

RT105M

Operator's Manual



Overview

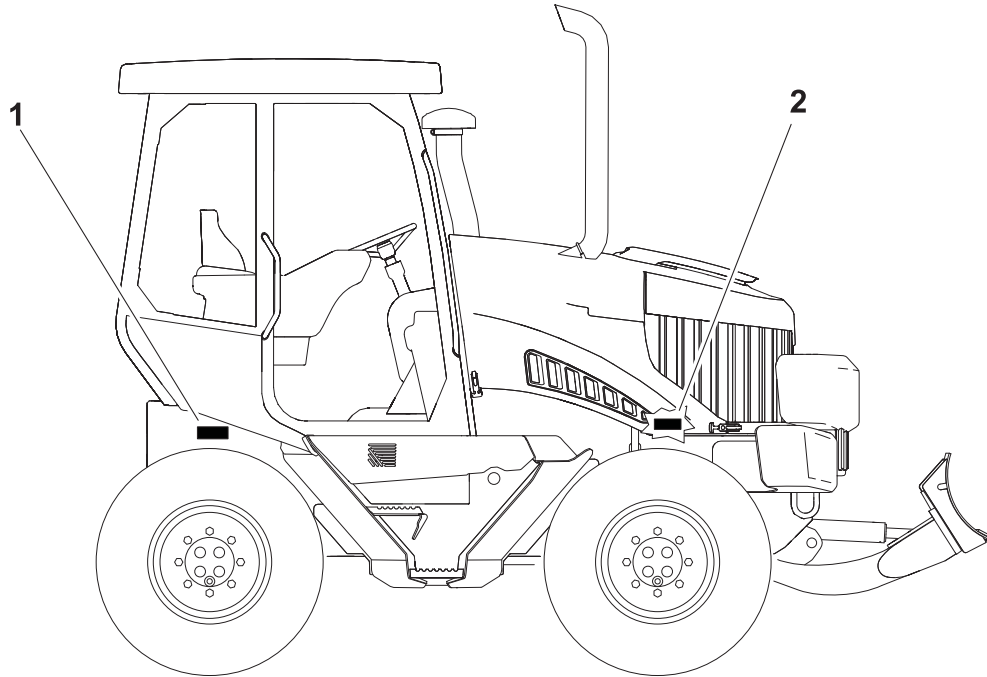


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Serial Number Location

Record serial numbers and date of purchase in spaces provided. RT105 (1) and engine serial numbers (2) are located as shown.



t50om001h.eps

Date of manufacture	
Date of purchase	
RT105 serial number	
Engine serial number	
Front attachment serial number	
Rear attachment serial number	

Intended Use



The RT105 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*
BH120 backhoe	24" (610 mm)	105" (2.7 m)
CT100M trencher	24" (610 mm)	97" (2.5 m)
DT100M offset trencher	24" (610 mm) center	97" (2.5 m)
	12" (305 mm) offset	97" (2.5 m)

This unit is designed for operation in ambient temperatures from -20° to 117° F (-29 to 47°C). Contact your Ditch Witch dealer for provisions required for operating in extreme temperatures. Use in any other way is considered contrary to the intended use.

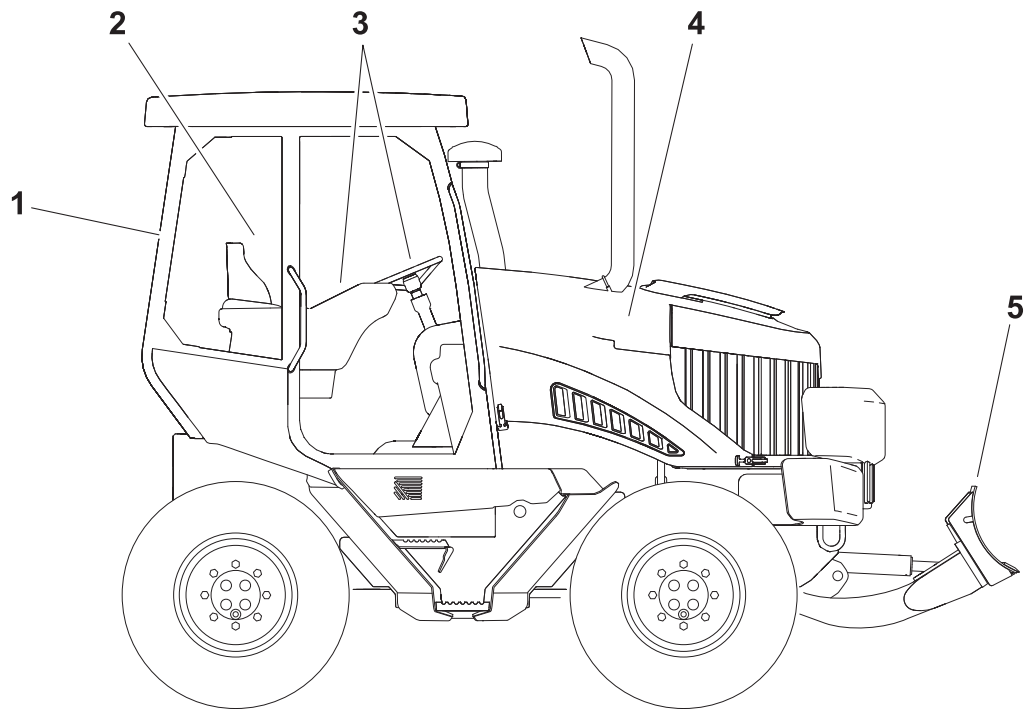
The RT105 should be used with genuine Ditch Witch chain, teeth, and sprockets. It should be operated, serviced, and repaired only by persons familiar with their particular characteristics and acquainted with the relevant safety procedures.

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.

NOTICE: The protection offered by the Rollover Protective System (ROPS) will be impaired if it has been subjected to any modification, structural damage, or has been involved in an overturn accident. The ROPS must be replaced after a roll-over.

Unit Components



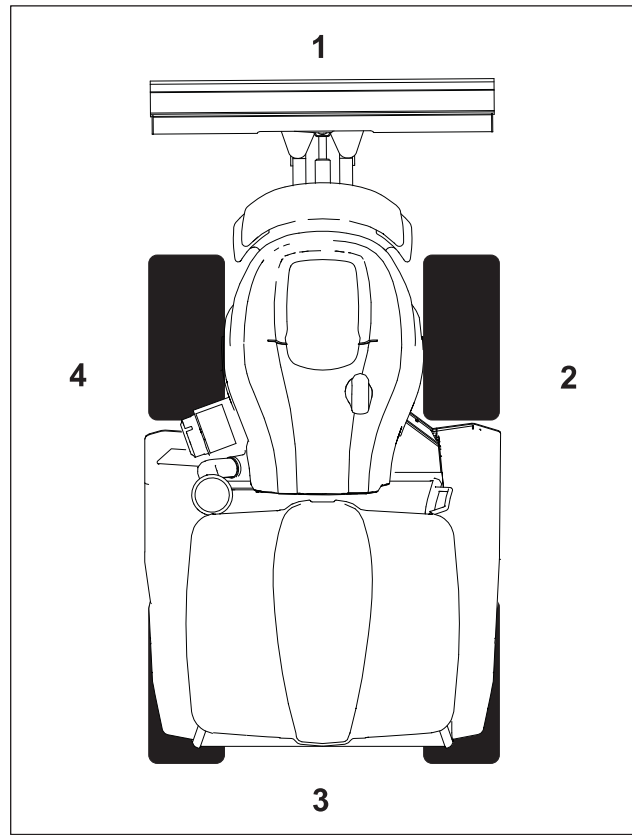
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- | | |
|---|-----------------------|
| 1. Rollover Protective Structure (ROPS) | 4. Engine compartment |
| 2. Operator station | 5. Backfill blade |
| 3. Control consoles | |

Operator Orientation

- | | |
|------------------|-----------------|
| 1. Front of unit | 3. Rear of unit |
| 2. Right 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.



**RT105M
Operator's Manual**

Issue number 2.0/OM-07/17

Part number 053-2943

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This product and its use may be covered by one or more patents at <http://patents.charlesmachine.works>.

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Safety

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Guidelines



When you see this safety alert sign, carefully read and follow all instructions.

YOUR SAFETY IS AT STAKE. Read this entire section before using your equipment.

Follow these guidelines before operating any jobsite equipment:

- Complete proper training and read operator's manual before using equipment.
- Mark proposed path with white paint and have underground utilities located before working. In the US or Canada, call 811 (US) or 888-258-0808 (US and Canada). Also contact any local utilities that do not participate in the One-Call service. In countries that do not have a One-Call service, contact all local utility companies to have underground utilities located.
- 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 or at www.ditchwitch.com/safe. Safety Data Sheets (SDS) are available at www.ditchwitch.com/support.
- Fully inspect equipment before operating. Repair or replace any worn or damaged parts. Replace missing or damaged safety shields and safety signs. Contact your Ditch Witch dealer for assistance.
- Use equipment carefully. Stop operation and investigate anything that does not look or feel right.
- Do not operate machine where flammable gas may be present.
- Only operate equipment in well-ventilated areas.
- 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/safe.

California Proposition 65 Warning

This product may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

- battery posts, terminals and related accessories
- engine exhaust
- ethylene glycol

Emergency Procedures



WARNING

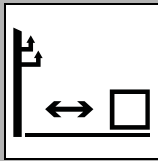
Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.



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 will cause death or serious injury. Stay away. 274-049

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. 275-419 (2P)



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 orders 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. Contact utility company.

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.

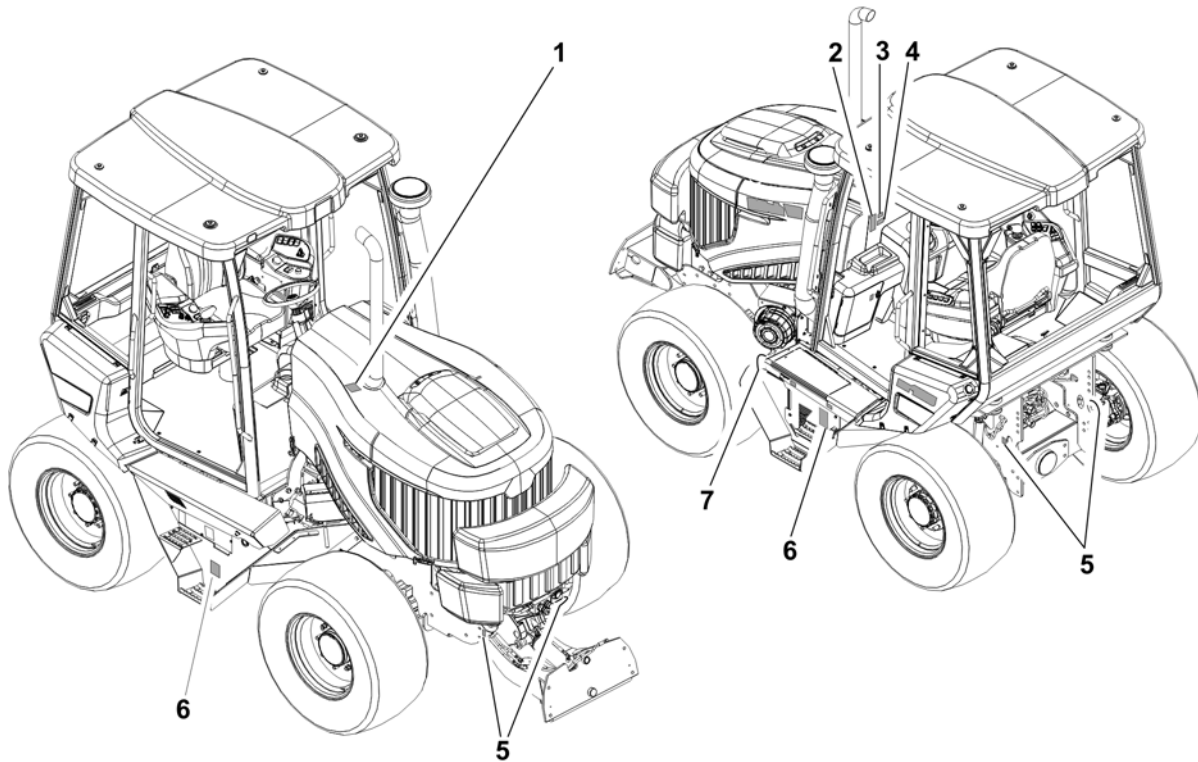
 **CAUTION** indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

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

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

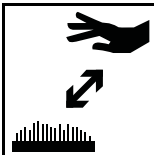
IMPORTANT can help you do a better job or make your job easier in some way.

Machine Safety Alerts



Decal_RT105

1



CAUTION

Hot parts may cause burns. Do not touch until cool or wear gloves. 275-355 (2-P), 273-423 (2-P)

2



WARNING

Rollover could kill or crush. Wear seat belt. 275-303

3



WARNING

Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment. 274-050; 274-724 (2P); 700-133

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Machine Safety Alerts

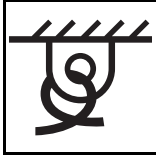
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4



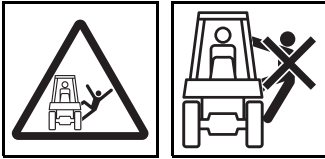
WARNING Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

5



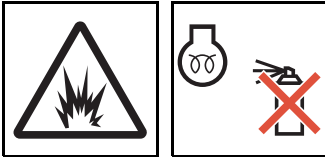
Tiedown location. See Transport chapter for more information. 274-318

6



WARNING Fall possible. Riders can fall from machine and be injured or killed. Single operator only. 275-185

7

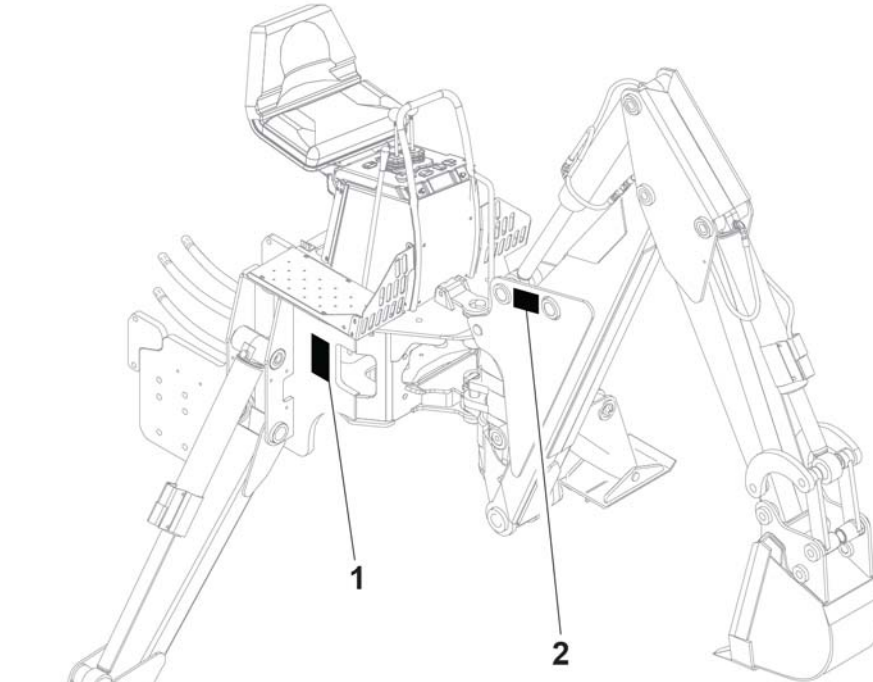


WARNING Fire or explosion possible. Do not use starter fluid. 273-459 (2P), 274-206 (2P), 700-206 (2P)



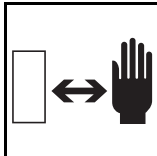
Attachment Safety Alerts

BH120



Decal_BH120.png

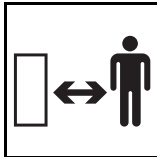
1



WARNING

Moving parts could cut off hand or foot. Stay away.
275-184, 273-437,

2



WARNING

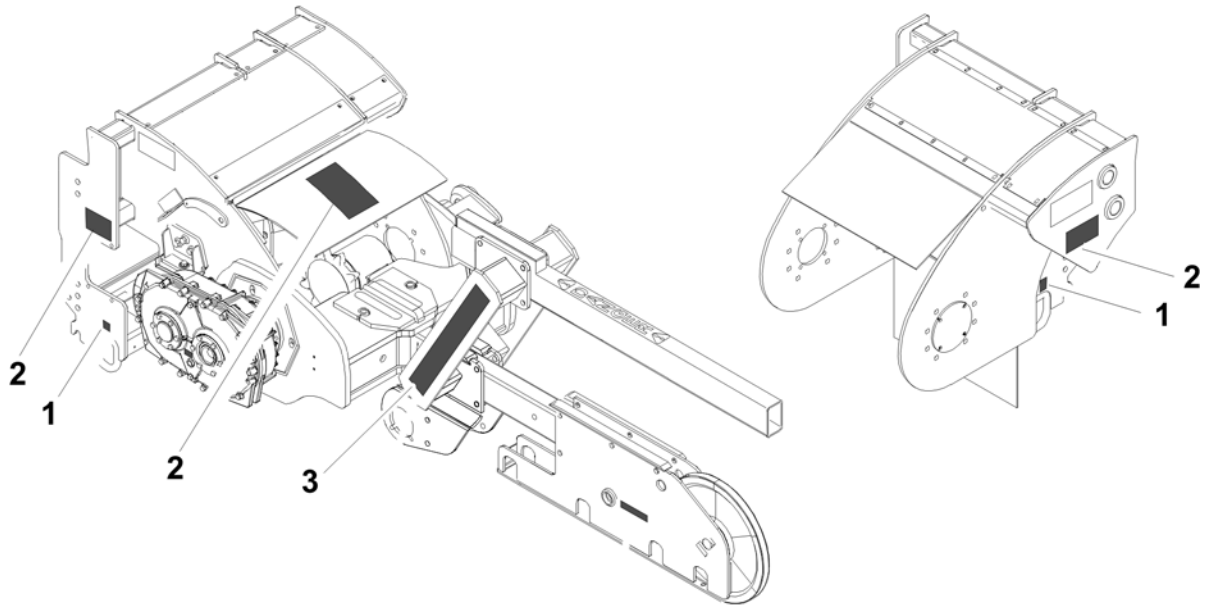
Crushing weight could cause death or serious
injury. Stay away. 275-326, 701-326

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Attachment Safety Alerts

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CT100M



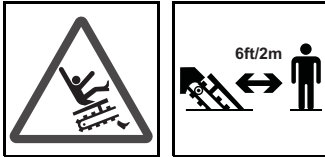
Decal_CT100M.png

1



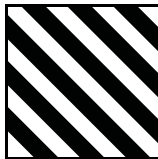
Tiedown location. See Transport chapter for more information.
274-318

2



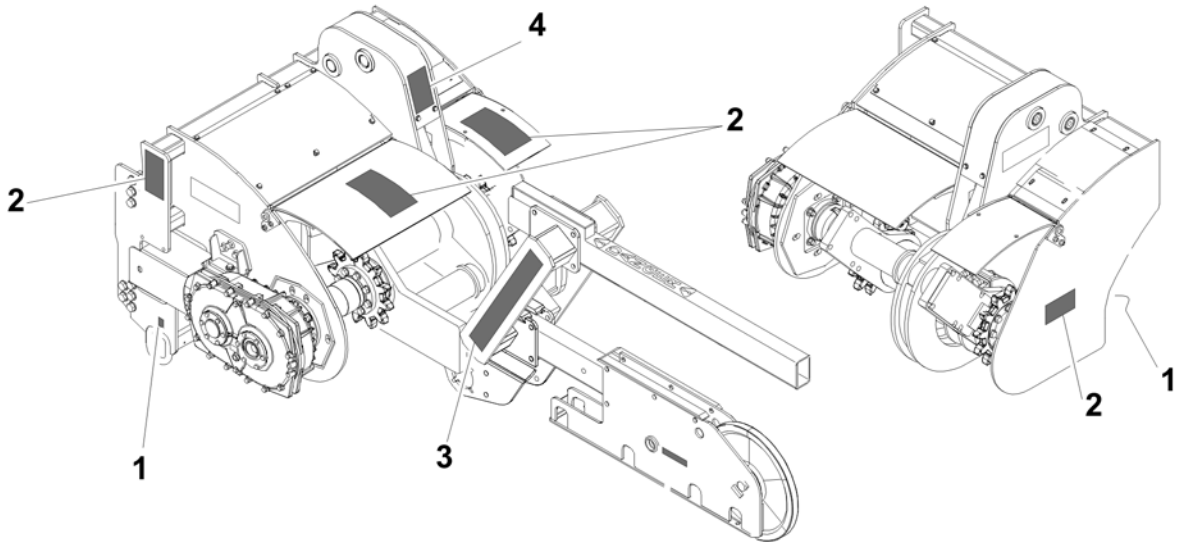
DANGER Moving digging teeth can kill. Trench cave-in can cause you to fall. Stay away. 275-097, 270-6900

3



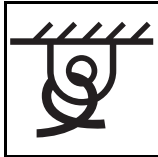
DANGER stripe decal. See Parts Manual for replacement part numbers.

DT100M



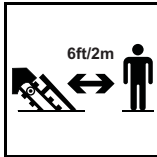
Decal_DT100M.png

1



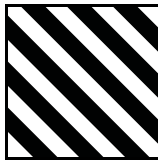
Tiedown location. See Transport chapter for more information.
274-318

2



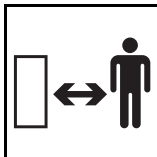
⚠ DANGER Moving digging teeth can kill. Trench cave-in can cause you to fall. Stay away. 275-097, 270-6900

3



DANGER stripe decal. See Parts Manual for replacement part numbers.

4



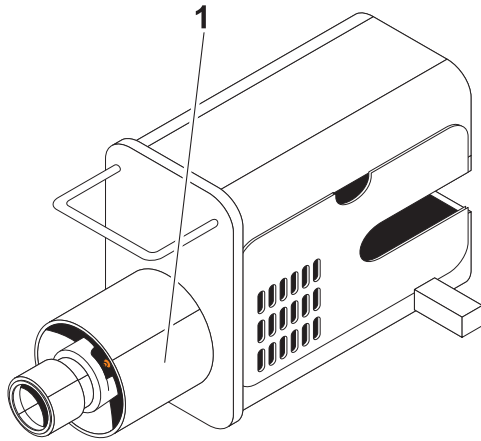
⚠ WARNING Moving parts could cut off hand or foot. Stay away.
275-184, 273-546

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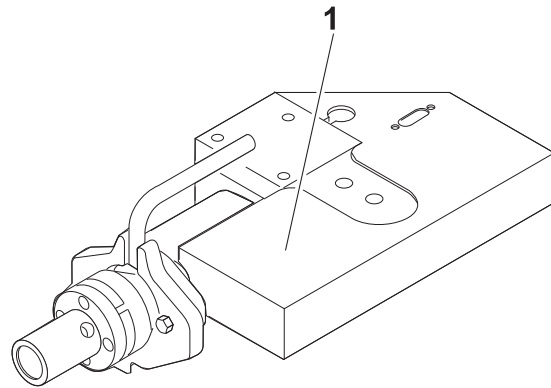
Attachment Safety Alerts

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RWIII/RWIV



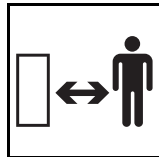
Decal_RW_III



Decal_RW_IV



1



⚠ DANGER

Turning shaft will kill you or crush arm or leg. Stay away. 275-197

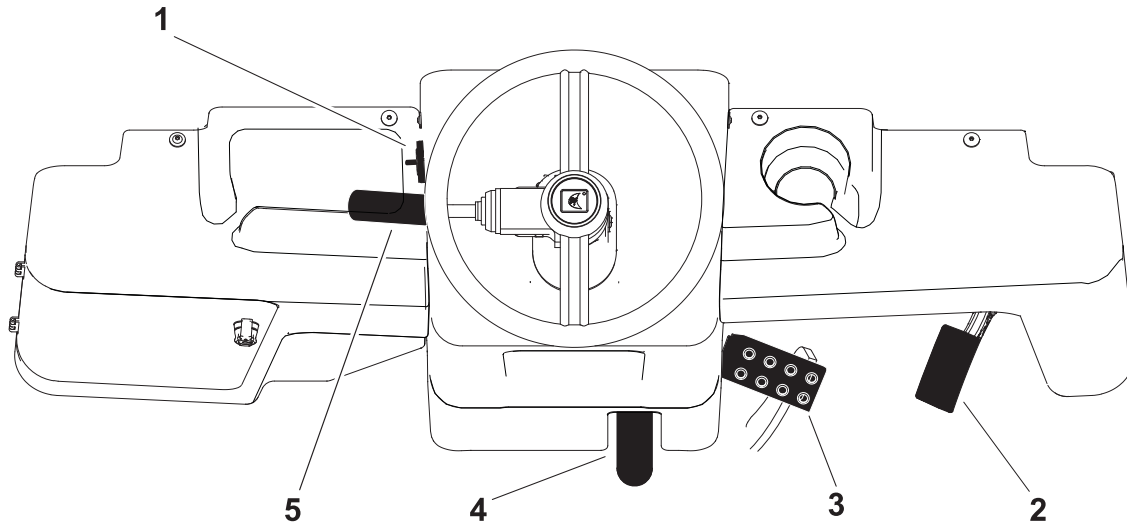
Controls

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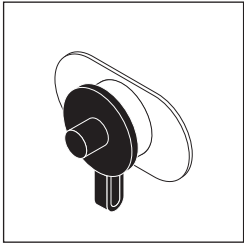


Center Console



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- | | |
|------------------------------|--|
| 1. Auxiliary outlet | 4. Steering column tilt control |
| 2. Ground drive foot control | 5. Ground drive direction/attachment direction/speed control |
| 3. Brake pedal | |

Item	Description	Notes
1. Auxiliary outlet  c00ic179h.eps	Provides power for other equipment.	Power output is 12V, 10A.

