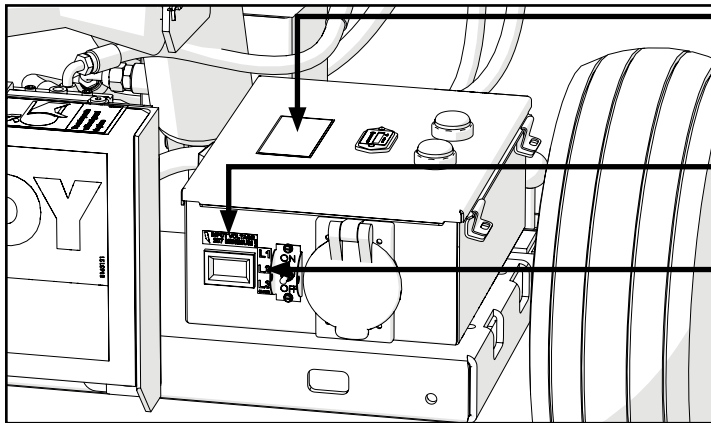


CD03659-11-13-24



CD03660-11-13-24

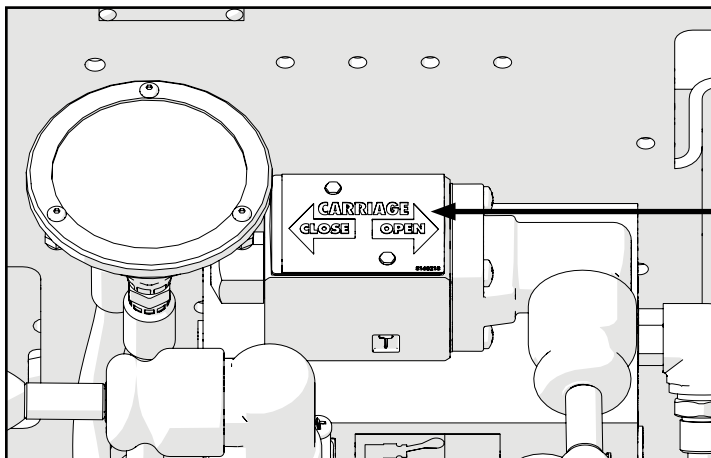
- OIL TYPE NOTICE LABEL
Part Number - 816349 (Gas Only)
- GENERATOR COVER FUSE LOCATOR LABEL
Part Number - 8163203 (Gas Only)
- BELT GUARD WARNING LABEL
Part Number - 8163123
- EPA EVAP LABEL
Part Number - 8163190 (Gas Only)



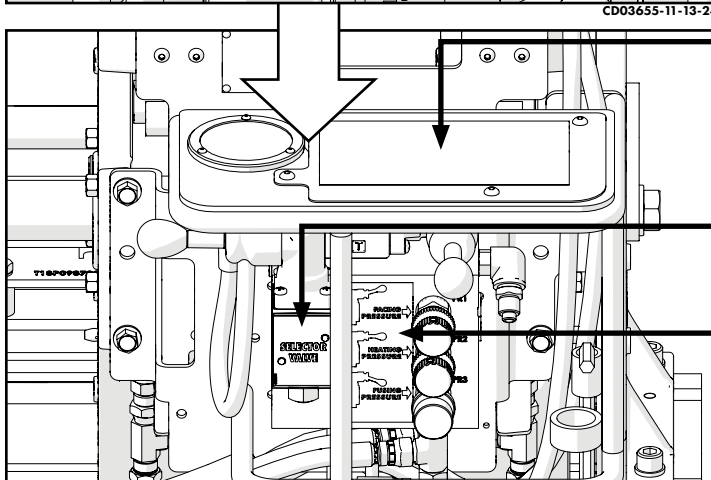
DANGER HIGH VOLTAGE LABEL
Part Number - 829201

207 MINIMUM INPUT VOLTAGE LABEL
Part Number - 816326 (Electric Only)

VOLTMETER LABEL
Part Number - 816328 (Electric Only)



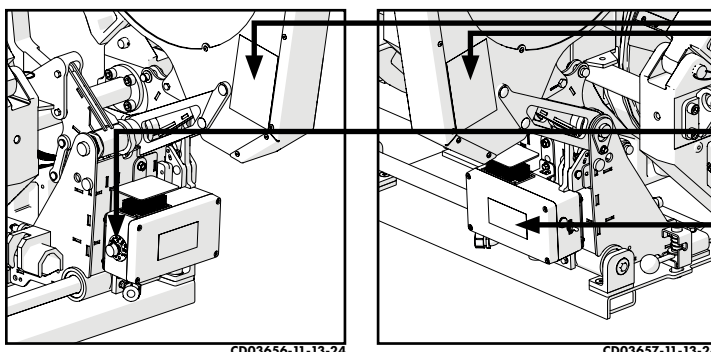
CARRIAGE OPEN/CLOSE LABEL
Part Number - 8163218



RESOURCE LIBRARY LABEL
Part Number - DISR5RC24

SELECTOR VALVE LABEL
Part Number - 8163211

**FACING, HEATING, FUSING PRESSURE
SELECTOR LABEL**
Part Number - 816301



6x4" CAUTION: HOT SURFACE LABEL
Part Number - MJQ00507

TEMPERATURE SCALE LABEL
Part Number - 816382

DANGER HIGH VOLTAGE LABEL
Part Number - 829201

MAINTENANCE

Machine Maintenance Task Schedule

Task													
	As Needed	Daily	Weekly	100 Service Hours	200 Service Hours	400 Service Hours	1000 Service Hours	2000 Service Hours	Yearly	3000 Service Hours	4000 Service Hours	Every 2 Years	Every 3 Years
Clean Machine	●												
Inspect Facer Blades	●												
Change Heater Butt Plates	●												
Replace Battery and Cables	●												
Check Tire Pressure	●												
Bleed Air from Carriage Cylinders	●												
Adjust System Pressure	●												
Check Indexer Gas Springs	●												
Check Carriage Pressure Gauge	●												
Replace Drive Belts	●												
Grease		●											
Check Hydraulic Fluid		●											
Check Machine Operation		●											
Inspect Heater Butt Plates		●											
Inspect Hydraulic Components and Hoses			●										
Check Fasteners Are Tight			●										
Inspect Wiring and Cables			●										
Change Hydraulic Fluid and Filter					●								
Inspect Drive Belts								●					
Replace Indexer Gas Springs												●	

Engine Maintenance Task Schedule

Task	As Needed	Daily	Weekly	25 Service Hours	100 Service Hours	200 Service Hours	250 Service Hours	500 Service Hours	Yearly	
Clean Engine	•									
Check Engine Oil Level		•								
Check Air Cleaner Element			•							
Service/Replace Low-Profile Precleaner				•					•	
Replace Air Cleaner Element					•				•	
Change Engine Oil*					•				•	
Remove Cooling Shrouds and Clean Cooling Areas					•				•	
Check Oil Cooler Fins (If Equipped) and Clean if Necessary					•				•	
Change Engine Oil Filter*						•				
Replace Fuel Filter						•				
Replace Air Cleaner Element							•			
Replace Spark Plugs and Set Gap								•		
Check Fuel Lines and Clamp Bands									•	

* Change engine oil and filter after the first 50 service hours. Change the oil after every 100 hours and the filter after every 200 hours of operation thereafter.

Perform these maintenance tasks more frequently in severe, dusty or dirty conditions.

Some additional engine maintenance procedures apply and may be performed by a Kohler authorized dealer. Refer to the engine service manual or consult your local Kohler dealer for these procedures.

Engine Maintenance Tasks

All engine maintenance tasks are in the engine's operation and service manual. Perform the appropriate engine maintenance task based on the correct interval in the [Engine Maintenance Task Schedule](#). Complete an engine maintenance task using the instructions in the engine service manual.

The Kohler engine service manual is included with this machine and can be found inside the literature compartment attached to the vehicle.

Preventative Maintenance

To ensure optimum performance, the machine must be kept clean and well maintained.

With reasonable care, this machine will give years of service. Therefore, it is important that a regular schedule of preventive maintenance be kept.

Store machine inside, out of the weather, whenever possible.

Clean Machine

Cover plugs and electrical control boxes before washing.

Clean the machine with soap and water as needed.

Do not pressure wash.

Check Machine Operation

- 1) Tow the machine and check for proper mobility.
- 2) Operate all carriage and indexer functions to check for proper operation. Open and close jaws. Open and close the carriage. Move indexer and pivot the heater and facer in and out. Pivot the heater into each latch point. Refer to the "[Indexer Operation](#)" section of this manual for heater latch point retention.
- 3) Open facer valve and check the facer for proper operation.
- 4) While the machine is running, turn on and check the heater to ensure it is heating up.

If any of the operations do not function properly, troubleshoot the issue and repair the operation.

Grease

Keep moving parts well lubricated with a high quality grease, such as Mobil® XHP 462 or equivalent.

- Pipe lift roller
- Wheel kingpins (2)
- Tow bar swivel
- Axle tilt

Inspect Facer Blades

Blades bolt directly to the blade holder and should be inspected for damage and sharpness.

Dull or chipped blades must be replaced.

NOTICE: Never extend the blades beyond the inner or outer circumference of the facer.

Inspect Wiring and Cables

Inspect wiring and cables for fraying, damaged connectors, missing insulation, cuts or other damage.

Replace any damaged wiring or cables.

Ensure all relays and fuses are seated correctly.

Inspect Heater Butt Plates

The surface of the heater butt plates are coated with an anti-stick coating.

