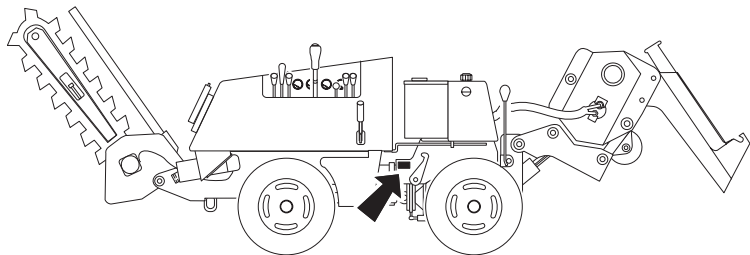


SUPPORT

SERIAL NUMBER

Record the serial number and date of purchase in spaces provided. Serial number is located on rear section near articulation joint.



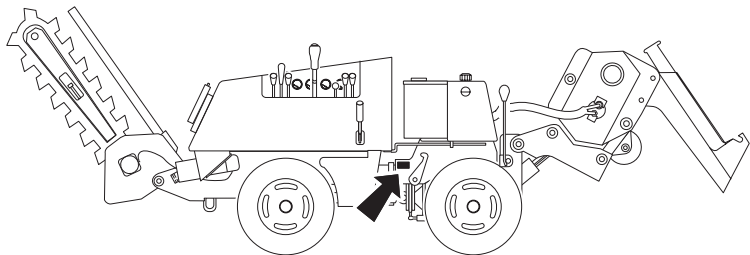
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Date of manufacture:	
Date of purchase:	
Serial number:	
Engine serial number:	
Trenching attachment serial number	

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Record the serial number and date of purchase in spaces provided. Serial number is located on rear section near articulation joint.



t02om035h.eps

Date of manufacture:	
Date of purchase:	
Serial number:	
Engine serial number:	
Trenching attachment serial number	

SUPPORT PROCEDURE

Notify your dealer immediately of any malfunction or failure of Ditch Witch equipment.

Always give model, serial number, and approximate date of equipment purchase. This information should be recorded and placed on file by owner at time of purchase.

Return damaged parts to dealer for inspection and warranty consideration.

Order genuine Ditch Witch replacement or repair parts from your authorized Ditch Witch dealer. Use of another manufacturer's parts may void warranty.

RESOURCES

Publications

Contact your Ditch Witch dealer for publications and videos covering safety, operation, service, and repair of your equipment.

Ditch Witch Training

For information about on-site, individualized training, contact your Ditch Witch dealer.

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FOREWORD

This manual is an important part of your equipment. It provides safety information and operation instructions to help you use and maintain your Ditch Witch equipment.

Read this manual before using your equipment. Keep it with the equipment at all times for future reference. If you sell your equipment, be sure to give this manual to the new owner.

If you need a replacement copy, contact your Ditch Witch dealer. If you need assistance in locating a dealer, visit our website at **www.ditchwitch.com** or write to the following address:

The Charles Machine Works, Inc.
Attn: Marketing Department
PO Box 66
Perry, OK 73077-0066
USA

The descriptions and specifications in this manual are subject to change. The Charles Machine Works, Inc. reserves the right to improve equipment. Some product improvements may have taken place after this manual was published. For the latest information on Ditch Witch equipment, see your Ditch Witch dealer.

Thank you for buying and using Ditch Witch equipment.

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**Operator's Manual
410sx**

Issue No. 3.0/OP-4/05
Part Number 054-498

Copyright 2002, 2005
by The Charles Machine Works, Inc.,
Perry, Oklahoma



, Ditch Witch, CMW, AutoCrowd, Modularmatic, Jet Trac, Roto Witch, Subsite, Fluid Miser, Perma-Soil, Power Pipe, Super Witch, Super Witch II, Pierce Airrow, The Underground, and The Underground Authority Worldwide are registered trademarks of The Charles Machine Works, Inc.

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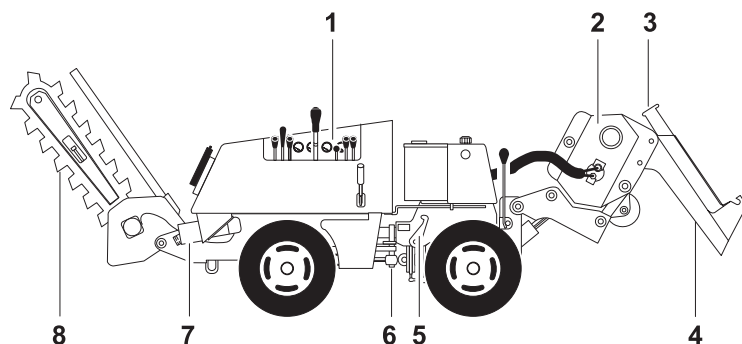
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OVERVIEW

The 410sx is an articulating, hydrostatic, four wheel drive, pedestrian vibratory plow designed to bury cable or pipe in a variety of soils. An optional trenching attachment, drilling attachment, and reel carrier are available. The 410sx is powered by a liquid-cooled 31.4 hp (23.4 kW) three-cylinder Caterpillar diesel engine.



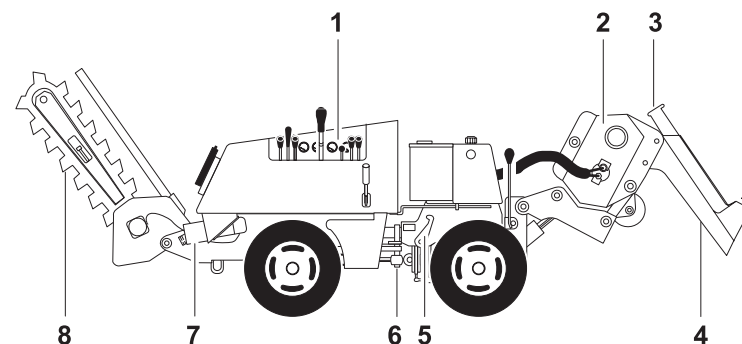
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- | | |
|--------------------|------------------------|
| 1. Control console | 5. Frame lock |
| 2. Vibrator | 6. Articulation joint |
| 3. Feed tube | 7. Drilling attachment |
| 4. Plow blade | 8. Trencher attachment |

For the purposes of this manual, we define “tractor” as a self-propelled wheeled machine, having rear and/or front-mounted equipment, primarily designed to produce a trench in a continuous operation, through motion of the machine; the attachment can be a digging chain, wheel, plow, blade, or similar item.

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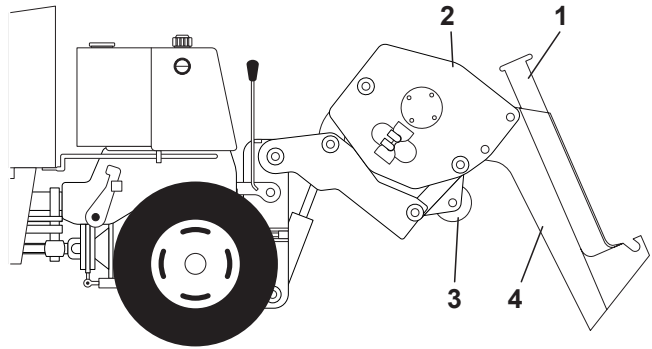


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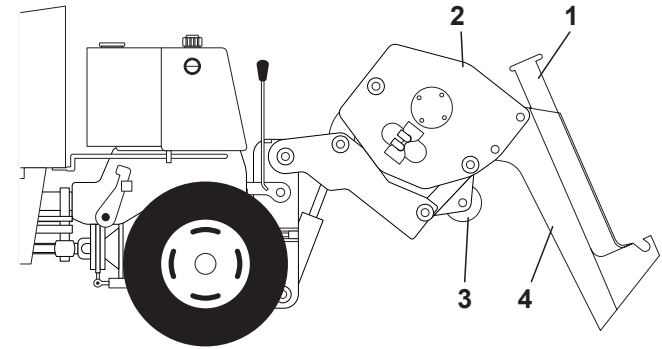
Plow



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1. Feed tube
2. Vibrator
3. Sod cutter
4. Plow blade

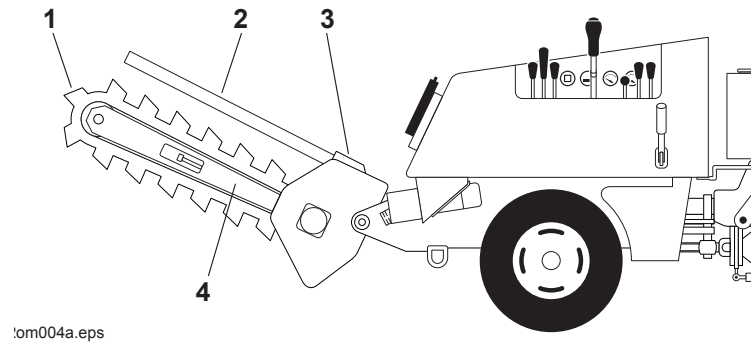
Plow



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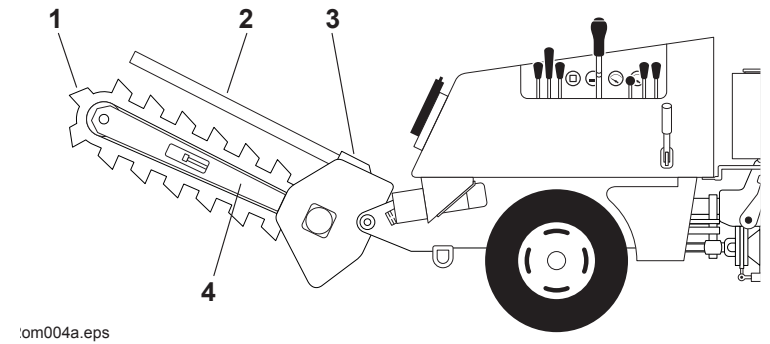
1. Feed tube
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3. Sod cutter
4. Plow blade

Trenching Attachment



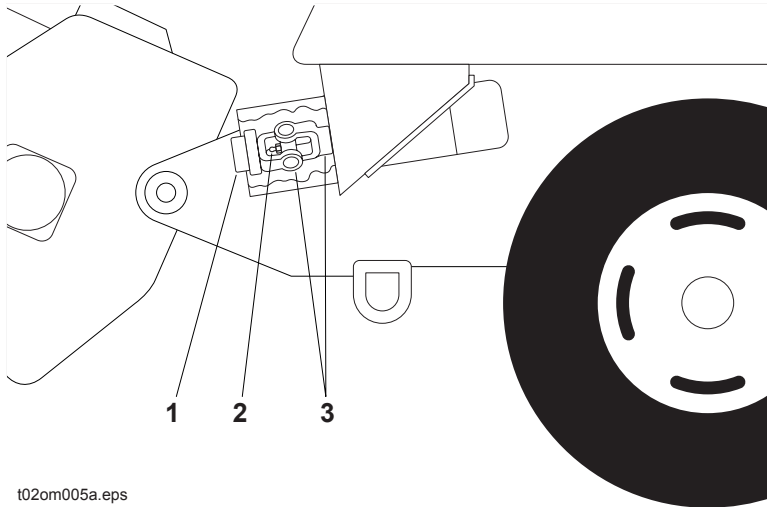
1. Digging chain
2. Restraint bar
3. Serial number
4. Boom

Trenching Attachment



1. Digging chain
2. Restraint bar
3. Serial number
4. Boom

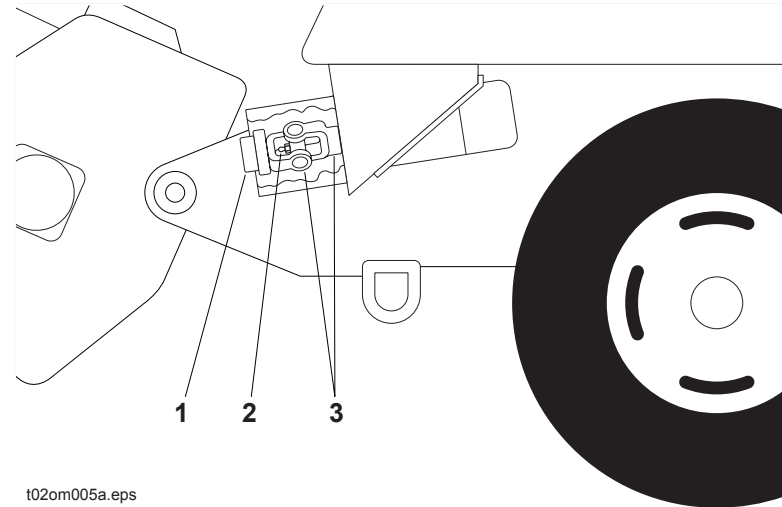
Drilling Attachment



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1. Coupler
2. Zerk
3. U-joint

Drilling Attachment

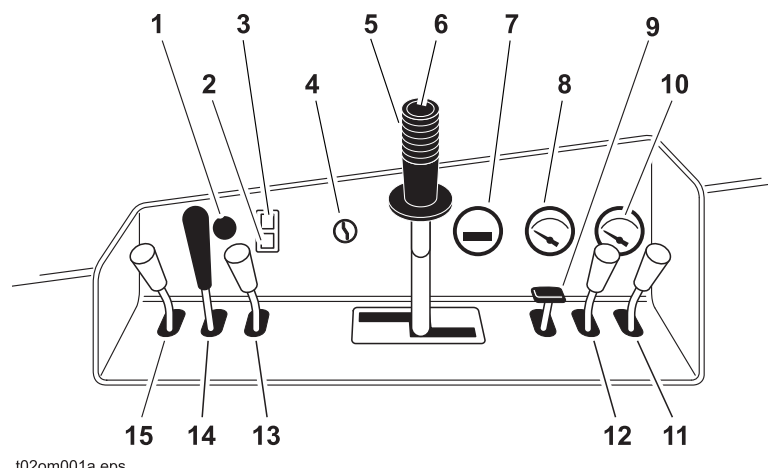


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1. Coupler
2. Zerk
3. U-joint

CONTROLS

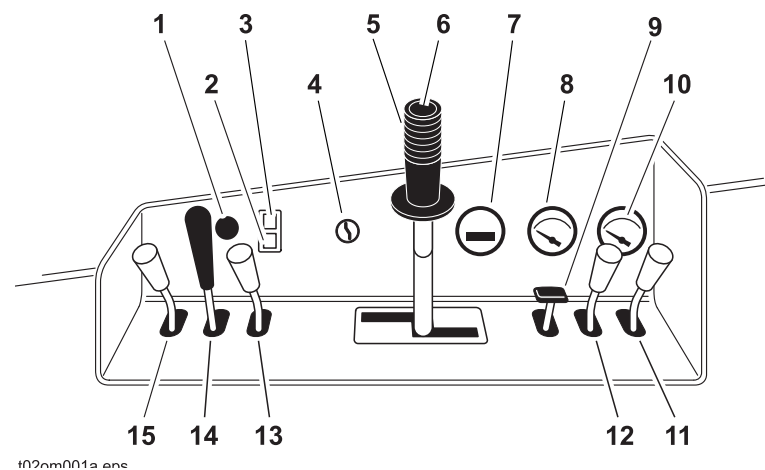
CONTROL CONSOLE OVERVIEW



- | | |
|--|-------------------------------|
| 1. Start assist switch | 8. Voltmeter |
| 2. Engine oil pressure indicator | 9. Throttle |
| 3. Hydraulic oil temperature indicator | 10. Coolant temperature gauge |
| 4. Ignition switch | 11. Plow lift |
| 5. Speed/direction control | 12. Trenching lift |
| 6. Operator presence switch | 13. Vibrator control |
| 7. Hourmeter | 14. Roto Witch control |
| | 15. Digging chain control |

CONTROLS

CONTROL CONSOLE OVERVIEW



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CONTROL CONSOLE DESCRIPTIONS

Start Assist Switch

This switch activates glow plugs for easier starting.

Starting above 32°F (0°C):

- Set throttle at high idle.
- Turn ignition switch to the on position.
- Hold in the start assist button for 6-10 seconds, then release.
- Turn ignition switch all the way to the start position.
- Slowly move throttle to low idle.

Starting below 32°F (0°C):

- Set throttle at low idle.
- Turn ignition switch to the on position.
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CONTROL CONSOLE DESCRIPTIONS

Start Assist Switch

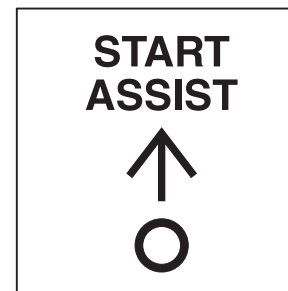
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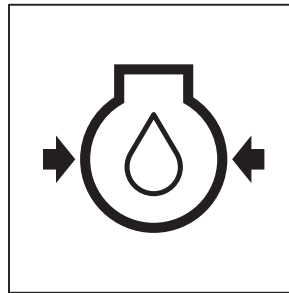


c00ic010a.eps

Engine Oil Pressure Indicator

This indicator lights when engine oil pressure is too low. Light will come on briefly when engine is started. If light comes on when engine is running:

- Turn engine off.
- Check oil level.
- Check for leaks before starting engine.



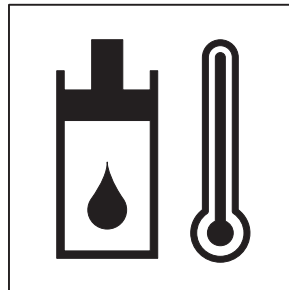
c00ic014a.eps

Hydraulic Fluid Temperature Indicator

This indicator lights when hydraulic fluid temperature is too high. Indicator will light briefly when engine is started.

If indicator lights during operation, check the following:

- Hydraulic fluid level should be full.
- Hydraulic fluid cooler should be clear of debris.

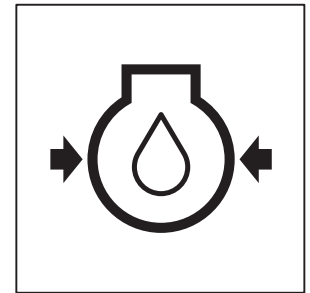


c00ic015a.eps

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This indicator lights when engine oil pressure is too low. Light will come on briefly when engine is started. If light comes on when engine is running:

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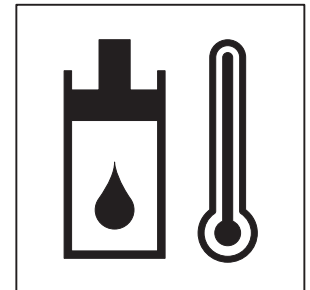
c00ic014a.eps

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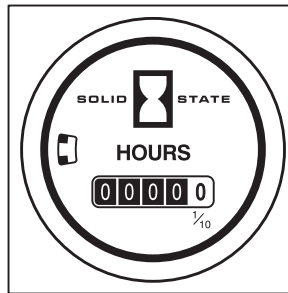
- Hydraulic fluid level should be full.
- Hydraulic fluid cooler should be clear of debris.



c00ic015a.eps

Hourmeter

This gauge shows machine operating time. Use to schedule service.

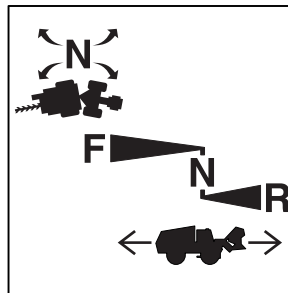


c00ic017a.eps

Speed/Direction Control (orange)

This lever controls unit speed and direction.

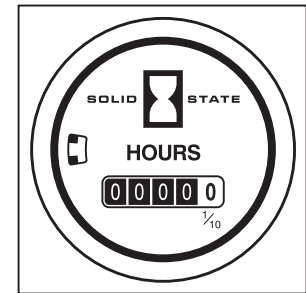
- Push toward "F" to move forward.
- Pull toward "R" to move in reverse.
- To go faster in either direction, move control farther from center (neutral) position.
- To stop, return to neutral position and engage parking brake.
- To turn, move control to left or right while it is in forward, neutral, or reverse position.



c00ic002a.eps

Hourmeter

This gauge shows machine operating time. Use to schedule service.

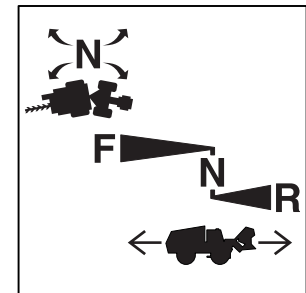


c00ic017a.eps

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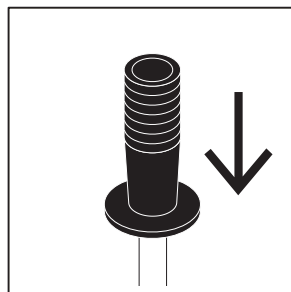
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c00ic002a.eps

Operator Presence Switch (inside handle)

This switch prevents machine from running when digging or driving unless operator activates the switch by pressing down the handle.



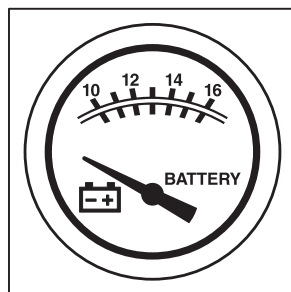
om0672h.eps

EMERGENCY SHUTDOWN:

Release operator presence switch by releasing the handle and turning the ignition switch to STOP.

Voltmeter

This gauge measures voltage in electrical system. Reading should be between 12 and 15 volts with engine running. If not, stop engine and investigate.

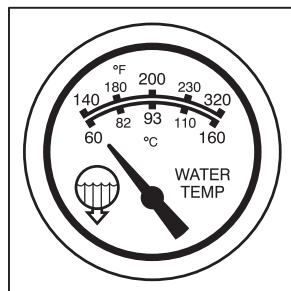


c00ic018a.eps

Coolant Temperature Gauge

This gauge measures coolant temperature. Operating temperature should read 160°-205°F (71-96°C).

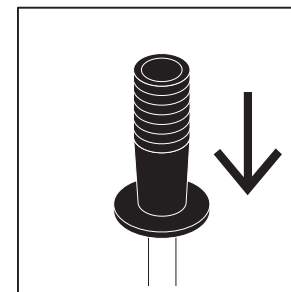
IMPORTANT: Do not operate when engine is overheating.



c00ic016a.eps

Operator Presence Switch (inside handle)

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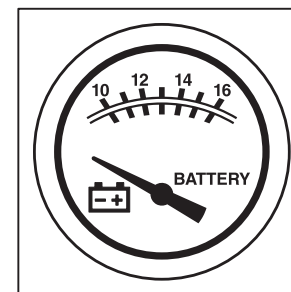
om0672h.eps

EMERGENCY SHUTDOWN:

Release operator presence switch by releasing the handle and turning the ignition switch to STOP.

Voltmeter

This gauge measures voltage in electrical system. Reading should be between 12 and 15 volts with engine running. If not, stop engine and investigate.

