RT100

with Powershift Transmission

Operator's Manual

CE

CMW®

Issue 1.0

Original Instruction

053-2707

Overview

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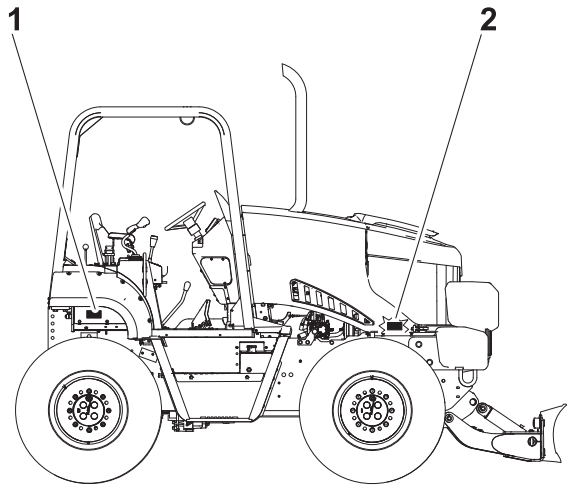
Serial Number Location

Record serial numbers and date of purchase in spaces provided. RT100 (1) and engine serial numbers (2) are located as shown.



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Date of manufacture	
Date of purchase	
RT100 serial number	
Engine serial number	
Front attachment serial number	
Rear attachment serial number	

Intended Use

The RT100 is a riding trencher designed to install buried service lines of various sizes using a variety of Ditch Witch attachments.

Attachment	Max. trench width	Max. trench depth*
M910 trencher	24" (610 mm)	100" (2.5 m)
M912 offset trencher	24" (610 mm) center	96" (2.4 m)
	12" (305 mm) offset	96" (2.4 m)

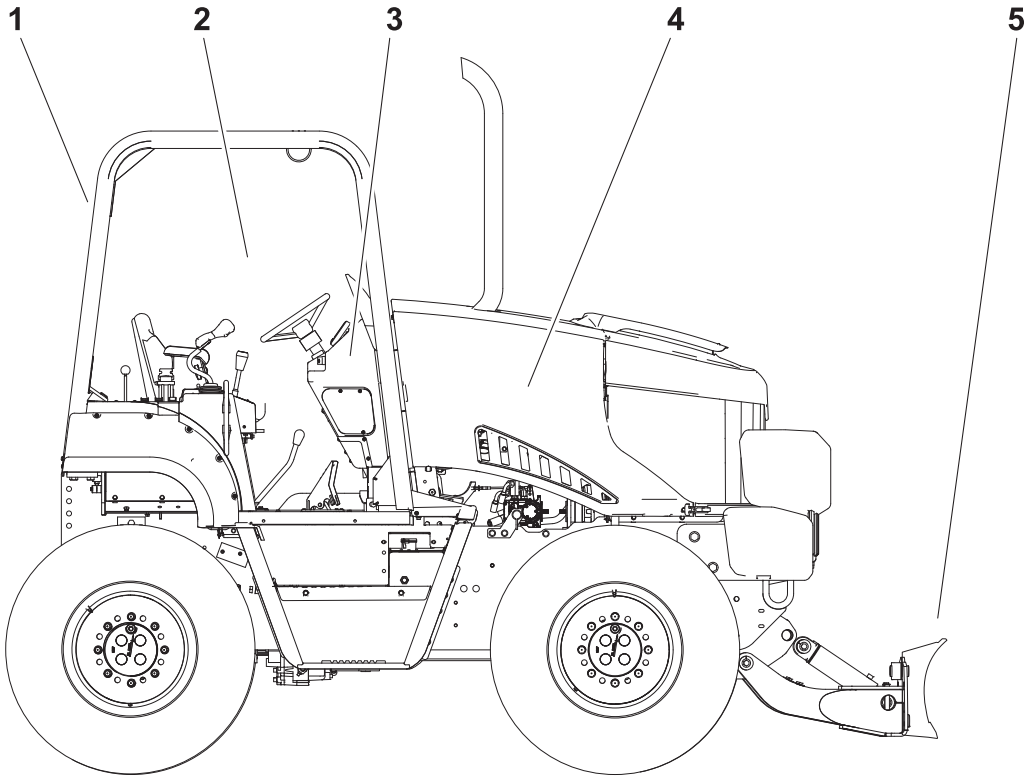
These units are designed for operation in temperatures typically experienced in earth moving and construction work environments. Provisions may be required to operate in extreme temperatures. Contact your Ditch Witch dealer. Use in any other way is considered contrary to the intended use.

The RT100 should be used with genuine Ditch Witch chain, teeth, and sprockets. It should be operated, serviced, and repaired only by persons familiar with their particular characteristics and acquainted with the relevant safety procedures.

Equipment Modification

This equipment was designed and built in accordance with applicable standards and regulations. Modification of equipment could mean that it will no longer meet regulations and may not function properly or in accordance with the operating instructions. Modification of equipment should only be made by competent personnel possessing knowledge of applicable standards, regulations, equipment design functionality/requirements and any required specialized testing.

Unit Components



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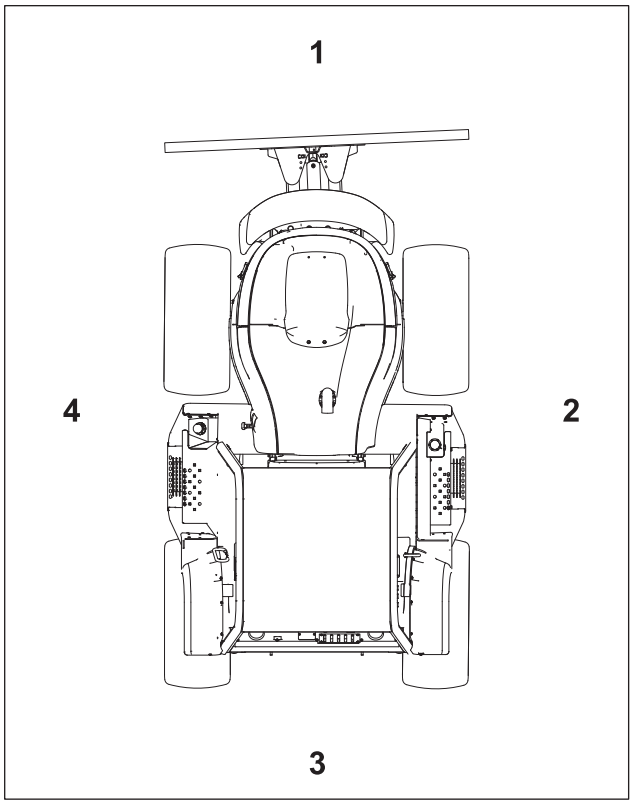
1. Rollover Protective Structure (ROPS)
2. Operator station
3. Control consoles
4. Engine compartment
5. Backfill blade (optional)

Operator Orientation

1. Front of unit
2. Right of unit
3. Rear of unit
4. Left of unit

Right and left sides of machine are determined by facing front of unit while seated at the controls.



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About This Manual

This manual contains information for the proper use of this machine. See **Operation Overview** for basic operating procedures. Cross references such as "See page 50" will direct you to detailed procedures.

Bulleted Lists

Bulleted lists provide helpful or important information or contain procedures that do not have to be performed in a specific order.

Numbered Lists

Numbered lists contain illustration callouts or list steps that must be performed in order.

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 without notice. 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.

RT100 Powershift

with Tier 4i engine

Operator's Manual

Issue number 1.0/OM-9/13
Part number 053-2707

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procedures for inspecting and classifying the jobsite, planning the installation path, and preparing the jobsite for work

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procedures for startup, cold start, driving, and shutdown

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procedures for lifting, hauling, and towing

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Safety

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Guidelines

Follow these guidelines before operating any jobsite equipment:

- Complete proper training and read operator's manual before using equipment.
- Contact your local One-Call (811 in USA) or the One-Call referral number (888-258-0808 in USA and Canada) to have underground utilities located before digging. Also contact any utilities that do not participate in the One-Call service. Mark proposed path with white paint prior to contacting One-Call or utilities.
- 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. Safety videos are available from your Ditch Witch® dealer.
- Replace missing or damaged safety shields and safety signs.
- Use equipment carefully. Stop operation and investigate anything that does not look or feel right.
- Do not operate unit where flammable gas may be present.
- Contact your Ditch Witch dealer if you have any question about operation, maintenance, or equipment use.
- Complete the equipment checklist located at www.ditchwitch.com/resources/safety.

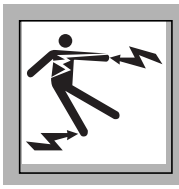
Emergency Procedures


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

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

EMERGENCY SHUTDOWN - Turn ignition switch to stop position or push remote engine stop button (if equipped).

Electric Strike Description



DANGER Electric shock. Contacting electric lines will cause death or serious injury. Know location of lines and stay away.

When working near electric cables, remember the following:

- Electricity follows all paths to ground, not just path of least resistance.
- Pipes, hoses, and cables will conduct electricity back to all equipment.
- Low voltage current can injure or kill. Many work-related electrocutions result from contact with less than 440 volts.

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

- power outage
- smoke
- explosion
- popping noises
- arcing electricity

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

If an Electric Line is Damaged

If you suspect an electric line has been damaged and you are **on tractor**, DO NOT MOVE. Remain on tractor and take the following actions. The order and degree of action will depend upon the situation.

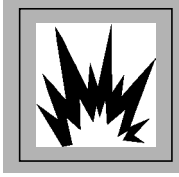
- Warn people nearby that an electric strike has occurred. Instruct them to leave the area and contact utility.
- Raise attachments and drive from immediate area.
- Contact utility company to shut off power.
- Do not return to jobsite or allow anyone into area until given permission by utility company.

If you suspect an electric line has been damaged and you are **off tractor**, DO NOT TOUCH TRACTOR. Take the following actions. The order and degree of action will depend upon the situation.

- LEAVE AREA. The ground surface may be electrified, so take small steps with feet close together to reduce the hazard of being shocked from one foot to the other. For more information, contact your Ditch Witch dealer.
- Contact utility company to shut off power.
- Do not return to jobsite or allow anyone into area until given permission by utility company.

If a Gas Line is Damaged

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



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

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

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.

- Immediately move battery disconnect switch (if equipped and accessible) to disconnect position.
- 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

Safety Alert Classifications

These classifications and the icons defined on the following pages work together to alert you to situations which could be harmful to you, jobsite bystanders or your equipment. When you see these words and icons in the book or on the machine, carefully read and follow all instructions. YOUR SAFETY IS AT STAKE.

Watch for the three safety alert levels: **DANGER**, **WARNING** and **CAUTION**. Learn what each level means.

DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

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

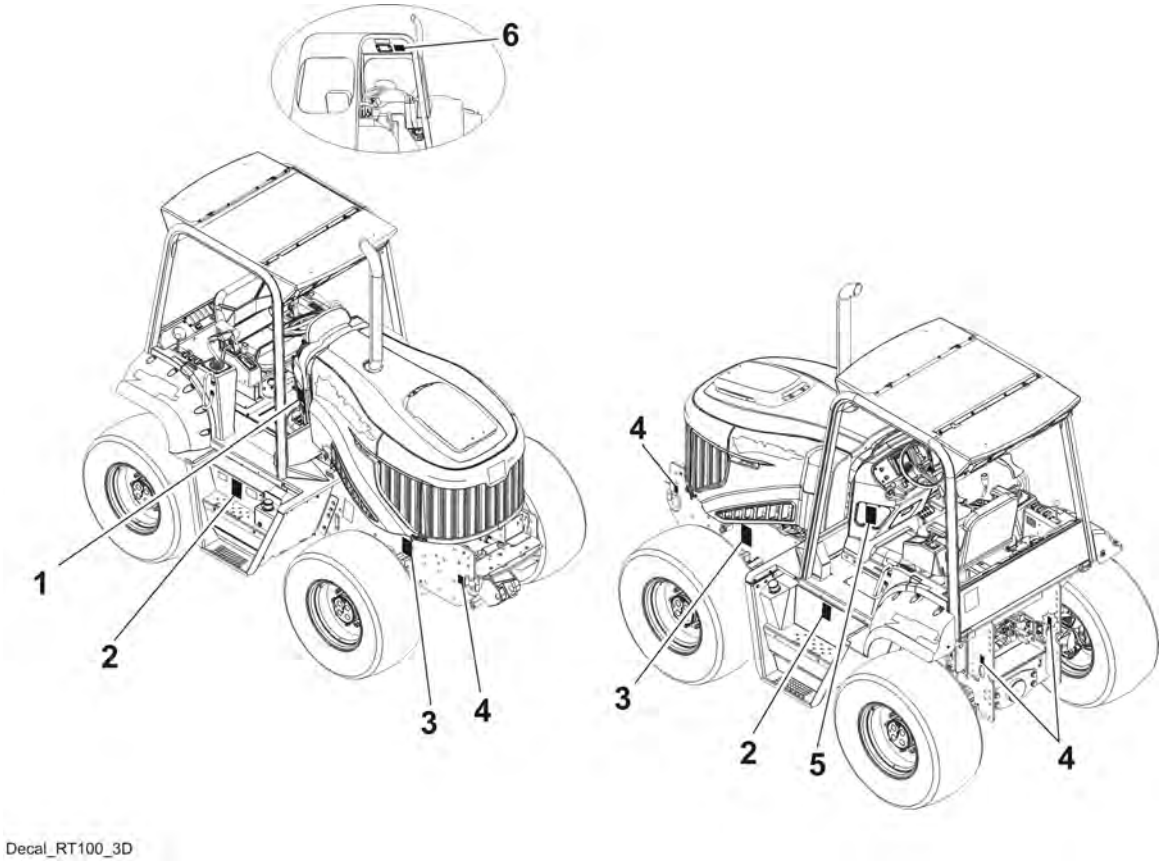
CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

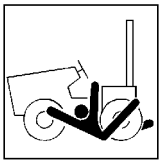
Watch for two other words: ***NOTICE*** and **IMPORTANT**.

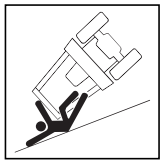
NOTICE indicates information considered important, but not hazard-related (e.g., messages relating to property damage).

IMPORTANT can help you do a better job or make your job easier in some way.

Machine Safety Alerts

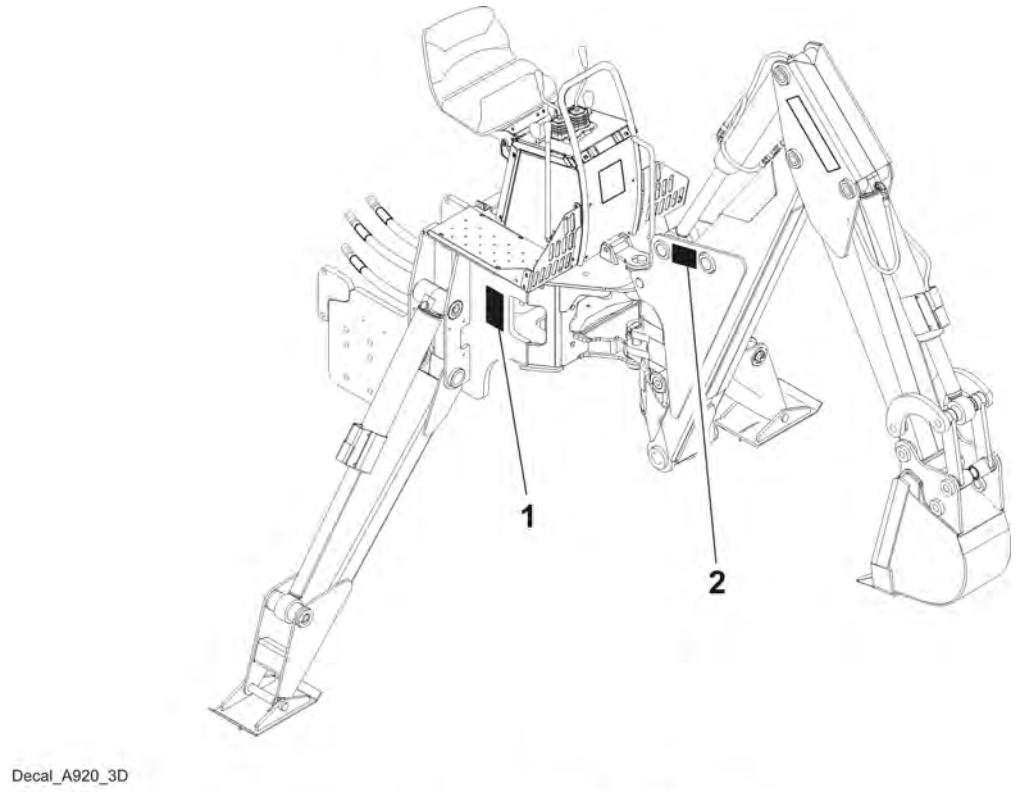


1		**WARNING** Runaway possible. Machine could run over you or others. Learn how to use all controls. Start and operate only from operator's position.
2		**WARNING** Fall possible. Riders can fall from machine and be injured or killed. Only operator is allowed on machine.
3		**WARNING** Moving parts could cut off hand or foot. Stay away.

4		Tiedown location. See Transport chapter for more information.
5		**WARNING** Rollover possible. If machine rolls over, you could be thrown from seat and killed or crushed. Wear seat belt.
6		**WARNING** Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

Attachment Safety Alerts

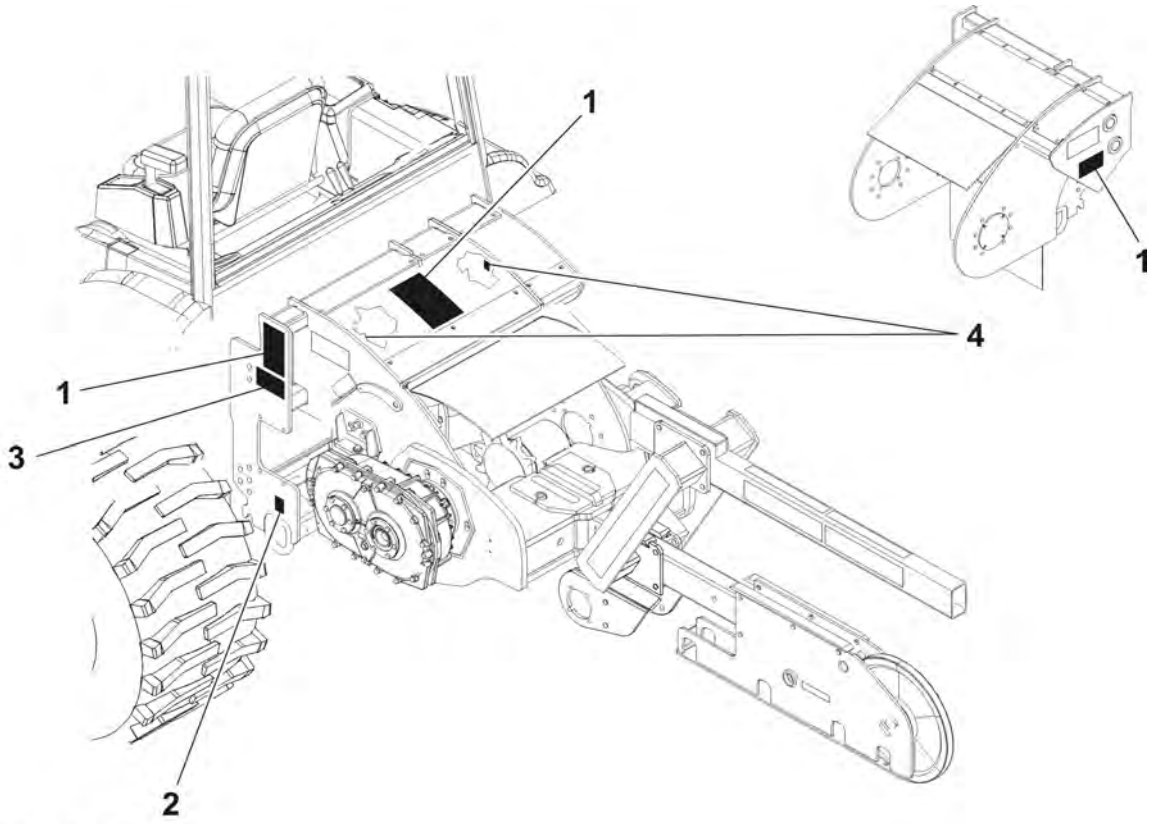
A920

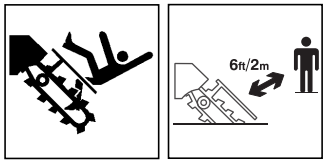


Decal_A920_3D

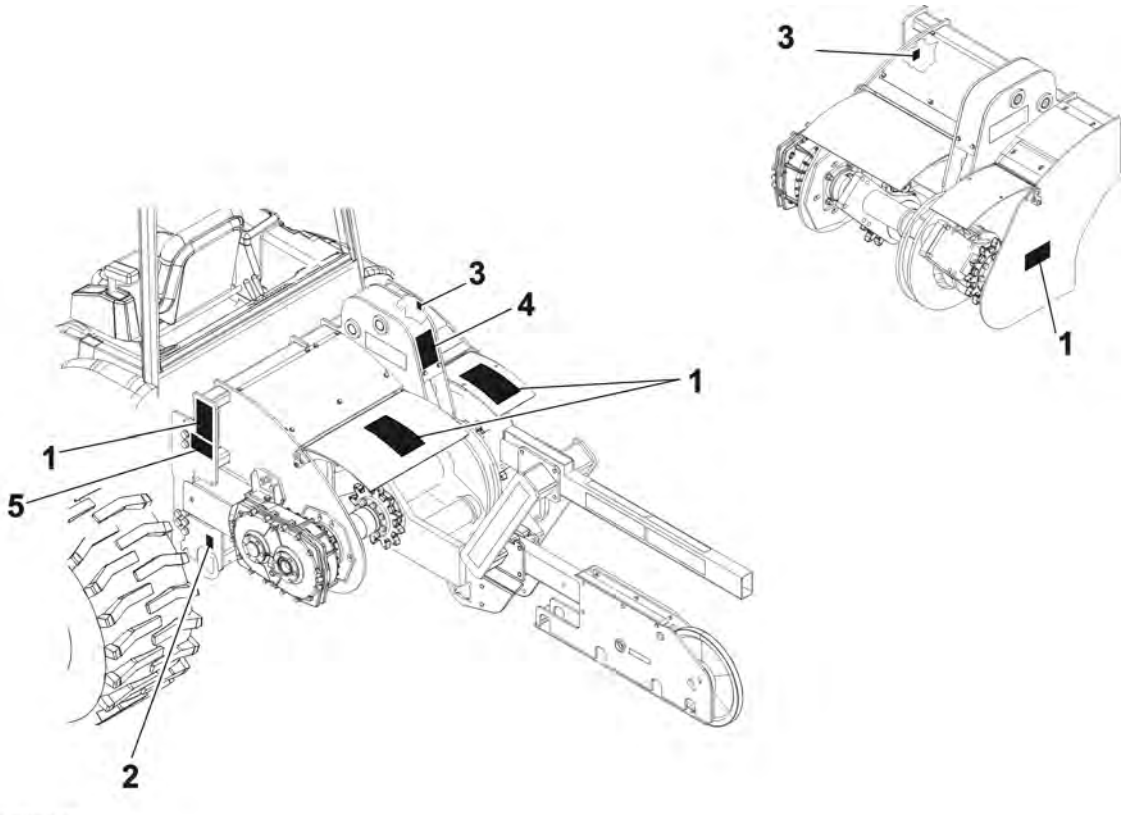
1		**WARNING** Moving parts could cut off hand or foot. Stay away.
2		**WARNING** Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

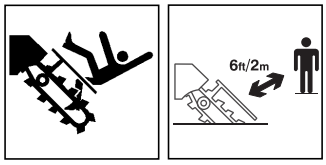
M910



1		**DANGER** Moving digging teeth will cause death or serious injury. Trench cave-in can cause you to fall. Stay away.
2		Tiedown location. See Transport chapter for more information.
3		**DANGER** Turning shaft will kill you or crush arm or leg. Stay away.
4		Lift point. See Transport chapter for more information.

M912



1		**DANGER** Moving digging teeth will cause death or serious injury. Trench cave-in can cause you to fall. Stay away.
2		Tiedown location. See Transport chapter for more information.
3		Lift point. See Transport chapter for more information.
4		**WARNING** Moving parts could cut off hand or foot. Stay away.

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

Controls

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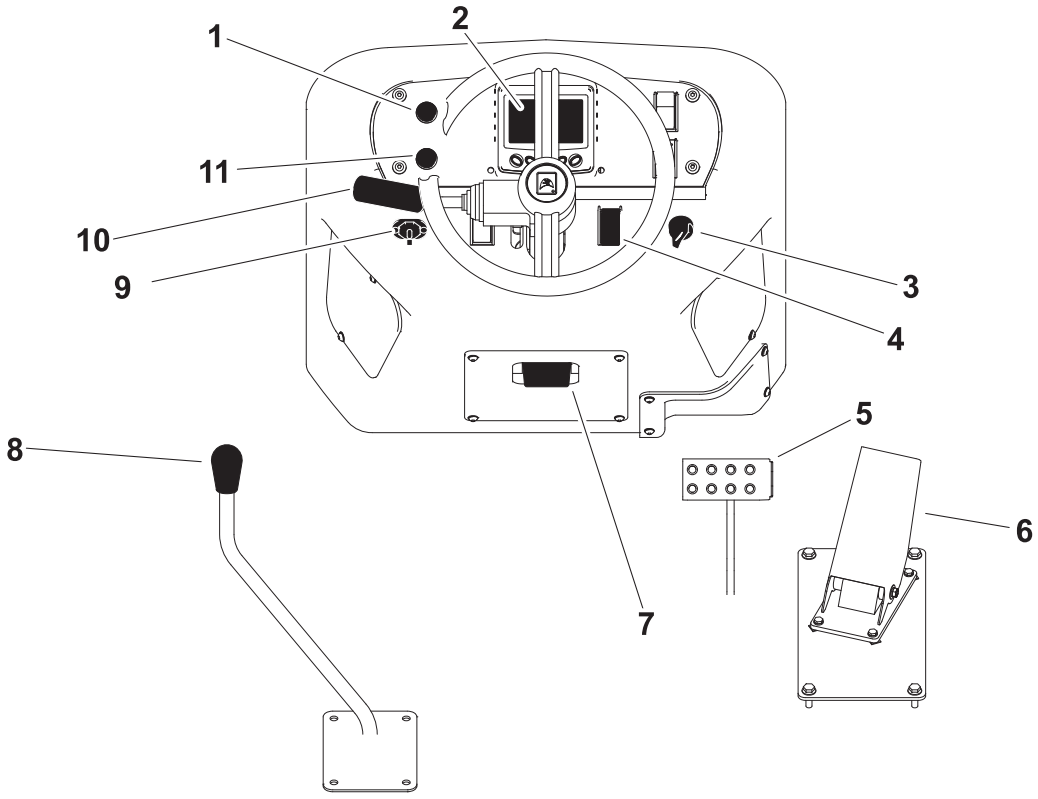
Center Console



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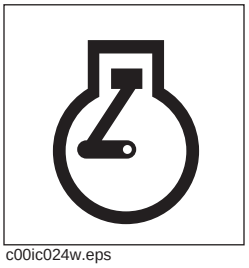
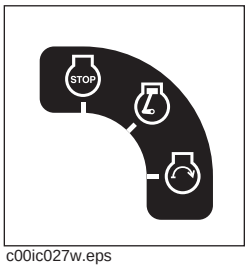
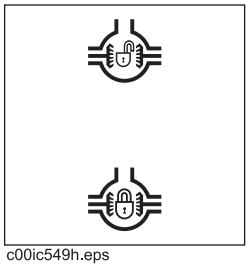
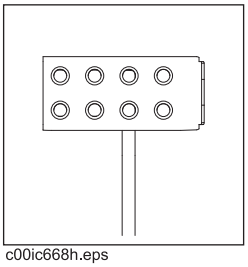
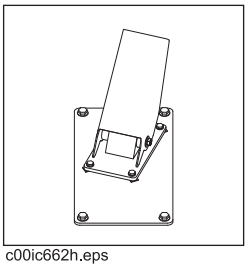
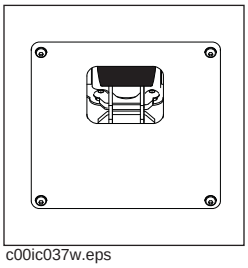
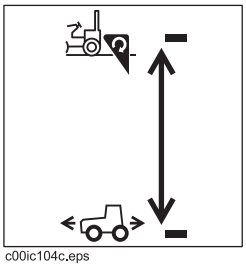
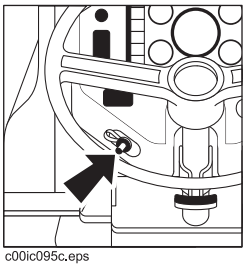
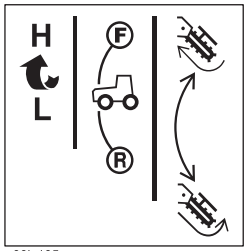
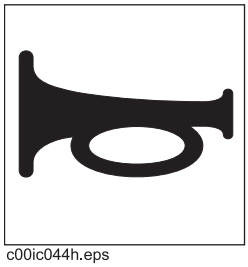
1. Engine shutdown override switch
2. Graphic display
3. Ignition switch
4. Axle lock
5. Service brake
6. Foot throttle
7. Steering column tilt control
8. Dig/drive control
9. Auxiliary outlet
10. F-N-R lever
11. Horn

*optional

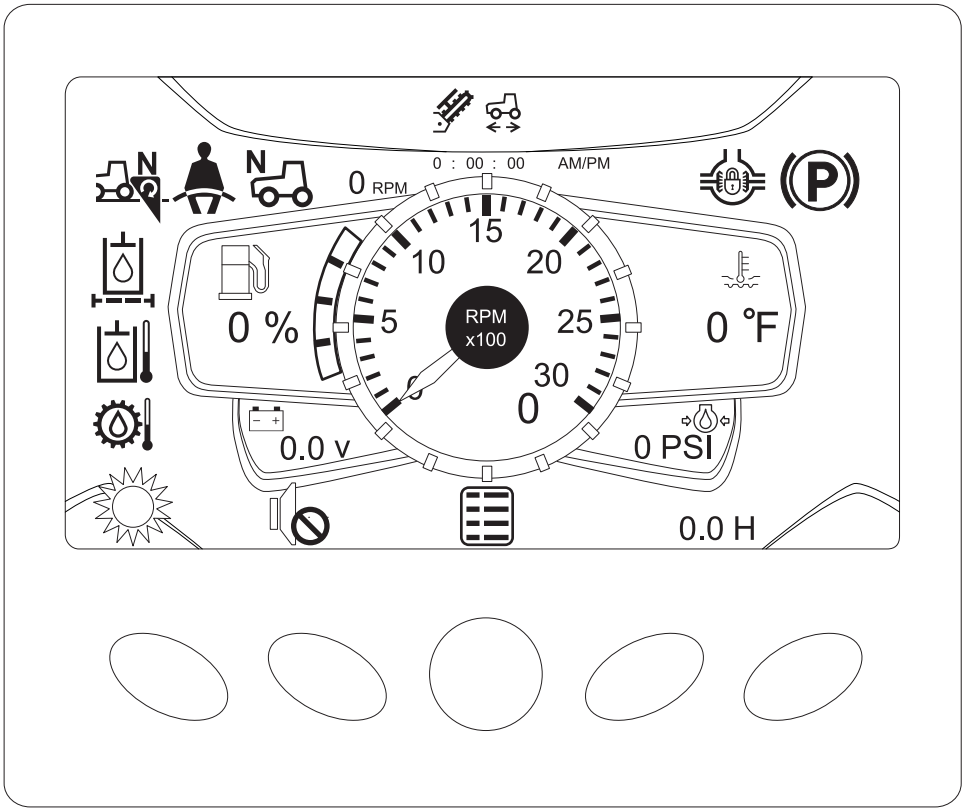
Item	Description	Notes
1. Engine shutdown override control  c00ic024w.eps	If engine shutdown indicator comes on, press to delay engine shutdown for 30 seconds.	This control allows a temporary override of engine shutdown. ***NOTICE:*** After 30 seconds, engine will again shut down unless fault condition has been cleared on diagnostic gauge.