Inspect the surface of the heater butt plates while cool. Inspect for damage or deterioration of the anti-stick coating on the heater butt plate surfaces.

Replace damaged components.

Changing Heater Butt Plates

CAUTION

The heater is hot and will burn clothing and skin. Keep the heater protected from personnel when not in use and use care when handling heater and heating pipe.

The heater body of this assembly is not coated. Coated heater butt plates are available for all fusion applications.

Heater butt plates are installed with stainless steel cap screws. Always use a high-temperature, anti-seize compound on mounting screw threads for easier later removal.

Care should be taken to assure that the heater butt plates are seated on the heater body and that no foreign matter is trapped between these surfaces.

IMPORTANT: Do not over-tighten the bolts.

The surface of the heater butt plates are coated with an anti-stick coating.

NOTICE: Only install heater plates when the heater is cool.

Clean Heater Butt Plate Surfaces

⚠ CAUTION

The heater is hot and will burn clothing and skin. Keep the heater protected from personnel when not in use and use care when handling heater and heating pipe.

The heater butt plate surfaces must be kept clean and free of any plastic build up or contamination. Plastic build up is best removed when the heater butt plates are at fusion temperature using a clean, dry, lint-free, non-synthetic cloth. Synthetic cloths may melt to the heater butt plate surfaces under fusion temperature.

The surface of the heater butt plates are coated with an anti-stick coating.

Before each fusion joint, the heater butt plate surfaces must be wiped with a clean, dry, lint-free, non-synthetic cloth.

NOTICE: Do not use any abrasive materials to clean heater butt plate surfaces. Use only a clean, dry, lint-free, non-synthetic cloth to avoid damaging heater butt plates.

Pivot the heater into latch point 1 and clean both sides of the lower half of the heater.

Pivot the heater into latch point 2 and clean both sides of the upper half of the heater.

Refer to the "[Indexer Operation](#)" section of this manual for heater latch point retention.

Check Carriage Pressure Gauge

The carriage pressure gauge should read zero when the machine is not running.

Replace damaged gauges.

Inspect Hydraulic Components

Inspect hydraulic components, hoses and sleeves for any leaks or damage. Replace or repair any damaged or leaking hydraulic components, hoses or sleeves.

⚠ WARNING

Escaping fluid under pressure can penetrate the skin causing serious injury. Keep hands and body away from pinholes which eject fluid under pressure. Use a piece of cardboard or paper to search for leaks. If any fluid is injected into the skin, it must be immediately removed by a doctor familiar with this type of injury.

Adjusting System Pressure

⚠ CAUTION

Do not touch belts and rotating parts while the engine is running. Failure to do so could result in injury.

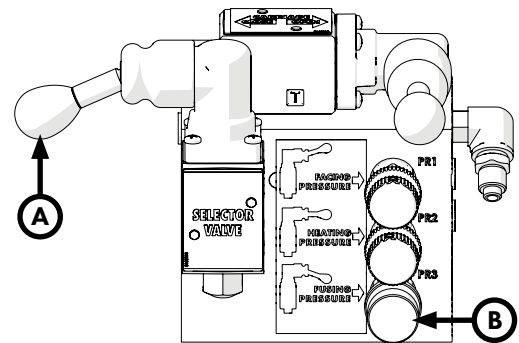
⚠ CAUTION

Engine component surfaces can be hot. Use caution when working around hot surfaces.

Turn the machine on by starting the engine or powering on the electrical box.

The system pressure should be set to 1,200 psi. Refer to the carriage pressure gauge for system pressure reading.

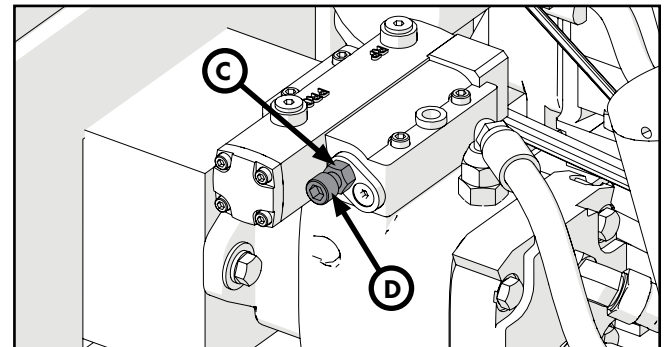
With the carriage directional valve in neutral, shift the selector valve (A) to fusing pressure and turn the fusing pressure reducing valve (B) clockwise until completely open. If the carriage pressure gauge reads 1,200 psi, no adjustment is needed.



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If the system pressure reading is above or below the criteria stated above, adjustment is needed at the hydraulic pump.

To make adjustments to the system pressure, loosen the jam nut (C) and turn the compensator screw (D) to the right to increase system pressure, or to the left to decrease system pressure.



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Once the carriage pressure gauge reads 1,200 psi, retighten the jam nut.

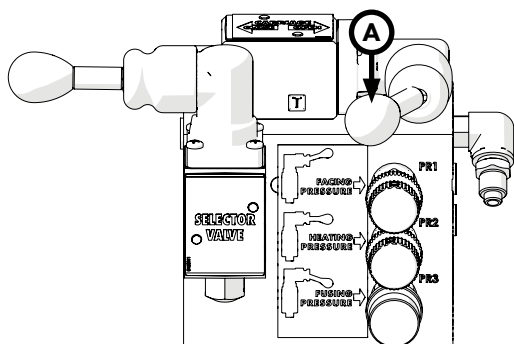
Bleeding Air From Carriage Cylinders

The two carriage cylinders have air bleed screws and must be bled if the system ever runs low on oil or leaks air on inlet side of pump. Air in the system is indicated when carriage movement becomes jerky and erratic. The bleed plugs are located on the cylinder glands.

To bleed the cylinders:

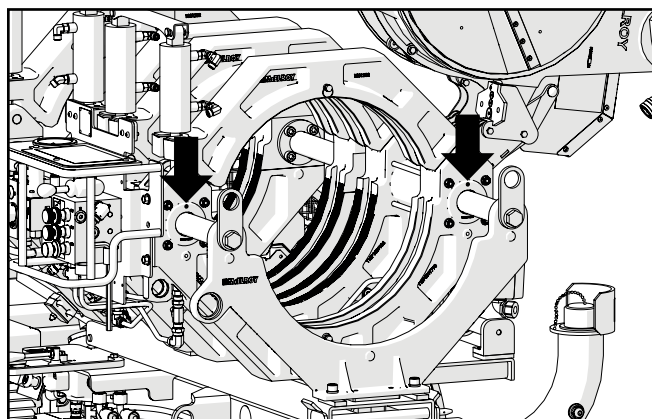
Tilt the machine so the fixed jaw end is higher than the opposite end.

Shift the carriage directional valve **(A)** to **CLOSE** to close the carriage. Then, adjust the pressure to approximately 50-100 psi using the pressure reducing valve selected before proceeding.



Loosen the bleed plugs on the movable end of the cylinders.

Hold pressure on the cylinders. Once no air is indicated, quickly tighten the plugs.



Then, tilt the machine so the movable end is higher than the opposite end.

Shift the carriage directional valve to **OPEN** to open the carriage.

Repeat the procedure outlined above for the fixed end of the cylinders.

Check Hydraulic Fluid

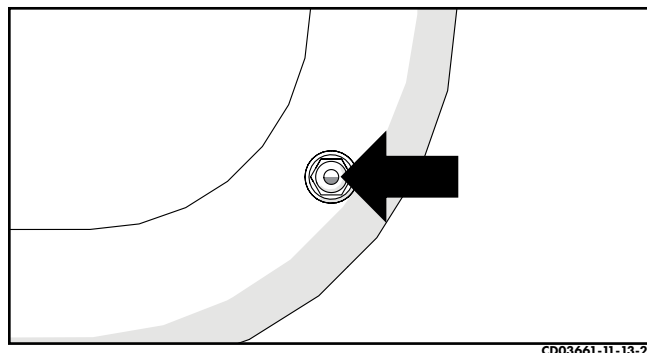
The hydraulic fluid level should be checked daily.

NOTICE: Ensure machine is on level ground.

If hydraulic fluid is not visible in the sight glass, fluid must be added by removing the hydraulic fill cap.

Add fluid until visible in the sight glass. Ensure the fluid is cool to allow for fluid volume expansion.

Refer to the "[Hydraulic Fluids](#)" section for hydraulic fluid recommendations.



Changing Hydraulic Fluid and Filter

The hydraulic fluid and filters should be replaced approximately every 400 hours of operation. Fluid should also be changed as extreme weather conditions dictate. If the filter restriction gauge is in the red while the facer is running, change the hydraulic fluid and filter.

To drain hydraulic fluid:

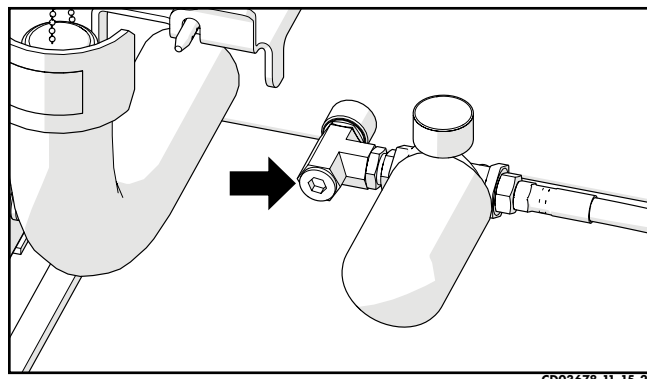
Ensure the machine is turned off.

