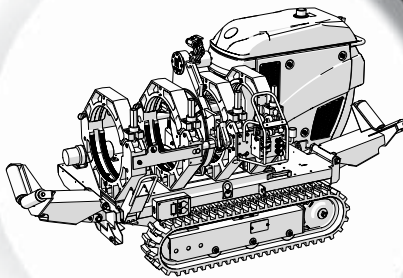


# Operator's Manual



# McELROY

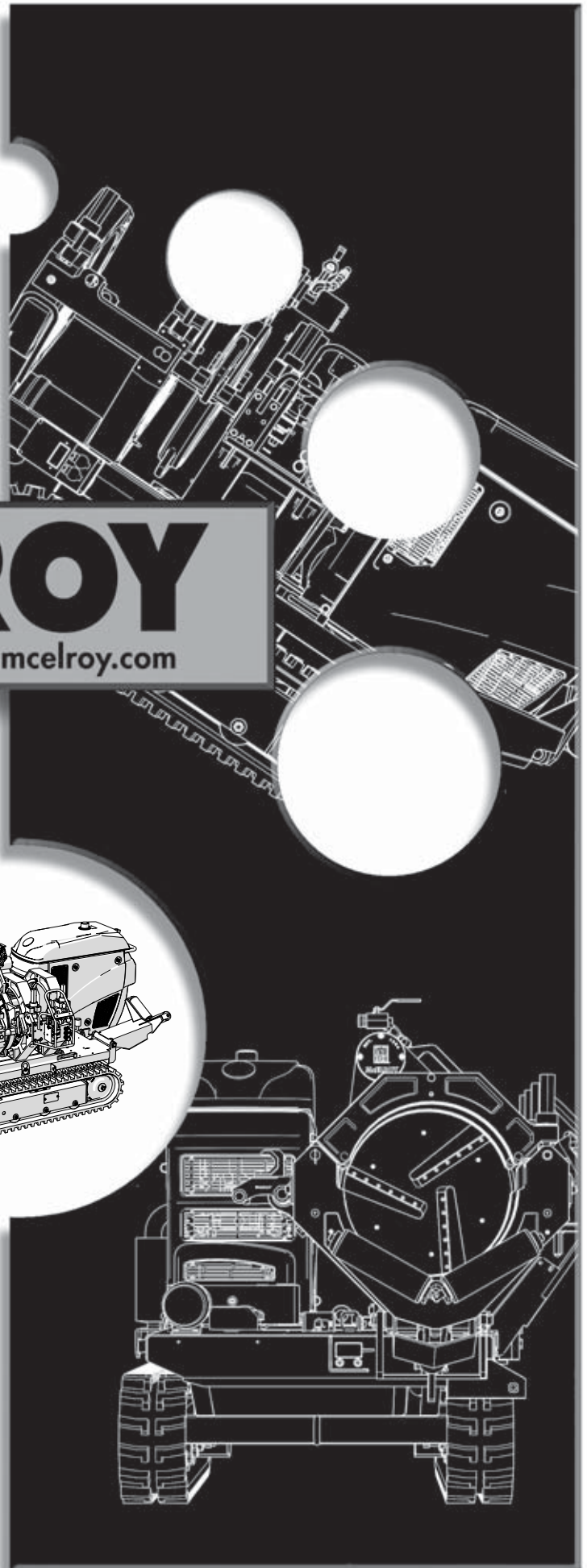
[www.mcelroy.com](http://www.mcelroy.com)



## **TracStar<sup>®</sup>** **28/250** **412/618** **Series 2** Fusion Machines

Original Language: English

Manual: T1829901 Revision: 09/16



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](http://patent.mcelroy.com)

## **California Proposition 65 Warning**

*Engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.*



# Introduction



## Thank you for choosing McElroy

The McElroy TracStar® Series 2 28/250/412/618 are self-contained, self-propelled, all terrain fusion machines, and are designed to butt fuse polyethylene pipe.

If fusing other thermoplastic pipe materials, refer to the pipe manufacturer's fusion procedures or appropriate joining standard.

The TracStar® 28 model fuses 2" IPS (63mm) minimum to 8" DIPS (225mm) maximum pipe.

The TracStar® 250 model fuses 63mm (2" IPS) minimum to 250mm (8" DIPS) maximum pipe.

The TracStar® 412 model fuses 4" IPS (110mm) minimum to 12" DIPS (340mm) maximum pipe.

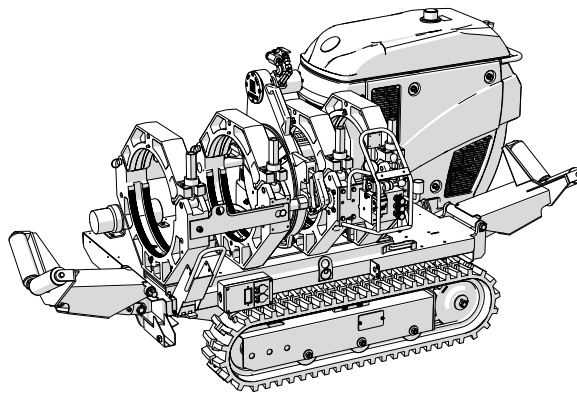
The TracStar® 618 model fuses 6" IPS (180mm) minimum to 18" IPS (450mm) maximum pipe.

With reasonable care and maintenance, this machine will give years of exemplary service.

TX05158-09-22-16

Before operating this machine, please read this manual thoroughly, and keep a copy with the machine for future reference. This manual is to be considered part of your machine.

Always return the manual to the literature compartment.



## 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](http://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.



MU203-13-14



# Warranty



## 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](mailto:fusion@McElroy.com)

**Note:** Certain repairs, warranty work, and inquiries may be directed, at McElroy's discretion, 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 whatever, 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](http://www.McElroy.com/fusion)**

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

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Date Received \_\_\_\_\_

Distributor \_\_\_\_\_





# Table of Contents

## Safety

Safety Alerts . . . . .	1-1
Read and Understand. . . . .	1-1
General Safety . . . . .	1-2
Wear Safety Equipment . . . . .	1-2
Fuel Handling . . . . .	1-2
Units with Engines . . . . .	1-3
Carbon Monoxide . . . . .	1-3
Do Not Operate in a Hazardous Environment . . . . .	1-3
Pipe Handling Safety . . . . .	1-4
Battery . . . . .	1-4
Electrical Safety . . . . .	1-5
Crush Points . . . . .	1-5
Facer Blades are Sharp . . . . .	1-5
Units with Hydraulics . . . . .	1-6
Positioning and Setting Fusion Machine . . . . .	1-6
Keep Machine Away from Edge of Ditch. . . . .	1-6
Heater is Hot. . . . .	1-7
Personal Lifting Safety. . . . .	1-7
Fusion Procedures . . . . .	1-7
Do Not Tow TracStar . . . . .	1-7

## Overview

Theory of Heat Fusion. . . . .	2-1
Carriage Assembly. . . . .	2-2
Chassis. . . . .	2-2
Diesel Engine . . . . .	2-3
Operator Panel . . . . .	2-3
Battery Disconnect Switch . . . . .	2-4
Hydraulic Fluid Reservoir. . . . .	2-4
Hydraulic Fluid Filter. . . . .	2-4
Carriage Manifold Block. . . . .	2-5
Facer . . . . .	2-6
Heater . . . . .	2-6
Power for Heater . . . . .	2-6
Insulated Heater Stand . . . . .	2-7
Heater Stripper Bar . . . . .	2-7
Pipe Lift Controls . . . . .	2-7
Battery Charging Connection . . . . .	2-7

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Tulsa, Oklahoma, USA

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# Table of Contents

## Operation

Read Before Operating . . . . .	3-1
Check Hydraulic Fluid Level . . . . .	3-1
Diesel Engine . . . . .	3-1
Moving Machine into Position . . . . .	3-2
Prepare Heater . . . . .	3-2
Set up Pipe Supports . . . . .	3-2
Install Clamping Inserts . . . . .	3-3
Loading Pipe Into Machine . . . . .	3-3
Positioning Pipe in Machine . . . . .	3-3
Begin Facing . . . . .	3-4
After Facing . . . . .	3-4
Check Alignment . . . . .	3-5
Check Heater Temperature . . . . .	3-5
Determine Drag Pressure . . . . .	3-6
Set Fusion Pressure . . . . .	3-6
Check for Slippage . . . . .	3-7
Inserting Heater . . . . .	3-7
Heat Pipe . . . . .	3-8
Fusing the Pipe . . . . .	3-8
Opening Jaws . . . . .	3-9
Raise Pipe . . . . .	3-9
Position Pipe for Next Joint . . . . .	3-9
Install Next Piece of Pipe . . . . .	3-9

## Special Operations

Disconnect Hydraulic Hoses . . . . .	4-1
Remove Outer Fixed Jaw . . . . .	4-1
Remove Carriage Assembly from the Vehicle . . . . .	4-2
Outrigger . . . . .	4-2
Remove 3-Jaw Assembly from the Carriage . . . . .	4-3
Remove Facer from TracStar 412 & 618 Carriage . . . . .	4-4
Remove Facer from TracStar 28 and 250 Carriage . . . . .	4-5
Manual Facer Operation . . . . .	4-6
Removing Top Jaws . . . . .	4-6
Lower 3-Jaw or 4-Jaw Carriage into Ditch . . . . .	4-7
Clamp Carriage Assembly to Pipe . . . . .	4-8
Attach Hydraulic Hoses . . . . .	4-9
Make Fusion Joint . . . . .	4-9
Remove Carriage Assembly from Ditch . . . . .	4-9
Reassemble Fusion Machine . . . . .	4-10

## Saddle Fusion Procedures

Saddle Fusion Procedure for TracStar 28CU and 250CU . . . . .	5-1
Install Heater Adapters . . . . .	5-1
Assure Saddle will Fit . . . . .	5-1
Install Clamping Inserts . . . . .	5-2
Remove Carriage Assembly from Vehicle . . . . .	5-2
Attach Carriage Assembly to Main . . . . .	5-2
Set Hydraulic Pressure . . . . .	5-2



# Table of Contents



## Saddle Fusion Procedures - Continued

Clean Surfaces . . . . .	5-3
Clamp Fitting . . . . .	5-3
Test for Slippage . . . . .	5-3
Prepare Heater . . . . .	5-4
Inserting Heater . . . . .	5-4
Heat Pipe and Fitting . . . . .	5-5
Remove Heater . . . . .	5-5
Fuse Fitting to Pipe . . . . .	5-5
Allow Joint to Cool . . . . .	5-6

## Lifting

Lifting Safety . . . . .	6-1
Lift Fusion Machine . . . . .	6-2
Lift 4-Jaw or 3-Jaw Carriage . . . . .	6-2

## Maintenance

Preventative Maintenance . . . . .	7-1
Washing the Machine . . . . .	7-1
Check Hydraulic Fluid . . . . .	7-1
Change Hydraulic Fluid and Filter . . . . .	7-1
Remove Cowlings . . . . .	7-2
Adjusting System Pressure . . . . .	7-3
Check Gauge . . . . .	7-3
Bleeding Air From Hydraulic System . . . . .	7-3
Engine Oil System . . . . .	7-4
Engine Maintenance . . . . .	7-4
Setting Engine Speed . . . . .	7-4
Check/Add Antifreeze . . . . .	7-5
Facer Blades . . . . .	7-5
Clean Heater Surfaces . . . . .	7-5
Installing Butt Fusion Heater Adapter . . . . .	7-6
Track Tension . . . . .	7-6
Adjusting Track Tension . . . . .	7-6
Clean Jaws and Inserts . . . . .	7-7
Clean Thrust Bearings . . . . .	7-7
Clean Eyebolt Threads . . . . .	7-7
Clean the Clamping Chains . . . . .	7-7
Fasteners Must Be Tight . . . . .	7-8
Adjusting Heater Temperature . . . . .	7-8
Heater Indicator Light . . . . .	7-8
Battery Replacement and Charging . . . . .	7-9

## Machine Maintenance Checklist

Machine Checklist . . . . .	8-1
-----------------------------	-----

## Determining Fusion Pressure

Determining Fusion Pressure . . . . .	9-1
Determining Fusion Pressure - Sidewall . . . . .	9-2

## Hydraulic Fluid

Hydraulic Fluid Characteristics . . . . .	10-1
---	------

## Specifications

TracStar® Series 2 28/250/412/618 Fusion Machine Specifications . . . . .	11-1
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## Safety Alerts



This hazard alert sign appears in this manual. When you see this sign, carefully read what it says. YOUR SAFETY IS AT STAKE.

You will see the hazard alert sign with these words: DANGER, WARNING, and CAUTION.



WR00051:1-30-92



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



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



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



In this manual you should look for two other words: **NOTICE** and **IMPORTANT**.

**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.

TX00030-12-1-92

## Read and Understand

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

Your safety and the safety of others depends upon care and judgment in the operation of this equipment.

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

McElroy Manufacturing, Inc. cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this manual and on the machine are therefore not all inclusive. You must satisfy yourself that a procedure, tool, work method, or operating technique is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the method of operation or maintenance you choose.



WR00052:12-1-92

TX02946-4-15-09



# Safety



## 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-1222-92

TX00114-4-22-93

## Wear Safety Equipment

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

Remove jewelry and rings, do not wear loose-fitting clothing, and tie back long hair that could catch on controls or moving machinery.



WR00053-122-92

TX00032-04-18-16

## Fuel Handling



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

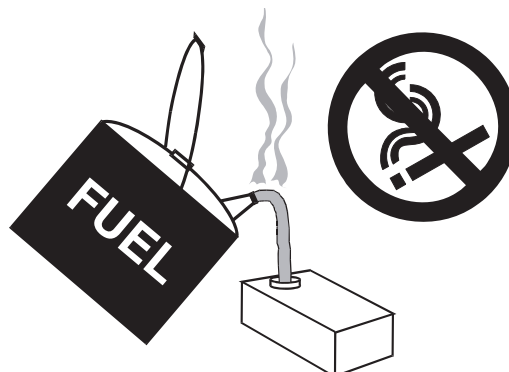
Do not fill the fuel tank while the engine is hot or running, as spilled fuel could ignite.

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.



CD00365-2-19-97

TX00953-04-18-16





# Safety



## Units With Engines



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 hydraulic extension hoses to the carriage.

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



WR00080-4-12-93

TX04881-03-14-16

## Carbon Monoxide



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.



WR00093-5-14-96

TX00954-04-18-16

## Do Not Operate in a Hazardous Environment



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.



WR00080-4-12-93

TX00796-04-18-16



# Safety



## 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

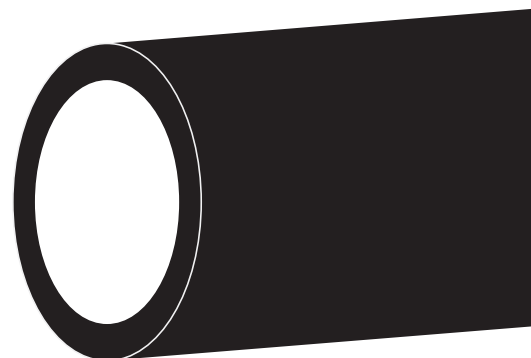
Pipe that is bent can store a great amount of energy. Do not bend and force the pipe into the machine. A bent pipe with stored energy can generate tremendous force when that energy is released.

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.



VR00097-4-17-13

TX04882-04-18-16

## 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.



CD001769-14-95

CD001779-14-95

TX00650-04-18-16



# Safety



## 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 electric 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.

### **⚠️WARNING**

Disconnect the machine from the power source before attempting to service the control panel. Failure to disconnect the power could result in serious injury or death due to electric shock. Refer service to a qualified technician.



VR00055-4-7-93



VR00025-11-30-92

TX03003-3-30-11

## 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 operated. Always ensure machine power is off before entering the machine for any reason.



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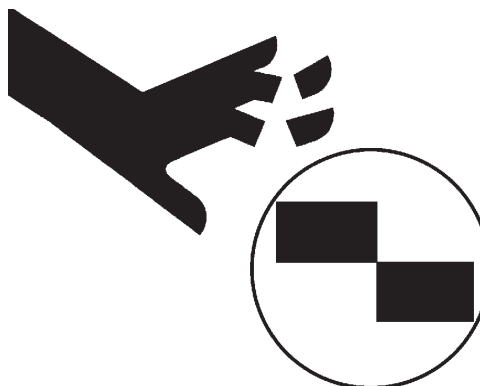
## Facer Blades Are Sharp

### **⚠️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 unit.

**NOTICE:** Turn machine off, disconnect machine power, and remove the facer blades before attempting any maintenance or adjustment.

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



VR00073-4-6-93

TX02378-04-18-16



# Safety



## Units With Hydraulics

It is important to remember that a sudden hydraulic oil leak can cause serious injury, or 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.

**⚠ WARNING** Unwanted movement of the machine could result in serious injury or damage to machine. Unwanted movement of the machine may take place if switches do not match machine state when the machine power is turned on.

**NOTICE:** Wear safety glasses, and keep face clear of area when bleeding air from hydraulic system to avoid spraying oil into eyes.

TX03007-04-18-16



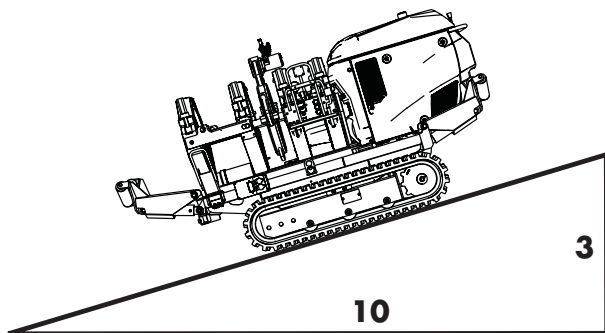
WR00078-4-8-93

## Positioning and Setting Fusion Machine

Place fusion machine on as level ground as possible.

If it is necessary to operate machine on unlevel grade, make sure that the ground is stable. Some unstable conditions may be ice, snow, mud and loose gravel.

**⚠ WARNING** For operation safety, never operate the machine on a grade steeper than 30 %. (A 3 foot elevation change in 10 feet)

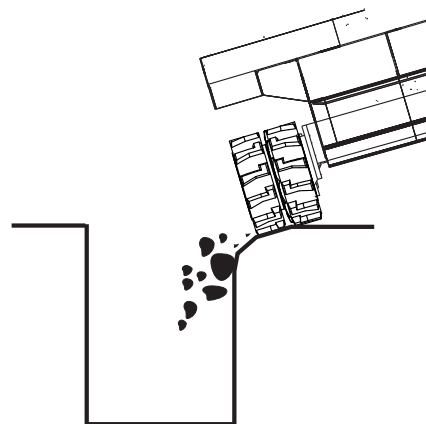


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TX01902-3-30-11

## 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.



CD00408b-9-27-00

TX01447-04-18-16



# Safety



## Heater Is Hot

### ⚠ CAUTION

The heater is hot and will burn clothing and skin. Keep the heater in its insulated heater frame or stand when not in use, and use care when heating the pipe.