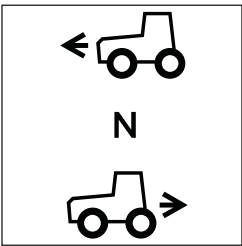
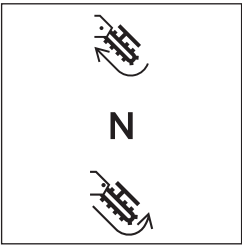
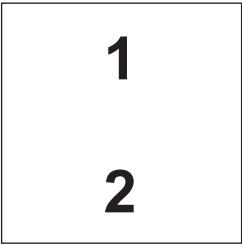
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Center Console

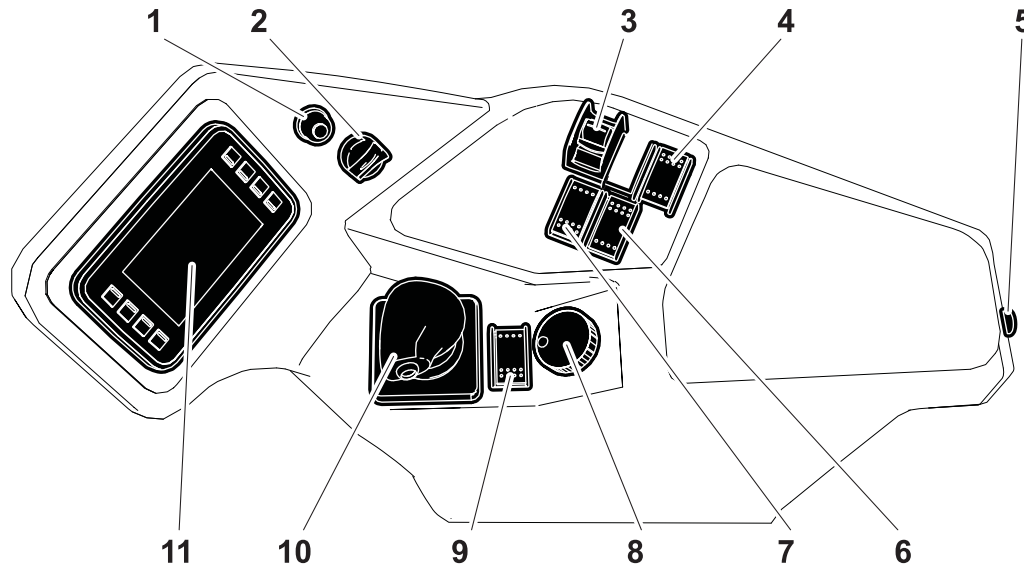
Controls - 27

Item	Description	Notes
2. Ground drive foot control	To move tractor, push pedal down. To increase speed in either direction, push pedal farther from neutral position. To reduce speed in either direction, release pedal slightly. To stop, release pedal.	To function, ground drive direction control must be in forward or reverse. See "Ground drive/attachment direction/speed control" on page 28. IMPORTANT: With gearbox shift control in low to dig, increasing engine speed also increases digging chain speed. Pedal should automatically return to neutral when released.
3. Brake pedal	To stop tractor, press.	
4. Steering column tilt control	To adjust tilt, depress lever. To secure steering column in position, release.	



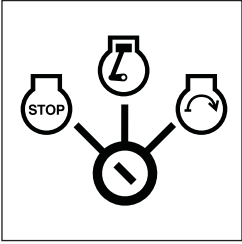
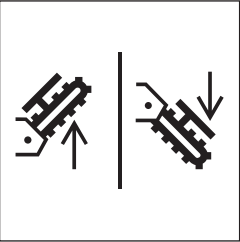
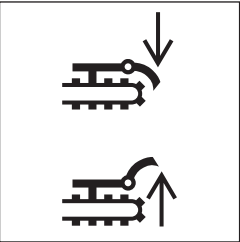
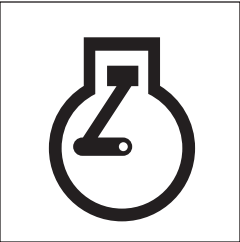
Item	Description	Notes
5. Ground drive/ attachment direction/ speed control  c00ic161w.eps	Performs multiple functions determined by the gearbox shift control. See page 43. When gearbox shift control is in high to drive: - To move tractor forward, move lever to the upper position. - To put tractor into neutral, move lever to the center position. - To move tractor in reverse, move lever to the lower position. When gearbox shift control is in low to dig: - To move digging chain in forward motion, move lever to the upper position. - To stop digging chain, move lever to the center position. - To move digging chain in reverse motion, move lever to the lower position.	Must be in forward or reverse position for ground drive foot control to function. See “Ground drive foot control” on page 27. Display indicates forward, neutral, or reverse selection.
 c00ic743h.eps	To change dig or drive speeds: - For high speed, rotate to 2. - For low speed, rotate to 1.	Screen icon displays High or Low selection.
 c00ic763h.eps		

Right Console



- | | |
|------------------------------------|------------------------------------|
| 1. Horn button | 7. Rear steer adjustment switch* |
| 2. Ignition switch | 8. Ground drive speed hand control |
| 3. Trencher lift control | 9. Frame tilt control* |
| 4. Trench cleaner lift control* | 10. Backfill blade control |
| 5. Start override button | 11. Graphic display |
| 6. Rear steer mode selector switch | |
- *Optional

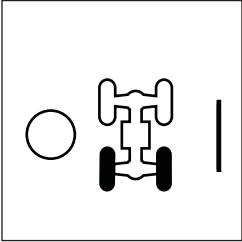
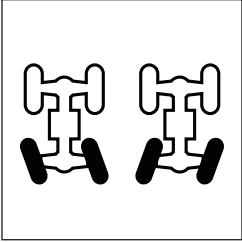
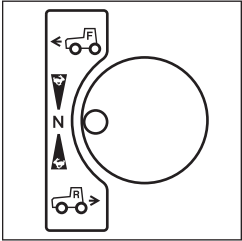
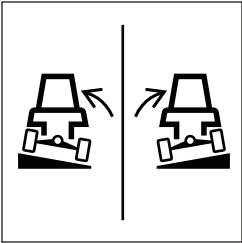
Item	Description	Notes
1. Horn button  c00ic044h.eps	To sound horn, press.	

Item	Description	Notes
2. Ignition switch  c00ic137w.eps	To start engine, insert key and turn clockwise. To stop engine, turn counterclockwise.	
3. Trencher lift control  c00ic762h.eps	To lower, press forward. To raise, press back.	
4. Trench cleaner lift control  c00ic199h.eps	To lower, move forward. To raise, pull back.	
5. Start override button  c00ic024w.eps	To engage start override, press and hold.	IMPORTANT: Override starts interlock functions, allowing operator to start tractor for a short period of time to move from a potentially dangerous position.

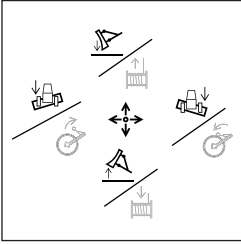
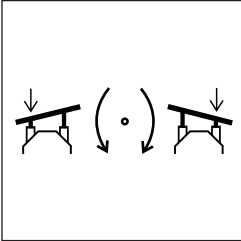
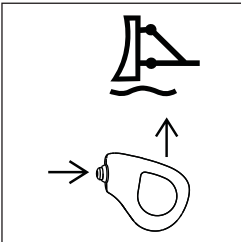
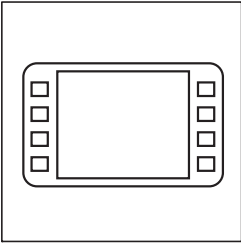
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Right Console

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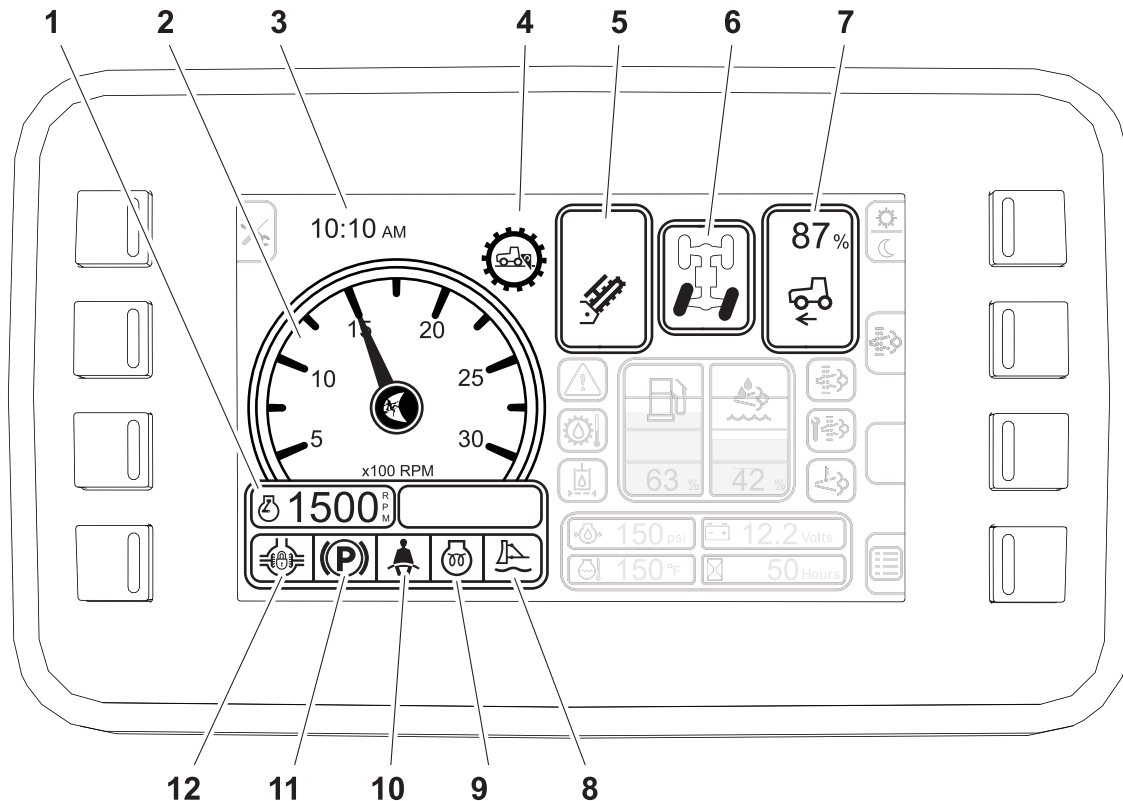
Item	Description	Notes
6. Rear steer mode selector switch  c00ic146w.eps	To engage rear steer, press left. To center wheels, press right.	
7. Rear steer adjustment switch  c00ic145w.eps	To move rear wheels left, press and hold left. To move rear wheels right, press and hold right. To stop wheel movement, release switch.	NOTICE: Visually verify wheel position.
8. Ground drive speed hand control  c00ic157w.eps	To go faster in either direction, move farther from neutral. To stop, return to center.	NOTICE: Control does not automatically return to neutral.
9. Frame tilt control  c00ic140w.eps	To tilt left, press left. To tilt right, press right.	IMPORTANT: Use frame tilt to improve comfort while operating machine on slope. See "Safe Slope Operation" on page 76.



Item	Description	Notes
10. Backfill blade control  c00ic141w.eps  c00ic144w.eps  c00ic143w.eps	• To lower, move forward. • To raise, move backward. • To tilt right side down, move right. • To tilt left side down, move left. • To angle blade to the right, twist right. • To angle blade to the left, twist left. • To float, move forward to end, press button, and release handle. • To remove from float, move back.	Display indicates float position.
11. Graphic display  c00ic152w.eps	Displays graphic symbols for indicators and conditions.	See more information in "Graphic Display" on page 33.

Graphic Display

Gauges and Indicators



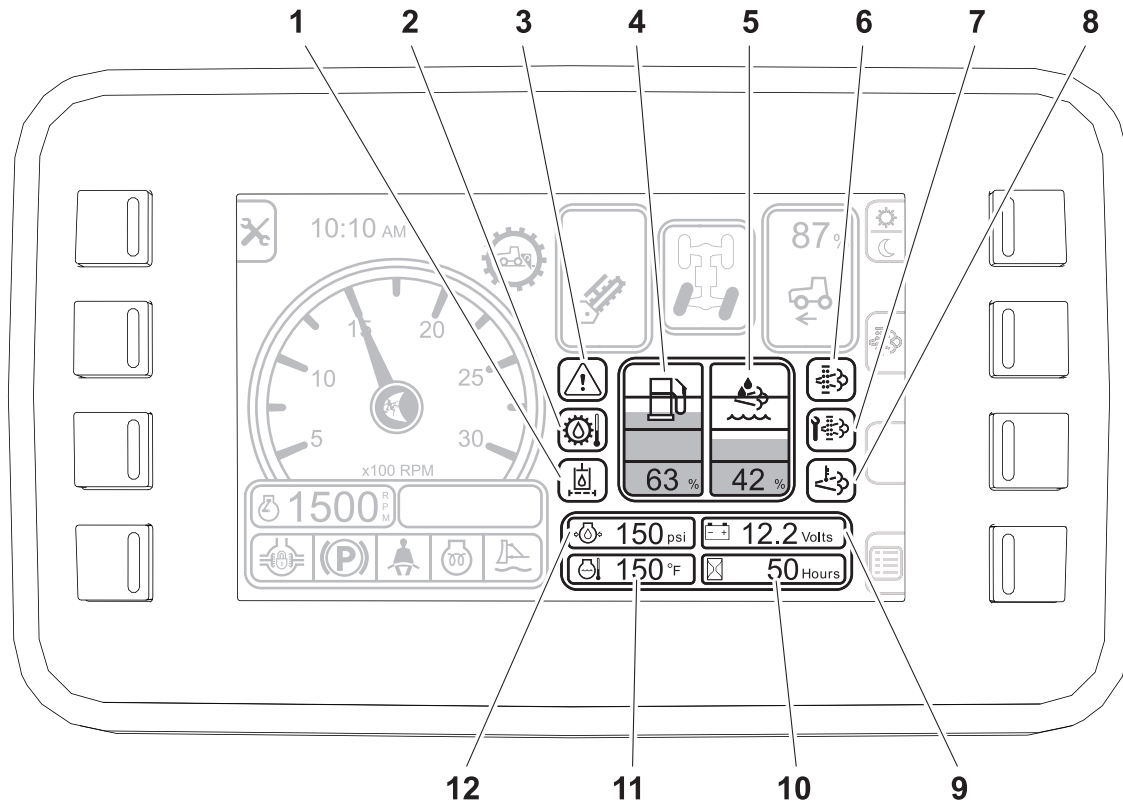
t52om015h.eps

- | | |
|-------------------------------|-------------------------------------|
| 1. Tachometer | 7. Ground drive direction indicator |
| 2. Engine speed display (rpm) | 8. Backfill blade float indicator |
| 3. Real time clock | 9. Cold start wait indicator |
| 4. Gearbox indicator | 10. Operator presence indicator |
| 5. Attachment drive indicator | 11. Parking brake indicator |
| 6. Rear steer indicator | 12. Axle lock indicator |

Item	Description	Notes
1. Tachometer	Displays engine speed.	
2. Engine speed display (rpm)	Displays numeric value for engine speed.	
3. Real time clock	Displays time.	

Item	Description	Notes
4. Gearbox indicator 	Indicates whether gearbox is in high or low.	IMPORTANT: - Gearbox must be in high to drive. - Gearbox must be in low to dig. "--" indicates no information has been received from the controller.
5. Attachment drive indicator 	Lights when an attachment is in use.	
6. Rear steer indicator 	Lights when rear steer is in use.	IMPORTANT: Icon displays direction of wheels.
7. Ground drive direction indicator 	Indicates whether tractor is in forward, reverse, or neutral.	Part of the start interlock system.
8. Backfill blade float indicator 	Lights when backfill blade is in float.	
9. Cold start wait indicator 	Lights when cold start aids are active. Wait until light goes off before starting engine.	
10. Operator presence indicator 	Lights when operator is in seat.	Part of the start interlock system.
11. Parking brake indicator 	Lights when parking brake is set.	
12. Axle lock indicator 	Lights when axle lock is set.	

Gauges and Indicators



t52om016h.eps

- | | |
|---|--|
| 1. Hydraulic fluid filter indicator | 7. Aftertreatment service indicator |
| 2. Transmission oil temperature indicator | 8. High exhaust temperature indicator |
| 3. Engine caution/stop indicator | 9. Voltmeter display |
| 4. Fuel gauge | 10. Hourmeter |
| 5. DEF indicator/tank level percentage | 11. Engine coolant temperature indicator/numeric display |
| 6. Exhaust cleaning indicator | 12. Engine oil pressure indicator/numeric display |

Item	Description	Notes
1. Hydraulic fluid filter indicator 	Lights when hydraulic filter is restricted.	NOTICE: Engine caution indicator will light when hydraulic fluid filter needs attention. Indicator can also light when hydraulic fluid is cold. See "Engine caution/stop indicator" on page 36.

Item	Description	Notes
2. Transmission oil temperature indicator 	Lights when transmission oil temperature is too high.	
3. Engine caution/stop indicator 	Lights yellow when engine needs attention. Lights red when operator needs to stop engine.	
4. Fuel gauge 	Displays amount of fuel remaining in tank.	See "Approved Fuel" on page 123.
5. DEF indicator/tank level percentage 	Displays amount of diesel exhaust fluid (DEF) remaining in tank.	IMPORTANT: Icon changes color and/or flashes to indicate DEF level. Read pop up messages for more information.
6. Exhaust cleaning indicator 	Indicates that a system cleaning is needed.	IMPORTANT: Icon changes color and/or flashes to indicate exhaust cleaning need. Read pop up messages for more information. See "Diesel Exhaust Fluid (DEF)" on page 124.
7. Aftertreatment service indicator 	Indicates when aftertreatment system needs to be serviced.	NOTICE: Contact an authorized Deutz® service technician.
8. High exhaust temperature indicator 	Lights when exhaust temperatures are high.	NOTICE: May light when exhaust cleaning is occurring.
9. Voltmeter display 	Displays machine voltage.	
10. Hourmeter	Displays number of hours engine has been running.	
11. Engine coolant temperature indicator/numeric display 	Displays engine coolant temperature.	Normal coolant temperature is 187°-230° F (86°-110° C).

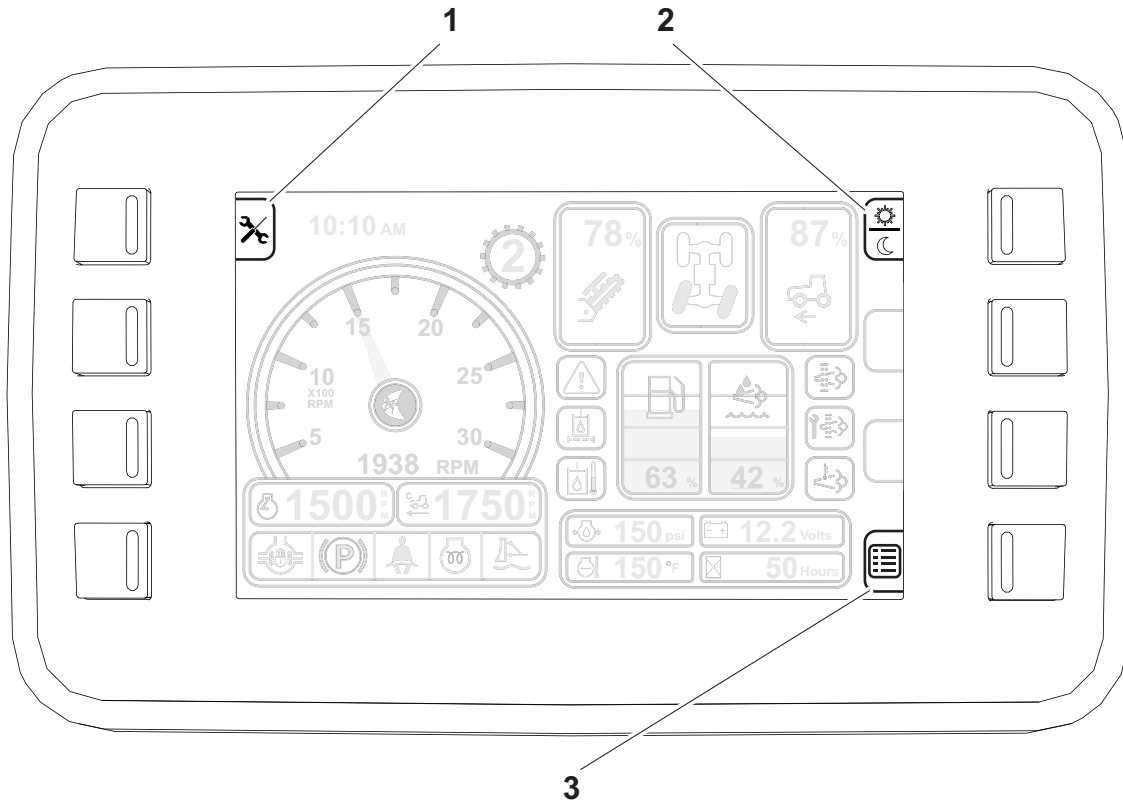
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Graphic Display

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Item	Description	Notes
12. Engine oil pressure indicator/numeric display 	Displays engine oil pressure.	Minimum pressure for warm engine at full throttle is 32 psi (2.21 bar).



Buttons

t48om052w.eps

1. Hide/Recall engine diagnostics key
2. Day/Night mode key
3. Main menu key

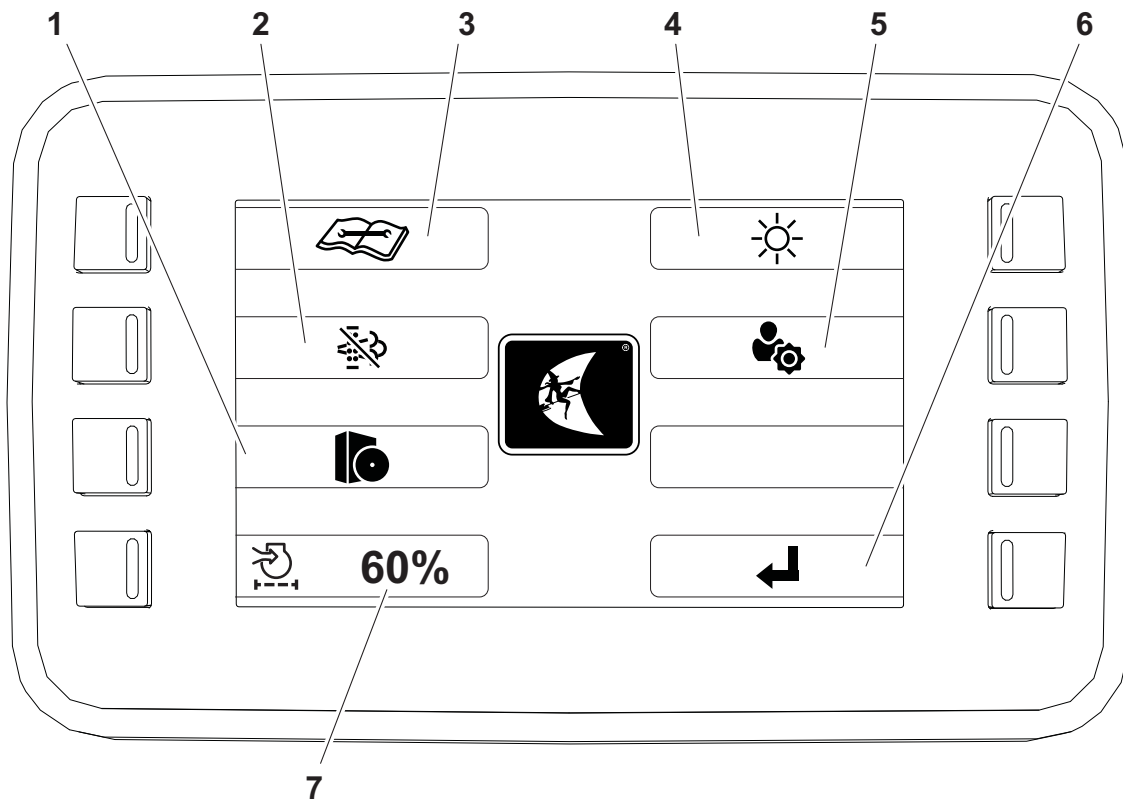
Item	Description	Notes
1. Hide/Recall engine diagnostics key 	When diagnostic message appears, press button twice to hide. Press button twice to recall message.	
2. Day/Night mode key 	Press from main screen to toggle between day and night modes.	
3. Main menu key 	Press from main screen (gauges) to select main menu.	