IMPORTANT: Drain hydraulic fluid before removing any component of the hydraulic system. A large amount of hydraulic fluid will leak from the system.

Place an oil pan beneath the fluid drain.

Remove the fluid drain plug next to the hydraulic filter.

Allow all hydraulic fluid to drain from the reservoir.



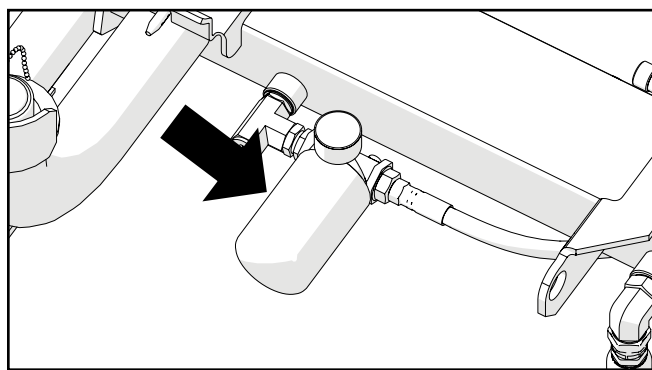
To replace the hydraulic filter:

Ensure the machine is off and all hydraulic fluid has been drained.

If changing oil based on the ISO Cleanliness guidelines, the target level is 19/16/13 and the maximum level is 21/19/16.

The level contains three numbers. The first represents the number of particles equal to or larger than 4µm per milliliter of fluid. The second represents the number of particles equal to or larger than 6µm per milliliter of fluid. The third represents the number of particles equal to or larger than 14µm per milliliter of fluid.

Unscrew and replace the hydraulic filter.



To replace the hydraulic fluid:

NOTICE: Ensure fluid drain plug is reinstalled before adding hydraulic fluid.

NOTICE: Ensure machine is on level ground.

Fill until fluid is visible in the sight glass.

Refer to the "[Hydraulic Fluids](#)" section for hydraulic fluid recommendations.

After replacing fluid, circulate fluid for 5 minutes to remove all air from the system. To circulate fluid, actuate all hydraulic functions of the machine.

Check Fasteners Are Tight

Check all nuts, bolts, snap rings and fasteners to make certain they are secure and in place.

Clean Jaws and Inserts

Ensure the machine is off and disconnected from power source.

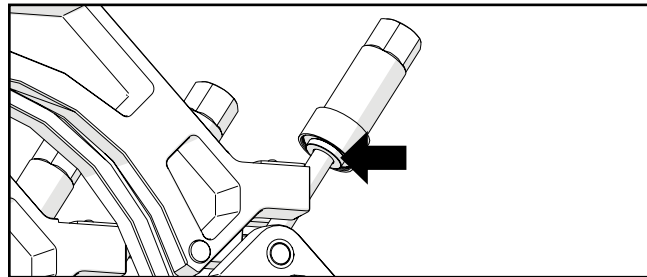
To prevent slippage and ensure proper alignment, the jaws and insert serrations must be clean.

Clean the jaws and inserts of any dirt or residual material using a stiff-bristled brush.

Clean Thrust Bearings

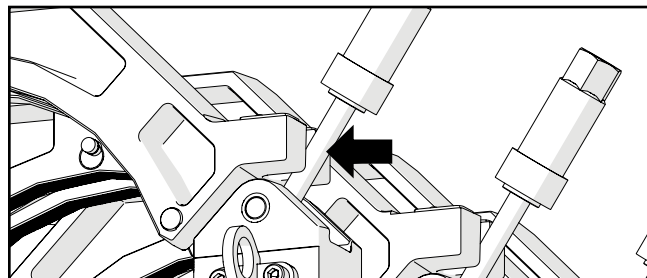
The thrust bearings located in the clamp knobs must turn freely.

Wash the clamp knob bearing assembly with a solvent, and then lubricate with 30W or lighter oil.



Clean Eyebolt Threads

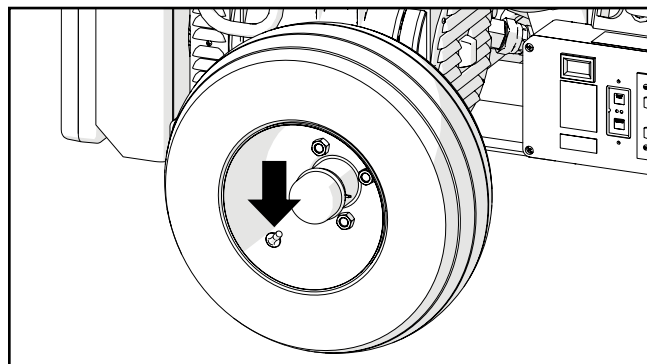
Keep the clamp knob eyebolt threads brushed clean.



Check Tire Pressure

Check tire pressure using a pressure gauge. The tire pressure should be kept at 70 psi.

Add air to low tires using the tire valves.



Drive Belt Replacement

⚠ CAUTION

Do not touch belts and rotating parts while the engine is running. Failure to do so could result in injury.

⚠ CAUTION

Engine component surfaces can be hot. Use caution when working around hot surfaces.

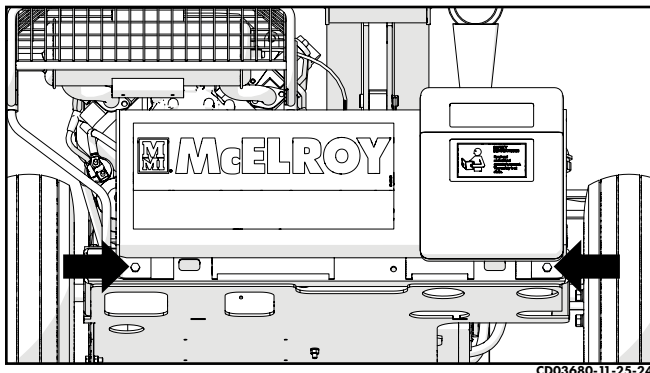
The belt guard must be removed in order to inspect or replace a worn drive belt.

Ensure the machine is off and the engine has cooled before performing this procedure.

Unscrew and remove the two bolts holding the belt guard in place.

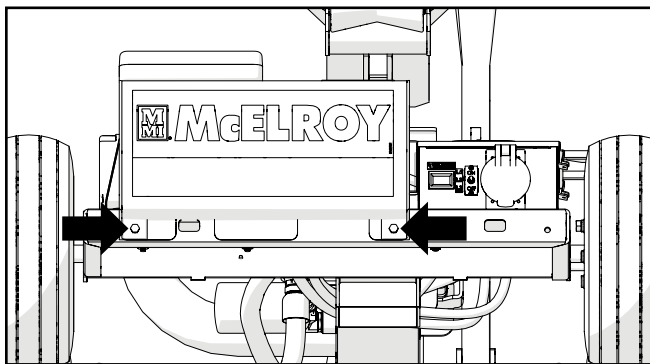
NOTICE: Retain all hardware for reinstallation of removed components.

Gas-Powered Unit:



CD03680-11-25-24

Electric Unit:



CD03681-11-25-24

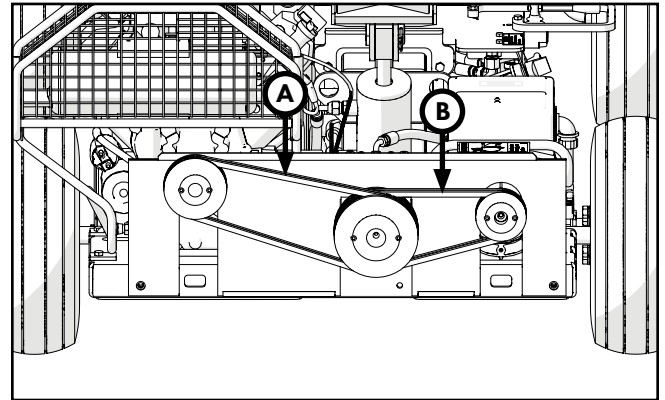
Remove the belt guard back plate.

The drive belts can be inspected or replaced once the belt guard back plate is removed.

Replacing drive belts on a gas-powered unit:

The two drive belts **(A)** tensioned between the engine and hydraulic pump are: V-Belt 3VX-425. The two drive belts **(B)** tensioned between the hydraulic pump and generator are: V-Belt 3VX-335.

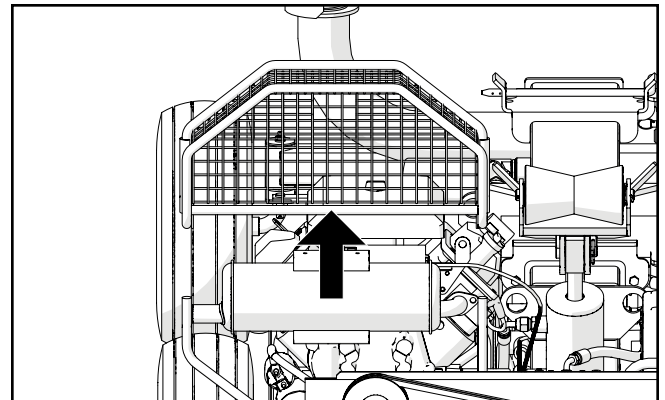
NOTICE: The engine drive belts must be removed in order to replace the generator drive belts.