Item	Description	Notes
2. Graphic display	Graphic symbols are displayed for indicators and conditions previously shown with gauges.	See more information in "Graphic Display" on page 30.
3. Ignition switch  c00ic027w.eps	To start engine, insert key and turn clockwise. To stop engine, turn counterclockwise.	**IMPORTANT:** If engine does not start on first attempt, check that all interlock requirements have been met, return switch to STOP, and try again.
4. Axle lock switch  c00ic549h.eps	To lock rear axle, press top. To unlock rear axle, press bottom.	***NOTICE:*** To prevent mechanical damage, stop tractor before operating axle lock switch. **IMPORTANT:** After pressing switch to unlock axle, it may be necessary to move tractor 6' (2 m) in reverse to fully unlock.
5. Service Brake  c00ic668h.eps	To stop tractor, press. To move tractor, release.	
6. Foot throttle  c00ic662h.eps	To increase engine speed when driving, press. To reduce engine speed when driving, release.	**IMPORTANT:** • With dig/drive control in dig, increasing engine speed also increases digging chain speed. This throttle control provides a temporary override (increase only) of the hand throttle control setting. • With dig/drive control in drive, increasing engine speed also increases ground drive speed.

Item	Description	Notes
7. Steering column tilt control  c00ic037w.eps	To adjust tilt, pull. To secure steering column in position, release.	**IMPORTANT:** Tilt steering column up before pivoting operator's seat.
8. Dig/drive control  c00ic104c.eps	Selects dig or drive settings. • To select dig, move forward. Use this position for trenching. • To select drive, move back. Use this position for driving.	**IMPORTANT:** Before changing between dig and drive settings, do the following: • Stop tractor. • Move F-N-R lever into the center or neutral position. • Move hand throttle to low idle.
9. Auxiliary outlet  c00ic095c.eps	Provides power for other equipment.	Power output is 12V, 5A.

Item	Description	Notes
10. F-N-R lever  c00ic105c.eps	Performs multiple functions determined by the dig/drive control. **When dig/drive control is in dig:** • To start forward digging chain motion, lift up and push forward. • To stop digging chain, move to center. • To start reverse digging chain motion, lift up and pull back. **When dig/drive control is in drive:** • To travel forward, lift up and push forward. • To stop, move to center. • To travel in reverse, lift up and pull back. **To change dig or drive speeds:** • For high speed, rotate to H. • For low speed, rotate to L.	**IMPORTANT:** When driving, stop tractor before shifting between forward and reverse.
11. Horn  c00ic044h.eps	To sound horn, press.	

Graphic Display



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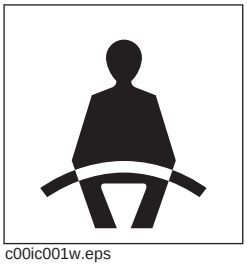
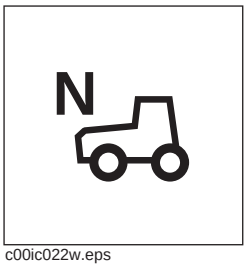
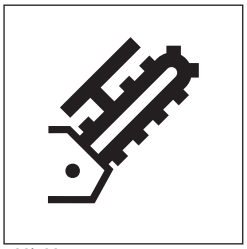
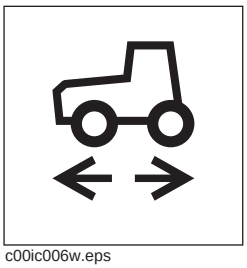
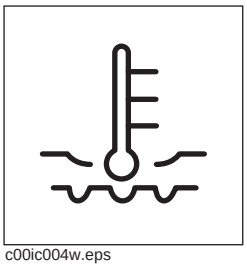
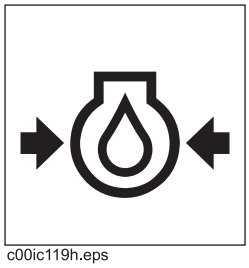
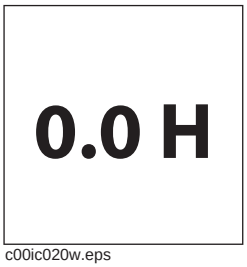
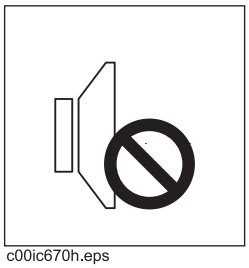
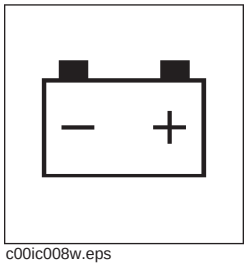
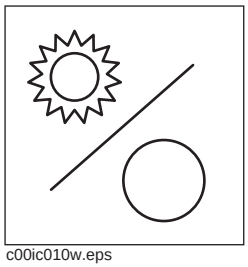
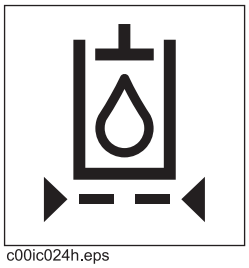
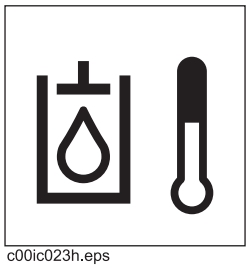
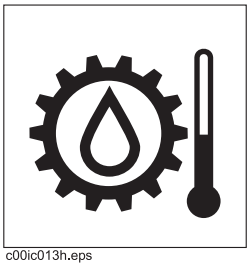
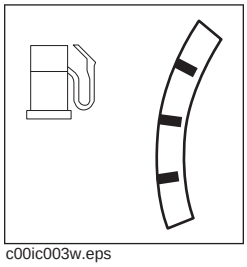
The graphic display module shows engine RPM and has icons for other functions. Soft keys allow the operator to toggle between various screens and functions.

Item	Description	Notes
Attachment neutral  c00ic021w.eps	Indicates attachment controls in neutral position.	

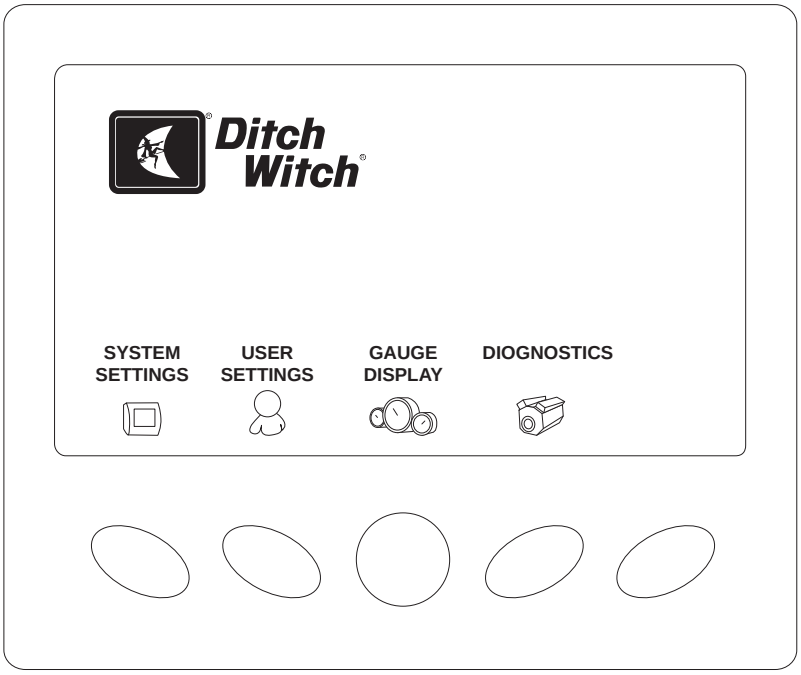
Item	Description	Notes
Operator Presence  c00ic001w.eps	Indicates operator presence for start interlock status.	
Ground Drive Neutral  c00ic022w.eps	Indicates ground drive controls in neutral position.	
Attachment speed  c00ic007w.eps	Displays percentage of attachment speed.	
Ground drive speed/ direction  c00ic006w.eps	Displays ground drive direction of travel, and speed as a percentage.	
Axle lock  c00ic002w.eps	Displays status of axle differential lock.	

Item	Description	Notes
Parking brake indicator  c00ic060c.eps	Indicates parking brake is engaged.	
Engine coolant temperature  c00ic004w.eps	Displays coolant temperature.	
Engine oil pressure indicator  c00ic119h.eps	Indicates engine oil pressure is low. Also lights briefly when engine is started.	Engine will stop. 1. Check oil level. 2. Check for leaks before starting engine.
Engine hours  0.0 H c00ic020w.eps	Displays engine hours.	
Speaker off indicator  c00ic670h.eps	Displays when speaker is off.	

Item	Description	Notes
Battery voltage  c00ic008w.eps	Displays battery voltage.	
Day/Night mode  c00ic010w.eps	Indicates selected mode.	
Hydraulic filter restriction  c00ic024h.eps	Lights when hydraulic filter is restricted. May also light in when fluid is extremely cold.	When indicator lights, change filter. Run tractor at low engine speed until hydraulic fluid warms. Indicator may turn off after hydraulic fluid warms.
Hydraulic fluid temperature  c00ic023h.eps	Lights and alarm sounds if hydraulic fluid overheats.	If light remains on: • Check that engine fan is turning when engine is running. • Turn off engine and let it cool. • Check hydraulic fluid level. • Check front of hydraulic fluid cooler for debris.
Transmission fluid temperature  c00ic013h.eps	Displays when transmission fluid temperature is too high.	

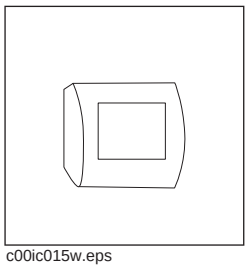
Item	Description	Notes
Fuel level  c00ic003w.eps	Displays fuel level and percentage.	

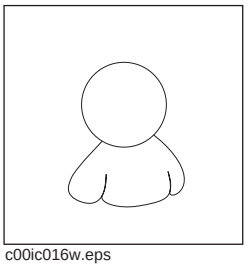
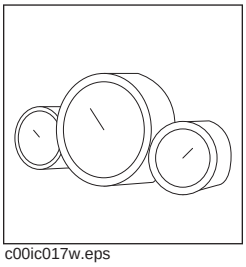
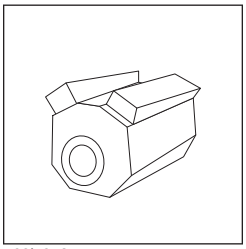
Main Menu



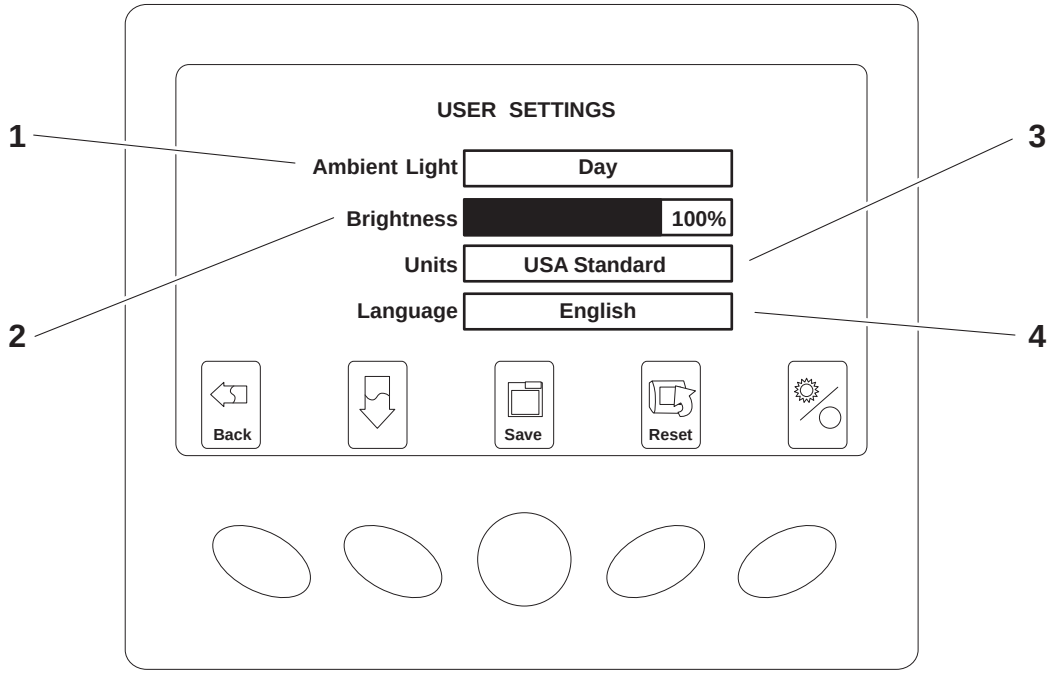
t33om093w.eps

Press center soft key to display the main menu screen, which has icons for other functions. Soft keys below on-screen icons allow the operator to toggle between various screens and functions.

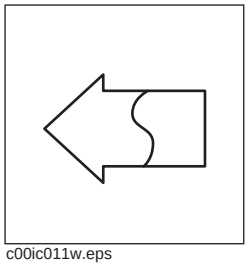
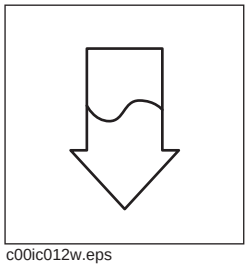
Item	Description	Notes
System Settings  c00ic015w.eps	This is an information display.	Press soft key below back icon  to return to previous screen. Press center soft key to display gauge screen.

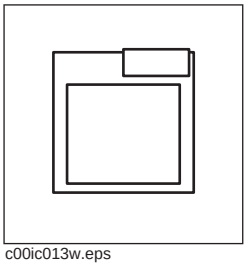
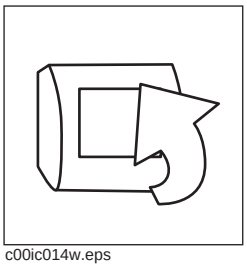
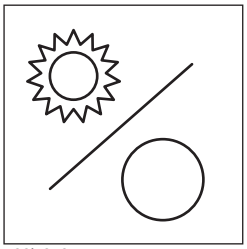
Item	Description	Notes
User Settings  c00ic016w.eps	Allows operator to customize settings.	
Gauge Display  c00ic017w.eps	Press the soft key below this on screen icon to select.	
Diagnostics  c00ic018w.eps	Displays interlock icons and diagnostic codes, if any. Press soft key below on screen icons to return to main menu or gauge display.	

User Settings

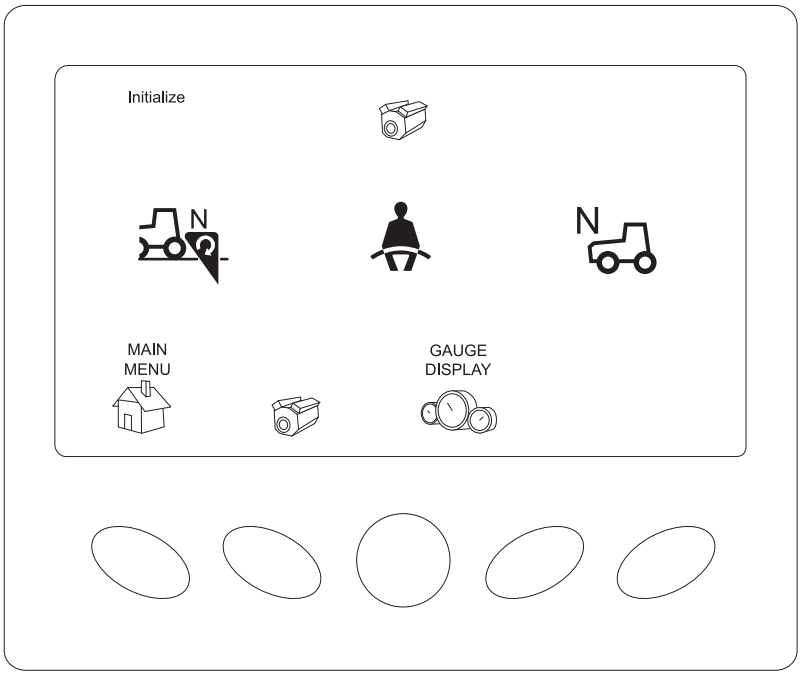


t33om092w.eps

Item	Description	Notes
Back  c00ic011w.eps	Press soft key below this icon to return to previous screen.	Press center soft key to display gauge screen.
Down  c00ic012w.eps	Press soft key below this icon to toggle through selections 1-4.	Press center soft key to display gauge screen.

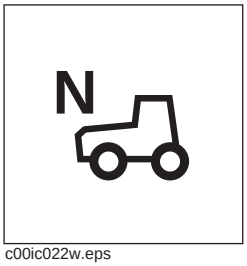
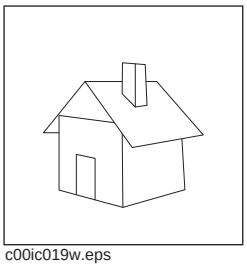
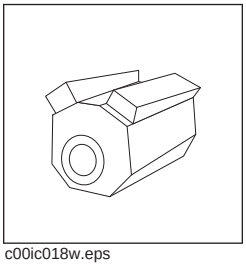
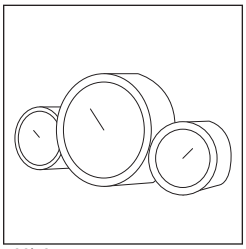
Item	Description	Notes
Save  c00ic013w.eps	Press soft key below this icon to save settings.	
Reset  c00ic014w.eps	Press soft key below this icon to return to default settings.	
Day/Night  c00ic010w.eps	Press soft key below this icon to select day or night mode.	

Diagnostics

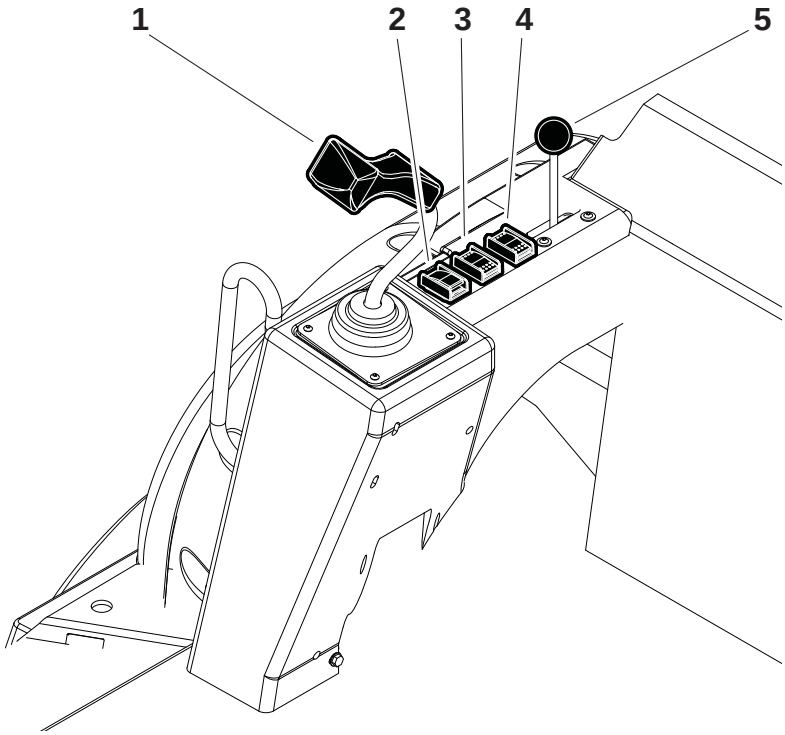


t40om050h.eps

Item	Description	Notes
Attachment neutral  c00ic021w.eps	Indicates attachment controls in neutral position.	
Operator Presence  c00ic001w.eps	Indicates operator presence for start interlock status.	

Item	Description	Notes
Ground Drive Neutral  c00ic022w.eps	Indicates ground drive controls in neutral position.	
Main Menu  c00ic019w.eps	Press soft key below this icon to return to previous screen.	Press center soft key to display gauge screen.
Diagnostics  c00ic018w.eps	This screen will display interlock icons and diagnostic codes, if any. Press soft key below on screen icons to return to main menu or gauge display.	
Gauge Display  c00ic017w.eps	Press the soft key below this on screen icon to select.	

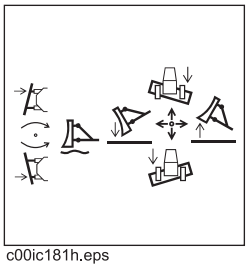
Right Console

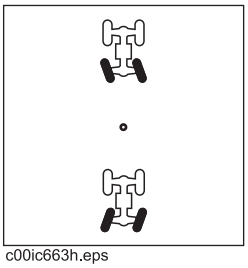
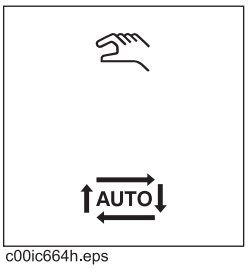
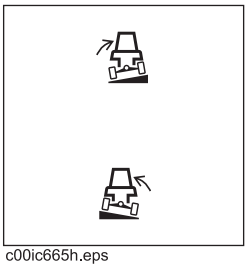
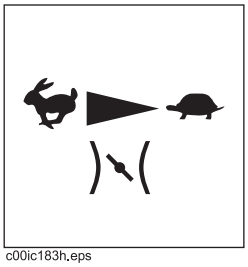


t37om005w.eps

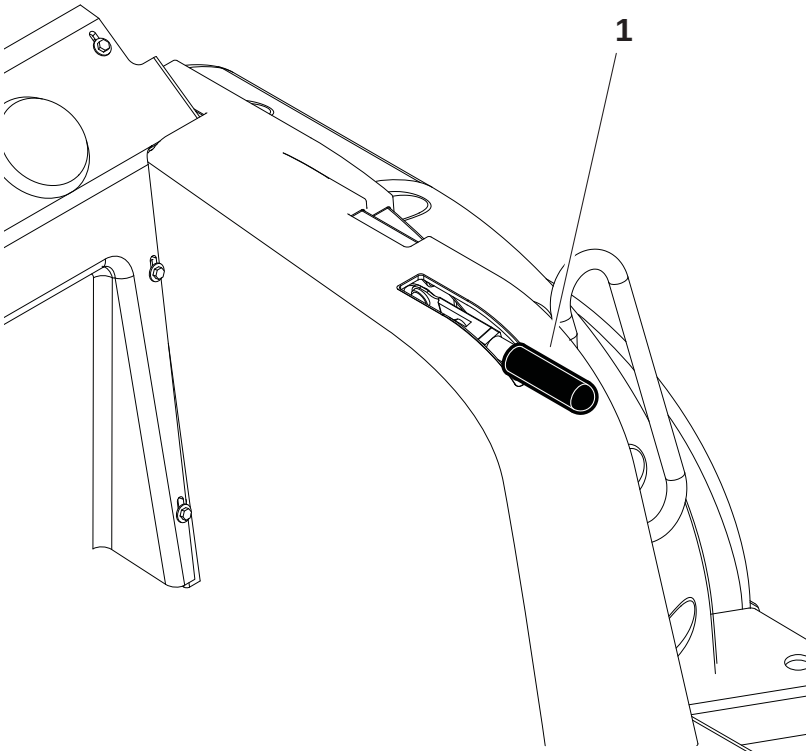
1. Backfill blade control
2. Rear steer switch*
3. Rear steer auto/manual switch*
4. Frame tilt switch*
5. Throttle

*optional

Item	Description	Notes
1. Backfill blade  c00ic181h.eps	To lower, move forward. To float, move forward to end. To raise, move backward. To tilt right side down, move right. To tilt left side down, move left. To angle left, twist left. To angle right, twist right.	

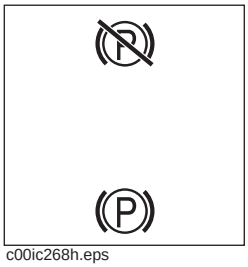
Item	Description	Notes
2. Rear steer switch  c00ic663h.eps	To move rear tracks left, press top. To move rear tracks right, press bottom.	***NOTICE:*** • Tracks move when you press the switch. To stop movement, release switch. • Visually verify track position
3. Rear steer auto/ manual switch  c00ic664h.eps	To manually steer rear tracks, press top. To center tracks, press bottom.	Use manual mode and the manual rear steer switch to bypass auto mode.
4. Frame tilt switch  c00ic665h.eps	To tilt right, press top. To tilt left, press bottom.	
5. Throttle  c00ic183h.eps	To increase speed when trenching, move left. To decrease speed when trenching, move right.	**IMPORTANT:** • With dig/drive control in dig, increasing engine speed also increases digging chain speed. Foot throttle control provides a temporary override (increase only) of the hand throttle control setting. • With dig/drive control in drive, increasing engine speed also increases ground drive speed.

Left Console



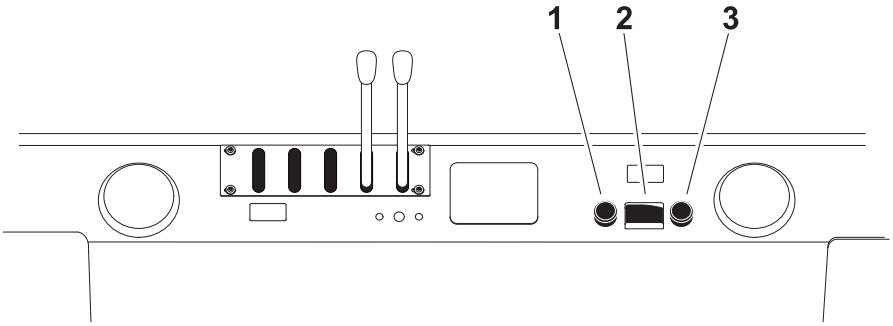
t37om006w.eps

1. Parking brake

Item	Description	Notes
1. Parking brake  c00ic268h.eps	To disengage, push. To engage, pull.	