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

TX04244-04-18-16



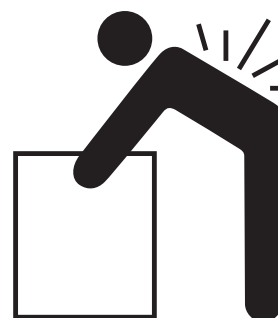
WR000302:10-93

## Personal Lifting Safety

### ⚠ CAUTION

The machine components are heavy. Using one person to lift the facer or carriage may result in an injury. Use a lifting strap and an overhead lifting device to lift facer or carriage. For manual lifting, two people are required to lift the facer or carriage.

TX05159-09-22-16



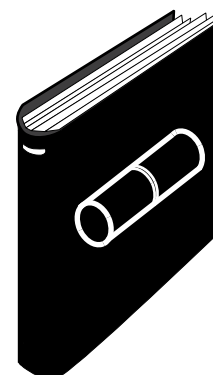
HeavyLifting5:25-10

## 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.

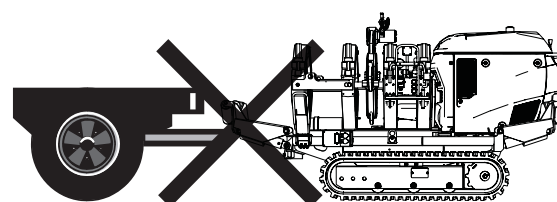
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WR00079:1:24-96

## Do Not Tow TracStar

**NOTICE:** The TracStar is not designed for towing. The tracks will not move. Attempting to tow the TracStar will result in machine damage. Always transport the machine by flatbed trailer or similar means, and make sure the unit is properly secured.



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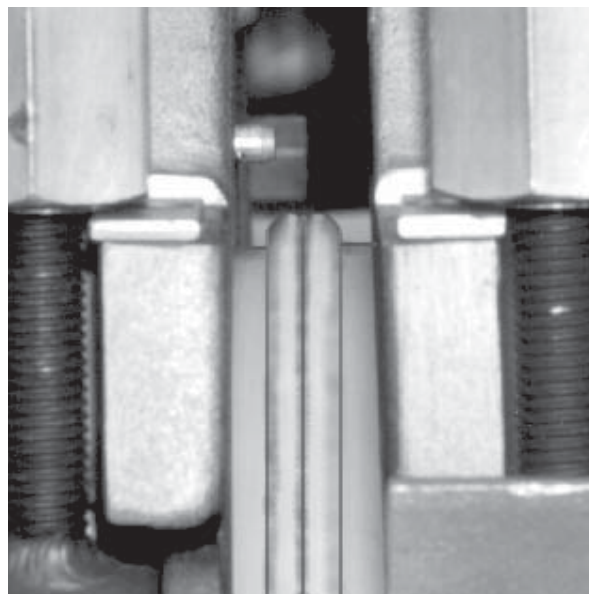


## Theory of Heat Fusion

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.



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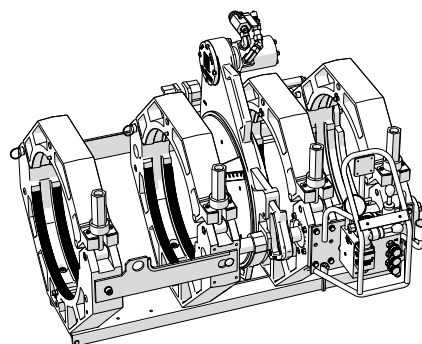
## Carriage Assembly

The carriage assembly consists of two fixed jaws and two hydraulically operated movable jaws.

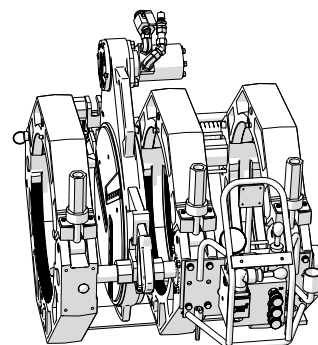
The carriage assembly can be removed from the machine for remote operation. An optional extension kit is required when using the carriage remotely.

The outer fixed jaw can be removed to allow more area to fuse tees or perform tie-ins easier.

The two moveable jaws and inner fixed jaw can be removed in a 3-Jaw configuration for remote operation from the carriage.



CD01783-08-04-16



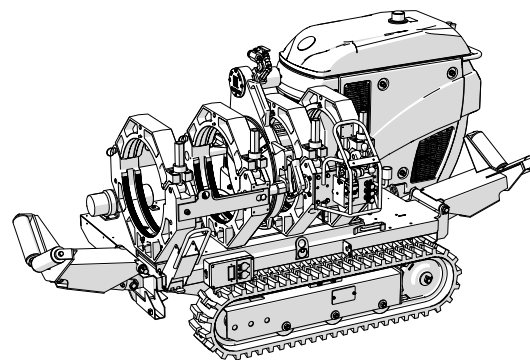
CD01784-08-04-16

TX02637-09-26-16

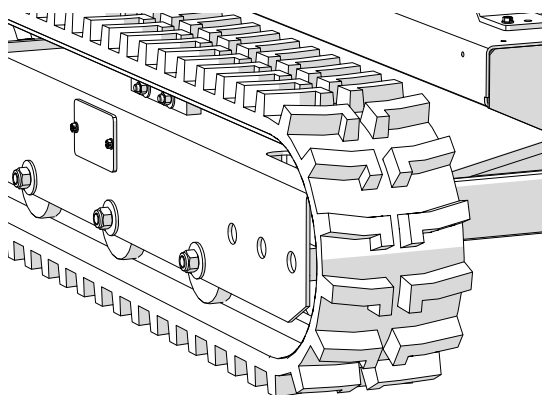
## Chassis

The carriage assembly is mounted on a track driven chassis for easy loading and movement along the pipe line.

The engine powers an alternator, used to power the heater, and a hydraulic pump, which powers the fusion machine and the track drive. The hydraulic reservoir is mounted above the engine. The fuel tank and battery are installed between the tracks.



CD01780-08-04-16



CD01785-08-04-16

TX02317-10-25-04



# Overview



## Diesel Engine

Read the operating and maintenance instructions for the engine before operating.

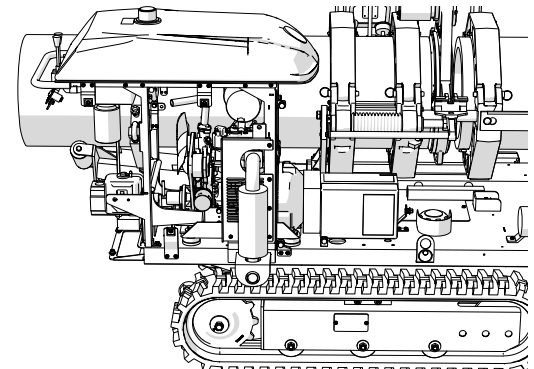
The engine is a 3 cylinder water cooled design. It uses an electric fuel pump located near the fuel tank.

The throttle control and key switch are at the rear of the machine. Turn the key switch to the left to preheat the glow plugs and then to the right to start the engine.

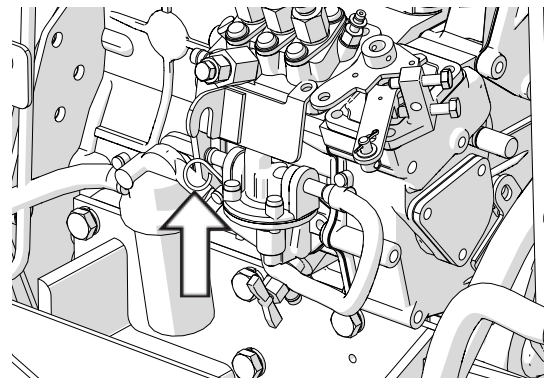
The engine is equipped with an oil pressure switch and coolant temperature switch that will sound an alarm at low oil pressure or coolant temperatures exceeding 230°F.

If you hear the alarm while operating the machine, turn the machine off and check oil level. If oil is at proper level, wait for machine to cool and then check coolant level and mixture.

The fuel shut off valve is located on the engine mounted fuel filter.



CD01789-08-17:16



CD01790-08-17:16

TX02542-9-15-05

## Operator Panel

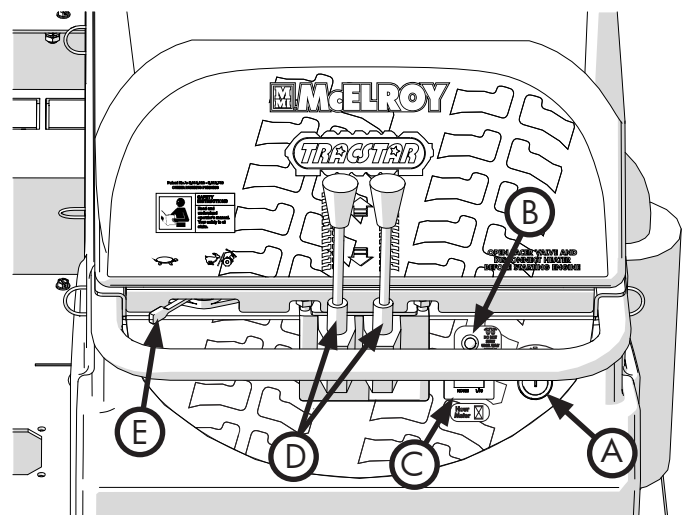
**A - Key switch** - Switch to start and stop the machine.

**B - Wait Light** - Indicate the engine is pre-heating and will turn off once engine pre-heat is complete.

**C - Hour Meter** - With the key switch in the run position, total hours of operation are displayed.

**D - Track Controls** - Used to control the movement of the left and right tracks.

**E - Engine Throttle Control** - Adjust the engine speed from low to high.



CD01849-09-21:16

TX05160-09-22:16

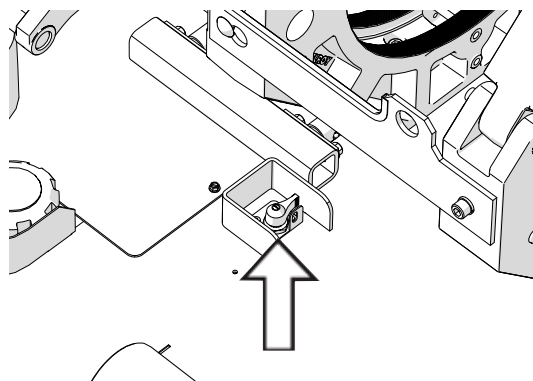


# Overview



## Battery Disconnect Switch

The battery disconnect switch removes the battery power to the system.



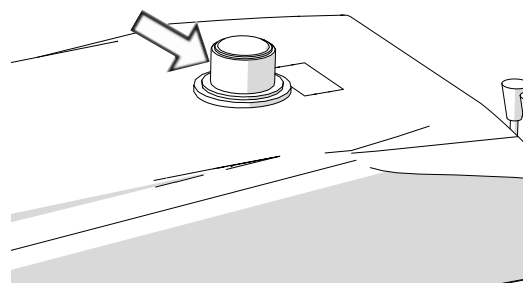
CD01788-08-17-16

TX05161-09-22-16

## Hydraulic Fluid Reservoir

The hydraulic fluid reservoir is located above the engine.

Refer to the "Hydraulic Fluids" section of this manual for hydraulic fluid recommendations.

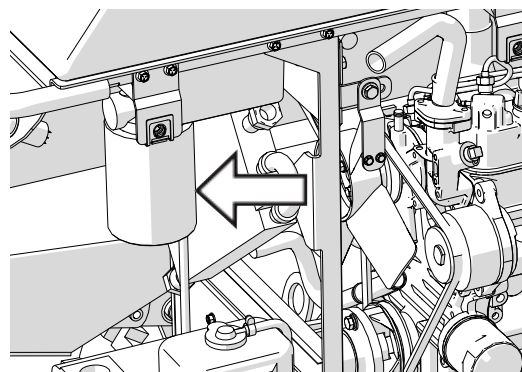


CD01792-08-17-16

TX02322-02-27-14

## Hydraulic Fluid Filter

This machine is equipped with a 10 Micron filter on the return side of the hydraulic system.



CD01793-08-17-16

TX01893-02-27-14



# Overview



## Carriage Manifold Block

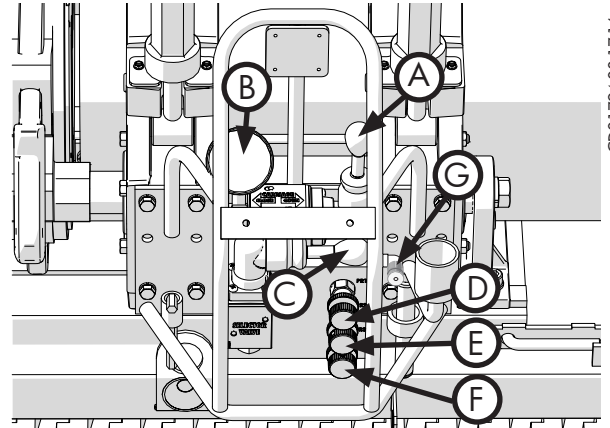
Parts of the carriage manifold block:

- A) The carriage directional valve, mounted on the top of the manifold, determines whether the carriage is moving left, right, or is in neutral.
- B) A 1500 psi carriage pressure gauge is mounted on a bracket above the manifold.
- C) The selector valve, mounted on the upper left of the manifold, selects a reduced pressure from one of the three pressure reducing valves.

Each pressure reducing valve is labeled with a different function:

- D) The top valve adjusts facing pressure to a maximum of 400 psi.
- E) The middle valve adjusts heating pressure to a maximum of 400 psi.
- F) The bottom valve adjusts fusing pressure to a maximum of 1500 psi.
- G) DataLogger® port.

TX05162-09-22-16



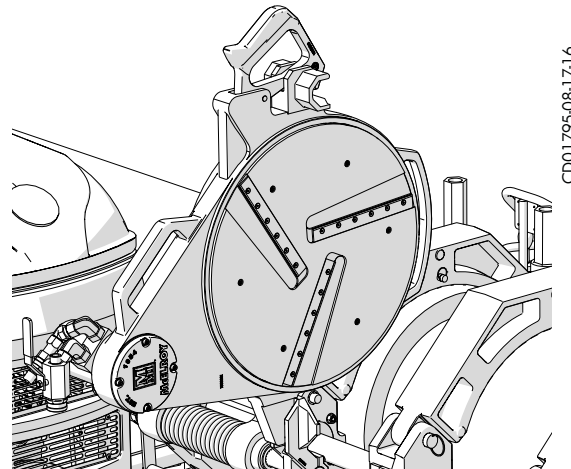
CD01794-08-17-16

## Facer

The facer is a rotating planer-block design. The blade holders each contain blades and are chain driven (enclosed in lubricant) by a hydraulic motor. There are facer stops that allow for a specific amount of faced pipe to protrude from the jaws.

When needed for off-vehicle modular operation, the facer can be removed from its carriage skid-mounted pivot arm.

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



CD01795-08-17-16

TX05163-09-22-16



## 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.

If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion.

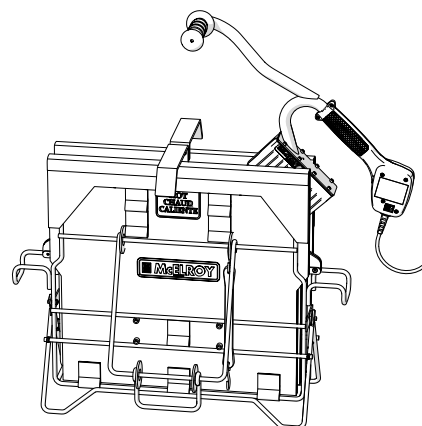
The heater has a green indicator light which will flash on and off. This indicates that the controller is operating normally. If the green indicator is not flashing then the controller may not be operating properly. If this occurs, disconnect power and have the heater repaired by a McElroy Authorized Service Center.

The heater temperature is controlled by a microprocessor. It has a red indicator light on the handle at the bottom of the temperature scale. When the heater is plugged in and preheating the light glows steadily until the set temperature is reached. The light then goes off and on slowly as the heater maintains temperature.

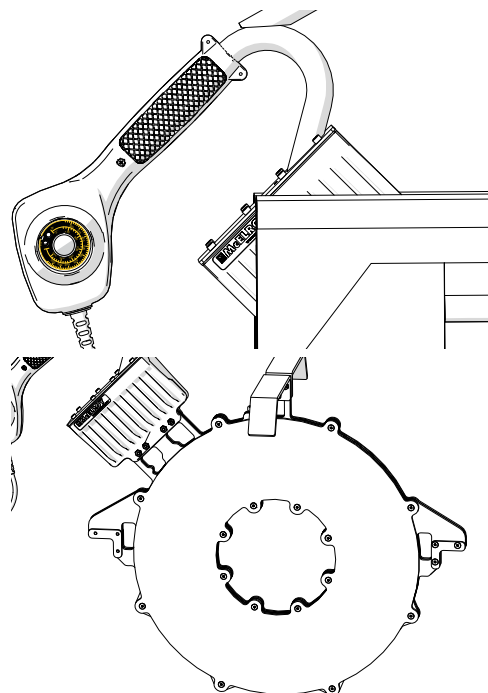
The heater body is not coated. Coated butt fusion heater plates are available for all butt fusion applications.

**NOTICE:** The heater should never be used without butt fusion heater plates installed.

To prevent a build-up of plastic pipe residue from accumulating on the heater plates (loss of surface temperature and pipe sticking may result), the heater plates should be cleaned with a non-synthetic cloth before every fusion joint.



CD01796-08-17-16



CD01797-08-17-16

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TX02309-04-28-14

## Power for Heater

The heater cord plugs into a receptacle on the frame.

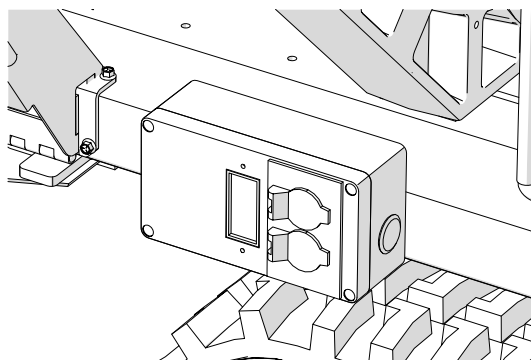
The 120V receptacle is used for the 28 butt fusion heater.



The 240V receptacle is used for the 250 butt fusion heater, 412 butt fusion heater, 618 butt fusion heater, and the 28/250 sidewall heaters.