CD03682-11-26-24

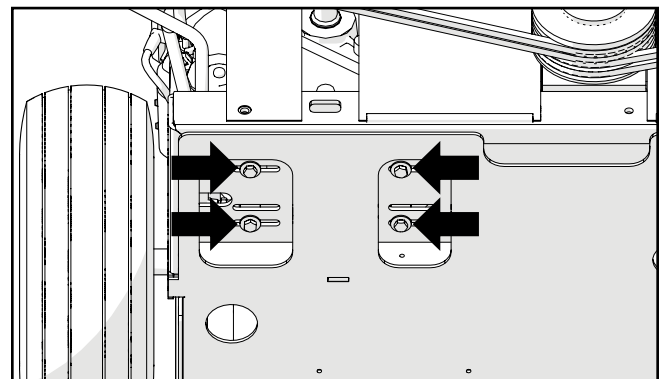
Remove the muffler guard.

NOTICE: Ensure the muffler guard is reinstalled once this procedure is complete.



CD03691-11-26-24

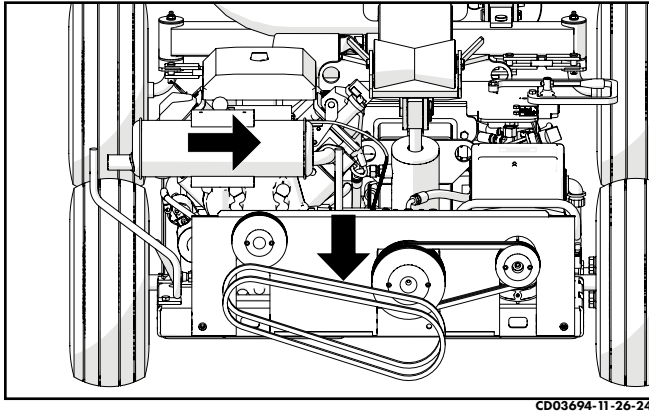
Loosen the four bolts securing the engine to the vehicle frame.



CD03692-11-26-24

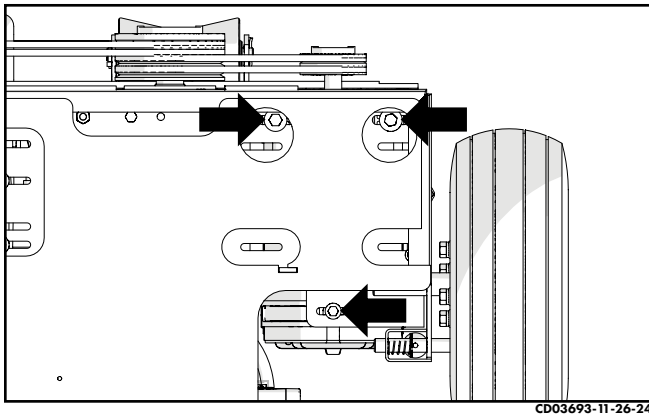
Once the four bolts are loose, the engine can be shifted inward towards the pipe lift to release the tension on the two engine drive belts.

Remove both engine drive belts.



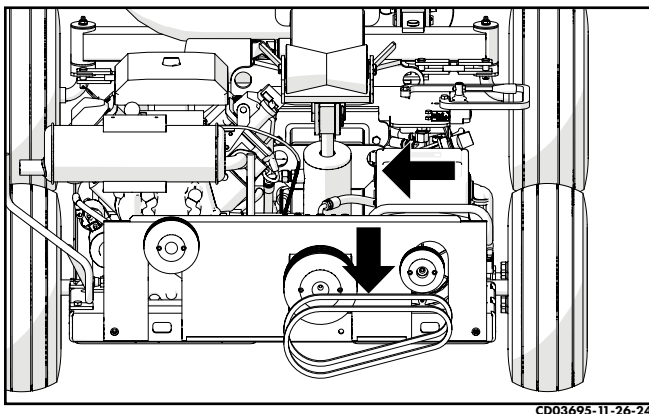
Loosen the three bolts securing the generator to the vehicle frame.

NOTICE: The generator drive belt replacement procedure can be skipped if the generator drive belts are not in need of replacement.

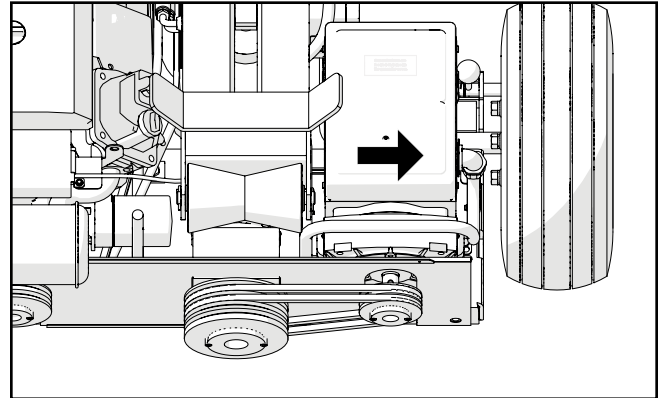


Once the three bolts are loose, the generator can be shifted inward towards the pipe lift to release the tension on the two generator drive belts.

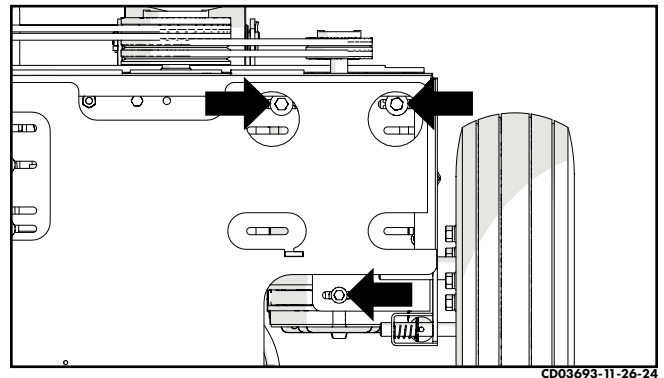
Remove and replace generator drive belts in need of replacement.



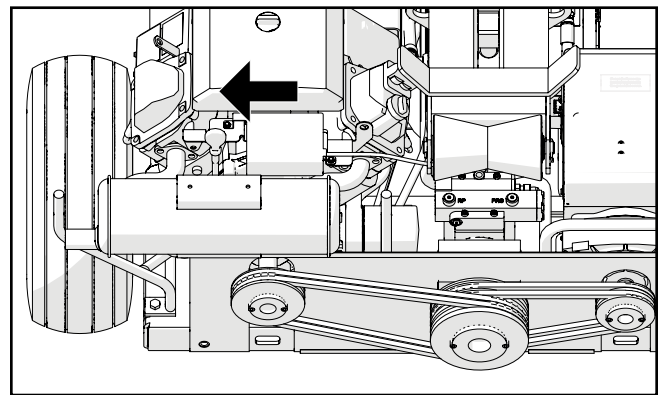
Once the generator drive belts have been replaced, shift the generator back towards its original position to apply tension.



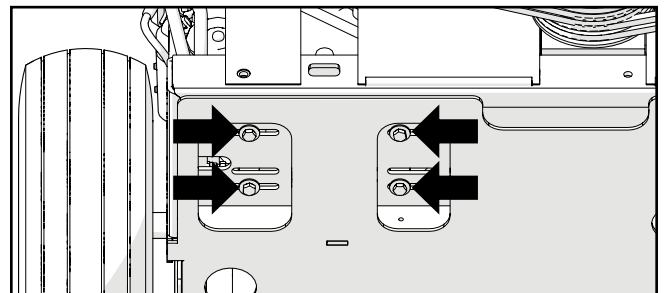
Tighten the three generator bolts to secure the generator in place.



Replace engine drive belts in need of replacement and shift the engine back towards its original position to apply tension.

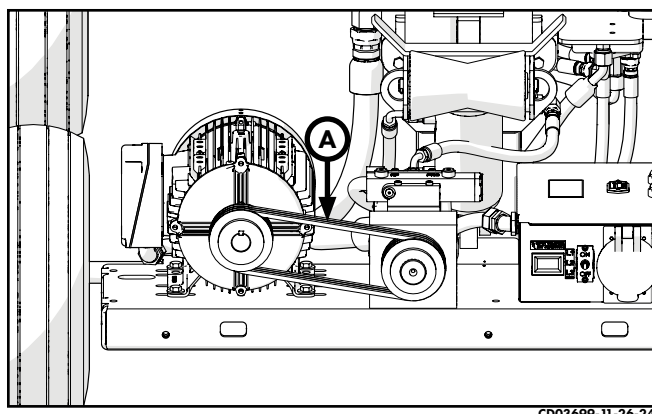


Tighten the four engine bolts to secure the engine in place.

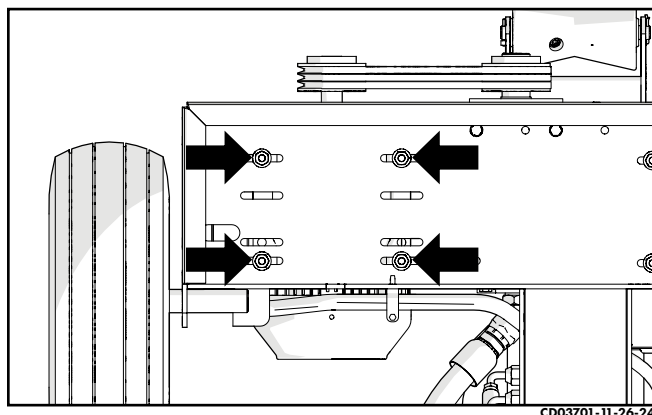


Replacing drive belts on a gas-powered unit:

The three drive belts (A) tensioned between the electric motor and hydraulic pump are: V-Belt 3VX-315.