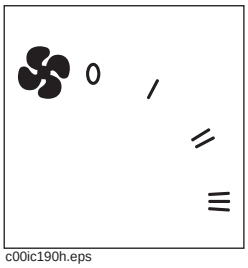
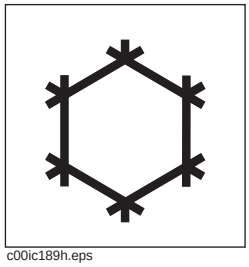
Rear Console

Optional Controls



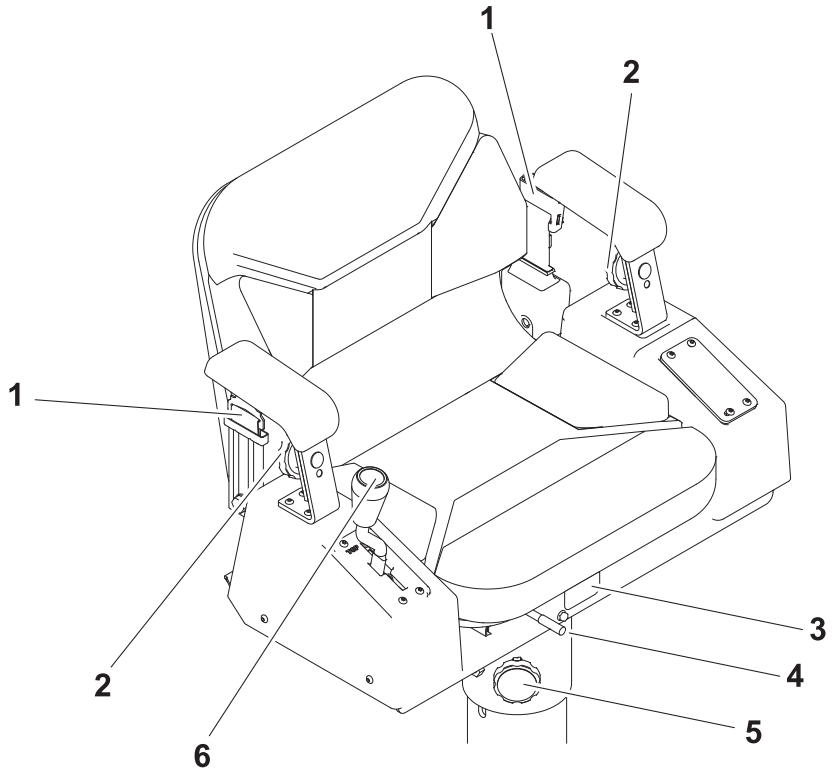
t40om045h.eps

1. Fan speed control
2. Air conditioning control
3. Climate control selector

Item	Description	Notes
1. Fan speed control  c00ic190h.eps	For higher air conditioning fan speed, turn clockwise. For lower air conditioning fan speed, turn counterclockwise.	**IMPORTANT:** This control works only when air conditioning is turned on.
2. Air conditioning control  c00ic189h.eps	To turn air conditioning on, press top. To turn air conditioning off, press bottom.	

Item	Description	Notes
3. Climate control selector  c00ic188h.eps	For warmer air, turn clockwise. For cooler air, turn counterclockwise.	

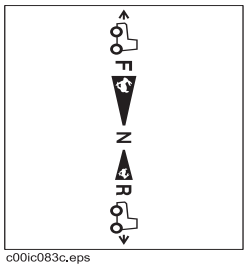
Seat



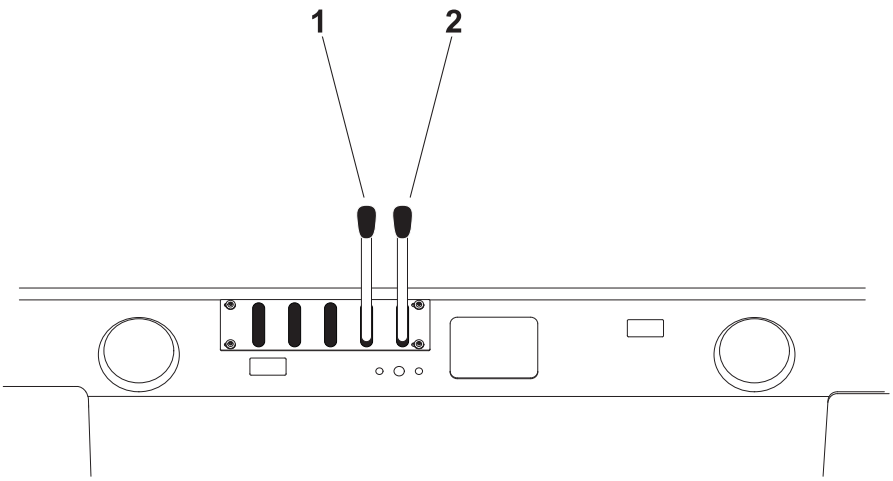
t40om005h.eps

1. Armrest adjustment control
2. Seat belt
3. Seat slide control
4. Seat pivot control
5. Seat height adjustment lock
6. Ground drive speed/direction control

Item	Description	Notes
1. Armrest adjustment control	To raise or lower armrests: • Remove knob. • Adjust armrest to desired position. • Replace knob.	
2. Seat belt	To fasten, insert latch into buckle. Adjust until seat belt is low and tight. To release, lift top of buckle.	

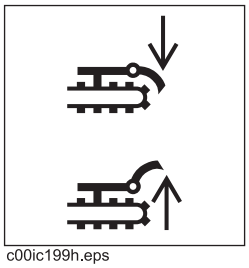
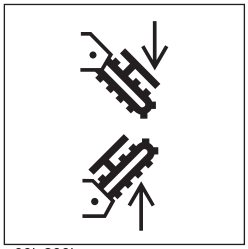
Item	Description	Notes
3. Seat slide control	To slide seat forward or backward, pull, then adjust seat. To lock seat in place, release.	
4. Seat pivot control	To pivot seat to the right, pull. To lock seat in position, release. To return seat to front-facing position, swing seat left.	Seat pivots only to the right and can be locked in any position from 0-90°. **IMPORTANT:** Drive tractor with operator's seat facing front, if desired. Operate rear attachments with seat pivoted.
5. Seat height adjustment lock	To lock seat height, turn clockwise. To unlock seat height, turn counterclockwise.	
6. Ground drive speed/ direction control  c00ic083c.eps	To go forward, push. To go backward, pull. To go faster in either direction, move farther from neutral. To stop, return to center.	

Trencher Controls

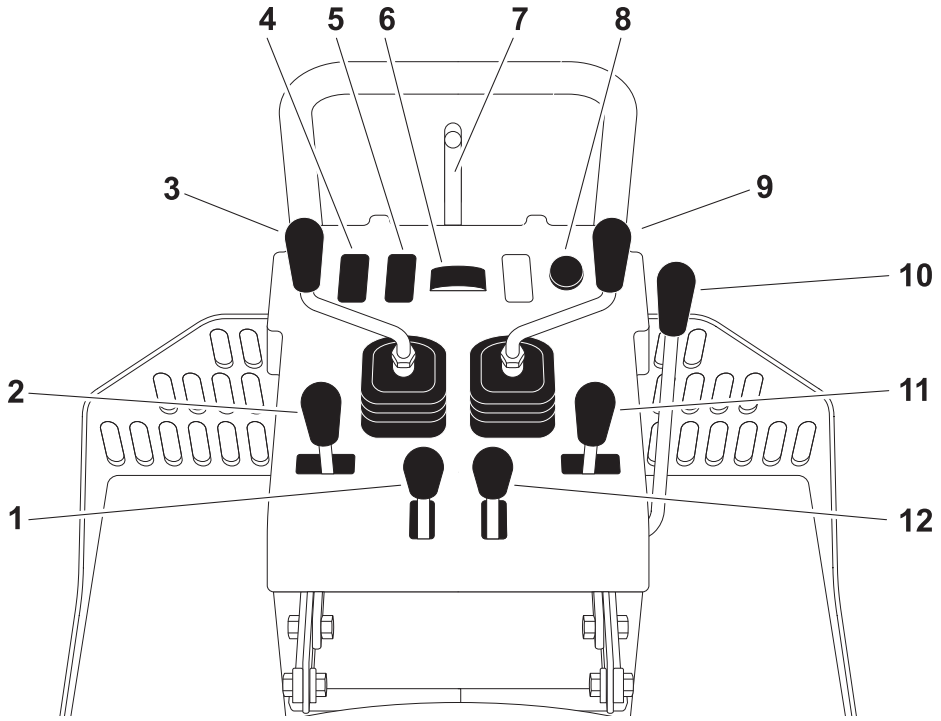


t40om044h.eps

1. Trench cleaner lift control (optional)
2. Boom lift control

Item	Description	Notes
1. Trench cleaner lift control  c00ic199h.eps	To lower, push. To raise, pull.	
2. Boom lift control  c00ic200h.eps	To lower, push. To raise, pull.	

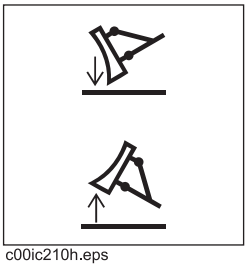
Backhoe Console

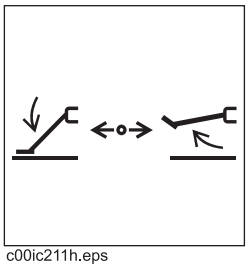
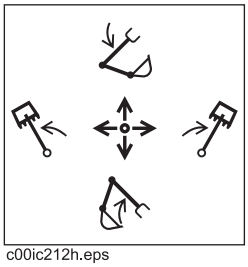
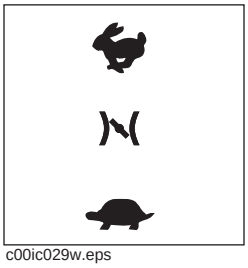
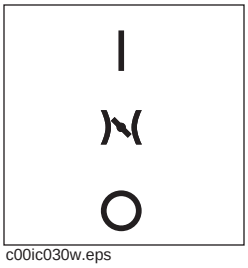
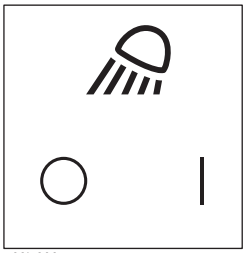


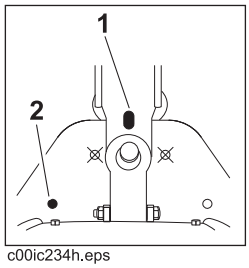
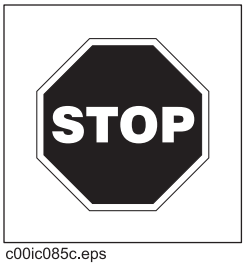
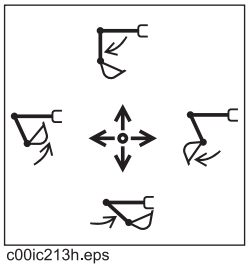
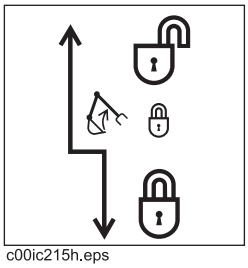
t40om051h.eps

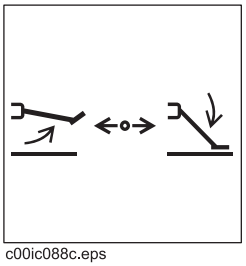
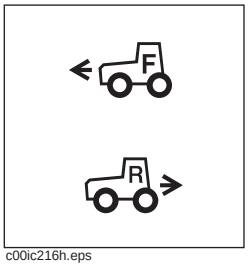
1. Remote backfill blade control*
2. Left stabilizer control
3. Boom/Swing control
4. Remote throttle control switch
5. Remote throttle enable switch
6. Work light switch*
7. Swing lock pin
8. Remote engine stop switch
9. Bucket/Dipper control
10. Stow lock control
11. Right stabilizer control
12. Ground drive control

*optional

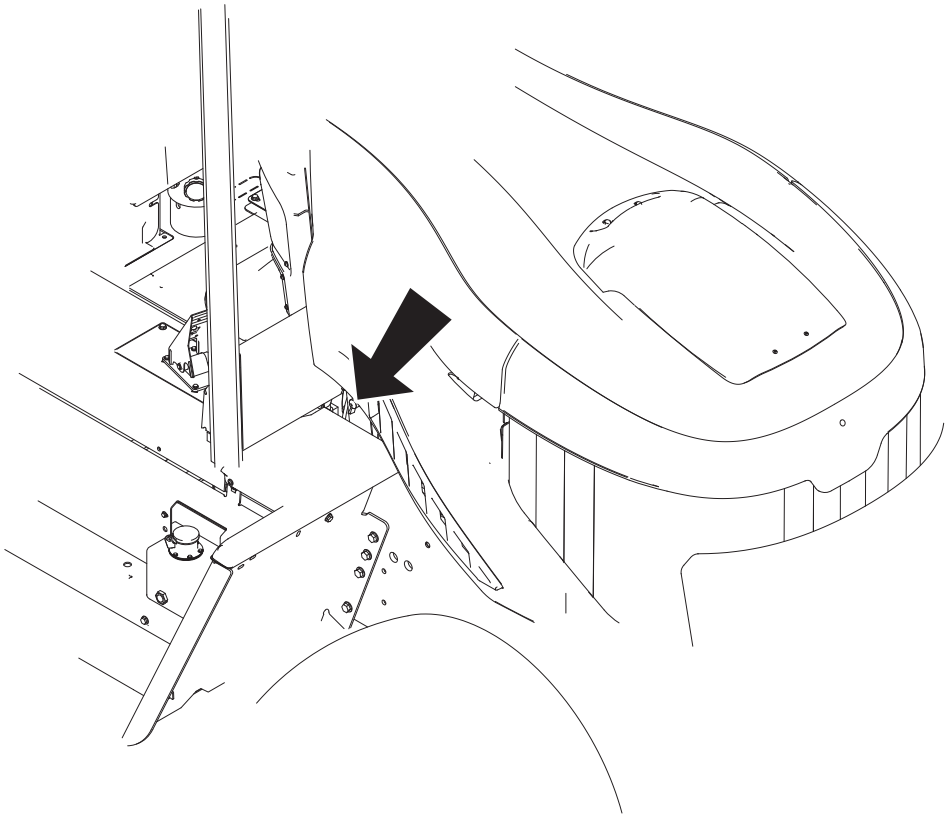
Item	Description	Notes
1. Remote backfill blade control  c00ic210h.eps	To lower, push. To raise, pull.	

Item	Description	Notes
2. Left stabilizer control  c00ic211h.eps	To lower, push out. To raise, pull in.	
3. Boom/Swing control  c00ic212h.eps	To swing boom left, move left. To swing boom right, move right. To raise boom, pull. To lower boom, push.	Control can perform more than one action at a time. By "feathering" the control, operator can combine backhoe operations. ***NOTICE:*** Do not operate with backhoe in the stowed (upright) position.
4. Remote throttle  c00ic029w.eps	To increase engine speed, press top. To decrease engine speed, press bottom.	
5. Remote throttle enable  c00ic030w.eps	To enable remote throttle control, press top. To disable remote throttle control, press bottom.	**Note:** This switch must be returned to the OFF position for normal throttle control at tractor.
6. Work light switch  c00ic086c.eps	To turn on, press right. To turn off, press left.	

Item	Description	Notes
7. Swing lock pin  c00ic234h.eps	**To lock:** • Engage stow lock. • Insert swing lock pin into hole (1). **To release:** • Remove pin and store in hole (2). • Release stow lock.	This pin locks boom from swinging during transport. ***NOTICE:*** **Do not** store pin in holes marked with an "X." Backhoe could swing and destroy pin.
8. Remote engine stop switch  c00ic085c.eps	Press to stop engine immediately.	**IMPORTANT:** For normal engine shutdown, use ignition switch. **Note:** This switch must be returned to the UP position to allow engine restarting.
9. Bucket/Dipper control  c00ic213h.eps	To open bucket, move right. To close bucket, move left. To move dipper in, pull. To move dipper out, push.	Control can perform more than one action at a time. By "feathering" the control, operator can combine backhoe operations.
10. Stow lock control  c00ic215h.eps	**To lock:** • Raise boom fully. • Pull stow lock handle. • Lower boom slightly to engage lock. • Insert swing lock pin. **To unlock:** • Remove swing lock pin. • Raise boom slightly. • Push stow lock handle to release lock.	Use this control to lock boom in the up position. ***NOTICE:*** Always use stow lock and install swing lock pin during transport. When unlocked, store swing lock pin in holder located on left stabilizer support.

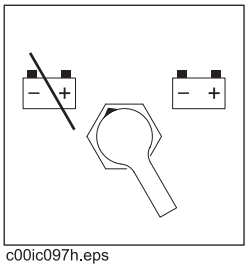
Item	Description	Notes
11. Right stabilizer control  c00ic088c.eps	To lower, push out. To raise, pull in.	
12. Remote ground drive control  c00ic216h.eps	To move tractor forward, push. To move tractor backward, pull.	***NOTICE:*** • Tractor must be in low speed for remote ground drive to function. • Ensure that backfill blade, if equipped, and stabilizers are raised before operating this control. • Do not move more than 30' (10 m) at a time.

Battery



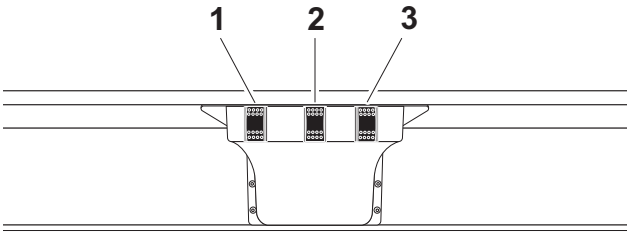
t40om042h.eps

1. Battery disconnect switch

Item	Description	Notes
1. Battery disconnect switch  c00ic097h.eps	To connect, move right. To disconnect, move left.	

Cab (Option)

Controls



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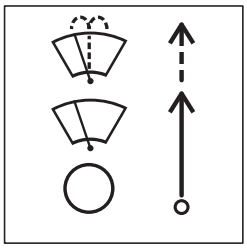
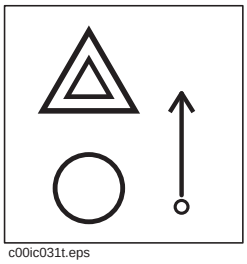
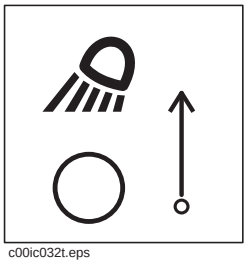
1. Windshield wiper control
2. Caution/Warning light control
3. Exterior light switch

Item	Description	Notes
1. Windshield wiper control  c00ic033t.eps	To wipe windshield, press top. To wash windshield, press top again. To stop, press bottom.	
2. Caution/Warning light control  c00ic031t.eps	To turn on caution/warning lights, press top. To turn off, press bottom.	

Item	Description	Notes
3. Exterior light switch  c00ic032t.eps	To turn on exterior lights, press top. To turn off, press bottom.	

Operation Overview

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Planning 58

Trenching 58

Drilling 58

Digging with Backhoe 59

Leaving Jobsite 59

Planning

1. Gather information about jobsite. See page 62.
2. Inspect jobsite. See page 63.
3. Classify jobsite. See page 64.
4. Select chain and teeth to match your soil type, if necessary. See page 98.
5. Check supplies and prepare equipment. See page 66.
6. Haul equipment to jobsite. See page 76.

Trenching

1. Start unit. See page 68.
2. Position tractor and controls. See page 82.
3. Begin trenching. See page 84.
4. Complete the installation. See page 102.
5. Shut down tractor. See page 72.

Drilling

1. Start unit. See page 68.
2. Dig approach trench and target trench. See page 93.
3. Assemble drill string and position tractor. See page 93.
4. Begin drilling. See page 94.
5. Use drill string guide as needed. See page 94.
6. Add rod. See page 95.
7. Backream. See page 95.
8. Shut down tractor. See page 72.
9. Disassemble joints. See page 96.

Digging with Backhoe

1. Start unit. See page 68.
2. Set stabilizers and unstow backhoe. See page 88.
3. Excavate. See page 89.
4. Stow backhoe properly. See page 90.
5. Shut down tractor. See page 72.

Leaving Jobsite

1. Backfill if necessary. See page 102.
2. Rinse equipment. See page 102.
3. Stow tools. See page 102.
4. Haul equipment from jobsite. See page 76.

Prepare

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- Review Job Plan 62
- Notify One-Call Services 62
- Arrange for Traffic Control. 62
- Plan for Emergency Services 62

Inspect Site 63

- Identify Hazards 63

Classify Jobsite. 64

- Inspect Jobsite 64
- Select a Classification 64
- Apply Precautions 65

Check Supplies and Prepare Equipment 66

- Supplies 66
- Fluid Levels 66
- Condition and Function 66
- Accessories. 66

Gather Information

A successful job begins before you dig. The first step in planning is reviewing information already available about the job and jobsite.

Review Job Plan

Review blueprints or other plans. Check for information about existing or planned structures, elevations, or proposed work that may be taking place at the same time.

Notify One-Call Services

Contact your local One-Call (811 in USA) or the One-Call referral number (888-258-0808 in USA and Canada) to have underground utilities located before digging. Also contact any utilities that do not participate in the One-Call service.

Arrange for Traffic Control

If working near a road or other traffic area, contact local authorities about safety procedures and regulations.

Plan for Emergency Services

Have the telephone numbers for local emergency and medical facilities on hand. Check that you will have access to a telephone.

Inspect Site

Inspect jobsite before transporting equipment. Check for the following:

- changes in elevation such as hills or other open trenches
- obstacles such as buildings, railroad crossings, or streams
- signs of utilities (See "Inspect Jobsite" on page 64.)
- traffic
- access
- soil type and condition

Identify Hazards

Identify safety hazards and classify jobsite. See "Classify Jobsite" on page 64.


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

To help avoid injury:

- Wear personal protective equipment including hard hat, safety eye wear, and hearing protection.
- Do not wear jewelry or loose clothing.
- Notify One-Call and companies which do not subscribe to One-Call.
- Comply with all utility notification regulations before digging or drilling.
- Verify location of previously marked underground hazards.
- Mark jobsite clearly and keep spectators away.

Remember, jobsite is classified by hazards in place -- not by line being installed.

Classify Jobsite

Inspect Jobsite

- Follow U.S. Department of Labor regulations on excavating and trenching (Part 1926, Subpart P) and other similar regulations.
- Contact your local One-Call (811 in USA) or the One-Call referral number (888-258-0808 in USA and Canada) to have underground utilities located before digging. Also contact any utilities that do not participate in the One-Call service.
- Inspect jobsite and perimeter for evidence of underground hazards, such as:
  - "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. Verify previously marked line and cable locations.
- Mark location of all buried utilities and obstructions.
- Classify jobsite.

Select a Classification

Jobsites are classified according to underground hazards present.

If working...	then classify jobsite as...
within 10' (3 m) of a buried electric line	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 working.

Apply Precautions

Once classified, precautions appropriate for jobsite must be taken.

Electric Jobsite Precautions

Use one or both of these methods.

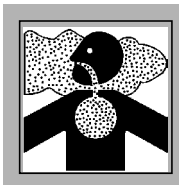
- Expose line by careful hand digging or soft excavation.
- Have service shut down while work is in progress. Have electric company test lines before returning them to service.

Natural Gas Jobsite Precautions

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

- Expose lines by careful hand digging or soft excavation.
- Have gas shut off while work is in progress. Have gas company test lines before returning them to service.

Crystalline Silica (Quartz) Dust Precautions



⚠ CAUTION Breathing crystalline silica dust may cause lung disease. Cutting, drilling, or working materials such as concrete, sand, or rock containing quartz may result in exposure to silica dust. Use dust control methods or appropriate breathing protection when exposed to silica dust.

Other Jobsite Precautions

You may need to use different methods to safely avoid other underground hazards. Talk with those knowledgeable about hazards present at each site to determine which precautions should be taken or if job should be attempted.

Check Supplies and Prepare Equipment

Supplies

- fuel
- keys
- personal protective equipment, such as hard hat and safety glasses

Fluid Levels

- fuel
- hydraulic fluid
- battery charge
- engine oil

Condition and Function

- digging chain and teeth
- brake pads and disc
- fan belts
- light bulbs
- filters (air, oil, hydraulic)
- tires
- pumps and motors
- hoses and valves
- signs, guards, and shields

Accessories

Fire Extinguisher

If required, mount a fire extinguisher near the power 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.

Drive

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Start Unit 68

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Shut Down 72

Start Unit

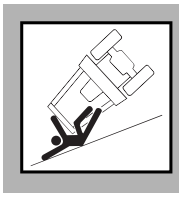
Before operating tractor, read engine manufacturer's starting and operating instructions. Follow instructions for new engine break-in.

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

⚠WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

To help avoid injury:

- Read operator's manual before operating equipment. Follow instructions carefully. Contact Ditch Witch dealership for operation information or demonstration.
- Wear hard hat, safety glasses, and other protective equipment required by job. Do not wear jewelry or loose clothing that can catch on controls.

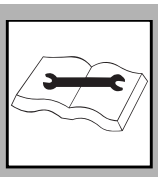


⚠WARNING Rollover possible. If machine rolls over, you could be thrown from seat and killed or crushed. Wear seat belt.

1. Fasten and adjust seat belt.
2. Check that speed/direction control and F-N-R lever are in neutral.
3. Move hand throttle to idle.
4. Check that parking brake is engaged.
5. Turn ignition switch to the run position (key on, engine off). Wait for operator's display to come on.
6. When cold start wait indicator goes off, turn ignition switch all the way clockwise to start tractor.

IMPORTANT:

- If engine does not crank, check start interlock display. See page 31 for start interlock information.
- If engine turns but does not start within 10 seconds, allow starter to cool before trying to start again.



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.

To help avoid injury:

- Have machine serviced if warning alarm does not sound.
- Machine will not start if start interlock requirements are not met. See page 31 for start interlock information.

7. Run engine at half-throttle or less for five minutes before operating tractor. During warm-up, check that all controls work properly.

IMPORTANT: Transmission fluid must warm to operating temperature or tractor will operate sluggishly.

Drive

⚠WARNING Moving traffic – hazardous situation. Death or serious injury could result. Avoid moving vehicles, wear high visibility clothing, post appropriate warning signs.

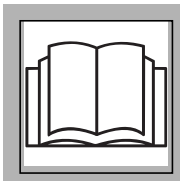
To help avoid injury:

- Drive carefully in congested areas. Know machine's clearance and turning radius.
- Keep attachments low when operating on slope. Drive slowly and cautiously.
- Press service brake to stop tractor if engine power is lost.Tractor will freewheel.

EMERGENCY SHUTDOWN: Turn ignition switch to STOP.

General Operaion

1. Fasten and adjust seatbelt.
2. Turn on lights and warning flasher as needed.
3. Tilt steering wheel column to desired operating position.
4. Raise backfill blade and all attachments.
5. Press service brake.
6. Release parking brake and verify parking brake indicator is off.
7. Move dig/drive control to drive position.
8. Ensure hand throttle is at low idle and axle lock is off.

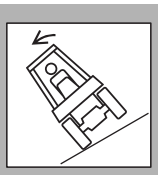


⚠WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

IMPORTANT: Hand throttle must be in low idle when driving.

9. Rotate F-N-R lever to 1 (low).
10. Move F-N-R lever to move forward or reverse.
11. Release service brake.
12. Press foot throttle to increase tractor speed.

Safe Slope Operation



WARNING Tipover possible. Machine can tip over and crush you.

To help avoid injury:

- Only operate equipment on slopes if absolutely necessary.
- Always operate with heavy end uphill. Keep attachments low and travel up and down the slope.
- Drive cautiously, in the lowest gear, at all times.
- Never jerk control levers. Use a steady even motion.
- Do not park unit on slope without lowering digging attachment to the ground, returning all controls to neutral position, shutting down unit, and applying parking brake.
- Assess the site to determine if the slope and conditions are conducive to a safe working environment.

Operating safely on a slope depends upon many factors including:

- Distribution of machine weight, including front loading and absence of load
- Height of load
- Saturated, even or rough ground conditions
- Potential for ground giving way causing unplanned tilt forward, reverse or sideways
- Nearness of ditches, ruts, stumps or other obstructions and sudden changes in slope
- Speed
- Turning
- Braking performance
- Operator skill

These varying factors make it impractical to specify a maximum safe operating angle in this manual. It is therefore important for the operator to be aware of these conditions and adjust operation accordingly.

Shut Down

1. When job is complete, press service brake.
2. Move F-N-R lever to neutral and move ground drive speed/direction hand control to neutral.
3. Tilt steering column up.
4. Engage parking brake and verify parking brake indicator is on.
5. Release service brake.
6. Lower all attachments to ground and let machine idle for three minutes to cool.
7. Turn ignition switch to STOP. If leaving machine unattended, remove key.
8. For maintenance or storage, turn battery disconnect switch to disconnect position.