TX05186-09-22-16



CD01791-08-17-16



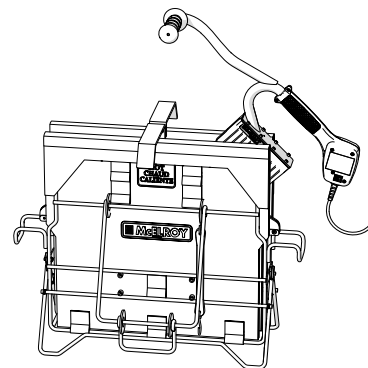
# Overview



## Insulated Heater Stand

The heater should always be stored in the insulated heater stand or blanket for protection of the operator and to minimize heat loss and risk of mechanical damage.

TX00363-9-15-94

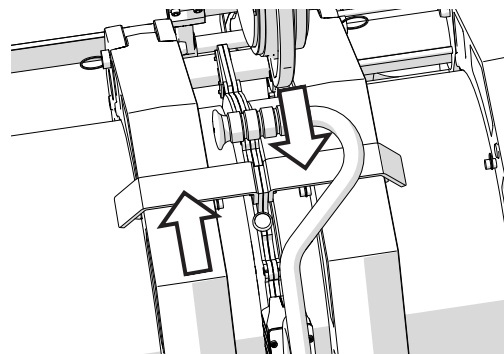


CD01796-08-17-16

## Heater Stripper Bar

The heater is equipped with a stripper bar that is used to separate the heater from the pipe ends after the heating cycle. When the inner jaws are opened, the jaws lift and press against the stripper bar separating the heater from pipe ends.

TX02982-4-27-09



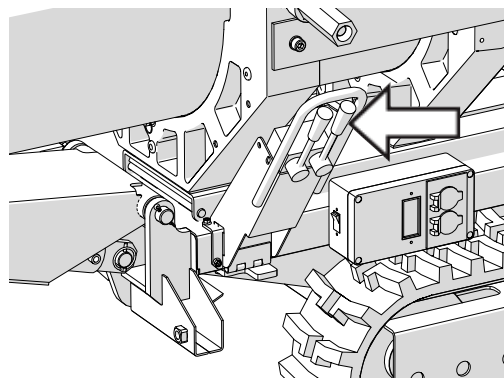
CD01799-08-17-16

## Pipe Lift Controls

Hydraulic pipe lifts are used to aid in positioning pipe in the machine.

The pipe lift control bracket can be loosened and rotated down from the vehicle to allow clearance to fuse tees or perform tie-ins.

TX05164-09-22-16



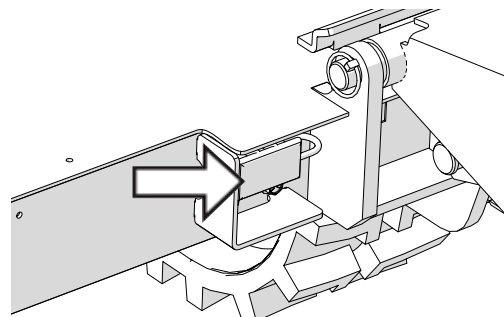
CD0181209-06-16

## Battery Charging Connection

The battery can be charged or jump started using the battery charging connection on the front of the machine.

**IMPORTANT:** The battery disconnect switch must be in the connected position to charge battery.

TX05165-09-22-16



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# Operation

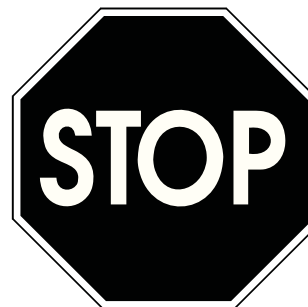


## Read Before Operating

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

Return manual to the protective storage box when not in use. This manual is to be considered part of your machine.

TX00401-9-15-94



STOP-12-28-95

## Check Hydraulic Fluid Level

Check fluid level in the reservoir and verify that fluid is visible in the strainer.

Refer to the "Hydraulic Fluids" section of this manual for hydraulic oil recommendations.

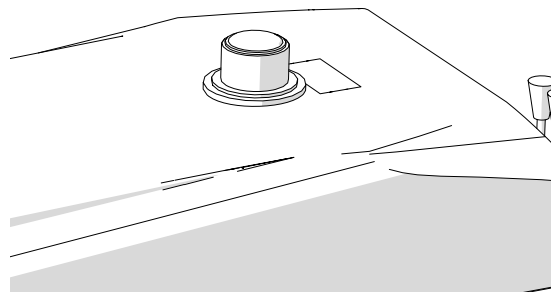
If fluid is not visible in the reservoir strainer, fill reservoir until fluid is visible in the strainer.

Do not overfill reservoir. The fluid will expand as it heats up.

Never allow dirt, water, or other foreign matter to enter the tank.

Use only clean oil from an unopened container.

TX02323-02-27-14



CD0179208-17-16

## Diesel Engine

Read the operating and maintenance instructions for the engine before operating.



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 hydraulic extension hoses to the carriage.

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

The key ignition has four positions. Preheat, off, run and start.

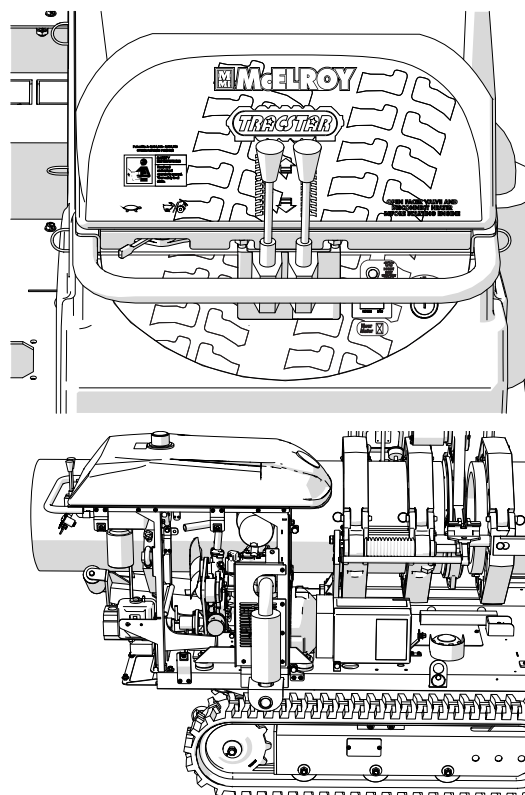
**NOTICE:** Set the engine to slow speed before starting. Never use starting fluid.

Open facer valve and unplug the heater. Turn switch to the left to preheat, until the red glow plug lamp goes out. Turn the key to the right to start the engine. Close the facer valve to allow the machine to build pressure.

Turn the key to OFF to stop the engine.



TX05166-09-22-16



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# Operation



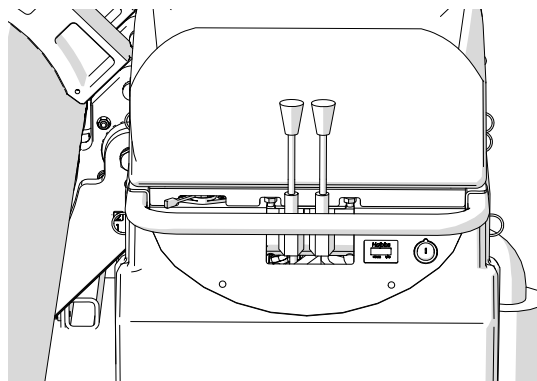
## Moving Machine Into Position

Make sure all personnel are safely clear of the machine before moving.

Stand behind the machine console.

Move both track control levers forward to go in a straight line. Release the levers to stop. Moving just the right track forward turns the machine to the left. Moving just the left track forward turns the machine to the right. Pull levers back to back up.

TX01491-3-2-98



CD01788-08-17-16

## Prepare Heater



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

If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion.

Install butt fusion heater plates while heater is cool.

**NOTICE:** The heater should never be used without butt fusion heater plates installed. Refer to the "Maintenance" section of this manual for installation procedure.

Place heater in insulated heater stand.

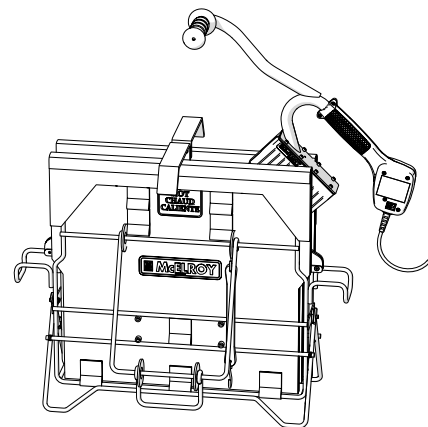
Plug heater into the appropriate outlet on machine.

**IMPORTANT:** Engine must be in high speed to provide electric power to the heater.

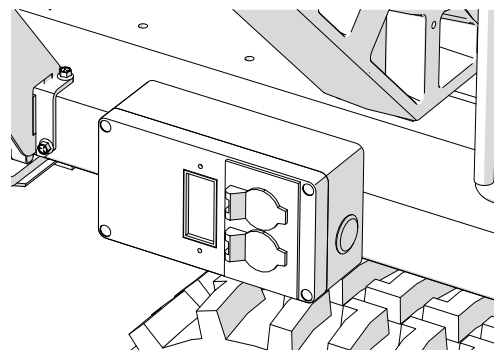
Refer to the "Maintenance" section of this manual for instructions how to adjust heater temperature.

Allow heater to warm-up to operating temperature.

TX02310-03-24-14



CD01796-08-17-16



CD01791-08-17-16

## Set up Pipe Supports

Set up pipe stands or pipe rollers and adjust height so the pipe is in line with the jaws.

TX02955-4-15-09



PH03879-4-15-09



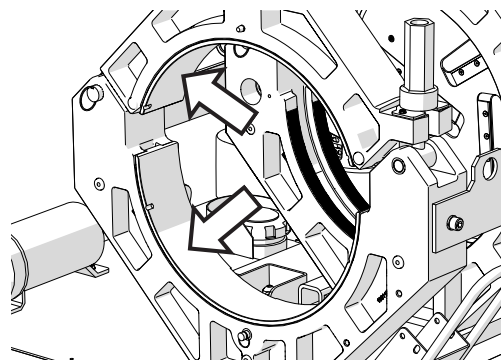
# Operation



## Install Clamping Inserts

Select and install appropriate clamping inserts for the pipe that is being fused.

Clamping inserts are required for all sizes except sizes that match the size of the jaw without inserts.



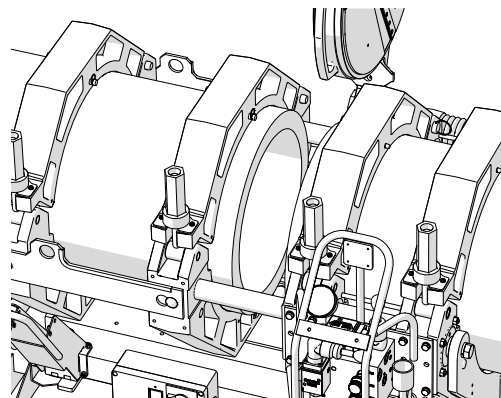
CD01801-08-26-16

TX02956-4-15-09

## Loading Pipe Into Machine

Clean the inside and outside of pipe ends that are to be fused.

Open the upper jaws and insert pipe in each pair of jaws with applicable inserts installed. Position pipe with enough material protruding past the jaw faces to allow for facing of the pipe end.

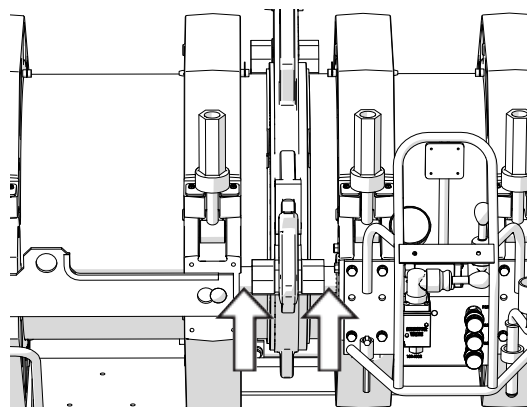


CD01802-08-26-16

TX02339-3-30-11

## Positioning Pipe In Machine

Swing the facer into place. With the carriage control valve lever, move the carriage toward the fixed jaws, while watching the gap at each end of the facer rest buttons. When the pipe is in contact with the facer, this gap indicates the amount of material that will be trimmed from the pipe end. Assure sufficient material will be removed for a complete face off. Tighten the clamp knobs on the outside jaws. Hand tighten the inside clamp knobs.



CD01803-08-26-16

TX00372-9-15-94





# Operation



## Begin Facing

Turn facer on by opening valve **(A)** on top of the facer.

Move the selector valve **(B)** on the hydraulic manifold block to the top (facing pressure) position.

The facing pressure should be set as low as possible while still facing pipe. Excessive facing pressure can damage the facer. It may be necessary to adjust the facing pressure.

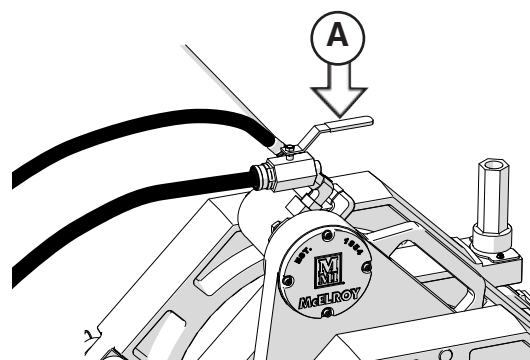


**WARNING** Facer blades are sharp and can cut. Never attempt to remove shavings while the facer is running, or is in the facing position between the jaws. Use care when operating the facer, and when handling the facer.

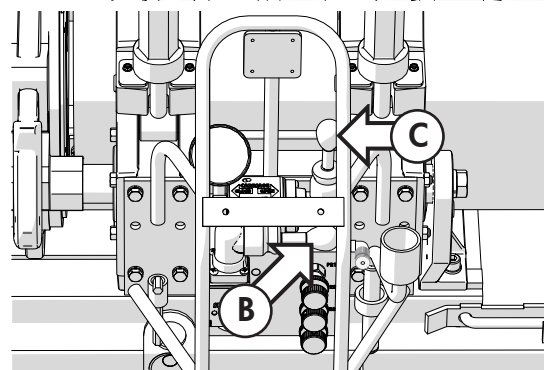
Move the carriage directional control **(C)** to the left to close the carriage and begin facing. Continue to face the pipe until the rest buttons on the jaws bottom out on the facer rest buttons.

Shift carriage directional control **(C)** to the center (neutral) position, and allow facer to turn 2 to 3 additional revolutions.

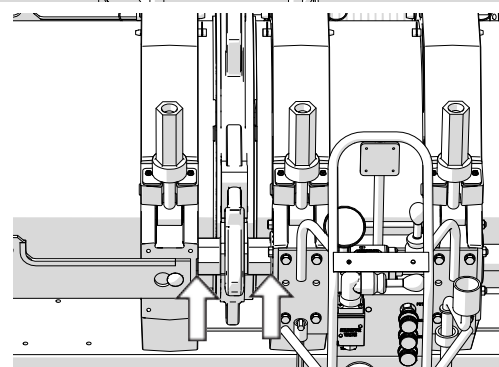
Turn facer off **(A)**.



CD01805-08-31-16



CD01794-08-17-16



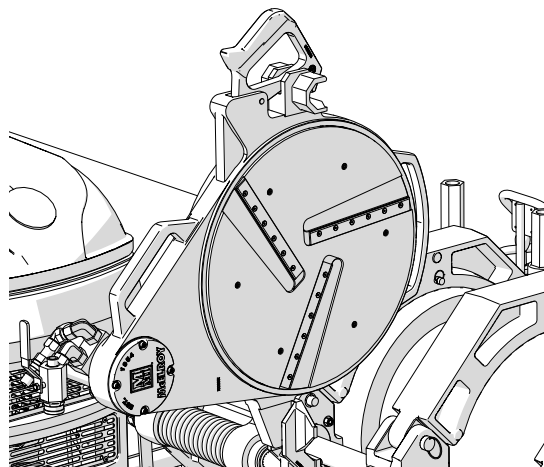
CD01804-08-31-16

TX05167-09-22-16

## After Facing

Move the carriage directional control to the right and allow the carriage to open completely. Center the facer in between the pipe ends to avoid dragging facer stops on the pipe ends. Swing facer to the out position.

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



CD01795-08-17-16

TX04262-09-22-16

## Check Alignment

Move carriage to the left at facing pressure, until pipe ends contact. Look across the top surface of pipe ends to check alignment. If there is a HI/LO misalignment between pipe ends, adjustments must be made. If HI/LO alignment is acceptable, proceed to "Check for Slippage".

To correct HI/LO misalignment:



**WARNING** Hydraulically operated equipment is operated under pressure. Anything caught in the machine will be crushed. Keep fingers, feet, arms, legs, and head out of the machine while operated.

If pipe is not lined up, tighten the high side jaw to bring into alignment.

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

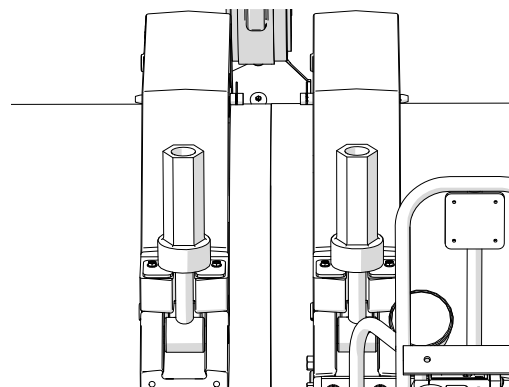
When the pipe is properly aligned, ensure all clamp knobs are tight.

**NOTICE:** When clamping, do not over-tighten the clamp knobs because machine damage can result. Check to see if there is space between the upper and lower jaws. If the two jaws are touching, do not continue to tighten.

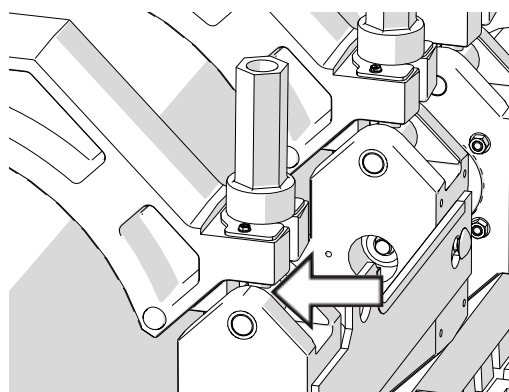
Insert facer and reface the pipe ends if adjustments were made. Check HI/LO alignment again and make further adjustments if necessary.

Ensure there is no unacceptable gap between the pipe ends. If there is an unacceptable gap, return to **Loading Pipe into Machine**.