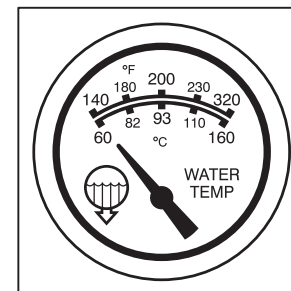


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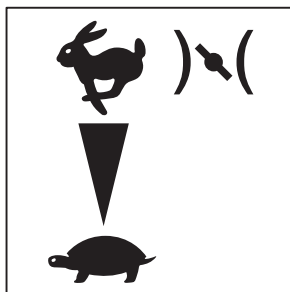


c00ic016a.eps

Throttle (black)

This lever adjusts engine speed.

- Push to increase engine speed.
- Pull to decrease engine speed.



c00ic009a.eps

Ignition Switch

This switch is used with start assist switch to start engine.

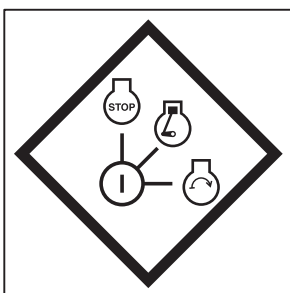
To start:

Starting above 32°F (0°C):

- Set throttle at high idle.
- Turn ignition switch to the on position.
- Hold in the start assist button for 6-10 seconds, then release.
- Turn ignition switch all the way to the start position.
- Slowly move throttle to low idle.

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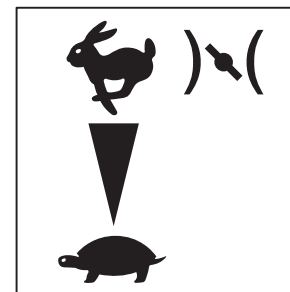


c00ic012a.eps

Throttle (black)

This lever adjusts engine speed.

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c00ic009a.eps

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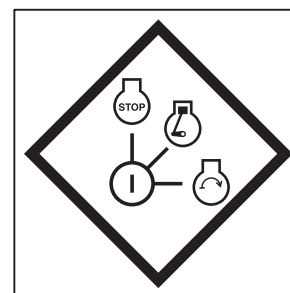
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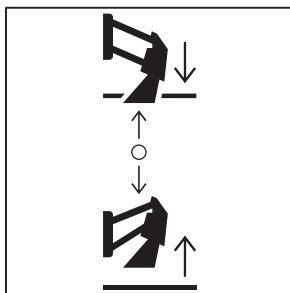


c00ic012a.eps

Plow Lift (green)

This lever raises or lowers plow.

- Push to lower plow.
- Pull to raise plow.

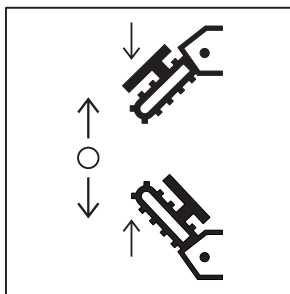


c00ic001a.eps

Trencher Lift (green)

This lever raises or lowers trencher boom. Can be used only when engine is running.

- Push to lower boom.
- Pull to raise boom.

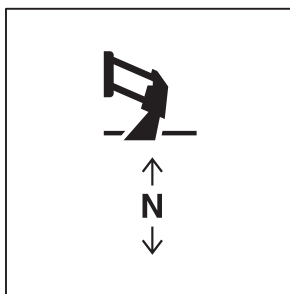


c00ic004a.eps

Vibrator Control (yellow)

This lever controls plow vibrator.

- Push to start vibrator.
- Move to neutral position to stop vibrator.

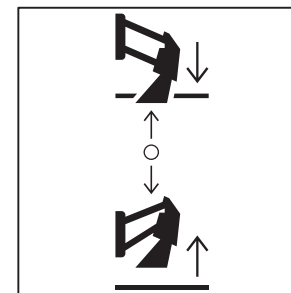


c00ic006a.eps

Plow Lift (green)

This lever raises or lowers plow.

- Push to lower plow.
- Pull to raise plow.

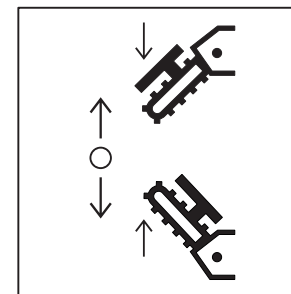


c00ic001a.eps

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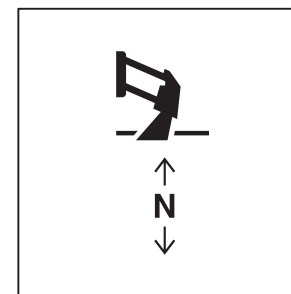


c00ic004a.eps

Vibrator Control (yellow)

This lever controls plow vibrator.

- Push to start vibrator.
- Move to neutral position to stop vibrator.

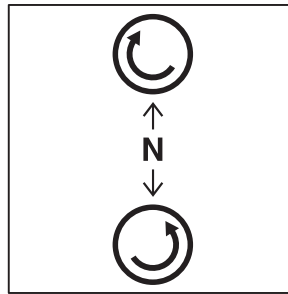


c00ic006a.eps

Roto Witch Control (black)

This lever controls optional drilling attachment. See **DRILLING ATTACHMENT** or Roto Witch Operator's Manual for additional information.

- Push to rotate clockwise.
- Pull to rotate counterclockwise.

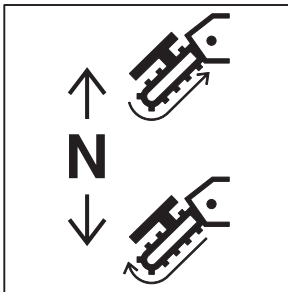


c00ic007a.eps

Digging Chain Control (yellow)

This lever controls optional trencher digging chain direction. See **TRENCHING ATTACHMENT** for additional information.

- Push to start digging chain.
- Pull to reverse digging chain.
- Return to neutral position to stop digging chain.

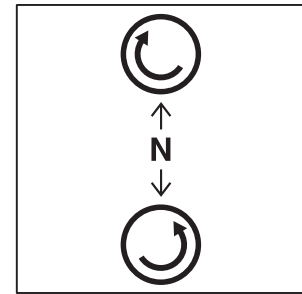


c00ic003a.eps

Roto Witch Control (black)

This lever controls optional drilling attachment. See **DRILLING ATTACHMENT** or Roto Witch Operator's Manual for additional information.

- Push to rotate clockwise.
- Pull to rotate counterclockwise.

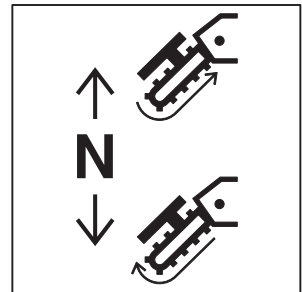


c00ic007a.eps

Digging Chain Control (yellow)

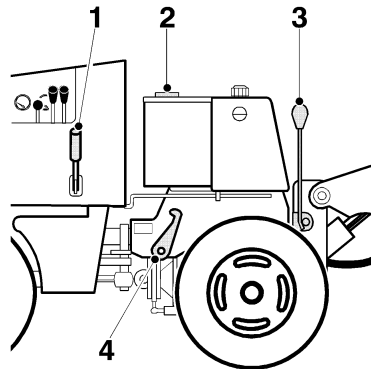
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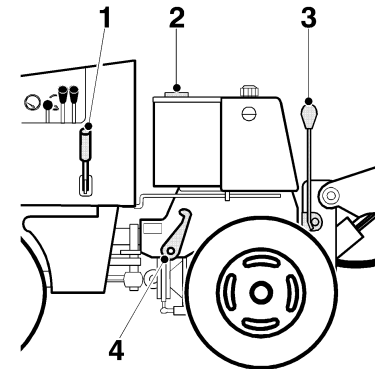
c00ic003a.eps

FRAME OVERVIEW



1. Parking brake
2. Fuel level indicator
3. Plow swing release
4. Frame lock

FRAME OVERVIEW



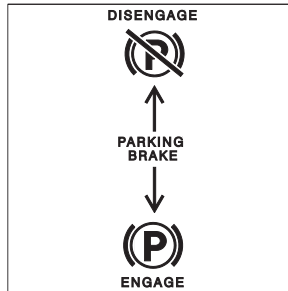
1. Parking brake
2. Fuel level indicator
3. Plow swing release
4. Frame lock

FRAME CONTROL DESCRIPTIONS

Parking Brake (orange)

This lever engages parking brake.

- Push down to engage.
- Pull up to disengage.

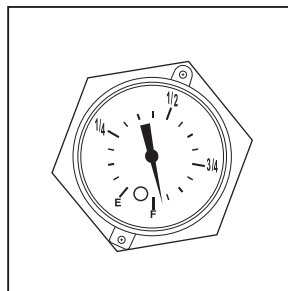


lc0032c.eps

Fuel Gauge

This gauge shows fuel level.

Refill as necessary with No. 2 diesel fuel.



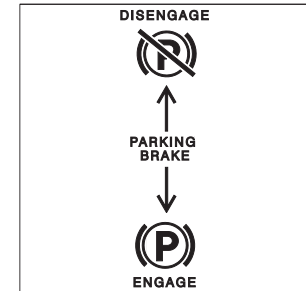
c00ic001h.eps

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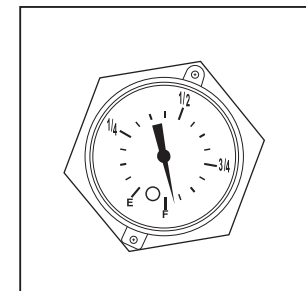


lc0032c.eps

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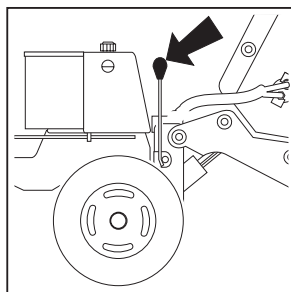


c00ic001h.eps

Plow Swing Lock (blue)

This lever controls plow swing lock.

- Move toward plow to disengage lock.
- Move toward front to engage lock.

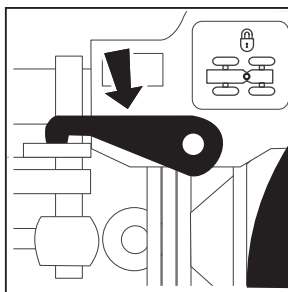


t02om036h.eps

Frame Lock (yellow)

This device prevents articulation joint from moving during transport or maintenance.

- Move yellow lock into gate.
- Use speed/direction control to pivot unit at articulation joint until lock is fully engaged.

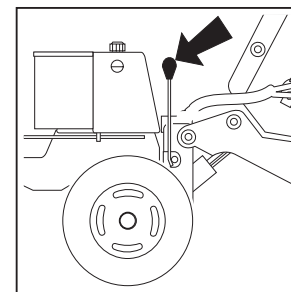


t02om037h.eps

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- Move toward front to engage lock.

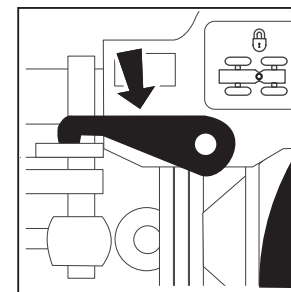


t02om036h.eps

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t02om037h.eps

SAFETY

Follow these guidelines before operating any jobsite equipment:

- Complete proper training and read operator's manual before using equipment.
- Contact One-Call (888-258-0808) and your local utility company. Have all underground pipes and cables located and marked before operating equipment. If you damage a utility, contact utility company.
- Classify jobsite based on its hazards and use correct tools and machinery, safety equipment, and work methods for jobsite.
- Mark jobsite clearly and keep spectators away.
- Wear personal protective equipment.
- Review jobsite hazards, safety and emergency procedures, and individual responsibilities with all personnel before work begins. Watch "Stay Alert, Stay Alive," or "Don't Take Chances."
- Replace missing or damaged safety shields and safety signs.
- Use equipment carefully. Stop operation and investigate anything that does not look or feel right.
- Contact your Ditch Witch dealer if you have any question about operation, maintenance, or equipment use.



When you see this safety alert sign, carefully read and follow all instructions. YOUR SAFETY IS AT STAKE. Read this entire section before using your equipment.

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ACCESSORIES

Fire Extinguisher

A fire extinguisher should be kept on or near the unit but away from possible points of ignition. The fire extinguisher should always be classified for both oil and electric fires. It should meet legal and regulatory requirements.

UNDERGROUND HAZARDS

Striking underground hazards can cause explosion, electrocution, fire, and exposure to hazardous materials.

Hazards include:

- Electric cables
- Natural gas lines
- Fiber optic cables
- Water lines
- Sewer lines
- Pipes carrying other chemicals, liquids, or gases
- Storage tanks

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EMERGENCY PROCEDURES

Before operating any equipment, review emergency procedures and check that all safety precautions have been taken.

EMERGENCY SHUTDOWN - Release operator presence switch and turn ignition switch to STOP.

Electric Strikes

When working near electric cables, remember the following:

- Electricity follows all paths to ground, not just path of least resistance.
- Digging attachments will conduct electricity back to equipment.
- Low voltage current can injure or kill. Almost one-third of work-related electrocutions result from contact with less than 440 volts.

Most electric strikes are not noticeable, but indications of electric strikes include:

- Power outage
- Smoke
- Explosion
- Popping noises
- Arcing electricity

If any of these occur, assume an electric strike has occurred.

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If an Electric Line is Damaged

If you suspect an electric line has been damaged and you are near pedestrian unit, DO NOT MOVE and do not touch unit. Take the following actions. The order and degree of action will depend upon the situation.

- Warn people nearby that an electric strike has occurred. Instruct them to leave the area and contact utility.
- Do not allow anyone into area until given permission by utility company.

If a Gas Line is Damaged

If you suspect a gas line has been damaged, take the following actions. The order and degree of action will depend upon the situation.

- Immediately shut off engine(s) if this can be done safely and quickly.
- Remove any ignition source(s) if this can be done safely and quickly.
- Warn others that a gas line has been cut and that they should leave area.
- Leave jobsite as quickly as possible.
- Immediately call your local emergency phone number and utility company.
- If jobsite is along street, stop traffic from driving near jobsite.
- Do not return to jobsite until given permission by emergency personnel and utility company.

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If a Fiber Optic Cable is Damaged

Do not look into cut ends of fiber optic or unidentified cable.
Vision damage can occur.

If Machine Catches on Fire

Perform emergency shutdown procedure and then take the following actions. The order and degree of action will depend on the situation.

- Release operator presence switch and turn ignition switch to stop.
- If fire is small and fire extinguisher is available, attempt to extinguish fire.
- If fire cannot be extinguished, leave area as quickly as possible and contact emergency personnel.

If a Fiber Optic Cable is Damaged

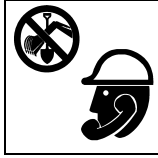
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JOBSITE CLASSIFICATION

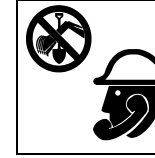
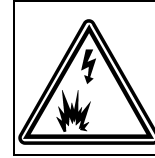


⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

Inspecting Jobsite

- Follow U.S. Department of Labor regulations on excavating and trenching (Part 1926, Subpart P) and other similar regulations.
- Contact One-Call and any utility companies which do not subscribe to One-Call.
- Inspect jobsite and perimeter for evidence of underground hazards.
 - “Buried utility” notices
 - Utility facilities without overhead lines
 - Gas or water meters
 - Junction boxes
 - Drop boxes
 - Light poles
 - Manhole covers
 - Sunken ground
- Have an experienced locating equipment operator sweep area within 20' (6 m) to each side of trench path.
- Mark location of all buried utilities and obstructions.
- Classify jobsite.

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Selecting a Classification

Jobsites are classified according to underground hazards present.

If working . . .	then classify jobsite as . . .
within 10' (3 m) of a buried electric cable	electric
within 10' (3 m) of a natural gas line	natural gas
in sand, granite, or concrete which is capable of producing crystalline silica (quartz) dust	crystalline silica (quartz) dust
within 10' (3 m) of any other hazard	other

NOTICE: If you have any doubt about jobsite classification, or if jobsite might contain unmarked hazards, take steps outlined previously to identify hazards and classify jobsite before digging.

NOTICE: This machine is not to be used on jobsites where flammable gas is present.

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NOTICE: This machine is not to be used on jobsites where flammable gas is present.

Applying Precautions

Once classified, precautions appropriate for jobsite must be taken.

Electric Jobsite Precautions

Use one or both of these methods on electric jobsites.

- Expose hazard cable by careful hand digging or soft excavation.
- Have service shut down while work is in progress. Have utility company test cables before returning them to service.

Natural Gas Jobsite Precautions

In addition to positioning equipment upwind from gas lines, use one or both of these methods on natural gas jobsites.

- Expose hazard by careful hand digging or soft excavation.
- Have service shut down while work is in progress. Have utility company test pipes before returning them to service.

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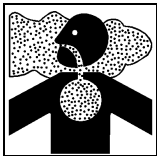
- Expose hazard by careful hand digging or soft excavation.
- Have service shut down while work is in progress. Have utility company test pipes before returning them to service.

Other Jobsite Precautions

You can use a variety of methods to safely dig around other underground hazards. Talk with those responsible for hazards to determine which precautions should be taken or if digging should be attempted.

Crystalline Silica (Quartz) Dust

Follow OSHA or other guidelines for exposure to crystalline silica when trenching, sawing or drilling through material that might produce dust containing crystalline silica (quartz) dust.



WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

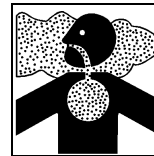
NOTICE: Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust. Use respirator, water spray or other means to control dust. Silica dust can cause lung disease and is known to the State of California to cause cancer.

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SAFETY ALERT CLASSIFICATIONS

You will see the following safety symbols:

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

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

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

In this book, 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.

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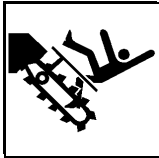
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SAFETY ALERTS



sf1018



sf1007

⚠ DANGER Moving digging teeth will kill you or cut off arm or leg. Stay away.

NOTICES:

- Machine might lunge when digging starts. Allow 3' (1 m) between digging teeth and obstacle.
- Keep everyone at least 6' (2 m) from machine and attachments.



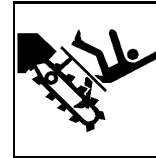
sf1019

⚠ DANGER Electrical shock. Contacting electrical lines will cause death or serious injury. Know location of lines and stay away.

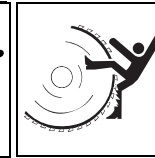
NOTICES:

- Hand-dig to expose all pipes and cables near planned trench or bore path.
- Keep equipment at least 10' (3 m) away from overhead electric lines.

SAFETY ALERTS



sf1018

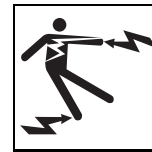


sf1007

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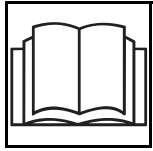
- Hand-dig to expose all pipes and cables near planned trench or bore path.
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sf1025

⚠ DANGER

Deadly gases. Lack of oxygen or presence of gas will cause sickness or death. Provide ventilation.



sf1027

⚠ WARNING

Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.



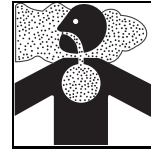
sf1013

⚠ WARNING

Fluid or air pressure could pierce skin and cause injury or death. Stay away.

NOTICES:

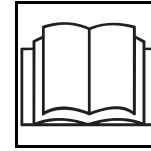
- Before disconnecting lines, turn off engine and operate controls to relieve system pressure.
- Before pressuring system, check that all connections are tight and lines, pipes, and hoses are not damaged. Check for escaping fluid with a piece of cardboard or wood.
- Wear protective clothing and eye protection.
- Seek immediate medical attention for all injuries from a doctor familiar with this type of injury.



sf1025

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sf1027

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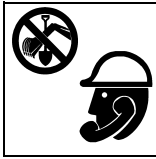
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⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.



⚠ WARNING Rollover possible. If machine rolls, you could be killed or crushed.



⚠ WARNING Runaway possible. Machine could run over you or others. Learn how to use all controls. Start and operate only from operator's position.



sf1014

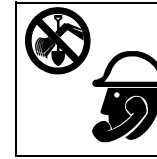
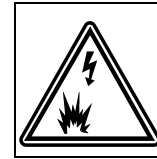
⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.



sf1022

⚠ WARNING Moving parts could cut off hand or foot. Stay away.

NOTICE: Before operation, replace guards and shields.



⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.



⚠ WARNING Rollover possible. If machine rolls, you could be killed or crushed.



⚠ WARNING Runaway possible. Machine could run over you or others. Learn how to use all controls. Start and operate only from operator's position.



sf1014

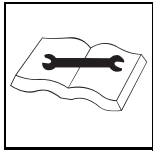
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sf1022

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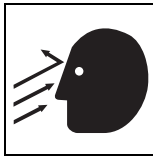
NOTICE: Before operation, replace guards and shields.



sf1020

⚠ WARNING

Improper control function could cause death or serious injury. If control does not work as described in instructions, stop machine and have it serviced.



sf1004

⚠ WARNING

Looking into fiber optic cable could result in permanent vision damage. Do not look into ends of fiber optic or unidentified cable.



sf1001

⚠ WARNING

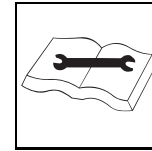
Explosion possible. Serious injury or equipment damage could occur. Remove internal batteries before using external power source.



sf1002

⚠ CAUTION

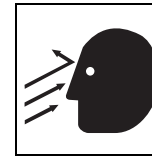
Exposure to high noise levels may cause hearing loss. Wear hearing protection.



sf1020

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sf1002

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sf1023

CAUTION

Flying objects thrown by machine may strike people. Wear hard hat and safety glasses.



sf1006

CAUTION

Hot parts may cause burns. Do not touch until cool.



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sf1006

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TRACTOR

DAILY INSPECTION

For safe and efficient use of your machine, do the following before each day's work:

- Check general appearance of unit and attachments. Look for loose, worn or damaged parts and fluid leaks.
- Check engine oil, plow vibrator oil, hydraulic fluid, and coolant levels.
- Check fuel level.
- Check condition of all wear items such as drive belts, hoses, digging chain, teeth, and attachment wear items.
- Check air filter minder.
- Check tire pressure. Use reliable tire pressure gauge.
- Check operation of all controls.
- Check fuel lines and hydraulic lines and fittings for signs of leakage, wear, or other damage.
- Check that all signs, guards, and shields are in place and readable.
- Service machine according to schedules in **SERVICE**, and in engine manufacturer's guide.

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STARTUP

**⚠ DANGER**

Deadly gases. Lack of oxygen or presence of gas will cause sickness or death. Provide ventilation.

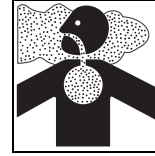
**⚠ WARNING**

Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.

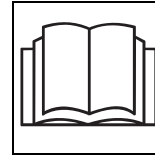
NOTICE:

- Read engine manufacturer's starting and operating instructions. Follow directions for new engine break-in.
- Read operator's manual before operating equipment. Follow instructions carefully. Contact your Ditch Witch dealer for operation information or demonstration.
- Wear necessary safety and personal protective equipment required by job. Do not wear jewelry or loose clothing that can catch on controls.