Transport

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- Procedure 74

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- Points 75
- Procedure 75

Haul 76

- Procedure 76

Tow 79

- Procedure 79

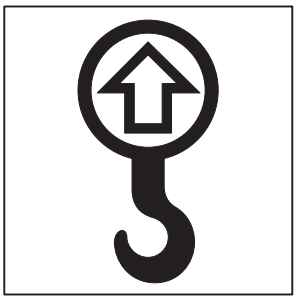
Lift

WARNING Crushing weight. If load falls or moves it could kill or crush you. Use proper procedures and equipment or stay away.

WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

Points

Lifting points are identified by lifting decals. Lifting at other points is unsafe and can damage machinery.



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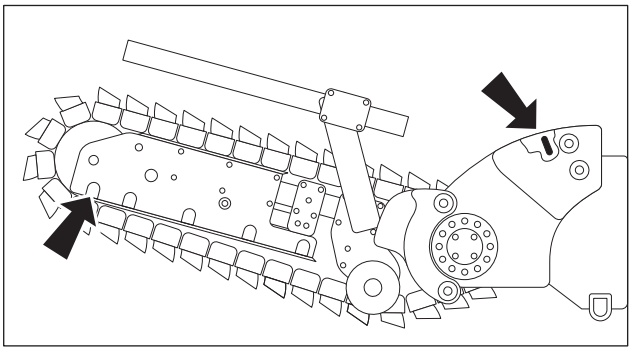
Procedure

Tractor

This machine is not configured for lifting. If the machine must be lifted, load machine into a container or onto a platform appropriate for lifting. See "Specifications" on page 145.

Trencher

Use crane capable of supporting the equipment's size and weight. See "Specifications" on page 145 or measure and weigh equipment before lifting.



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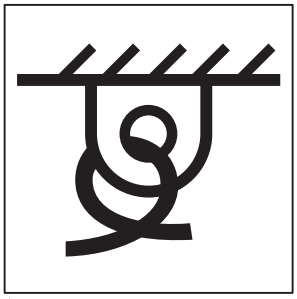
Tie Down

⚠WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

Points

Tiedown points are identified by tiedown decals. Securing to trailer at other points is unsafe and can damage machinery.



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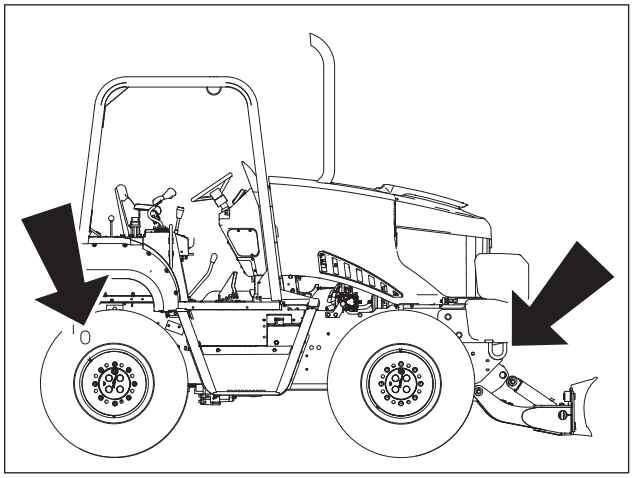
Procedure

Tractor

Attach chains at front and rear tiedown points. Make sure chains are tight before transporting unit.



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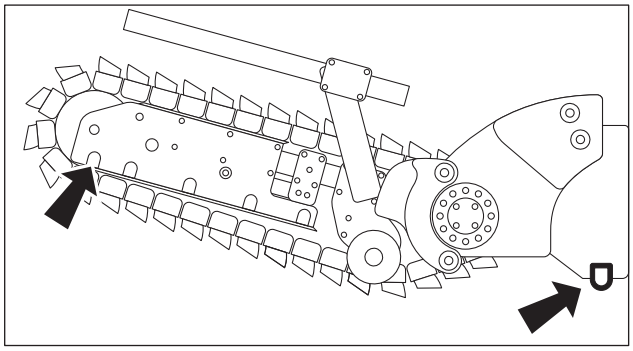
Trencher

Lower trencher to trailer deck and chain at attachment frame and through boom. Make sure chains are tight before transporting.

IMPORTANT: If trencher is equipped with a trench cleaner, ensure that trench cleaner shoe is fully up and extra bolt (found in operator's manual compartment) is installed in appropriate hole for additional support.



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Haul

⚠WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

To help avoid injury:

- Read trailer operator's manual before loading or transporting your machine. Incorrectly loaded machine can slip or cause trailer sway.
- Attach trailer to tow vehicle before loading or unloading.
- Park, load, and unload trailer on level ground.
- Check that unit and trailer do not exceed size or weight regulations.
- Ensure that tow vehicle has proper tow capacity rating.
- Position ten to fifteen percent of total vehicle weight (equipment plus trailer) on tongue to help prevent trailer sway.
- Connect safety chains to tow vehicle. Attach left chain to right side of tow vehicle and vice versa to cradle hitch. Do not connect to pintle hook or hitch ball.
- Connect breakaway switch cable to tow vehicle. Do not connect to pintle hook or hitch ball.

Procedure

Inspect Trailer

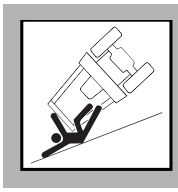
1. Check hitch for wear and cracks. Lubricate if needed.
2. Check battery for 12V charge.
3. Inspect lights for cleanliness and correct operation. Inspect reflectors and replace if needed.
4. Check tire pressure. Check lug nut torque with a torque wrench. Adjust if needed.
5. Ensure trailer brakes are adjusted to come on in synchronization with tow vehicle brakes.
6. Check ramps and trailer bed for cracks.

Load

WARNING Crushing weight. If load falls or moves it could kill or crush you. Use proper procedures and equipment or stay away.

To help avoid injury:

- Attach trailer to tow vehicle before loading or unloading.
- Load and unload trailer on level ground.
- Put manual transmission into first or reverse gear or automatic transmission into park. Turn off ignition. Set parking brake.
- Block trailer wheels.



WARNING Rollover possible. If machine rolls over, you could be thrown from seat and killed or crushed. Wear seat belt.

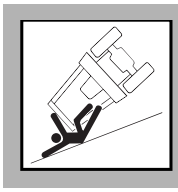
1. Fasten and adjust seat belt.
2. Tilt steering column down.
3. Start tractor. See page 68 for proper start-up procedures.
4. Raise attachments, but keep them low.
5. Release parking brake and verify that parking brake indicator is off.
6. Move dig/drive control to dig position.
7. With F-N-R lever in neutral, twist to 1 (low).
8. Release service brake.
9. Slow engine to low throttle and slowly drive tractor onto trailer.
10. Position tractor on trailer deck for proper weight distribution.
11. Engage parking brake and verify that parking brake indicator is on.
12. Lower attachments to trailer bed and turn tractor off. See page 72 for proper shutdown procedures.
13. Attach chains to tractor and attachments where tiedown decals are located. See page 75.

Unload

WARNING Crushing weight. If load falls or moves it could kill or crush you. Use proper procedures and equipment or stay away.

To help avoid injury:

- Attach trailer to tow vehicle before loading or unloading.
- Load and unload trailer on level ground.
- Put manual transmission into first or reverse gear or automatic transmission into park. Turn off ignition. Set parking brake.
- Block trailer wheels.



WARNING Rollover possible. If machine rolls over, you could be thrown from seat and killed or crushed. Wear seat belt.

1. Lower trailer or ramps.
2. Check that parking brake is engaged and verify that parking brake indicator is on.
3. Check that speed/direction hand control is in neutral.
4. Check that dig/drive control is still in dig position and that F-N-R lever is still in neutral and set at 1 (low).
5. Remove chains from tiedowns.
6. Fasten and adjust seat belt.
7. Tilt steering column down.
8. Start tractor. See page 68 for proper start-up procedures.
9. Raise attachments, but keep them low.
10. Release parking brake and verify that parking brake indicator is off.
11. Slow engine to low throttle and slowly back unit down trailer or ramps.

Tow

⚠WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

Under normal conditions, tractor should not be towed. If tractor becomes disabled and towing is necessary:

- Do not tow for more than 200 yd (180 m).
- Tow at less than 1 mph (1.6 km/h).
- Steering will be very difficult.

Procedure

1. Engage parking brake.
2. Block front and rear tires to prevent unit from rolling.
3. Attach tow line to all available tiedown points facing towing vehicle.
4. Move dig/drive control to 2 (drive).
5. Move F-N-R lever to neutral.
6. Remove blocks.
7. Fasten and adjust seatbelt.
8. Press service brake.
9. Disengage parking brake.
10. Use service brake to control unit.

Trench

Chapter Contents

Setup 82

Operation 84

Setup

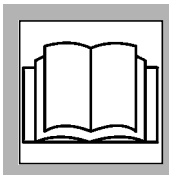
EMERGENCY SHUTDOWN - Turn ignition switch to STOP.

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

To help avoid injury: 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.

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

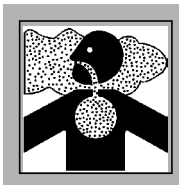
To help avoid injury: Comply with all utility notification regulations before digging or drilling.



⚠WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

1. If using optional trench cleaner, remove bolt installed for transport.
2. Fasten and adjust seatbelt.
3. Start tractor. See page 68 for start-up procedures.
4. Drive to starting point. Move in line with planned trench. See page 70 for driving procedures.
5. Apply service brake.
6. Engage parking brake and verify parking brake indicator is on.
7. Release service brake.
8. Move F-N-R lever to neutral.
9. Move dig/drive control to dig position.
10. Twist F-N-R lever to 1 (low).
11. Lower backfill blade.
12. Tilt steering column up.
13. Turn seat to the desired position.
14. Engage axle lock.
15. Lower boom to just above ground.
16. Check that boom is in line with planned trench.

Operation



⚠ CAUTION Breathing crystalline silica dust may cause lung disease. Cutting, drilling, or working materials such as concrete, sand, or rock containing quartz may result in exposure to silica dust. Use dust control methods or appropriate breathing protection when exposed to silica dust.

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

To help avoid injury: Expose lines by hand before digging.

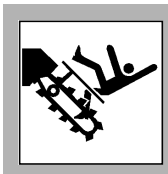
⚠ WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.

To help avoid injury:

- Comply with all utility notification regulations before digging or drilling.
- Notify companies that do not subscribe to One-Call.

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

1. Move hand throttle to half open.
2. Ensure dig/drive control to dig position and move F-N-R lever forward. DIGGING CHAIN WILL MOVE.



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

To help avoid injury:

- Allow 3' (1 m) between digging teeth and obstacle. Machine might jerk when digging starts.
- Keep everyone at least 6' (2 m) from machine, attachments, and their range of movement.

3. Lift trench cleaner, if equipped.
4. Slowly lower digging boom to desired trench depth.
5. Increase engine speed to full throttle using hand control.

IMPORTANT:

- When in "dig" mode, the foot throttle allows temporary override (increase only) of hand throttle setting. This will increase ground drive and attachment speed.
- Operate engine at full throttle when working.
- For best production, maintain engine speed at 2300-2650 rpm.

6. Raise backfill blade.
7. Press service brake.
8. Release parking brake and verify parking brake indicator is off.
9. Twist F-N-R lever to 2 (high), if desired.
10. Move ground drive speed/direction hand control to desired speed.
11. Release service brake.

12. If using optional trench cleaner, return speed/direction control to neutral when desired trench depth is reached. Raise boom slightly, then lower trench cleaner completely. This ensures trench cleaner will lock in place.

NOTICE:

- Do not have trench cleaner in working position when starting a trench.
- Do not back up with trench cleaner in working position.
- Do not use trench cleaner in working position in conditions where large rocks can get between chain and cleaner.

13. If using trench cleaner, lower boom to trench depth and push speed/direction hand control forward to trenching speed.

IMPORTANT:

- Do not make sharp turns. Lower boom to full depth when turning.
- If an object becomes lodged in chain, move attachment speed/direction control to neutral and raise boom slightly. Reverse chain direction. If object must be removed manually, turn engine off and engage parking brake.

14. When trench is complete, apply service brake.
15. Move ground drive speed/direction hand control to neutral.
16. Adjust throttle to low idle using hand control.
17. Raise boom.
18. As boom clears top of trench, move F-N-R lever to neutral.
19. Raise trench cleaner.
20. Swivel seat to the drive position and tilt steering column to desired operating position.
21. Move dig/drive control to drive position.
22. Drive a short distance away from work site. See page 70 for driving procedures.
23. Disengage axle lock by driving tractor in reverse 6' (2 m).
24. Shut down tractor. See page 72 for proper shutdown procedures.
25. Return optional trench cleaner to the stowed position.

Backhoe

Chapter Contents

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Operation 89

Stowing 90

Setup

1. Move F-N-R lever to neutral position.
2. Press service brake.
3. Move ground drive control to neutral position.
4. Shift gearbox control to 1 (low).
5. Lower rear attachment to 6" (150 mm) above ground.
6. Check that backfill blade is straight and lower it to ground.
7. Decrease engine speed to low throttle.
8. Move to backhoe operator's station.
9. Lower stabilizers enough to lift front tires.

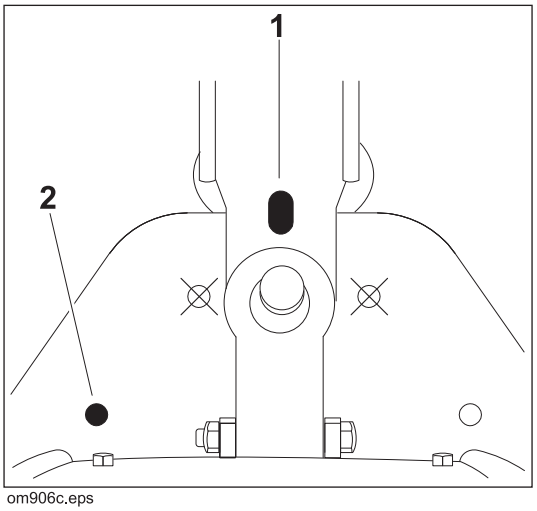
IMPORTANT: For more information about stabilizer controls, see page 49.

10. Remove swing lock pin from hole (1) and store in hole (2).
11. Raise boom to release tension on stow lock.
12. Release stow lock by pushing handle forward.

IMPORTANT: For more information about stow lock, see page 49.

13. Adjust engine speed to 1/2 to 3/4 throttle for digging.

NOTICE: Engine speed affects speed of backhoe operation.



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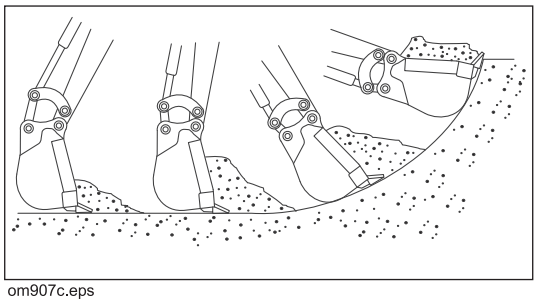
Operation

Use boom/swing control and bucket/dipper control to dig hole or trench.

IMPORTANT: For more information about backhoe controls, see page 49.

- Keep dipper and boom at right angles as much as possible for maximum power.
- Keep bucket in line with dipper as much as possible.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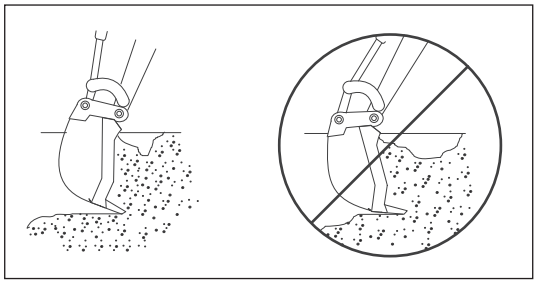
- Position bucket so teeth cut soil. As soil is cut, curl bucket under dipper.
- Move dipper and bucket together. Increasing engine speed will not increase backhoe force.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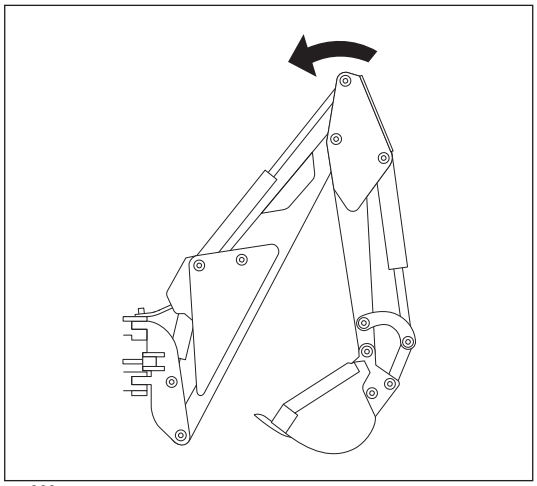
Stowing

NOTICE: Before returning to tractor operator station, raise stabilizers, return remote throttle to low idle, and stow and lock boom.

1. When hole or trench is complete, lift boom while keeping dipper pointed at ground.



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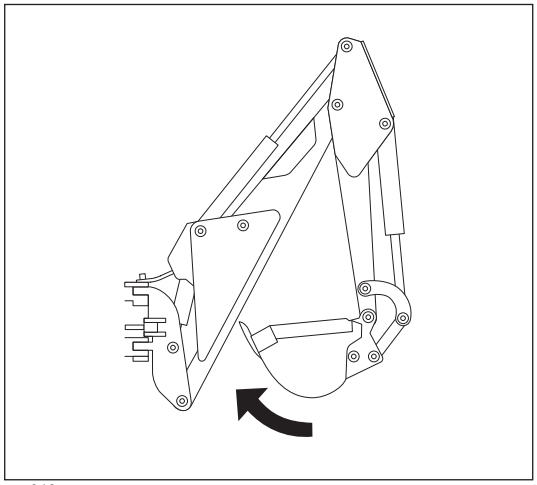
2. Curl bucket closed and move dipper fully toward boom.
3. Lift boom to highest position and latch stow lock.
4. Lower boom slightly to engage lock.
5. Engage swing lock. See page 88.



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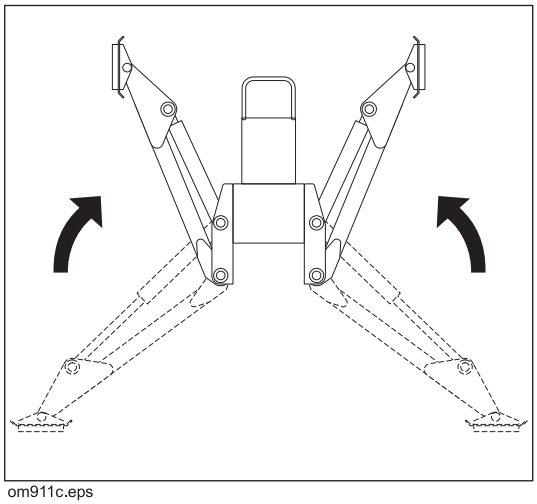
6. Raise stabilizers.
7. Return remote throttle to low idle.



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Drill

Chapter Contents

Prepare Jobsite and Equipment 93

- Approach Trench (1) 93
- Target Trench (2) 93
- Drill Pipe and Equipment. 93

Drill 94

- Using Drill String Guide. 94

Add Rod 95

Backream 95

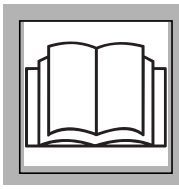
Disassemble Joints 96

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

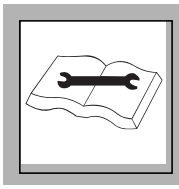
To help avoid injury: Keep everybody at least 10' (3 m) away from drill pipe during operation. Do not straddle trench or drill pipe while drilling.

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

To help avoid injury: Set up warning barriers and keep people away from equipment and jobsite while drilling.



WARNING Read operator's manual. Know how to use all controls before operating machine. When you see this sign ⚠ on the machine or in the manual, read it and use caution. Your safety is at stake.



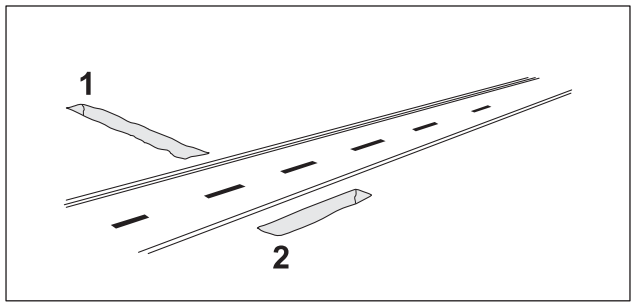
WARNING Improper control function could cause death or serious injury. If control does not work as described in instructions, stop machine and have it serviced.

To help avoid injury: Do not tape or tie down switch or lever.

Prepare Jobsite and Equipment

Approach Trench (1)

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



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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

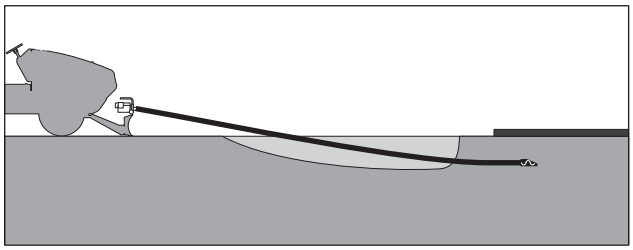
Target Trench (2)

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.

Drill Pipe and Equipment

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


DrillRod_Trencher_small.eps

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.

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.

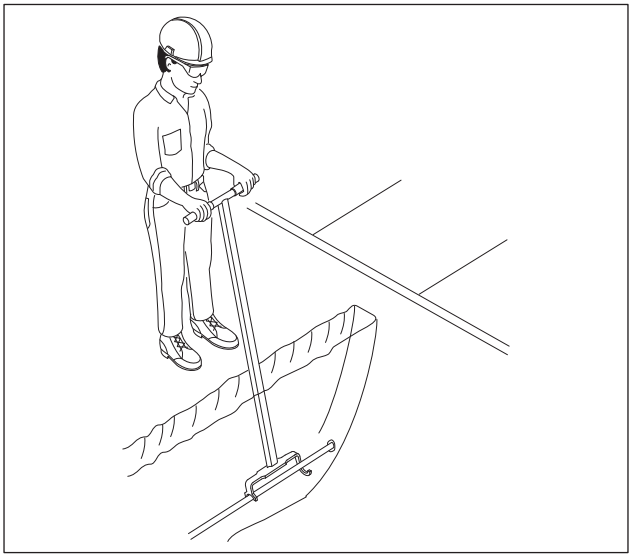
Using Drill String Guide

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

To help avoid injury: 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.



DrillStringGuide.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 seized in the bore hole.

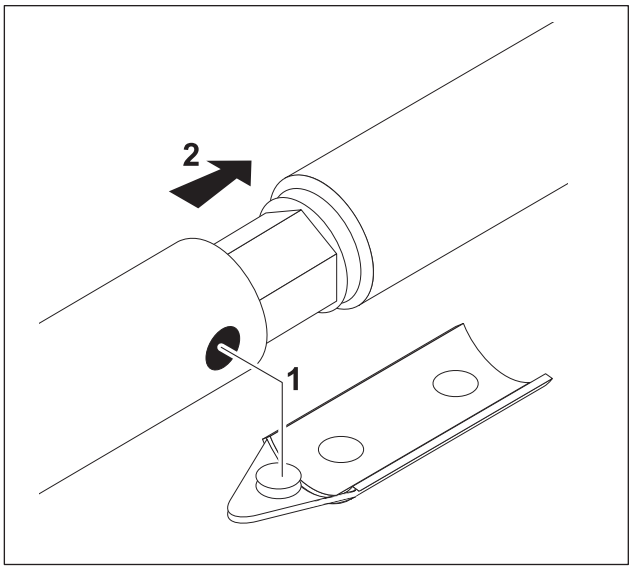
4. Slowly back up tractor while maintaining rotation.
5. When backreamer exits the bore hole, stop rotation immediately.

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.

Disassemble Joints

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



Systems and Equipment

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Chain, Teeth, and Sprockets 98

- Chain and Tooth Maintenance 98
- Chain Types 98
- Chain Selection 99

Optional Equipment 100

- RT100 Tractor 100
- M910/M912 Trencher 100

Chain, Teeth, and Sprockets

Chain and Tooth Maintenance

- Always replace sprockets at the same time you replace the digging chain. Sprockets and chain are designed to work together. Replacing one without the other will cause premature wear of the new part.
- Keep digging teeth sharp. Using dull, worn teeth will decrease production and increase shock load to other trencher components. It can also cause chain stretch, which leads to premature chain wear and failure.
- Maintain the proper amount of tension on the digging chain. Overtightening will cause chain stretch and loss of machine performance. For correct tightening procedure, see page 117.
- Use the tooth pattern most appropriate for your digging conditions. If you move to a different soil type, contact your Ditch Witch dealer for information about the most effective chain type and tooth pattern.

Chain Types

Chain type	Features
4-pitch	standard chain
2-pitch	more teeth for smoother cutting
alternating side bar	prevents spoil compaction on chain
bolt-on adapters	allow easy configuration changes
Shark Chain II	versatile, virtually maintenance-free
combination	provides pick and shovel effect

Chain Selection

These charts are meant as a guideline only. No one chain type works well in all conditions. See your Ditch Witch dealer for soil conditions and chain recommendations for your area. Ask for the latest Chain, Teeth, and Sprockets Parts Catalog.

- 1 = best
- 2 = better
- 3 = good
- 4 = not recommended

Chain	Sandy Soil	Soft Soil	Medium Soil	Hard Soil	Rocky Soil	Sticky Soil
4-pitch cup tooth	3	1	2	3	4	1
2-pitch cup tooth	2	3	1	1	3	4
bolt-on adaptor, 2-pitch	4	4	3	2	1	4
bolt-on adaptor/cup tooth combo	4	3	2	1	2	4
Shark Chain II	4	3	2	1	1	4
alternating side bar	4	4	4	4	4	1

Soil	Description
sandy soil	sugar sand, blow sand, or other soils where sand is the predominant component
soft soil	sandy loam
medium soil	loams, loamy clays
hard soil	packed clays, gumbo, all compacted soils
rocky soil	chunk rock, glacial till, cobble, rip rap, gravel
sticky soil	gumbo, sticky clays

Optional Equipment

See your Ditch Witch dealer for more information about the following optional equipment.

RT100 Tractor

Equipment	Description
backup alarm	for use with low visibility situations
light kit	mounts to ROPS and includes work lights and hazard light
cab kit	enclosed cab for extreme weather conditions
A/C-heater kit	climate control system for units with cabs
auxiliary step kit	additional step for moving from operator's station to backhoe station

M910/M912 Trencher

Equipment	Description
booms	several boom length options are available
hydraulic trench cleaner	removes spoils from the trench floor
long auger extensions	for conditions that require spoils to be moved farther from the trench

Complete the Job

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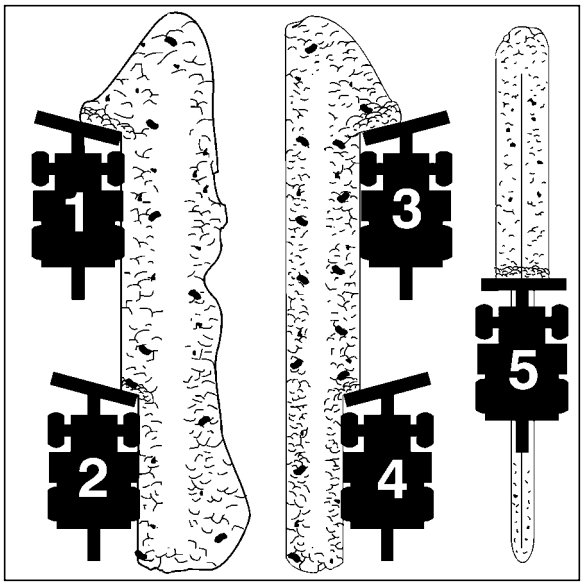
Rinse Equipment 102

Stow Tools 102

Restore Jobsite



After product is installed, return spoils to the trench with backfill blade.

Backfilling

1. Position unit at end of trench, several feet from spoils. Aim tractor at outer edge of spoils.
2. Adjust backfill blade to fit land contour.
3. Move outer edge of spoils toward trench. Take two or more passes at spoils rather than moving all spoils at once.
4. Repeat on other side of trench, if necessary.
5. Engage float and make final pass over trench.

Rinse Equipment

Spray water onto equipment to remove dirt and mud.

NOTICE: Do not spray water onto operator's console. Electrical components could be damaged. Wipe down instead.

Stow Tools

Make sure all tools and accessories are loaded and properly secured on trailer.