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Graphic Display

Controls - 39

Main Menu



t48om058w.eps

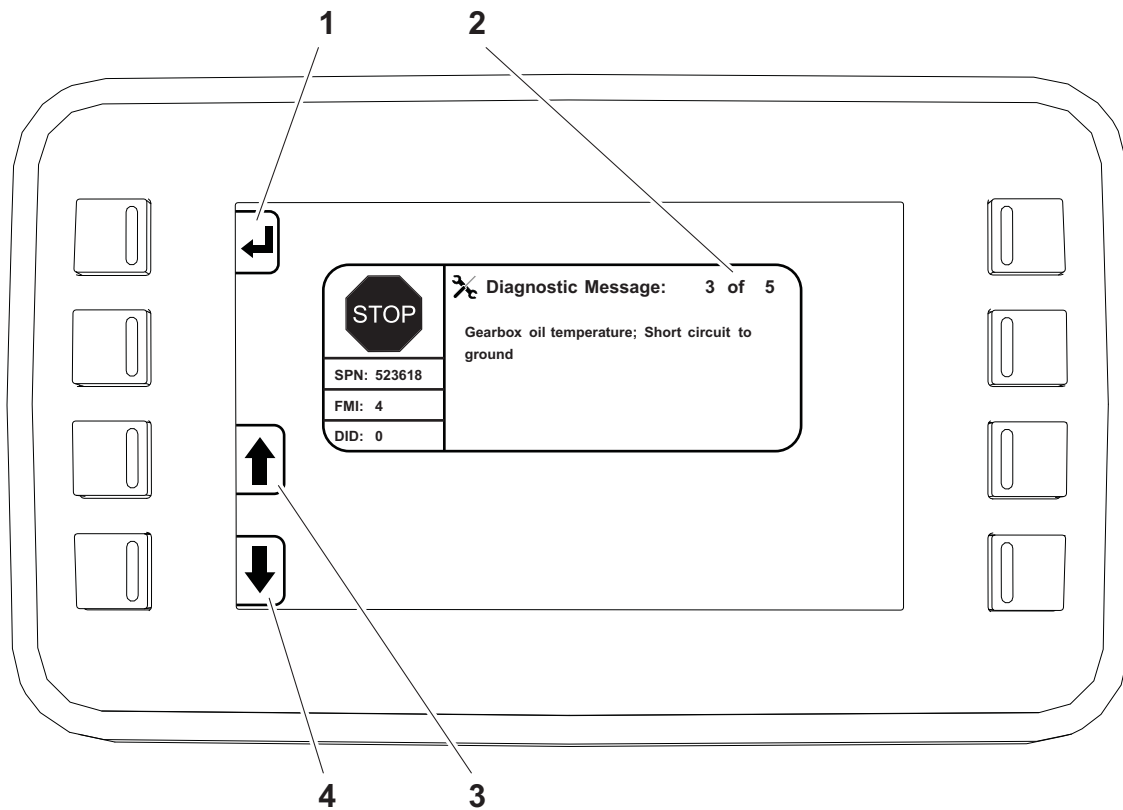
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|---|-------------------------------------|
| 1. System settings key | 5. User settings key |
| 2. Exhaust cleaning activation key | 6. Return key |
| 3. Machine diagnostics code display key | 7. Air filter restriction indicator |
| 4. Brightness control display key | |

Press the 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
1. System settings key	Press to display software version.	
2. Exhaust cleaning activation key	Press to activate exhaust cleaning.	
3. Machine diagnostics code display key	Press to display interlock icons and machine diagnostic codes, if any.	Note: If diagnostic codes are displayed, contact your Ditch Witch® dealer.

Item	Description	Notes
4. Brightness control display key	Press to change the brightness of the display screen.	Minimum brightness is 10%. Maximum brightness is 100%.
5. User settings key	Press to customize settings.	Real time clock setting, unit setting, and language can be changed in this screen.
6. Return key	Press to return to main screen (gauges).	
7. Air filter restriction indicator	Displays percentage of air filter left unrestricted. For best results, replace filter after pop-up message appears.	Access through main menu screen.

Diagnostic Messages



t48om048w.eps

- | | |
|--|-------------------------------|
| 1. Hide/Recall key | 3. Next error message key |
| 2. Diagnostics error message information display | 4. Previous error message key |

Item	Description	Notes
1. Hide/Recall key	Press to hide/recall active error codes.	
2. Diagnostics error message information display	Displays detailed information about the error code.	
3. Next error message key	Press to display next active error message in list.	
4. Previous error message key	Press to display previous error message in list.	

Display Pop-Up Messages

Machine display will automatically display pop-up messages for start interlock and exhaust cleaning systems when needed. Display screen will return to normal once conditions are met.

Start Interlock

For machine to start, operator must be in seat and ground drive direction control must be in neutral. If one or more of these conditions is not met, a pop-up message will appear with applicable information about which condition is not met.

Exhaust Cleaning

A pop-up message will appear when an exhaust cleaning is needed.

NOTICE: Failure to complete the exhaust cleaning when required can cause damage to the engine.

When pop-up message appears:

1. Ensure machine is away from combustible material.
2. Set parking brake.
3. Set engine at low throttle.
4. Follow on-screen prompts to initiate exhaust cleaning.

After exhaust cleaning is initiated, another pop-up message will be displayed with the estimated time remaining until process is complete.

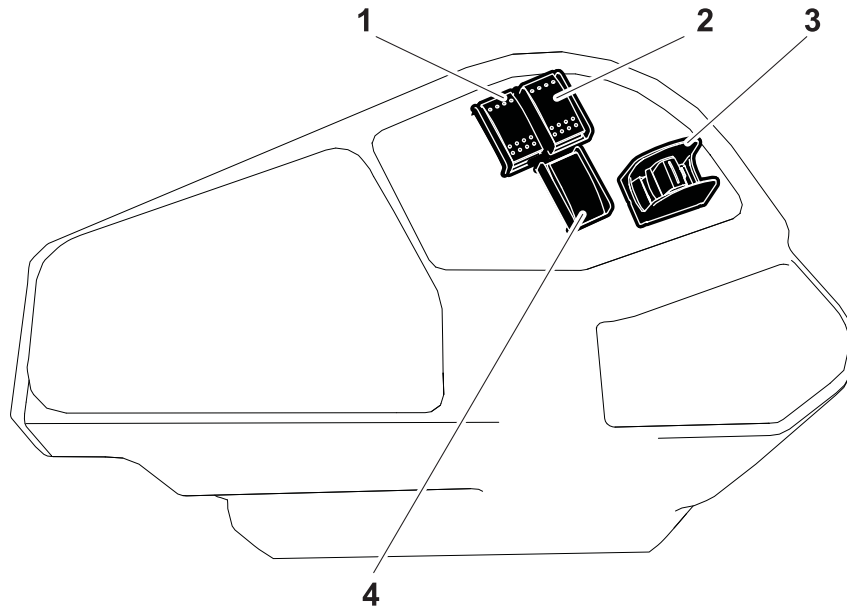
IMPORTANT: If exhaust cleaning cannot be initiated when pop-up message occurs, follow on-screen prompts to return to main screen (gauges). Pop-up message will return to prompt exhaust cleaning at a later time.

Air Filter

A pop-up message will appear when the air filter needs to be changed. See page 155 for more information on how to change air filter.

NOTICE: Failure to change the air filter when required can cause damage to the engine.

Left Console

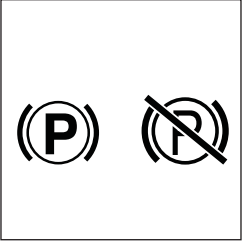


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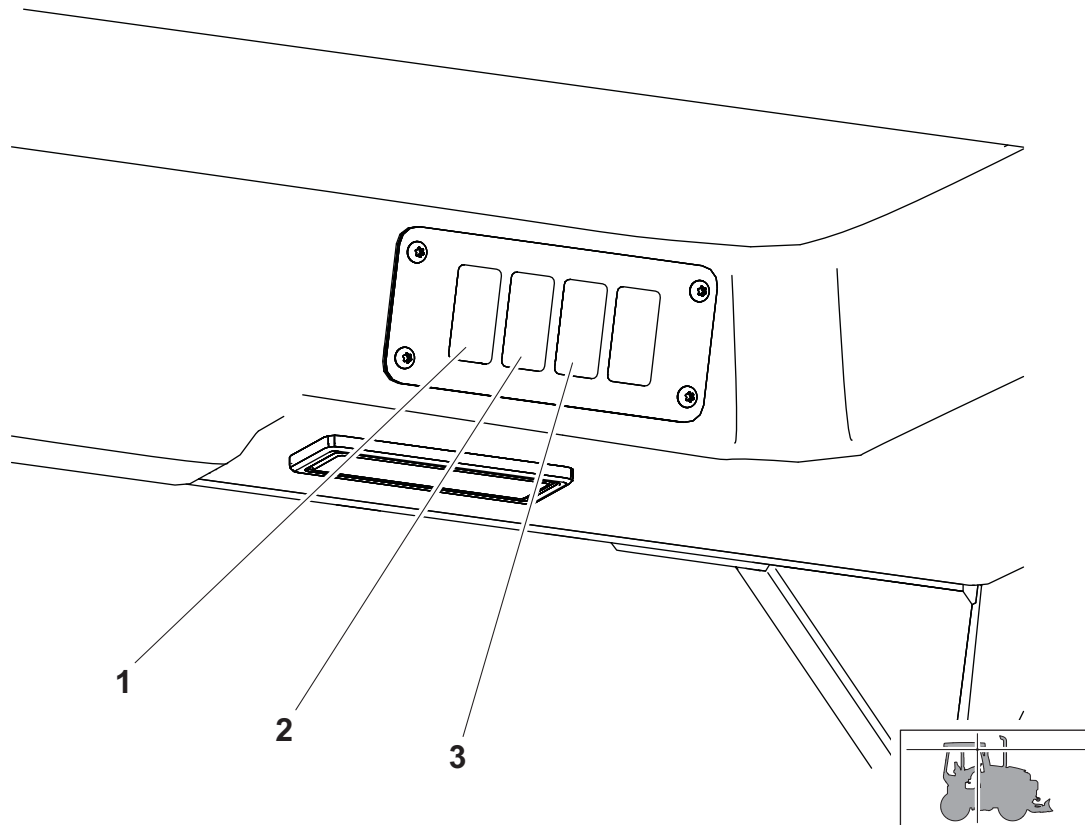
- | | |
|--------------------------|-------------------------|
| 1. Gearbox shift control | 3. Throttle |
| 2. Axle lock switch | 4. Parking brake switch |

Item	Description	Notes
1. Gearbox shift control c00ic735h.eps	To put gearbox in low to dig, press left. To put gearbox in high to drive, press right.	IMPORTANT: To shift gearbox, brake pedal must be pressed and ground drive direction control must be in neutral. See "Center Console" on page 26.
2. Axle lock switch c00ic136w.eps	To engage axle lock, press left. To disengage axle lock, press right.	NOTICE: - To engage axle lock, operator must be in seat and ground drive direction control must be in neutral. - After disengaging axle lock, drive tractor in reverse 6' (2 m) to fully disengage.



Item	Description	Notes
3. Throttle  c00ic133a.eps	To increase speed, move forward. To decrease speed, pull back.	
4. Parking brake indicator  c00ic147w.eps	To set parking brake, press left. To release parking brake, press right.	

Upper Console

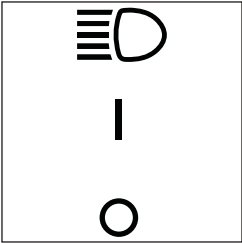


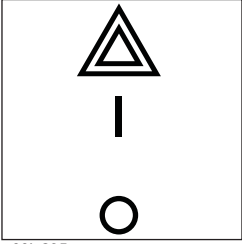
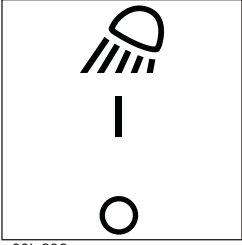
t50om004w.eps

1. Running light switch*
2. Hazard light switch*

3. Work light switch*

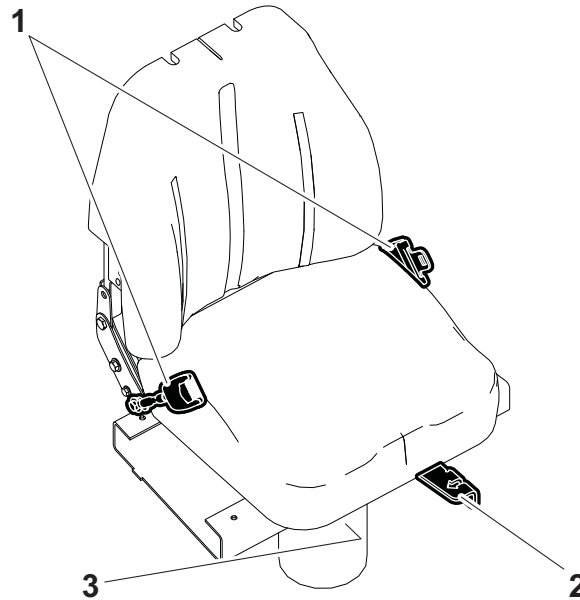
*Optional

Item	Description	Notes
1. Running light switch  c00ic234w.eps	To turn on, press top. To turn off, press bottom.	Clear lights used to help make the machine more visible.

Item	Description	Notes
2. Hazard light switch  c00ic235w.eps	To turn on, press top. To turn off, press bottom.	Flashing amber lights used to help make the machine more visible.
3. Work light switch  c00ic236w.eps	To turn on, press top. To turn off, press bottom.	Work light kit may be added to assist in operation. See "Optional Equipment" on page 116.

Seat Controls

Standard Seat



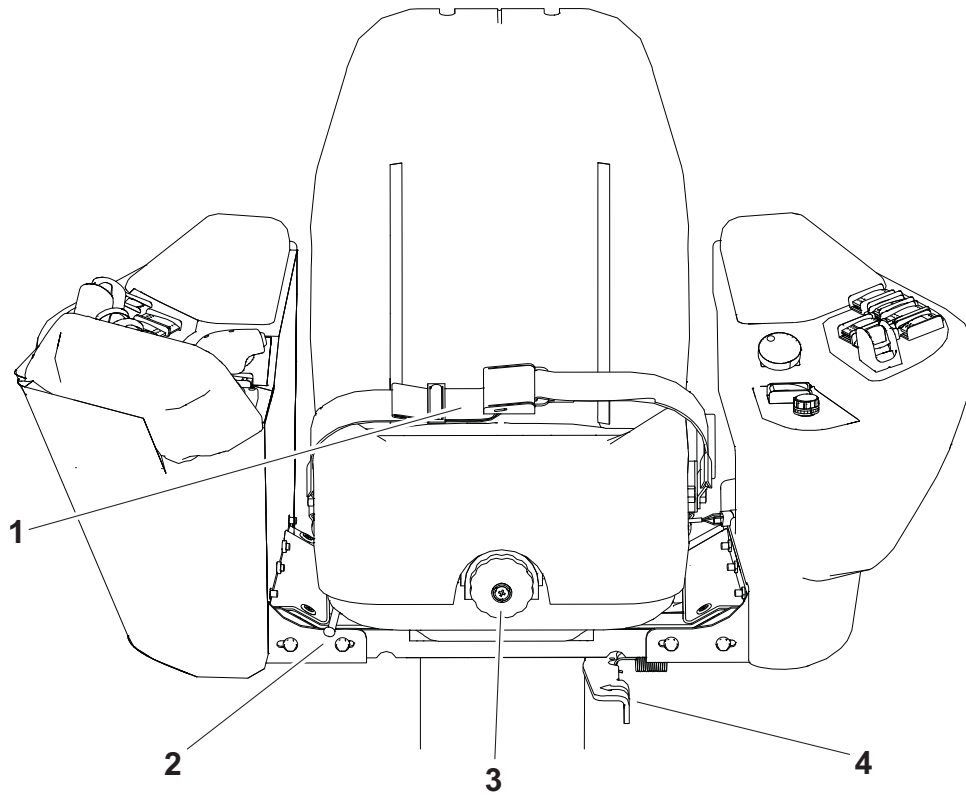
t48om006w.eps

- | | |
|------------------|------------------|
| 1. Seat belt | 3. Slide control |
| 2. Pivot control | |

Item	Description	Notes
1. Seat belt	To fasten, insert latch into buckle. Adjust until seat belt is low and tight. To release, lift top of buckle.	
2. Pivot control	To pivot seat, push lever in direction of arrow, rotate seat to desired position and release.	Seat pivots to the right at 0°, 5°, 60° and 90° and to the left at 30°. IMPORTANT: Drive tractor with operator's seat facing front. If desired, operate rear attachments with seat pivoted.
3. Slide control	To slide seat forward or backward, pull, then adjust seat. To lock seat in place, release.	



Suspension Seat (Optional)*



t50om007w.eps

- | | |
|------------------|-----------------------|
| 1. Seat belt | 3. Suspension control |
| 2. Pivot control | 4. Slide control |

Item	Description	Notes
1. Seat belt	To fasten, insert latch into buckle. Adjust until seat belt is low and tight. To release, lift top of buckle.	
2. Pivot control	To pivot seat, push lever in direction of arrow, rotate seat to desired position and release.	Seat pivots to the right at 0°, 5°, 60° and 90° and to the left at 30°. IMPORTANT: Drive tractor with operator's seat facing front. If desired, operate rear attachments with seat pivoted.
3. Suspension control	Adjust dial to approximate body weight for additional comfort.	

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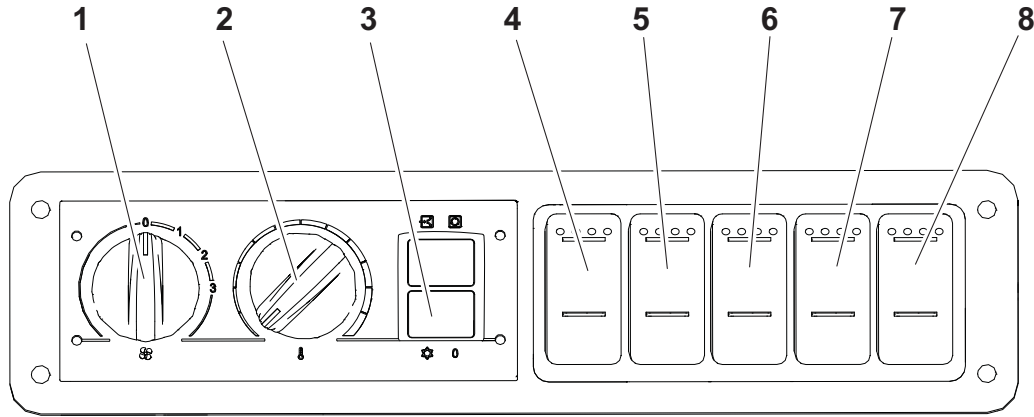
Seat Controls

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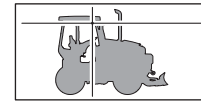
Item	Description	Notes
4. Slide control	To slide seat forward or backward, pull, then adjust seat. To lock seat in place, release.	



Cab Controls (Optional)

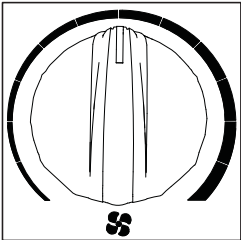


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- | | |
|-------------------------------------|------------------------|
| 1. Air conditioner fan speed dial | 5. Hazard light switch |
| 2. Air conditioner temperature dial | 6. Work light switch* |
| 3. Air conditioner on/off switch | 7. Front wiper switch |
| 4. Running light switch | 8. Rear wiper switch |

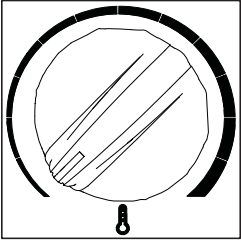
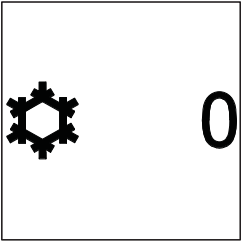
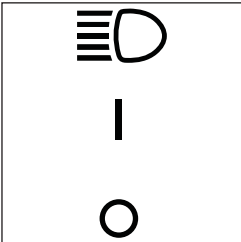
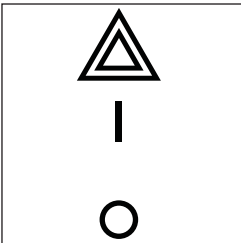
*Optional

Item	Description	Notes
1. Air conditioner fan speed dial  c00ic230w.eps	To adjust fan speed, turn dial. To decrease fan speed, turn counterclockwise. To increase fan speed, turn clockwise.	

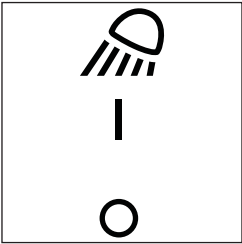
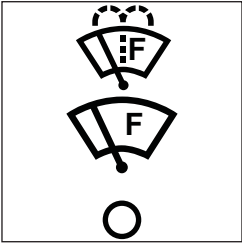
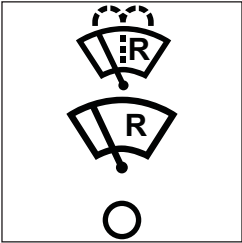
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Cab Controls (Optional)

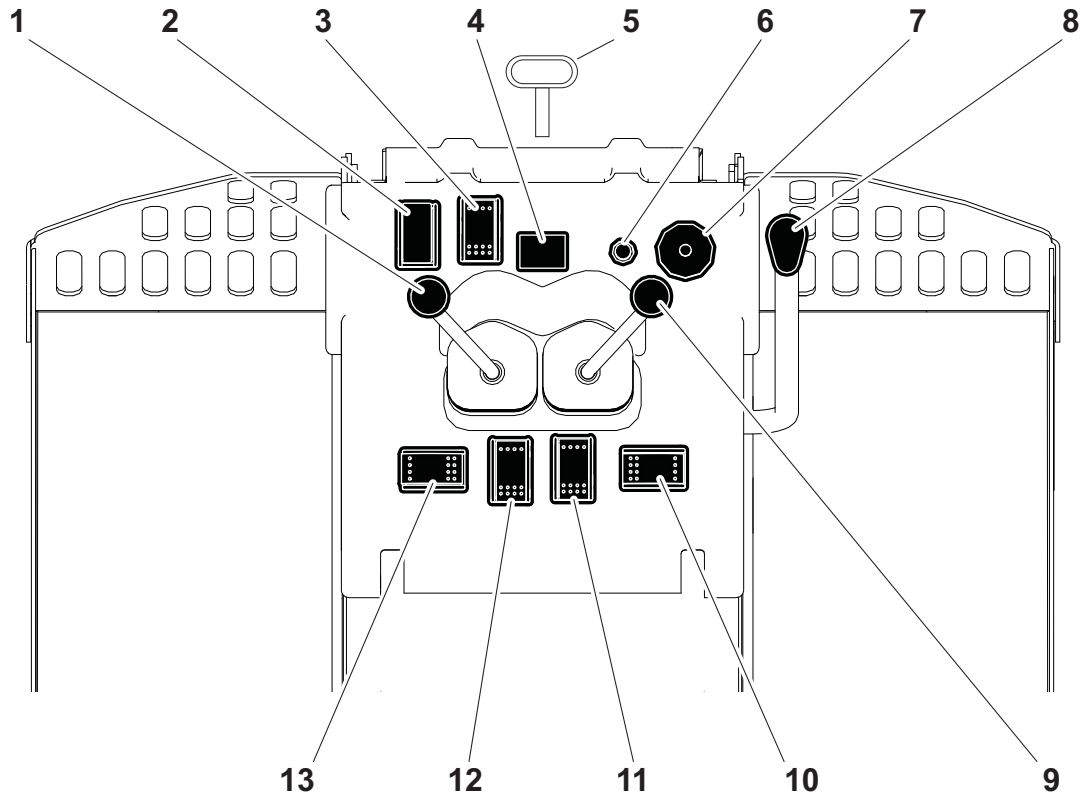
Controls - 51

Item	Description	Notes
2. Air conditioner temperature dial  c00ic231w.eps	To adjust air temperature, turn dial. To make air colder, turn counterclockwise. To make air warmer, turn clockwise.	
3. Air conditioner on/off switch  c00ic233w.eps	To turn air conditioner on, press left. To turn air conditioner off, press right.	
4. Running light switch  c00ic234w.eps	To turn on, press top. To turn off, press bottom	Clear lights used to help make the machine more visible.
5. Hazard light switch  c00ic235w.eps	To turn on, press top. To turn off, press bottom.	Flashing amber lights used to help make the machine more visible.



Item	Description	Notes
6. Work light switch  c00ic236w.eps	To turn on, press top. To turn off, press bottom.	Work light kit may be added to assist in operation. See "Optional Equipment" on page 116.
7. Front wiper switch  c00ic237w.eps	To turn on, press top. To turn off, press bottom. To turn on washer fluid, press and hold.	
8. Rear wiper switch  c00ic238w.eps	To turn on, press top. To turn off, press bottom. To turn on washer fluid, press and hold.	