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1. Engage parking brake.
2. Starting above 32°F (0°C):
 - Set throttle at high idle.
 - Turn ignition switch to the on position.
 - Hold in the start assist button for 6-10 seconds, then release.
 - Turn ignition switch all the way to the start position.
 - Slowly move throttle to low idle.
3. Starting below 32°F (0°C):
 - Set throttle at low idle.
 - Turn ignition switch to the on position.
 - Hold in the start assist button for 15-20 seconds, then release.
 - Turn ignition switch all the way to the start position.
4. When engine starts, release key:

NOTICE: If engine does not start within 30 seconds, release ignition key. Allow starter to cool before attempting to start again. If engine does not start after three attempts, determine cause.
5. Run at half throttle or less for 5 minutes to warm engine before operating unit.
6. Check function and operation of all controls before operating unit.

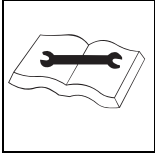
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SHUTDOWN

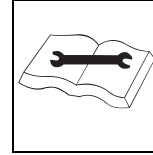
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Improper control function could cause death or serious injury. If control does not work as described in instructions, stop machine and have it serviced.

1. Return all controls to neutral or disengaged position.
2. Engage parking brake.
3. Lower attachments to ground.
4. Briefly run at half throttle or less to cool engine.
5. Move throttle control to idle position.
6. Turn ignition switch to STOP and remove key.

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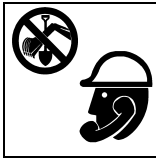
DRIVE



⚠ WARNING

Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.

NOTICE: Drive slowly and cautiously at all times.

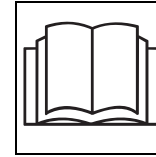


⚠ WARNING

Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

1. Start engine and run at idle.
2. Raise attachments for ground clearance.
3. Ensure plow swing lock is engaged.
4. Ensure tires are positioned straight or in direction of intended movement.
5. Move throttle control to half throttle position.
6. Disengage parking brake.

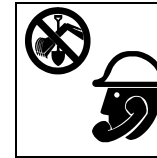
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7. Press and hold operator presence switch.
8. Move speed/direction control to forward or reverse position.
9. Adjust throttle control for desired ground speed.
10. To turn move speed/direction control. Push to turn right. Pull to turn left.
11. To stop, move speed/direction control to neutral and engage parking brake.

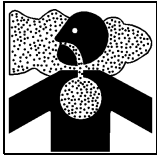
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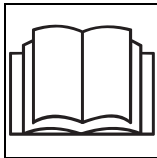
PLOW

Setup



⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

NOTICE: Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust. Use respirator, water spray or other means to control dust. Silica dust can cause lung disease and is known to the State of California to cause cancer.



⚠ WARNING Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.

NOTICE: Do not operate vibrator when plow is out of the ground. This will cause excessive vibration resulting in rapid wear and possible damage to the unit.

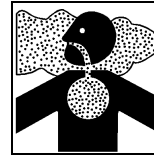


⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

NOTICE: Swinging plow or raised attachments can cause rollover on slopes. Use attachments or counterweights to make front and rear loads balance when all attachments are raised. Contact your Ditch Witch dealer about counterweighting for your equipment and soil type.

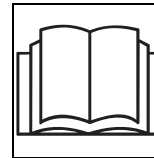
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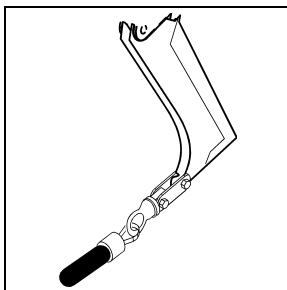
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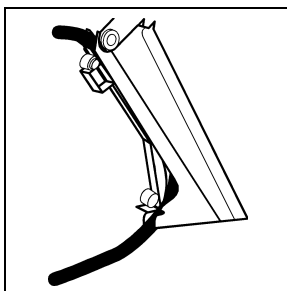
1. Move machine to starting point.
2. Move ground drive speed/direction control to neutral position.
3. Engage parking brake.
4. Pull plow control to lower plow to just above ground.
5. Stop engine.
6. Attach material being pulled or fed.

Pull:

- Insert material into pulling grip.
- Tape grip with duct tape.

**Feed:**

- Remove cable guide.
- Feed cable through tube from top to bottom.
- Replace cable guide and tighten fasteners.
- Secure cable.



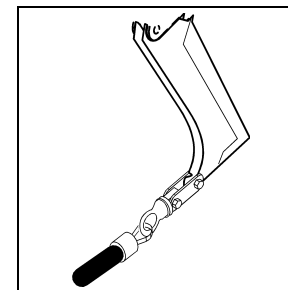
NOTICE: Keep everyone away from material being installed. Keep everybody at least 10' (3 m) away from machine while operating.

EMERGENCY SHUTDOWN: Release operator presence switch and turn ignition switch to STOP.

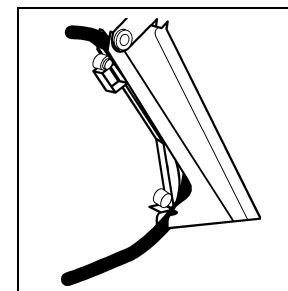
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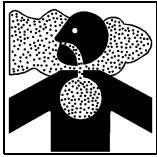
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Operation

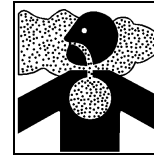


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NOTICE: Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust. Use respirator, water spray or other means to control dust. Silica dust can cause lung disease and is known to the State of California to cause cancer.

1. Ensure that vibrator control is in neutral position.
2. Start engine.
3. Disengage parking brake.
4. Move speed/direction control forward to begin moving.
5. Pull plow control to lower plow blade as unit moves forward.
6. Move throttle control to at least half throttle position.
7. Release plow swing lock.
8. Move plow vibrator control out of neutral position. PLOW WILL VIBRATE.

Operation



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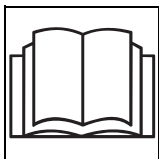
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9. Move throttle control to adjust desired ground speed.
10. Push speed/direction control to turn right. Pull to turn left.
Unlock plow swing before turning.
11. When finished plowing, move the speed/direction control to neutral position.
12. Engage parking brake.

NOTICE: Do not operate vibrator when plow is out of the ground. This will cause excessive vibration resulting in rapid wear and possible damage to the unit.

EMERGENCY SHUTDOWN: Release operator presence switch and turn ignition switch to STOP.



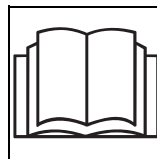
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13. Raise plow:

- Reduce engine speed while raising plow blade.
- Leave plow vibrator engaged until plow blade is almost at ground level, then move vibrator control to neutral and continue raising plow.
- In sticky soils or when installing delicate cable, it may be necessary to move the unit forward as plow blade is raised.
- Place plow swing lock in locked position before blade clears ground.

14. Stop engine following **SHUTDOWN** procedures.

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OPERATING TIPS

- If material being installed must be at a constant depth, dig starting and target trenches.
- Check cable for damage while plowing. Run continuity checks on electric cable and check pipe pressure. Damage can result from improper operation, incorrect blade choice, striking underground obstructions, or other conditions.
- Keep sod cutter edge sharp when plowing in areas with heavy grass cover or surface clutter.
- When operating on a slope, place plow swing lock in locked position. Remove blade from ground slowly and raise plow only as high as necessary to clear ground. Move across slope slowly to prevent rollover. Plow in direction that keeps operator on uphill side of unit.
- Lock plow swing before lifting plow.

OPTIONAL EQUIPMENT

Blades

Several blade lengths and types are available. See your authorized Ditch Witch dealer to select the blade right for your needs.

Reel Carrier

Reel carriers are designed to fit your Ditch Witch equipment and speed cable installation. Contact your Ditch Witch dealer for more information.

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TRANSPORTATION

LIFT



⚠ WARNING

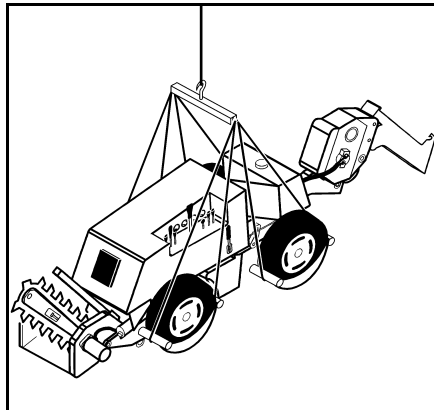
Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

Procedure

Before lifting, check **SPECIFICATIONS**. Use a hoist capable of supporting the equipment's size and weight.

Engage parking brake, frame lock and plow swing lock before lifting.

Lift tractor by attaching slings to wheels and to a common member.



TRANSPORTATION

LIFT



⚠ WARNING

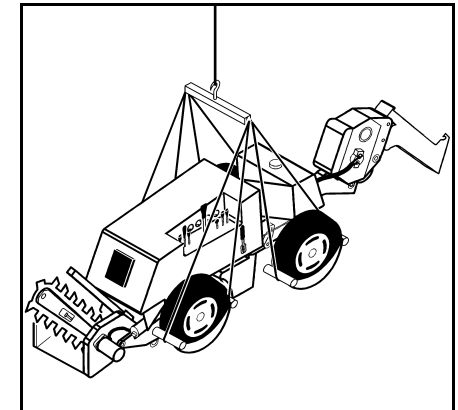
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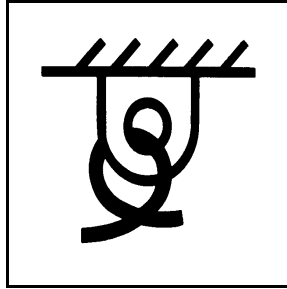
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TIEDOWN

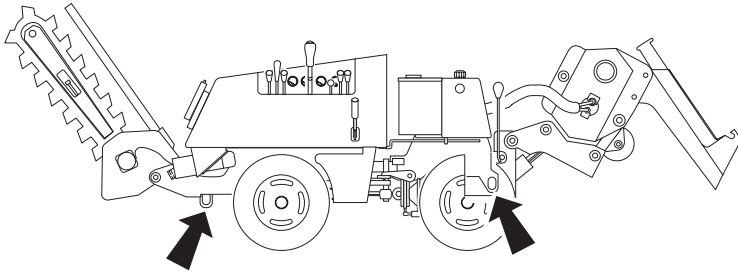
Points

Tiedown points are identified by tiedown decals. Securing tractor and attachments to trailer at any other points is unsafe and can cause damage.



Procedure

Engage frame lock and plow swing lock. Attach tiedowns at front D-rings and rear cut-outs. Ensure tiedown chains and load binders are tight before transporting.

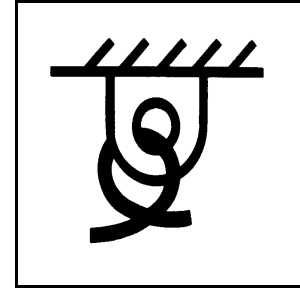


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TIEDOWN

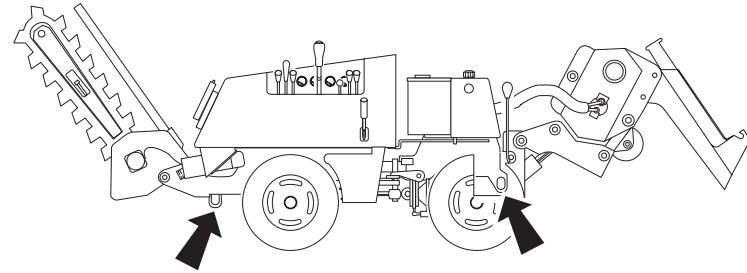
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t02om039h.eps

LOAD

1. Engage parking brake.
2. Place all attachment controls in neutral position.
3. Engage plow swing lock.
4. Place speed/direction control in neutral position.
5. Move throttle control to midpoint.
6. Start machine. See **TRACTOR** for proper start up procedure.

EMERGENCY SHUTDOWN: Release operator presence switch and turn ignition switch to STOP.

7. Raise attachments away from ground keeping them as low as possible.
8. Disengage parking brake.
9. Move speed/direction control to forward or reverse position.
10. To turn, move speed/direction control to right or left.
11. Align tractor with trailer ramps.
12. Slowly guide tractor onto trailer.
13. When tiedown position is reached, move speed/direction control to neutral position.
14. Engage parking brake.
15. Engage frame lock.
16. Lower attachments.
17. Return throttle to idle position.
18. Turn ignition switch to STOP and remove key.
19. Securely fasten unit to trailer deck using chains and load binders.

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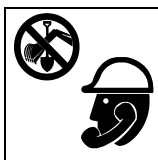
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19. Securely fasten unit to trailer deck using chains and load binders.

HAUL

Tractor with attachments can be hauled by trailer. Before hauling check the following:

- Check that loading ramps and trailer will support weight. See **SPECIFICATIONS**.
- Check that adequate chains and load binders are available.



⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

NOTICES:

- Park, unload, and load trailer on level part of jobsite.
- To prevent tipping, connect trailer to tow vehicle before loading or unloading.
- Keep attachments low when operating on slopes.
- Keep all attachments lowered to trailer deck and secured at tiedowns when hauling.

HAUL

Tractor with attachments can be hauled by trailer. Before hauling check the following:

- Check that loading ramps and trailer will support weight. See **SPECIFICATIONS**.
- Check that adequate chains and load binders are available.



⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

NOTICES:

- Park, unload, and load trailer on level part of jobsite.
- To prevent tipping, connect trailer to tow vehicle before loading or unloading.
- Keep attachments low when operating on slopes.
- Keep all attachments lowered to trailer deck and secured at tiedowns when hauling.

UNLOAD

1. Remove chains and load binders.
2. Start machine. See **TRACTOR** for proper start up procedures.
3. Raise attachments away from trailer deck keeping them as low as possible.
4. Disengage frame lock.
5. Move throttle control to midpoint.
6. Disengage parking brake.
7. Use speed/direction control to slowly drive tractor off trailer.

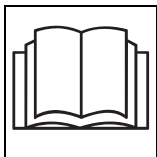
EMERGENCY SHUTDOWN: Release operator presence switch and turn ignition switch to STOP.

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TOW

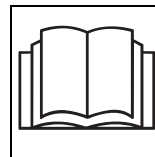
**⚠ WARNING**

Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.

NOTICE:

- If tractor becomes disabled and must be moved without its own power, bypass ground drive pump or hydraulic system will be damaged.
- Towing speed should not exceed 1-2 mph (1.5 - 3 km/h).
- Tractor should not be towed more than 200 yds (183 m).
- Do not tow tractor on slopes.
- Tractor cannot be steered as it is towed.

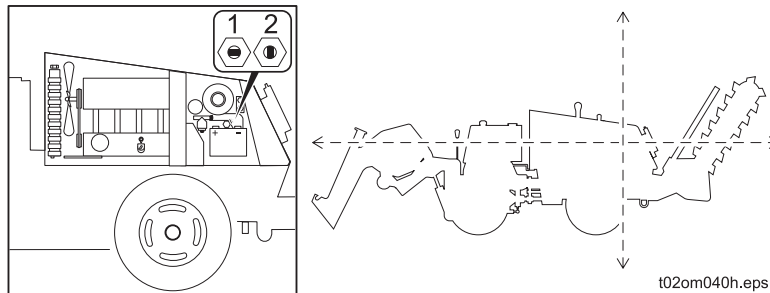
TOW

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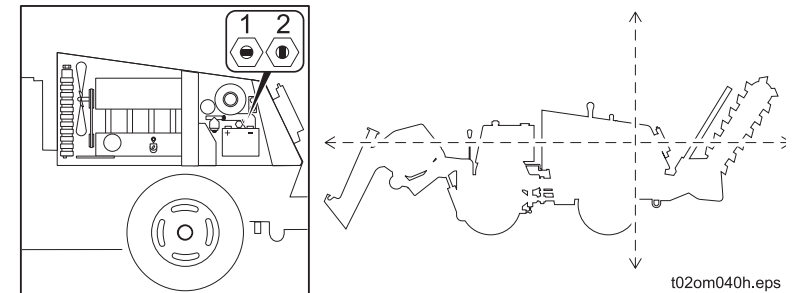
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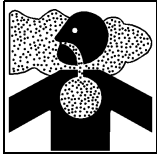
1. Disengage parking brake.
2. Check that all controls are in neutral position.
3. Locate tow valve on front of hydraulic pump, behind battery.
4. Turn tow valve 1/4 turn so that flat sides are horizontal (1).
5. Move speed/direction control in direction of travel.
6. After towing, turn tow valve 1/4 turn back to vertical (2).

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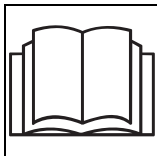
TRENCHING ATTACHMENT

SETUP



⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

NOTICE: Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust. Use respirator, water spray or other means to control dust. Silica dust can cause lung disease and is known to the State of California to cause cancer.

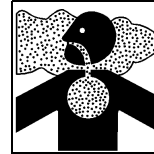


⚠ WARNING Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.

NOTICE: Keep digging boom and attachments low when operating on slopes. Counterweighting may be necessary to balance front and rear loads when attachments are raised. Tire ballast, counterweights, or attachments can be used. Talk to your Ditch Witch dealer about the correct counterweighting for your equipment.

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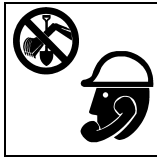
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1. Move unit to starting point of trench.
2. Move speed/direction control to neutral position.
3. Engage parking brake.
4. Adjust throttle control to half throttle position.
5. Push boom lift control until boom and chain are 1" (25 mm) above ground surface.



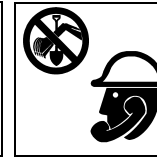
WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

NOTICE:

- Do not dig within 10' (3 m) of unexposed electric cables or gas lines.
- Keep digging boom low when operating on slopes.
- Drive cautiously at all times.

EMERGENCY SHUTDOWN: Release operator presence switch and turn ignition switch to STOP.

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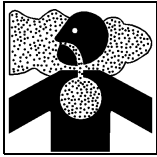
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OPERATION



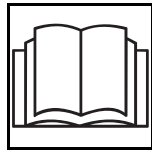
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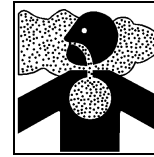
⚠ DANGER Electrical shock. Contacting electrical lines will cause death or serious injury. Know location of lines and stay away.

NOTICE: Cutting high voltage cable can cause electrocution. Expose lines by hand before digging.



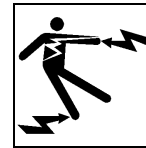
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OPERATION



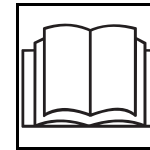
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⚠ CAUTION Flying objects thrown by machine may strike people. Wear hard hat and safety glasses.



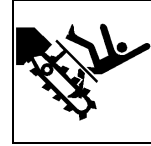
⚠ DANGER Moving digging teeth will cause death or serious injury. Stay away.

NOTICES:

- Comply with all utility notification regulations before digging or drilling.
- Notify companies that do not subscribe to One-Call.
- Machine might jerk when digging starts. Allow 3' (1 m) between digging teeth and obstacle.
- Stand back from operator console and hold controls loosely.
- Keep everyone at least 6' (2 m) from machine, attachments, and their range of movement.



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1. Engage parking brake.
2. Lower digging boom to just above ground surface.
3. Push digging chain control to start digging chain rotation.
DIGGING CHAIN WILL MOVE.
4. Increase engine speed to full throttle.
5. Slowly lower digging boom to digging depth.
6. Disengage parking brake.
7. Pull back on speed/direction control to begin trenching.
TRACTOR WILL MOVE.

NOTICE: Trenching is always done with tractor moving in reverse.

EMERGENCY STOP: Release operator presence switch and turn ignition switch to STOP.

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8. When trench is finished, move speed/direction control to neutral position.
9. Adjust throttle control to half throttle position.
10. Pull boom lift control to raise boom to top of trench.
11. Pull digging chain control to stop digging chain rotation.
12. Pull boom lift control to fully raise boom.
13. Use speed/direction control to move tractor away from trench.
14. Lower attachments to ground surface.
15. Engage parking brake.
16. Idle engine a few moments to stabilize temperature.
17. Stop engine. See **TRACTOR** for proper shutdown procedures.

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OPERATING TIPS

- Avoid digging with badly worn digging chain teeth. When replacing old teeth, maintain original tooth pattern. Use Ditch Witch replacement teeth for best trenching results.
- Operate engine at full throttle under load for most productive trenching. If soil conditions permit, operating in this range gives longer engine life and more efficient use of available engine horsepower.
- Use alligator chain in frozen or rocky soil.
- When beginning trench near a wall or fence, allow enough distance between boom and footings, drains, and cables.
- Use correct digging boom length. Shortest turn may be made with boom fully down.
- When cutting across asphalt roads, start trench in soil at edge of road and dig with shortest possible boom at full digging depth.
- When straight trenching across a slope, it can be helpful to stake a wooden beam parallel to intended course and just far enough from trench to guide downslope wheel.

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OPTIONAL EQUIPMENT

Chain

A variety of chains, teeth, and tooth patterns are available to provide efficient digging at any jobsite. For more information, contact your Ditch Witch dealer.

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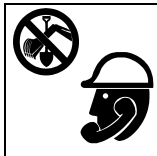
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DRILLING ATTACHMENT



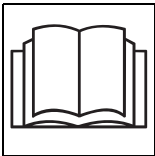
⚠ DANGER Turning shaft will kill you or crush arm or leg. Stay away.

NOTICE: Keep everybody at least 10' (3 m) away from drill pipe during operation. Do not straddle trench or drill pipe while drilling.

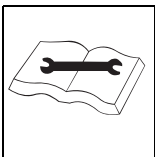


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NOTICE: Set up warning barriers and keep people away from equipment and jobsite while drilling.



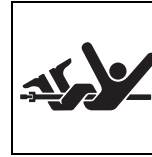
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⚠ WARNING Improper control function could cause death or serious injury. If control does not work as described in instructions, stop machine and have it serviced.

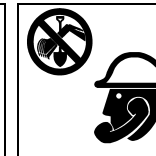
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DRILLING ATTACHMENT



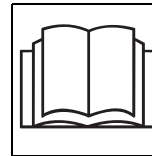
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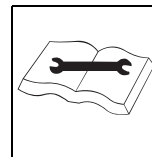


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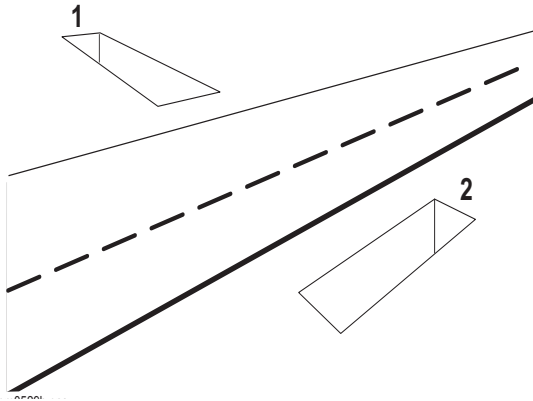
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PREPARE JOBSITE AND EQUIPMENT



Approach Trench (1)

1. Mark path where you intend to drill.
2. Dig an approach trench (1) along the intended bore path.

IMPORTANT: The approach trench should be at least:

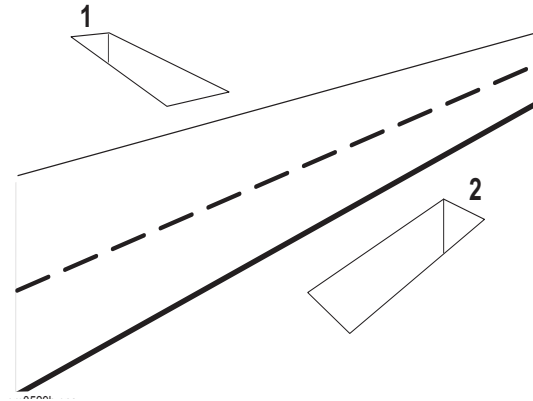
- deep enough for pipe to lay flat and enter soil at correct angle
- 20' (6 m) long
- 4" (100 mm) wide

Target Trench (2)

1. Select a completion point for the drilling project.
2. Dig a target trench (2) **across** the anticipated completion point.