Service

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Recommended Lubricants/Service Key 104

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- Engine Oil Temperature Chart 107

10 Hour 108

50 Hour 118

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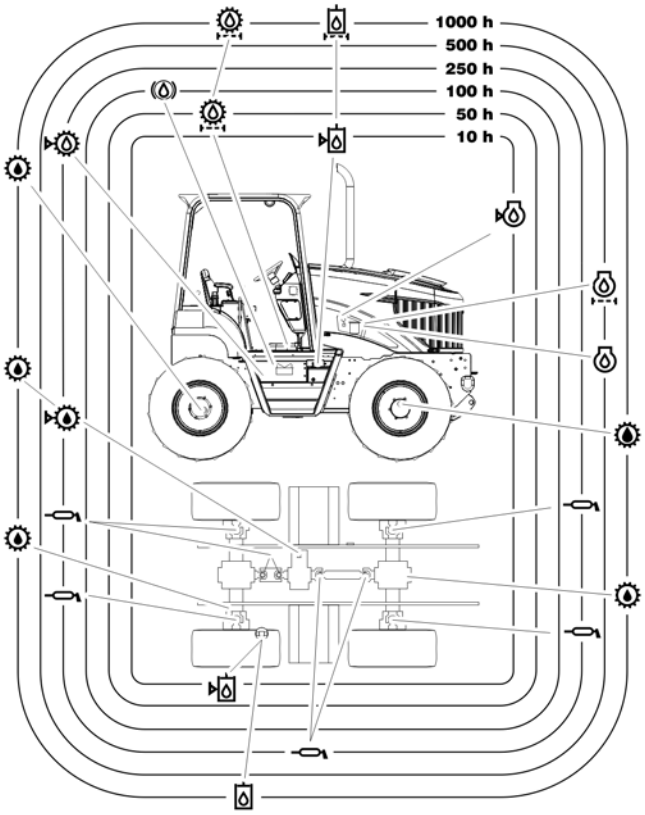
Lubrication Overview



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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 148.

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.
- Use the "Service Record" on page 159 to record all required service to your machine.

Recommended Lubricants/Service Key

Item	Description
Tier 4i DEO	Diesel engine oil meeting or exceeding Deutz specification DQC III- LA. ***NOTICE:*** Shipped from factory with API CJ-4 DEO meeting Deutz specification DQC II-LA. Change oil initially at 250 hours. • Engine must use low sulfated ash, phosphorous, and sulfur (low SAPS) oil. • See viscosity chart. • If oils meeting only API CJ-4 or ACEA E6/E9 are used, service interval is reduced to 250 hours.
Tier 3 DEO	Diesel engine oil meeting or exceeding Deutz specification DQC III. ***NOTICE:*** Shipped from factory with API CJ-4 DEO meeting Deutz specification DQC II-LA. Change oil initially at 100 hours if fuel sulphur content exceeds 500 ppm (500 mg/kg). Otherwise, initial oil change should be at 250 hours. • See viscosity chart. • If oils meeting only API CJ-4 or ACEA E7 are used, service interval is reduced to 250 hours.
MPG	Multipurpose grease meeting ASTM D217 and NLGI 5
EPG	Extreme pressure grease meeting ASTM D217 and NLGI 5
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
BRAKE	Brake fluid meeting or exceeding DOT 3 specifications
PTF	Powershift transmission fluid: Phillips 66 Torque Fluid high-performance, multipurpose, heavy-duty torque converter fluid for use in off-highway powershift transmissions
DEAC	Diesel engine Antifreeze/Coolant meeting ASTM specification D6210
	Check level of fluid or lubricant
	Check condition
	Filter
	Change, replace, adjust, service, or test

Approved Fuel

Tier 4i Engine (U.S., Canada, EU, and Japan)

⚠WARNING Avoid static electricity when fueling. Ultra Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations. Avoid death or serious injury from fire or explosion. Consult with your fuel system supplier to ensure the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

This engine is designed to run on diesel fuel. Use only high quality fuel meeting ASTM D975 No. 2D, EN590, or equivalent. At temperatures below 32°F (0°C) winter fuel blends are acceptable. See the engine operation manual for more information.

NOTICE: Use only Ultra Low Sulfur Diesel (less than 15 ppm (15 mg/kg) sulfur content) in this unit. Operating with higher sulfur content will damage the engine and aftertreatment device.

Biodiesel blends up to 5% (B5) are approved for use in this unit. The fuel used must meet the specifications for diesel fuel shown above. In certain markets, higher blends may be used if certain steps are taken. Extra attention is needed when using biodiesel, especially when operating in cold weather or storing fuel. Contact your Ditch Witch dealer or the engine manufacturer for more information.

Tier 3 Engine (Rest of World)

This engine is designed to run on diesel fuel. Use only high quality fuel meeting ASTM D975 No. 2D, EN590, or equivalent. At temperatures below 32°F (0°C) winter fuel blends are acceptable. See the engine operation manual for more information.

IMPORTANT: Worldwide, fuel sulfur regulations vary widely. Fuel used should always comply with local regulations. Prior to shipping, Tier 3 units were filled with API CJ-4 DEO. If operating fuel with sulfur content above 500 ppm (500 mg/kg), change oil initially at 100 hours.

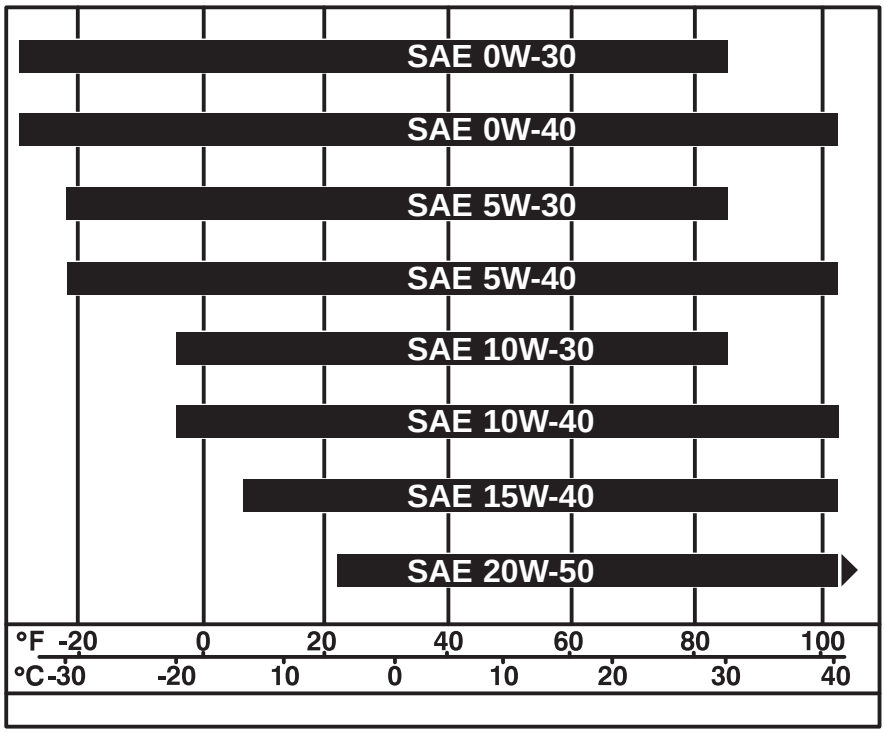
Biodiesel blends up to 5% (B5) are approved for use in this unit. The fuel used must meet the specifications for diesel fuel shown above. In certain markets, higher blends may be used if certain steps are taken. Extra attention is needed when using biodiesel, especially when operating in cold weather or storing fuel. Contact your Ditch Witch dealer or the engine manufacturer for more information.

Approved Coolant

This unit was filled with John Deere Cool-Gard coolant before shipment from factory. Add only John Deere Cool-Gard II (p/n 255-006) or any fully-formulated, low-silicate, ethylene glycol based, heavy-duty diesel engine coolant meeting ASTM specification D6210.

NOTICE: Do not use water or automotive-type coolant. This will lead to engine damage or premature engine failure.

Engine Oil Temperature Chart



t37om047w.eps

Temperature range anticipated before next oil change

To help avoid injury:

- Unless otherwise instructed, all service should be performed with engine off.
- Refer to engine manufacturer's manual for engine maintenance instructions.
- Before servicing equipment, lower unstowed attachments to ground.

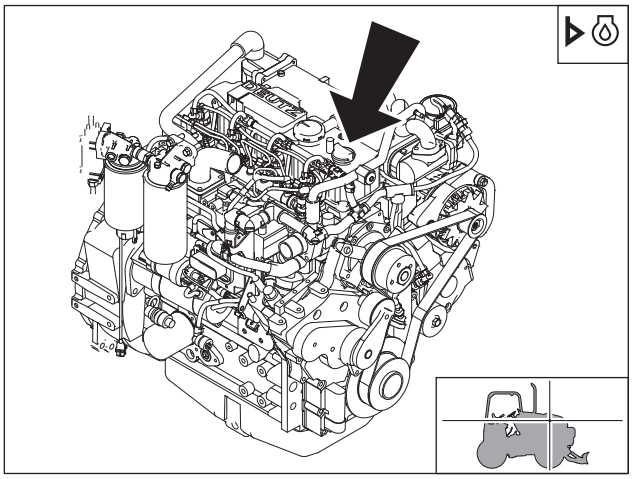
10 Hour

Location	Task	Notes
TRACTOR	Check engine oil level	DEO
	Check air filter indicator and clean dust trap	
	Check water separators and fuel filter	
	Check hydraulic fluid level	THF
	Check hydraulic reservoir fill and strainer	
	Check hydraulic hoses	
	Check coolant level	DEAC
	Check hoses	
	Check radiator fins	
	Check tire pressure	
	Check wheel lug nuts	295 ft•lb (400 N•m)
TRENCHER	Lube trencher tail roller	EPG
	Lube trencher pivot	EPG
	Lube headshaft pivot	EPG
	Lube trencher auger bearings	EPG
	Lube trencher auger shaft	EPG
	Check trencher auger bolts	
	Check digging chain	
	Check digging chain tension	
	Check trencher gearbox oil	MPL
	Lube headshaft bearing	
	Check boom mounting bolts	250 ft•lb (339 N•m)
	Check attachment mounting bolts	200 ft•lb (271 N•m)
	Check personnel restraint bar bolts	350 ft•lb (475 N•m)

Tractor

Check Engine Oil Level

Check engine oil at dipstick (1) before operation and every 10 hours thereafter. Add DEO at fill (2) as necessary to keep oil level at highest line on dipstick.



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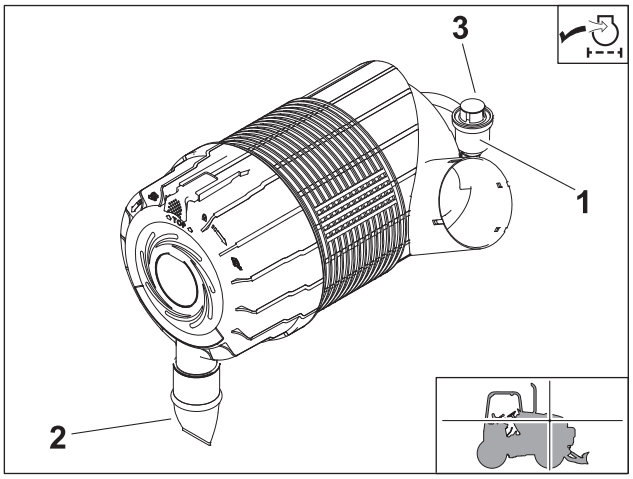
Check Air Filter Indicator and Clean Dust Evactuator Valve

Check air filter indicator (1) and clean dust trap (2) every 10 hours. Red band indicates filter must be changed. Push button (3) to reset indicator.



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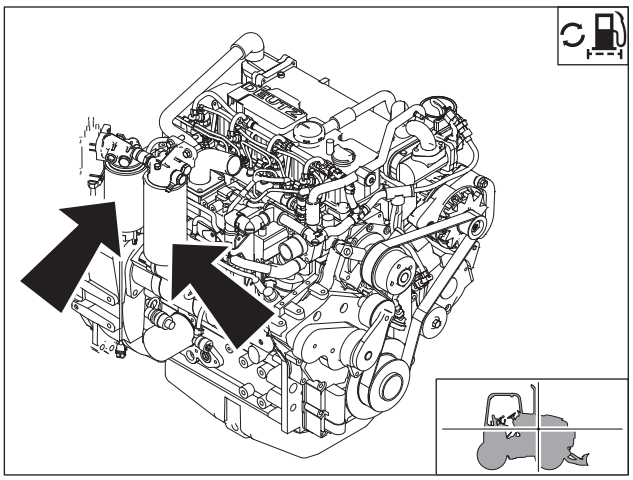
Check Water Separators and Fuel Filter

Check water separators and fuel filter every 10 hours. Drain at plug as needed until water is removed and fuel runs from drain.



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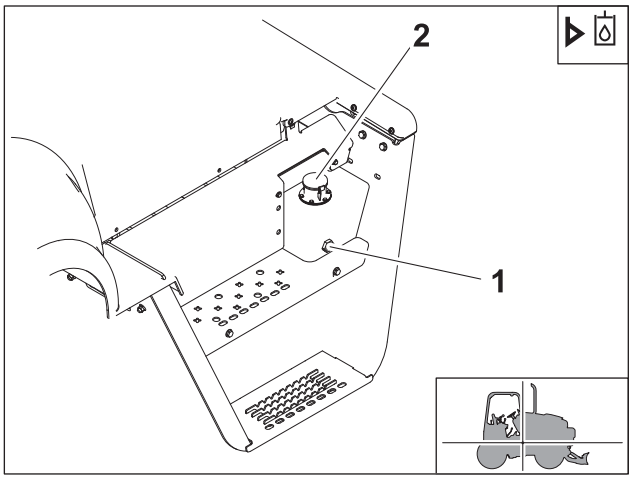
Check Hydraulic Fluid Level

With frame level, check fluid at sight glass (2) every 10 hours. Add THF at fill (1) as necessary. Fluid capacity up to sight glass is 24 gal (91 L).

Clean dust from cap by blowing with low-pressure air.

IMPORTANT: Do not open unless adding hydraulic fluid.



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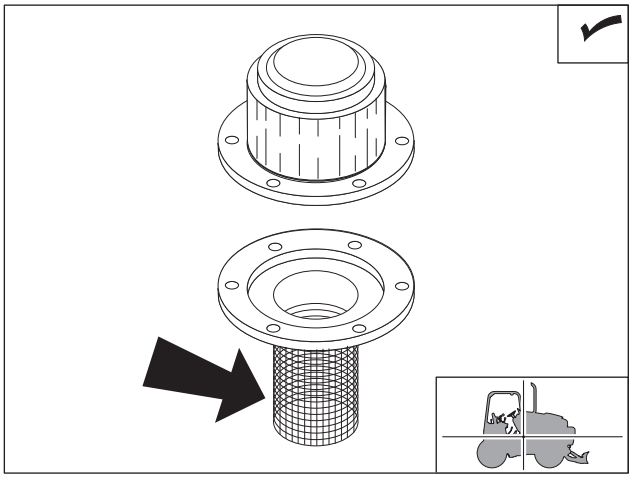
Check Hydraulic Reservoir Fill and Strainer

Check hydraulic reservoir fill and strainer on operator's station step every 10 hours. Wipe away any dirt or debris.



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Check Hydraulic Hoses

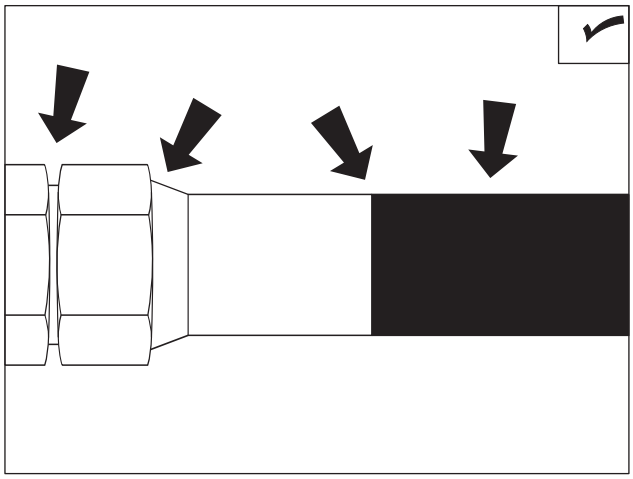
⚠WARNING Fluid or air pressure could pierce skin and cause injury or death. Stay away.

To help avoid injury:

- 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.
- 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.

Check all hydraulic hoses every 10 hours.

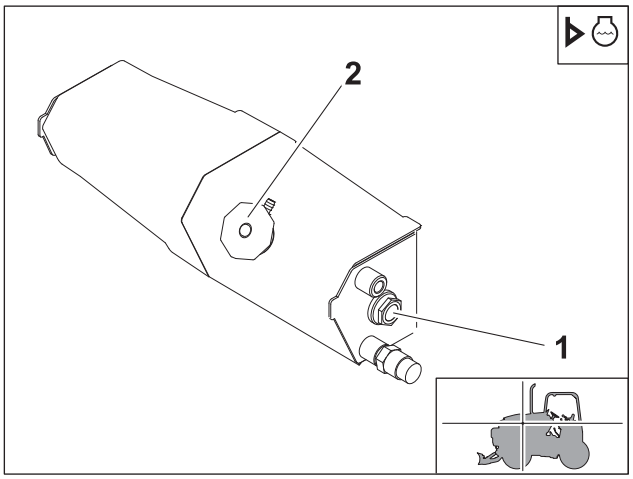


CheckHoses.eps

Check Coolant Level

With engine cool, check coolant level in auxiliary tank sight glass (1) every 10 hours. Maintain level so that coolant is visible in sight glass and no higher than bottom of fill neck. If low, add approved coolant at fill (2). Do not overfill.

IMPORTANT: See page 107 for information on approved coolants.



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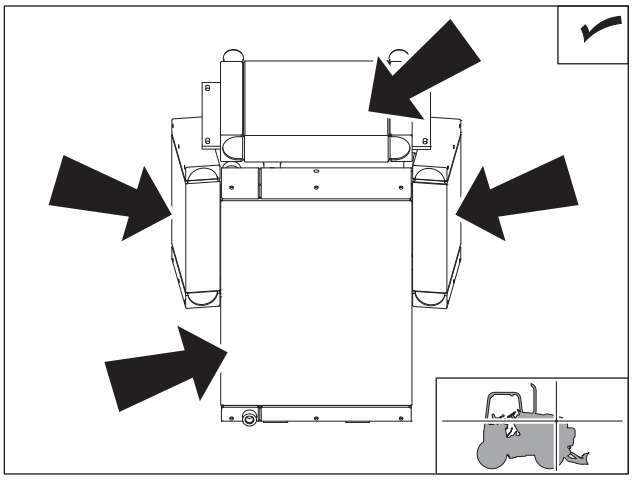
Check Radiator Fins

Check radiator for dirt, grass, and other foreign matter every 10 hours. Clean out with compressed air or spray wash if required. Be careful not to damage fins with high pressure air or water. Check more often if operating in dusty or grassy conditions.



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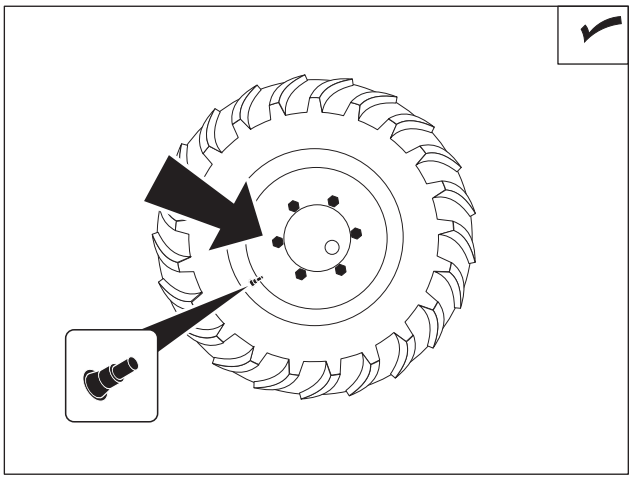
Check Tire Pressure

Check tire pressure every 10 hours.

Tire option	Maximum pressure
38 x 18.00-20	55 psi (3.8 bar)

Check tightness of wheel lugnuts (shown) every 10 hours. Tighten lugnuts to 295 ft•lb (400 N•m).

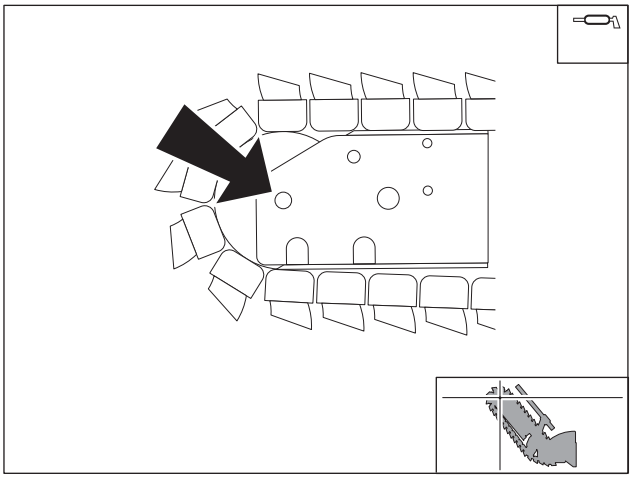


Tires_Service.eps

Trencher

Lube Trencher Tail Roller

Wipe zerks clean and lube every 10 hours with EPG. Lube roller zerks on both sides of boom.



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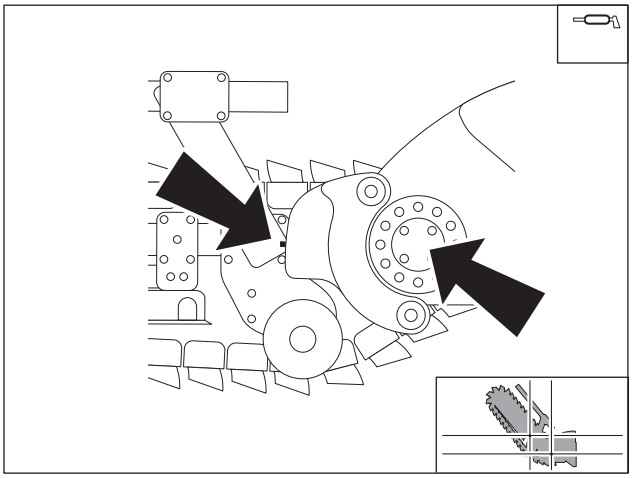
Lube Trencher Pivot

Wipe five zerks located on right of trencher pivot clean and lube every 10 hours with EPG.



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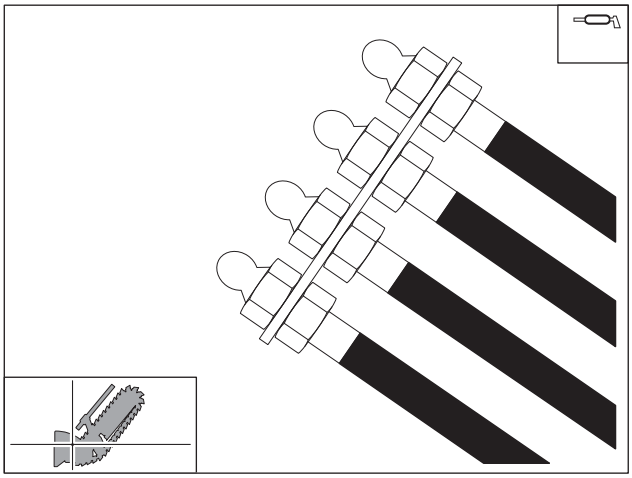
Wipe four zerks located on left of trencher pivot clean and lube every 10 hours with EPG.



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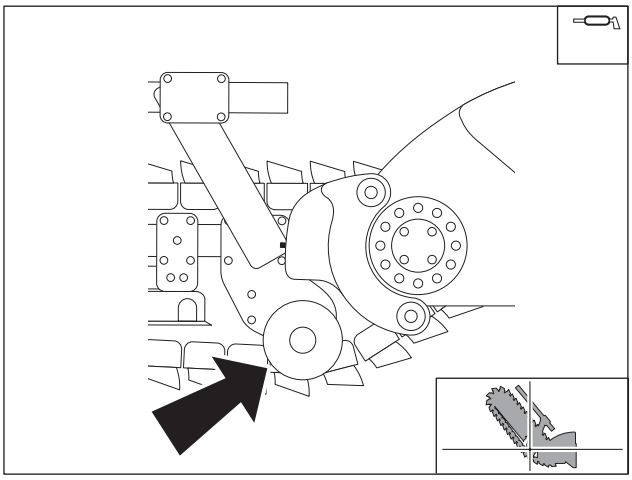
Lube Trencher Auger Bearings

Lube two auger bearing zerks (one on each side) every 10 hours with EPG.



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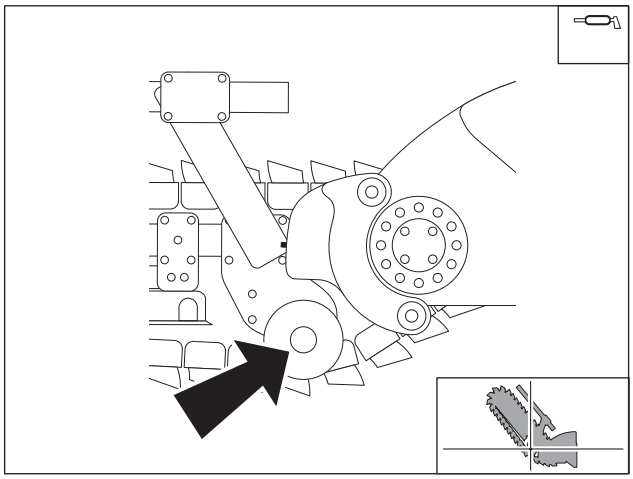
Lube Trencher Auger Shaft

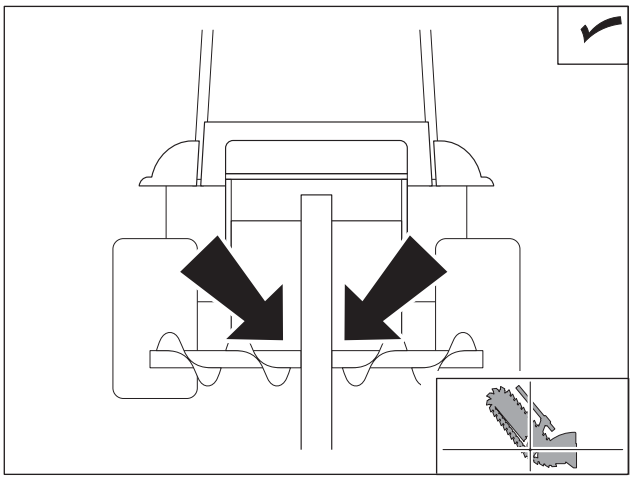
Lube four auger shaft zerks (two on each side) every 10 hours with EPG.



t30om053h.eps

Check Trencher Auger Bolts

Check trencher auger bolts every 10 hours. For optimal spoils delivery, adjust augers to match terrain and digging depth.



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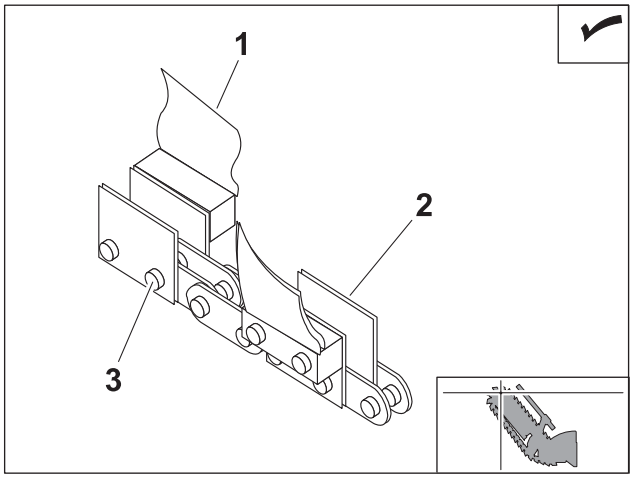
Check Digging Chain Teeth and Bits



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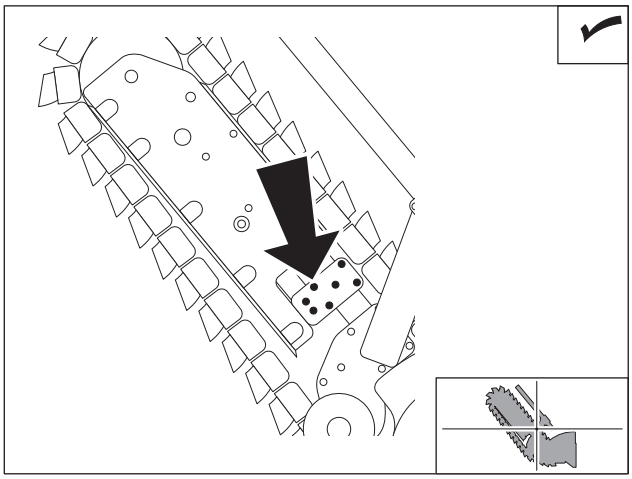
Check teeth (1) for wear every 10 hours. Replace worn teeth, using Ditch Witch replacement parts and maintaining original tooth pattern.

For more efficient digging, contact your Ditch Witch dealer for information about the tooth pattern best suited to your jobsite.