Backhoe Console

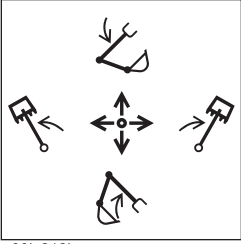
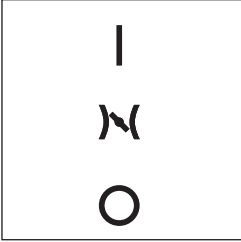
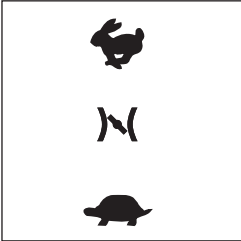
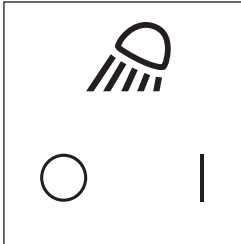


t48om057w.eps

- | | |
|----------------------------------|------------------------------------|
| 1. Boom/Swing control | 8. Stow lock control |
| 2. Remote throttle enable switch | 9. Bucket/Dipper control |
| 3. Remote throttle control | 10. Right stabilizer control |
| 4. Work light switch* | 11. Remote ground drive control |
| 5. Swing lock pin | 12. Remote backfill blade control* |
| 6. Remote ignition control | 13. Left stabilizer control |
| 7. Remote engine stop button | |

*Optional

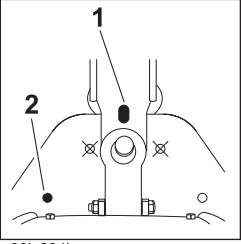
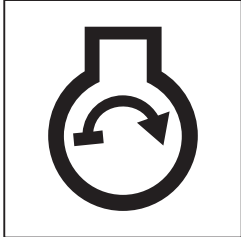


Item	Description	Notes
1. Boom/Swing control  c00ic212h.eps	To swing boom left, move left. To swing boom right, move right. To raise boom, pull. To lower boom, push.	Control can perform more than one action at a time. By "feathering" the control, operator can combine backhoe operations. NOTICE: Do not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

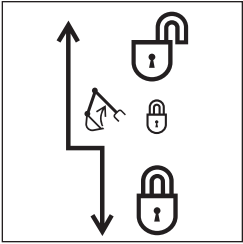
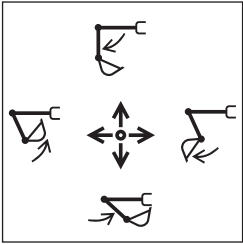
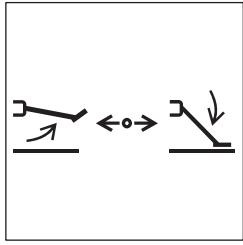
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Backhoe Console

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Item	Description	Notes
5. Swing lock pin  c00ic234h.eps	To lock: - Engage stow lock. See "Stow lock control" on page 56. - Insert swing lock pin into hole (1). To release: - Remove pin and store in hole (2). - Release stow lock.	NOTICE: - Always use stow lock and install swing lock pin during transport. Do not store pin in holes marked with an "X." Backhoe could swing and destroy pin.
6. Remote ignition control  c00ic056t.eps	To start engine, press.	
7. Remote engine stop button  c00ic085c.eps	Press to stop engine immediately.	For normal engine shutdown, use remote ignition control. IMPORTANT: Engine will not start if remote engine stop is engaged.

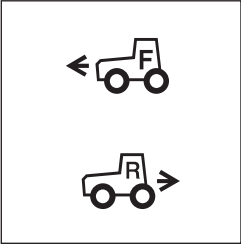
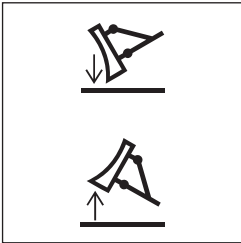
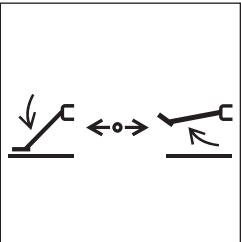


Item	Description	Notes
8. Stow lock control  c00ic215h.eps	To lock: • Raise boom fully. • Pull stow lock handle. • Lower boom slightly to engage lock. • Insert swing lock pin. To unlock: • Remove swing lock pin. • Raise boom slightly. • Push stow lock handle to release lock.	NOTICE: Always use stow lock and install swing lock pin during transport.
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. Right stabilizer control  c00ic088c.eps	To lower, move right. To raise, move left.	

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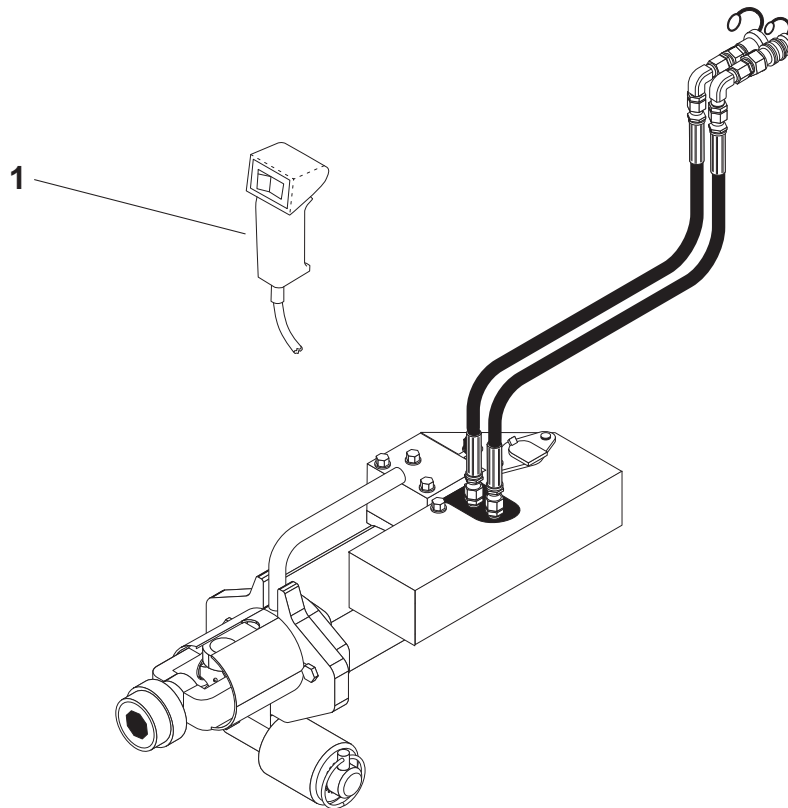
Backhoe Console

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Item	Description	Notes
11. Remote ground drive control  c00ic216h.eps	To move tractor forward, push. To move tractor backward, pull.	NOTICE: • This control is disabled if tractor seat is occupied. • Tractor must be in low speed and ground drive direction control must be in neutral for remote ground drive to function. • Ensure that backfill blade, and stabilizers are raised, and parking brake is released before operating this control. • Do not move more than 30' (10 m) at a time.
12. Remote backfill blade control  c00ic210h.eps	To lower, push. To raise, pull.	
13. Left stabilizer control  c00ic211h.eps	To lower, move left. To raise, move right.	

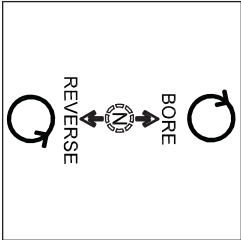


Drill Controls



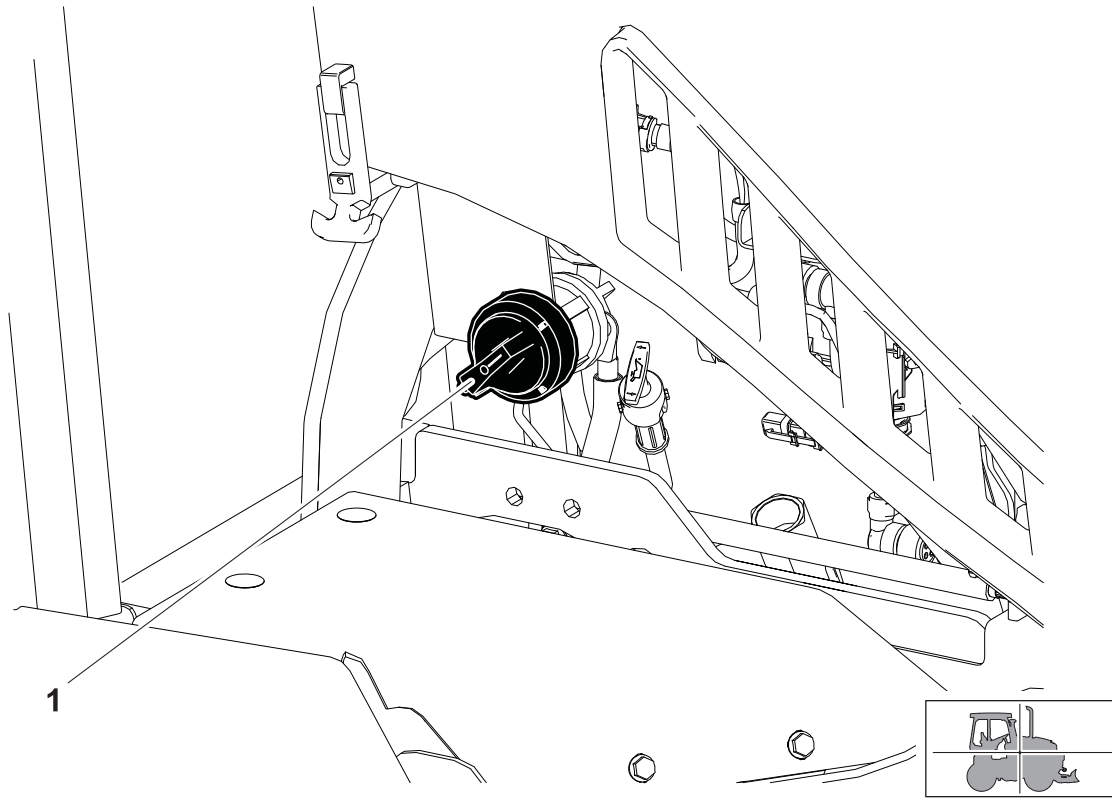
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1. Drilling attachment control

Item	Description	Notes
1. Drilling attachment control 	To rotate clockwise, press bore. To rotate counterclockwise, press reverse.	IMPORTANT: Always rotate clockwise during drilling and backreaming. Rotate counterclockwise only to dislodge a dry bore bit or reamer that has seized in the bore hole. Switch should return to neutral position when released.

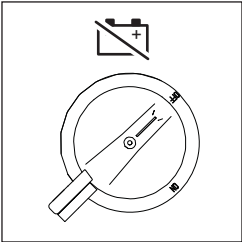
c00ic655w.eps

Battery Disconnect



t50om003h.eps

1. Battery disconnect switch

Item	Description	Notes
1. Battery disconnect switch  c00ic156w.eps	To connect, move clockwise. To disconnect, move counterclockwise.	NOTICE: - Do not operate battery switch with engine running. - To avoid equipment damage, wait two minutes after turning engine off before disconnecting battery.

Operation Overview

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Leaving Jobsite	63



Planning

1. Gather information about jobsite. See page 66.
2. Inspect jobsite. See page 67.
3. Classify jobsite. See page 68.
4. Select chain and teeth to match your soil type, if necessary. See page 114
5. Check supplies and prepare equipment. See page 70.
6. Haul equipment to jobsite. See page 82.

Trenching

1. Start unit. See page 74.
2. Position tractor and controls. See page 96.
3. Begin trenching. See page 98.
4. Complete the installation. See page 100.
5. Shut down tractor. See page 77.

Digging with Backhoe

1. Start unit. See page 74.
2. Set stabilizers and unstow backhoe. See page 88.
3. Excavate. See page 90.
4. Stow backhoe properly. See page 92.
5. Shut down tractor. See page 77.

Drilling

1. Start unit. See page 74.
2. Dig approach trench and target trench. See page 102.
3. Assemble drill string and position tractor. See page 103.
4. Begin drilling. See page 105.
5. Use drill string guide as needed. See page 106.
6. Add rod. See page 107.
7. Backream. See page 108.
8. Shut down tractor. See page 77.
9. Disassemble joints. See page 112.

Leaving Jobsite

1. Backfill if necessary. See page 118.
2. Rinse equipment. See page 118.
3. Stow tools. See page 118.
4. Haul equipment from jobsite. See page 82.



Prepare

Chapter Contents

Gather Information 66

- Review Job Plan 66
- Notify One-Call Services 66
- Arrange for Traffic Control 66
- Plan for Emergency Services 66

Inspect Site 67

- Identify Hazards 67

Classify Jobsite 68

- Select a Classification 68
- Apply Precautions 69

Check Supplies and Prepare Equipment 70

- Check Supplies 70
- Prepare Equipment 70
- Assemble Accessories 71



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

Mark proposed path with white paint and have underground utilities located before working.

- In the US or Canada, call 811 (US) or 888-258-0808 (US and Canada). Also contact any local utilities that do not participate in the One-Call service.
- In countries that do not have a One-Call service, contact all local utility companies to have underground utilities located.

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

Identify Hazards

Inspect jobsite before transporting equipment. Check for the following:

- overall grade or slope
- changes in elevation such as hills or other open trenches
- obstacles such as buildings, railroad crossings, or streams
- signs of utilities on jobsite and perimeter, such as:
 - “buried utility” notices
 - utility facilities without overhead lines
 - gas or water meters
 - junction boxes
 - drop boxes
 - light poles
 - manhole covers
 - sunken ground
- traffic
- access
- soil type and condition

Have an experienced locating equipment operator sweep area within 20' (6 m) to each side of trench path to verify previously marked line and cable locations. Mark location of all buried utilities and obstructions.



Classify Jobsite



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.
- Mark proposed path with white paint and have underground utilities located before working.
- 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.

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. Follow U.S. Department of Labor regulations on excavating and trenching (Part 1926, Subpart P) and other similar regulations.

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

Crystalline silica dust is a naturally occurring substance found in soil, sand, concrete, granite, and quartz. Breathing silica dust particles while cutting, drilling, or working materials may cause lung disease or cancer. To reduce exposure:

- Use water spray or other means to control dust.
- Refer to U.S. Department of Labor Occupational Safety and Health Administration guidelines to learn more about appropriate breathing protection and permissible exposure limits.

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

Check Supplies

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

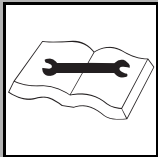
Prepare Equipment

Fluid Levels

- fuel
- hydraulic fluid
- diesel exhaust fluid
- battery charge
- engine oil

Condition and Function

- all controls



⚠ 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.

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

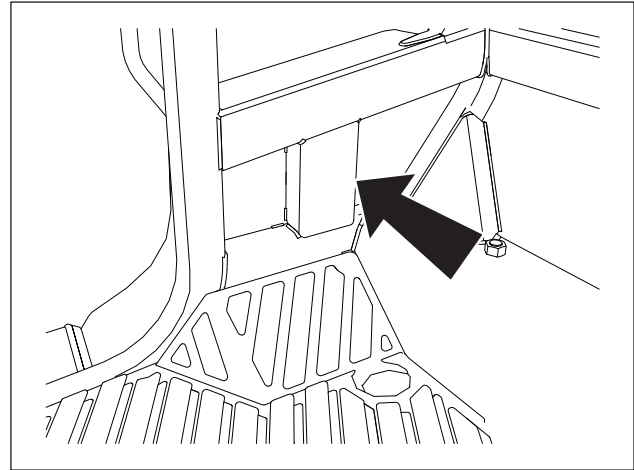
RT105M Operator's Manual ***Check Supplies and Prepare Equipment***

Prepare - 71

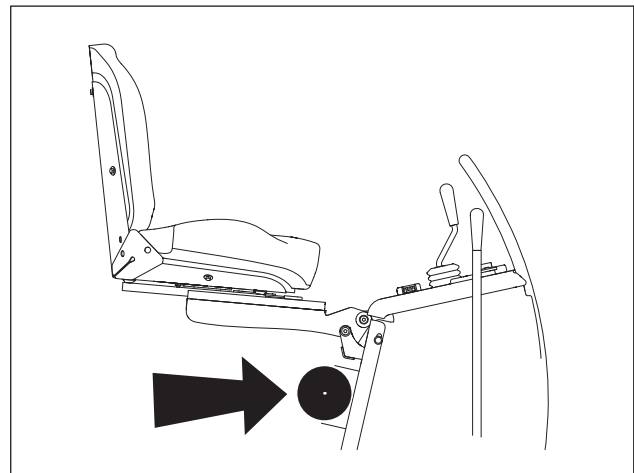
Assemble Accessories

Fire Extinguisher

If required, mount a fire extinguisher near the power unit but away from possible points of ignition where shown. The fire extinguisher should always be classified for both oil and electric fires. It should meet legal and regulatory requirements.



Tractor



Backhoe_Fire_Extinguisher.eps

Backhoe

Drive

Chapter Contents

Start Unit 74

Drive 75

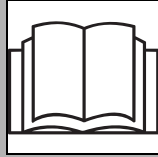
- General Operation. 75
- Safe Slope Operation 76

Shut Down 77



Start Unit

Before operating tractor, read engine manufacturer's starting and operating instructions.



⚠ WARNING Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

To help avoid injury: Wear hard hat, safety glasses, and other protective equipment required by job. Do not wear jewelry or loose clothing that can catch on controls.

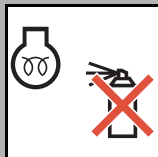


⚠ WARNING Rollover could kill or crush. Wear seat belt.
275-303

1. Clear the area around the machine of all bystanders.
2. Fasten and adjust seat belt.
3. Check that start interlock conditions are met. See "Start Interlock" on page 42.
4. Check that speed/direction control and ground drive switch are in neutral.

IMPORTANT: Machine controls will not function if not returned to neutral prior to starting machine. If controls are not returned to neutral prior to starting machine, turn control off and then back on in order to function after machine is running.

5. Adjust throttle to low.
6. Verify that parking brake is set.
7. Turn ignition switch to the run position (key on, engine off). Wait for operator's display to come on. Cold start wait indicator will light if necessary.



⚠ WARNING Fire or explosion possible. Do not use starter fluid. 273-459
(2P), 274-206 (2P), 700-206 (2P)

Drive

8. When cold start wait indicator turns off, turn ignition switch clockwise to start tractor. Warning alarm will sound. Indicators light.
 - If engine does not start, ensure start interlock conditions are met. See page 42 for start interlock information.
 - If engine turns but does not start within 20 seconds, allow starter to cool one minute before trying to start again.
9. Run engine at half-throttle or less for five minutes before operating tractor. During warm-up, check that all controls work properly.

Drive

General Operation



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:

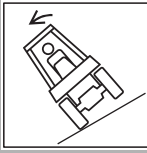
- Survey your field of vision when operating the machine.
- Drive carefully in congested areas. Know machine's clearance and turning radius.



EMERGENCY SHUTDOWN: Turn ignition switch to STOP.

1. Turn on optional lights as needed. See page 45 or page 50.
2. Raise backfill blade and all attachments. See "Backfill blade control" on page 32.
3. Press brake pedal.
4. Release parking brake and verify parking brake indicator is off.
5. Ensure ground drive direction/speed control is in neutral. See page 28.
6. Ensure gearbox shift control is in high to drive. See "Gearbox shift control" on page 43.
7. Adjust ground drive direction/speed control to move tractor.
8. Release brake pedal.
9. Press foot throttle to increase tractor speed.

Safe Slope Operation



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

To help avoid injury:

- Always operate with heavy end uphill.
- Drive cautiously 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 setting parking brake.

Operating safely on a slope depends upon many factors including:

- Distribution of machine weight, including front loading and absence of load
- Height of load
- 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, drive unit to level ground.
2. Move ground drive control to neutral.
3. Set parking brake and verify parking brake indicator is on.
4. Lower all attachments to ground.
5. Run engine at low throttle for three minutes to cool.
6. Turn ignition switch to STOP. If leaving machine unattended, remove key.
7. For maintenance or storage, turn battery disconnect switch to disconnect position.

NOTICE: To avoid equipment damage, wait two minutes after turning engine off before disconnecting battery.



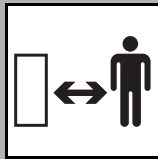
Transport

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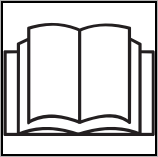


Lift



WARNING

Crushing weight. If load falls or moves it could kill or crush you. Stay away.



WARNING

Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

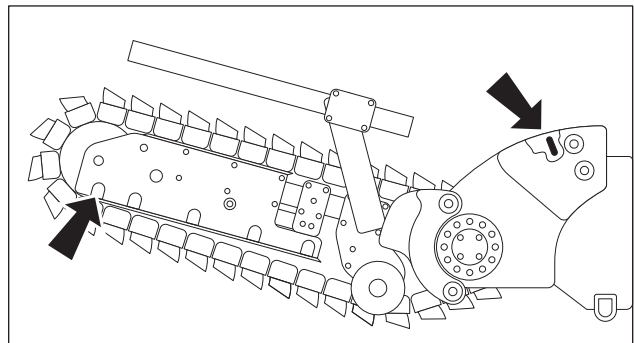
Procedure

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 163.

Centerline Trencher

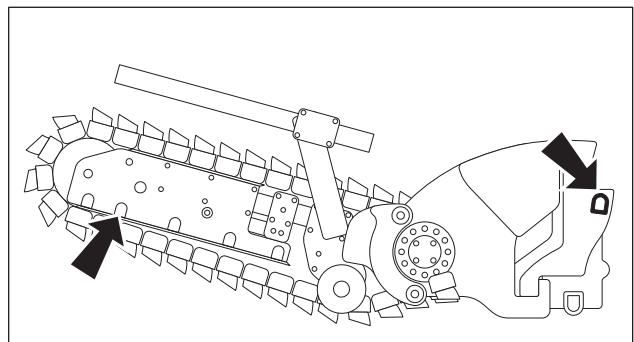
Use crane capable of supporting the equipment's size and weight. See "Specifications" on page 163 or measure and weigh equipment before lifting.



t30om012h.eps

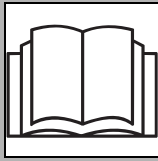
Traversing Trencher

Use crane capable of supporting the equipment's size and weight. See "Specifications" on page 163 or measure and weigh equipment before lifting.



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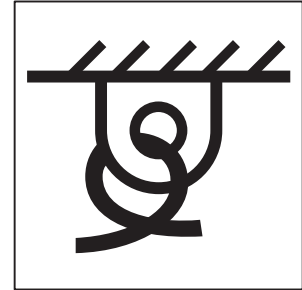
Tie Down



Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

Points

Tiedown points are identified by tiedown decals. Securing to trailer at other points is unsafe and can damage machinery. Attachment tiedown points shown are for tractor and attachment assembly.

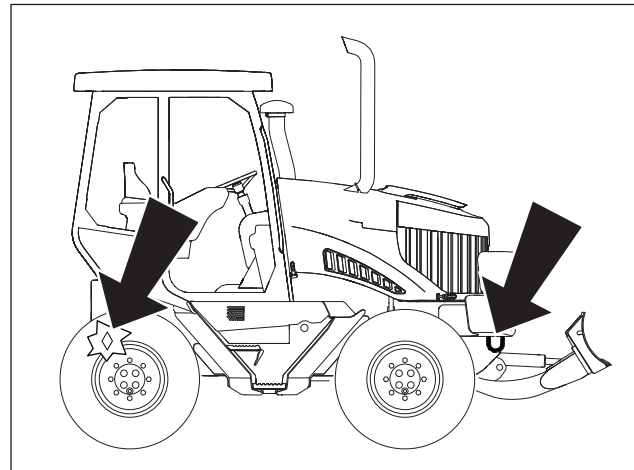


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Procedure

Tractor

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

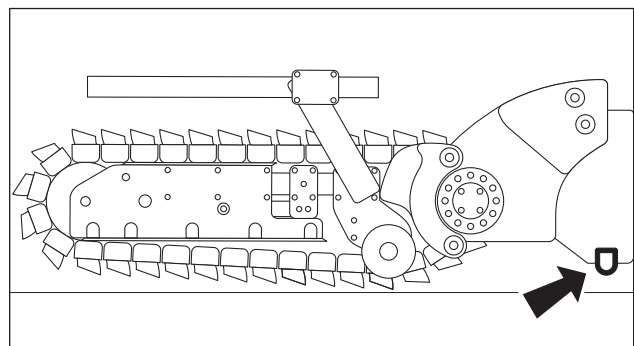


t50om004h.eps

Centerline Trencher

Lower trencher to trailer deck and chain at attachment frame. Ensure chains are tight before transporting.

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



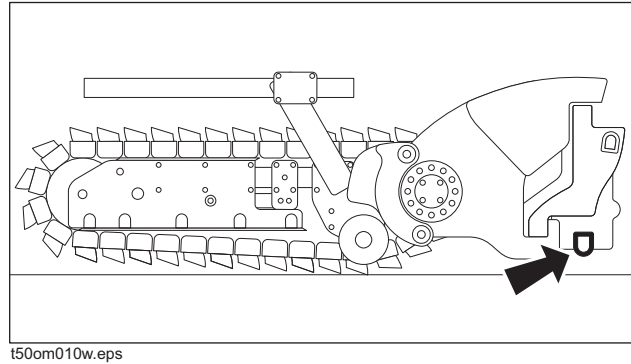
t50om009w.eps



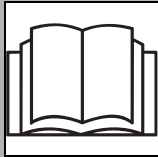
Traversing Trencher

Lower trencher to trailer deck and chain at attachment frame. Ensure chains are tight before transporting.