IMPORTANT: The actual length of the target trench depends on soil conditions and length of pipe sections. Make it deep enough for drill bit to enter slightly above the trench floor.

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Drill Pipe and Equipment



t02om011a.eps

1. Assemble at least 20' (6 m), but not more than 30' (9 m), of drill rod.

NOTICE: More than 10-15' (3-4.5 m) of drill rod out of the trench increases the tendency of drill rod to bend.

2. Install drill bit to the cutting end of the drill string.
3. Put drill string in approach trench.
4. Move tractor to the approach trench and align the drilling attachment with the intended bore path.
5. Turn off engine.
6. Attach drill string to drilling attachment.

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DRILL

EMERGENCY SHUTDOWN: Release drilling control and turn ignition switch to STOP.

1. Start tractor's engine and begin clockwise (forward) rotation.
2. Slowly advance tractor while maintaining clockwise rotation.

NOTICE:

- Drilling too quickly causes bit to drift off course and may bend drill rod. After bore path is established, speed may be slightly increased.
- If drill rod starts to bend, stop forward movement of unit and back the unit slightly until rod straightens. Do not drill with bent rod.
- If drill rod hits an obstruction, rotate drill string counterclockwise to back up slightly.
- If drilling unit does not return to neutral when releasing the handle, then stop using and have the control repaired.

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Using Drill String Guide

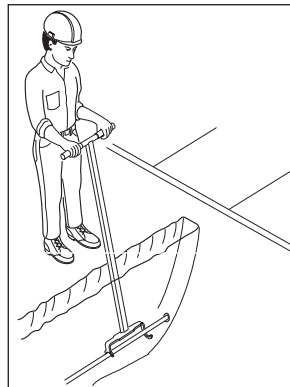


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NOTICE: Keep everybody at least 10' (3 m) away from drill rod during operation. Do not straddle trench or drill rod while drilling.

Use drill string guide to align drill string as it enters the soil. When using drill string guide, follow these guidelines:

- Use only approved Ditch Witch drill string guide (p/n 179-737).
- Stand only on the **left** side of the approach trench.
- Keep drill string guide at least 3' (1 m) behind bit.
- Use drill string guide to control only the first 5' (1.5 m) of the bore path.
- After drilling 5' (1.5 m), stop unit and remove drill string guide.
- **Do not** use drill string guide during backreaming or any time the drill string is being pulled back.



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Using Drill String Guide

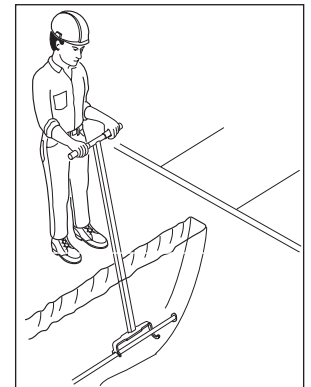


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om0342c.eps

ADD ROD

1. Stop drilling attachment.
2. Back up tractor 6" (150 mm) to loosen drill rod in ground.
3. Disconnect drill rod from drilling attachment.
4. Move tractor away from bore.
5. Add one drill rod to continue bore.

BACKREAM

After drill bit enters target trench, the bore hole may be enlarged by changing the drill bit to a backreamer and drawing it back through the initial bore.

1. Turn tractor ignition switch to STOP.
2. Replace drill bit with backreamer.
3. Start tractor engine and begin clockwise rotation.

IMPORTANT: Always rotate clockwise during backreaming. Rotate counterclockwise only to dislodge a dry bore bit or reamer that has siezed in the bore hole.

4. Slowly back up tractor while maintaining rotation.
5. When backreamer exits the bore hole, stop rotation immediately.

IMPORTANT:

- Do not try to increase hole size too much in one pass. Several passes using successively larger reamers will save wear on machine.
- During backreaming, keep drill string straight. Sharp bends in the drill rod at the motor coupling can cause rod failure.

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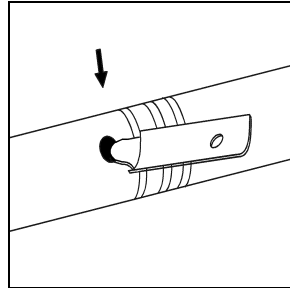
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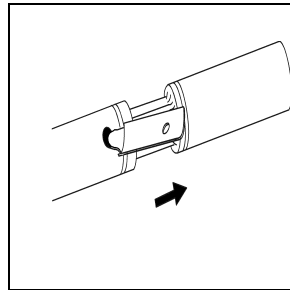
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DISASSEMBLE JOINTS

1. Press tab through hole in female side of joint using special tool or screwdriver.



2. Pull rods apart.



OPTIONAL EQUIPMENT

Drill Rod

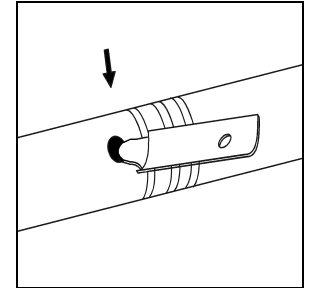
Bent or damaged drill rod might break when being pushed. Replacement drill rod and connectors are available through your Ditch Witch dealer.

Bits and Backreamers

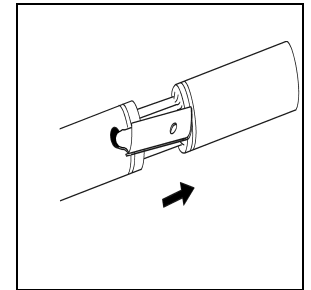
Bits and backreamers are available in a variety of sizes and types to match jobsite needs. Contact your Ditch Witch dealer for more information.

DISASSEMBLE JOINTS

1. Press tab through hole in female side of joint using special tool or screwdriver.



2. Pull rods apart.



OPTIONAL EQUIPMENT

Drill Rod

Bent or damaged drill rod might break when being pushed. Replacement drill rod and connectors are available through your Ditch Witch dealer.

Bits and Backreamers

Bits and backreamers are available in a variety of sizes and types to match jobsite needs. Contact your Ditch Witch dealer for more information.

SERVICE

Recommended Lubricants/Service Key

Item	Description
 DEO	Diesel engine oil meeting or exceeding CH-4 per the API service classification or E5 per the European Automobile Manufacturer's Association (ACEA) and SAE viscosity recommended by engine manufacturer (SAE 15W40)
 MPG	Multipurpose grease meeting ASTM D217 and NLGI 5
 EPS	Extreme pressure spray lubricant
 MPL	Multipurpose gear oil meeting API service classification GL-5 (SAE 80W90)
 THF	Tractor hydraulic fluid, similar to Phillips 66 HG, Mobilfluid 423, Chevron Tractor Hydraulic Fluid, Texaco TDH Oil, or equivalent
 DEAC	Diesel engine antifreeze/coolant meeting ASTM D5345 (prediluted) or D4985 (concentrate)
	Check level of fluid or lubricant
	Check condition
	Filter
	Change, replace, adjust, service or test

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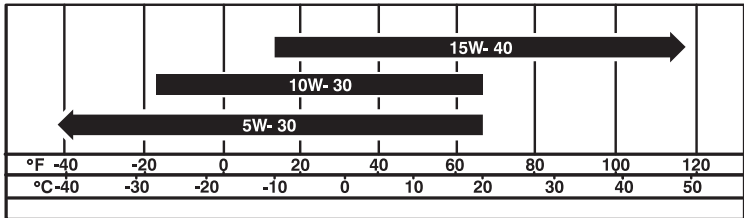
Proper lubrication and maintenance protects Ditch Witch equipment from damage and failure. Service intervals listed are for minimum requirements. In extreme conditions, service machine more frequently. Use only recommended lubricants. Fill to capacities listed in “Fluid Capacities” on page 127.

For more information on engine lubrication and maintenance, see your engine manual.

NOTICE:

- Use only genuine Ditch Witch parts, filters, approved lubricants, TJC, and approved coolants to maintain warranty.

Engine Oil Temperature Chart



i02om044h.eps

Select oil based on ambient temperature range expected before next oil change.

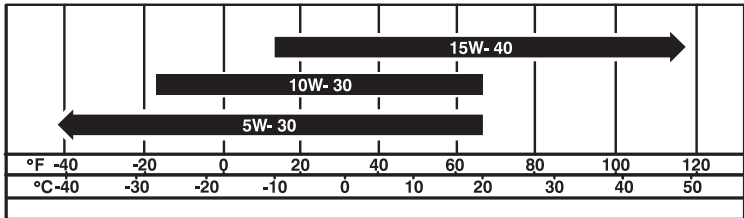
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i02om044h.eps

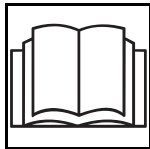
Select oil based on ambient temperature range expected before next oil change.

Approved Coolant

This unit was filled with PAR Products Heavy Duty Diesel & Gasoline Silicate Free coolant before shipment from factory. Add only PAR Products Heavy Duty Diesel & Gasoline Silicate Free coolant (p/n 256-444) or any fully-formulated, ethylene glycol based, low-silicate, heavy-duty diesel engine coolant meeting ASTM specification D5345 (prediluted) or D4985 (concentrate).

NOTICE:

- Do not use water or high-silicate automotive-type coolant. This will lead to engine damage or premature engine failure.
- Do not mix heavy-duty diesel engine coolant and automotive-type coolant. This will lead to coolant breakdown and engine damage.
- Use only distilled water for mixing coolants. Do not use tap water.



WARNING

Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.



CAUTION

Improper handling or use of chemicals may result in illness, injury, or equipment damage. Follow instructions on labels and in material safety data sheets (MSDS).



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NOTICE:

- Unless otherwise instructed, all service should be performed with engine off, frame lock engaged, plow swing locked and parking brake on.
- Refer to engine manufacturer's manual for engine maintenance instructions.
- Before servicing equipment, lower unstowed attachments to ground.
- Drain used fluids into appropriate containers and dispose of properly.

IMPORTANT: Most engine area service points are accessible under service hood from right side of machine.

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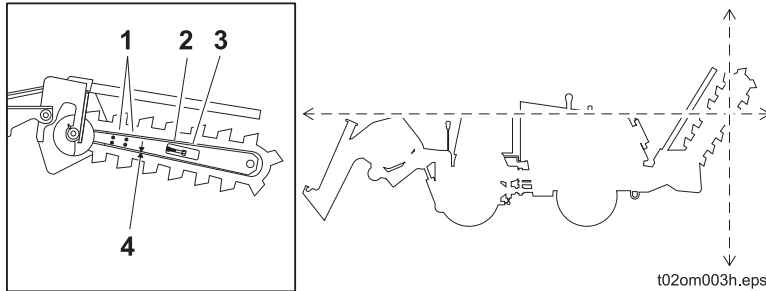
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10 HOUR SERVICE

	Task	Note
TRENCHER	Check and adjust digging chain	
	Lube outboard auger bearing	MPG
TRACTOR	Check engine oil level	DEO
	Check engine coolant level	
	Check hydraulic fluid level	THF
	Check tire pressure	20 psi (14 bar)
PLOW	Check plow vibrator oil level	MPL

Trencher

Check and Adjust Digging Chain Tension



If unit is equipped with optional trencher attachment, adjust digging chain tension every 10 hours. Clearance between chain and boom (4) should be approximately 1" (25 mm).

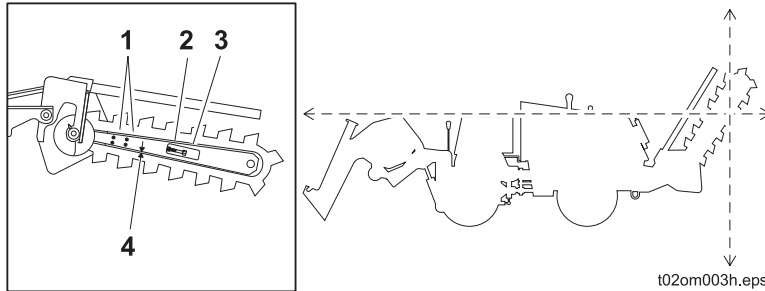


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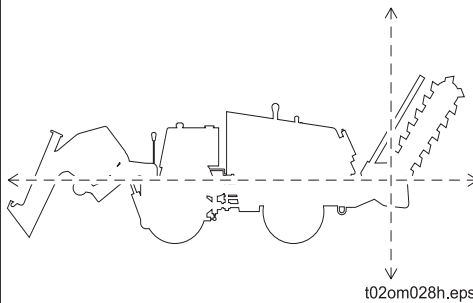
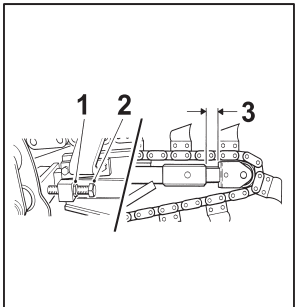


To adjust chain with roller boom:

1. Lower boom to ground and stop engine.
2. Engage parking brake.
3. Loosen four trencher boom clamp bolts (1).
4. Loosen jam nut (2) and turn adjusting screw (3) clockwise to increase and counterclockwise to decrease chain tension.
5. Tighten jam nut.
6. Tighten trencher boom clamp bolts to 78 ft•lb (106 N•m).



⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

**To adjust chain with sprocket boom:**

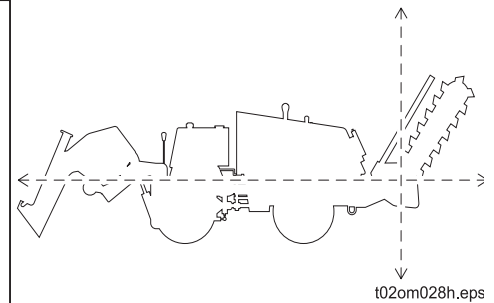
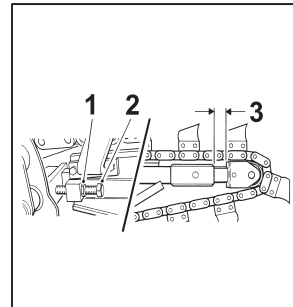
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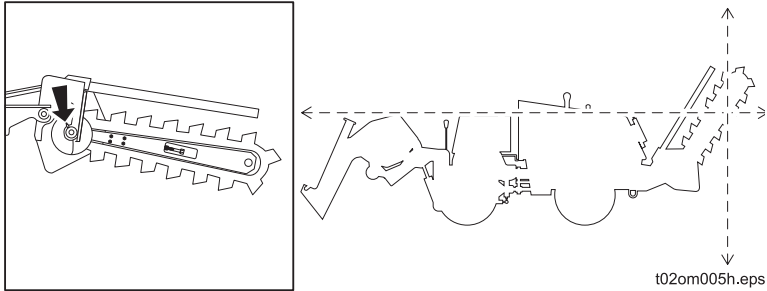
**To adjust chain with sprocket boom:**

1. Lower boom to ground and stop engine.
2. Engage parking brake.



3. Adjust chain tension by tightening or loosening adjustment screw (2) and jam nut (1). Digging chain tension is correct when 1-1.5" (25-40 mm) of slide and stop is exposed (3).
4. Tighten jam nut.

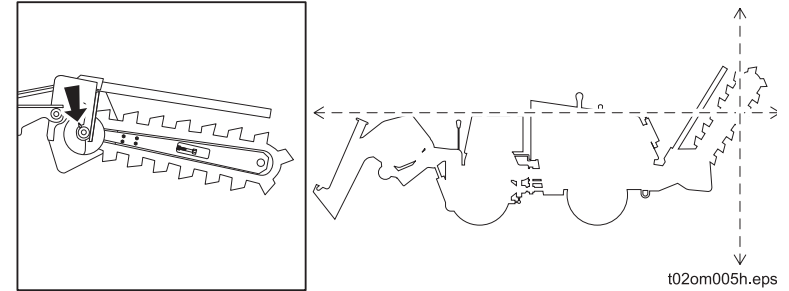
Lube Outboard Auger Bearing



Lube outboard auger bearing every 10 hours with MPG. Clean zerk before servicing to prevent contamination.

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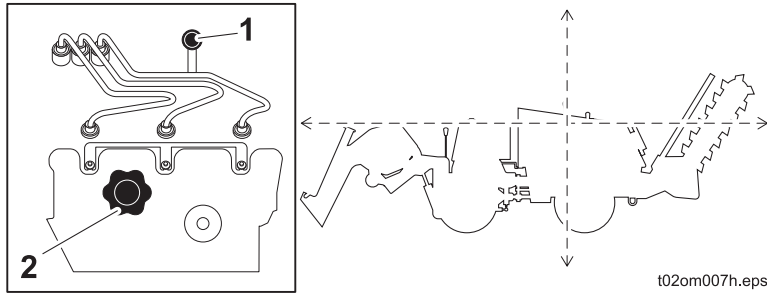
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Tractor

Check Engine Oil Level



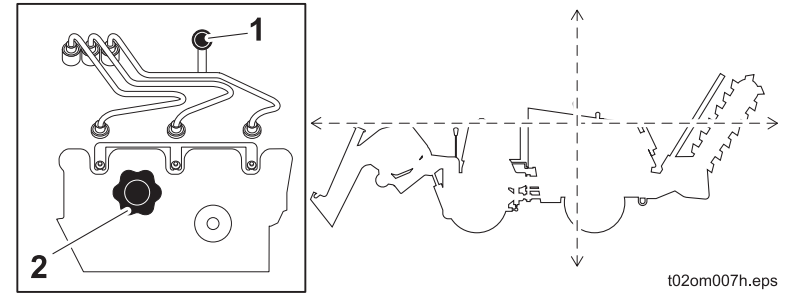
Check engine oil at dipstick (1) under service hood every 10 hours. Maintain DEO level at FULL mark on dipstick. Oil fill cap (2) is located near dipstick.

**CAUTION**

Hot parts may cause burns. Do not touch until cool.

Tractor

Check Engine Oil Level

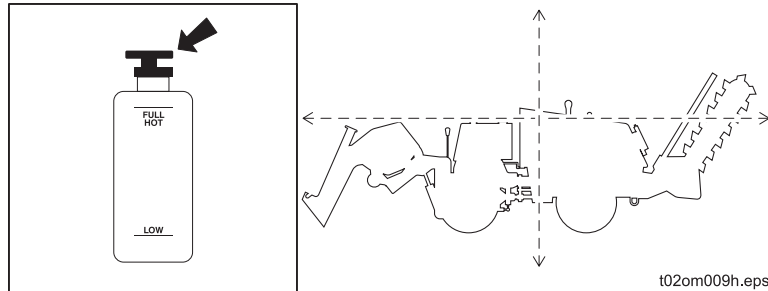


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Check Engine Coolant Level



Check coolant level every 10 hours with engine cool at plastic overflow tank. Maintain coolant level above low level mark. If low, add approved coolant. Clean debris from radiator cooling fins using compressed air or pressurized water.

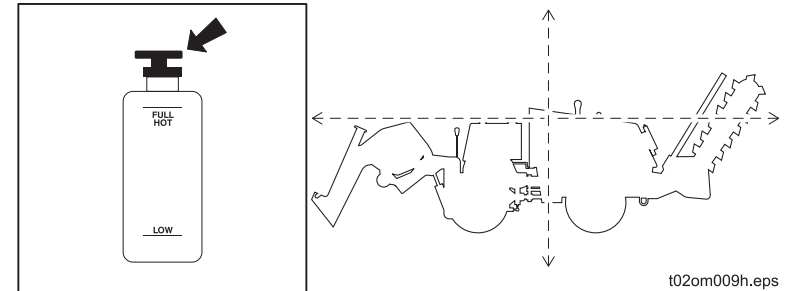


WARNING Hot pressurized cooling system fluid can cause serious burns. Allow to cool before servicing.

NOTICE:

- Use caution when removing radiator pressure cap.
- To prevent engine damage or premature failure, use only specified coolant. See "Approved Coolant" on page 79.
- Do not mix coolant types. See "Approved Coolant" on page 79 for specific coolant recommendations and details.

Check Engine Coolant Level



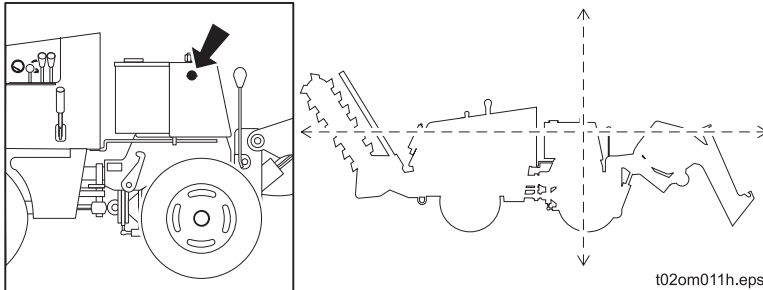
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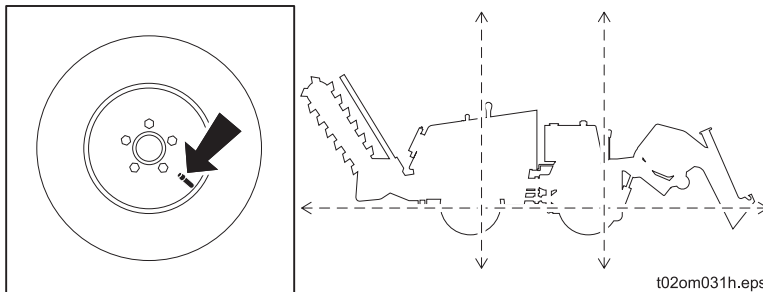
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Check Hydraulic Fluid Level

Check hydraulic fluid level every 10 hours. Maintain fluid level at center of reservoir sight glass on left side of tank. Clean dust from reservoir cap before removing to prevent fluid contamination.

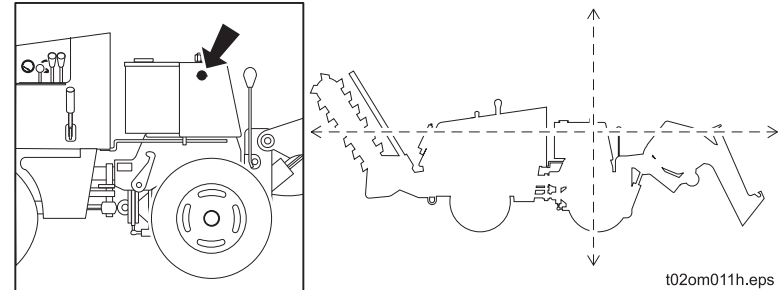
Check Tire Pressure

Check tire pressure every 10 hours. Inflate tires to 20 psi (13.8 bar) using a tire pressure gauge.