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

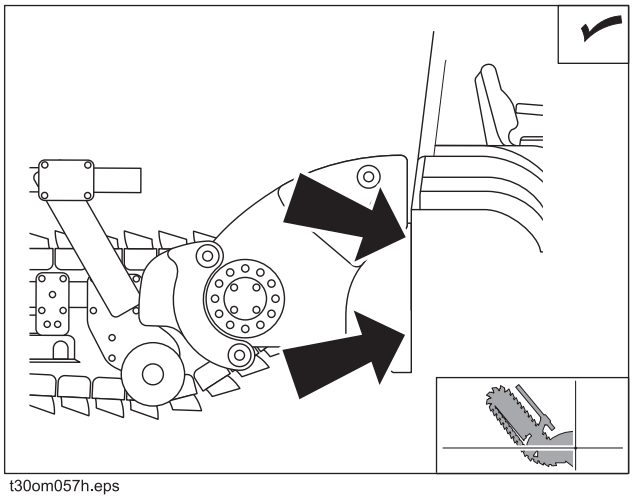
Check chain every 10 hours. Replace worn or broken chains. If sidebars (2) are bent or loose on chain pins (3), chain spacers should be used to join sidebars.

Check Boom Mounting Bolts


t30om056h.eps

Check 14 bolts (7 on each side) every 10 hours and tighten as necessary to keep bolts and other fasteners tight. Check for looseness or wear. Check that bolts are tightened to 250 ft•lb (28 N•m).

Check Attachment Mounting Bolts

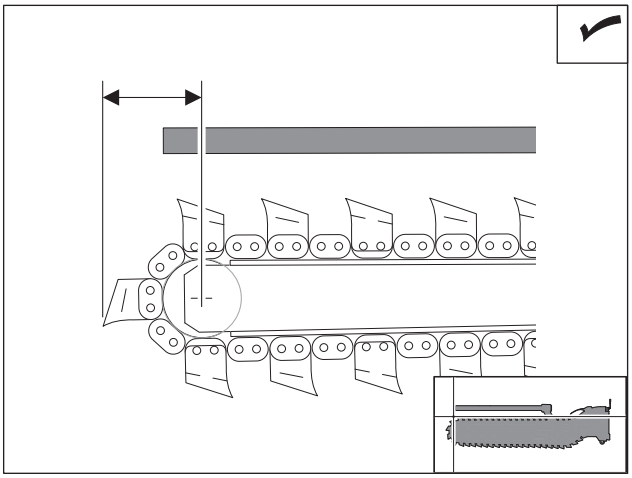

t30om057h.eps

Check bolts every 10 hours and tighten as necessary to keep bolts and other fasteners tight. Check for looseness or wear. Apply Loctite 271® adhesive. Check that bolts are tightened to 200 ft•lb (271 N•m).

Check Restraint Bar Position

Check restraint bar position every 10 hours, or anytime the digging chain is adjusted or replaced. The restraint bar is properly positioned when the end of bar extends between the center of the tail roller/sprocket and the end of the digging chain. Check for looseness or wear.

Tighten bolts as necessary to keep them tight. Bolts mounting arm to boom should be tightened to 400 ft•lb (542 N•m). Apply Loctite 271® adhesive.

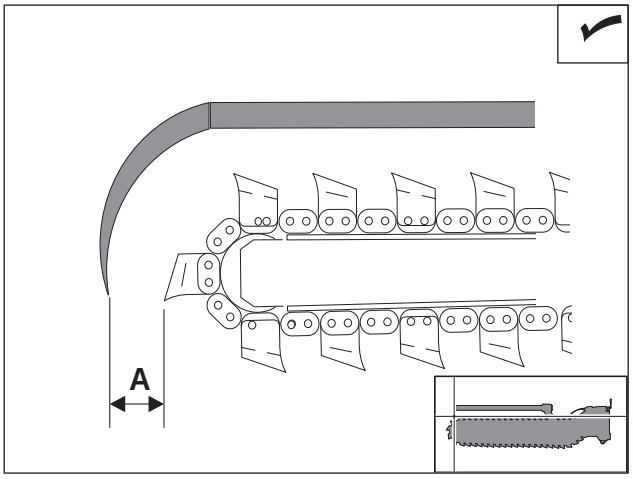


t33om89w.eps

Check Trench Cleaner Position

Check trench cleaner position (if equipped) every 10 hours, or anytime the digging chain is adjusted or replaced. The trench cleaner is properly positioned when there is 3-4 in (76-102 mm) between the digging teeth and the inside of the trench cleaner shoe (A).

Check that bolts holding personnel restraint bar/ trench cleaner to arm are tightened to 350 ft•lb (475 N•m). Apply Loctite 271® adhesive.

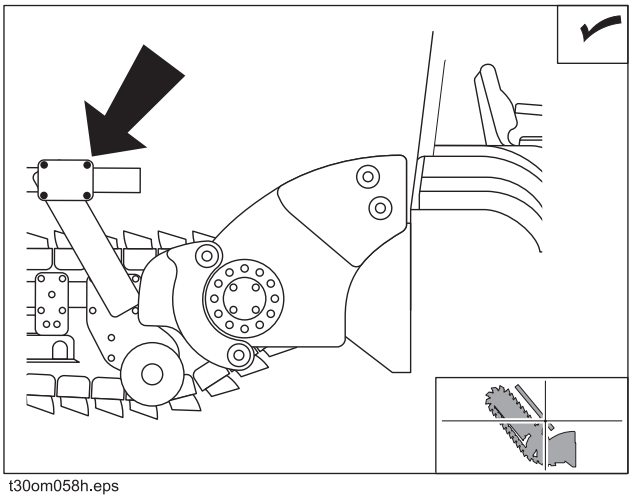


t33om90w.eps

Check Personnel Restraint Bar/Trench Cleaner Bolts

Check all bolts that mount restraint bar/trench cleaner to arm every 10 hours and tighten as necessary to keep bolts tight. Check for looseness or wear. Apply Loctite 271® adhesive.

Check that bolts holding personnel restraint bar/ trench cleaner to arm are tightened to 350 ft•lb (475 N•m). Bolts mounting arm to boom should be tightened to 400 ft•lb (542 N•m).



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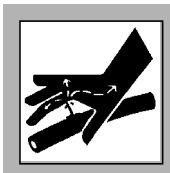
Check Digging Chain Tension.

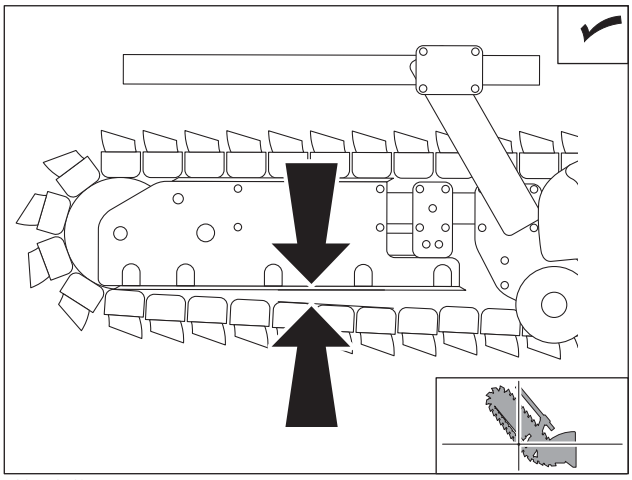


⚠ WARNING Fluid pressure could pierce skin and cause injury or death. Stay away.

To help avoid injury: Service digging boom grease cylinder only while standing on opposite side of boom. Wear gloves and safety glasses, and cover fitting with cloth when relieving pressure in cylinder.

Check digging chain tension every 10 hours. With boom horizontal, measure distance from bottom of boom to chain. When properly adjusted, distance should be 4.5 - 5.5**"** (114 - 140 mm).

To tighten chain, loosen six bolts on trencher boom and pump EPG into cylinder. To relieve chain tension, loosen plug on grease cylinder.



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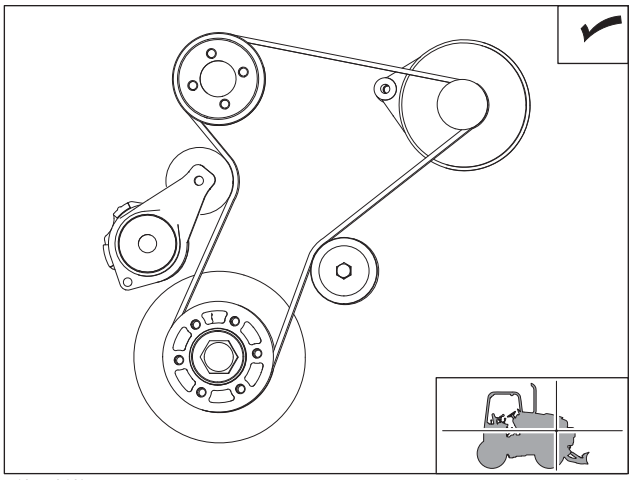
50 Hour

Location	Task	Notes
TRACTOR	Check drive belt	
	Check hydraulic reservoir breather	
	Check fuel tank breather	
	Check cab air filter	
	Change transmission fluid and filter (initial)	
TRENCHER	Lube attachment driveshaft u-joints	EPG

Tractor

Check Drive Belt

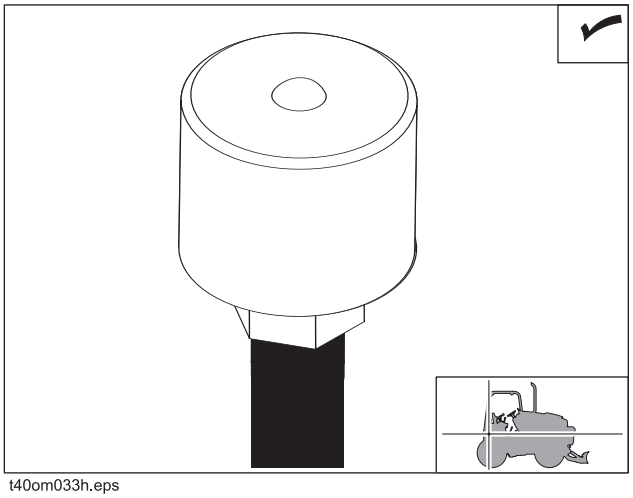
Check belt every 50 hours for damage or wear. Replace worn belt. Belt is properly tensioned when long span (2) moves about 1/2" (13 mm) when pushed. If needed, loosen alternator bolts (1) and adjust idler pulley.



t40om013h.eps

Check Hydraulic Reservoir Breather

Check hydraulic reservoir breather every 50 hours. Ensure breather is not clogged. Remove dust around breather as needed by blowing with low-pressure air. When breather element becomes clogged, remove and clean or replace.



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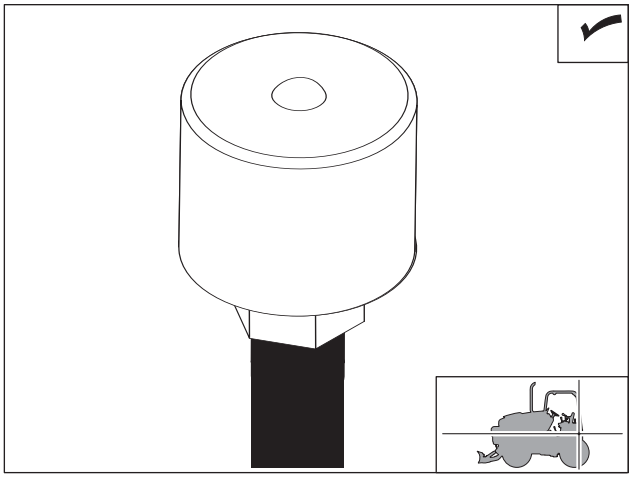
Check Fuel Tank Breather

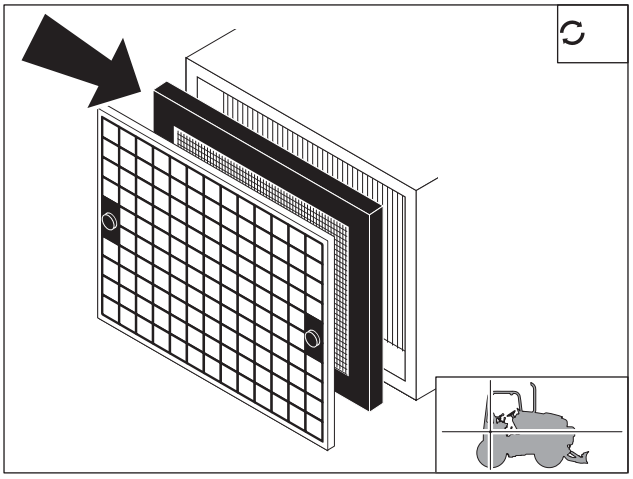
Check fuel tank breather every 50 hours. Ensure breather is not clogged. Remove dust around breather as needed by blowing with low pressure air. When breather element becomes clogged, remove and clean or replace.



t40om034h.eps

Check Cab Air Filter

Check filter every 50 hours for wear or holes. Check more often if working in dusty conditions.



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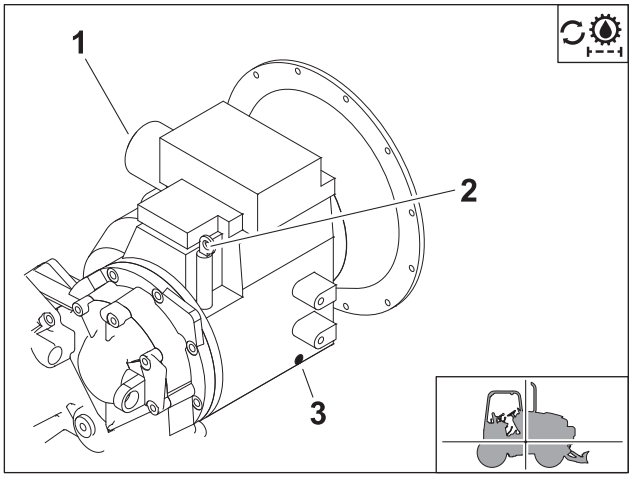
Change Transmission Fluid and Filter (Initial)



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Change transmission fluid and filter (2) after first 50 hours of operation. Change more frequently if working in dusty conditions.

To change:

1. While fluid is warm, remove drain plug (3), screen, and filter (2).
2. Drain fluid and reinstall plug, screen, and new filter.
3. Add approximately 6 qt (5.6 L) of PTF at fill (1).
4. Start engine and run at low idle with transmission in neutral.
5. Cycle transmission from forward to reverse several times.
6. Check fluid level at dipstick. Add PTF as necessary to keep fluid at the appropriate line on the dipstick according to the table below.

Oil temperature	Condition	Line on dipstick
50-86°F (10-30°C)	engine at low idle a few minutes after startup	COLD
176-212°F (80-100°C)	normal operating temperature	HOT

IMPORTANT: If transmission fluid temperature falls between the two ranges listed, fluid level should fall proportionally between the COLD and HOT lines on the dipstick.

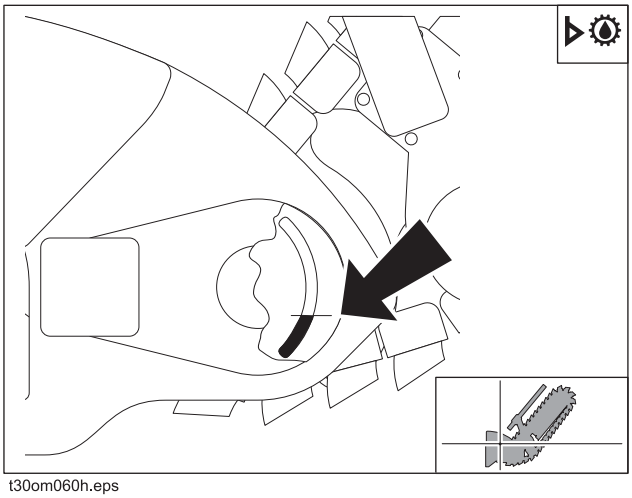
NOTICE:

- Transmission damage can occur if oil is not maintained to the correct level.
- Use only Ditch Witch-approved Phillips 66 Torque Fluid transmission fluid. Do not substitute any other transmission fluid.

Trencher

Check Trencher Gearbox Oil Level

Check oil at sight tube every 50 hours. Keep oil level at horizontal line on housing. If necessary, add MPL at fill plug.



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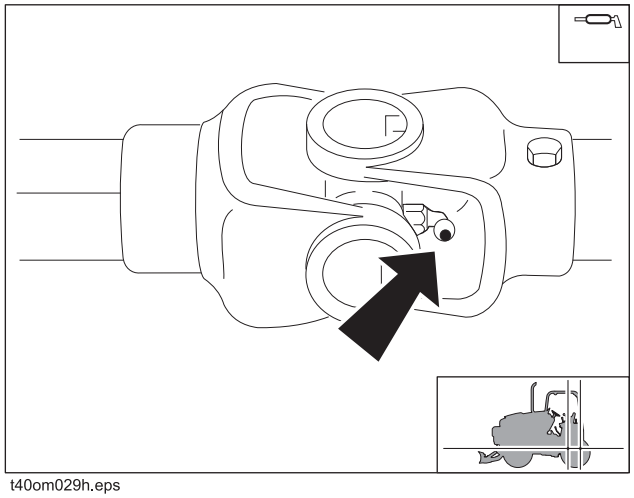
Lube Attachment Driveshaft U-Joints

Lube attachment driveshaft u-joints every 50 hours with 3-4 shots of EPG.



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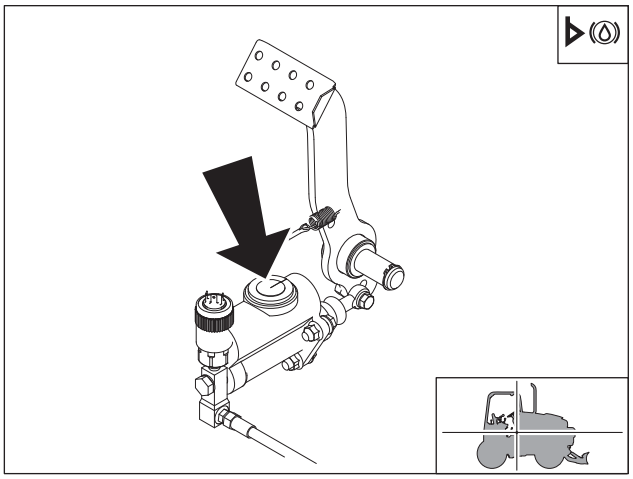
100 Hour

Location	Task	Notes
TRACTOR	Check brake fluid	BRAKE
	Change engine oil (Tier 3)	Initial; if using fuel with sulfur content above 500 ppm (500 mg/kg)

Tractor

Check Brake Fluid

Check brake fluid every 100 hours of operation. Check brake fluid more frequently if working in dusty conditions. Add DOT 3 brake fluid.



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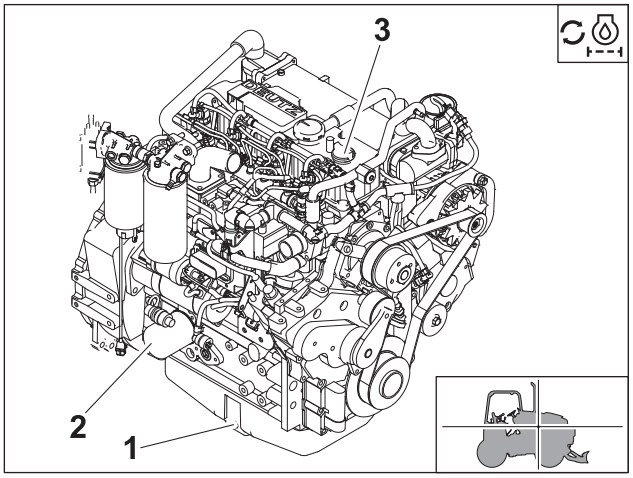
Change Engine Oil and Filter (Initial)

Change engine oil and filter at 100 hours if fuel sulfur content is above 500 ppm (500 mg/kg).

To change:

1. While oil is warm, remove drain plug (3). Drain oil and replace plug.
2. Remove filter (1) and replace with new filter each time oil is changed. Add DEO at fill neck (2).



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250 Hour

Location	Task	Notes
TRACTOR	Change engine oil and filter	
	Adjust service brake	
	Lube driveshaft U-joints	EPG
	Lube axle spindle pins	EPG
	Check transfer case oil level	MPL
	Check differential oil level	MPL
	Lube planetary wheel ends	MPL
	Change cab air filter	
	Check transmission fluid level	PTF

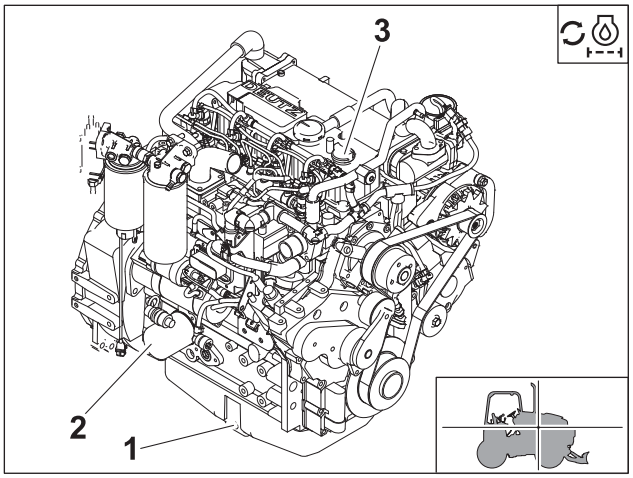
Tractor

Engine Oil and Filter Change (Tier 3)

Change engine oil and filter every 250 hours when using motor oils meeting only API CJ-4 or ACEA E7. See page 104 for more information about DEO specifications.

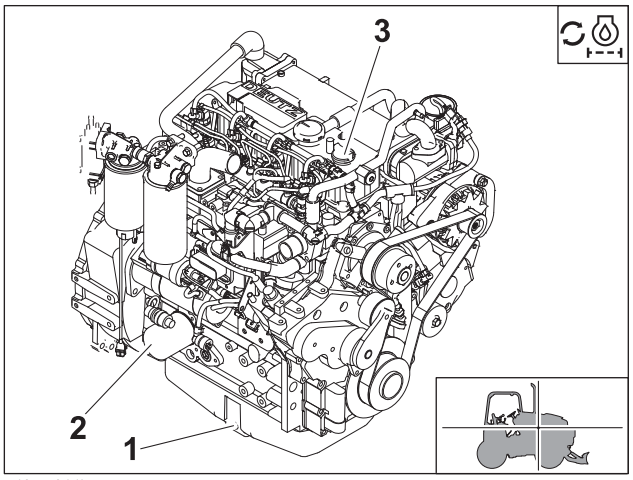
To change:

1. While oil is warm, remove drain plug (1). Drain oil and replace plug.
2. Remove filter (2) and replace with new filter each time oil is changed. Add DEO at fill neck (3).



t40om014h.eps

Engine Oil and Filter Change (Tier 4i)



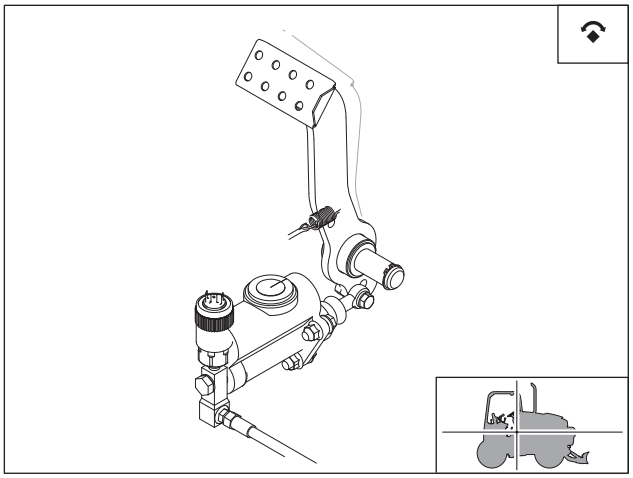
t40om014h.eps

Change engine oil and filter every 250 hours when using motor oils meeting only API CJ-4 or ACEA E6/E9. See page 104 for more information about DEO specifications.

To change:

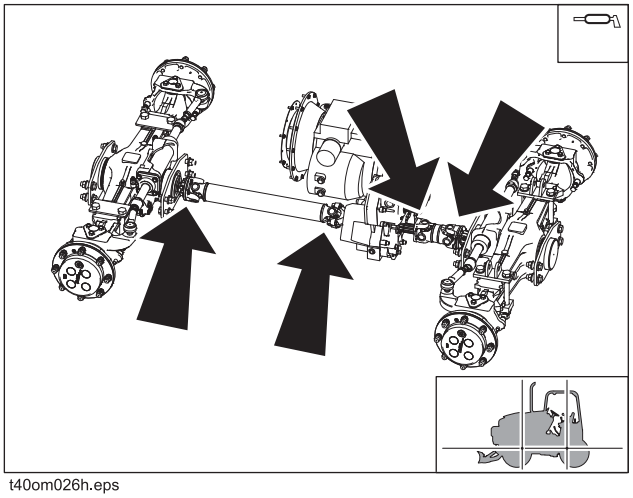
1. While oil is warm, remove drain plug (1). Drain oil and replace plug.
2. Remove filter (2) and replace with new filter each time oil is changed. Add DEO at fill neck (3).

Adjust Service Brake


t40om047h.eps

Adjust service brake after 250 hours of operation. When properly adjusted, there is 1/4-1/2" (6-13 mm) free play in pedal.

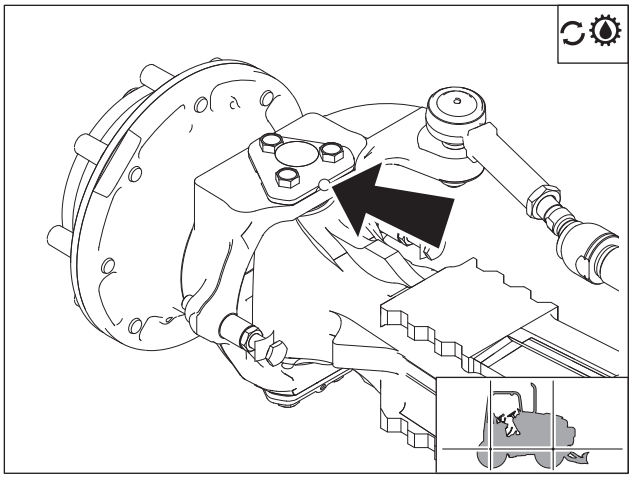
Lube Driveshaft U-joints


t40om026h.eps

Lube driveshaft U-joints every 250 hours with 3-4 shots of EPG.

Lube Axle Spindle Pins

Lube axle spindle pins every 250 hours with 3-4 shots of EPG.



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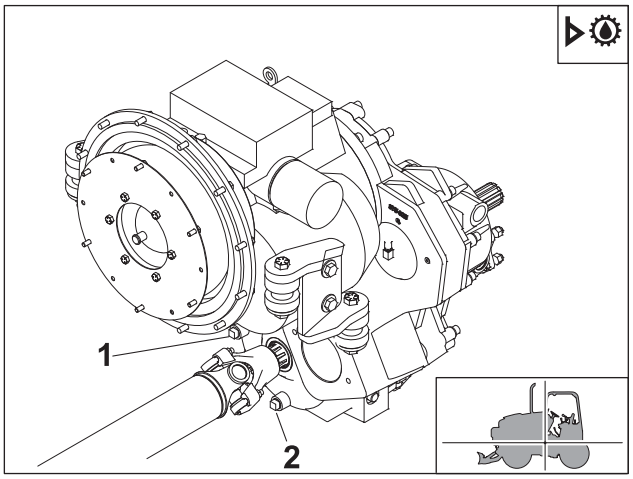
Check Transfer Case Oil Level

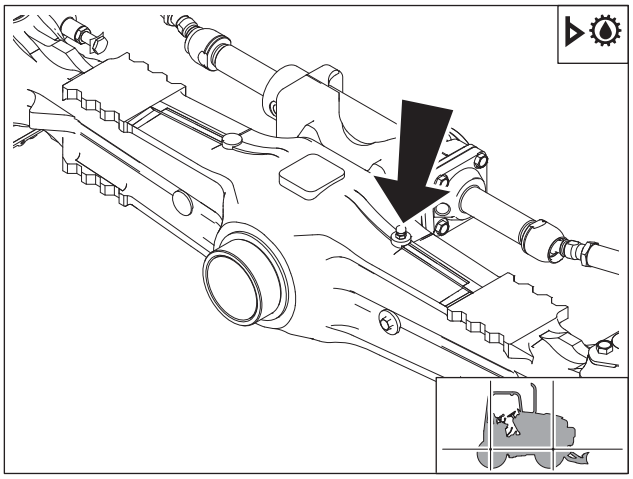
Check oil level at plug (2) every 250 hours. Add MPL as needed at fill (1) until level with plug (2).



t40om023h.eps

Check Differential Oil Level

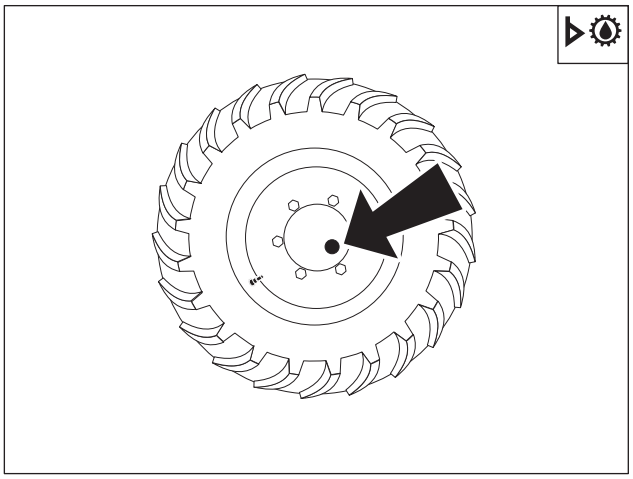
Check oil level at fill (shown) every 250 hours. Add MPL as needed.



t40om027h.eps

Lube Planetary Wheel Ends

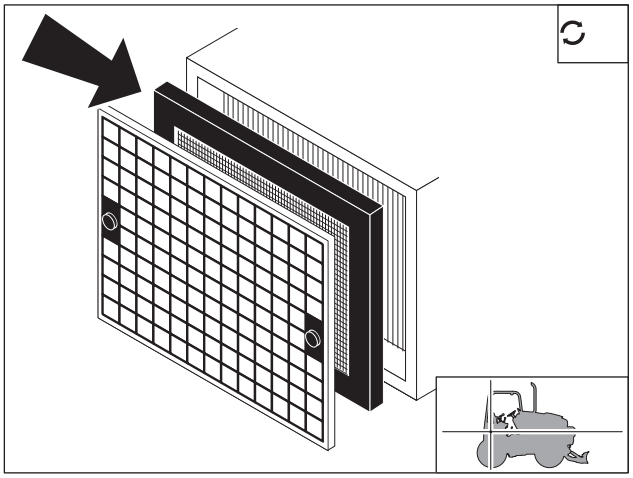
Check oil level in planetary wheel ends every 250 hours. Add MPL as needed.