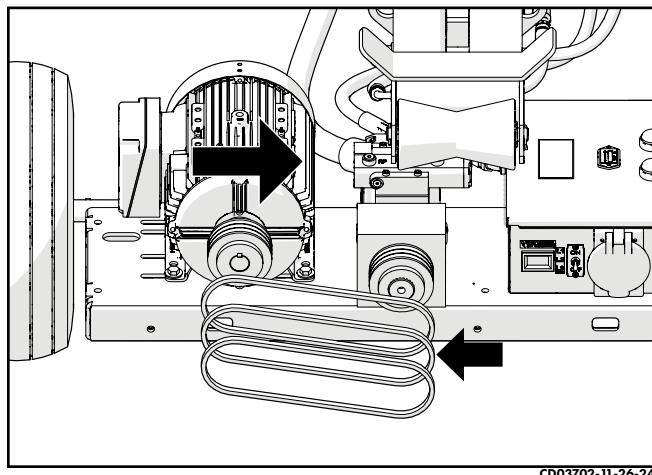


Loosen the four bolts securing the electric motor to the vehicle frame.

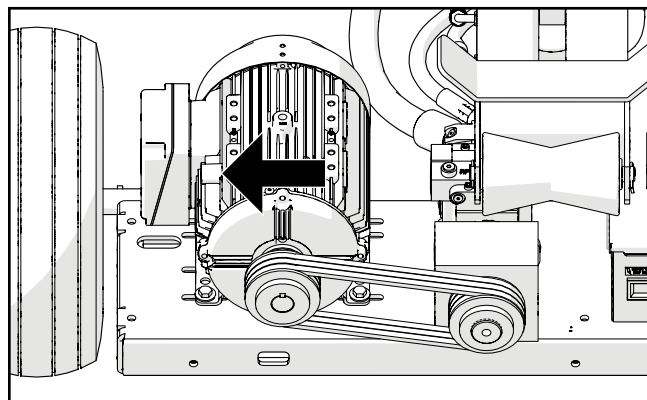


Once the four bolts are loose, the electric motor can be shifted inward towards the pipe lift to release the tension on the three drive belts.

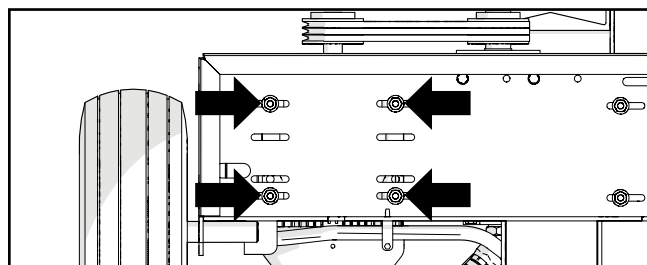
Remove and replace electric motor drive belts in need of replacement.



Once the drive belts have been replaced, shift the electric motor back towards its original position to apply tension.



Tighten the four electric motor bolts to secure the electric motor in place.



Once the appropriate drive belts have been inspected or replaced, reinstall the belt guard.

Battery Replacement

Unscrew the bolt (A) holding the battery toe clamp in place.

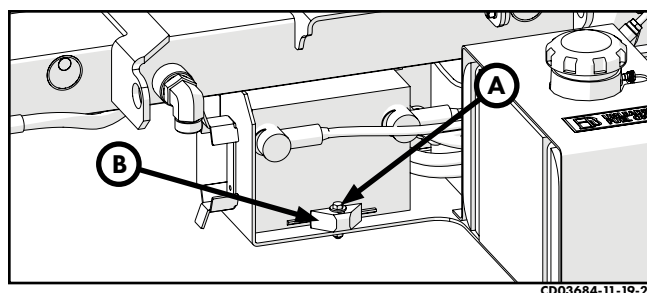
Remove the battery toe clamp (B).

NOTICE: Retain all hardware for reinstallation of removed components.

Disconnect the battery by removing the negative (black) cable first. Then, remove the positive (red) cable.

Lift the battery out of the vehicle.

Replace the battery with one that meets all of the requirements listed below.



- Group size: 75 battery
- Cold cranking amperes at 0°F (-18°C): 525 (CCA)
- Cranking amperes at 32°F (0°C): 630 (CA)

GUIDED FIRMWARE UPDATE

Overview

The guided firmware update process allows users to update components which are controlled by firmware for operation.

The guided process, presented on the DataLogger 7, can be used as a step-by-step guide for updating machine components as new releases become available. Updating firmware is essential to ensuring the machine is running the latest version for continued enhancements and new features.

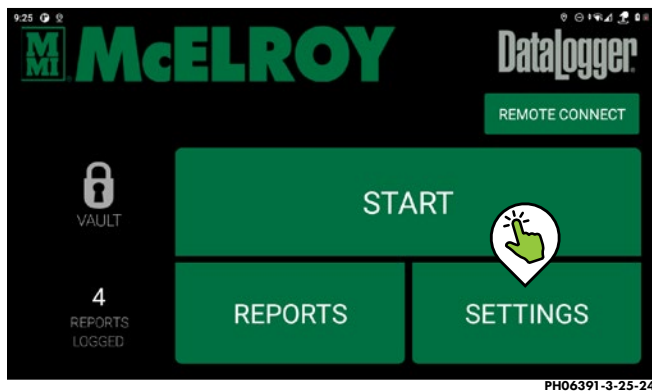
Other machine components not covered in this section may later become updatable.

The Guided Firmware Update section is divided into:

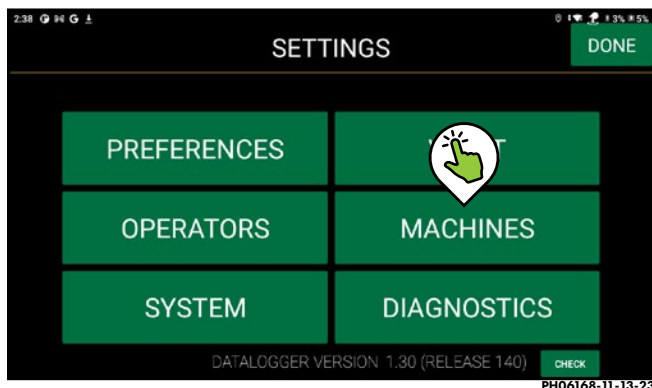
- **Navigating to Update Firmware** - Navigating to the Firmware Update screen.
- **Heater Control Module Update Process** - Process for updating heater control module firmware.
- **Offline Updating Procedure** - Procedure for updating a component without an internet connection.
- **Port Connection Issues** - For troubleshooting a port connection issue.

Navigating to Update Firmware

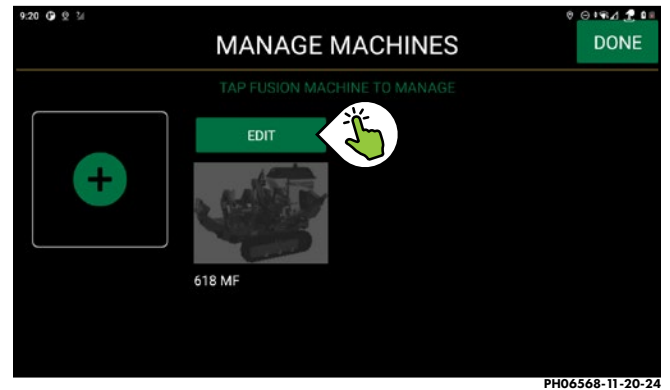
From the DataLogger home screen, tap **SETTINGS**.



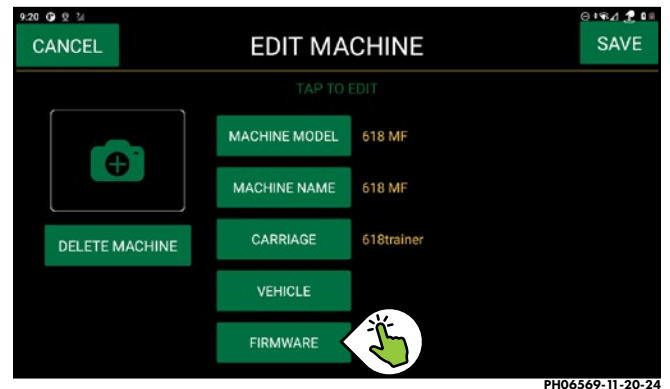
From the Settings screen, tap **MACHINES**.



In the Manage Machines screen, tap **EDIT** on the machine intended for an update.



In the Edit Machine screen, tap **FIRMWARE** to access the Firmware Update screen.



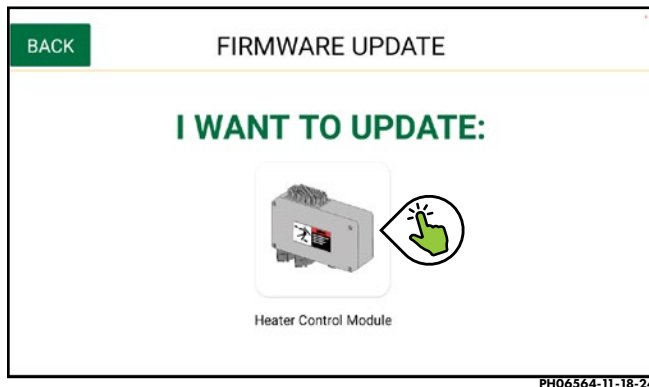
Proceed to the heater control module update process to perform an HCM firmware update.