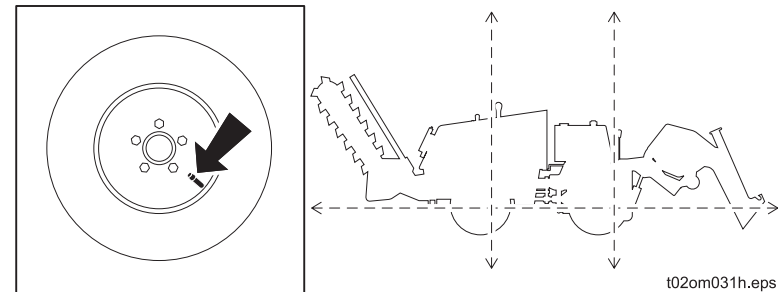


! WARNING Explosion possible. Serious injury or equipment damage could occur. Follow directions carefully.

NOTICE: Stand clear and keep head and face away from tires when inflating. Do not over-inflate tires.

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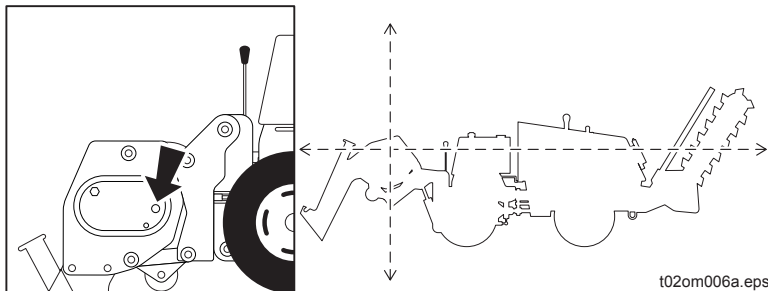


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Plow

Check Plow Vibrator Oil Level



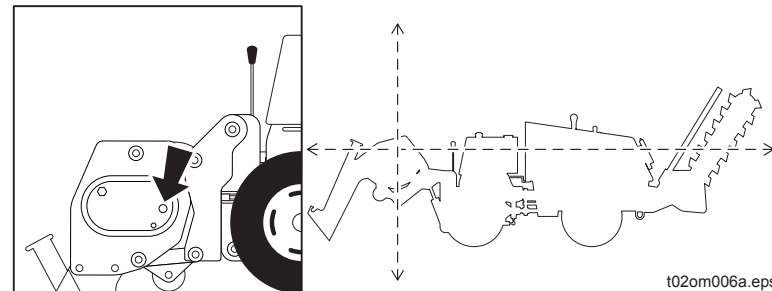
Check plow vibrator oil level every 10 hours. Maintain MPL level in sight glass when vibrator is lowered to a level position. Do not overfill.



⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

Plow

Check Plow Vibrator Oil Level



Check plow vibrator oil level every 10 hours. Maintain MPL level in sight glass when vibrator is lowered to a level position. Do not overfill.



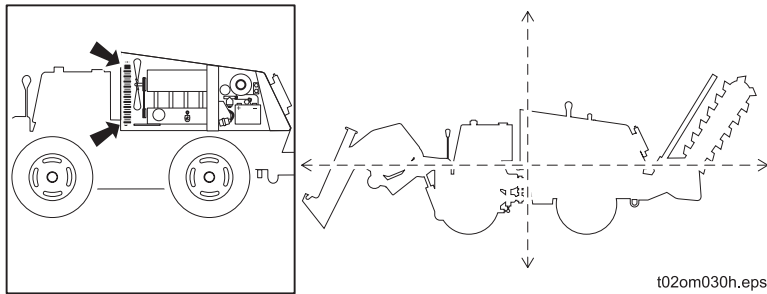
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50 HOUR SERVICE

	Task	Note
TRACTOR	Check radiator hoses	
	Check fan/alternator belt	
	Clean battery terminals	
	Check hydraulic hoses	
	Check Vacuator® valve	

Tractor

Check Radiator Hoses



Check radiator hoses for leaks, abnormal swelling or other signs of deterioration. Also check for leaks or corrosion at water pump and fittings.



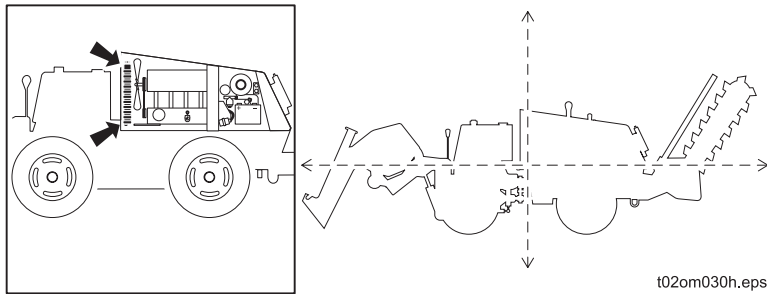
CAUTION Hot parts may cause burns. Do not touch until cool.

50 HOUR SERVICE

	Task	Note
TRACTOR	Check radiator hoses	
	Check fan/alternator belt	
	Clean battery terminals	
	Check hydraulic hoses	
	Check Vacuator® valve	

Tractor

Check Radiator Hoses

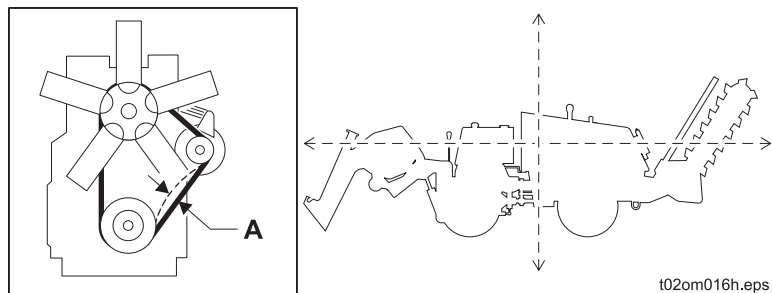


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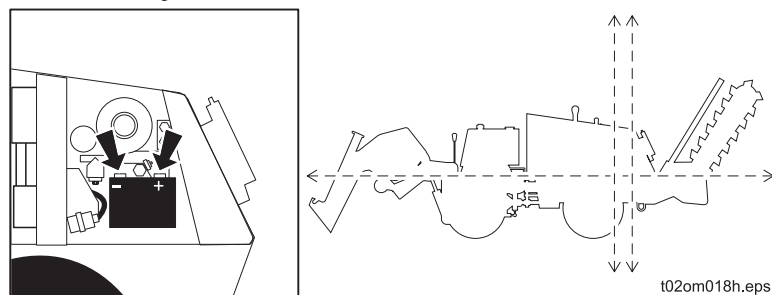
CAUTION Hot parts may cause burns. Do not touch until cool.

Check Fan/Alternator Belt



Check belt for cracking or other signs of wear. Check belt tension by depressing belt at midspan. Proper tension will result in deflection (A) of approximately 1/2" (13 mm). To avoid damage to alternator, do not overtighten.

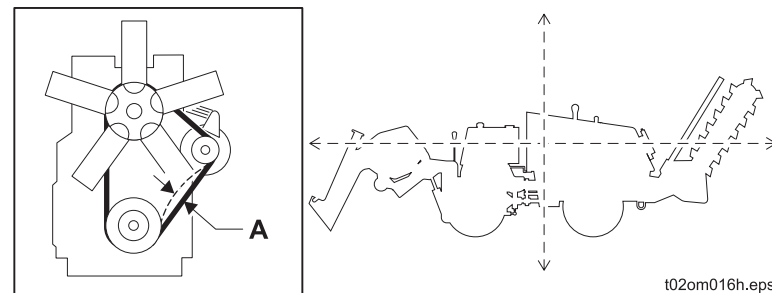
Clean Battery Terminals



Clean battery terminals with wire brush to remove dull glaze and apply MPG to terminals after cleaning to reduce corrosion. Check for signs of internal corrosion in cables and tighten any loose connections.

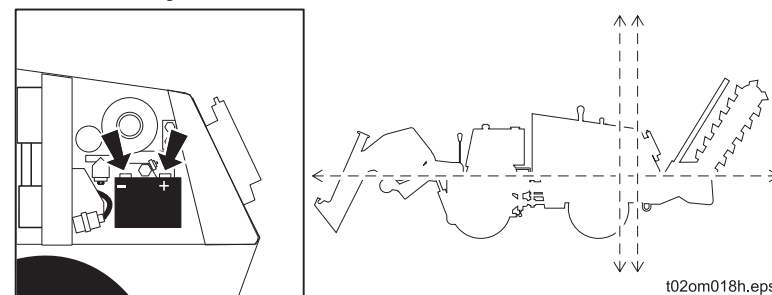


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⚠ WARNING Fire or explosion possible. Fumes could ignite and cause burns. No smoking, no flame, no spark.

NOTICE:

- Do not short circuit across battery terminals for any reason.
- Always disconnect ground cable first.
- Always connect ground cable last.

Check Hydraulic Hoses

Check hydraulic hoses for wear or leaks every 50 hours. Replace as needed.



⚠ WARNING Fluid or air pressure could pierce skin and cause injury or death. Stay away.

NOTICE: Escaping pressurized fluid can cause injury or pierce skin and poison.

- Before disconnecting a hydraulic line, turn engine off and operate all controls to relieve pressure. Lower, block, or support any raised component with a hoist. Cover connection with heavy cloth and loosen connector nut slightly to relieve residual pressure. Catch all fluid in a container.
- Before using system, check that all connections are tight and all lines are undamaged.
- Fluid leaks can be hard to detect. Use a piece of cardboard or wood, rather than hands, to search for leaks.
- Wear protective clothing, including gloves and eye protection.
- If you are injured, seek immediate medical attention from a doctor familiar with this type of injury.



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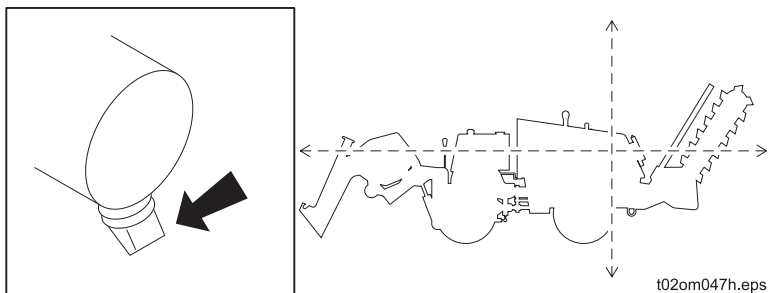


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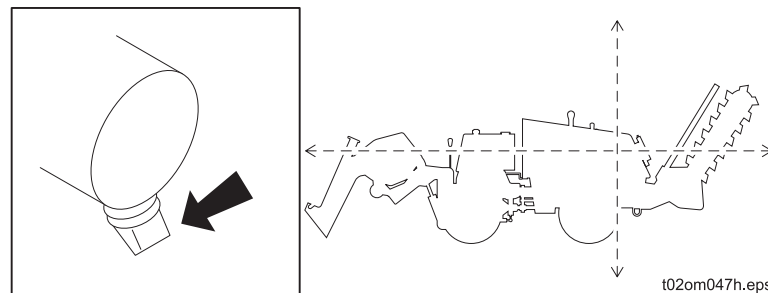
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Check Vacuator® Valve



Check the Vacuator® valve on the air filter cover for wear or damage. Replace yearly, or if damaged, immediately. The Vacuator® valve should close when the engine is running for proper operation.

Check Vacuator® Valve



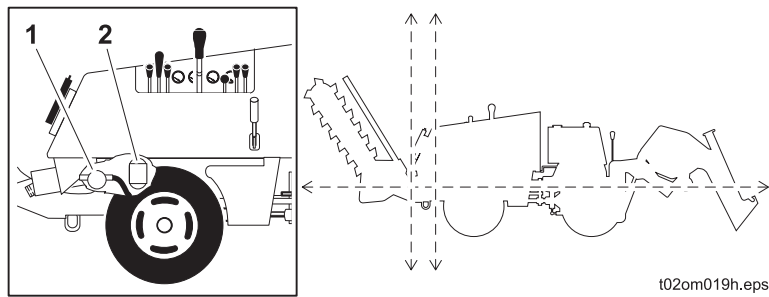
Check the Vacuator® valve on the air filter cover for wear or damage. Replace yearly, or if damaged, immediately. The Vacuator® valve should close when the engine is running for proper operation.

250 HOUR SERVICE

	Task	Note
Tractor	Change hydraulic fluid filters	

Tractor

Change Hydraulic Fluid Filters



Change hydraulic fluid filters (1,2) every 250 hours. Spin-on type filters should be hand-tightened. Do not overtighten. Check oil level at hydraulic reservoir sight glass and fill with fluid as needed.

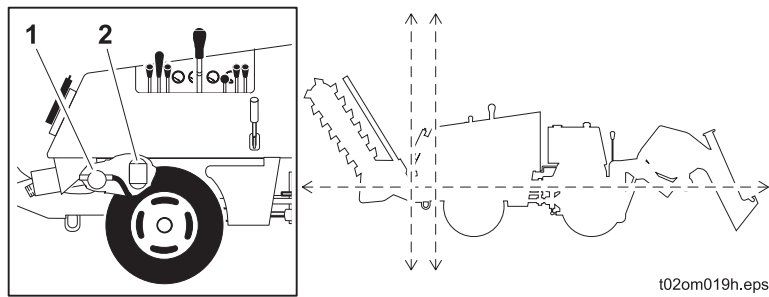
IMPORTANT: Use permanent marker to write date and hours of filter change on filter for future reference.

250 HOUR SERVICE

	Task	Note
Tractor	Change hydraulic fluid filters	

Tractor

Change Hydraulic Fluid Filters



Change hydraulic fluid filters (1,2) every 250 hours. Spin-on type filters should be hand-tightened. Do not overtighten. Check oil level at hydraulic reservoir sight glass and fill with fluid as needed.

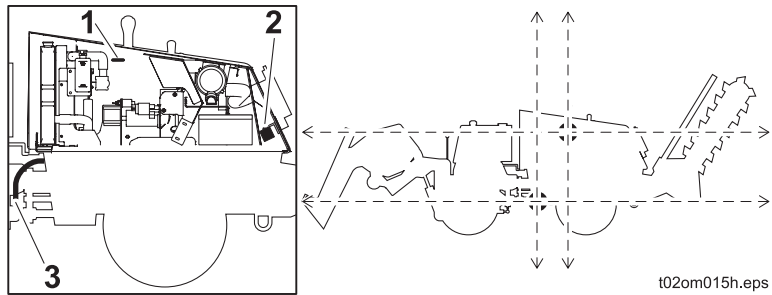
IMPORTANT: Use permanent marker to write date and hours of filter change on filter for future reference.

500 HOUR SERVICE

	Task	Note
TRACTOR	Change engine oil and filter	
	Change hydraulic fluid	THF
	Replace fuel filter	
	Lubricate and inspect U-joints	MPG
	Check ground drive transmission oil level	MPL
	Check ground drive differential oil levels	MPL
PLOW	Change plow vibrator oil	MPL

Tractor

Change Engine Oil and Filter



Change engine oil and filter after 500 hours of operation. See “Recommended Lubricants/Service Key” on page 77.

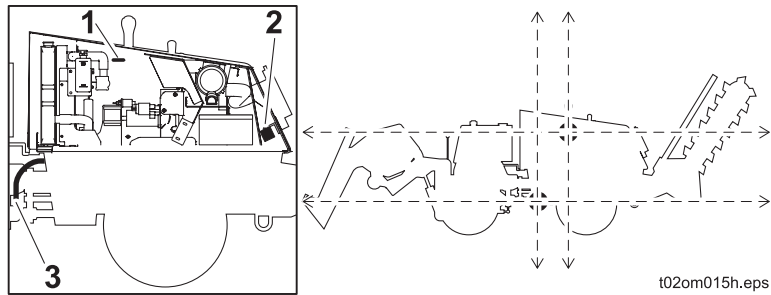


500 HOUR SERVICE

	Task	Note
TRACTOR	Change engine oil and filter	
	Change hydraulic fluid	THF
	Replace fuel filter	
	Lubricate and inspect U-joints	MPG
	Check ground drive transmission oil level	MPL
	Check ground drive differential oil levels	MPL
PLOW	Change plow vibrator oil	MPL

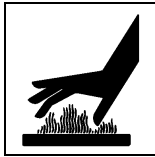
Tractor

Change Engine Oil and Filter



Change engine oil and filter after 500 hours of operation. See “Recommended Lubricants/Service Key” on page 77.



**CAUTION**

Hot parts may cause burns. Do not touch until cool.

To change oil:

1. While oil is warm, remove drain plug (3), located in hose under engine.
2. Drain oil and replace plug.
3. Remove filter (2) and replace with new filter.
4. Filter should be hand-tightened. Do not overtighten.
5. Fill with 6.3 qt (6 L) of DEO at oil fill cap (1).

NOTICE: Change oil and filter more frequently if unit is operating in dusty conditions.

IMPORTANT: Use permanent marker to write date and hours of oil change on filter for future reference.

**CAUTION**

Hot parts may cause burns. Do not touch until cool.

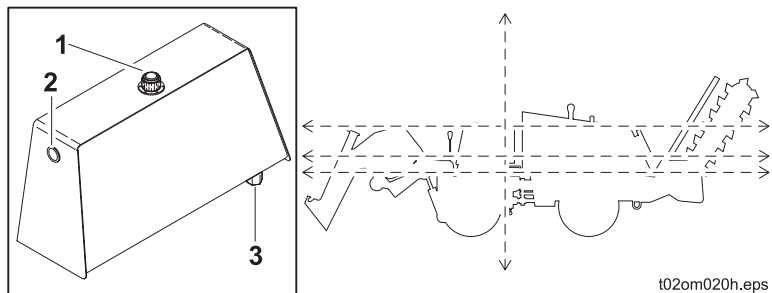
To change oil:

1. While oil is warm, remove drain plug (3), located in hose under engine.
2. Drain oil and replace plug.
3. Remove filter (2) and replace with new filter.
4. Filter should be hand-tightened. Do not overtighten.
5. Fill with 6.3 qt (6 L) of DEO at oil fill cap (1).

NOTICE: Change oil and filter more frequently if unit is operating in dusty conditions.

IMPORTANT: Use permanent marker to write date and hours of oil change on filter for future reference.

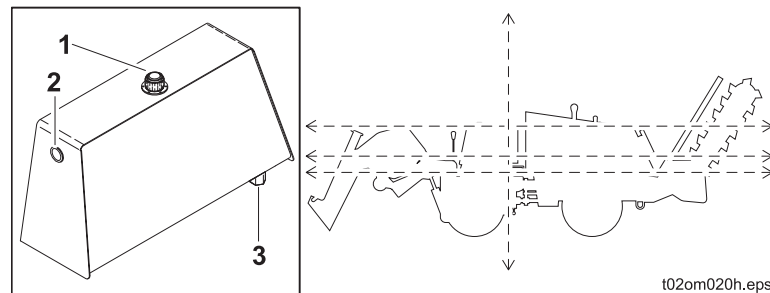
Change Hydraulic Fluid



To change hydraulic fluid:

1. With fluid warm, remove drain plug (3), located at bottom of reservoir on right side of tractor.
2. Drain fluid and replace plug.
3. Fill through fill cap (1) to center of reservoir sight glass (2) with THF. Reservoir capacity is 14 gal (53 L).

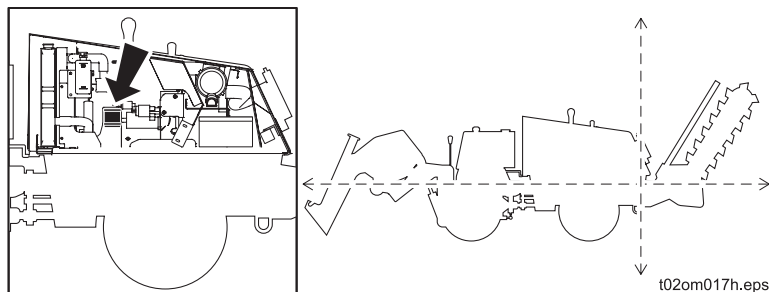
Change Hydraulic Fluid



To change hydraulic fluid:

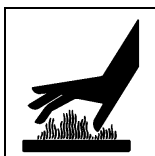
1. With fluid warm, remove drain plug (3), located at bottom of reservoir on right side of tractor.
2. Drain fluid and replace plug.
3. Fill through fill cap (1) to center of reservoir sight glass (2) with THF. Reservoir capacity is 14 gal (53 L).

Replace Fuel Filter



Change engine fuel filter every 500 hours. Replace fuel filter more often if refueling with metal containers. Spin-on type filters should be hand-tightened. Do not overtighten.

NOTICE: Do not spill fuel on hot engine parts. Clean fuel spills immediately.

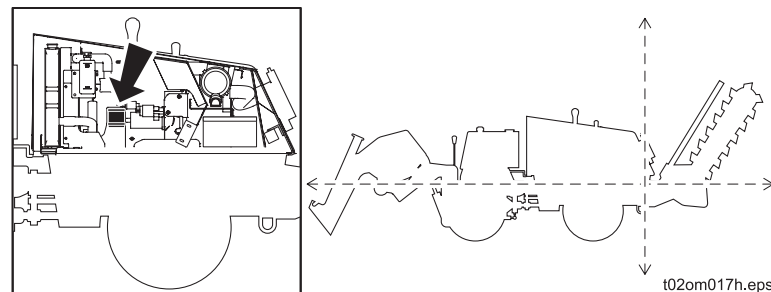


CAUTION

Hot parts may cause burns. Do not touch until cool.

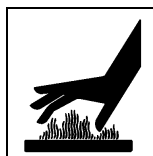
IMPORTANT: Use permanent marker to write date and hours of filter change on filter for future reference.

Replace Fuel Filter



Change engine fuel filter every 500 hours. Replace fuel filter more often if refueling with metal containers. Spin-on type filters should be hand-tightened. Do not overtighten.

NOTICE: Do not spill fuel on hot engine parts. Clean fuel spills immediately.

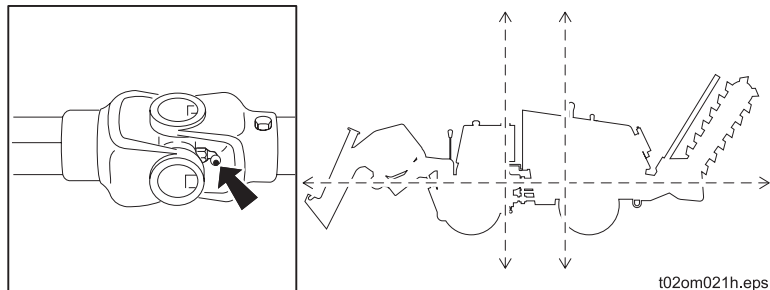


CAUTION

Hot parts may cause burns. Do not touch until cool.