Tires_Service_PlanetaryWheelEndOil_CheckLevel.eps

Change Cab Air Filter

Change filter every 250 hours. Change more often if working in dusty conditions.

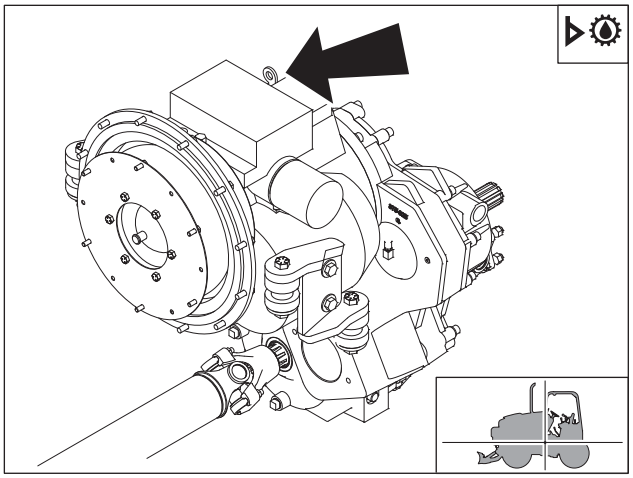


t40om048h.eps

Check Transmission Fluid Level

NOTICE:

- Transmission damage can occur if fluid is not maintained to the correct level.
- Use only Ditch Witch-approved Phillips 66 Torque Fluid transmission fluid. Do not substitute any other transmission fluid.


t40om024h.eps

Check transmission fluid level at dipstick (1) before operation and every 250 hours thereafter. Follow these steps:

1. Start engine and run at low idle for 3-5 minutes or until transmission fluid reaches 50-86°F (10-30°C).
2. With engine running, transmission in neutral, and fluid at this temperature, fluid level should be at the COLD line on the dipstick.
3. Add PTF at fill (1) as necessary to keep fluid level at COLD line on dipstick.

IMPORTANT:

- With transmission fluid at normal operating temperature, (176-212°F/80-100°C), fluid level should be at the HOT line on the dipstick.
- If transmission fluid temperature falls between the two ranges listed, fluid level should fall proportionally between the COLD and HOT lines on the dipstick.

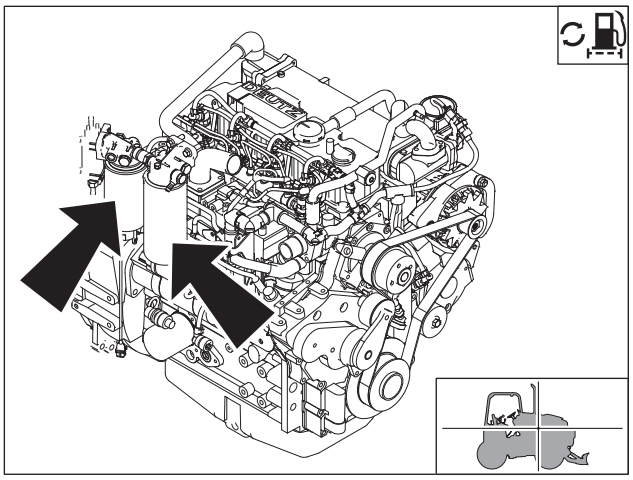
500 Hour

Location	Task	Notes
TRACTOR	Change fuel filters	
	Change engine oil and filter	ONLY if using motor oil meeting Deutz specifications DQCIII-LA (Tier 4i) or DQCIII (Tier 3).
	Change hydraulic fluid and filter	THF
	Test coolant freeze protection level	

Tractor

Change Fuel Filters

Change fuel filters (shown) every 500 hours.



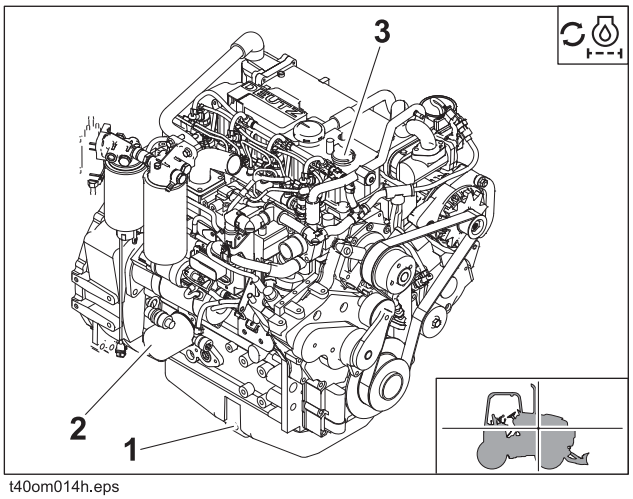
t40om015h.eps

Change Engine Oil and Filter

Change engine oil and filter every 500 hours ONLY if using motor oil meeting Deutz specifications DQCIII-LA.

To change:

1. While oil is warm, remove drain plug (1). Drain oil and replace plug.
2. Remove filter (2) and replace with new filter each time oil is changed. Add DEO at fill neck (3).



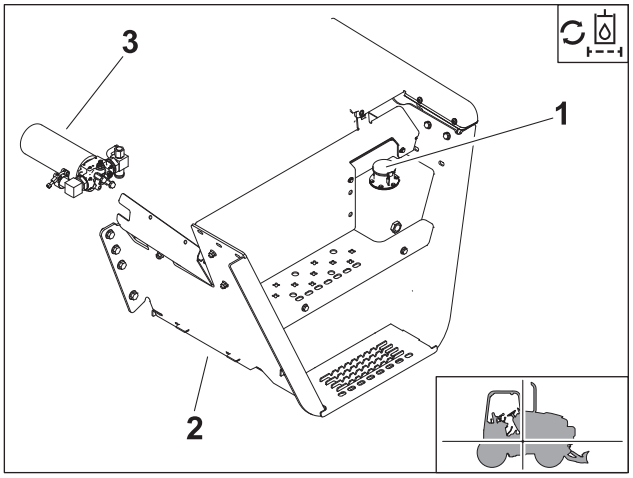
t40om014h.eps

Change Hydraulic Fluid and Filter

Change hydraulic fluid and filter every 500 hours. Change hydraulic fluid and filter every 250 hours if jobsite temperature exceeds 100°F (38°C) more than 50% of the time.

To change:

1. Remove drain plug (2).
2. Drain fluid and replace plug.
3. Change filter (3).
4. Add THF at fill (1).



t40om016h.eps

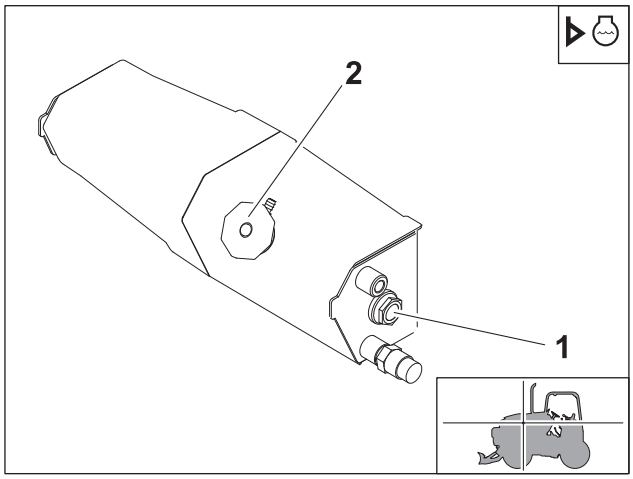
Test Coolant Freeze Protection Level

With engine cool, test coolant freeze protection level using a hydrometer or refractometer. Recommended freeze protection level is -34°F (-37°C). Adjust as needed.

If colder temperatures are expected, consult your Ditch witch dealer or coolant supplier.

IMPORTANT: See page 107 for information on approved coolants.

Use pre-dilluted coolant to maintain proper freeze protection.



t40om010h.eps

1000 Hour

Location	Task	Notes
TRACTOR	Change differential oil	MPL
	Change transfer case oil	MPL
	Change planetary wheel end oil	MPL
	Change transmission fluid and filter	PTF
TRENCHER	Change trencher gearbox oil	MPL
	Lube attachment driveshaft slip yoke	EPG

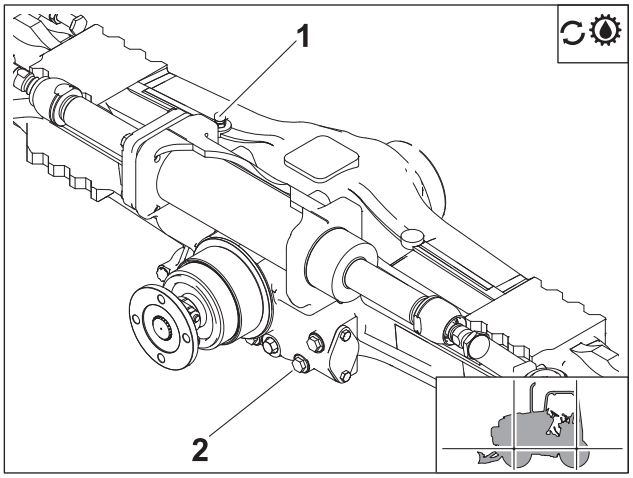
Tractor

Change Differential Oil

Change differential oil every 1000 hours.

To change:

1. Remove drain plug (2).
2. Drain fluid and replace plug.
3. Add MPL at fill (1).



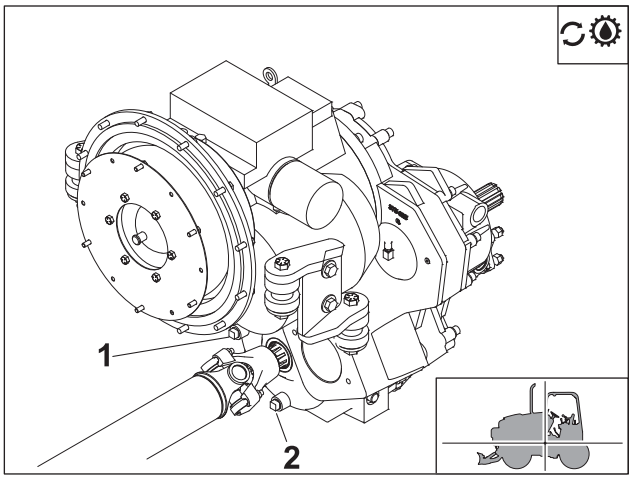
t40om028h.eps

Change Transfer Case Oil

Change transfer case oil every 1000 hours.

To change:

1. Remove drain plug (2).
2. Drain oil and replace plug.
3. Add MPL at fill (1) until level with plug (2).



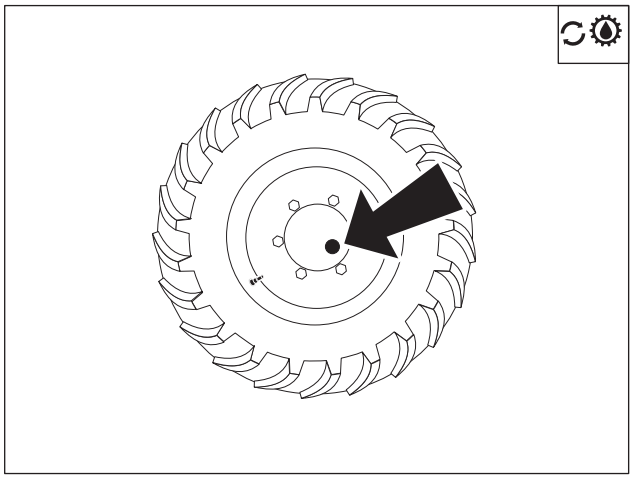
t40om025h.eps

Change Planetary Wheel End Oil

Change wheel end oil every 1000 hours.

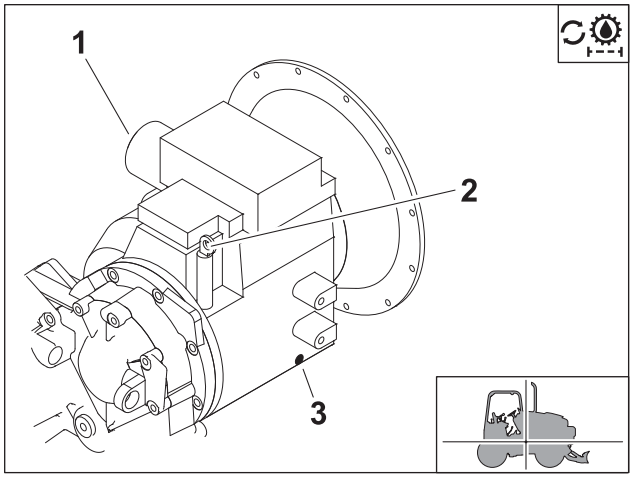
To change:

1. Position wheel with plug at bottom.
2. Remove plug.
3. Drain oil.
4. Reposition wheel with plug at midway position.
5. Add MPL until level reaches plug opening.
6. Replace plug.



Tires_Service_PlanetaryWheelEndOil_Change.eps

Change Transmission Fluid and Filter



t40om022h.eps

Change transmission fluid and filter (2) every 1000 hours.

To change:

1. While fluid is warm, remove drain plug (1), screen, and filter (2).
2. Drain fluid and reinstall plug, screen, and new filter.
3. Add approximately 6 qt (5.6 L) of PTF at fill (3).
4. Start engine and run at low idle with transmission in neutral.
5. Cycle transmission from forward to reverse several times.
6. Check fluid level at dipstick. Add PTF as necessary to keep fluid at the appropriate line on the dipstick according to the table below.

Oil temperature	Condition	Line on dipstick
50-86°F (10-30°C)	engine at low idle a few minutes after startup	COLD
176-212°F (80-100°C)	normal operating temperature	HOT

IMPORTANT: If transmission fluid temperature falls between the two ranges listed, fluid level should fall proportionally between the COLD and HOT lines on the dipstick.

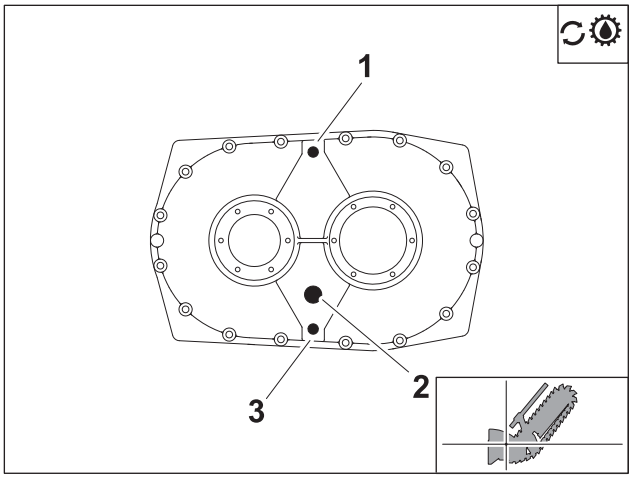
NOTICE:

- Transmission damage can occur if oil is not maintained to the correct level.
- Use only Ditch Witch-approved Phillips 66 Torque Fluid transmission fluid. Do not substitute any other transmission fluid.

Trencher

Change Trencher Gearbox Oil

Change trencher gearbox oil every 1000 hours. Drain at plug (3). Replace drain plug and add MPL at fill (1) to center of sight glass (2).



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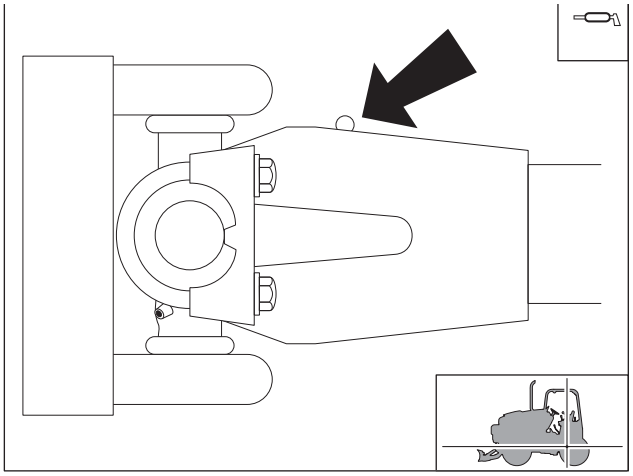
Lube Attachment Driveshaft Slip Yoke

Lube attachment driveshaft slip yoke every 1000 hours with 3-4 shots of EPG.



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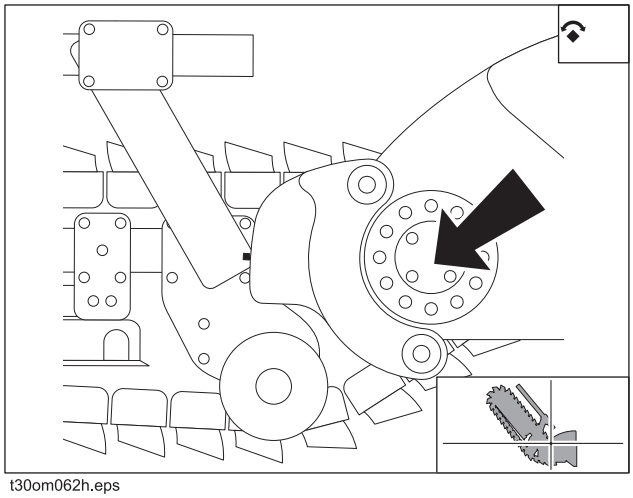
Adjust Headshaft Bearing


t30om062h.eps

Adjust headshaft bearing every 500 hours.

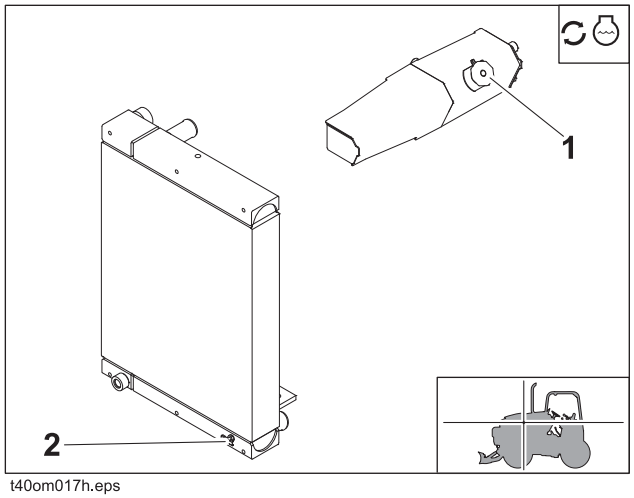
To adjust:

1. Remove cover. Remove bolts attaching trenching attachment motor to gearbox.
2. Remove bolt and washers in left end of headshaft.
3. Support gearbox with hoist and slide it off headshaft.
4. Install spacer (p/n 184-044) in place of gearbox while checking bearings.
5. Replace bolt on end of headshaft.
6. Remove chain from headshaft sprocket.
7. Turn chain sprocket until headshaft sprocket turns. When properly adjusted, it will take two hands and some effort. If it turns easily, remove a shim.

2000 Hour

Tractor

Change Engine Coolant



t40om017h.eps

Drain cooling system at drain (2) every two years or 2000 hours. Add approved coolant at fill (1).

NOTICE:

- The use of non-approved coolant may lead to engine damage or premature engine failure and will void engine warranty.
- See page 107 for list of approved coolants.

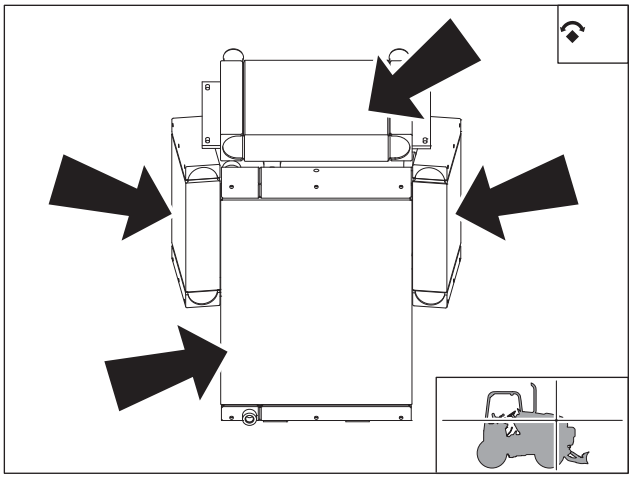
As Needed

Location	Task	Notes
TRACTOR	Clean radiator fins	
	Adjust parking brake	
	Inspect seat belt	
	Check batteries	
	Charge battery	
TRENCHER	Replace digging chain	
BACKHOE	Replace pins and bushings	

Tractor

Clean Radiator Fins

Clean out radiator fins with compressed air or spray wash if required. Be careful not to damage fins with high-pressure air or water. Check more often if operating in dusty or grassy conditions.



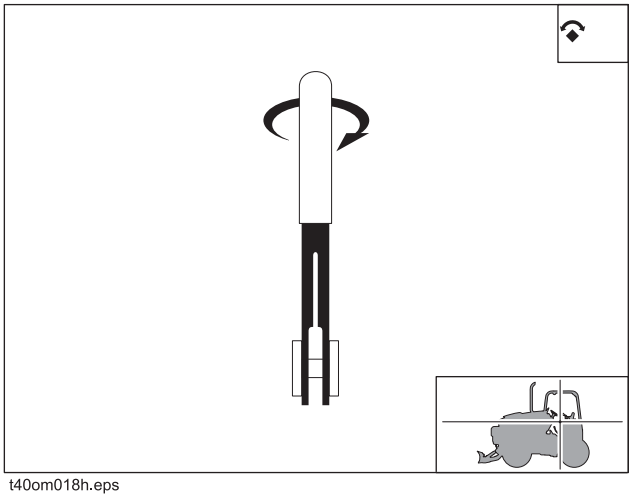
t40om019h.eps

Adjust Parking Brake

Adjust parking brake every 1000 hours.

To adjust:

1. Release parking brake.
2. Remove orange sleeve.
3. Twist lever clockwise to tighten.
4. Engage parking brake to test tension. If tension is too tight, the brake lever will not engage fully. Repeat steps 1-3 as necessary.
5. Replace orange sleeve.



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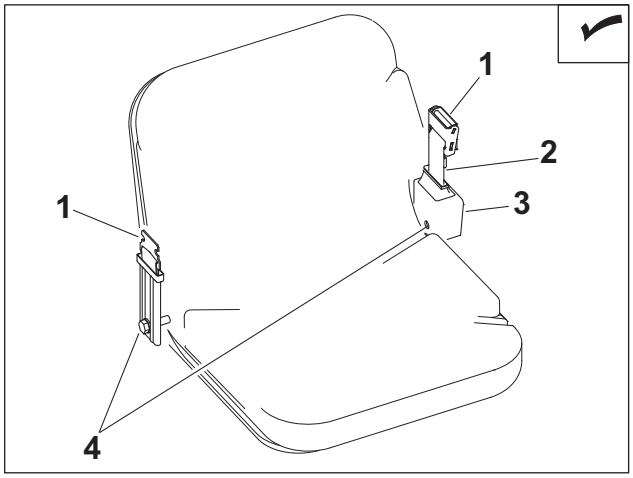
Inspect Seat Belt



SeatBelt.eps

Check seat belt and mounting hardware as needed. Inspect the webbing, buckle and latch, retractor, and mounting hardware.

Buckle and Latch

Check that the buckle and latch (1) are not broken or corroded. When inserting the latch into the buckle, the latch should insert smoothly until an audible click is heard. Latch should not release when the seat belt is tugged.

Webbing

Inspect seat belt webbing (2) to ensure that it is not cut, frayed or showing signs of extreme or unusual wear. Check the area near the buckle and latch and anywhere the seat belt has contact with equipment or seat.

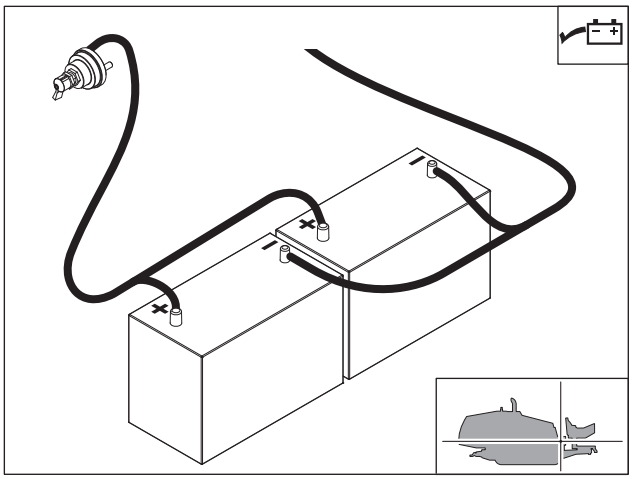
Retractor

Check that the retractor (3) operates smoothly when the belt is pulled and released. Retractor should spool belt without locking.

Mounting Hardware

Inspect the seat belt mounting bolts (4) on both sides of the seat to ensure they are tight. Replace missing, damaged, or corroded bolts.

Check Batteries


j37om035h.eps

Check batteries as needed. Keep batteries clean and terminals free of corrosion.

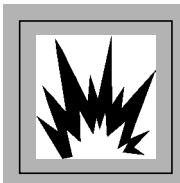
To clean:

1. Turn battery disconnect switch, if equipped, to the off position.
2. Ensure that no ignition sources are near batteries.
3. Loosen and remove battery cable clamps carefully, **negative (-)** cable first.
4. Clean cable clamps and terminals to remove dull glaze.
5. Check for signs of internal corrosion in cables.
6. Apply MPG to terminals after cleaning to reduce corrosion.
7. Connect battery cable clamps, **positive (+)** cable first.
8. Tighten any loose connections.
9. Ensure that battery tiedowns are secure.
10. Turn battery disconnect switch to the on position.

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

To help avoid injury: Do not create sparks and do not short across battery terminals for any reason.

Charge Battery



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

To help avoid injury:

- Use a single 12V maximum source for charging. Do not connect to rapid chargers or dual batteries.
- Use caution and wear personal protective equipment such as safety eyewear, when charging or cleaning battery.
- Keep sparks, flames, and any ignition source away from batteries at all times. Internal contents are extremely hazardous. Leaking fluid is corrosive. Battery may be explosive at higher temperatures.
- NEVER lean over battery when making connections.
- Do not allow vehicles to touch when charging.
- Do not attempt to charge a battery that is leaking, bulging, heavily corroded, frozen, or otherwise damaged.
- NEVER short-circuit battery terminals for any reason or strike battery posts or cable terminals.
- Refer to MSDS for additional information regarding this battery.