Heater Control Module (HCM) Update Process

The DataLogger must be connected to wifi to download a firmware update file. An internet connection is recommended while performing an update but can be performed offline if the update file has been downloaded onto the DataLogger.

Turn the machine on without starting the engine by turning the key to **RUN**. The engine should not be running for this process.

To begin the HCM update process, tap **Heater Control Module (HCM)** on the Firmware Update screen on the DataLogger.

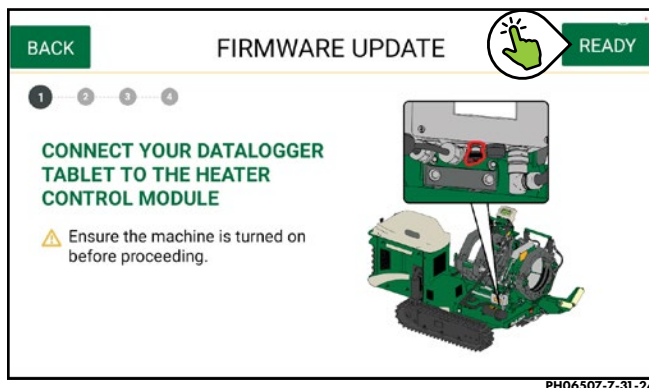


This update is a four-step process.

Step 1: Connect the DataLogger to the programming port on the HCM. The location of the HCM programming port is illustrated on-screen. This connection requires the TracStar iSeries Tablet Cable (MLEP0853263).

Ensure the machine is turned on before proceeding.

Once connected, tap **READY**.

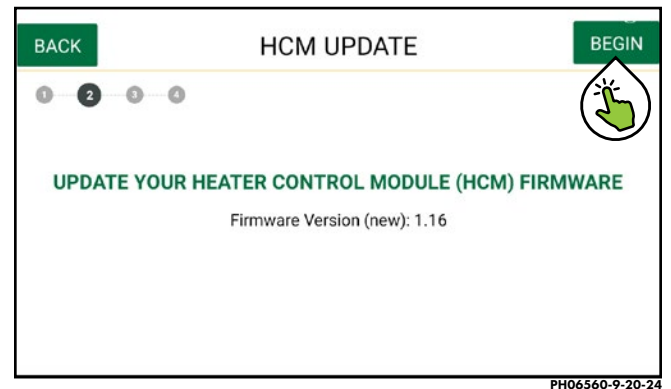


Step 2: Wait for the latest firmware update to be found. This should take a few seconds.

The new firmware version will be displayed on-screen along with the existing firmware version.

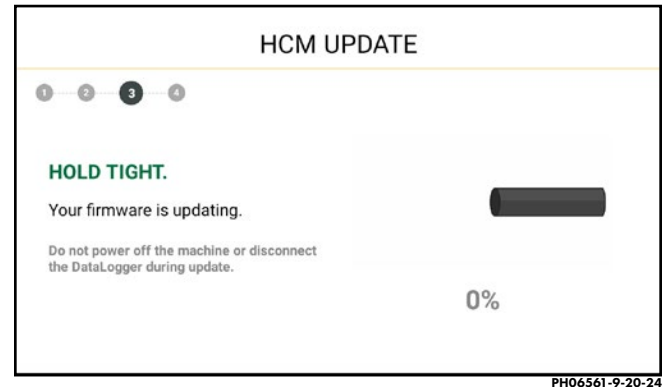
Refer to [Port Connection Issues](#) in this section if a port connection issue is encountered.

Tap **BEGIN** to update the HCM firmware.



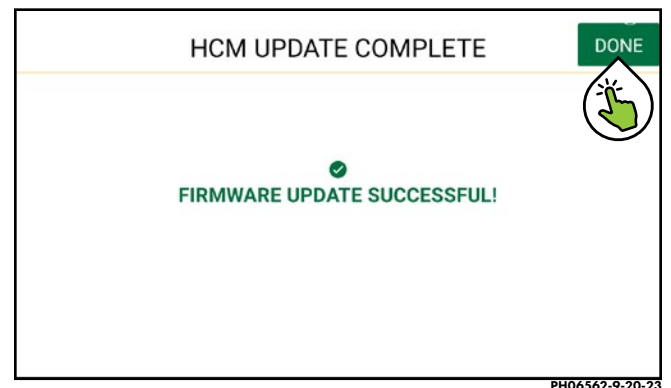
Step 3: Wait for the HCM firmware to update. A percentage to process completion is displayed under the loading animation.

Do not power off the machine or disconnect the DataLogger during the update.



The update screen will indicate the HCM update was successful.

Step 4: Tap **DONE** to return to the Firmware Update screen.



At this point, the DataLogger can be disconnected and normal machine operation can continue.

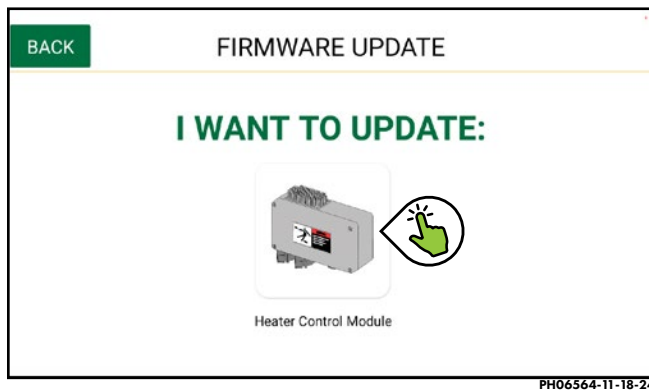
Offline Updating Procedure

An internet connection is recommended while performing an update but may not always be available. An update can be performed offline if the update file has been downloaded onto the DataLogger.

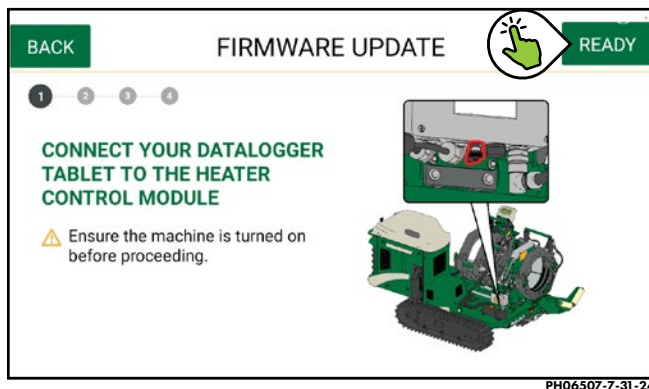
In this case, an update file must be downloaded onto a DataLogger that has an internet connection. The DataLogger does not need to be connected to a machine for an update file to be downloaded.

Ensure the DataLogger is connected to the internet, and begin the process of performing an update as outlined below.

Navigate to the Firmware Update screen and tap on the desired update to be performed.



Once prompted to connect to the designated port, disregard and tap **READY**.



This will result in a port connection issue screen as no connection will be detected. However, arriving at this screen with an internet connection indicates the file for the update selected has been downloaded.

This procedure can be performed for additional machine components by navigating back to the Firmware Update screen and selecting a different component.

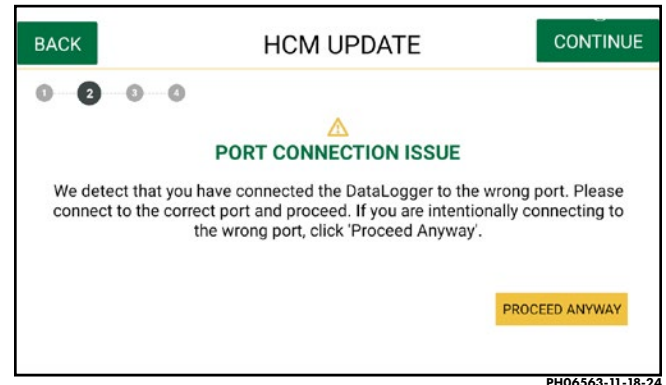
Once this procedure is complete, the DataLogger can be returned to the machine and updates can be performed offline using the processes outlined in the previous pages of this section.

Port Connection Issues

The DataLogger will detect if the wrong port has been connected to for an update process.

The DataLogger will also detect if it is not connected to any port on the machine.

In either case, a port connection issue will occur.



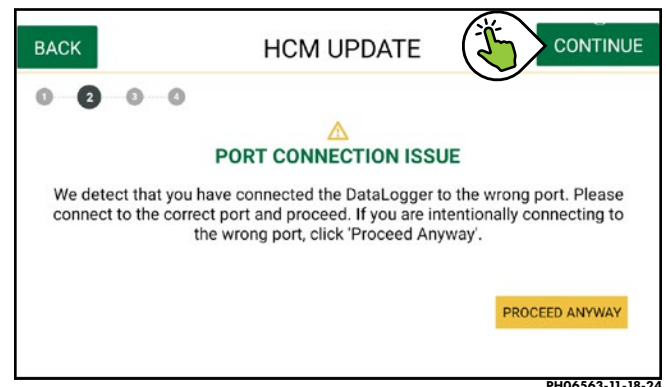
If a port connection issue is encountered, disconnect the DataLogger and connect to the correct port.

The ports pertaining to each update process are as listed:

- Heater Control Module Update: HCM Programming Port

IMPORTANT: It is not recommended to tap **PROCEED ANYWAY** except in the instance a replacement controller is being updated.

Once the DataLogger has been connected to the correct port, tap **CONTINUE** to proceed with the update.