IMPORTANT: Use permanent marker to write date and hours of filter change on filter for future reference.

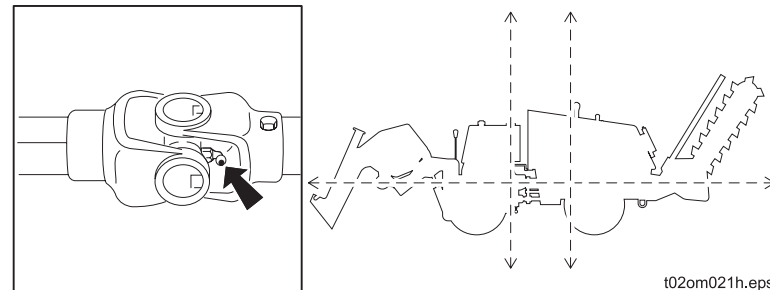
Lubricate and Inspect U-Joints



t02om021h.eps

Lubricate U-joints at zerks with MPG every 500 hours. Clean zerk before servicing to prevent contamination. Also check U-joints for wear or damage.

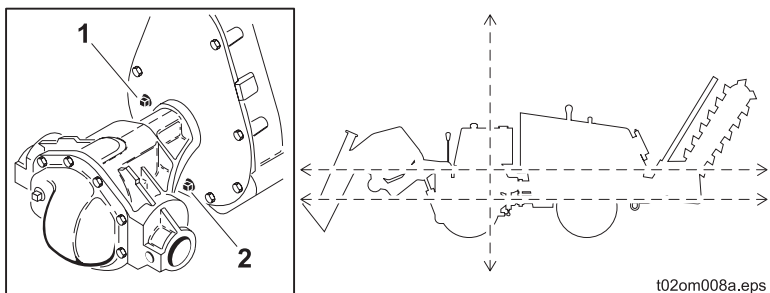
Lubricate and Inspect U-Joints



t02om021h.eps

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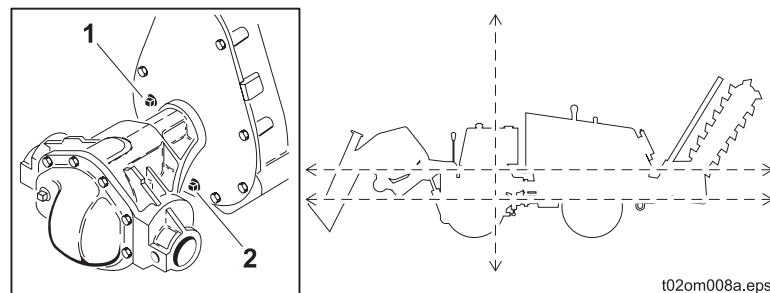
Check Ground Drive Transmission Oil Level



t02om008a.eps

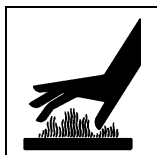
Check ground drive transmission oil every 500 hours. Oil level should be maintained up to fill plug (1). Fill with MPL as needed.

Check Ground Drive Transmission Oil Level



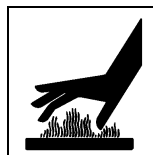
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Check ground drive transmission oil every 500 hours. Oil level should be maintained up to fill plug (1). Fill with MPL as needed.



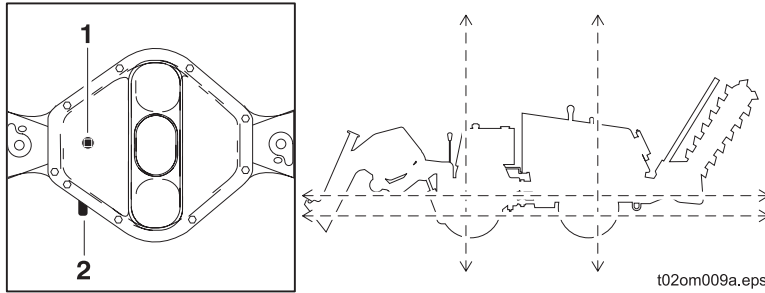
CAUTION

Hot parts may cause burns. Do not touch until cool.

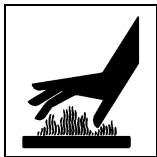


CAUTION

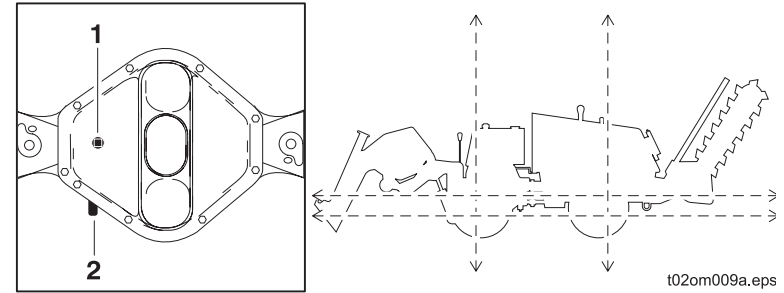
Hot parts may cause burns. Do not touch until cool.

Check Ground Drive Differential Oil Level

Check differential oil every 500 hours. Oil level should be maintained up to fill plug (1). Fill with MPL as needed.

**CAUTION**

Hot parts may cause burns. Do not touch until cool.

Check Ground Drive Differential Oil Level

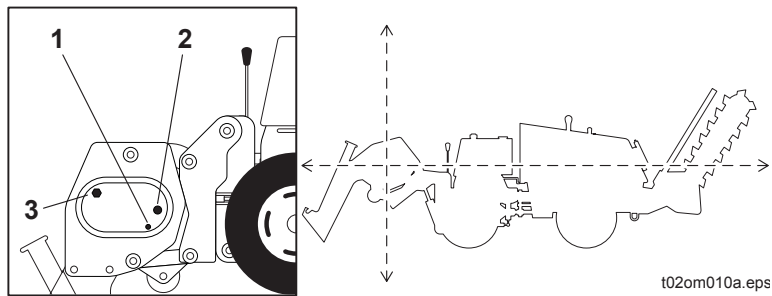
Check differential oil every 500 hours. Oil level should be maintained up to fill plug (1). Fill with MPL as needed.

**CAUTION**

Hot parts may cause burns. Do not touch until cool.

Plow

Change Plow Vibrator Oil



Change oil in plow vibrator every 500 hours.

To change:

1. Removing drain plug (1) located below sight glass (2) on gear cover.
2. Drain oil and replace plug.
3. Fill at fill plug (3) with MPL to level of sight glass.

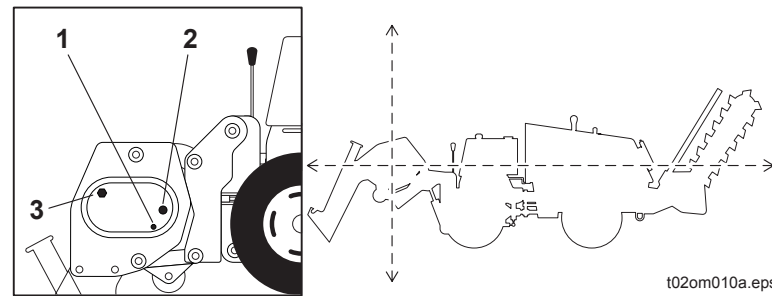
NOTICE: Capacity is 2.4 pt (1 L). Do not overfill.



⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

Plow

Change Plow Vibrator Oil



Change oil in plow vibrator every 500 hours.

To change:

1. Removing drain plug (1) located below sight glass (2) on gear cover.
2. Drain oil and replace plug.
3. Fill at fill plug (3) with MPL to level of sight glass.

NOTICE: Capacity is 2.4 pt (1 L). Do not overfill.

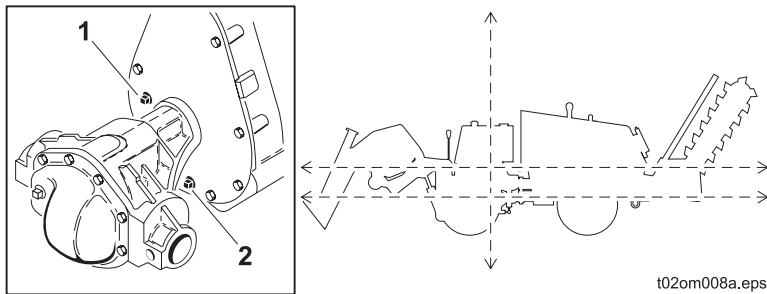


⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

1000 HOUR SERVICE

	Task	Note
TRACTOR	Change ground drive transmission oil	MPL
	Change ground drive differential oil	MPL

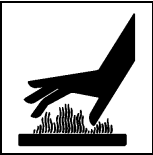
Change Ground Drive Transmission Oil



Change ground drive transmission oil every 1000 hours.

To change:

1. Drain oil at drain plug (2) and replace plug.
2. Fill with MPL to level of fill plug opening (1). Capacity is 4 pt (1.9 L).

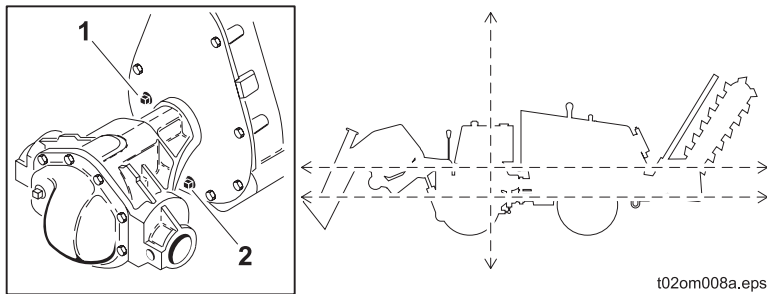


CAUTION Hot parts may cause burns. Do not touch until cool.

1000 HOUR SERVICE

	Task	Note
TRACTOR	Change ground drive transmission oil	MPL
	Change ground drive differential oil	MPL

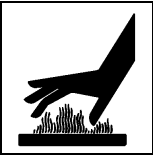
Change Ground Drive Transmission Oil



Change ground drive transmission oil every 1000 hours.

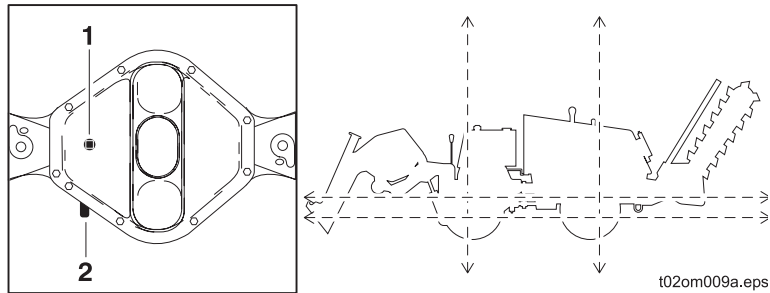
To change:

1. Drain oil at drain plug (2) and replace plug.
2. Fill with MPL to level of fill plug opening (1). Capacity is 4 pt (1.9 L).



CAUTION Hot parts may cause burns. Do not touch until cool.

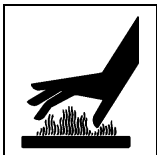
Change Ground Drive Differential Oil



Change differential oil every 1000 hours.

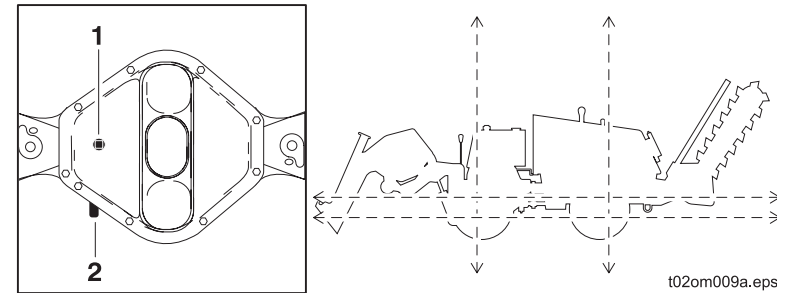
To change:

1. Drain oil at drain plug (2) and replace plug.
2. Fill with MPL to level of fill plug opening (1). Capacity is 4.5 pt (2.1 L).



CAUTION Hot parts may cause burns. Do not touch until cool.

Change Ground Drive Differential Oil



Change differential oil every 1000 hours.

To change:

1. Drain oil at drain plug (2) and replace plug.
2. Fill with MPL to level of fill plug opening (1). Capacity is 4.5 pt (2.1 L).



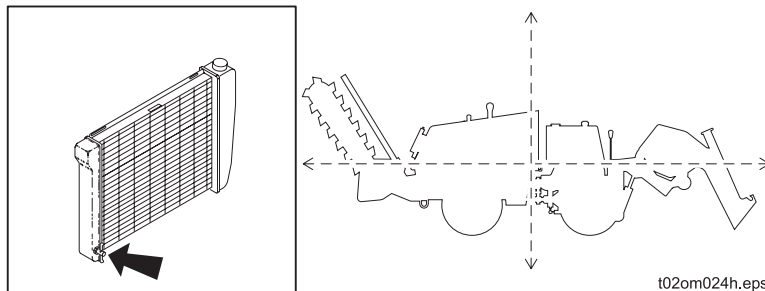
CAUTION Hot parts may cause burns. Do not touch until cool.

2000 HOUR SERVICE

	Task	Note
TRACTOR	Change engine coolant	
	Clean engine crankcase breather	

Tractor

Change Engine Coolant

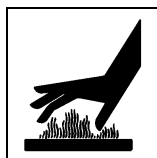


t02om024h.eps

Change coolant every 2 years or 2000 hours. See "Approved Coolants" on page 79.



WARNING Hot pressurized cooling system fluid can cause serious burns. Allow to cool before servicing.



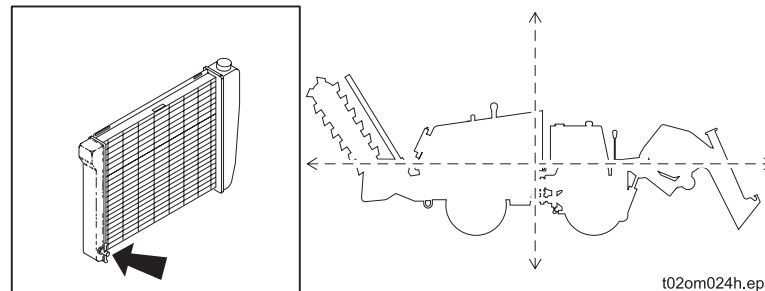
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2000 HOUR SERVICE

	Task	Note
TRACTOR	Change engine coolant	
	Clean engine crankcase breather	

Tractor

Change Engine Coolant



t02om024h.eps

Change coolant every 2 years or 2000 hours. See "Approved Coolants" on page 79.



WARNING Hot pressurized cooling system fluid can cause serious burns. Allow to cool before servicing.



CAUTION Hot parts may cause burns. Do not touch until cool.



CAUTION

Improper handling or use of chemicals may result in illness, injury, or equipment damage. Follow instructions on labels and in material safety data sheets (MSDS).

To change coolant:

1. Locate drain at the bottom of radiator tank on control side of tractor, accessible by removing engine cover.
2. Drain coolant and close drain valve.
3. Fill with approved coolant to within one inch (25 mm) below radiator fill neck. Capacity is 2.3 gal (8.7 L).
4. Inspect radiator cap and replace if seal is damaged.
5. Fill coolant overflow bottle with approved coolant to low level mark.
6. Clean debris from radiator cooling fins using compressed air or pressurized water.

NOTICE:

- To prevent engine damage, it is extremely important that different coolants not be mixed or interchanged without extreme care. It is **strongly** recommended that a single brand and type of coolant be used consistently for all service and maintenance.
- Tractors are shipped with PAR Products Heavy Duty Diesel & Gasoline Silicate Free.
- Should it be necessary to switch coolant brands or types, all residual coolant must first be carefully flushed from the cooling system.
- Failure to properly flush old coolant may result in engine failure.
- Do not use water as coolant.



CAUTION

Improper handling or use of chemicals may result in illness, injury, or equipment damage. Follow instructions on labels and in material safety data sheets (MSDS).

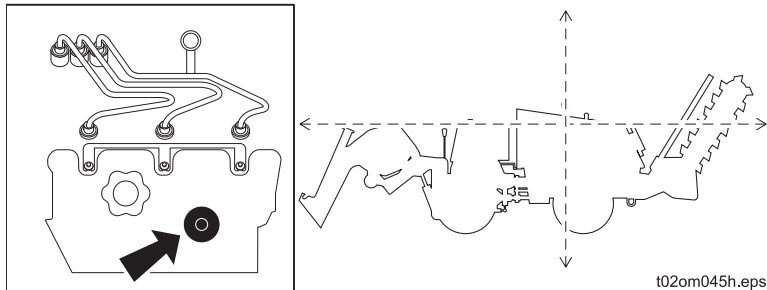
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Clean Engine Crankcase Breather

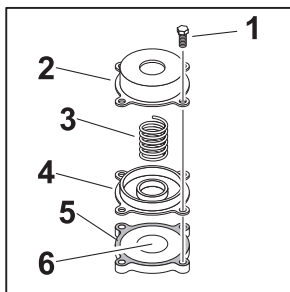


To change engine crankcase breather:

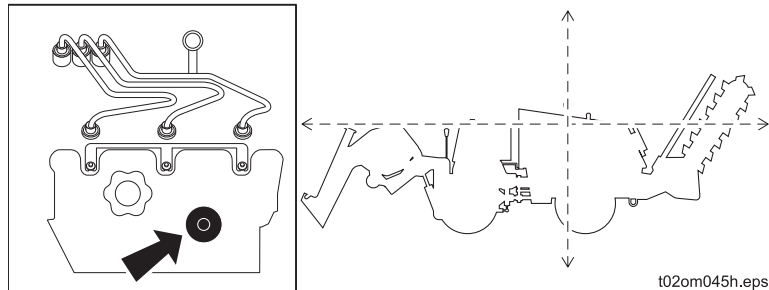
NOTICE: Keep all parts clean from contaminants.

NOTICE: Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

1. Loosen bolts (1) and remove breather cover (2) from the valve mechanism cover.
2. Remove spring (3). Remove the diaphragm and plate (4).
3. Clean vent hole (6). Clean cavity (5) for the breather assembly in the valve mechanism cover.



Clean Engine Crankcase Breather

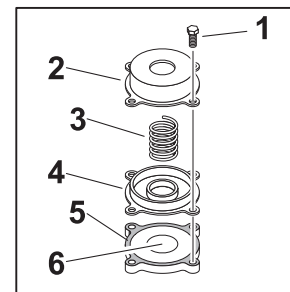


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1. Loosen bolts (1) and remove breather cover (2) from the valve mechanism cover.
2. Remove spring (3). Remove the diaphragm and plate (4).
3. Clean vent hole (6). Clean cavity (5) for the breather assembly in the valve mechanism cover.



NOTICE: Make sure that the components of the breather assembly are installed correctly. Engine damage may occur if the breather assembly is not working properly.

4. Install a new diaphragm and plate (4) for the breather assembly. Install a new spring (3). Install breather assembly into cavity (5) of the valve mechanism cover.
5. Install breather cover (2) and four bolts (1). Tighten the bolts.

NOTICE: Make sure that the components of the breather assembly are installed correctly. Engine damage may occur if the breather assembly is not working properly.

4. Install a new diaphragm and plate (4) for the breather assembly. Install a new spring (3). Install breather assembly into cavity (5) of the valve mechanism cover.
5. Install breather cover (2) and four bolts (1). Tighten the bolts.

AS NEEDED SERVICE

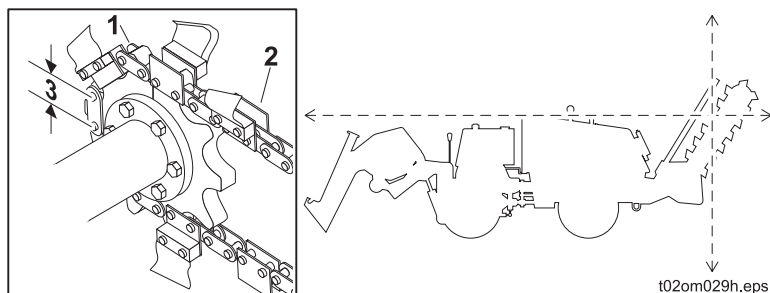
	Task	Note
TRENCHER	Check digging chain rollers, sidebars, pins and bushings	
	Check digging chain teeth and bits	
	Check trencher boom mounting bolts	85 ft•lb (115 N•m)
	Check trencher headshaft sprocket bolts	85 ft•lb (115 N•m)
	Replace digging chain	
REEL CARRIER	Check reel carrier arms	
DRILL	Lube shaft, coupler and U-joint	MPG
TRACTOR	Check and adjust parking brake	
	Check wheel lug nut torque	90 ft•lb (122 N•m)
	Replace air filter	
	Replace fan/alternator belt	
	Replace hoses	
PLOW	Check plow blade	
	Clean plow blade feed tube	
	Remove plow blade	
	Install plow blade	

AS NEEDED SERVICE

	Task	Note
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	Clean plow blade feed tube	
	Remove plow blade	
	Install plow blade	

Trencher Attachment

Check Digging Chain Rollers, Sidebars, Pins and Bushings



Perform periodic visual inspections of digging chain. Check for wear on rollers (1) and sidebars (2). Check pins and bushing wear by measuring distance (3) between chain pins and comparing it to new chain.

NOTICE:

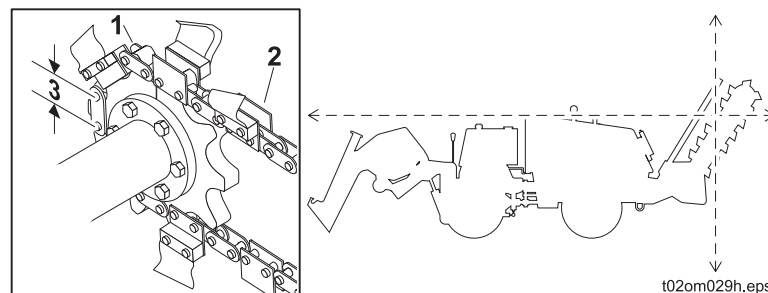
- If sidebars are bending or getting loose on chain pins, chain spacers should be used to join sidebars.
- Replace worn or broken chains.
- Replace sprockets when new chain is installed.



WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

Trencher Attachment

Check Digging Chain Rollers, Sidebars, Pins and Bushings



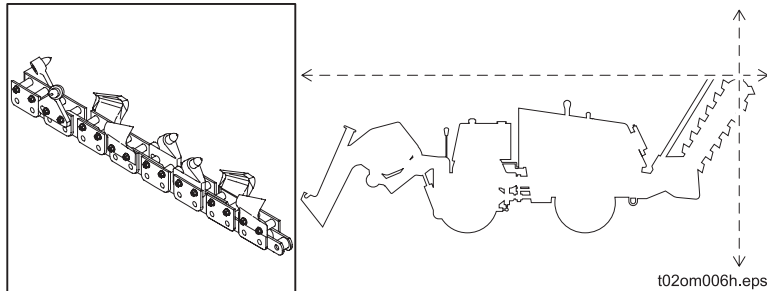
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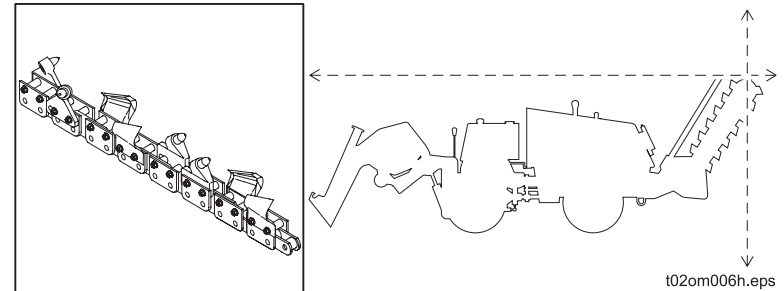
Check Digging Chain Teeth and Bits

Inspect digging chain teeth for wear as needed. Worn teeth should be replaced with new Ditch Witch teeth. Each unit is equipped with a standard tooth configuration. When replacing teeth, maintain original tooth pattern. Depending on soil conditions and type of chain, a different configuration might produce better results. Contact your authorized Ditch Witch dealer for more information about digging teeth patterns.

Alligator chain bits, like teeth, wear out. When tungsten cap or insert is gone, bit will wear quickly. Replace it before bit adapter is damaged.

Bits must rotate freely in bit holders. Clean chain and check bits for free rotation after each use. If any bit does not rotate, it will quickly wear unevenly.

If using rock chain bits, check that bits rotate freely. Clean chain and check bits after each use. Replace bit when tungsten cap or insert is worn or adapter can be damaged.

Check Digging Chain Teeth and Bits

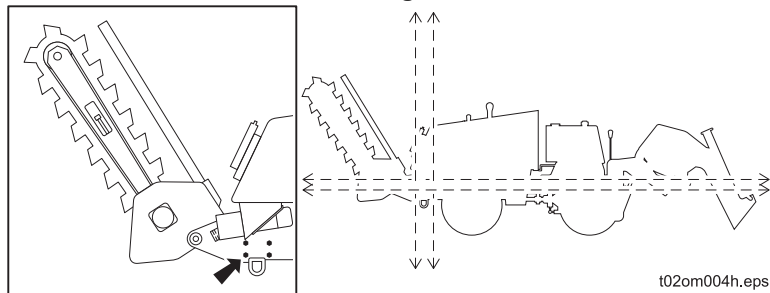
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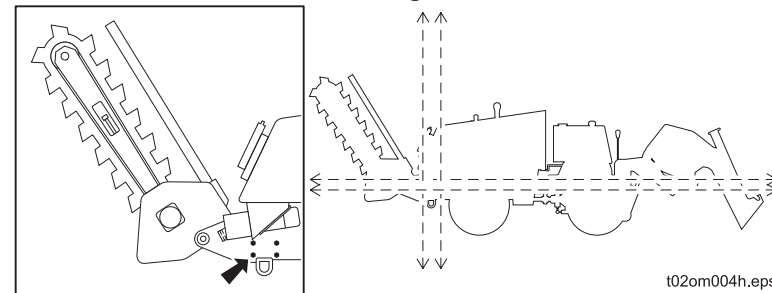
If using rock chain bits, check that bits rotate freely. Clean chain and check bits after each use. Replace bit when tungsten cap or insert is worn or adapter can be damaged.

Check Trencher Boom Mounting Bolts



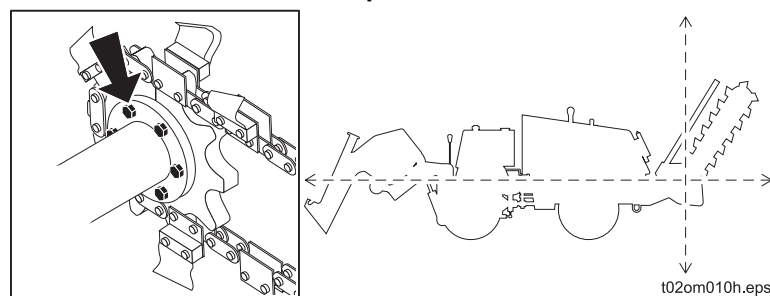
Check tightness of boom mounting bolts as needed. Tighten bolts to 85 ft•lb (115 N•m).

Check Trencher Boom Mounting Bolts



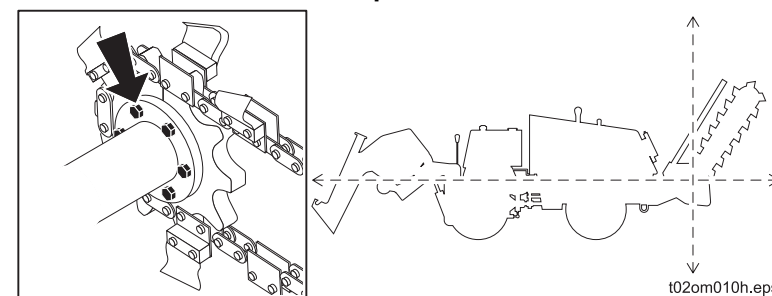
Check tightness of boom mounting bolts as needed. Tighten bolts to 85 ft•lb (115 N•m).

Check Trencher Headshaft Sprocket Bolts



Check tightness of headshaft sprocket bolts as needed. Tighten to 85 ft•lb (115 N•m).

Check Trencher Headshaft Sprocket Bolts

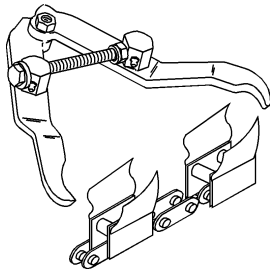


Check tightness of headshaft sprocket bolts as needed. Tighten to 85 ft•lb (115 N•m).

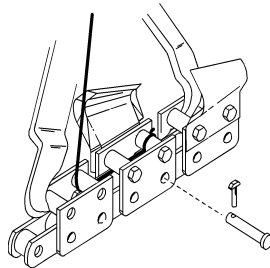
Replace Digging Chain

To remove digging chain:

1. Start engine. See starting procedures in **TRACTOR**.
2. Position digging chain with connector pin at top of boom.
3. Lower boom to ground.
4. Stop engine.
5. Secure chain:
 - With sprocket booms, lock rear idler sprocket.
 - With roller booms, clamp links on either side of connector pin with chain jaws. Squeeze jaws to reduce pressure on connector pin.



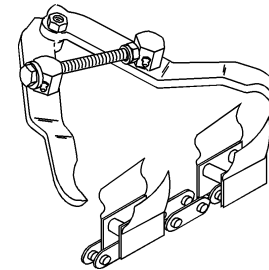
6. Loop cable through links nearest connector pin.



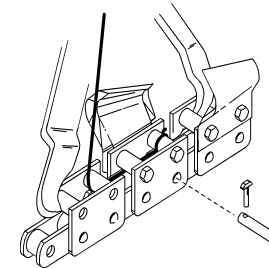
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6. Loop cable through links nearest connector pin.





⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

7. Turn tension bolts counterclockwise to release tension on digging chain.
8. Stand clear of chain. Do not stand behind boom. Keep feet from under boom.
9. Remove pin from connector pin and drive pin out of link.
10. Unclamp links (roller boom). Slowly release cable and lower chain to ground.

To install digging chain:

1. Position digging chain on ground with teeth down and pointed toward unit.
2. Loop cable through end links.
3. Start engine.
4. Back unit up until digging chain extends past headshaft about 12' (30 cm).
5. Lower boom to horizontal position.
6. Stop engine.
7. Secure chain on sprocket booms by locking rear idler sprocket.
8. Pull rear end of chain over tail sprocket or roller. Pull cable until chain is in place on boom.
9. Attach chain jaws to end links and bring links into place.
10. Install connector pin and lock key.



⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

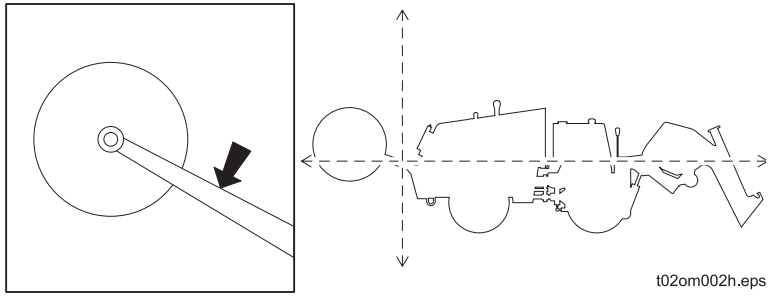
7. Turn tension bolts counterclockwise to release tension on digging chain.
8. Stand clear of chain. Do not stand behind boom. Keep feet from under boom.
9. Remove pin from connector pin and drive pin out of link.
10. Unclamp links (roller boom). Slowly release cable and lower chain to ground.

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Reel Carrier Attachment

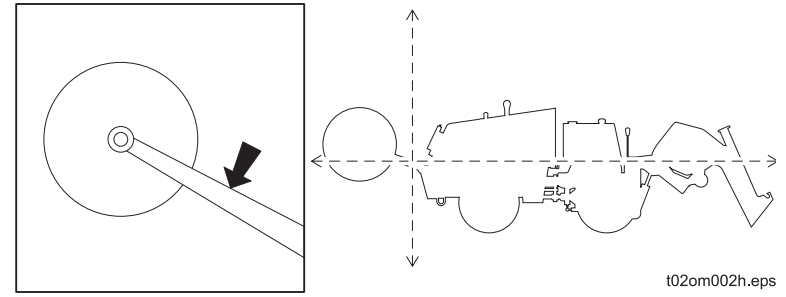
Check Reel Carrier Arms



Check reel carrier arms for damage. Replace if necessary.

Reel Carrier Attachment

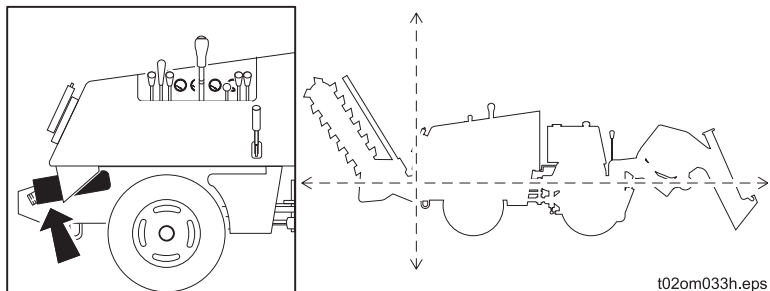
Check Reel Carrier Arms



Check reel carrier arms for damage. Replace if necessary.

Drill

Lube Shaft, Coupler and U-Joint



If tractor is equipped with optional Roto Witch® drilling attachment, lube shaft, coupler and U-joint as needed. Wipe away dirt and debris and clean zerk before servicing to prevent contamination.

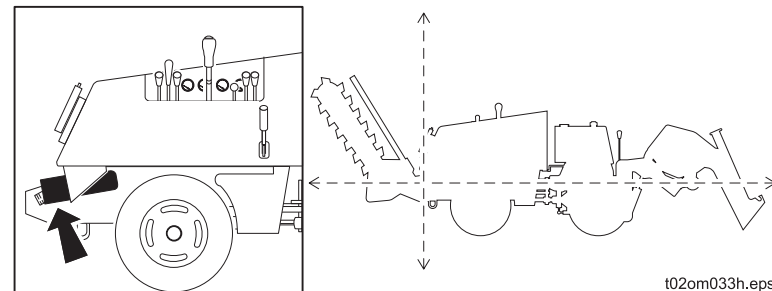


⚠ DANGER

Turning shaft will kill you or crush arm or leg. Do not operate while servicing. Keep away from rotating shaft anytime attachment is operating.

Drill

Lube Shaft, Coupler and U-Joint



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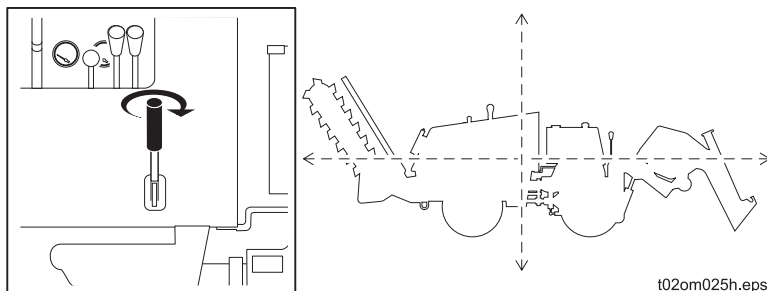


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Tractor

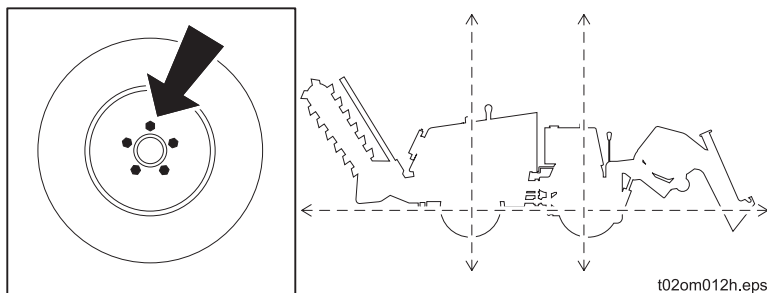
Check and Adjust Parking Brake



t02om025h.eps

Check and adjust parking brake periodically and every 1000 hours. If adjustment is needed, remove orange sleeve with brake released and turn handle lever clockwise to tighten. Replace sleeve. Do not overtighten.

Check and Adjust Wheel Lug Nut Torque

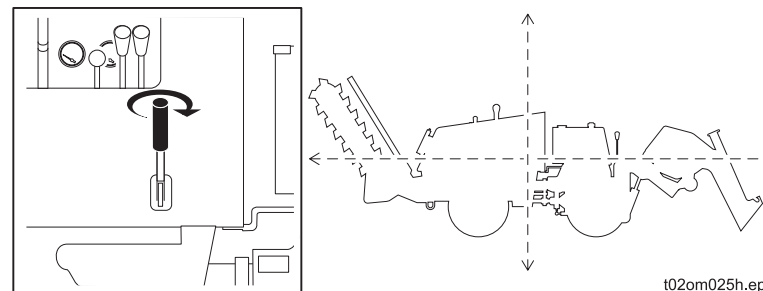


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Check lug nut torque as needed and anytime wheels are removed. Tighten lug nuts to 90 ft•lb (122 N•m) using torque wrench. Check wheels for obvious cracks or damage, replace if needed.

Tractor

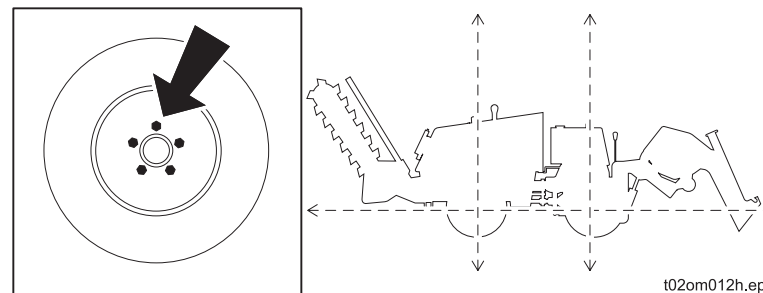
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t02om025h.eps

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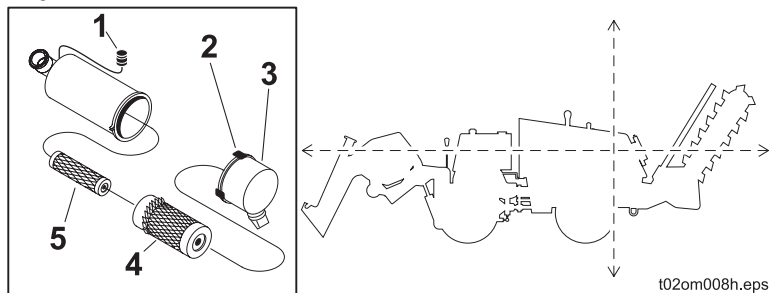
Check and Adjust Wheel Lug Nut Torque



t02om012h.eps

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Replace Air Filter



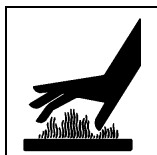
Replace air filter element as needed, when red band on filter minder (1) is visible. Push button to re-set indicator.

To replace air filter:

1. Unlatch (2) and carefully remove the cover (3).
2. Remove the primary (4) and secondary (5) filters from the canister (6).
3. Wipe out the canister (6) and cover (3) with a damp cloth.
4. Install the new secondary and primary filters by hand with a slight turn and firm push to seat the filters in the canister.
5. Install the cover with a slight turn as it reaches the canister to allow the tab inside the cover to go into a slot.

Note: If the cover hits the filter before it is fully in place, then remove the cover and push the filter further into the air cleaner and try again. The cover should go on without any extra force.

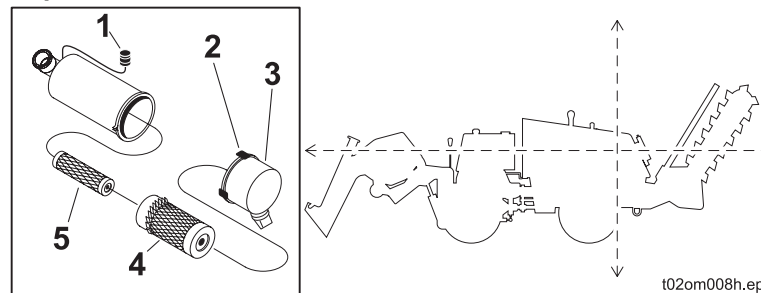
6. Latch the cover in place.
7. Reset filter minder indicator (1) by pressing the red button.



CAUTION

Hot parts may cause burns. Do not touch until cool.

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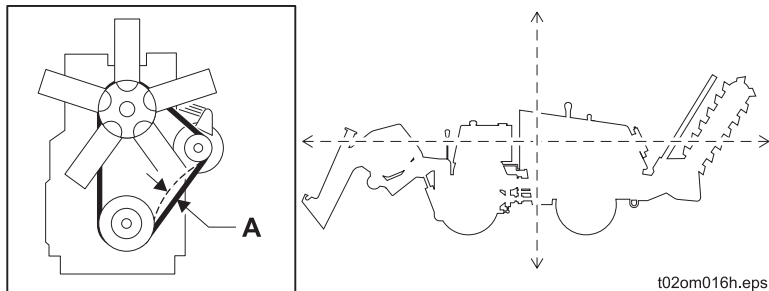
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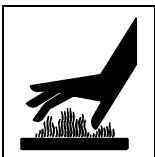
CAUTION

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Replace Fan/Alternator Belt

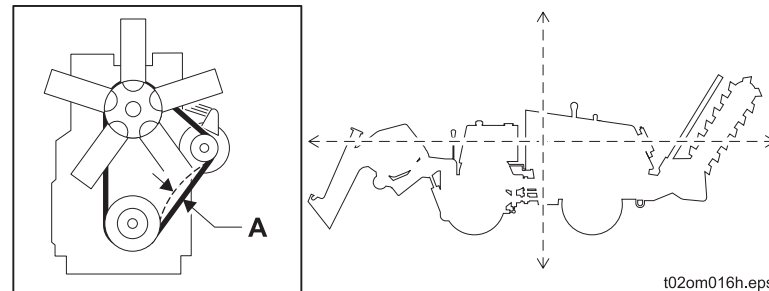


Replace fan/alternator belt as needed. Adjust belt tension until belt deflects approximately 1/2" (13 mm) at midspan. To avoid alternator damage, do not overtighten.

**CAUTION**

Hot parts may cause burns. Do not touch until cool.

Replace Fan/Alternator Belt

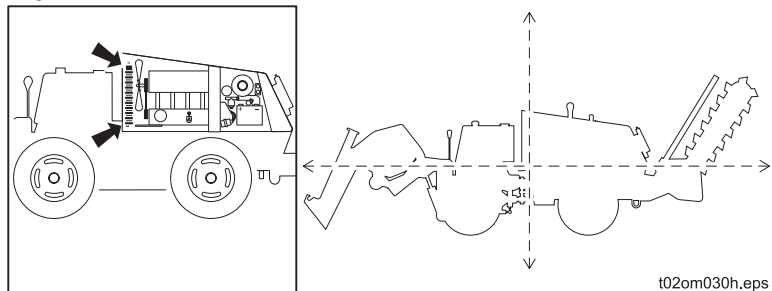


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**CAUTION**

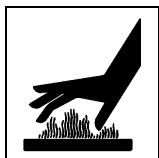
Hot parts may cause burns. Do not touch until cool.

Replace Hoses



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Replace cooling system hoses and other hoses as needed.
Check for leaks, abnormal swelling or other signs of deterioration.



CAUTION

Hot parts may cause burns. Do not touch until cool.



WARNING

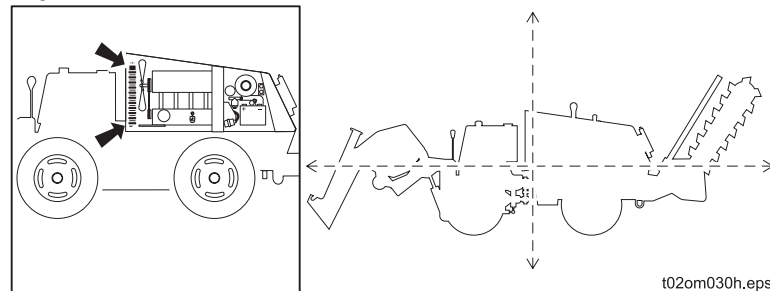
Hot pressurized cooling system fluid can cause serious burns. Allow to cool before servicing.



WARNING

Fluid or air pressure could pierce skin and cause injury or death. Stay away.