TX04263-09-22-16



CD01806-08-31-16



CD01806-08-31-16

## Check Heater Temperature



**CAUTION** The heater is hot and will burn clothing and skin. Keep the heater in its insulated heater stand or frame when not in use, and use care when heating the pipe.

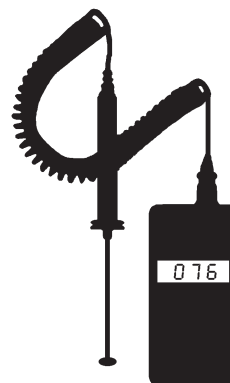
**NOTICE:** Incorrect heating temperature can result in questionable fusion joints. Check heater plates periodically with a pyrometer and make necessary adjustments.

Check heater surface temperature where the pipe will contact the heater.

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

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

TX05168-09-22-16

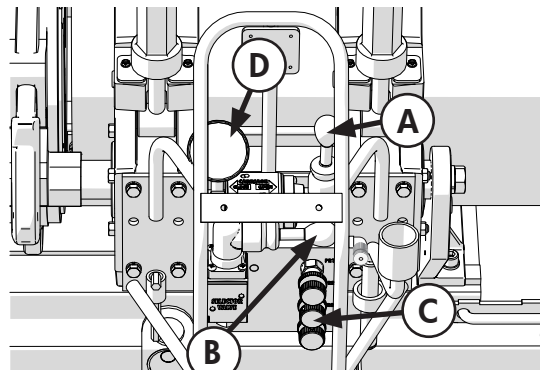


WR00077-4-16-93

## Determine Drag Pressure

Determine drag pressure using the following steps:

- 1) Move the carriage so that the faced pipe ends are approximately 2" (50mm) apart.
- 2) Shift the carriage directional valve to the middle (neutral) position (A).
- 3) Shift the selector valve (B) to the middle heating position, and adjust the heating pressure reducing valve (C) to its lowest pressure by turning the valve counterclockwise completely.
- 4) Shift the carriage directional valve to the left (A).
- 5) Gradually increase the heating pressure by turning the valve clockwise slowly. Increase the pressure until the carriage just begins to move.
- 6) Quickly reduce the heating pressure valve counterclockwise until the carriage is just barely moving.
- 7) View pressure on carriage pressure gauge (D). Record this actual drag pressure.



- A - Carriage Directional Valve
- B - Pressure Selector Valve
- C - Heating Pressure Reducing Valve
- D - Carriage Pressure Gauge

TX03023-04-18-16

## Set Fusion Pressure

With the selector valve in the down fusing position, the fusion pressure can be set.

The theoretical fusion pressure can be determined using the fusion pressure calculator that is supplied with the machine or by using the McCalc<sup>®</sup> app is available for iOS, Android, Windows Phone and PC devices.

Always add drag pressure to the theoretical fusion pressure.

Gauge (Fusing) Pressure = Theoretical Fusing Pressure + Drag Pressure

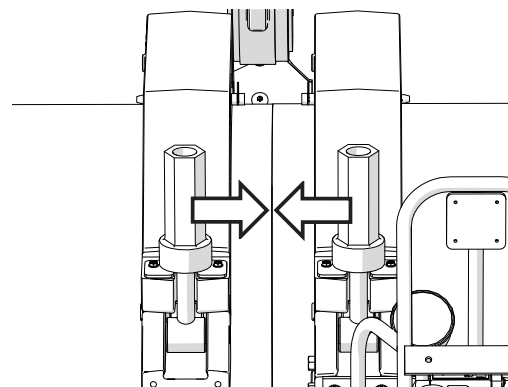


TX03024-04-18-16

## Check for Slippage

Bring the two sections of pipe together under fusing pressure to make sure they don't slip in the jaws.

If slippage occurs, return to **Loading Pipe into Machine**.



CD01806-08-31-16

TX00971-04-18-16

## Inserting Heater

Open the carriage completely.



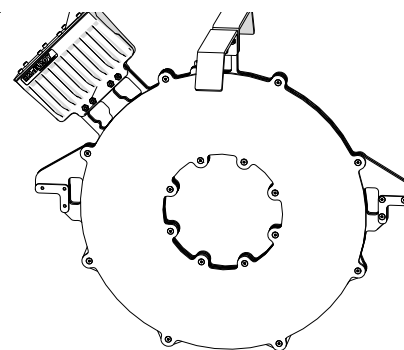
Heater is not explosion proof. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion.

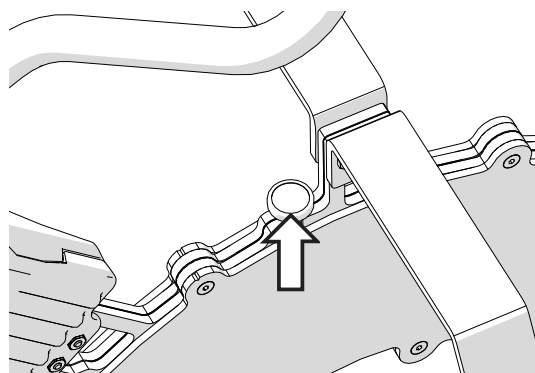
Use a clean dry non-synthetic cloth to clean the butt fusion heater surfaces.

Verify heater temperature by noting the reading on the dial thermometer.

Insert heater between the pipe ends.



CD01798-08-17-16



CD01808-08-31-16

TX05169-09-22-16



# Operation



## Heat Pipe

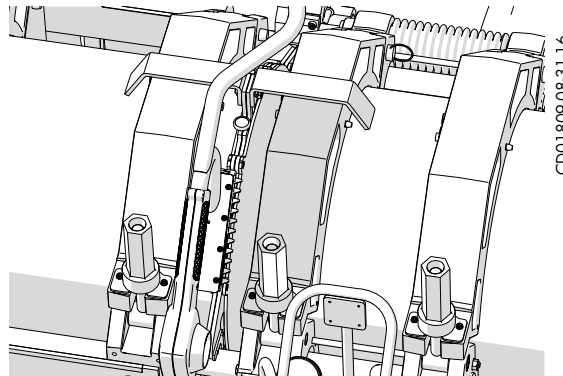
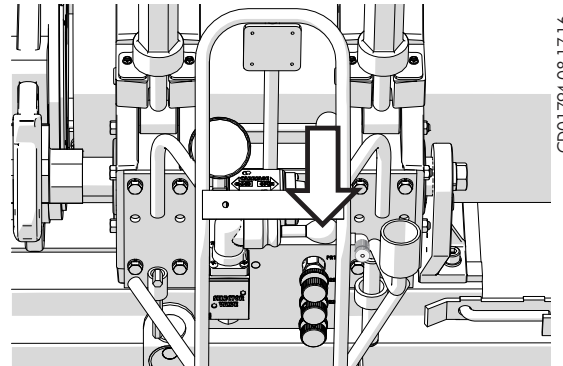
The heating pressure was established during the Determine Drag Pressure section.

Follow the pipe manufacturer's or joining standard's suggested heating procedure.

**IMPORTANT:** A modified shift sequence may be required in certain situations.

Shift the selector valve to the fusing position and move carriage to the left to bring pipe ends in contact with the heater. Ensure proper initial bead-up, move selector valve to middle (heating) position. If heating pressure is not required by pipe manufacturer or joining standard, or opposing forces are not great enough to move the carriage away from the heater, shift the carriage directional valve to neutral after the carriage pressure drops to drag pressure.

**IMPORTANT:** Always shift into the heating mode **before** returning carriage directional valve to neutral.



TX02880-04-18-16

## Fusing the Pipe

**NOTICE:** Failure to follow the pipe manufacturer's heating time, pressure and cooling time may result in a bad joint.

After following the heating procedure, verify carriage control valve is in neutral and move selector valve down, to fusion position.

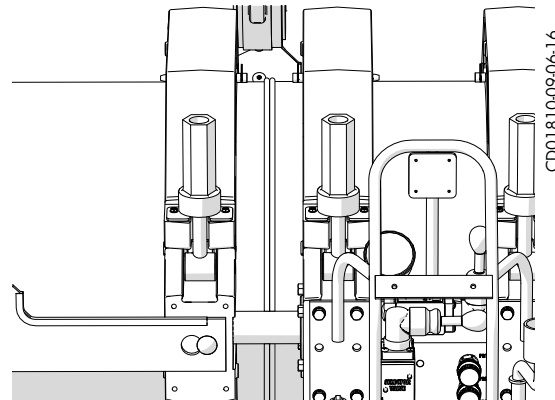
Open the carriage just enough to remove the heater.

Quickly remove the heater.

Quickly inspect pipe ends for appropriate melt.

When heater is clear of the jaws, quickly close the carriage to bring the pipe ends together. Ensure the appropriate maximum open/close time is not exceeded.

Allow joint to cool under pressure according to pipe manufacturer's or appropriate joining standard's recommendations.



TX04265-09-22-16





# Operation



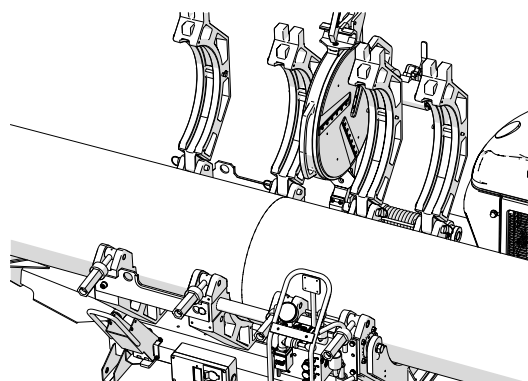
## Opening Jaws

After the fusion process is complete, Shift the carriage directional control to the neutral position.

Loosen all clamp knobs, and move carriage to the right far enough to open the jaw nearest the facer.

Open the jaws.

TX05170-09-22-16



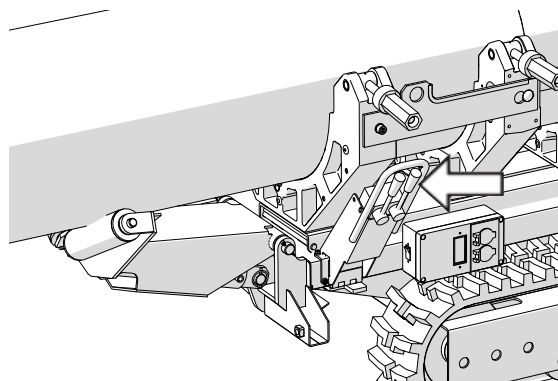
CD0181109-06-16

## Raise Pipe

Raise the joined pipe using the pipe lifts.

The levers mounted to the vehicle below the outer fixed jaw move the pipe lifts up and down.

TX05171-09-28-16

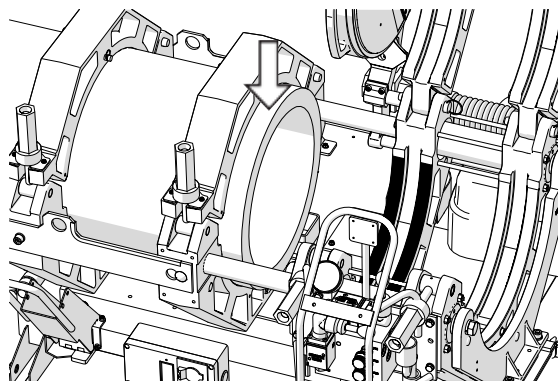


CD0181209-06-16

## Position Pipe for Next Joint

Drive the fusion machine to end of pipe, or pull the pipe through the jaws until the end of the pipe is protruding 1" past the jaw face of the fixed jaw.

TX00383-9-15-94

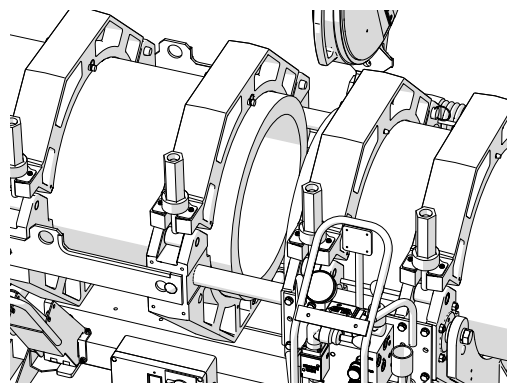


CD0181309-06-16

## Install Next Piece of Pipe

Insert a new piece of pipe in movable jaws and repeat all previous procedures.

TX00384-10-12-95



CD0180208-26-16





# Special Operations



## Disconnect Hydraulic Hoses

There are two sets of hydraulic hoses. One set connects to the carriage hoses on the machine and to the carriage. The other set connects to the facer hoses on the machine and to the facer.

Disconnect both sets of hoses.



TX02340-10-25-04

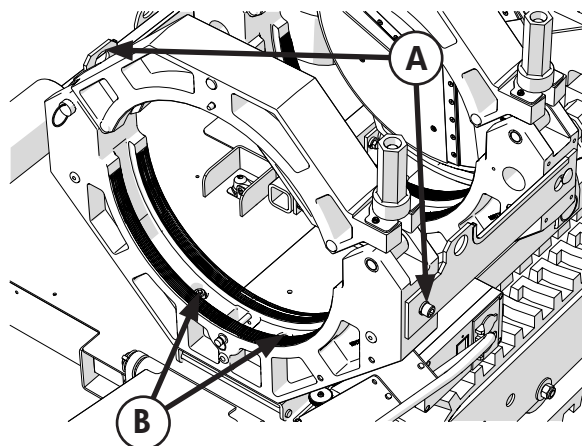
## Remove Outer Fixed Jaw

The outer fixed jaw can be removed to allow more room to fuse tees or perform tie-ins.

Remove both fixed jaw braces (A).

Loosen 2 bolts (B) on the jaw and remove the jaw.

The pipe lift control bracket (C) can be loosened and rotated down from the vehicle to allow clearance to fuse without the outer fixed jaw on the machine.



TX05187-09-26-16

## Remove Carriage Assembly from the Vehicle

### **⚠ DANGER**

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

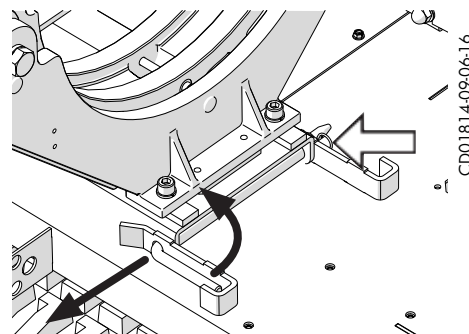
The carriage can be removed from the machine for fusing pipe on the ground or in the ditch. For especially tight conditions it is also possible to remove the outer fixed jaw and skid for a 3-Jaw configuration. The facer can be removed from the pivot shaft and lifted from above by hand or using a lifting sling.

### **⚠ CAUTION**

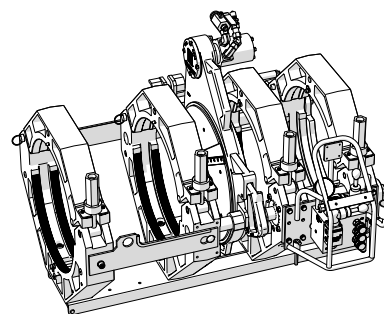
The machine components are heavy. Using one person to lift the facer or carriage may result in an injury. Use a lifting strap and an overhead lifting device to lift facer or carriage. For manual lifting, two people are required to lift the facer or carriage.

To remove the carriage, pull the pin at the rear of the machine and slide the carriage forward approximately one inch.

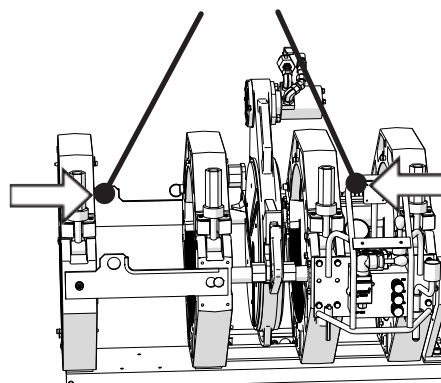
Attach lifting sling to the manifold bracket and the far side lift point on the fixed jaw brace then lift the carriage assembly.



CD01814-09-06-16



CD01815-09-06-16



PH04466-1-31-11

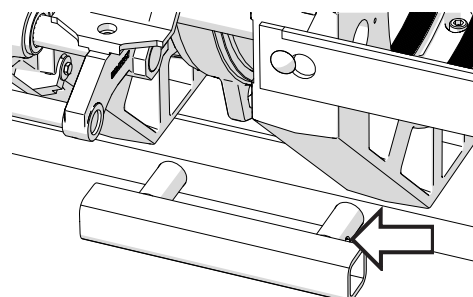
TX05172-09-28-16

## Outrigger

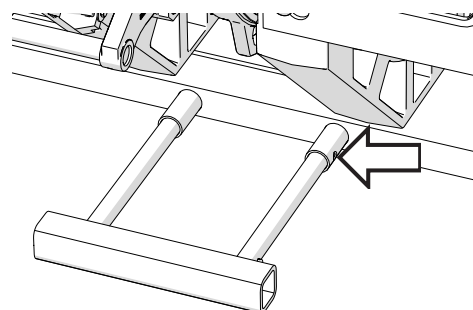
The outrigger is an arm that is retractable and adds support to the carriage assembly when opening the jaws and pivoting the facer away from the carriage.

To extend or retract the outrigger, press the locking button near the base of the outrigger and push or pull the arm until the button snaps to the locked position.