FAULTS

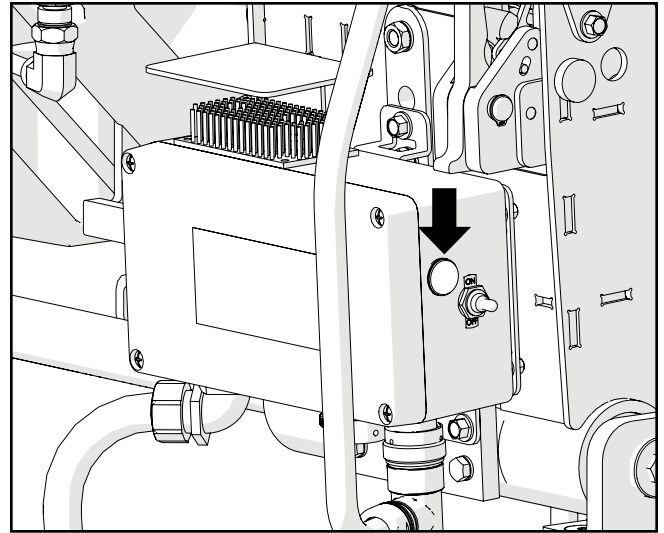
Overview

Faults are identified using the indicator light on the heater control module (HCM). The indicator light emits red and green illuminations to provide visual status alerts for the heater and HCM. The indicator light glows red to indicate the heater is preheating to setpoint and glows green to indicate the heater is unpowered to regulate temperature at setpoint.

NOTICE: The indicator light will alternate between red and green as heater temperature is regulated.

Indicator Light Blink Codes

Faults are identified with blink codes output by the indicator light. There are seven possible blink codes. The blink code indications are listed in the table below.



Blink Code	Visual	Description
Two consecutive red blinks		HCM is in CAN mode. Manual mode jumper not connected
Three consecutive red blinks		Primary RTD no change fault
Four consecutive red blinks		Primary RTD above normal
Five consecutive red blinks		Primary RTD out of range low
Six consecutive red blinks		Primary RTD out of range high
Seven consecutive red blinks		Manual Potentiometer Fault (out of range)
Steady red glow		No faults. Heater element is powered (temperature below setpoint)
Steady green glow		No faults. Heater element is unpowered (temperature regulated above setpoint)
Two consecutive green blinks		Bog or Recovery Mode

DETERMINING FUSION PRESSURE

Variable Descriptions

Descriptions of variables:

- OD** - Outside Diameter of Pipe (in)
- t** - Wall Thickness of Pipe (in)
- π** - 3.14
- SDR** - Standard Dimensional Ratio of Pipe (unitless)
- IFP** - Interfacial Pressure of Pipe (psi)
- TEPA** - Total Effective Piston Area of Carriage (in²)

Formulas

Use the formulas below to obtain variables.

$$t = \frac{OD}{SDR}$$

$$\text{Pipe Area} = (OD - t) \times t \times \pi$$

$$\text{Fusion Force} = \text{AREA} \times \text{IFP}$$

$$\text{Gauge Pressure} = \frac{\text{Fusion Force}}{\text{TEPA}} + \text{Drag}$$

Example

Below is an example of determining fusion pressure.

Pipe Size: 8" IPS, SDR 11

OD: 8.625"

Drag: 30 psi

Recommended IFP: 75 psi

Machine: 28 High Force

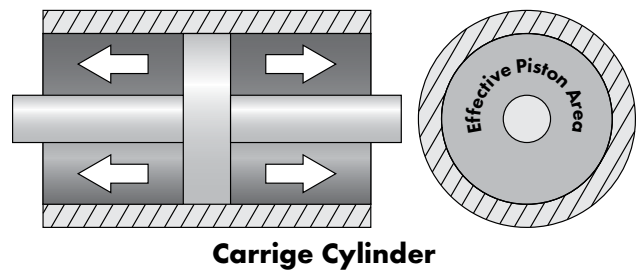
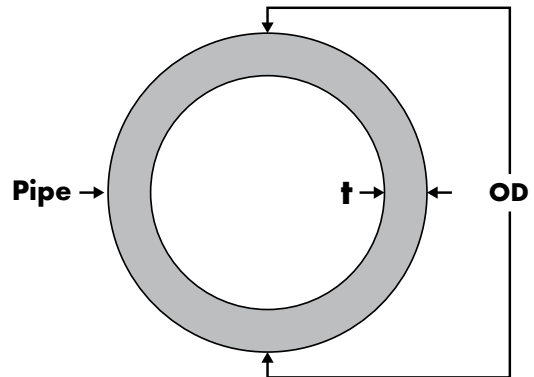
$$t = \frac{OD}{SDR} = \frac{8.625}{11} = 0.784$$

TEPA = 4.71 (from table)

$$\text{Gauge Pressure} = \frac{(OD - t) \times t \times \pi \times \text{IFP}}{\text{TEPA}} + \text{Drag}$$

$$\text{Gauge Pressure} = \frac{(8.625 - .784) \times .784 \times 3.14 \times 75}{4.71} + 30 \text{ psi}$$

Gauge Pressure = **338 psi**



Total Effective Piston Areas (in²)

Machine Model	High Force	Medium Force	Low Force
A160/A250	-	-	0.90
28	4.71	3.24	1.66
250	4.71	3.24	1.66
412	11.78	6.01	3.14
618	11.78	6.01	3.14
500	-	6.01	3.14
824/T630	29.44	15.32	9.43
1236/T900	29.44	15.32	9.43
1648/T1200	31.42	14.14	-
2065	31.42	-	-
1600	31.42	14.14	-
2000	32.99	-	-

HYDRAULIC FLUIDS

Hydraulic Fluids

The use of proper hydraulic fluid is mandatory to achieve maximum performance and machine life. Use a clean, high quality, anti-wear hydraulic fluid with a viscosity index (VI) of 135 minimum. It should have a maximum viscosity of 500 cSt (2000 SSU) at startup (ambient temperature) and a minimum viscosity of 13 cSt (65 SSU) at the maximum fluid temperature (generally 80°F above ambient). Using hydraulic fluids that do not meet these criteria may cause poor operation and/or damage to the hydraulic components.

The following table specifies the fluid temperature at various viscosities. Temperature rise of the hydraulic fluid can vary from 30°F to about 80° F over the ambient temperature depending on the pressure setting, age of the pump, wind, etc. VG46 hydraulic fluid is installed at our factory. The advantage of this fluid is a wider temperature range, however, this fluid should not be used for continuous operation below 23°F.

Hydraulic Fluids Characteristics																	
Manufacturer	Fluid Name	cSt 100F	cSt 210F	V.I.	-20F	-10F	0F	10F	30F	50F	70F	90F	110F	130F	150F	Range °F	Range °C
Mobil	DTE 10 Excel 15	15.8	4.1	168	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	-16 - 113	-27 - 45
	DTE 10 Excel 32	32.7	6.6	164				*****	*****	*****	*****	*****	*****	*****	*****	12 - 154	-11 - 68
	DTE 10 Excel 46	45.6	8.5	164				*****	*****	*****	*****	*****	*****	*****	*****	23-173	-5 - 78
	DTE 10 Excel 68	68.4	11.2	156					*****	*****	*****	*****	*****	*****	*****	37-196	3 - 91
	Univis N-32	34.9	6.9	164				*****	*****	*****	*****	*****	*****	*****	*****	12-150	-11 - 66
	Univis N-46	46	8.5	163				*****	*****	*****	*****	*****	*****	*****	*****	24-166	-4 - 74
	Univis N-68	73.8	12.1	160					*****	*****	*****	*****	*****	*****	*****	39-193	4 - 89

NOTE: This chart is based on pump manufacturer recommendations of 13 to 500 cSt.

NOTE: Temperatures shown are fluid temperatures NOT ambient temperatures.

SPECIFICATIONS

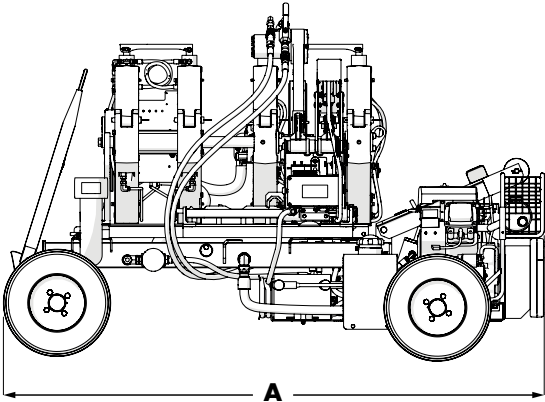
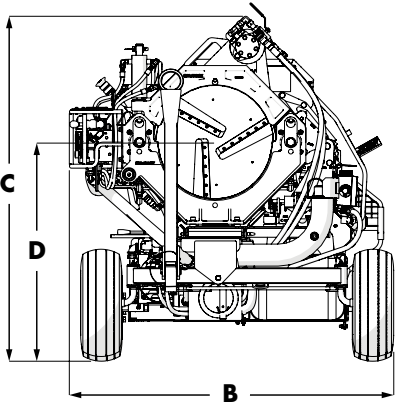
Generator Sizing Form

Complete this form and provide a copy to your generator supplier. This information will enable your generator supplier to correctly size a generator for your application.