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



Haul



WARNING

Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

To help avoid injury:

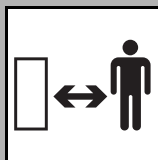
- Read trailer operator's manual before loading or transporting your machine. Incorrectly loaded machine can slip or cause trailer sway.
- Ensure that tow vehicle has proper tow capacity rating.
- Attach trailer to tow vehicle before loading or unloading.
- Park, load, and unload trailer on level ground.
- Check that unit and trailer do not exceed size or weight regulations.
- Load trailer correctly to avoid trailer sway. Ten to fifteen percent of total vehicle weight (equipment plus trailer) must be 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



Crushing weight. If load falls or moves it could kill or crush you. Stay away.

To help avoid injury:

- Attach trailer to tow vehicle before loading or unloading.
- Load and unload trailer on level ground.
- Block trailer wheels.
- Put ground drive control into neutral. Turn off ignition. Set parking brake.



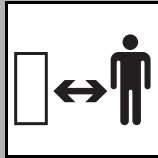
275-303

Rollover could kill or crush. Wear seat belt.

1. Fasten and adjust seat belt with seat facing forward.
2. Tilt steering column down.
3. Start tractor. See page 74 for proper start-up procedures.
4. Raise attachments, but keep them low and centered. Check that they are not in float.
5. Release parking brake.
6. Move gearbox shift control switch to high. See "Gearbox shift control" on page 43.
7. Slow engine to low throttle and slowly drive tractor onto trailer. See "Center Console" on page 26 for more information.
8. Position tractor on trailer deck for proper weight distribution.
9. Set parking brake and verify that parking brake indicator is on.

10. Lower attachments to trailer bed and turn tractor off. See page 77 for proper shutdown procedures.
11. Attach chains to tractor and attachments where tiedown decals are located. See page 81.

Unload



WARNING

Crushing weight. If load falls or moves it could kill or crush you. Stay away.

To help avoid injury:

- Attach trailer to tow vehicle before loading or unloading.
- Load and unload trailer on level ground.
- Block trailer wheels.



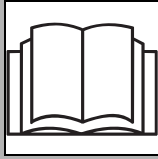
WARNING

Rollover could kill or crush. Wear seat belt.

275-303

1. Lower trailer or ramps.
2. Set parking brake and verify that parking brake indicator is on.
3. Check that ground drive controls are in neutral.
4. Remove chains from tiedowns.
5. Fasten and adjust seat belt.
6. Tilt steering column down.
7. Start tractor. See page 74 for proper start-up procedures.
8. Raise attachments, but keep them low and centered. Check that they are not in float.
9. Release parking brake.
10. Slow engine to low throttle and slowly back unit down trailer or ramps. See "Center Console" on page 26 for more information.

Retrieve



Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

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

- tow for no more than 200 yd (180 m) at less than 1 mph (1.6 km/h),
- use towing chains appropriately rated for maximum towing force,
- steering will be difficult.

Procedure

1. Set parking brake.
2. Block front and rear wheels to prevent unit from rolling.
3. Attach tow line to all available tiedown points facing vehicle.
4. Ensure gearbox shift control is in high to drive. See "Gearbox shift control" on page 43.
5. Ensure ground drive direction/speed control is in neutral. See "Ground drive/attachment direction/speed control" on page 28.
6. Remove blocks.
7. Fasten and adjust seatbelt.
8. Press brake pedal.
9. Set ground drive direction/speed control to forward.
10. Release parking brake.
11. Set ground drive direction/speed control to neutral.
12. Use brake pedal to control unit.



IMPORTANT: If retrieve procedure does not work in your situation contact your Ditch Witch® dealer.

Backhoe

Chapter Contents



Set Up. 88

- Position Tractor 88
- Prepare Backhoe 89

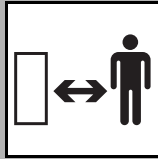
Operate 90

- Move Unit 91

Finish Job 92

Set Up

EMERGENCY SHUTDOWN - Turn ignition switch to STOP.



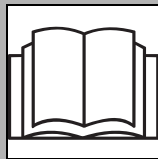
WARNING Crushing weight could cause death or serious injury. Stay away.

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. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

Position Tractor

1. Fasten and adjust seat belt.
2. Start tractor. See page 74 for start-up procedures.
3. Drive to starting point. Move in line with planned job. See page 75 for driving procedures.
4. Ensure gearbox shift control is in low to dig. See "Gearbox shift control" on page 43.

IMPORTANT: For backhoe to function properly, gearbox shift control must be in low to dig.

RT105M Operator's Manual

Set Up

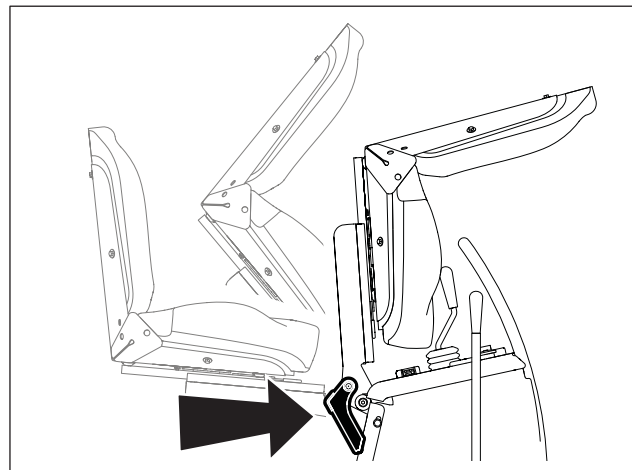
Backhoe - 89

5. Ensure ground drive direction control is in neutral.
6. Move attachment direction/speed control to neutral position.
7. Move ground drive speed hand control to neutral position.
8. Lower rear attachment to 6" (150 mm) above ground.
9. Lower backfill blade.
10. Turn ignition switch to STOP.
11. Move to backhoe operator's station.



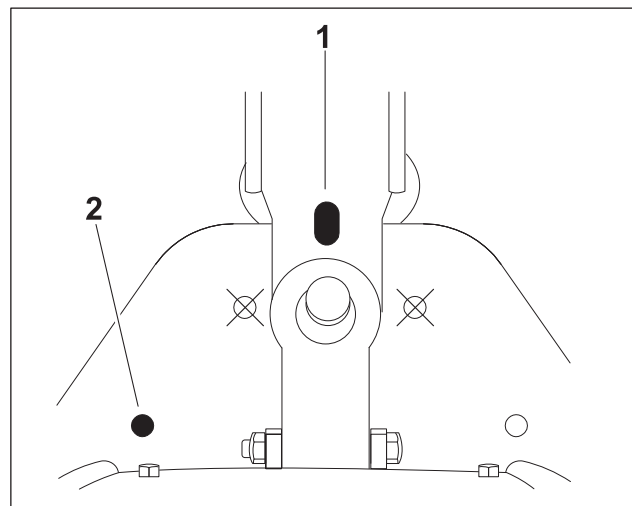
Prepare Backhoe

1. Disengage seat lock (shown) and rotate seat out of stowed position.



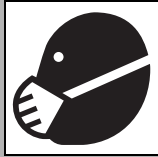
Backhoe_Seat_32016.eps

2. Remove swing lock pin from hole (1) and store in hole (2).
3. Raise boom to release tension on stow lock.
4. Release stow lock by pushing handle forward. For more information about stow lock, see page 48.



Backhoe_Setup_Swinglock.eps

Operate

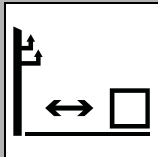


CAUTION

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.

To help avoid injury:

- Use water spray or other means to control dust.
- Refer to U.S. Department of Labor Occupational Safety and Health Administration guidelines to learn more about appropriate breathing protection and permissible exposure limits.



DANGER

Electric shock will cause death or serious injury. Stay away. 274-049

To help avoid injury: Expose lines by hand before digging. Cutting high voltage cable can cause electrocution.



WARNING

Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

1. Clear the area around the machine of all bystanders.
2. Start tractor using remote ignition control from backhoe console. For more information about backhoe controls, see page 48.
3. Lower stabilizers until they touch the ground.
4. Adjust throttle to desired speed.

RT105M Operator's Manual

Operate

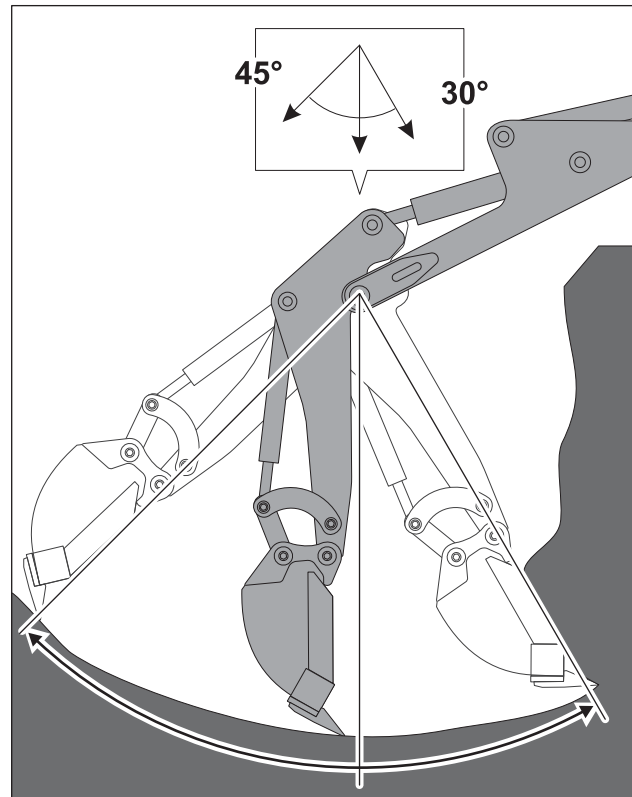
Backhoe - 91

5. Use boom/swing control and bucket/dipper control to dig hole or trench. For more information about backhoe controls, see "Backhoe Console" on page 53.
 - Keep dipper and boom at right angles as much as possible for maximum power. Keep bucket in line with dipper as much as possible.
 - 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.

Move Unit

NOTICE:

- Backhoe may obstruct the forward visibility of the operator. Machines with limited forward visibility should be driven only for short distances and with the help of a spotter.
- Only use this method to move unit less than 30' (10 m) at one time.

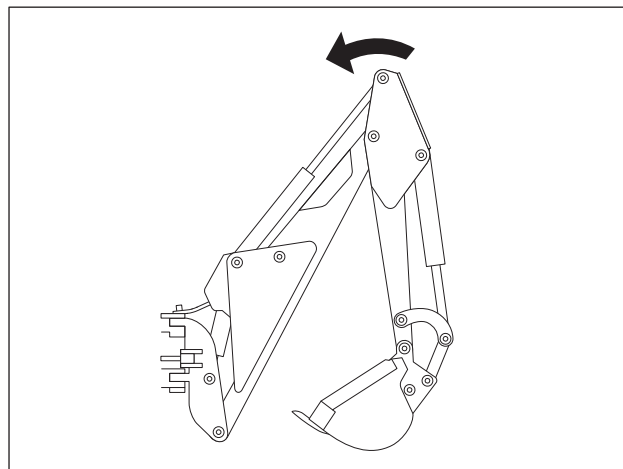


Backhoe_Dig.eps

1. Clear the area around the machine of all bystanders.
2. Raise stabilizers enough to clear ground.
3. Ensure ground drive direction control is in neutral.
4. Move attachment direction/speed control to neutral position.
5. Move ground drive speed hand control to neutral position.
6. Use remote ground drive switch to move unit.
7. Lower stabilizers.

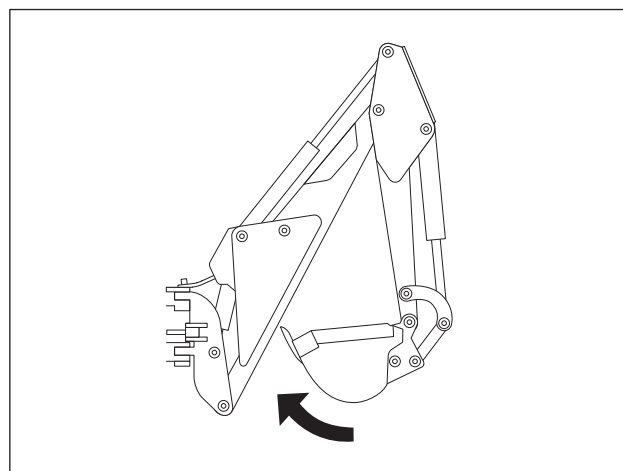
Finish Job

1. Raise stabilizers fully to engage latch.
2. Return remote throttle to low.
3. Lift boom while keeping dipper pointed at ground (shown).



Backhoe_Stow_Boom.eps

4. Curl bucket closed and move dipper fully toward boom (shown).
5. Lift boom to highest position and latch stow lock.
6. Lower boom slightly to engage lock.
7. Engage swing lock. See page 55.



Backhoe_Stow_Bucket.eps

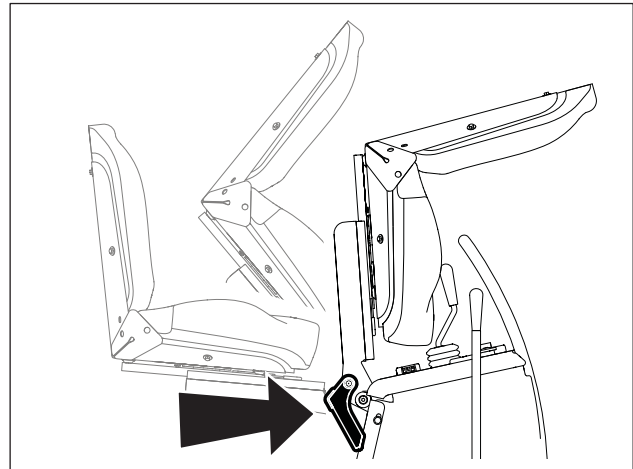
IMPORTANT: For tractor to function once operator has returned to operator station, stabilizers must be raised, remote throttle must be set at low, and boom must be stowed and locked. See "Remote throttle enable" on page 54.

RT105M Operator's Manual

Finish Job

Backhoe - 93

8. Rotate seat into stowed position and engage seat lock (shown).
9. Drive a short distance away from work site.
10. Shut down tractor. See page 77 for proper shutdown procedures.



Backhoe_Seat_32016.eps



Trench

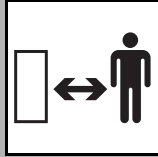


Chapter Contents

Set Up.	96
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Set Up

EMERGENCY SHUTDOWN - Turn ignition switch to STOP.



⚠ WARNING

Crushing weight could cause death or serious injury. Stay away.

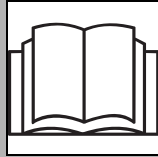
To help avoid injury: Use attachments or counterweights to make front and rear loads balance when all attachments are raised. Contact your Ditch Witch® dealer about counterweighting for your equipment.



⚠ 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. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

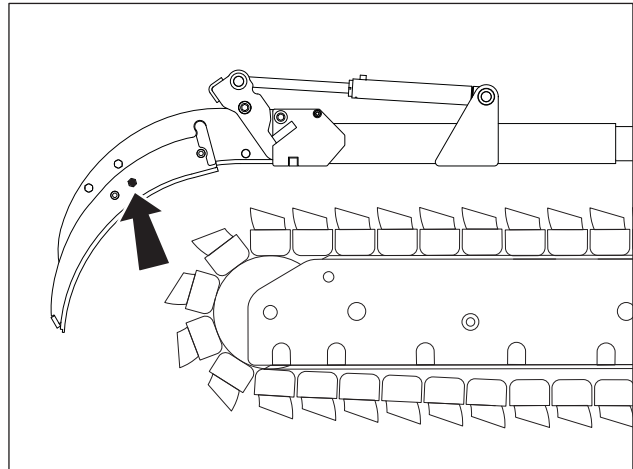
RT105M Operator's Manual **Set Up**

Trench - 97

1. If using optional trench cleaner, remove bolt installed for transport (shown).
2. Fasten and adjust seat belt.
3. Start tractor. See page 74 for start-up procedures.
4. Drive to starting point. Move in line with planned trench. See page 75 for driving procedures.

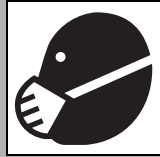
IMPORTANT:

- When cutting asphalt, start trench in soil at edge of road and use shortest possible boom at full depth.
- Sight along center of hood to a stake driven beyond end of trench line for straight trench.
- For optimal spoils delivery, adjust the auger positions forward or backward to accommodate terrain and digging depth.



5. Set parking brake and verify parking brake indicator is on.
6. Ensure gearbox shift control is in low to dig. See "Gearbox shift control" on page 43.
7. Tilt steering wheel column up.
8. Turn seat to desired position.
9. Lower boom to just above ground.
10. Check that attachment direction/speed control is in neutral.
11. Check that boom is in line with planned trench.
12. Lower backfill blade to reduce shock when trenching begins.

Operate

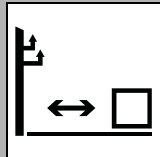


CAUTION

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.

To help avoid injury:

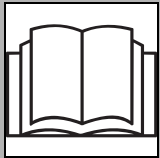
- Use water spray or other means to control dust.
- Refer to U.S. Department of Labor Occupational Safety and Health Administration guidelines to learn more about appropriate breathing protection and permissible exposure limits.



DANGER

Electric shock will cause death or serious injury. Stay away. 274-049

To help avoid injury: Expose lines by hand before digging. Cutting high voltage cable can cause electrocution.



WARNING

Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475



CAUTION

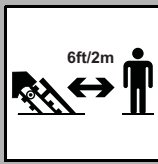
Flying objects thrown by machine may strike people. Wear hard hat and safety glasses. 275-193

RT105M Operator's Manual

Operate

Trench - 99

1. Move attachment speed/direction control to desired speed. DIGGING CHAIN WILL MOVE.



Moving digging teeth can kill. Trench cave-in can cause you to fall. Stay away. 275-097, 270-6900

To help avoid injury:

- Ensure parking brake is set.
- Allow 3' (1 m) between digging teeth and obstacle. Machine might jerk when digging starts.
- Keep everyone at least 10' (3 m) from machine, attachments, and their range of movement.

2. Set throttle to full engine speed.
3. Lift trench cleaner, if equipped.
4. Slowly lower digging boom to desired trench depth.
5. Raise backfill blade, if equipped.
6. Release parking brake.
7. If using trench cleaner:
 - Use ground drive hand control to move forward about 1' (30 cm), or until there is enough room for trench cleaner to enter trench.
 - Return ground drive control to neutral to stop forward movement.
 - Raise boom slightly, then fully lower trench cleaner to lock it in place.
 - Lower boom to desired trench depth.

NOTICE:

- Do not have trench cleaner in working position when starting a trench.
- Do not back up with trench cleaner in working position.

8. Move ground drive hand control to desired speed. Always start trenching with ground drive speed set at low. Increase ground drive speed only as soil conditions permit.
9. Operate engine at full throttle when working.

NOTICE:

- 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 set parking brake.



Finish Job

1. When trench is complete, move ground drive hand control to neutral.
2. Adjust throttle to low.
3. Raise boom.
4. As boom clears top of trench, move attachment direction/speed control to neutral.
5. Raise trench cleaner, if equipped.
6. Return seat to the drive position.
7. Tilt steering wheel column down.
8. Disengage axle lock. After disengaging axle lock, drive tractor in reverse 6' (2 m) to fully disengage.
9. Drive a short distance away from work site.
10. Shut down tractor. See page 77 for proper shutdown procedures.
11. Stow trench cleaner.

Drill

Chapter Contents

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- Dig Approach Trench 102
- Dig Target Trench 103
- Install Drill String 103

Operate 104

- Drill 105
- Start Bore with Drill String Guide. 106
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- Install Product 109
- Remove Rod 110

Finish Job 112

- Disassemble Drill String 112
- Remove Drilling Attachment 112



Set Up

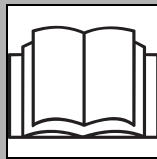
EMERGENCY SHUTDOWN - Turn ignition switch to STOP.



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.
- Set up warning barriers and keep people away from machine and jobsite.
- Do not operate drilling attachment if bore path is less than 10' (3 m) from any underground hazard.



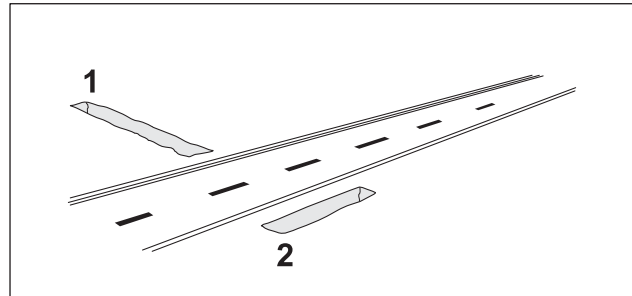
WARNING Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

Dig Approach Trench

1. Mark planned bore path and all located utility lines with flags or paint.
2. Dig an approach trench (1) along the intended bore path.

IMPORTANT: Ensure that approach trench is:

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



Drill_Attchmnt_Prep_Job.eps

Dig Target Trench

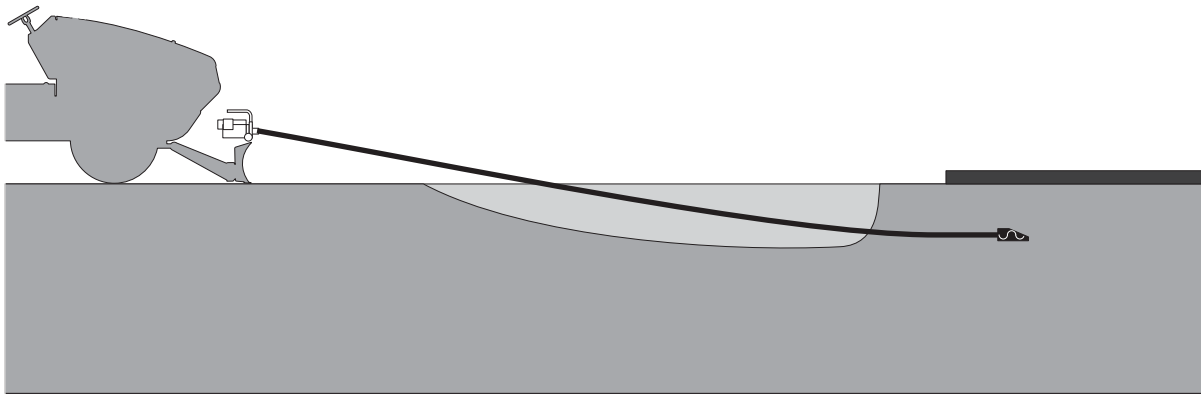
1. Select a completion point for the bore.
2. Dig a target trench (2) **across** the intended completion point.

IMPORTANT: Ensure that target trench is:

- deep enough for drill bit to enter slightly above the trench floor, and
- long enough to allow for drift of unguided drill string. Accuracy of bore decreases with length and varies with soil conditions.



Install Drill String



DrillRod_Trencher

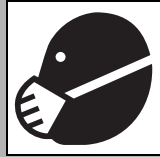
1. Assemble at least 20' (6 m), but not more than 30' (9 m), of drill rod sections.
2. Install drill bit to the cutting end of the drill string.
3. Put drill string in approach trench and align with intended bore path.

NOTICE: Incorrect installation can cause rod sections to bend.

- Ensure more than half of drill string length is inside trench.
- If necessary, remove rod sections or increase length of trench.

4. Start engine and set to low throttle. See "Start Unit" on page 74.
5. Lower boom in parallel position to ground.
6. Move machine toward approach trench. See "Drive" on page 75.
7. Shut down engine. See "Shut Down" on page 77.
8. Install drilling attachment to backfill blade.
9. Connect hydraulic lines.

Operate

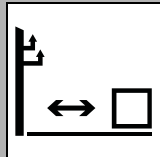


CAUTION

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.

To help avoid injury:

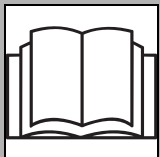
- Use water spray or other means to control dust.
- Refer to U.S. Department of Labor Occupational Safety and Health Administration guidelines to learn more about appropriate breathing protection and permissible exposure limits.



DANGER

Electric shock will cause death or serious injury. Stay away. 274-049

To help avoid injury: Expose lines by hand before digging. Cutting high voltage cable can cause electrocution.



WARNING

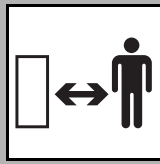
Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475



CAUTION

Flying objects thrown by machine may strike people. Wear hard hat and safety glasses. 275-193

Drill



Rotating shaft will cause death or serious injury. Stay away.

To help avoid injury:

- Keep everyone at least 10' (3 m) away from drill string and machine.
- Wear close-fitting clothing and personal protective equipment.