Replace Hoses



t02om030h.eps

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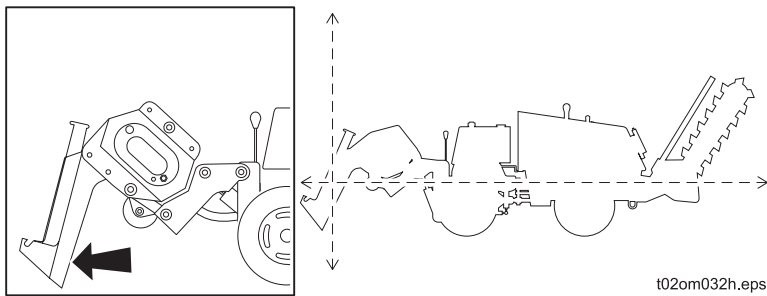


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Plow

Check Plow Blade



Plow blades wear with use and should be replaced when any of the following occur:

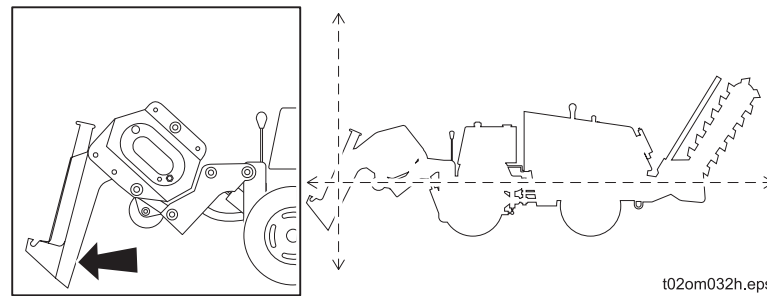
- Plow toe edge is worn to curve
- Side plates begin to peel
- Plow blade bends
- Plow blade is worn, scratched, or gouged



⚠ WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

Plow

Check Plow Blade



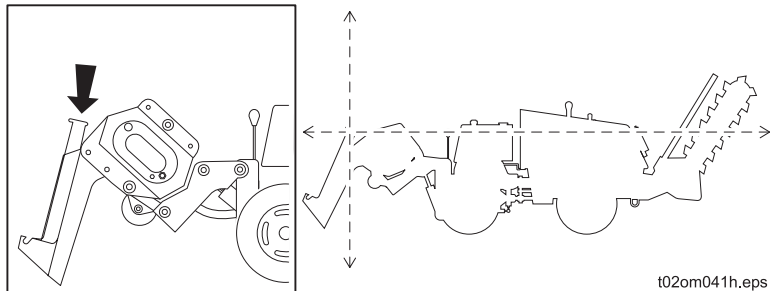
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Clean Plow Blade Feed Tube

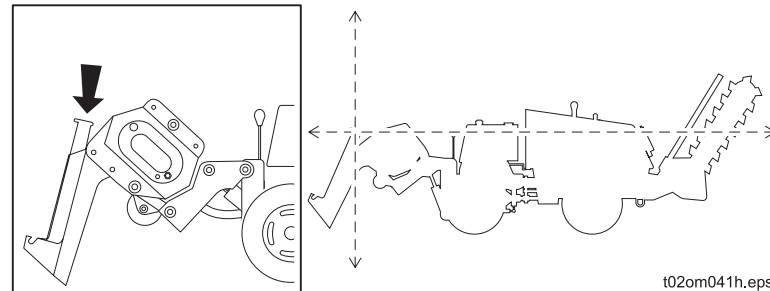


Clean dirt and debris from plow blade feed tube as needed.



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Clean Plow Blade Feed Tube

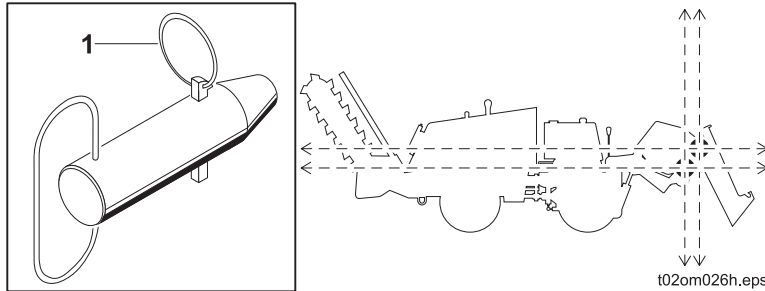


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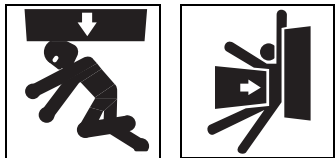


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Remove Plow Blade

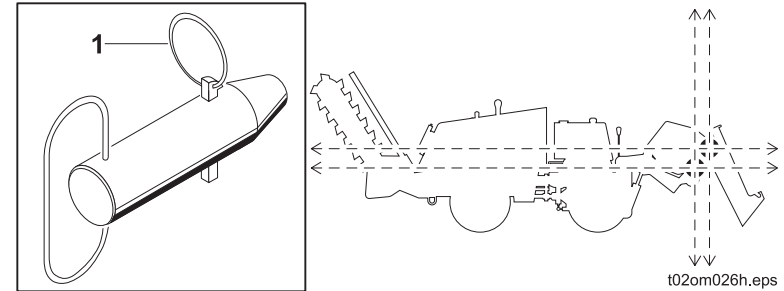


1. Engage plow swing lock.
2. Push plow lift control to position plow so blade barely clears the ground.
3. Stop engine.
4. Engage parking brake.
5. Remove keeper pins (1).
6. Remove front plow blade pin (nearest cutting edge).
7. Remove rear plow blade pin (farthest from cutting edge).

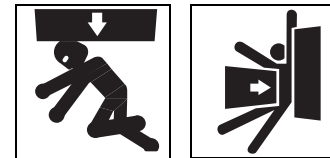


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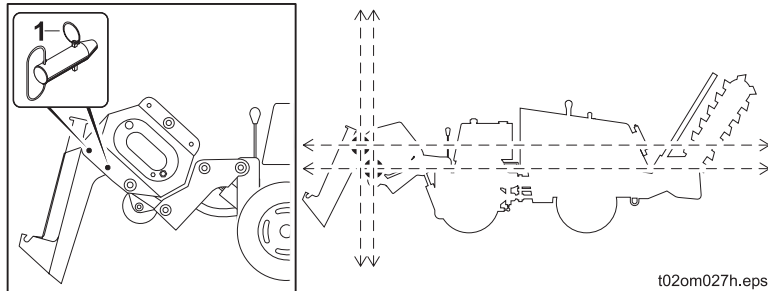


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Install Plow Blade

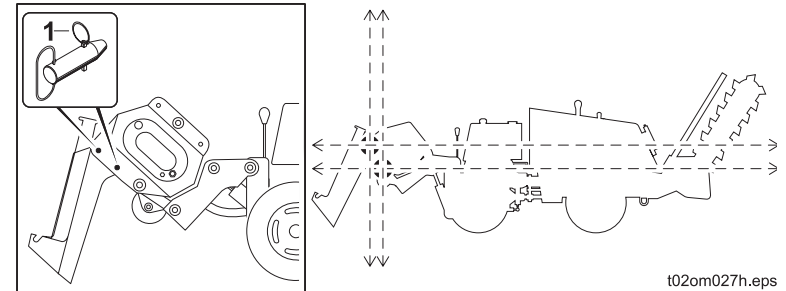


1. Engage plow swing lock.
2. Use plow lift control to raise plow.
3. Stop engine.
4. Engage parking brake.
5. Position blade with cutting edge down so pin holes in blade align with pin holes in vibrator.
6. Install upper blade pin, then install lower pin.
7. Start engine and lower plow blade to ground.

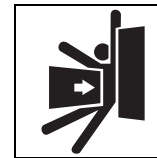


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Install Plow Blade



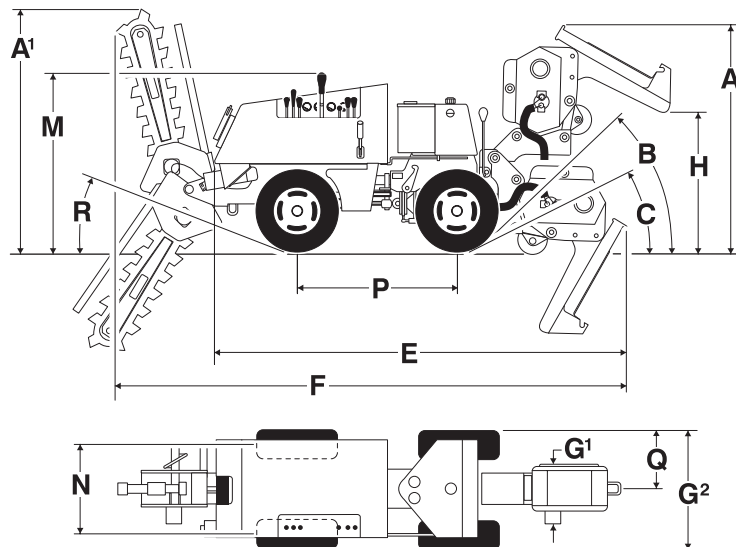
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SPECIFICATIONS

410sx STANDARD UNIT

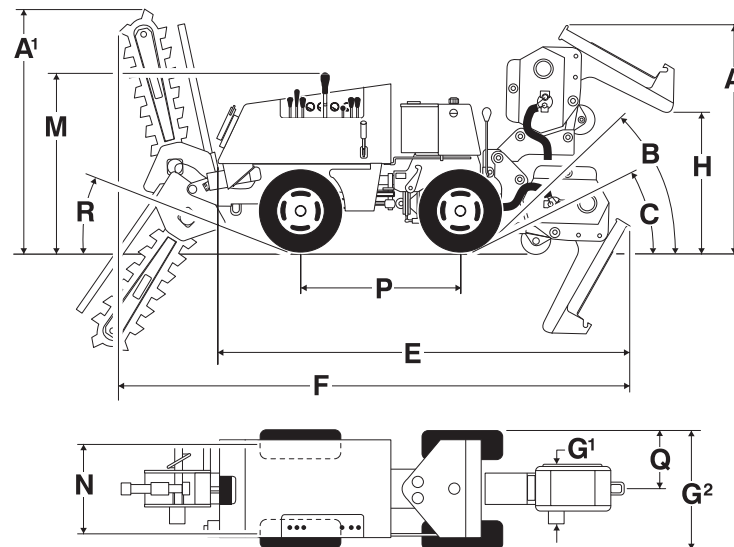


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DIMENSIONS		U.S.	METRIC
A	Transport height from top of raised plow	58 in	1.5 m
A'	Transport height from top of 2' (610 mm) boom and chain	63.5 in	1.6 m
B	Angle of departure without blade	39°	39°
C	Angle of departure with 24' (610 mm) blade	17°	17°
E	Maximum length plowing without trenching attachment	118 in	3.0 m
F	Maximum length plowing with trenching attachment and 3' (915 mm) boom	151 in	3.8 m
G ¹	Width, plow unit	23 in	580 mm
G ²	Width, transport (23 x 10.50-12 tires)	36 in	910 mm
	Width, transport (26 x 12-12 tires)	48.5 in	1.2 m
	Width, transport (23 x 10.50 dual tires)	56 in	1.4 m

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	Width, transport (23 x 10.50 dual tires)	56 in	1.4 m

H	Blade ground clearance with 18" (457 mm) blade	26 in	660 mm
K	Maximum cover depth*	24 in	610 mm
M	Operating height without trenching attachment	49.5 in	1.3 m
N	Tread (23 x 10.50-12 tires)	25.5 in	650 mm
	Tread (26 x 12 -12 tires)	37.5 in	950 mm
P	Wheelbase	46 in	1.2 m
Q	Centerline plow to outside edge of unit, blade centered (23 x 10.50-12 tires)	18 in	460 mm
	Centerline plow to outside edge of unit, blade centered (26 x 12-12 tires)	24 in	610 mm
R	Angle of approach with trenching attachment	21°	21°
	Angle of approach without trenching attachment	22°	22°

Dimensions are based on unit equipped with 26 x 12-12 tires unless otherwise specified.

* Suggested maximum depth. Actual depth will depend on job requirements and soil conditions.

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OPERATION		U.S.	METRIC
Operator orientation: Side position provides full view of work areas			
Vehicle speeds @ 2775 rpm			
	Maximum transit forward (23 x 10.50-12 tires)	2.3 mph	3.8 km/h
	Maximum transit forward (26 x 12-12 tires)	2.7 mph	4.3 km/h
	Maximum transit reverse (23 x 10.50-12 tires)	1.1 mph	1.8 km/h
	Maximum transit reverse (26 x 12-12 tires)	1.4 mph	2.3 km/h
Maximum pipe or cable diameter, pull type plow blade		3 in	75 mm
Feed type plow blade, inside chute diameter		1 in	25 mm
Vehicle clearance circle, wall-to-wall, with trenching attachment and 18" (457 mm) plow blade			
	Right turn (23 x 10.50-12 tires)	20 ft	6.1 m
	Right turn (26 x 12-12 tires)	21 ft	6.4 m
	Left turn (23 x 10.50-12 tires)	18 ft	5.5 m
	Left turn (26 x 12-12 tires)	19 ft	5.8 m
Operating weight			
	Basic unit weight without plow blade or options	3270 lb	1483 kg
	H400 weight without boom, chain, or restraint bar	310 lb	140 kg
	Reel carrier weight without reel	100 lb	45 kg

OPERATION		U.S.	METRIC
Operator orientation: Side position provides full view of work areas			
Vehicle speeds @ 2775 rpm			
	Maximum transit forward (23 x 10.50-12 tires)	2.3 mph	3.8 km/h
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Maximum pipe or cable diameter, pull type plow blade		3 in	75 mm
Feed type plow blade, inside chute diameter		1 in	25 mm
Vehicle clearance circle, wall-to-wall, with trenching attachment and 18" (457 mm) plow blade			
	Right turn (23 x 10.50-12 tires)	20 ft	6.1 m
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POWER PLANT	U.S.	METRIC
Engine: Caterpillar 3013C or Perkins 403C-15		
Fuel: diesel		
Cooling medium: liquid		
Number of cylinders: 3		
Engine angle, max. (continuous, all directions) *	20°	20°
Displacement	91 in ³	1.5 L
Bore	3.3 in	84 mm
Stroke	3.5 in	90 mm
Manufacturer's gross power rating (Per SAE J1995)	31.4 hp	23.4 kW
Estimated net power rating (per SAE J1349)	29 hp	21.6 kW
Rated speed	2600 rpm	2600 rpm
* Exceeding this operating angle will cause damage. This DOES NOT imply machine is stable to maximum angle of safe engine operation.		

POWER TRAIN	
Ground drive transmission: Hydrostatic drive, infinitely variable from zero to maximum, lever operated speed and direction control	
Brake: Speed/direction control brakes machine hydraulically when moved to neutral position	
Parking brake: Mechanical disc and caliper, hand operated	
Differentials: Dana 44, limited slip	
Tires	
	23 x 10.5-12 tubeless 4 ply
	26 x 12-12 tubeless or tube type 4 ply

ATTACHMENT DRIVE
Plow--- hydrostatic
Trencher---hydrostatic

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ATTACHMENT DRIVE
Plow--- hydrostatic
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HYDRAULIC SYSTEM		U.S.	METRIC
Ground drive pump capacity at 2775 rpm		16.7 gpm	63.2 L/min
Ground drive relief valve setting		4000 psi	276 bar
Attachment pump capacity @ 2775 rpm		18.9 gpm	71.5 L/min
Attachment relief valve setting		3000 psi	207 bar
Auxilliary pump capacity @ 2775 rpm		7.8 gpm	29.5 L/min
Auxilliary pump relief valve setting		2000 psi	138 bar
Filtration			
	Charge pump, 25 psi (2 bar) bypass with 10 micron nominal filter		
	Return full flow, 15 psi (1 bar) bypass with 10 micron nominal filter		

FLUID CAPACITIES	U.S.	METRIC
Fuel tank	8.8 gal	33.3 L
Engine oil with filter	6.3 qt	6.0 L
Hydraulic reservoir	14 gal	53 L
Hydraulic system	16 gal	60 L
Cooling system	2.3 gal	8.7 L
Ground drive transmission	2.0 qt	2.0 L
Ground drive differentials	4.5 pt	2.1 L
Plow vibrator	2.4 pt	1.1 L

BATTERY

Group 75DT; 720 cold crank amps@ 0° F (-18° C) SAE reserve capacity 90 minutes

HYDRAULIC SYSTEM		U.S.	METRIC
Ground drive pump capacity at 2775 rpm		16.7 gpm	63.2 L/min
Ground drive relief valve setting		4000 psi	276 bar
Attachment pump capacity @ 2775 rpm		18.9 gpm	71.5 L/min
Attachment relief valve setting		3000 psi	207 bar
Auxilliary pump capacity @ 2775 rpm		7.8 gpm	29.5 L/min
Auxilliary pump relief valve setting		2000 psi	138 bar
Filtration			
	Charge pump, 25 psi (2 bar) bypass with 10 micron nominal filter		
	Return full flow, 15 psi (1 bar) bypass with 10 micron nominal filter		

FLUID CAPACITIES	U.S.	METRIC
Fuel tank	8.8 gal	33.3 L
Engine oil with filter	6.3 qt	6.0 L
Hydraulic reservoir	14 gal	53 L
Hydraulic system	16 gal	60 L
Cooling system	2.3 gal	8.7 L
Ground drive transmission	2.0 qt	2.0 L
Ground drive differentials	4.5 pt	2.1 L
Plow vibrator	2.4 pt	1.1 L

BATTERY

Group 75DT; 720 cold crank amps@ 0° F (-18° C) SAE reserve capacity 90 minutes

H400 TRENCHER

DIMENSIONS *		U.S.	METRIC
Trench depth, maximum		36 in	910 mm
Trench width, minimum to maximum		3.5-6 in	90-150 mm
Boom travel down		57°	57°
Boom travel up		78°	78°
Centerline trench to outside edge of unit			
	Left	22 in	559 mm
	Right	27 in	686 mm
Headshaft height- digging chain			
	Up	24 in	610 mm
	Down	8 in	200 mm
Headshaft overhang			
	Up	38.5 in	980 mm
	Down	32 in	810 mm
Headshaft speed w/o chain (no load)		310 rpm	310 rpm
Digging chain speed		338 fpm	103 m/min

* Dimensions are based on unit equipped with 26 x 12-12 tires unless otherwise specified.

FRONT- MOUNTED REEL CARRIER

DIMENSIONS	U.S.	METRIC
Maximum reel weight	200 lb	45.4 kg
Maximum reel diameter	36 in	635 mm
Maximum reel width	24 in	610 mm

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ROTO WITCH

DIMENSIONS		U.S.	METRIC
Bore diameter		1.75 - 12 in	45 - 300 mm
Hydraulic motor			
	Displacement	18.7 in ³	306 cm ³
	Torque @ 2,000 rpm	450 ft•lb	610 N•m
	Speed @ 19 gpm, no load	235 rpm	235 rpm
	Speed @ 15 gpm, 2000 psi	190 rpm	190 rpm

Specifications are called out according to SAE recommended practices. Specifications are general and subject to change without notice. If exact measurements are required, equipment should be weighted and measured. Due to selected options, delivered equipment may not necessarily match that shown.

ROTO WITCH

DIMENSIONS		U.S.	METRIC
Bore diameter		1.75 - 12 in	45 - 300 mm
Hydraulic motor			
	Displacement	18.7 in ³	306 cm ³
	Torque @ 2,000 rpm	450 ft•lb	610 N•m
	Speed @ 19 gpm, no load	235 rpm	235 rpm
	Speed @ 15 gpm, 2000 psi	190 rpm	190 rpm

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WARRANTY

Ditch Witch Equipment and Parts Limited Warranty Policy

Subject to the limitations and exclusions herein, free replacement parts will be provided at any authorized Ditch Witch dealership for any Ditch Witch equipment or parts manufactured by The Charles Machine Works, Inc. (CMW) that fail due to a defect in material or workmanship within one (1) year of first commercial use (Exception: 2 years for all SK500 attachments). Free labor will be provided at any authorized Ditch Witch dealership for installation of parts under this warranty during the first year following initial commercial use of the serial-numbered Ditch Witch equipment on which it is installed.

Exclusions from Product Warranty

- Wear-related failure of parts subject to ground contact including, but not limited to, digging teeth, digging chains, sprockets, backhoe buckets, plow blades, drill pipe, drill bits, backreamers, and swivels.
- All incidental or consequential damages.
- All defects, damages, or injuries caused by misuse, abuse, improper installation, alteration, neglect, or uses other than those for which products were intended.
- All defects, damages, or injuries caused by improper training, operation, or servicing of products in a manner inconsistent with manufacturer's recommendations.
- All engines and engine accessories (these are covered by original manufacturer's warranty).
- Tires, belts, and other parts which may be subject to another manufacturer's warranty (such warranty will be available to purchaser).
- All implied warranties not expressly stated herein, including any warranty of fitness for a particular purpose and merchantability.

IF THE PRODUCTS ARE PURCHASED FOR COMMERCIAL PURPOSES AS DEFINED BY THE UNIFORM COMMERCIAL CODE, THEN THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE FACE HEREOF AND THERE ARE NO IMPLIED WARRANTIES OF ANY KIND WHICH EXTEND TO A COMMERCIAL BUYER. ALL OTHER PROVISIONS OF THIS LIMITED WARRANTY APPLY INCLUDING THE DUTIES IMPOSED.

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Ditch Witch products have been tested to deliver acceptable performance in most conditions. This does not imply they will deliver acceptable performance in all conditions. Therefore, to assure suitability, products should be operated under anticipated working conditions prior to purchase.

Defects will be determined by an inspection within thirty (30) days of the date of failure of the product or part by CMW or its authorized dealer. CMW will provide the location of its inspection facilities or its nearest authorized dealer upon inquiry. CMW reserves the right to supply remanufactured replacements parts under this warranty as it deems appropriate.

Extended warranties are available upon request from your local Ditch Witch dealer or CMW.

Some states do not allow exclusion or limitation of incidental or consequential damages, so above limitation of exclusion may not apply. Further, some states do not allow exclusion of or limitation of how long an implied warranty lasts, so the above limitation may not apply. This limited warranty gives product owner specific legal rights and the product owner may also have other rights which vary from state to state.

For information regarding this limited warranty, contact CMW's Product Support department, P.O. Box 66, Perry, OK 73077-0066, or contact your local Ditch Witch dealer.

First version: 1/91; Latest version: 1/03

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**A Note To
Ditch Witch
Equipment Owners:**

If your equipment was purchased through a Ditch Witch dealer, there is no need to read further.

However, if you purchased from any other source, please fill out the form on the reverse side and return it to us.

This will enable you to receive updates on this equipment as well as information on new products of interest.

Thanks for using Ditch Witch equipment.

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(Please Fold Along This Line And Seal At Bottom With Tape)

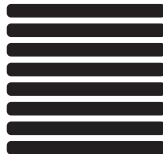


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UNITED STATES

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FIRST CLASS PERMIT NO 23 PERRY OKLAHOMA

POSTAGE WILL BE PAID BY



**The Charles Machine Works, Inc.
P.O. Box 66
Perry, Oklahoma 73077-9989**



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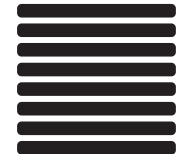


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Perry, Oklahoma 73077-9989**



Ditch Witch® Registration Card

Please Type or Print All Information

Purchaser's Company Name		
Attention		
Street Address or P.O. Box		
City	County	
State	Zip	Nation
()		
Phone Number With Area Code		
Model	Serial Number	
Attachments/Accessories	Serial Numbers	
Attachments/Accessories	Serial Numbers	
Attachments/Accessories	Serial Numbers	
Name of Ditch Witch Dealership		
Your Signature		

Ditch Witch® Registration Card

Please Type or Print All Information

Purchaser's Company Name		
Attention		
Street Address or P.O. Box		
City	County	
State	Zip	Nation
()		
Phone Number With Area Code		
Model	Serial Number	
Attachments/Accessories	Serial Numbers	
Attachments/Accessories	Serial Numbers	
Attachments/Accessories	Serial Numbers	
Name of Ditch Witch Dealership		
Your Signature		