**NOTICE:** Never use the outrigger to lift or move the carriage.



CD01823-09-15-16



CD01824-09-15-16

TX02304-04-29-04

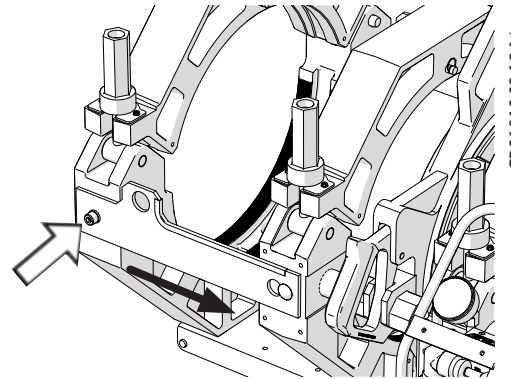


# Special Operations

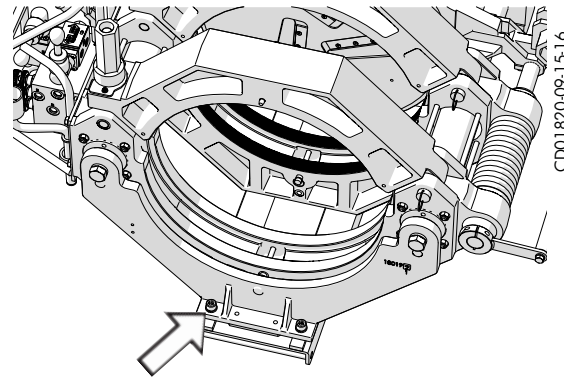
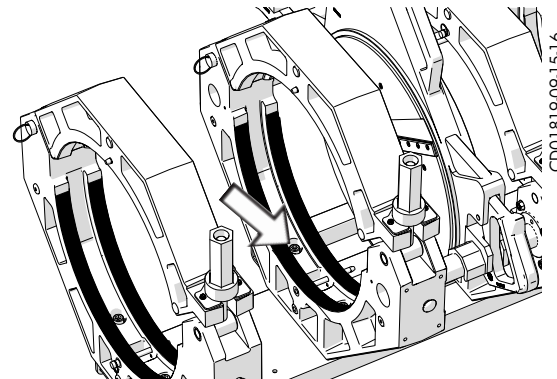


## Remove 3-Jaw Assembly from the Carriage

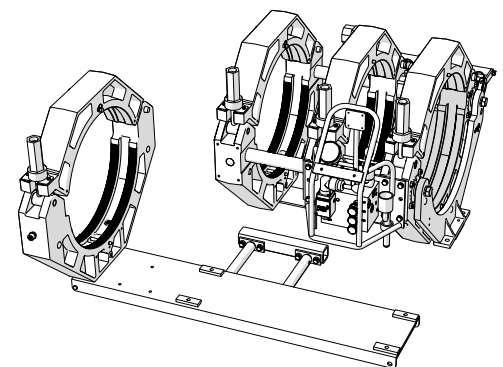
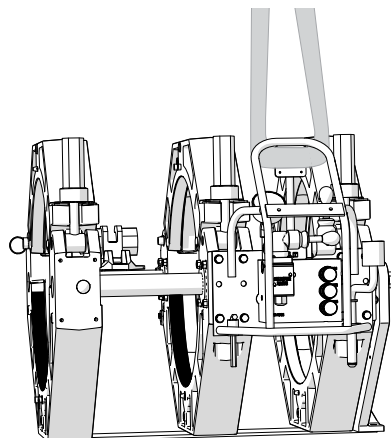
Remove braces from inner fixed jaw.



Remove the four bolts holding the carriage assembly to the skid with the wrench provided.



Attach lifting strap as shown and lift the carriage assembly.



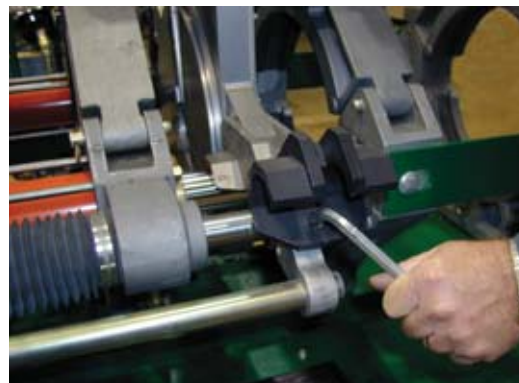


# Special Operations



## Remove Facer From TracStar 412 and 618 Carriage

Remove rear guide rod bracket.



Support the facer with a person or sling so it does not fall once the facer locking bolts are removed.

Remove facer locking bolts.



Lift facer out of the carriage and set on cardboard or wood blocks off of ground.

Attach rear guide rod bracket in the position shown.







# Special Operations



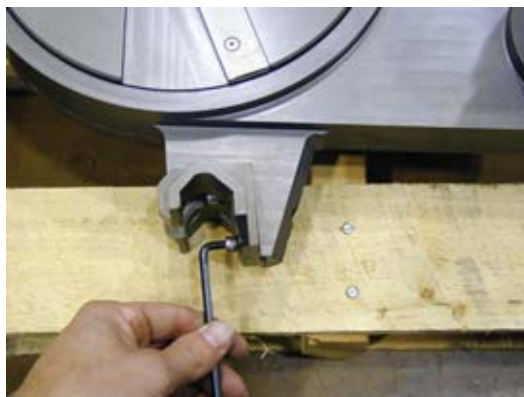
## Remove Facer From TracStar 28 and 250 Carriage

Loosen facer locking bolt.



Lift facer out of the carriage and set on cardboard or wood blocks off of ground.

Remove rear guide rod bracket.



Attach rear guide rod bracket in the position shown.





# Special Operations



## Manual Facer Operation

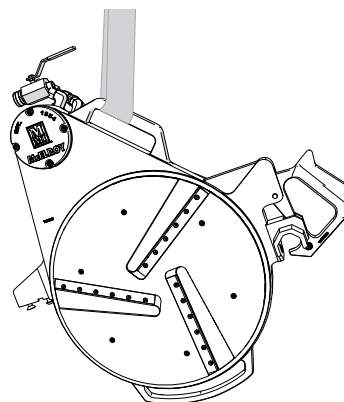
### ⚠ CAUTION

The machine components are heavy. Using one person to lift the facer or carriage may result in an injury. Use a lifting strap and an overhead lifting device to lift facer or carriage. For manual lifting, two people are required to lift the facer or carriage.

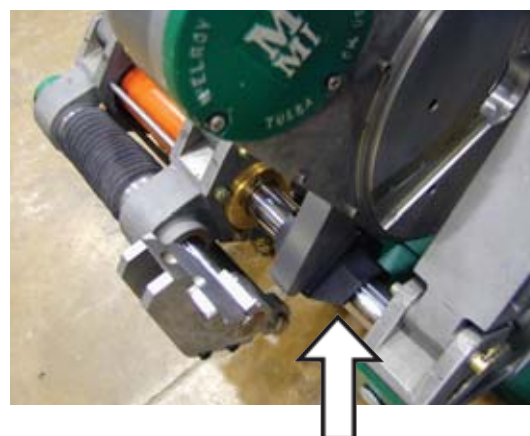
For the TracStar 412 and 618, use a lifting strap or a two person lift to lift the facer.

The TracStar 28 and 250 can be lifted by a single person.

Lock onto back guide rod, then latch on front guide rod.



CD01829-09-15-16



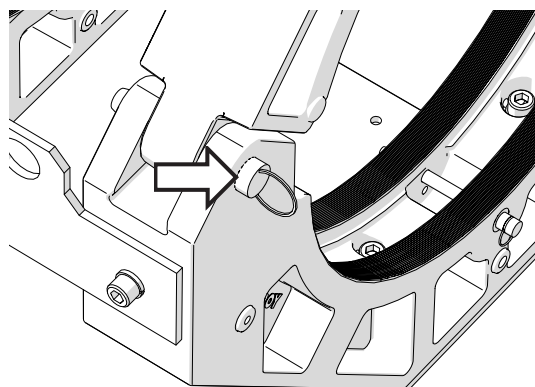
PH01946-11-15-00

TX05173-09-22-16

## Removing Top Jaws

If the carriage is going to be hand carried, or if the carriage needs to be hoisted and slid underneath the pipe, the top jaws need to be removed.

Loosen all clamp knobs. Take out the detent pins securing the top jaws and remove the jaws.



CD01825-09-15-16

TX01479-226-98





# Special Operations



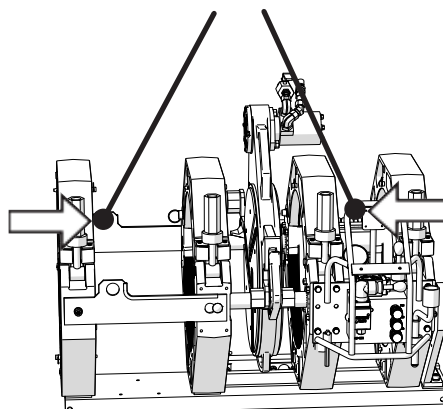
## Lower 3-Jaw or 4-Jaw Carriage into Ditch

Use all 4 jaws whenever possible. The three jaw unit should be used only when space is not available for the entire carriage, such as fusing onto a tee, an ell or doing saddle fusion.

### 4-Jaw

Attach lifting sling to the manifold bracket and the far side lift point on the fixed jaw brace.

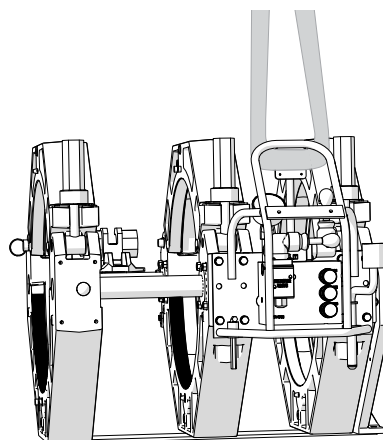
Lift carriage assembly and lower into ditch.



### 3-Jaw

Attach lifting strap to the manifold bracket.

Lift carriage assembly and lower into ditch.

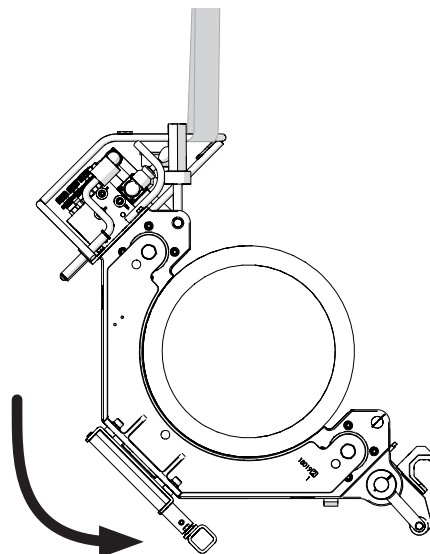


PH04466-1-31-11

CD01822-09-15-16

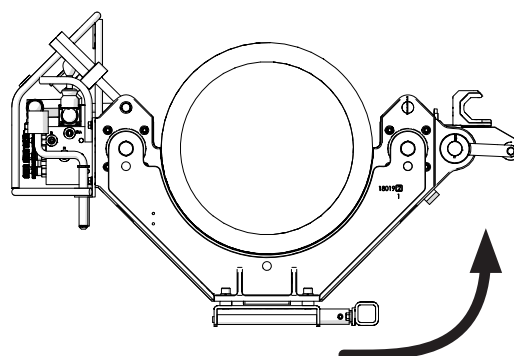
## Clamp Carriage Assembly to Pipe

Position carriage assembly on side of the pipe. Lift pipe and slide carriage assembly under pipe.



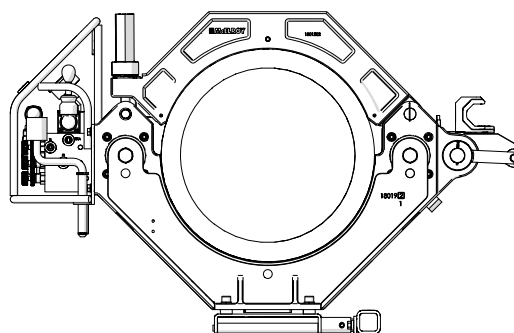
CD01828.09.15.16

Rotate carriage assembly around to a normal upright position.



CD01827.09.15.16

Attach the top jaws and loosely clamp around pipe.



CD01826.09.15.16



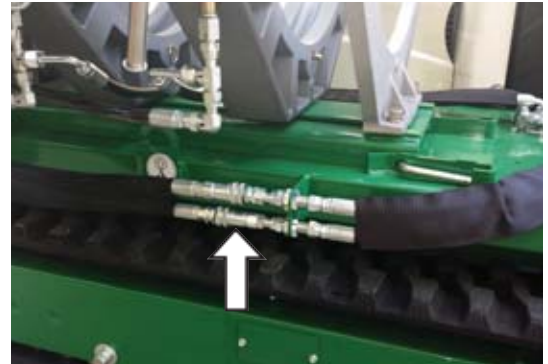
# Special Operations



## Attach Hydraulic Hoses

There are two sets of hydraulic extension hoses. One set connects to the carriage hoses on the machine and to the carriage. The other set connects to the facer hoses on the machine and to the facer.

Connect all hoses.



PH05639-09-06-16

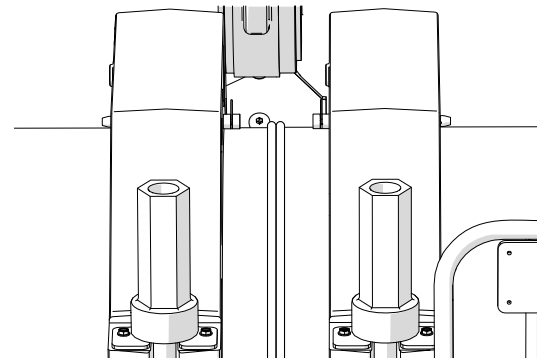


PH05640-09-06-16

TX01485-2-26-98

## Make Fusion Joint

Refer to the "Butt Fusion Procedure" for operating instructions.  
After facing operation, remove the facer from ditch.



CD01810-09-06-16

TX00450-9-16-94

## Remove Carriage Assembly from Ditch

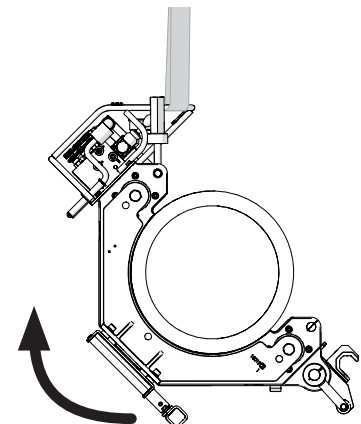
Loosen clamp knobs and remove top jaws.

Rotate carriage assembly from under the pipe.

**IMPORTANT:** Always rotate unit with valve system facing up to protect against damage.

Attach sling to lifting points).

Lift carriage assembly from ditch.



CD01828-09-15-16

TX00451-9-16-94

## Reassemble Fusion Machine

Install carriage assembly to the vehicle and connect carriage hoses.

Lift facer into position and bolt to facer mount. Do not tighten. Pivot facer down and close carriage against the facer to establish facer position. Tighten one of the facer mounting bolts. Open carriage from facer and pivot facer out. Tighten the other facer mounting bolt.

Connect facer hoses.

TracStar 412 and 618



PH01907-11-15-00

TracStar 28 and 250



PH01930-11-15-00

Replace top jaws.



# Saddle Fusion Procedure

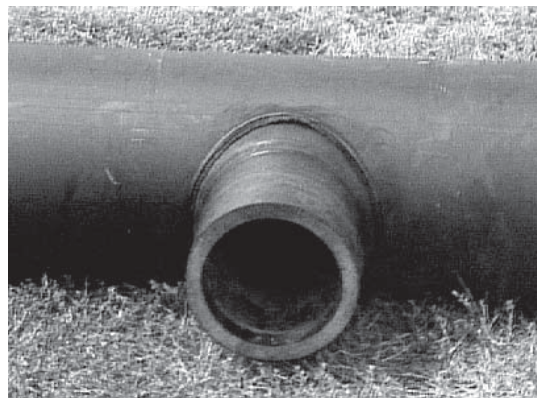


## Saddle Fusion Procedure for TracStar 28CU and 250CU

The combination unit fuses branch saddles up to 8" DIPS outlet and up to a 9-5/8" diameter base on any size main.

**IMPORTANT:** Optional chain extension kit are available for larger main sizes.

TX05175-09-22-16



PH00406-92-1-94

## Install Heater Adapters



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

If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion.

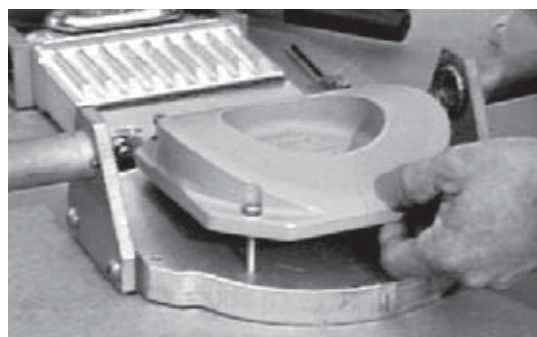
Select appropriate heater and sidewall fusion heater adapters. Clean heater surfaces and adapter surfaces. Attach the adapters to the heater when the heater is cool.

Place heater in insulated heater blanket.

Plug heater into the vehicle.

**IMPORTANT:** Engine must be in high speed to provide electric power to the heater.

TX04266-06-02-14



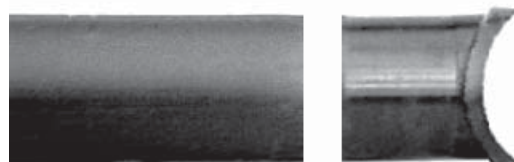
PH00416-1-1-94



PH00418-1-1-94

## Assure Saddle Will Fit

For branch saddles, a nipple long enough to extend through both movable jaws should be fused to the fitting using standard butt fusion procedures.



PH00423-1-1-94

TX00456-9-15-94





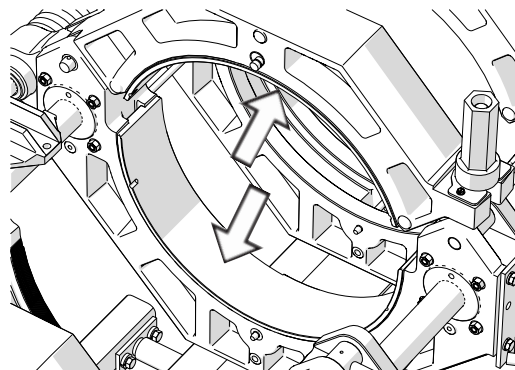
# Saddle Fusion Procedure



## Install Clamping Inserts

Select and install appropriate clamping inserts in the movable jaws.

TX00457-9-16-94



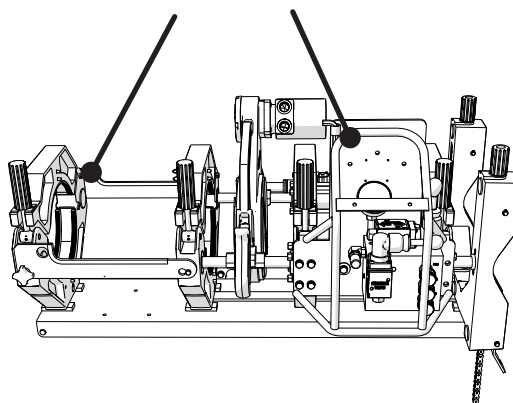
CD01830-09-16-16

## Remove Carriage Assembly from Vehicle

Use lifting sling and detach carriage from vehicle.

Refer to Remove Carriage Assembly from Vehicle in the Special Operations section of this manual for instructions for removing the carriage.

TX05176-09-22-16



CD01831-09-16-16

## Attach Carriage Assembly to Main

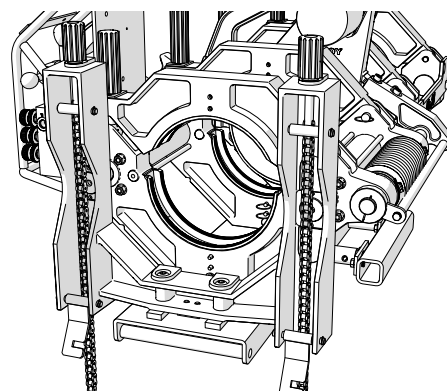
Place the machine on the main.