1. If necessary, have helper use drill string guide to align drill string as it enters the soil. See "Start Bore with Drill String Guide" on page 106.
2. Start engine and set to low throttle.
3. Operate drilling attachment controls to start clockwise rotation.
4. Slowly move machine forward while maintaining rotation. See "Drive" on page 75.
 - When length of bore is more than 5' (1.5 m), you may carefully and slowly increase speed.
 - Always use lowest speed necessary.
5. Carefully monitor progress of bore:
 - If rod section starts to bow, stop forward movement of machine and back machine slightly until rod straightens.
 - If drill string becomes blocked, rotate drill string counterclockwise.

NOTICE: Incorrect drilling will damage drilling equipment.

- Do not drill too quickly. Drilling bit will drift off course and rod sections may bow or break.
- Do not drill with bent rod section.

6. When drill bit enters target trench, stop rotation immediately.

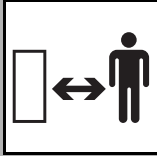
IMPORTANT: After initial bore is complete, backream to enlarge bore or pull drill string to install product.

- See "Backream" on page 108.
- See "Install Product" on page 109.



Start Bore with Drill String Guide

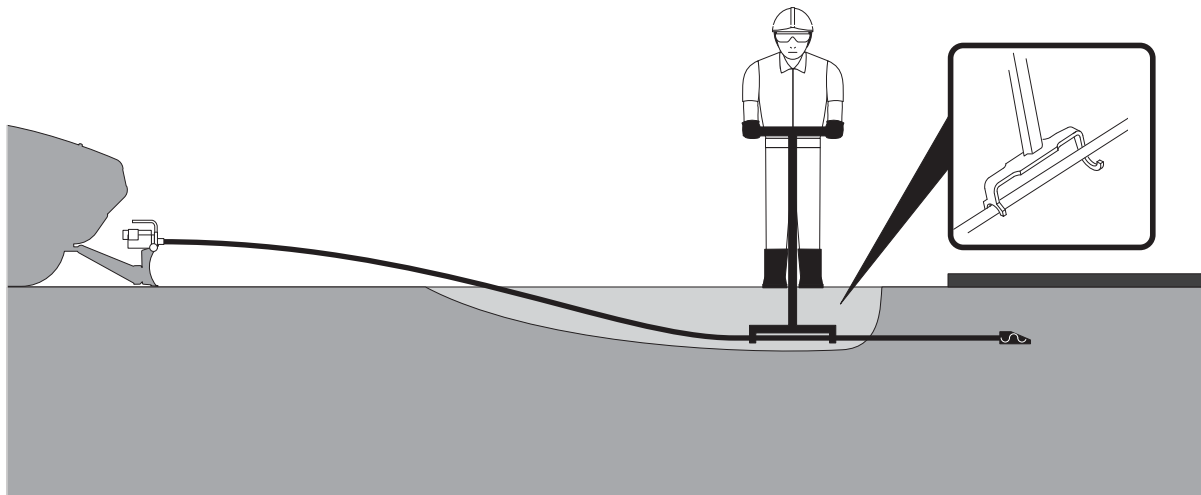
If necessary, have helper follow the instructions below to operate the drill string guide at start of bore.



Rotating shaft will cause death or serious injury. Stay away.

To help avoid injury:

- Use only the approved Ditch Witch® drill string guide (p/n 118-079).
- Do not straddle trench or drill string.
- Do not enter trench.
- Keep hands and feet away from drill string and drilling attachment.
- Do not use drill string guide during backreaming or when drill string is being pulled back.
- Only use drill string guide on left side of approach trench.

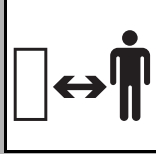


DrillRod_Trencher2

1. Stand on **left** side of approach trench.
2. Put drill string guide in correct position:
 - at least 3' (1 m) behind drill bit
 - hook side toward bore
 - cradle side toward machine
3. When drill string guide is in correct position, signal machine operator to start bore.
4. Use drill string guide to control the first 5' (1.5 m) of the bore path.
5. When length of bore is 5' (1.5 m), have machine operator stop machine.
6. When drill string has stopped, remove drill string guide and leave area.

Add Rod

If more length is needed, ask a helper to add a rod section.



⚠ DANGER Rotating shaft will cause death or serious injury. Stay away.

To help avoid injury: Only access drilling attachment with hands when engine is shut down.

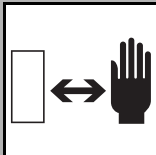


Disconnect Drill String from Drilling Attachment

1. Stop rotation of drilling attachment.
2. Operate ground drive controls to move machine in reverse 6" (15 cm) to loosen drill string in ground.
3. Shut down tractor. See page 77 for proper shutdown procedures.
4. Disconnect drill string from drilling attachment with special tool (p/n 351-272). See "Disassemble Drill String" on page 112.
5. Start tractor. See page 74 for start-up procedures.
6. Use ground drive foot control to move in reverse 1' (30 cm), about the length of a rod section.

Add Rod Section

1. Shut down tractor.
2. Have helper connect new rod section to drilling attachment.
3. Start tractor and set engine to low throttle.
4. Slowly move machine forward until new rod section and drill string are about 1' (30 cm) apart.
5. Have helper lightly hold new rod section and drill string so that they are aligned.



⚠ WARNING Pinch point. Crushing will cause serious injury.

To help avoid injury:

- Keep hands at least 6" (15 cm) from ends of rod section and drill string.
- Support rods from underneath with open palms. Do not grip rods.

6. Rotate drilling attachment to align slip latches of new rod section and drill string.
7. Move unit forward slowly. As soon as new rod section and drill string are connected, have helper move hands clear.
8. Slightly move forward until the slip latch connection is correctly latched.

Backream

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

NOTICE: Incorrect use may damage components and increase wear.

- Do not try to increase hole size too much in one pass. Make several passes using successively larger reamers.
- Keep drill string straight and aligned with drilling attachment. Sharp bends can cause rod failure.
- Never have more than 30' (9 m) of exposed rod outside the bore. Remove rods as necessary. See "Remove Rod" on page 110.

Single Pass

1. Shut down tractor. See page 77 for proper shutdown procedures.
2. Remove drill bit and install appropriate reamer.
3. Start tractor and begin clockwise rotation. See page 74 for start-up procedures.

IMPORTANT: Always rotate clockwise during backreaming. Rotate counterclockwise only if drill bit or reamer is blocked in bore.

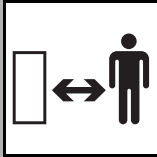
4. Slowly drive in reverse while maintaining rotation. See page 75 for proper driving procedures. When reamer exits the approach trench, stop rotation immediately.

Multiple Passes

1. Repeat steps 1-5.
2. Install drill bit.
3. Push drill string through bore. Do not rotate.
4. At final pass, install product. See "Install Product" on page 109.

Install Product

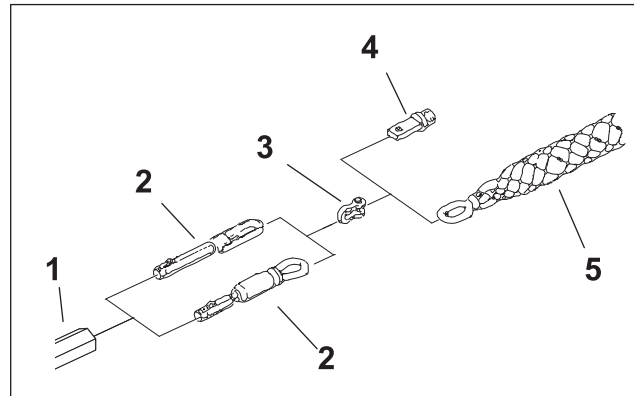
To install product, pull it through the bore after drilling or final pass of backreaming.



Rotating shaft will cause death or serious injury. Stay away.

To help avoid injury: Ensure no one is in target trench or near product being installed. If swivel malfunctions, material can rotate.

1. Install appropriate swivel (2) to drill string (1) or reamer. Ensure swivel functions correctly.
2. Use shackle (3) to attach pipe pulling adapter (4) or pulling grip (5) to swivel.
3. Attach material to pipe pulling adapter or pulling grip.
4. Set engine to low throttle.
5. Slowly drive in reverse. See page 75 for proper driving procedures.



RW_PullingTools.eps

IMPORTANT:

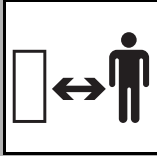
- If bore becomes blocked begin counterclockwise rotation.
- If length of rod outside the bore reaches 30' (9 m), remove rod section. See "Remove Rod" on page 110.

6. When product exits approach trench, stop machine immediately.



Remove Rod

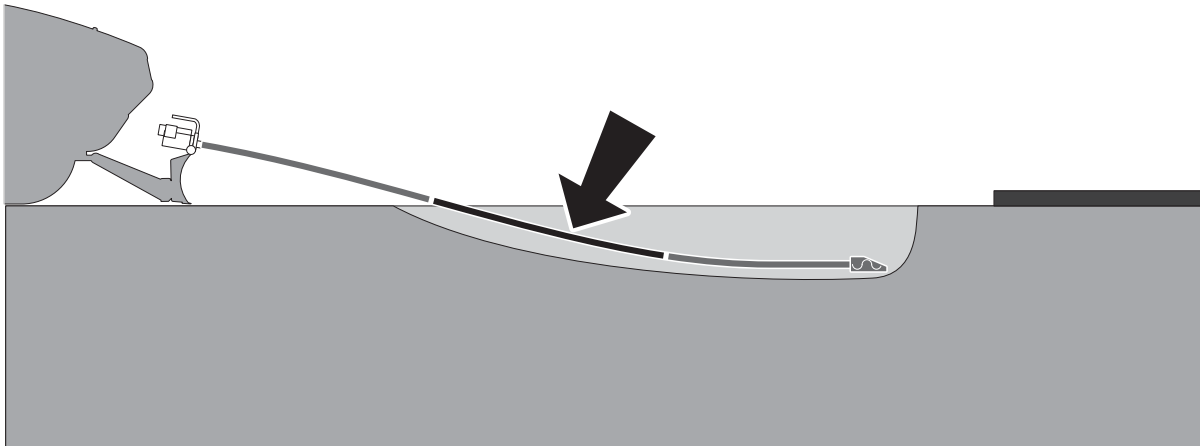
If the length of rod outside the bore reaches 30' (9 m), ask a helper to remove rod sections as needed.



Rotating shaft will cause death or serious injury. Stay away.

To help avoid injury:

- Only access drill string with hands when tractor is shut down.
- Always remove second rod (as shown). Leave first rod section attached to drilling attachment.



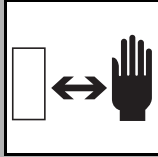
DrillRod_RemoveRod.eps

Remove Rod Section

1. Stop rotation of drilling attachment.
2. Shut down tractor. See page 77 for proper shutdown procedures.
3. Disconnect and remove appropriate rod section with special tool (p/n 351-272). See "Disassemble Drill String" on page 112.

Reconnect Drill String

1. Start tractor and set to low throttle.
2. Slowly move machine forward until attached rod section and drill string are about 1' (30 cm) apart.
3. Have helper lightly hold attached rod section and drill string so that they are aligned.



Pinch point. Crushing will cause serious injury.

To help avoid injury:

- Keep hands at least 6" (15 cm) from ends of rod section and drill string.
- Support rods from underneath with open palms. Do not grip rods.

4. Rotate drilling attachment to align slip latches of new rod section and drill string.
5. Move unit forward slowly. As soon as new rod section and drill string are connected, have helper move hands clear.
6. Slightly move forward until the slip latch connection is correctly latched.



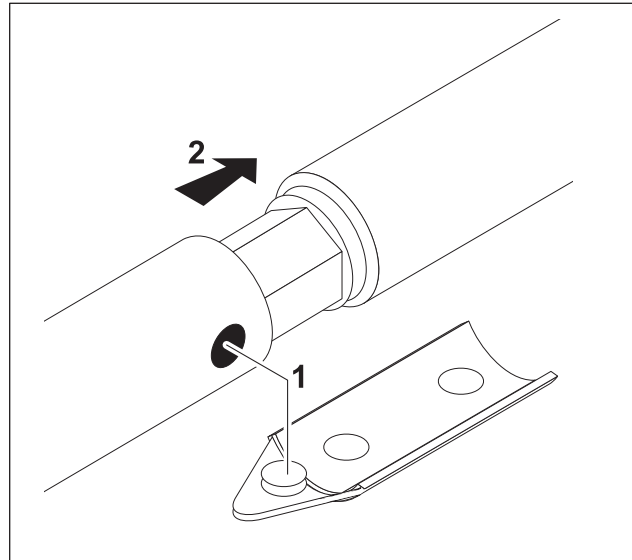
Finish Job

Disassemble Drill String

1. Shut down tractor.
2. Disconnect drill string from drilling attachment.
3. Remove drill bit.
4. Disconnect sections:
 - Press tab through hole in female side of joint (1) using special tool (p/n 351-272).
 - Pull rod sections apart (2).

Remove Drilling Attachment

1. Disconnect hydraulic hoses if necessary.
2. If desired, remove drilling attachment from backfill blade.



Drill_Attchmnt_RodJoints.eps

Systems and Equipment

Chapter Contents

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- Chain Types 114
- Chain Selection 115

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- BH120 Backhoe 116
- CT100M/DT100M Trencher 116

Counterweighting 116



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 137.
- 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

RT105M Operator's Manual

Chain, Teeth, and Sprockets

Systems and Equipment - 115

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.

RT105 Tractor

Equipment	Description
backup alarm	for use with low visibility situations
light kit	mounts to ROPS and includes work lights and hazard light
cab	enclosed, climate-controlled cab
suspension seat	adjustable self-contained suspension

BH120 Backhoe

Equipment	Description
bucket width	12-24" (305-610 mm) buckets available

CT100M/DT100M 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

Counterweighting

Attachment	Counterweight required
CT100M trencher	1300 lb (590 kg) nose weight + 500 lb (227 kg) side weight required.
	BH120 backhoe + 250 lb (113 kg) TBS in each rear tire required.
DT100M trencher	BH120 backhoe + no additional counterweight required.

Complete the Job

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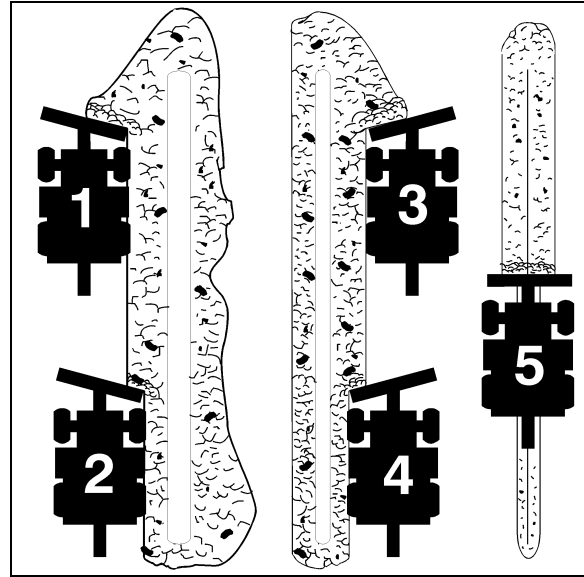


Restore Jobsite

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.
- Ensure all mud and debris is rinsed from operator's station floor.
- Ensure all mud and debris is rinsed from wheels before parking unit overnight.

Stow Tools

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

Service

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- Washing Precaution 120
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- Exhaust Cleaning 125

10 Hour 126

50 Hour 137

100 Hour. 142

250 Hour 143

500 Hour 146

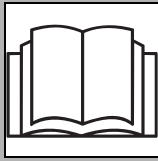
1000 Hour 148

2000 Hour. 152

As Needed 154



Service Precautions



⚠ WARNING

Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

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.
- Lower unstowed attachments to ground before servicing equipment.
- Wear personal protective equipment.

Welding Precaution

NOTICE: Welding can damage electronics.

- Disconnect battery at battery disconnect switch, or disconnect battery cables before welding to prevent damage to battery.
- Do not turn off battery disconnect switch with engine running or alternator and other electronic devices may be damaged.
- Welding currents can damage electronic components. Always disconnect the ECU ground connection from the frame, harness connections to the ECU, and other electronic components prior to welding on machine or attachments. Connect welder ground close to welding point and ensure no electric components are in the ground path.

Washing Precaution

NOTICE: Water can damage electronics. When cleaning equipment, do not spray electrical components with water.

Changing Attachments

The RT105 is programmed to operate with the original attachment configuration. If you change attachments, contact your Ditch Witch® dealer to ensure the electronic programming is updated. If you change attachments without updating the electronic programming, your attachment may not function correctly.

Recommended Lubricants/Service Key

Item	Description		
 T4 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.		
 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)		
 PTF	Powershift transmission fluid: Phillips 66® Torque Fluid high-performance, multipurpose, heavy-duty torque converter fluid for use in off-highway powershift transmissions		
 THF	Tractor hydraulic fluid, similar to Phillips 66 PowerTran™ Fluid, Mobilfluid® 423, Chevron® Tractor Hydraulic Fluid, Texaco® TDH Oil, or equivalent		
 DEAC	Diesel engine Antifreeze/Coolant meeting ASTM specification D6210		
	Check level of fluid or lubricant		
	Filter		Check condition
	Adjust, service or test		Change or replace

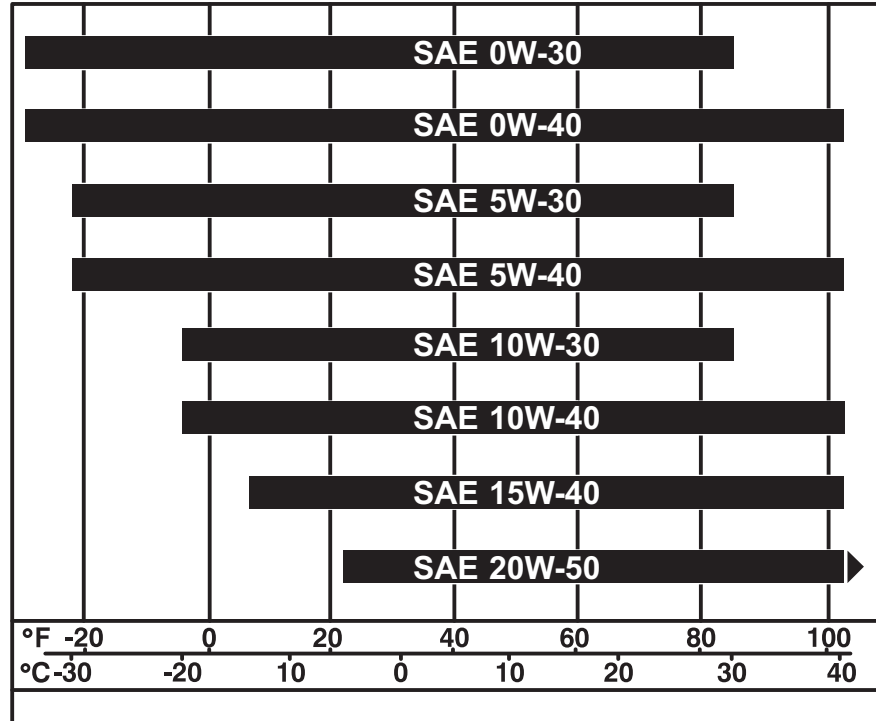


Proper lubrication and maintenance protects Ditch Witch® equipment from damage and failure. Service intervals listed are for minimum requirements. In extreme conditions, service machine more frequently. Use only genuine Ditch Witch parts, filters, approved lubricants, TJC, and approved coolants to maintain warranty. Fill to capacities listed in “Fluid Capacities” on page 166.

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

IMPORTANT: Use the “Service Record” on page 223 to record all required service to your machine.

Engine Oil Temperature Chart



t37om047w.eps

Recommended oil weight based on ambient temperature range anticipated before next oil change

Approved Coolant

This unit was filled with coolant meeting Deutz® DQC CB-14 before shipment from factory. Add or replace only with coolant meeting this specification. This coolant is available, pre-diluted, from your Ditch Witch® dealer as part number 255-1053. Contact your Deutz service partner for a full list of approved coolants meeting DQC CB-14. In an emergency, non-Deutz approved, heavy duty diesel engine coolant meeting ASTM D6210 may be used. Change to DQC CB-14 coolant as soon as practical.

NOTICE:

- Use only pre-diluted coolant or concentrated coolant mixed with distilled water. Do not use tap water.
- Do not use water or high-silicate automotive-type coolant. This will lead to engine damage or premature engine failure.
- Do not mix heavy-duty diesel engine coolant and automotive-type coolant. This will lead to coolant breakdown and engine damage.

Approved Fuel



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.



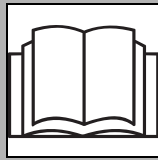
Tier 4 Engine (U.S., Canada, EU, and Japan)

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.

Diesel Exhaust Fluid (DEF)



⚠ WARNING Read operator's manual. Follow safety rules and know how to use all controls. Your safety is at stake. 273-475

To help avoid injury:

- Diesel exhaust fluid is corrosive. Avoid spills. If spill occurs wipe clean immediately.
- Avoid contact with skin. If contact occurs, rinse with water immediately.
- Avoid contact with eyes. If contact occurs, seek medical help immediately.
- Avoid ingestion. If ingested, seek medical help immediately.

This engine requires diesel exhaust fluid (DEF) to meet emission regulations. Use only high quality DEF meeting ISO 22241-1 or DIN 70070 requirements. Running this engine without DEF will increase exhaust emissions and cause engine to derate. Do not dilute or contaminate DEF or substitute other fluids. Tampering with the DEF system will increase exhaust emissions and cause the engine to derate.

DEF has other common names such as Urea, AUS 32, AdBlue, NOx Reduction Agent, and Catalyst Solution.

DEF freezes at 11.3°F (-11.5°C) but the system is designed to prevent freezing during normal operation. If DEF freezes in the tank when the engine is shut down, the system will quickly thaw DEF when engine is started.

DEF has a limited shelf life. In ideal conditions, minimum expected shelf life is 18 months. At temperatures higher than 90°F (32°C), DEF will degrade more rapidly. Do not store in direct sunlight.

Storage and transfer equipment must be compatible with DEF. Most materials (especially hoses) are not compatible and will degrade and contaminate DEF. Never use contaminated DEF. Containers made of polyethylene or polypropylene are recommended.

This machine will consume DEF at a rate between 2 and 3% of diesel consumption. Many factors affect consumption rate, but a good rule of thumb is to fill the DEF tank every other time the diesel tank is filled.

Exhaust Cleaning

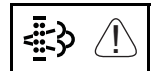
IMPORTANT: See "Exhaust Cleaning" on page 42.

This engine has a Selective Catalytic Reduction (SCR) system that uses a small amount of DEF to convert NOx emissions in the exhaust into nitrogen and water. The SCR system may require periodic cleaning.

Sensors in the engine monitor the exhaust status. When a cleaning cycle is needed, the system will create the following pop-up message: "Exhaust cleaning needed soon. Failure to clean will result in power loss. Park unit away from combustible materials, set engine to low throttle, set parking brake, and activate cleaning process through the main menu." The exhaust cleaning icon will also flash. An operator may choose to hide and ignore this message. If so, the icon will continue to flash and the message will reappear after fifteen minutes.



If the operator continues to ignore the cleaning request, a second pop-up message will appear with the following message: "Exhaust cleaning needed. Failure to clean will result in severe power loss and engine service. Engine power reduced by 25%. Park unit away from combustible materials, set engine to low throttle, set parking brake, and activate cleaning process through the main menu." The exhaust cleaning icon will flash and the engine caution icon will appear. An operator may choose to hide and ignore this message. If so, the icons will continue to display and the message will reappear after five minutes.



If the operator continues to ignore the cleaning request, a third pop-up message will appear with the following message: "Exhaust service required. Engine derating activated. Exhaust cleaning request ignored. Contact Deutz® service." The exhaust cleaning and the engine stop icons will flash. An operator may choose to hide and ignore this message. If so, the icons will continue to display and the message will reappear after one minute.



Once the operator starts the exhaust cleaning cycle, adjusting the throttle or releasing the parking brake will terminate the cycle. A typical cycle will take approximately 35 minutes. A pop-up message will display the remaining time in the cycle. The high exhaust temperature icon may also light.

The frequency of exhaust cleaning is dependent upon working conditions. In general, operating in hotter conditions and higher loads will lengthen the time between cleaning cycles. The engine monitors the elapsed time since the previous cleaning and will request a cleaning when that time reaches 1050 hours.