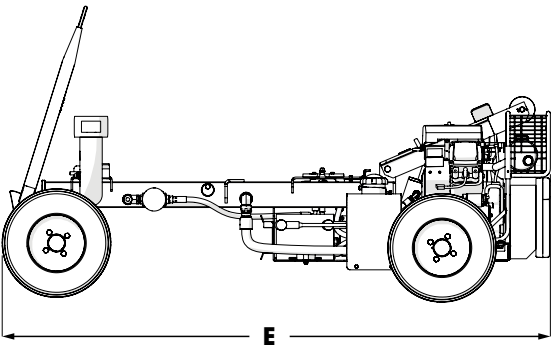
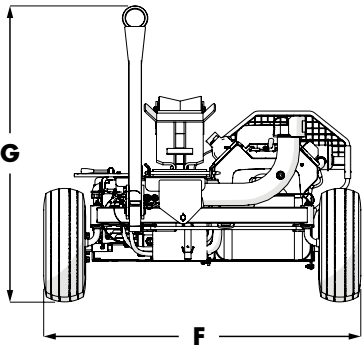
Motor: 5.0 Horsepower
Motor Code Letter: H (from motor nameplate)
Motor Voltage: 240 VAC
Motor Phases: 3 Delta
Motor Frequency: _____ (50 or 60 Hz)
Heater Wattage Rating: _____ (3000 or 4300 Watts resistive)
Heater Voltage: 240 VAC
Operational Altitude Range: _____ to _____
Ambient Temperature Range: _____ to _____
Duty Cycle: Standby (not continuous 24 hours/day)
Allowable Voltage Dip: 20%
Allowable Frequency Dip: 5%
Starting Load Application: Simultaneous turn-on of both motor and heater
Running Load: Motor continuous, heater cycling on and off at approximately 5 minute intervals
Fuel: _____ (Gasoline or Diesel)

Special Requirements for Customer Application: _____

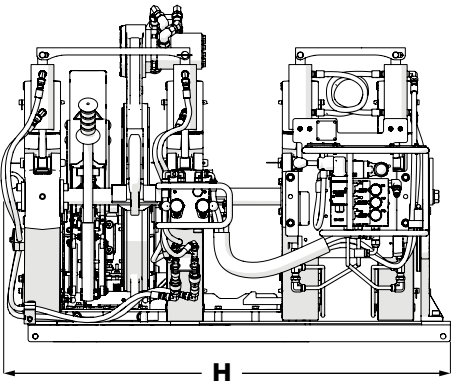
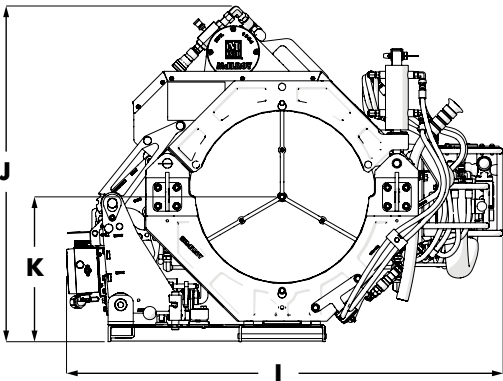
Rolling 412 and 618 Specifications



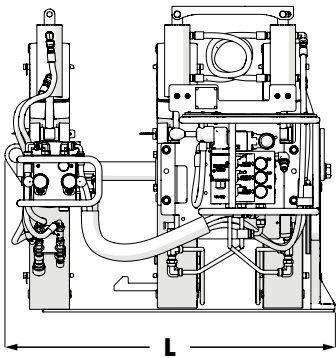
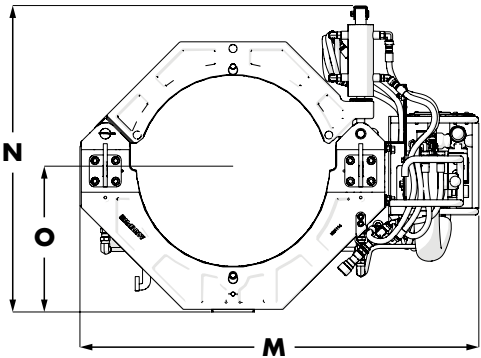
FUSION MACHINE



VEHICLE ONLY



4-JAW CARRIAGE



3-JAW CARRIAGE

	Model	Rolling 412	Rolling 618
CARRIAGE	Capabilities	4" IPS - 12" DIPS (110mm - 340mm)	6" IPS - 18" OD (160mm - 450mm)
	Cylinder Force Type	HF, MF, LF	HF, MF, LF
	High Force Total Effective Piston Area Maximum Force	TEPA: 11.78 in ² (75.9 cm ²) Max Force: 17,670 lbs (8,015 kg)	TEPA: 11.78 in ² (75.9 cm ²) Max Force: 17,670 lbs (8,015 kg)
	Medium Force Total Effective Piston Area Maximum Force	TEPA: 6.01 in ² (38.7 cm ²) Max Force: 9,015 lbs (4,089 kg)	TEPA: 6.01 in ² (38.7 cm ²) Max Force: 9,015 lbs (4,089 kg)
	Low Force Total Effective Piston Area Maximum Force	TEPA: 3.14 in ² (20.2 cm ²) Max Force: 4,710 lbs (2,136 kg)	TEPA: 3.14 in ² (20.2 cm ²) Max Force: 4,710 lbs (2,136 kg)
WEIGHT	Machine Weight (Hydraulic Clamp Cylinders)	1,405 lbs (637 kg)	1,630 lbs (739 kg)
	Machine Weight (Clamp Knobs)	1,365 lbs (619 kg)	1,590 lbs (723 kg)
	Shipping Weight (Hydraulic Clamp Cylinders)	2,020 lbs (916 kg)	2,245 lbs (1,018 kg)
	Shipping Weight (Clamp Knobs)	1,980 lbs (898 kg)	2,205 lbs (1,002 kg)
	4-Jaw Carriage Weight (Hydraulic Clamp Cylinders)	585 lbs (265 kg)	810 lbs (367 kg)
	4-Jaw Carriage Weight (Clamp Knobs)	545 lbs (247 kg)	770 lbs (350 kg)
	3-Jaw Carriage Weight (Hydraulic Clamp Cylinders)	275 lbs (125 kg)	375 lbs (171 kg)
	3-Jaw Carriage Weight (Clamp Knobs)	235 lbs (106 kg)	375 lbs (171 kg)
	Vehicle Weight	820 lbs (373 kg)	820 lbs (373 kg)
	Heater Weight	24 lbs (11 kg)	34 lbs (16 kg)
	Facer Weight	62 lbs (28 kg)	91 lbs (41 kg)
DIMENSIONS	Machine Length	A 85" (2,159 mm)	85" (2,159 mm)
	Machine Width	B 50" (1,270 mm)	50" (1,270 mm)
	Machine Height	C 55" (1,405 mm)	57" (1,447 mm)
	Machine Centerline Height	D 32" (806 mm)	36" (914 mm)
	Vehicle Length	E 85" (2,159 mm)	85" (2,159 mm)
	Vehicle Width	F 50" (1,259 mm)	50" (1,259 mm)
	Vehicle Height	G 47" (1,194 mm)	47" (1,194 mm)
	4-Jaw Carriage Length	H 44" (1,189 mm)	44" (1,189 mm)
	4-Jaw Carriage Width	I 43" (1,184 mm)	43" (1,184 mm)
	4-Jaw Carriage Height	J 29" (736 mm)	33" (942 mm)
	4-Jaw Carriage Centerline Height	K 13" (330 mm)	16" (406 mm)
	3-Jaw Carriage Length	L 29" (736 mm)	29" (736 mm)
	3-Jaw Carriage Width	M 33" (838 mm)	43" (2000 mm)
	3-Jaw Carriage Height (Hydraulic Clamp Cylinders)	N 26" (660 mm)	31" (795 mm)
	3-Jaw Carriage Height (Clamp Knobs)	N 23" (584 mm)	25" (635 mm)
	3-Jaw Carriage Centerline Height	O 13" (330 mm)	16" (406 mm)

DIMS.	Shipping Length (Min.)	61" (1,549 mm)	61" (1,549 mm)
	Shipping Width (Min.)	91" (2,311 mm)	91" (2,311 mm)
	Shipping Height (Min.)	64" (1,626 mm)	64" (1,626 mm)
ENGINE	Engine Horse Power	19 HP (14 kW)	19 HP (14 kW)
	Engine Fuel Tank Capacity	5 gallons (19 liters)	5 gallons (19 liters)
	Engine Fuel Type	Gas	Gas
	Engine Operational Fuel Tank Capacity	8 hours	8 hours
	Engine Starting System	Electric	Electric
HYDRAULIC	Fusion Pressure	1,200 psi (83 bar)	1,200 psi (83 bar)
	Hydraulic System Pressure	1,200 psi (83 bar)	1,200 psi (83 bar)
	Hydraulic Reservoir Capacity	6 gallons (23 liters)	6 gallons (23 liters)
	Facer Power	Hydraulic	Hydraulic
MOBILITY	Mobility Transportation	Towed	Towed
	Mobility Type	High-flotation, inflatable tires	High-flotation, inflatable tires
	Maximum Towing Speed	5 mph (8 kph)	5 mph (8 kph)
ELECTRICAL	Electrical Input	240V	240V
	Heater Power	3,000 W	4,300 W
SOUND LEVELS	Operator Location at Carriage (Gas)	90 dB	90 dB
	Operator Location at Carriage (Electric)	70 dB	70 dB

NOTES

Notes:

This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal black lines across the entire width of the page, typical of notebook or legal stationery. The background is a solid off-white color. There are no margins, text, or other markings present.



P.O. Box 580550 Tulsa, Oklahoma 74158-0550, USA
www.mcelroy.com