Place a line bolster on main opposite the carriage assembly if required.

Position the tailstock chains around the main and lock into the chain hooks.

Tighten the machine onto the main using the tailstock clamp knobs.

TX00458-9-16-94



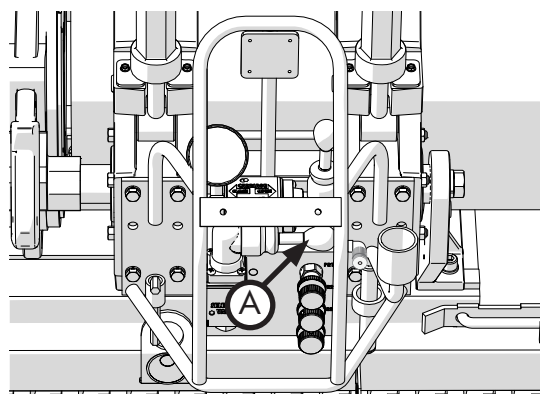
CD01832-09-16-16

## Set Hydraulic Pressure

Check hydraulic pressure. Shift the selector valve (A) to the center position to set the pressure for heat/soak. With the selector valve in the down position, the initial heat (bead-up) pressure can be set. With the selector valve in the top position, the fusion pressure can be set.

Consult the pipe manufacturer or appropriate joining standard for proper pressures.

TX04025-4-12-10



CD01794-08-17-16





# Saddle Fusion Procedure



## Clean Surfaces

Clean the pipe in the area the fitting will come in contact.

Clean the base of the fitting.

Use a 50 or 60 grit utility cloth, scraping tool, or other procedure specified by the pipe manufacturer, fitting manufacturer, or applicable standard.

Clean and rough the main to expose fresh material.

Surfaces must be free of water and oil.

TX01879-3-30-11



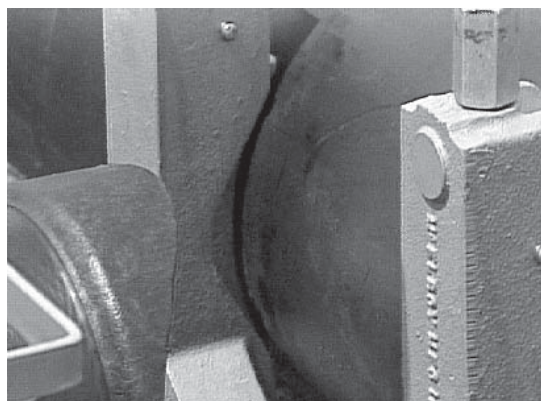
PH00400-9-21-94

## Clamp Fitting

Position the fitting, and bolster if required, loosely in the movable jaw(s). Close the carriage to properly position the fitting on the main. Tighten the clamp knobs.

Be sure to allow enough travel for the melt pattern and fusion to occur (3/4" min.).

TX04027-4-12-10

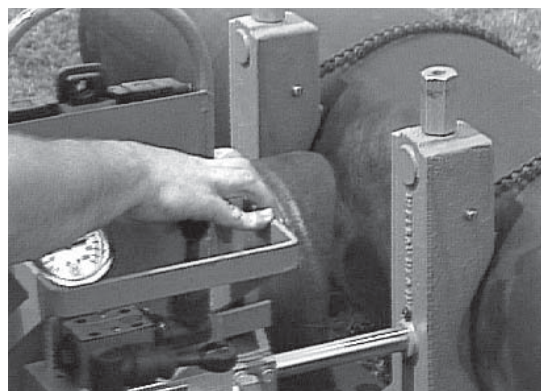


PH00399-9-21-94

## Test for Slippage

Bring the fitting against the main under initial heat (bead-up) pressure to insure that no slippage or movement of the main or fitting occurs.

TX00462-3-30-11



PH00390-9-21-94



# Saddle Fusion Procedure



## Prepare Heater

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

Refer to the "Maintenance" section of this manual for instructions on how to adjust heater temperature.

Check heater surface temperature with a pyrometer.

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

**IMPORTANT:** The dial thermometer on the heater indicates internal temperature which varies from the actual surface temperature.

The dial thermometer can be used as reference once the surface temperature has been verified and is never a substitute for actual surface temperature.



PH00417-11-1-94

TX04011-4-12-10

## Inserting 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.

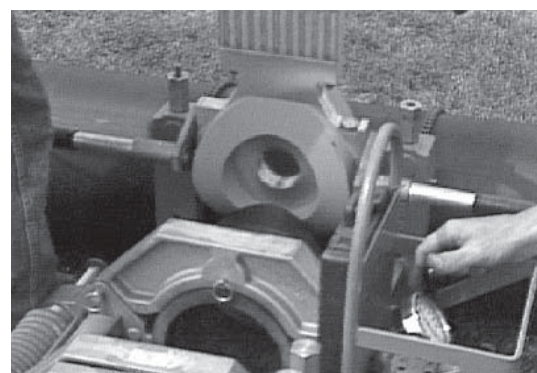
If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion.

Use a clean dry non-synthetic cloth to clean the saddle fusion heater adapter surfaces.

Verify heater temperature by noting the reading on the dial thermometer.

Place the heater between the fitting and the main. Place the Flexible Heat Shield between the heater and the fitting base.

**IMPORTANT:** A heat shield may not be required for fittings 3" and smaller.



PH00389-921-94

TX04267-09-22-16



# Saddle Fusion Procedure



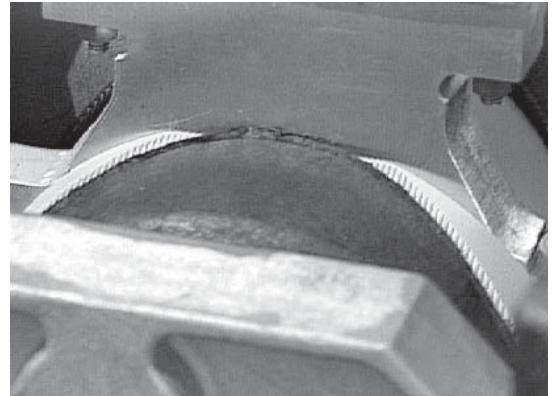
## Heat Pipe and Fitting

Move selector valve to the bottom position.

Move the fitting against the Flexible Heat Shield under bead-up pressure, and observe melt bead formation on the main all around the heater faces. When a melt bead is first visible on the main all around the heating tool faces, in a quick continuous motion, open the carriage slightly and remove the Flexible Heat Shield.

Move the fitting against the heater face and start the heat time. When a melt bead is first visible all around the fitting base (usually about 3 to 5 seconds) immediately move the selector valve to the middle position to reduce pressure to the heat soak pressure (usually drag). Wait for the pressure to drop to drag pressure then shift the control valve to neutral. Maintain the heat soak pressure according to the pipe fitting manufacturer's recommendations or appropriate joining standard.

TX04042-4-12-10-



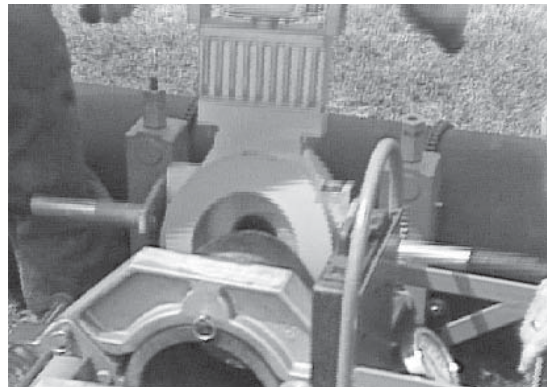
PH004029-21-94

## Remove Heater

Shift the carriage control valve to neutral and move the selector valve to the top position. Open the carriage just enough to remove the heater.

Remove the heater.

Quickly check for a complete and even melt pattern on the pipe and fitting.



PH004049-21-94

TX04029-4-12-10

## Fuse Fitting to Pipe

Quickly close the carriage bringing the fitting and main together under the pipe manufacturer's recommended pressure or appropriate joining standard.



PH004039-21-94

TX04030-4-12-10

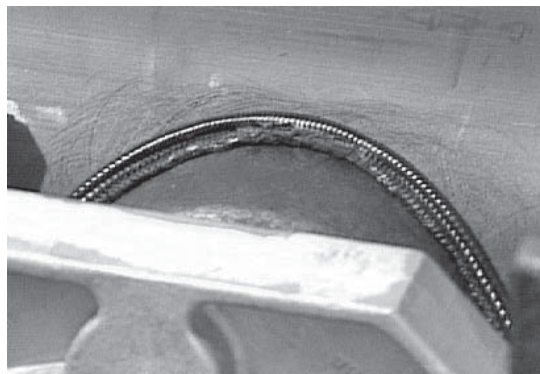


# Saddle Fusion Procedure



## Allow Joint to Cool

Allow the joint to cool under pressure as specified by the pipe manufacturer's recommendation or appropriate joining standard. To maintain fusion pressure during cooling, the carriage control valve must be in the position toward the fusion.



PH00405-921-94

TX00467-09-22-16



# Lifting



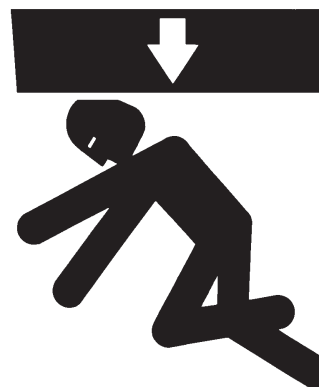
## Lifting Safety

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

### **⚠ WARNING**

#### **Safety warnings:**

1. Do not exceed rated load or lift loads greater than the rated load of the lifting device.
2. Do not operate a damaged or malfunctioning lifting device.
3. Do not lift persons.
4. Do not lift a suspended load over persons.
5. Do not leave a suspended load unattended.
6. Do not remove or obscure warning labels.
7. Read and understand the lifting device operator's manual before use.
8. Stay clear of the suspended load.
9. Lift loads only as high as necessary.
10. Do not alter or modify the lifting device.
11. Employ generally accepted safe lifting practices.
12. Do not shock or impact load the lifting device.
13. Inspect all lifting pins for damage.



SAFETy 12.14.92

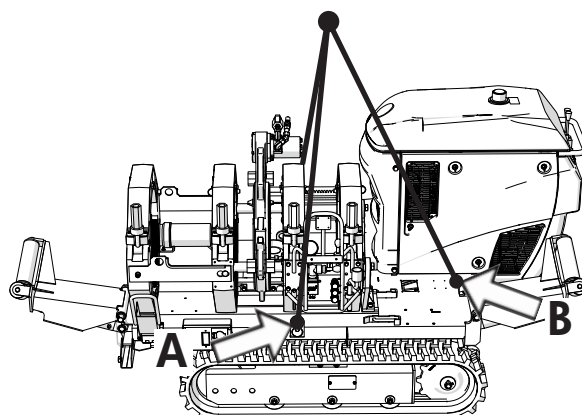
WR00014-3-8-93



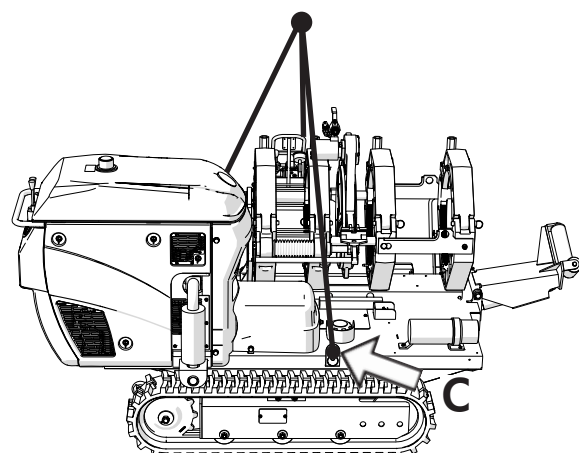
## Lift Fusion Machine

The sling has equal length cables, attach the sling to the three lifting points. The cable attached at position (A) will run between the moveable jaws of the carriage. Move the carriage so that the cable does not come into contact with the jaws when lifting.

Lift fusion machine.



CD01833-09-20-16



CD01834-09-20-16

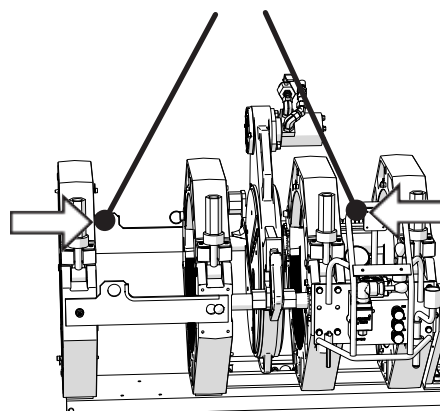
TX02331-10-25-04

## Lift 4-Jaw or 3-Jaw Carriage

### 4-Jaw Carriage

Attach lifting sling to the manifold bracket and the far side lift point on the fixed jaw brace.

Lift carriage assembly.

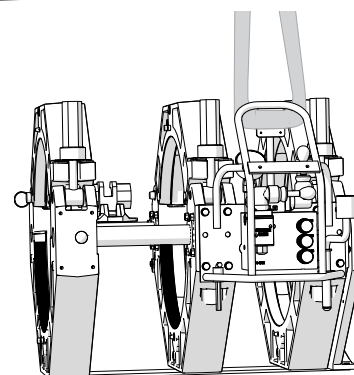


CD01816-09-20-16

### 3-Jaw Carriage

Attach lifting strap to the manifold bracket.

Lift carriage assembly.



CD01822-09-15-16

TX05177-09-22-16





# Maintenance



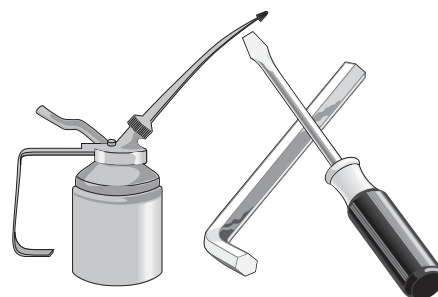
## Preventative Maintenance

To insure 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.

TX00428-8-10-95



CD00142-11-2-94

## Washing the Machine

Cover plugs and electrical control boxes before washing.

The machine should be cleaned, as needed with a soap and water wash.

Do not pressure wash.

TX00429-03-31-16



CD00178-5-3-96

## Check Hydraulic Fluid

The hydraulic fluid level should be checked daily.

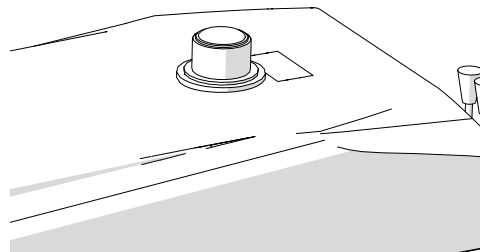
Refer to the "Hydraulic Fluids" section of this manual for hydraulic fluid recommendations.

If fluid is not visible in the reservoir strainer, fill reservoir until fluid is visible in the strainer. Do not overfill reservoir as the fluid will expand as it heats up.

Never allow dirt, water or other foreign matter to enter the tank.

Use only clean fluid from an unopened container.

TX02332-02-27-14



CD01792-08-17-16

## Change Hydraulic Fluid and Filter

The hydraulic fluid and filter (A) should be replaced after every 400 hours of operation.

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

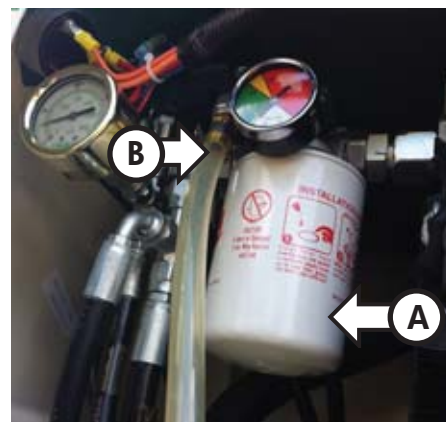
The level contains three numbers. The first represents the number of particles equal to or larger than 4µm per milliliter of fluid. The second represents the number of particles equal to or larger than 6µm per milliliter of fluid. The third represents the number of particles equal to or larger than 14µm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

Fluid should also be changed as extreme weather conditions dictate.

To drain tank, remove the cowl and place the drain tube into a container and open drain valve (B).

Refer to the "Hydraulic Fluids" section of this manual for hydraulic fluid recommendations.

TX05188-09-29-16

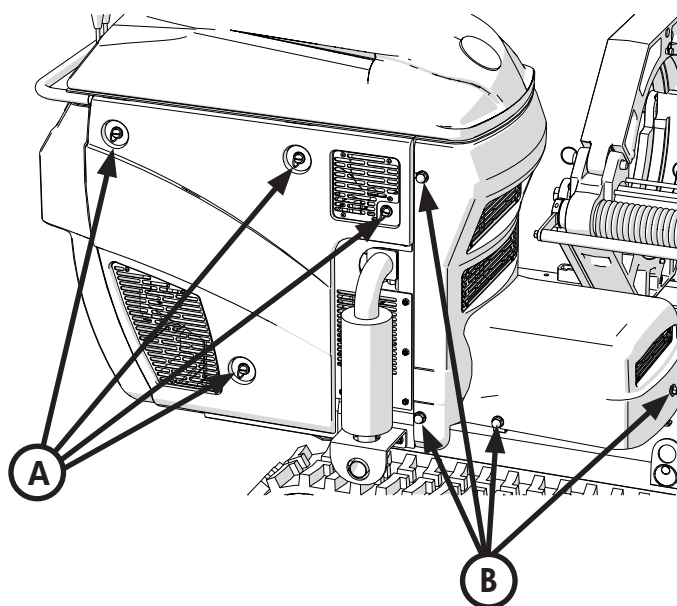


PH0564209-21-1-6

## Remove Cowlings

### To Remove Side Cowlings:

Flip up the ring on the fasteners (A) and turn them 90° to release. Remove the cowling.