10 Hour

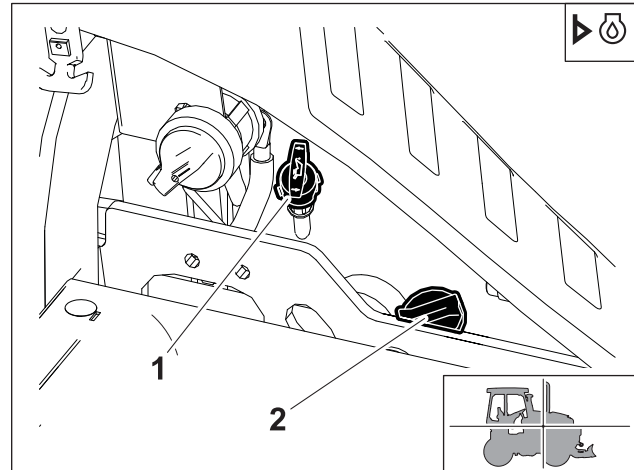
Location	Task	Notes
TRACTOR	Check engine oil level	DEO
	Check hydraulic fluid level and reservoir cap	THF
	Check hydraulic hoses	
	Check coolant level	DEAC
	Check transmission fluid level	PTF
	Check radiator	
	Clean dust ejector valve	
	Check tire pressure and lugnuts	
TRENCHER	Lube trencher tail roller	EPG
	Lube trencher pivot stub	EPG
	Lube trencher auger bearings	EPG
	Lube trencher auger sleeve	EPG
	Check trencher auger bolts	
	Check boom mounting bolts	250 ft•lb (339 N•m)
	Check attachment mounting bolts	200 ft•lb (271 N•m)
	Check personnel restraint bar position	400 ft•lb (542 N•m)
	Check trench cleaner position (if equipped)	350 ft•lb (475 N•m)
	Check personnel restraint bar/trench cleaner bolts	400 ft•lb (542 N•m)
	Check digging chain	
	Check digging chain tension	

Tractor

Check Engine Oil Level

IMPORTANT: See "Recommended Lubricants/Service Key" on page 121.

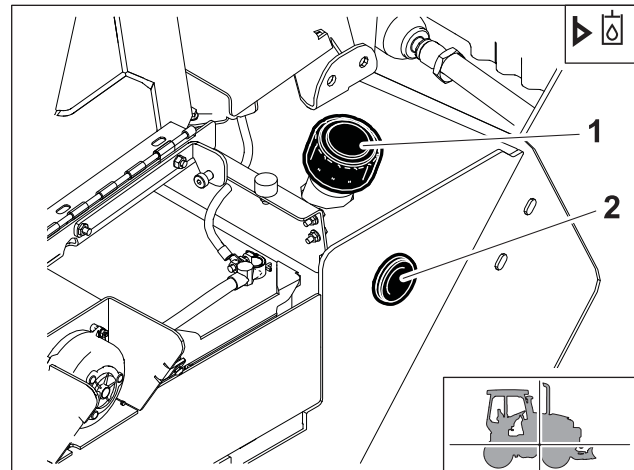
Check engine oil at dipstick (1) before operation and every 10 hours thereafter. Add DEO at fill (2) as necessary to keep oil level at highest line on dipstick.



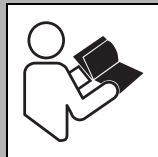
Check Hydraulic Fluid Level and Reservoir Cap

With frame level, check fluid at sight glass (2) every 10 hours. Maintain fluid level on midway point on sight glass. Add THF at fill (1) as needed.

Check hydraulic reservoir cap (1) every 10 hours. Clean as needed.



Check Hydraulic Hoses

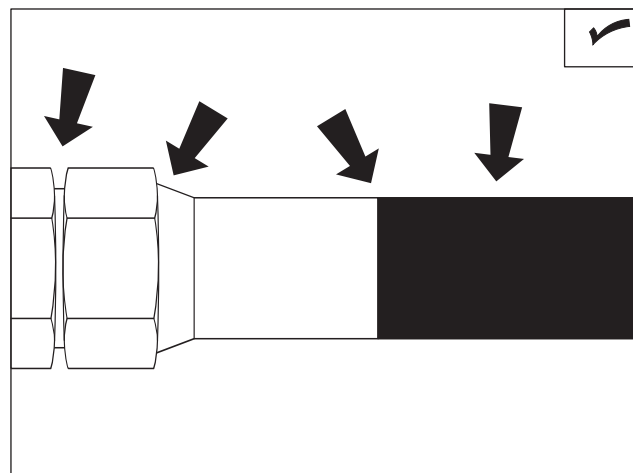


⚠ WARNING Pressurized fluid or air could pierce skin and cause severe injury. Refer to operator's manual for proper use.

To help avoid injury:

- Use a piece of cardboard or wood, rather than hands, to search for leaks.
- Wear protective clothing, including gloves and eye protection.
- 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 lines are undamaged.
- If you are injured, seek immediate medical attention from a doctor familiar with this type of injury.

Check all hydraulic hoses every 10 hours.

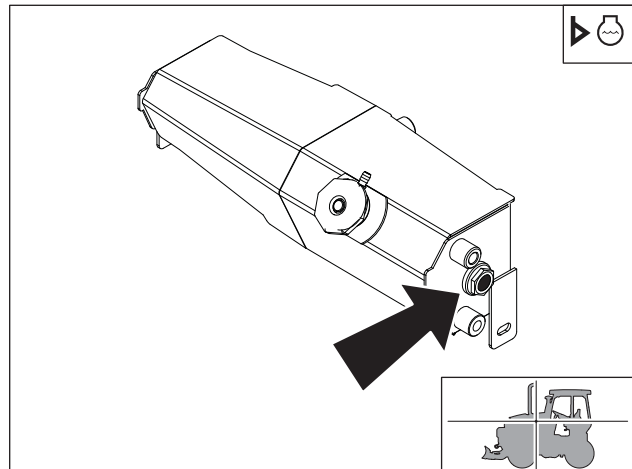


CheckHoses.eps

Check Coolant Level

Check coolant level, with engine cool and unit on level ground, at sight glass (shown) of expansion tank every 10 hours. Maintain coolant level so that coolant is visible in sight glass and no higher than bottom of fill neck. If low, add approved coolant. Do not overfill.

IMPORTANT: See "Approved Coolant" on page 123 for more information.



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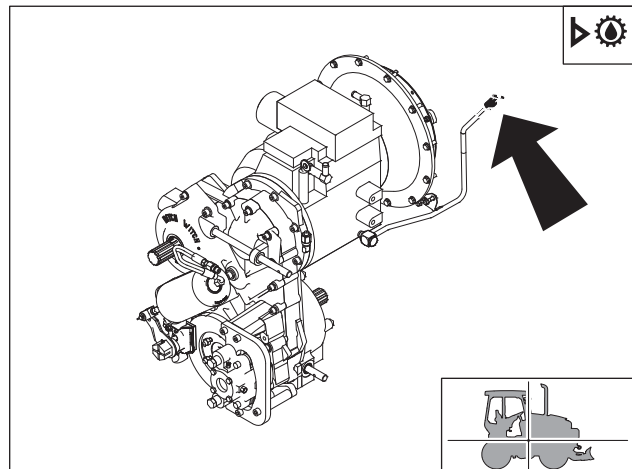
Check Transmission Fluid Level

NOTICE:

- Transmission damage can occur if fluid is not maintained to the correct level.
- See "Recommended Lubricants/Service Key" on page 121 for more information.

Check transmission fluid level at dipstick (1) every 10 hours. 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.



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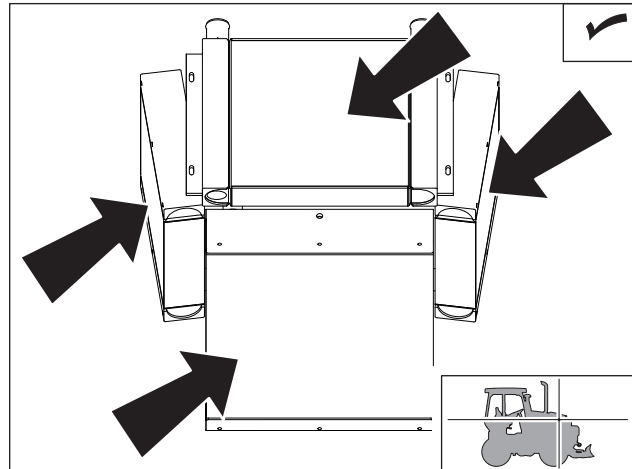
IMPORTANT:

- 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.



Check Radiator

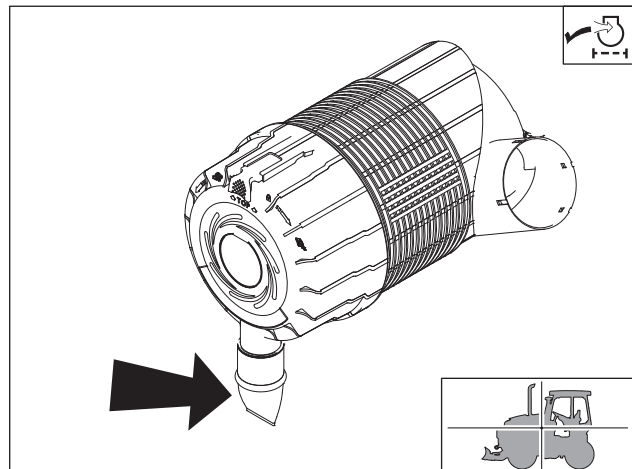
Check radiator for dirt and debris every 10 hours. Clean with compressed air or spray wash as needed. See "Clean Radiator" on page 154.



t50om009h.eps

Clean Dust Ejector Valve

Check dust ejector valve (shown) every 10 hours of operation. Ensure that valve is not inverted, damaged, plugged, or cracked.



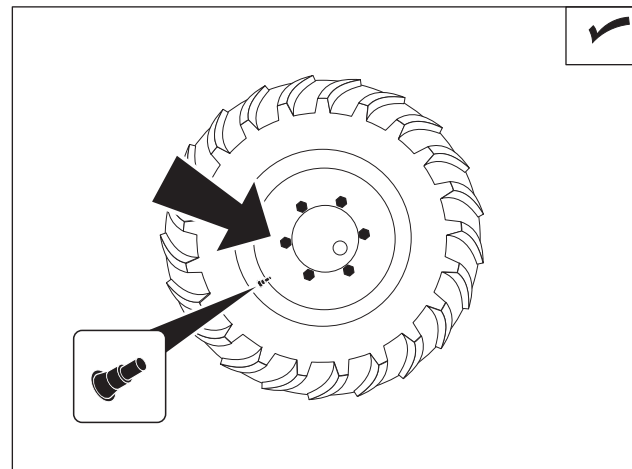
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Check Tire Pressure and Lugnuts

Check tire pressure every 10 hours.

Tire option	Maximum pressure
38 x 18.00-20 16-ply	75 psi (5.2 bar)

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

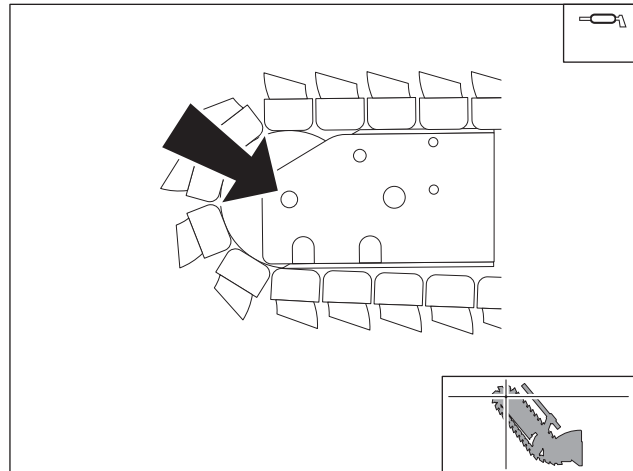


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Trencher

Lube Trencher Tail Roller

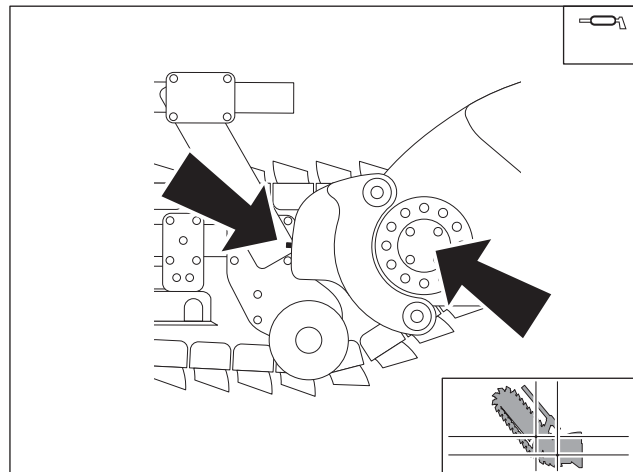
Wipe zerks clean and lube every 10 hours with EPG. Lube roller zerks on both sides of boom.



t30om049h.eps

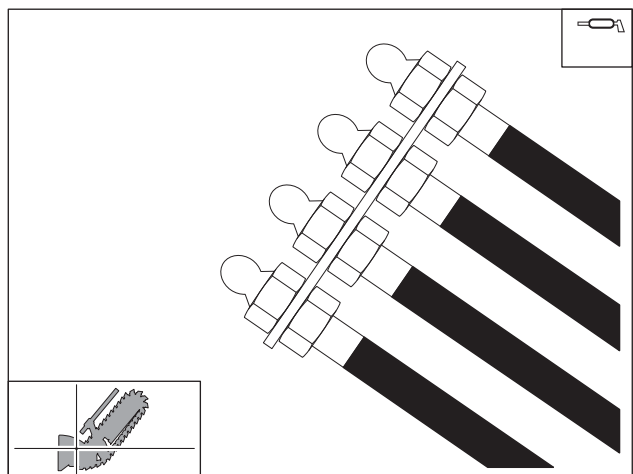
Lube Trencher Pivot Stub

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



t30om050h.eps

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

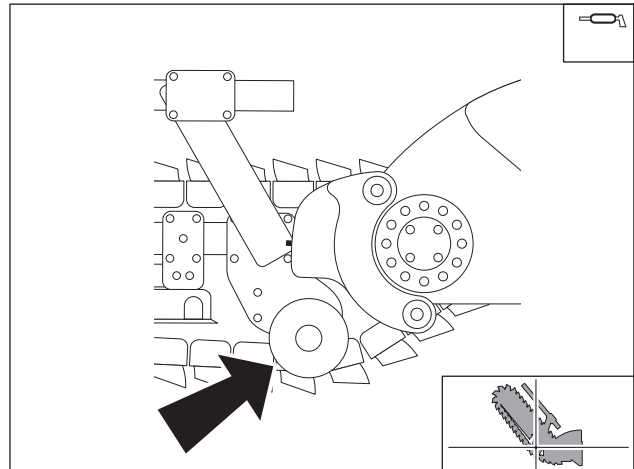


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Lube Trencher Auger Bearings

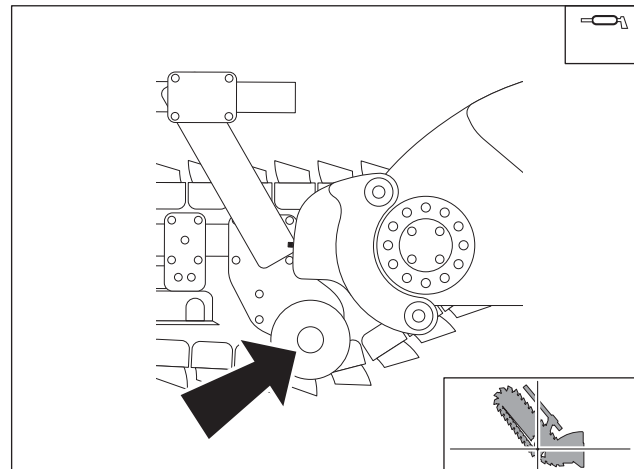
Lube two auger bearing zerks (one on each side) every 10 hours with EPG.



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Lube Trencher Auger Sleeve

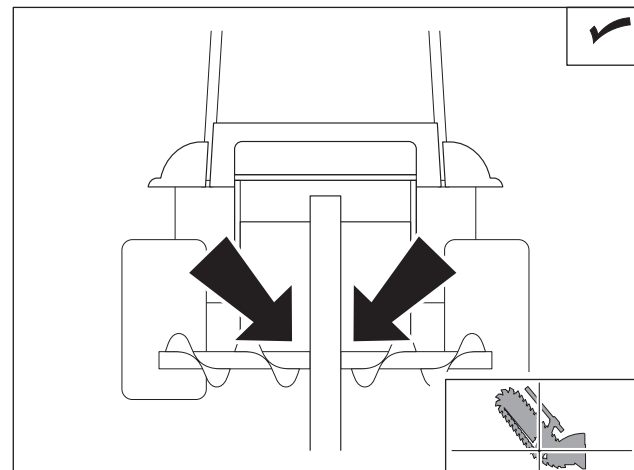
Lube four auger shaft zerks (two on each side) every 10 hours with EPG.



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.



t30om054h.eps

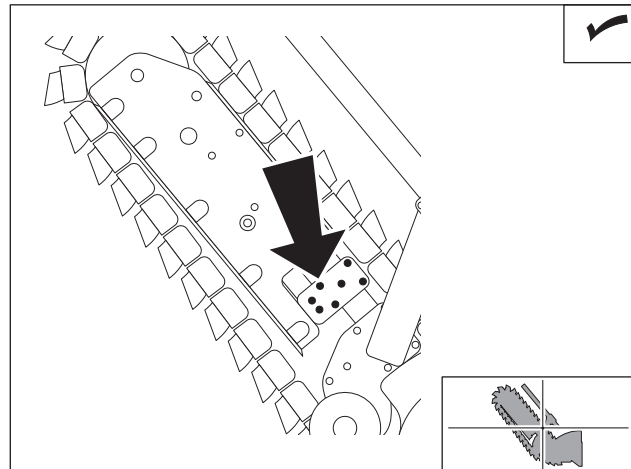
RT105M Operator's Manual

10 Hour

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Check Boom Mounting Bolts

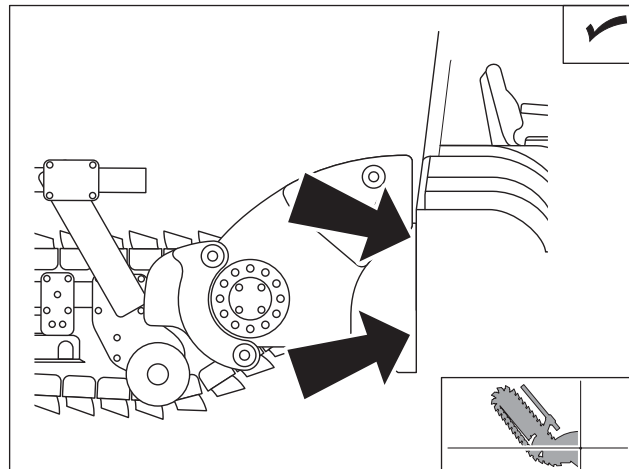
Check 14 bolts (7 on each side) every 10 hours and tighten as necessary to keep bolts and other fasteners tight. Check for looseness or wear. Check that bolts are tightened to 250 ft•lb (28 N•m).



t30om056h.eps

Check Attachment Mounting Bolts

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).

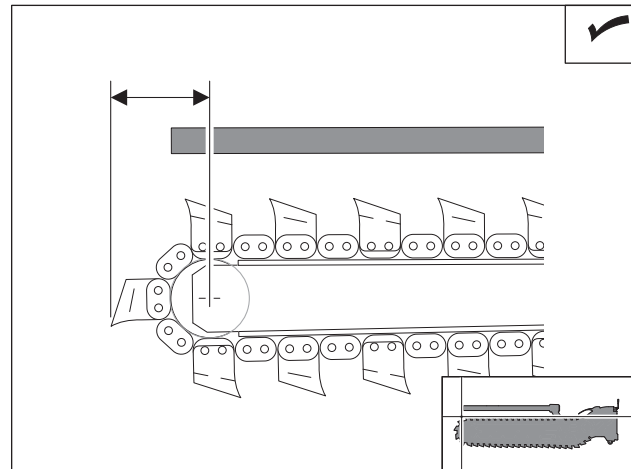


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Check Restraint Bar Position

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.



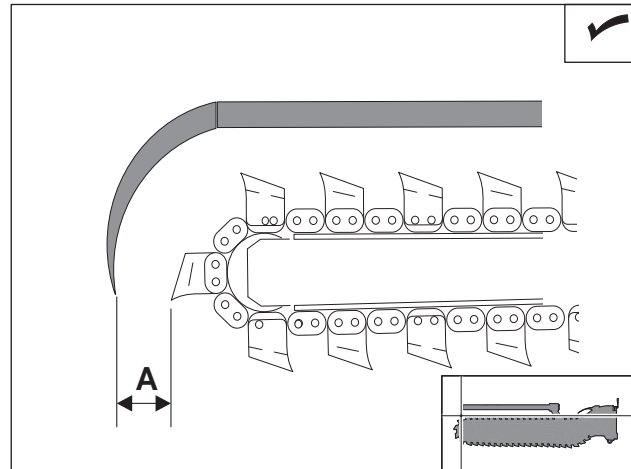
t33om89w.eps



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.

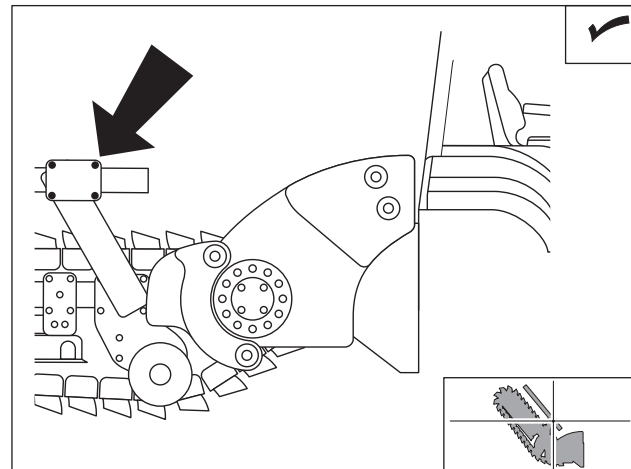


t330m90w.eps

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).



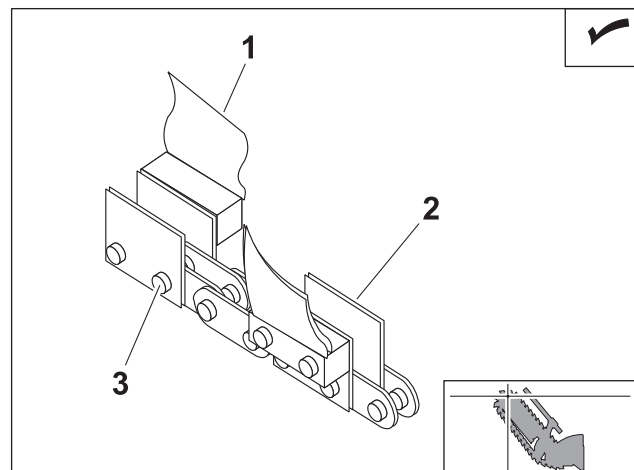
t330m058h.eps

Check Digging Chain

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

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.

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.



t330m055h.eps

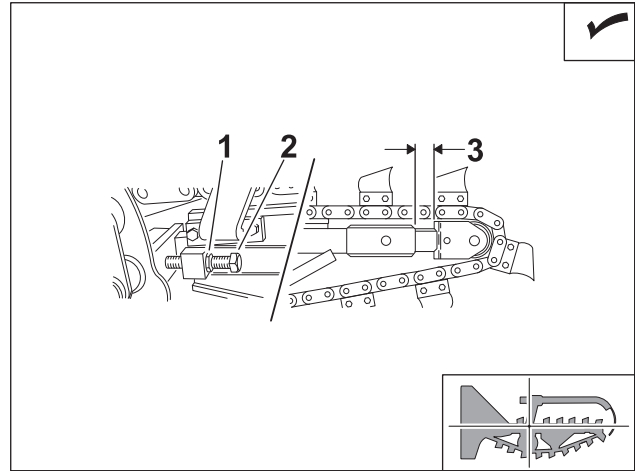
For more efficient digging, contact your Ditch Witch dealer for information about the tooth pattern best suited to your jobsite.

Check Digging Chain Tension

Check digging chain tension every 10 hours.

Sprocket Boom

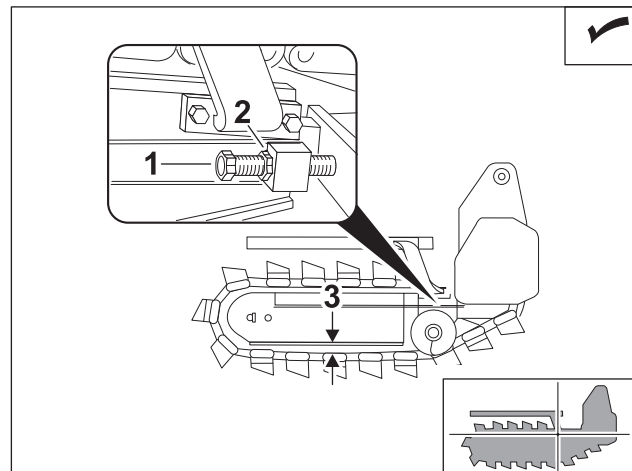
Tension is correct when 2" (50 mm) of slide and stop (3) are exposed. Adjust tension with boom horizontal by tightening or loosening adjustment screws (2) and jam nuts (1).



t28om030h.eps

Roller Boom with Adjusting Screw

With boom horizontal, measure distance from bottom of boom to chain (3). When properly adjusted, distance should be 1.5-2" (40-50 mm). Adjust tension by tightening or loosening adjustment screw (1) and jam nut (2).



t28om028h.eps



Roller Boom with Grease Cylinder

With boom horizontal, measure distance from bottom of boom to chain (2). When properly adjusted, distance should be 1.5-2.0" (40-50 mm).