Before You Start

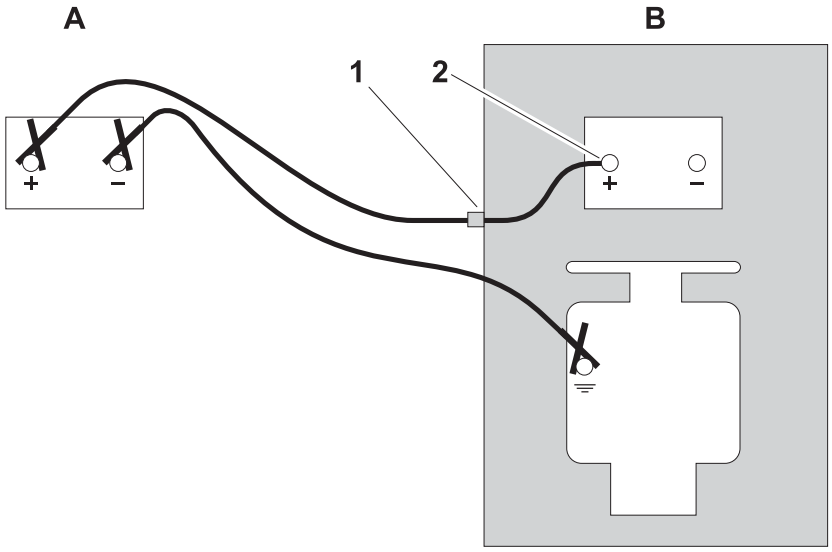
Electronic components can be easily damaged by electrical surges. Jump starting can damage electronics and electrical systems, and is not recommended. Try to charge the battery instead. Use quality large diameter booster cables capable of carrying high currents (400 amps or more). Cheap cables may not allow enough current flow to charge a dead/discharged battery.

IMPORTANT: Some equipment may have a positive booster cable terminal located externally. If so equipped, use this terminal instead of connecting directly to battery.

Read all steps thoroughly and review illustration before performing procedure.

Charging Procedure (Engine Off)

1. Park service vehicle close to disabled equipment but do not allow vehicles to touch. Engage parking brake in both vehicles.
2. Turn the ignition switch to the OFF position in both vehicles, and turn off all electrical loads. Disconnect the machine controller.



3. Inspect battery in disabled vehicle (B) for signs of cracking, bulging, leaking, or other damage. Connect red positive (+) booster cable clamp to positive (+) post (2) of battery in disabled vehicle first.

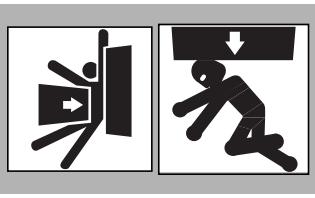
IMPORTANT: Some equipment may have a positive booster cable terminal (1) located externally. If so equipped, connect red positive (+) booster cable clamp to terminal.

4. Connect the other red positive (+) booster cable clamp to positive (+) post of battery (A) in the service vehicle.
5. Connect black negative (-) cable clamp to negative (-) post of battery (A) in service vehicle.
6. Connect the other black negative (-) cable clamp to the engine or frame ground on the disabled vehicle, at least 12" (305 mm) from the failed battery, as shown.
7. Operate service vehicle engine at 1500-2000 rpm for a few minutes to build an electrical charge in the failed battery.
8. Stop engine in service vehicle.
9. Remove booster cables from the service vehicle, black negative (-) clamp first. Do not allow clamps to touch.
10. Remove black negative (-) cable clamp from the disabled engine or frame ground first.
11. Remove red positive (+) cable clamp from the disabled vehicle positive (+) battery post last.
12. Reconnect machine controller and try to start disabled vehicle.

If the disabled vehicle did not start, check for loose or corroded battery cable connections. Poor connections will prevent current from charging the failed battery. Clean terminals and posts if necessary and repeat steps above.

Trencher

Change Boom Position

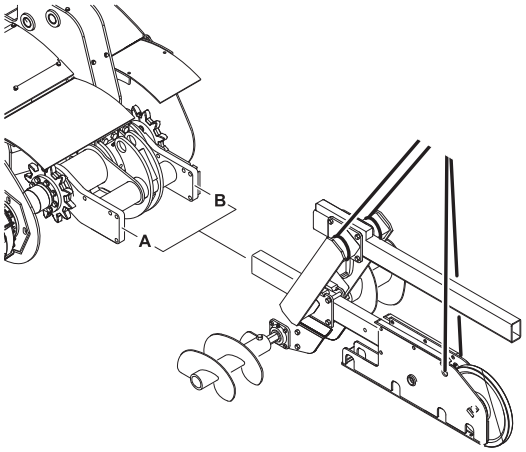


WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

NOTICE: Use a hoist capable of supporting equipment's size and weight.

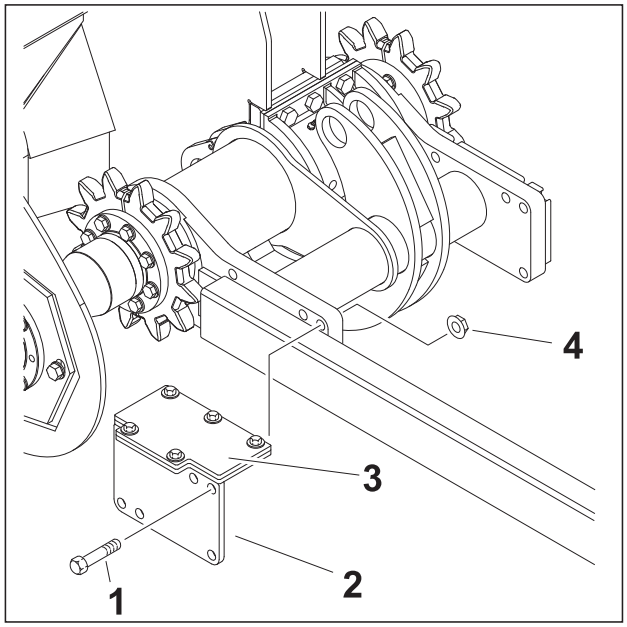
1. Remove digging chain. See "Replace Digging Chain" on page 141.
2. Use hoist to move clamp and boom to centerline (A) or offset (B) position.

NOTICE: Mount boom tube on sprocket side of pivot.



t03in022c.eps

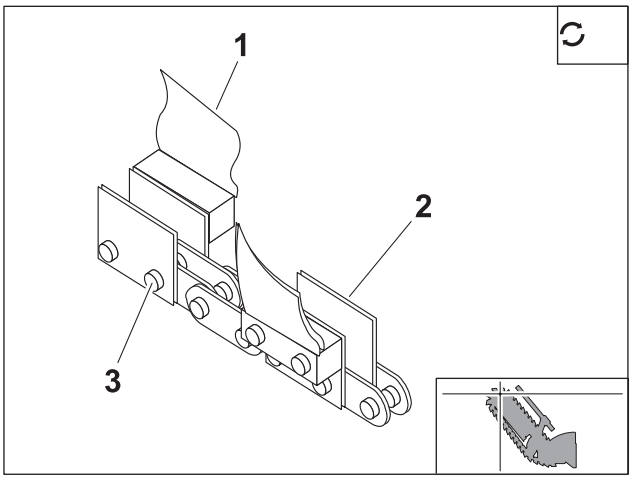
3. Install clamp and boom tube onto pivot arm.
4. Install digging chain. See "Replace Digging Chain" on page 141.
5. Adjust spoils door following procedure on page 24.



t03in012c.eps

Replace Digging Chain

Visually check digging chains for wear on teeth (1), rollers, and sidebars (2). Check pins (3) and bushing wear by measuring distance between chain pins and comparing it with a new chain.

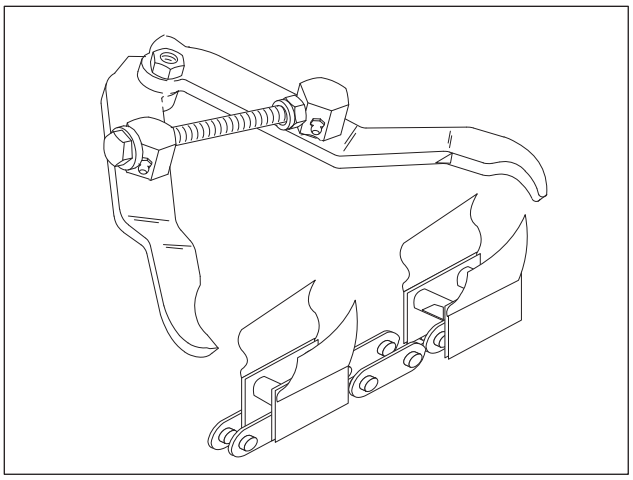


t30om063h.eps

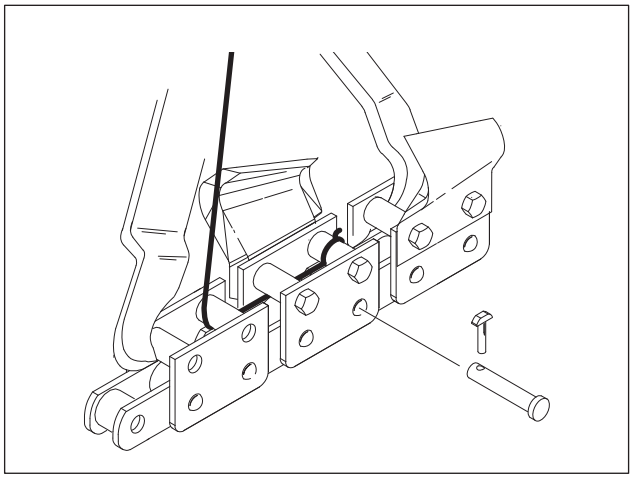
IMPORTANT: Replace sprockets when a new chain is installed.

To remove chain:

1. Fasten and adjust seat belt.
2. Start tractor. See page 68 for proper start-up procedures.
3. Move attachment direction/speed control until digging chain connector pin is on top of boom.
4. Lower boom to ground.
5. Engage parking brake and verify parking brake indicator is on.
6. Turn ignition switch to STOP.
7. Secure chain by clamping links on either side of connector pin with chain jaws. Squeeze jaws to reduce pressure on connector pin.


Digging_Chain_Remove_01.eps

8. Loop cable through links nearest connector pin.



Digging_Chain_Remove_02.eps

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

To help avoid injury: Service digging boom grease cylinder only while standing on opposite side of boom. Wear gloves and safety glasses, and cover fitting with cloth when relieving pressure in cylinder.

9. Loosen plug on grease cylinder to relieve chain tension.
10. Stand clear of chain and remove lock key from connector pin. Drive connector pin out of link.

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

11. Unclamp links. Slowly release cable and lower chain to ground.
12. Lay chain on ground with teeth down.

To install chain:

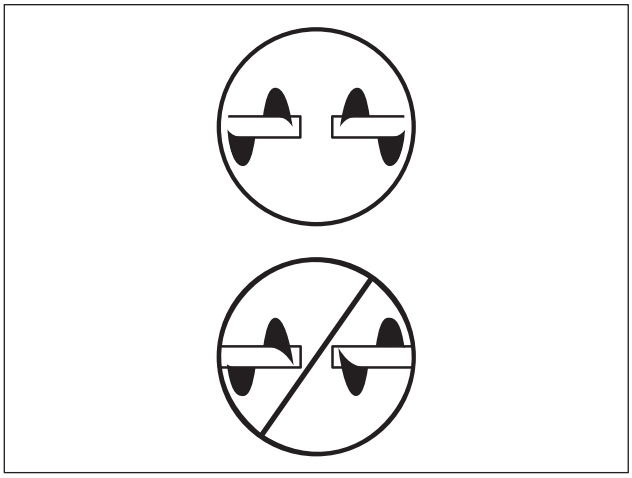
1. Lay chain on ground with teeth down and pointed toward unit.
2. Fasten and adjust seat belt.
3. Start tractor. See page 68 for start-up procedures.
4. Disengage parking brake and verify parking brake indicator is off.
5. Move ground drive control to reverse.
6. Back unit up until chain extends past head shaft about 1' (305 mm).
7. Move ground drive control to neutral.
8. Lower backfill blade, if equipped, to ground.
9. Lower boom to horizontal position.
10. Engage parking brake and verify parking brake indicator is on.
11. Turn ignition switch to STOP.
12. Pull rear end of chain over and about 10" (260 mm) past tail roller.
13. Use hoist to pull front end of chain over head shaft sprocket.
14. Move chain down boom until chain connector pin and lock key can be installed. Install connector pin and lock key.
15. Tighten chain by pumping EPG into grease cylinder.

Time Augers

Ensure that augers are balanced, as shown. If auger timing is off, unit will bounce from side to side even in normal digging conditions.

To adjust timing:

1. Remove bolts holding augers to auger shaft and rotate either auger as needed until augers are balanced.
2. Reinstall bolts and tighten securely.

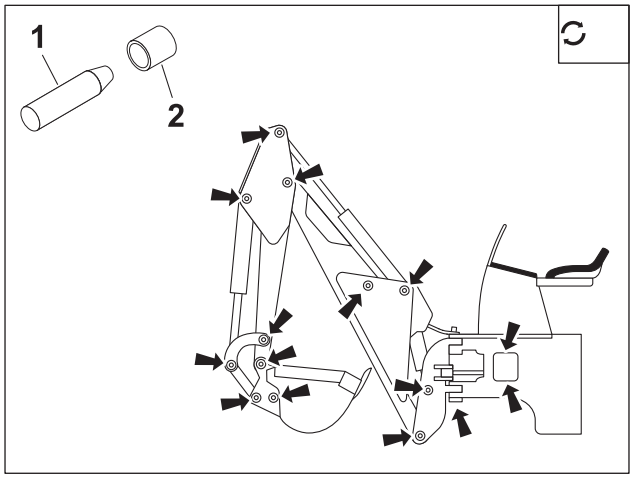


Augers_Adjust.eps

Backhoe

Replace Pins and Bushings

Replace pins (1) and bushings (2) when worn or damaged.



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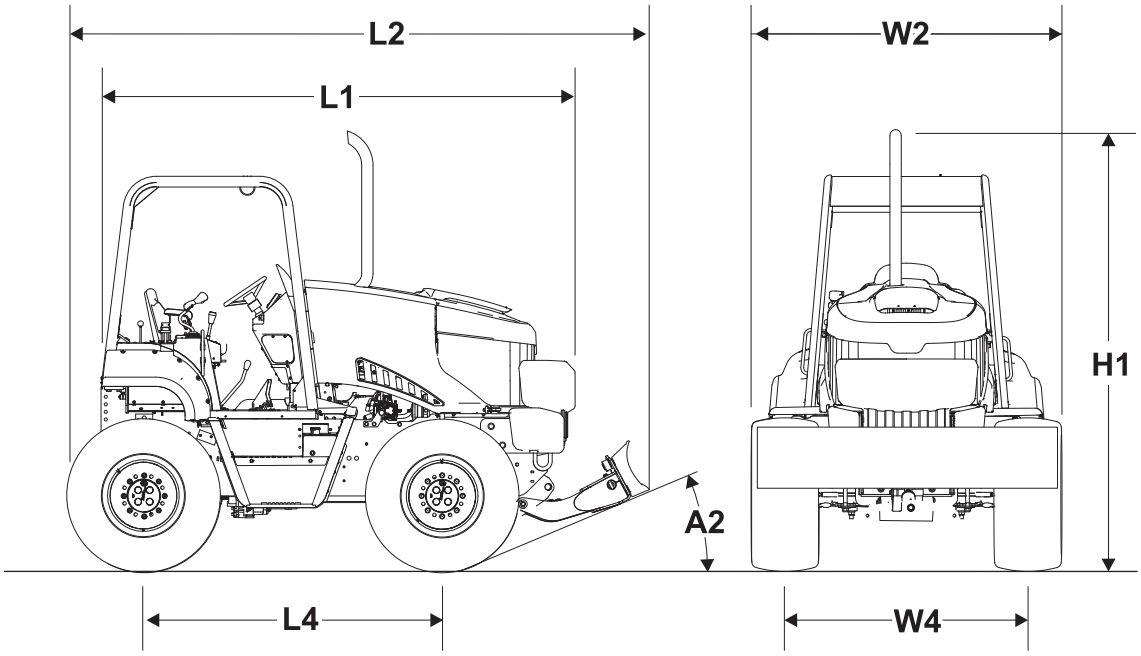
Specifications

RT100 Tractor



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Dimensions		U.S.	Metric
A2	Angle of approach	23°	23°
H1	Height	116 in	2.95 m
L1	Nose to rear mount length	135 in	3.4 m
L2	Length - transport	156 in	3.96 m
L4	Wheelbase	78 in	1.98 m
W2	Width	82 in	2.1 m
W4	Tread	65 in	1.65 m

Operation		U.S.	Metric
Forward speeds			
	Low/Low	0.44 mph	0.71 km/h
	Low	6.4 mph	9.91 km/h
	High	9.5 mph	14.85 km/h
Reverse speeds			
	Low/Low	0.44 mph	0.71 km/h
	Low	6.0 mph	9.65 km/h
	High	8.89 mph	14.31 km/h
Vehicle clearance circle (SAE) wall to wall with backfill blade			
	Front steer only	35 ft	11 m
	Front and rear steer	21 ft	6 m
Ground clearance		14 in	355 mm
Basic unit weight		8880 lb	4028 kg
Maximum allowable tractor weight		19,300 lb	8754 kg
Front counterweight		1300 lb	590 kg

Backfill Blade	U.S.	Metric
Blade width	80 in	2.0 m
Blade height	18 in	457 mm
Lift height above ground	20 in	508 mm
Blade drop below ground	14 in	356 mm
Maximum swing angle (left/right)	25°	25°
Tilt angle (up/down)	12°	12°

Power		U.S.	Metric
Engine: Deutz TCD3.6L4, 4-cylinder diesel			
Cooling medium: liquid			
Injection: direct			
Aspiration: turbocharged, charge-air cooled			
Displacement		220 in^3	3.6 L
Bore		3.86 in	98 mm
Stroke		4.72 in	120 mm
Engine manufacturer's gross power per SAE J1349		100 hp	74.5 kW
Estimated net power per SAE J1349		92.4 hp	70 kW
Rated speed		2300 rpm	2300 rpm
Maximum engine tilt angles*			
	Longitudinal	30°	30°
	Lateral	30°	30°
*Exceeding these operating angles will cause engine damage. This DOES NOT IMPLY machine is stable to maximum angle of safe engine operation.			
Emissions compliance		EPA Tier 4i	EU Stage IIIb
Emissions compliance (Rest of World)		EPA Tier 3	EU Stage IIIa

Power Train
Ground drive transmission: powershift (driving), hydrostatic (digging)
Differentials: planetary front and rear with optional rear steering
Service brake: Disc, foot operated
Parking brake: Disc, hand operated
Tires: 38 x 18.00-20 14-ply bar lug flotation; Inflate to 45 psi (3.1 bar).
Attachment drive transmission: powershift, lever-operated speed infinitely variable from zero to maximum forward with limited stroke reverse.

Hydraulic System	U.S.	Metric
Ground drive pump capacity at 2300 rpm	9.7 gpm	36.7 L/min
Ground drive pump relief pressure	4000 psi	276 bar
Auxiliary pump capacity at 2300 rpm	13.6 gpm	51.5 L/min
Auxiliary pump relief pressure	2500 psi	172 bar

Fluid Capacities	U.S.	Metric
Fuel tank	38 gal	144 L
Engine oil	8.5 qt	8 L
Hydraulic reservoir	24 gal	91 L
Hydraulic system	29 gal	110 L
Cooling system	10.9 qt	10.3 L
Transmission fluid	9.5 qt	10.5 L

Battery (2 used)
Group 34H, SAE res. cap 120 min., SAE cold crank @ 0° F (-18° C), 800 amp
Auxiliary power outlet - 12 volt, 10 amp

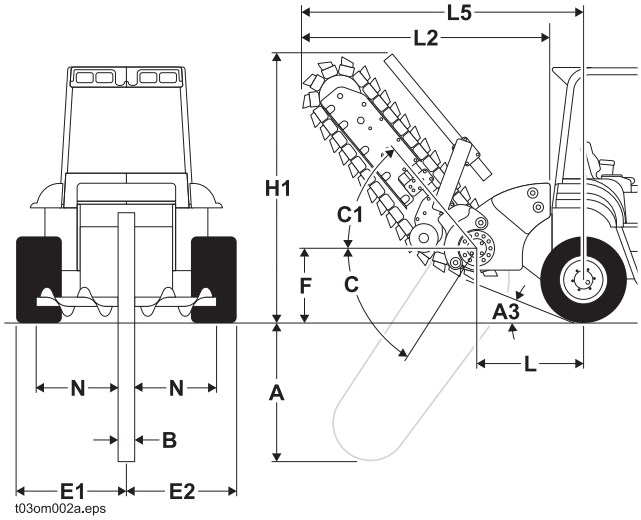
Vibration Level
Vibration transmitted to the operator's hand/arm and whole body during normal operation is 6.4 and 2.44 meters per second squared respectively.
Operator seat per ISO 7096.

Noise Levels
Operator 93 dBA sound pressure per ISO 6394
Exterior 108 dBA sound power per ISO 6393.

Unless otherwise specified, all figures are for standard equipment only.

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

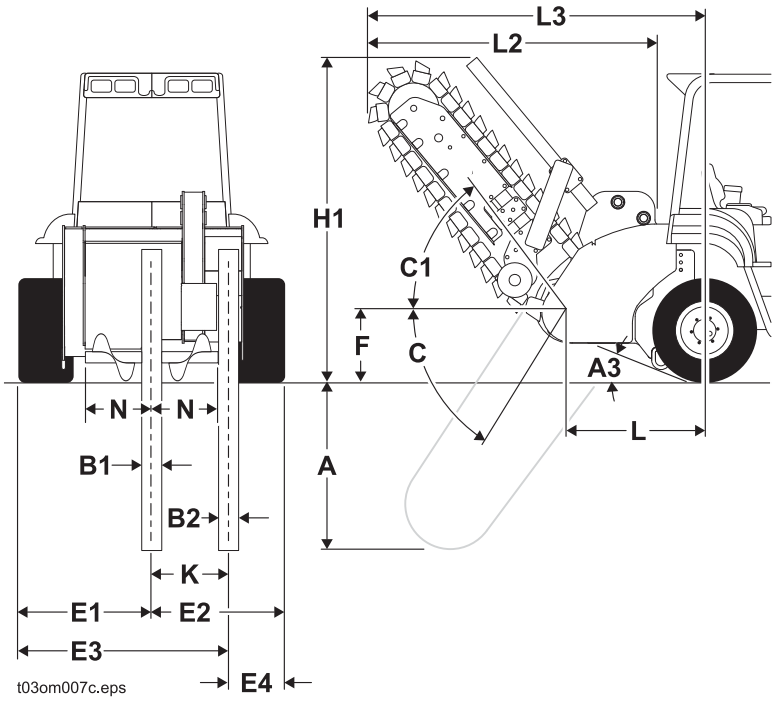
M910 Trencher



Dimensions		U.S.	Metric
A3	Angle of departure		
	RT100 with 38 x 18.00-20 tires	28°	28°
A	Trench depth, maximum		
	RT100 with 38 x 18.00-20 tires	94 in	2.4 m
B	Trench width, maximum	24 in	610 mm
C	Boom travel down	65°	65°
C1	Boom travel up	50°	50°
E1	Centerline of trench to outside edge, left	41 in	1.0 m
E2	Centerline of trench to outside edge, right	32 in	810 mm
F	Headshaft height, digging chain		
	RT100 with 38 x 18.00-20 tires	32 in	810 mm
H1	Transport height		
	RT100 with 38 x 18.00-20 tires	124 in	3.2 m
L2	Transport length	112 in	2.8 m
L	Headshaft overhang	40 in	1.0 m
N	Soil discharge reach	33 in	840 mm
	Attachment weight	1750 lb	794 kg

Operation		U.S.	Metric
Headshaft speeds			
	Ratio low	156-223 rpm	156-223 rpm
	Ratio standard	171-257 rpm	171-257 rpm
	Ratio high	188-282 rpm	188-282 rpm
Digging chain speeds			
	Ratio low	445-664 ft/min	136-202 m/min
	Ratio standard	487-732 ft/min	148-223 m/min
	Ratio high	535-804 ft/min	163-245 m/min

M912 Offest Trencher

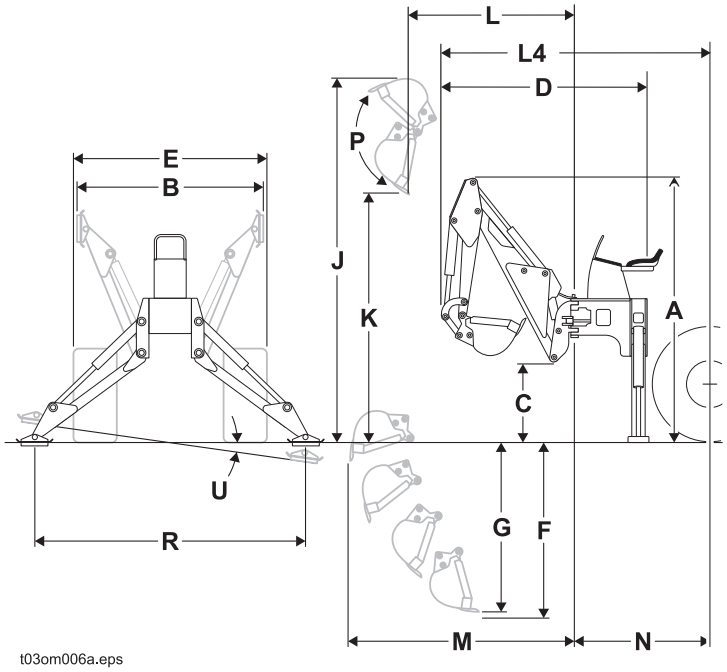


Dimensions		U.S.	Metric
A3	Angle of departure		
	RT100 with 38 x 18.00-20 tires	28°	28°
A	Trench depth, maximum		
	RT100 with 38 x 18.00-20 tires	97 in	2.47 m
B1	Trench width, center position maximum	24 in	610 mm
B2	Trench width, offset position maximum	12 in	305 mm
C	Boom travel down	65°	65°
C1	Boom travel up	50°	50°
E1	Centerline of trench to outside left edge, center position	40 in	1.0 m
E2	Centerline of trench to outside right edge, center position	34 in	864 mm
E3	Centerline of trench to outside left edge, offset position	67 in	1.7 m
E4	Centerline of trench to outside right edge, offset position	8 in	203 mm
F	Headshaft height, digging chain		
	RT100 with 38 x 18.00-20 tires	32 in	810 mm

Dimensions		U.S.	Metric
H1	Transport height		
	RT100 with 38 x 18.00-20 tires	124 in	3.2 m
K	Distance between trencher positions	26 in	660 mm
L2	Transport length	112 in	2.8 m
L	Headshaft overhang	40 in	1.0 m
N	Soil discharge reach	33 in	840 mm
	Attachment weight	3600 lb	1633 kg

Operation		U.S.	Metric
Headshaft speeds			
	Ratio extra low	141-211 rpm	141-211 rpm
	Ratio low	155-232 rpm	155-232 rpm
	Ratio standard	171-255 rpm	171-255 rpm
Digging chain speeds			
	Ratio extra low	437-654 ft/min	133-199 m/min
	Ratio low	481-720 ft/min	147-219 m/min
	Ratio standard	530-793 ft/min	162-242 m/min

A920 Backhoe



Dimensions		U.S.	Metric
A	Transport height	118 in	3.0 m
C	Ground clearance	29 in	740 mm
D	Backhoe length, stowed	117 in	2.9 m
F	Digging depth, max.	112 in	2.8 m
G	Digging depth, 2' (0.6 m) flat bottom	109 in	2.7 m
J	Operating height, fully raised	156 in	3.9 m
K	Loading height	104 in	2.6 m
L	Loading reach	78 in	1.9 m
M	Reach from swing pivot	158 in	4.0 m
N	Swing pivot to centerline axle	57 in	1.4 m
P	Bucket rotation	170°	170°
B	Stabilizer spread, transport	86 in	2.2 m
E	Backhoe or basic unit width	82 in	2.0 m
R	Stabilizer spread, operating	121 in	3.0 m
U	Leveling angle	10°	10°

General		U.S.	Metric
Bucket			
	Width	12-24 in	305-610 mm
	Capacity	1.7-3.5 ft^3	0.05-.1m^3
Backhoe weight with 18" (686 mm) bucket		3300 lb	1497 kg
Lift capacity, boom over end and swing arc, SAE*			
	@ 48" (1.2 m)	1170 lb	530 kg
	@ ground level	1250 lb	567 kg
	@ 72" (1.8 m)	1184 lb	537 kg
Lift capacity, dipperstick over end and swing arc, SAE*			
	@ 52" (1.3 m)	3184 lb	1444 kg
	@ 96" (2.4 m)	2242 lb	1017 kg
Swing arc		180°	180°
Digging force			
	Using bucket cylinder	6600 lb	2994 kg
	Using dipperstick cylinder	4475 lb	2030 kg

*Lift capacities are for a stationary machine supported by stabilizers.

Support

Procedure

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

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

Return damaged parts to dealer for inspection and warranty consideration if in warranty time frame.

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

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.

Warranty

Ditch Witch® Equipment and Replacement Parts Limited Warranty Policy

Subject to the limitation 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. 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. The customer is responsible for transporting their equipment to an authorized Ditch Witch dealership for all warranty work.

Exclusions from Product Warranty

- 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.

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: 11/11

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.

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

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UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO 23 PERRY OKLAHOMA

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

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The Charles Machine Works, Inc.
P.O. Box 66
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

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( )

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Your Signature

Service Record

Service Performed	Date	Hours

Service Performed	Date	Hours