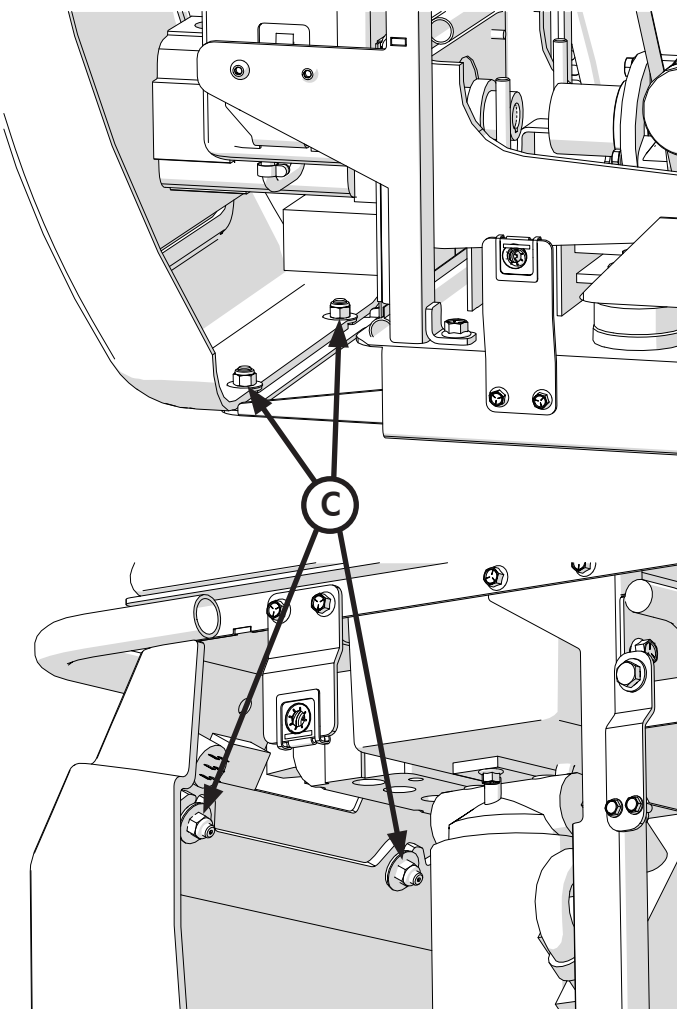
CD01836-09-20-16

### To Remove Front Cowlings:

Loosen and remove the nuts (B) that attach the cowling to the machine. Remove the cowling.

### To Remove Back Cowling:

Loosen the nuts (C) and slide the bottom of the cowling out and then slide the cowling down out of the machine.



CD01837-09-20-16

CD01838-09-20-16



# Maintenance



## Adjusting System Pressure

Remove the left side cowlings to gain access to the hydraulic pump.

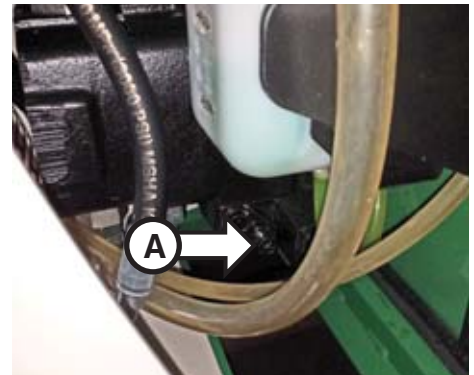
Start the engine and select high speed.

The system pressure is 2000 psi. Use the system pressure gauge (B) next to the hydraulic filter to set the system pressure.

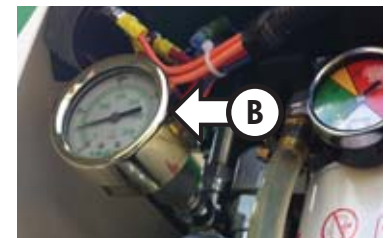
To adjust the pressure, loosen the jam nut and turn the compensator (A) to the right to increase the pressure, or to the left to decrease pressure. Retighten the jam nut.

**NOTICE:** Do not adjust screw on opposite side of pump.

**CAUTION** This machine has moving parts when the machine is in operation. Use caution when making pressure adjustments while the machine is running and avoid the moving parts. Failure to do so could result in minor or moderate injury.



PH05644-09-26-16



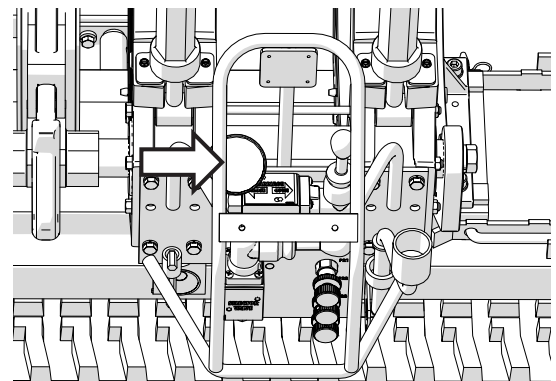
PH05642-09-21-16

TX05179-09-22-16

## Check Gauge

The gauge should read zero when the unit is not running.

Damaged gauges should be replaced.



CD01839-09-21-16

TX02291-3-8-04

## Bleeding Air From Hydraulic System

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. To bleed the system, proceed as follows:

The bleed plugs are on the cylinder glands.

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

Shift the directional control and move the carriage to the fixed jaw end.

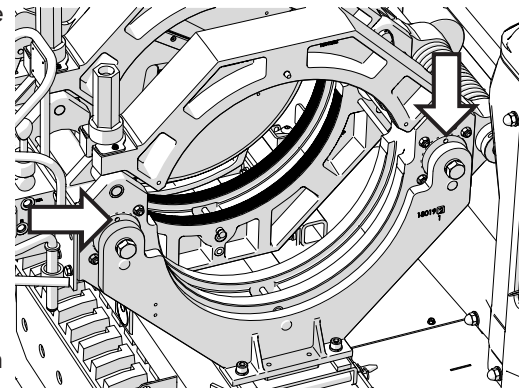
Adjust the pressure to approximately 50-100 psi before proceeding.

Loosen the bleed plug on one cylinder next to the fixed jaw.

Hold pressure on the cylinder until no air is indicated and quickly tighten the plug.

Repeat this operation on the opposite cylinder.

Tilt the machine so the opposite end is higher than the fixed jaw end. Move the carriage to the end opposite the fixed jaw and repeat the above procedure on the this end of the cylinders.



CD01840-09-21-16

TX05180-09-22-16



# Maintenance



## Engine Oil System

Change engine oil and filter after the first 50 hours of operation. After the first oil change, change the oil every 100 hrs and the filter every 200 hours of operation. Read the engine maintenance instructions and use the appropriate oil for the ambient temperature.

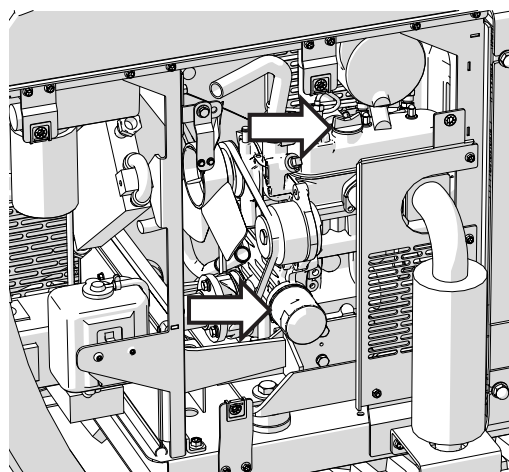
If using high sulfur fuel (>5000 ppm), consult engine manual for reduced maintenance intervals and appropriate oil.

The oil filter is located behind the right side cowling. The dipstick is on the opposite side of the engine.

The oil drain plug is located on the bottom of the oil pan.

The oil filler cap is located on top of the engine.

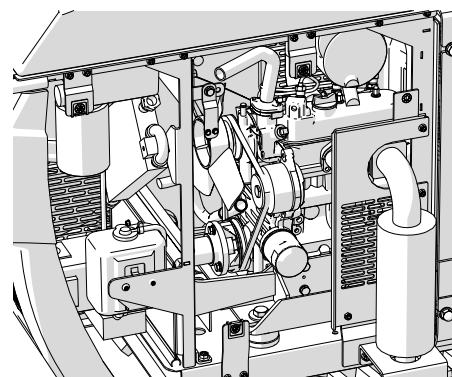
TX05181-09-28-16



## Engine Maintenance

Refer to the operation and maintenance manual for the engine for all recommended maintenance, including air filter and fuel filter service intervals.

TX02337-10-25-04



## Setting Engine Speed

With the engine running at max speed plug the heater in. Put a voltmeter in the unused receptacle.

Adjust throttle cable sheath until voltage is correct.

The voltmeter should read  $120V \pm 5$  in the 120V receptacle and  $240V \pm 5$  in the 240V receptacle.

TX05182-09-22-16







# Maintenance

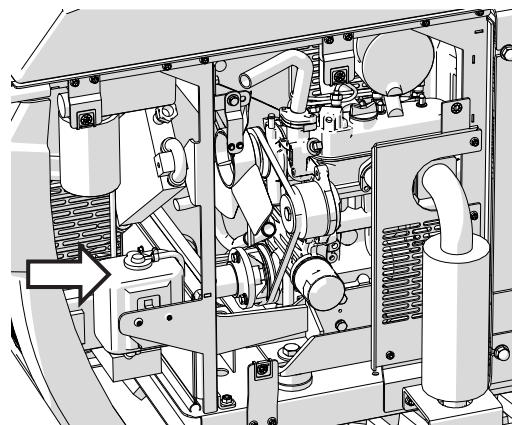


## Check/Add Antifreeze

Add antifreeze in a 50/50 mix with water as needed.

Replace antifreeze mixture once each year or as recommended in engine manual.

TX05183-09-22-16



## Facer Blades

Ensure the machine is off.

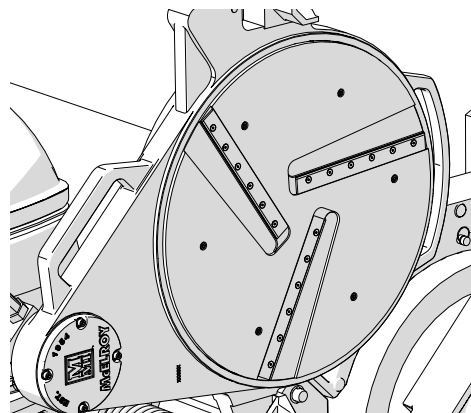


**WARNING** Facer blades are sharp and can cut. Never attempt to remove shavings while the facer is running, or is in the facing position between the jaws. Use care when operating the facer, and when handling the unit.

Facer blades bolt directly to the blade holders and should be inspected for damage and sharpness. Dull or chipped blades must be replaced.

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

TX04939-04-18-16



## Clean Heater Surfaces



**CAUTION** The heater is hot and will burn clothing and skin. Keep the heater in its insulated heater stand or frame when not in use, and use care when heating the pipe.

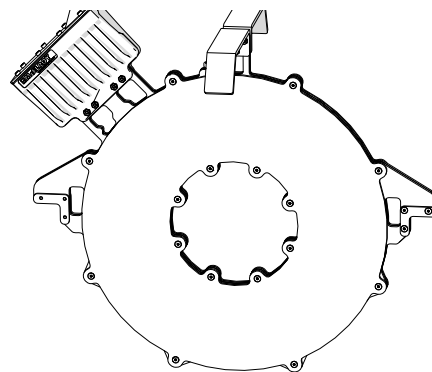
The butt fusion heater plate faces must be kept clean and free of any plastic build up or contamination. Plastic build up is best removed when the heater surfaces are at fusion temperature using a clean dry non-synthetic cloth. Synthetic cloths may melt to the heater surfaces under fusion temperature.

The surface of the butt fusion heater plates are coated with an antistick coating.

Before each fusion joint the heater surfaces must be wiped with a dry clean non-synthetic cloth.

**NOTICE:** Do not use any abrasive materials to clean heater surfaces. Use only a non-synthetic cloth that won't damage heater surfaces.

TX00440-04-18-16







# Maintenance



## Installing Butt Fusion Heater Plates

Install butt fusion heater plates while the heater is cool.

**CAUTION** The heater is hot and will burn clothing and skin. Keep the heater in its insulated heater stand or frame when not in use, and use care when heating the pipe.

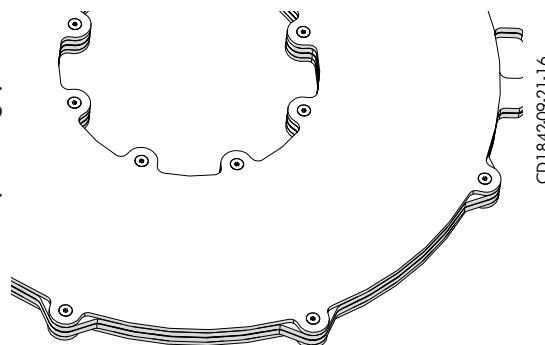
Butt fusion heater plates are installed with stainless steel cap screws. Always use high temperature anti-seize compound on mounting screw threads for easier removal later.

The butt plates are coated on one side with an antistick coating. Install the butt plates with the non-coated side against the heater body.

Carefully ensure that the butt fusion heater plates are seated completely on the heater body, and that there is no foreign matter trapped between the butt plates and heater body.

**IMPORTANT:** Do not over tighten the bolts.

TX02716-04-18-16



CD184209-21-16

## Track Tension

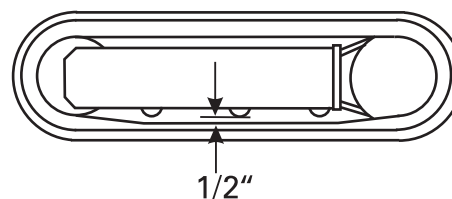
Park the machine on a flat solid surface.

Use the lifting sling to raise machine off the ground.

Place adequate supports under the bottom frame after lifting.

Measure the deflection between the bottom center roller and the inside surface of the rubber track. Track tension is normal when this distance is about 1/2". If the deflection is more or less than this, the tension needs to be adjusted.

TX01885-09-22-16



CD00463-22-25-98

## Adjusting Track Tension

**WARNING** The grease in the hydraulics of the track is pressurized. If the grease valve is loosened too much, grease can be expelled at high pressure and cause serious injury. Never loosen grease valve more than one turn. Injury could also result if the grease nipple is loosened. Never loosen the grease nipple.

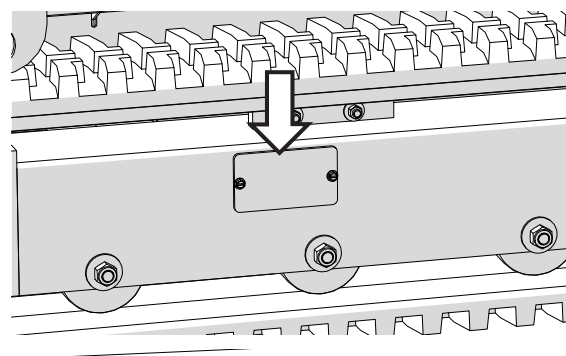
Remove screws and cover to access the adjustment system.

To loosen the track, turn hex shaped valve (A) counterclockwise no more than 1 turn. If grease does not start to drain out, then slowly rotate the track. When correct track tension is obtained, turn valve clockwise and tighten it. Clean off any expelled grease.

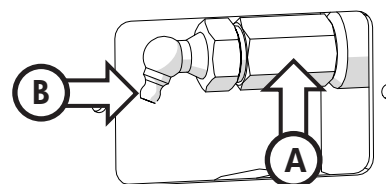
To tighten the track, connect a grease gun to the nipple (B) and add grease to the system. When the track stretches to the correct tension, stop adding grease. Clean off any excess grease.

Replace access cover.

TX01898-11-15-00



PH01283-22-25-98



PH01979-11-15-00



# Maintenance



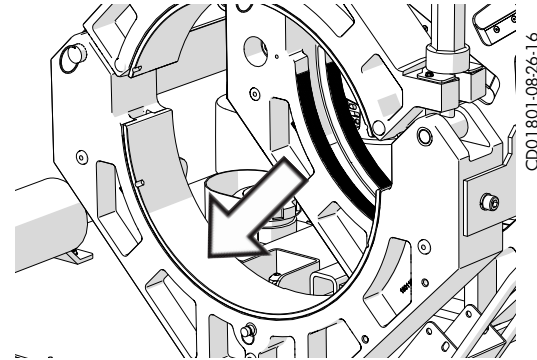
## Clean Jaws and Inserts

Ensure the machine is off and disconnected from power source.

To prevent slippage and insure 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.

TX00433-04-18-16

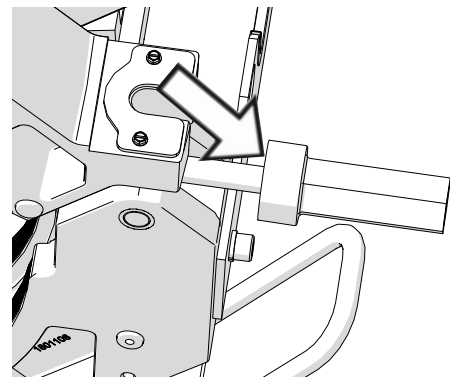


## Clean Thrust Bearings

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.

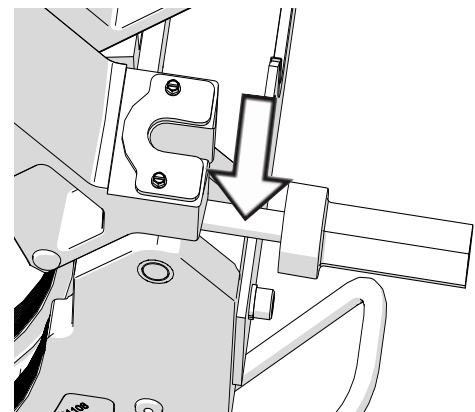
TX00434-9-13-94



## Clean Eyebolt Threads

Keep the clamp knob eyebolt threads brushed clean.

TX00435-9-13-94

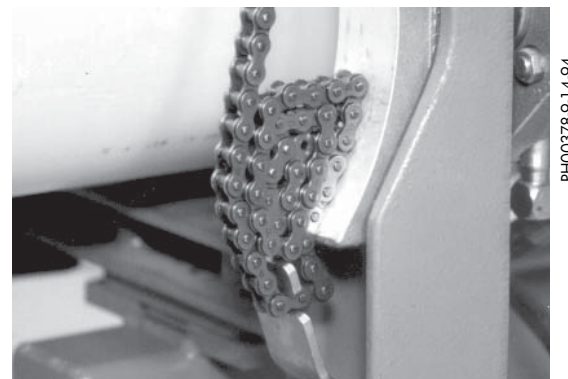


## Clean the Clamping Chains

On the combination unit clean the side fusion chains as needed.

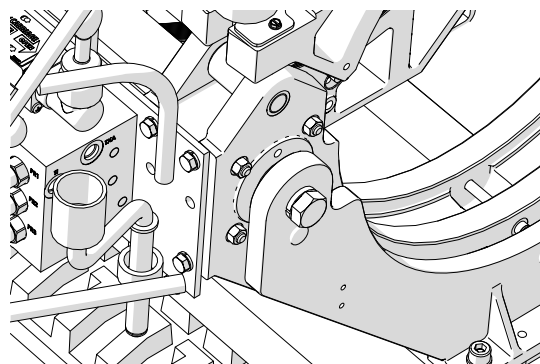
Clean using a stiff-bristled brush and oil generously. Wipe away any excess oil.

TX00436-9-13-94



## Fasteners Must Be Tight

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



CD01846-09-21-16

TX00437-9-13-94

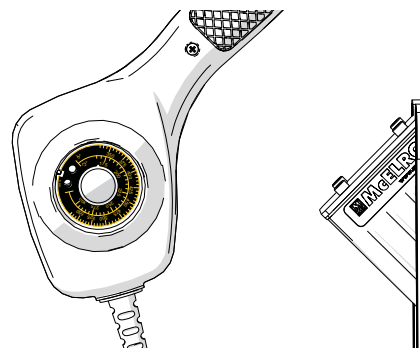
## Adjusting Heater Temperature

Turn knob to desired temperature. Measure the heater surface temperature with a pyrometer. Any variance must be corrected to the pyrometer reading.

Loosen setscrew in the knob. Turn knob to point to the same temperature as the pyrometer. Tighten setscrew in the knob.

Turn knob to desired temperature. Allow heater to stabilize at the new temperature (5 to 10 minutes) after adjusting.

The thermometer on the heater body indicates internal temperature and should be used as a reference only.



CD01797-08-17-16

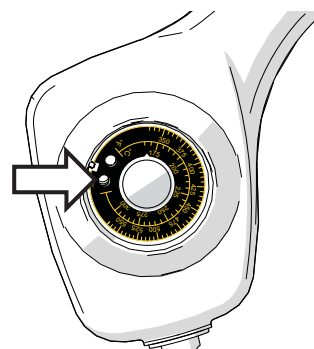
TX02034-7-08-02

## Heater Indicator Light

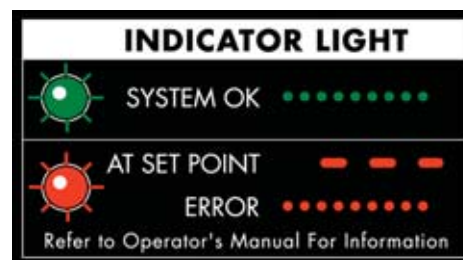
The heater has a green indicator light which will flash on and off. This indicates that the controller is operating normally. If the green indicator is not flashing then the controller may not be operating properly. If this occurs, disconnect power and have the heater repaired by an McElroy Authorized Service Center.

The heater has a red indicator light on the handle at the bottom of the temperature scale. When the heater is plugged in and preheating the red light glows steadily until the set temperature is reached. The red light then goes off and on as the heater maintains temperature.

If the heater is not operating properly, the control will attempt to turn the heater off and the red indicator light will flash rapidly. If this occurs, disconnect the power and take it to a McElroy Authorized Service Center for repair.



CD01797-08-17-16



PH02571-09-16-03

TX04036-4-12-10



## Battery Replacement and Charging

Remove the vehicle deck cover.

The battery for the vehicle is under the cover below the deck of the vehicle.

Disconnect the battery by removing the negative (black) cable first and then remove the positive (red) cable.

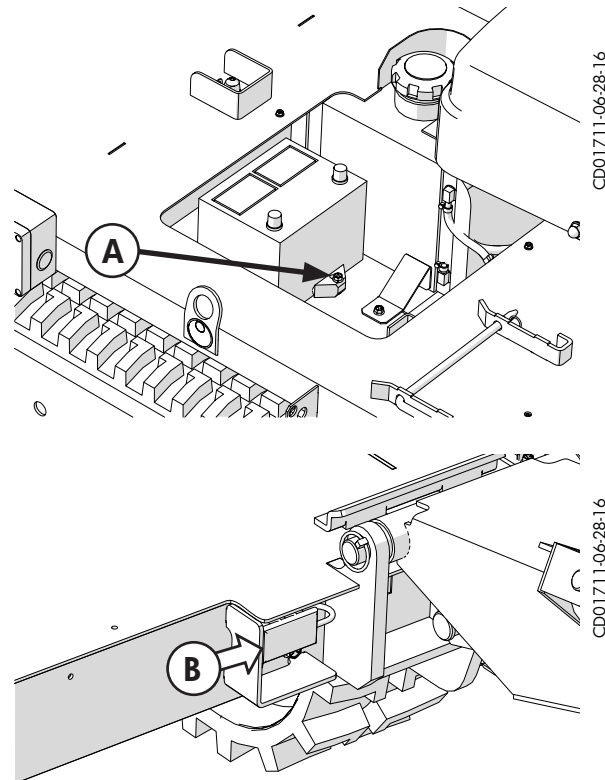
To remove the battery, remove the bolt (A) and remove the battery holders.

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

- Group Size: 70 battery
- Cold cranking amperes at 0°F (-18°C): 525 (CCA)
- Cranking amperes at 32°F: 630 (CA)

### Battery Charging Connection

The battery can be charged through a remote battery connector (B) mounted on the front of the vehicle. Ensure the connector has its dust cover on when not in use.



TX05184-09-22-16



# Maintenance Checklist



## Fusion Machine Checklist

Items to Check	OK
<b>UNIT</b>	
Machine is clean	
All pins and snaprings are in place	
All nuts and bolts are tight	
All identification placards and handles are in place	
All safety labels and decals are in place.	
All clamp knobs are lubricated and turn freely	
Wiring, battery cables, & all electrical terminals	
Cords and plugs are in good condition	
Hydraulic oil level is correct	
No oil or water leaks (engine and hydraulic system)	
Hydraulic gauge reads correctly	
Rubber tracks in good condition	
Fuel tank full	
Engine crankcase is filled to correct level	
Cooling system level is correct	
Hydraulic hoses are in good condition	
Engine starts and runs properly	
Jaws are properly aligned	
Facer pivot operates properly	
Facer operates smoothly	
Face-off is square	
Inserts fit and pin properly	
Voltage to heater is correct	
Carriage and selector valves operate smoothly	
Pressure reducing valves operate in their range	
Heater cord and plug are in good condition	
Heater surface is clean and in good condition	
Thermometer is in good working order	
Surface temperature checked with pyrometer	
Throttle control works properly	
Low Oil /alarm works	
Primary pump pressure 2000 psi	
Hydraulic carriage works smoothly	
Check receptacles for damage	

TX05185-09-22-16



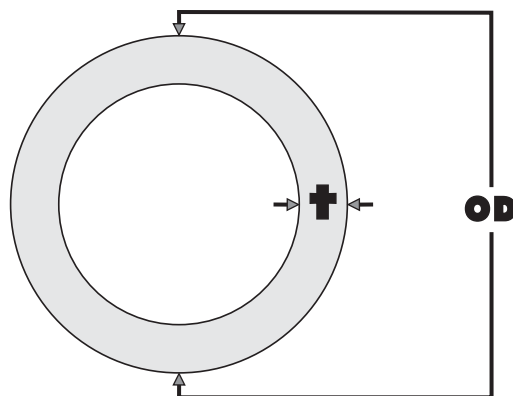


# Determining Fusion Pressure



## Variable Definitions

- O.D. = Outside Diameter of Pipe (inch)  
 t = Wall Thickness of Pipe (inch)  
 $\Pi$  = 3.14  
 SDR = Standard Dimensional Ratio of Pipe (unitless)  
 IFP = Interfacial Pressure of Pipe (PSI)  
 TEPA = Total Effective Piston Area of Carriage Cylinders (inch<sup>2</sup>)



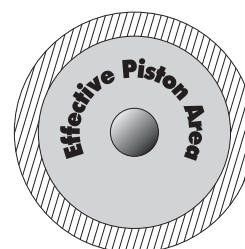
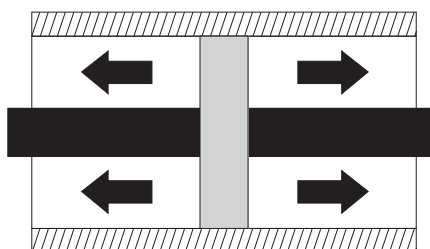
## Formulas

$$t = \frac{\text{O.D.}}{\text{SDR}}$$

$$\text{PIPE AREA} = (\text{O.D.} - t) \times t \times \Pi$$

$$\text{FUSION FORCE} = \text{AREA} \times \text{IFP}$$

$$\text{GAUGE PRESSURE} = \frac{\text{FUSION FORCE}}{\text{TEPA}} + \text{DRAG}$$



## Example

Pipe Size = 8" IPS, SDR 11

O.D. = 8.625 inch

DRAG = as measured in PSI (for this example use 30 PSI)

Recommended IFP = 75 PSI

Using a Model 28 High Force Fusion Unit

$$t = \frac{\text{O.D.}}{\text{SDR}} = \frac{8.625}{11} = 0.784$$

TEPA = 4.71 (From Table)

$$\text{GAUGE PRESSURE} = \frac{(\text{O.D.} - t) \times t \times \Pi \times \text{IFP}}{\text{TEPA}} + \text{DRAG}$$

$$\text{GAUGE PRESSURE} = \frac{(8.625 - .784) \times .784 \times 3.14 \times 75}{4.71} + 30 \text{ PSI} = 338 \text{ PSI}$$

Total Effective Piston Areas (in<sup>2</sup>)

Fusion Model	High Force	Medium	Low Force
A160/A250	-	-	0.895
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	-	-



# Determining Fusion Pressure - Sidewall



## Variable Definitions

- O.D. = Outside Diameter of Base (not branch)  
 t = Wall Thickness  
 $\Pi$  = 3.1416  
 SDR = Standard Dimensional Ratio  
 IFP = Manufacturer's Recommended Interfacial Pressure  
 TEPA = Total Effective Piston Area

## Formulas

$$t = \frac{\text{O.D.}}{\text{SDR}}$$

$$\text{AREA} = (\text{O.D.} - t) \times t \times \Pi$$

$$\text{FORCE} = \text{AREA} \times \text{IFP}$$

$$\text{IFP} = \begin{cases} 60 \text{ PSI for Bead-up} \\ 0 \text{ PSI for Heat/Soak} \\ 30 \text{ PSI for Saddle Fusion} \end{cases}$$

## ROUND BASE

$$\frac{(\text{O.D.} - t) \times t \times \Pi \times \text{IFP}}{\text{TEPA}}$$

## RECTANGULAR BASE

$$\frac{[L \times W - (d \times d \times 0.7854)] \times \text{IFP}}{\text{TEPA}}$$

## Example

O.D. of Base = 7.36"

t = 1.10"

DRAG = as measured in PSI (30 PSI for this example)

30 PSI for Saddle Fusion (must calculate for other IFP's also).

Using 28 Combination Unit and calculating the fusion pressure

$$\frac{(\text{O.D.} - t) \times t \times \Pi \times \text{IFP}}{\text{TEPA}} + \text{DRAG}$$

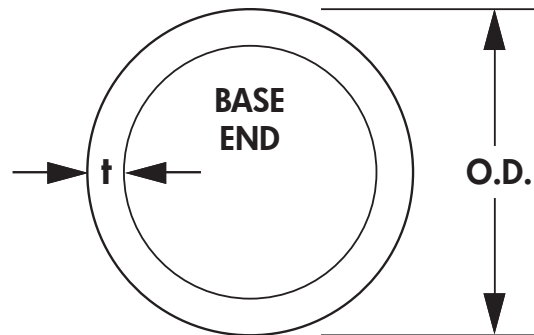
$$\frac{(7.36 - 1.10) \times 1.10 \times 3.14 \times 30}{4.71} + 30 \text{ PSI}$$

$$\frac{648.66}{4.71} + 30 \text{ PSI} = \mathbf{168 \text{ PSI Fusion Pressure}}$$

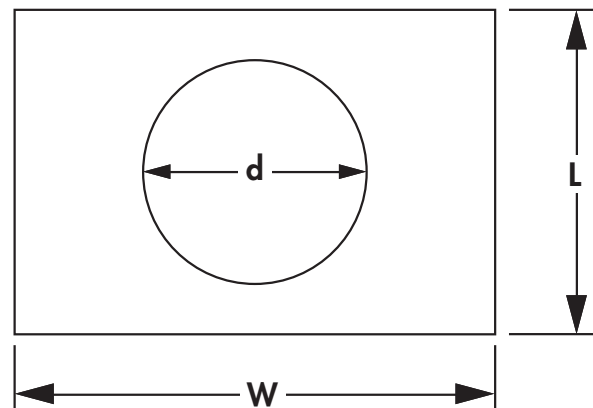
Using the same formula substitute the IFP with the IFP appropriate for the process and recalculate for each

Heat Soak Pressure for this example = **30 PSI**

Bead-up Pressure for this example = **306 PSI**



ROUND BASE



RECTANGULAR BASE

## Total Effective Piston Areas

Fusion Model	High Force (Standard)	Medium Force (High Velocity)	Low Force Extra High Velocity
Sidewinder	1.00		
28 CU	4.71	-	1.66
28 EP Sidewall	-	-	1.66
18 Sidewall	11.80	-	-
36 Sidewall	11.00	-	-



# 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. Mobil Univis N46 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 24°F.

TX03082-04-18-16

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



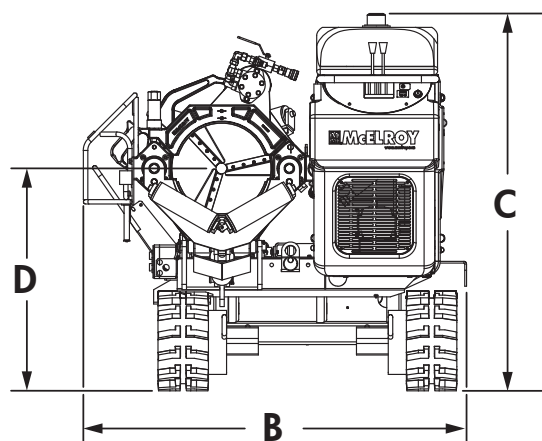
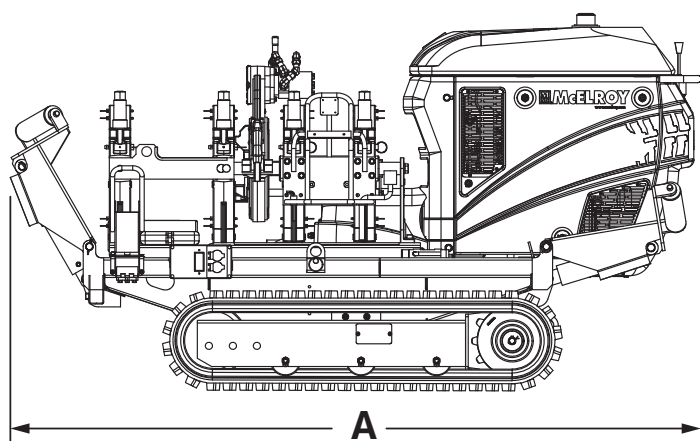
## TracStar® 28, 250, 412, 618 Series 2 Fusion Machine Specifications:

- Engine: 20 HP Liquid cooled
- Starting System: Electric
- Fuel Type: Diesel
- Fuel Tank Capacity: 5 Gals.
- Operational Tank Capacity: 8 Hrs.
- System Pressure: 2000 PSI
- Hydraulic Reservoir Capacity: 8 Gals
- Vehicle Speed: 1.5 MPH
- AC Output: 120 & 240V, 60Hz, 15 Amp

Machine Model	Dimensions				Weight Entire Machine*
	A	B	C	D	
<b>28</b>	97" (2464mm)	53" (1346mm)	53" (1346mm)	28" (711mm)	1930 lbs. (875 Kg)
<b>250</b>	97" (2464mm)	53" (1346mm)	53" (1346mm)	29" (737mm)	1910 lbs. (866 Kg)
<b>412</b>	97" (2464mm)	54" (1372mm)	53" (1346mm)	31" (787mm)	2110 lbs. (957 Kg)
<b>618</b>	97" (2464mm)	56" (1422mm)	53" (1346mm)	34" (864mm)	2290 lbs. (1039 Kg)

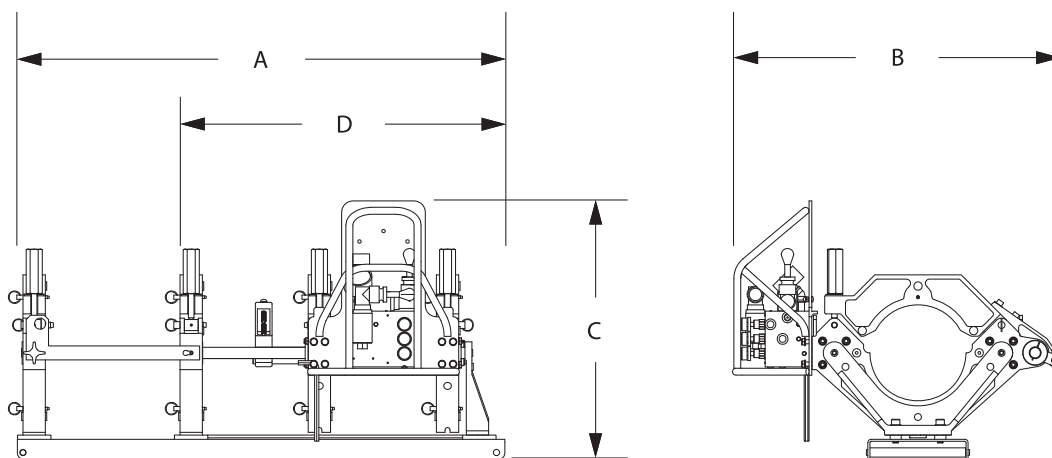
\*Entire machine weight includes heater and facer

TracStar vehicle weight: 1620 lbs. (735 Kg)





# Specifications



CD00662:3-8-04

Pit Bull model	Minimum Pipe Size	Maximum Pipe Size	Weights lbs (kg)			Heater Power Watts	Dimensions in (mm)			
			Carriage	Facer	Heater/ with Bag		A	B	C	D
28	2" IPS (63mm)	8" DIPS (225 mm)	221 (100)	44 (19.9)	21/42 (9.5/19)	1750	44 (1118)	30 (762)	23 (584)	30 (762)
250	2" IPS (63mm)	250mm	203 (100)	44 (19.9)	21/42 (9.5/19)	3000	44 (1118)	30 (762)	23 (584)	30 (762)
412	4" IPS (110mm)	12" DIPS (340mm)	380 (172)	62 (28.1)	24/44 (10.9/19.9)	3000	44 (1118)	30 (762)	27 (686)	29 (737)
618	6" IPS (180mm)	18" OD (450mm)	511 (232)	94 (42.6)	34/58 (15.4/26)	3000	44 (1118)	43 (1092)	33 (838)	29 (737)

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## About this manual . . .

McElroy Manufacturing continually strives to give customers the best quality products available. This manual is printed with materials made for durable applications and harsh environments.

This manual is waterproof, tear resistant, grease resistant, abrasion resistant and the bonding quality of the printing ensures a readable, durable product.

The material does not contain any cellulose based materials and does not contribute to the harvesting of our forests, or ozone-depleting constituents. This manual can be safely disposed of in a landfill and will not leach into ground water.

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