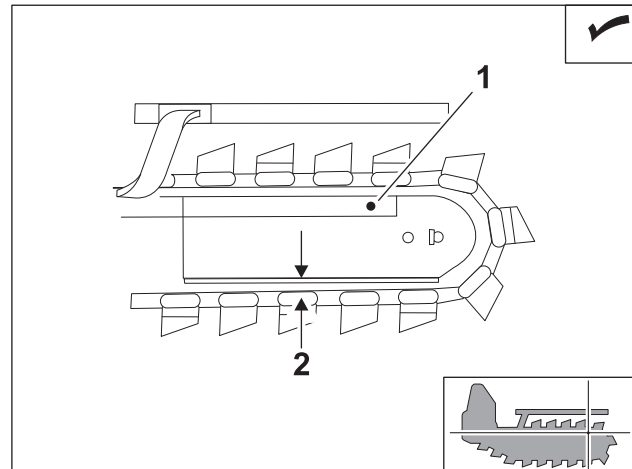


WARNING

Pressurized fluid or air could pierce skin and cause severe injury. Refer to operator's manual for proper use.

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.



t28om029h.eps

To tighten chain, remove plug and pump MPG into cylinder (1). To relieve chain tension, loosen plug on grease cylinder.

50 Hour

Location	Task	Notes
TRACTOR	Change cab filters	
	Check fuel tank breather	
	Check cab washer fluid	
	Change transmission fluid and filter	Initial service, PTF
	Lube universal joints	Initial service, EPG
	Lube axle spindle pins	Initial service, EPG
TRENCHER	Check trencher gearbox oil level	MPL
	Lube attachment driveshaft universal joints	EPG

Tractor

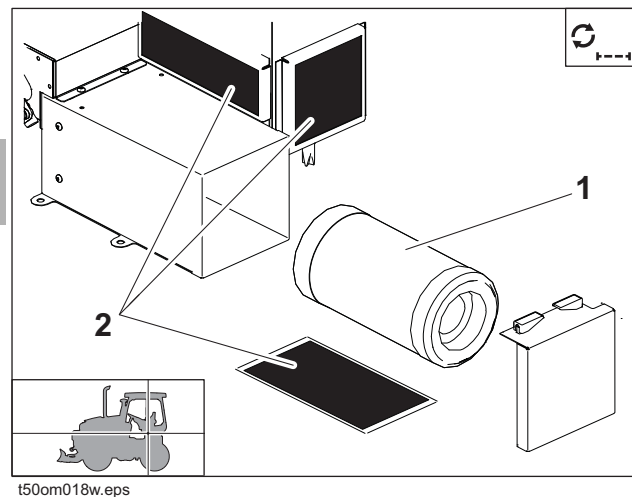
Change Cab Filters

Change cab air filters every 50 hours.

IMPORTANT: Filters may need to be changed more frequently in dusty conditions.

To change cab air filter (1):

1. Lift latches to remove door.
2. Remove filter element.
3. Empty and clean dustpan. Replace dustpan.
4. Replace filter element.
5. Replace door and secure latches.



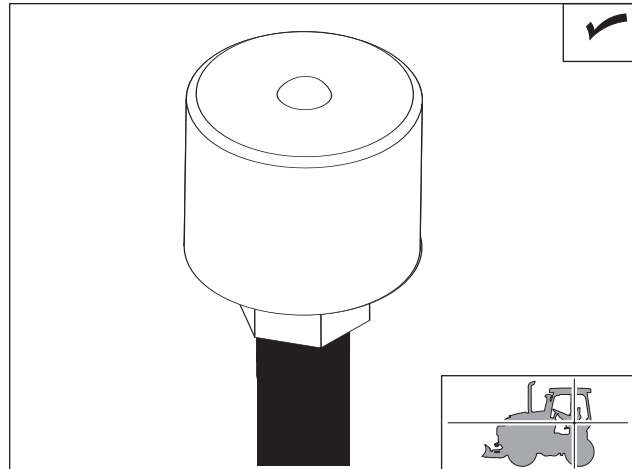
To change recirculation filters (2):

1. Remove filters.
2. Clean with soapy water. Replace if necessary. See parts manual or contact your Ditch Witch® dealer for correct replacement filters.



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.

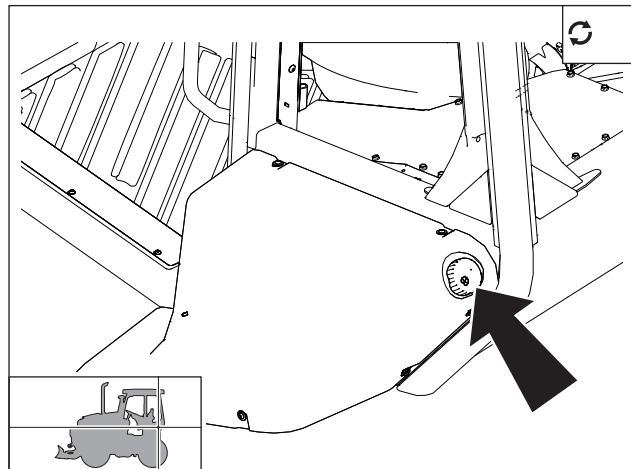


t52om022h.eps

Check Cab Washer Fluid

Check cab washer fluid every 10 hours of operation.

Refill as needed. To refill, unscrew cap (shown) and fill. Refill capacity is 2 qt (1.9 L).



t50om003w.eps

RT105M Operator's Manual

50 Hour

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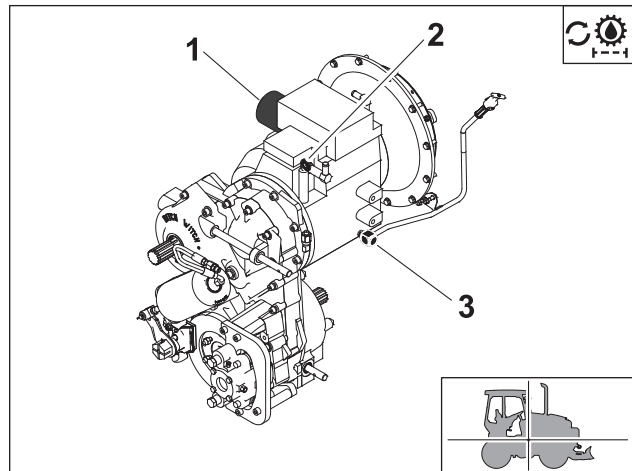
Check washer fluid level every 50 hours.

Change Transmission Fluid and Filter (Initial)

Change transmission fluid and filter (1) 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 (1).
2. Drain fluid and reinstall plug, screen, and new filter.
3. Add approximately 6 qt (5.6 L) of PTF at fill (2).
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.



t52om005h.eps

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.

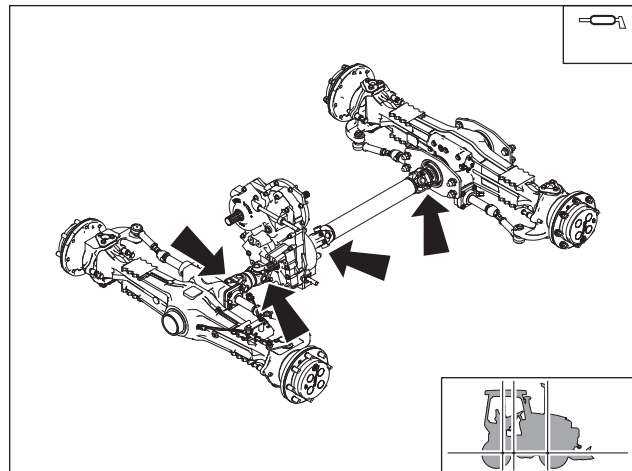
NOTICE:

- Transmission damage can occur if oil is not maintained to the correct level.
- See "Recommended Lubricants/Service Key" on page 121 for more information.



Lube Universal Joints (Initial Service)

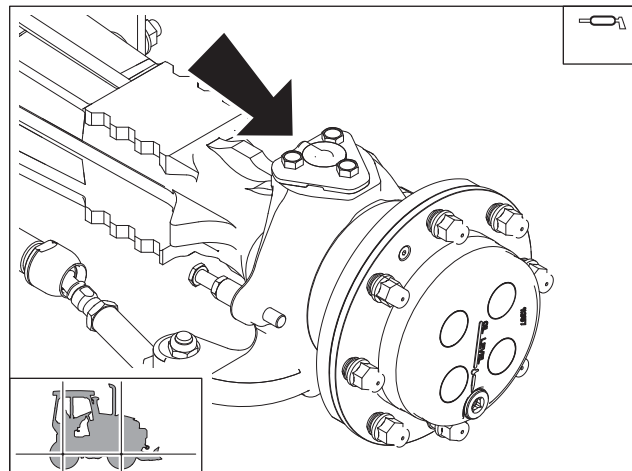
Lube universal joints (shown) at zerks at 50 hours initially and every 250 hours thereafter with EPG.



t52om009h.eps

Lube Axle Spindle Pins (Initial Service)

Lube axle spindle pins (shown) after 50 hours. initially and every 250 hours thereafter with EPG.

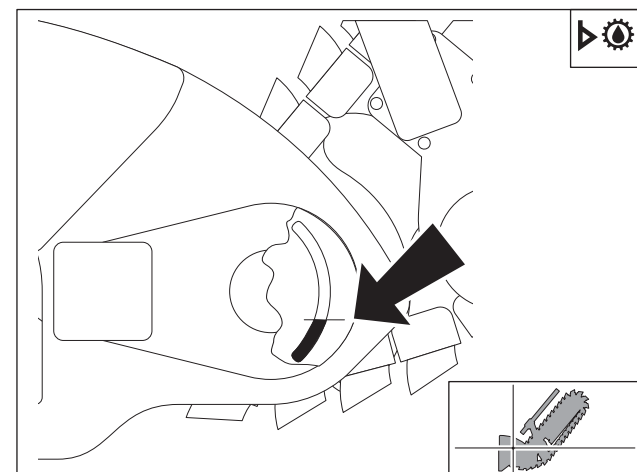


t50om014h.eps

Trencher

Check Trencher Gearbox Oil Level

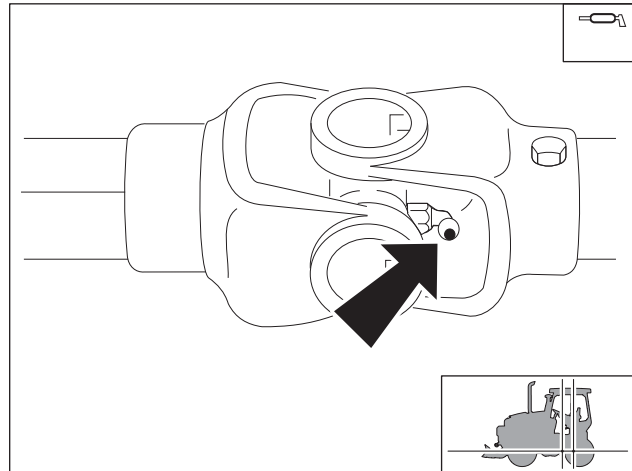
Check oil at sight tube every 50 hours. Keep oil level at horizontal line on housing. If necessary, add MPL at fill plug.



t30om060h.eps

Lube Attachment Driveshaft Universal Joints

Lube attachment driveshaft universal joints at zerks (shown) every 50 hours with EPG.



t52om006h.eps



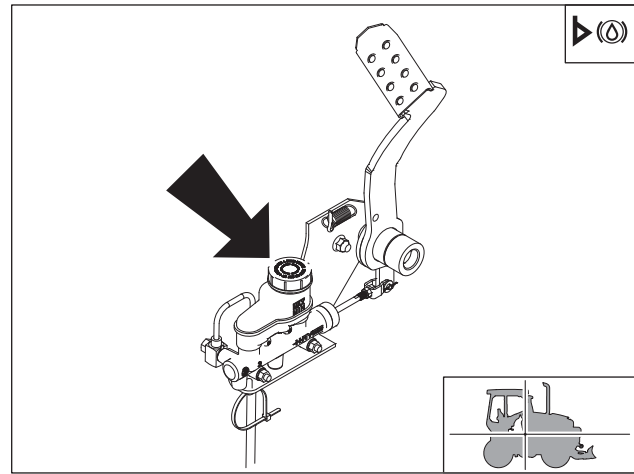
100 Hour

Location	Task	Notes
TRACTOR	Check brake fluid	BRAKE
	Lube axle mounts	EPG

Tractor

Check Brake Fluid

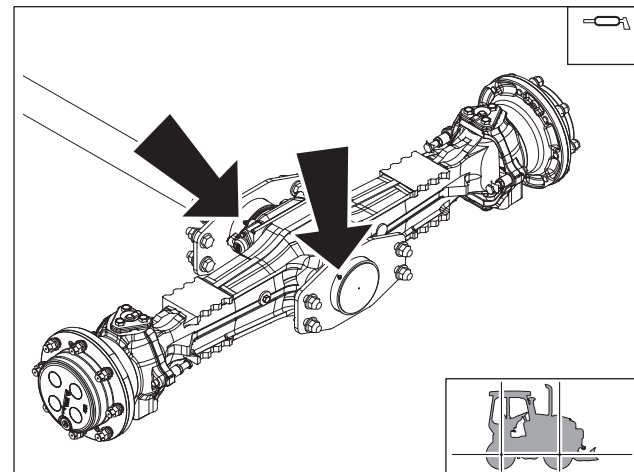
Check brake fluid every 100 hours of operation. Check brake fluid more frequently if working in dusty conditions. Add DOT 3 brake fluid.



t52om007h.eps

Lube Axle Mounts

Lube axle mounts every 100 hours with EPG.



t50om010h.eps

250 Hour

Location	Task	Notes
TRACTOR	Change engine oil and filter	DEO
	Check brake pedal	
	Lube universal joints	EPG
	Lube axle spindle pins	EPG
	Check transfer case oil level	MPL
	Check differential oil level	MPL
	Check planetary wheel end oil level	MPL

Tractor

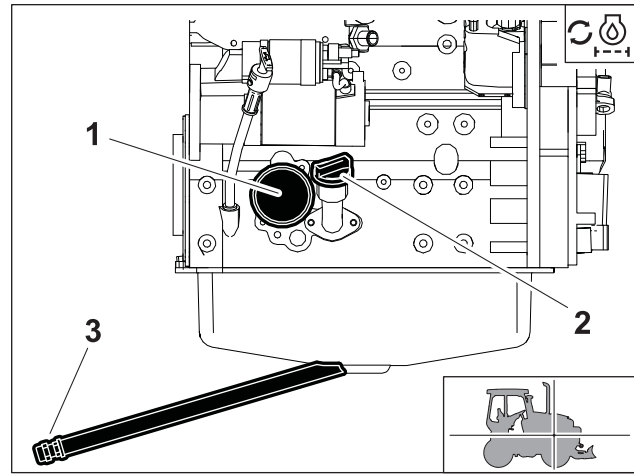
Engine Oil and Filter Change

IMPORTANT: See "Recommended Lubricants/Service Key" on page 121.

Change engine oil and filter every 250 hours.

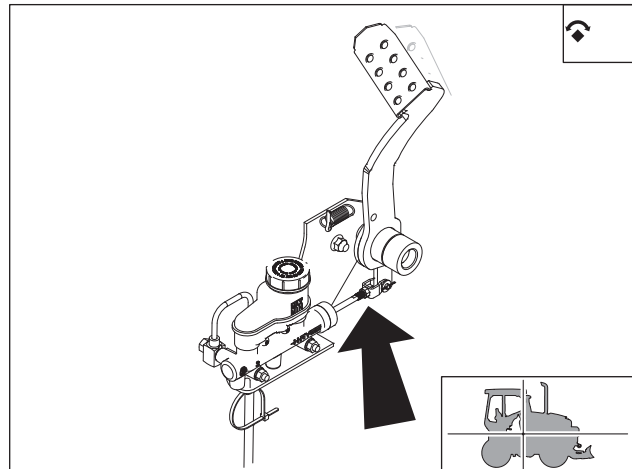
To change:

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) until oil level is at highest capacity on dipstick. Capacity is 8.4 qt (8 L).



Check Brake Pedal

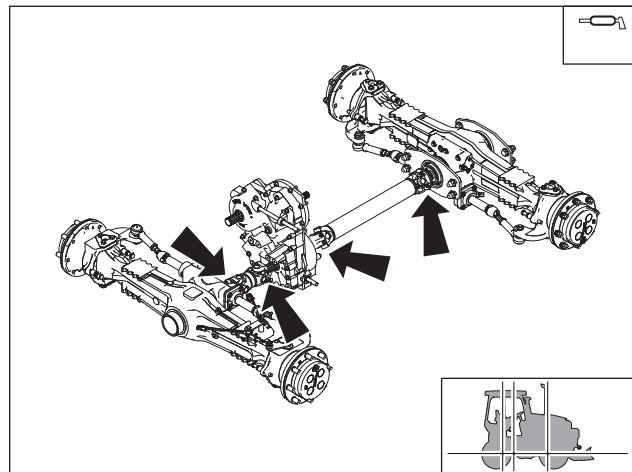
Check brake pedal after 250 hours of operation. When properly adjusted, there is 1/4-1/2" (6-13 mm) free play in pedal. See "Check Engine Compartment" on page 156.



t52om008h.eps

Lube Universal Joints

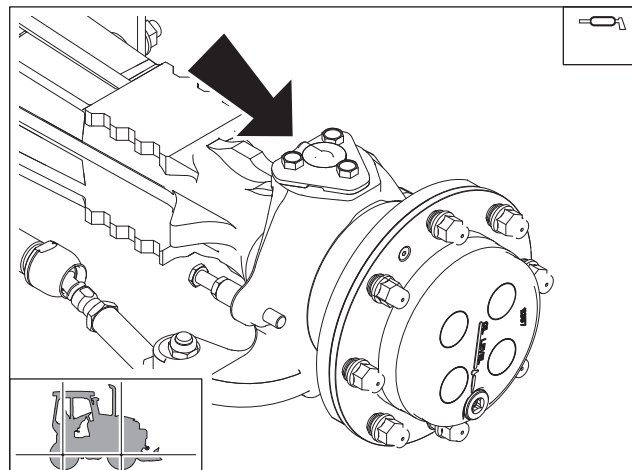
Lube driveshaft universal joints (shown) at zerks every 250 hours with EPG.



t52om009h.eps

Lube Axle Spindle Pins

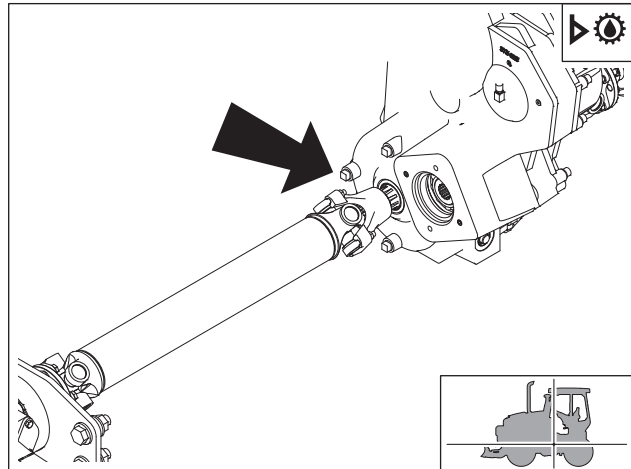
Lube axle spindle pins every 250 hours with EPG.



t50om014h.eps

Check Transfer Case Oil Level

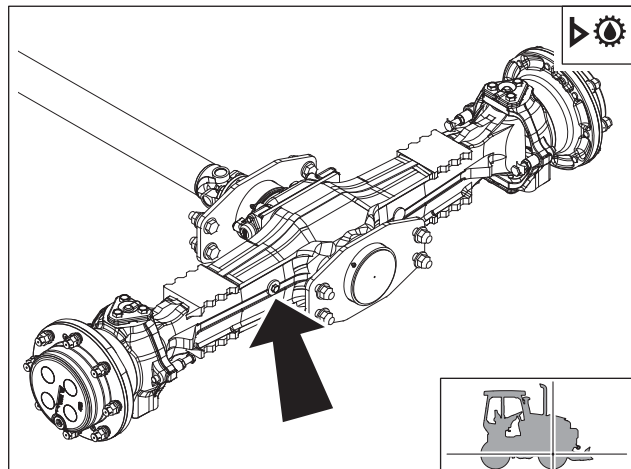
Check oil level at plug (shown) every 250 hours.
Add MPL as needed until level with plug.



t52om010h.eps

Check Differential Oil Level

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



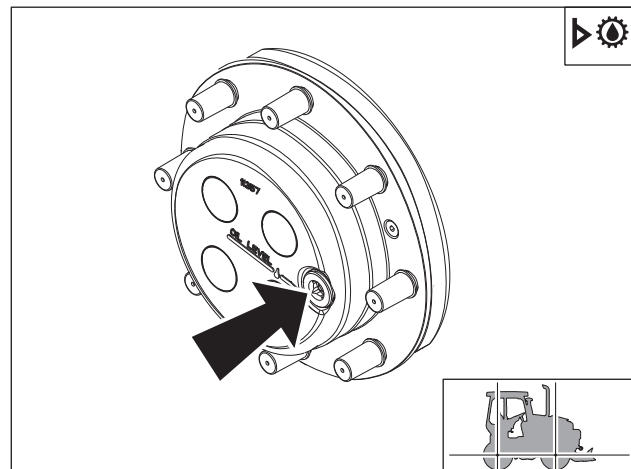
t50om016h.eps

Check Planetary Wheel End Oil Level

Check planetary wheel end oil every 250 hours.
See "Change Planetary Wheel End Oil" on
page 149.

To check:

1. Position wheel with plug at midway position as shown.
2. Ensure wheel is level.
3. Check to ensure oil is at plug level.
4. Add MPL as needed at plug opening.



t50om017h.eps



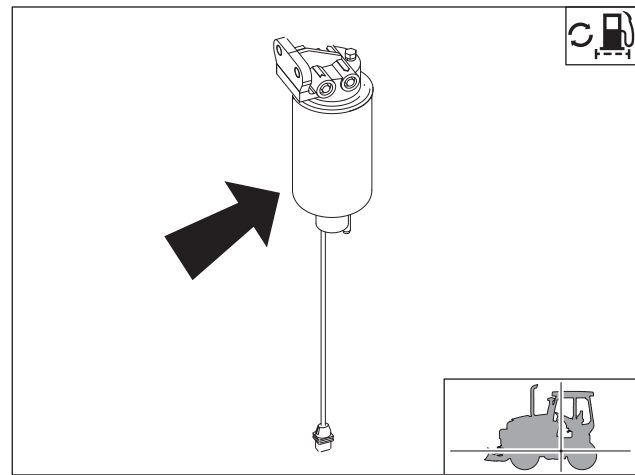
500 Hour

Location	Task	Notes
TRACTOR	Change primary fuel filter	
	Change secondary fuel filter	
	Test coolant freeze protection level	
	Change DEF filter	

Tractor

Change Primary Fuel Filter

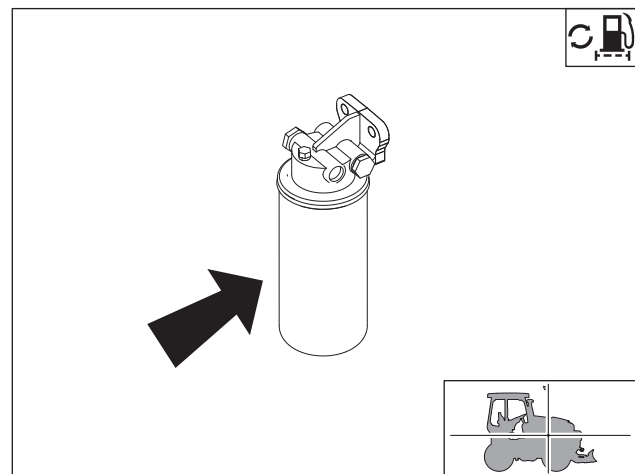
Change primary fuel filters (shown) every 500 hours.



t50om018h.eps

Change Secondary Fuel Filter

Change secondary fuel filters (shown) every 500 hours.



t50om019h.eps

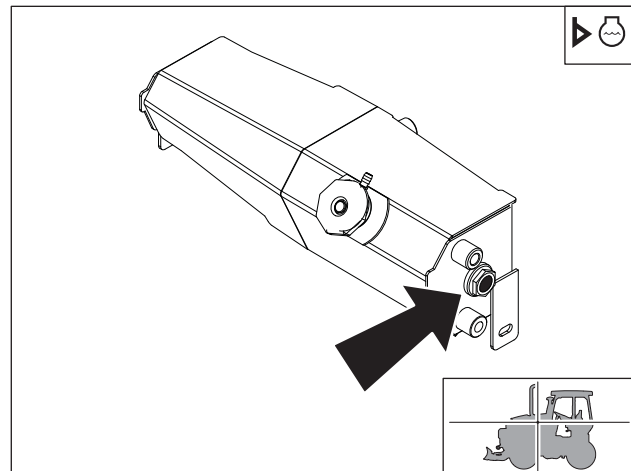
Test Coolant Freeze Protection Level

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 123 for information on approved coolants.

Use pre-diluted coolant to maintain proper freeze protection.

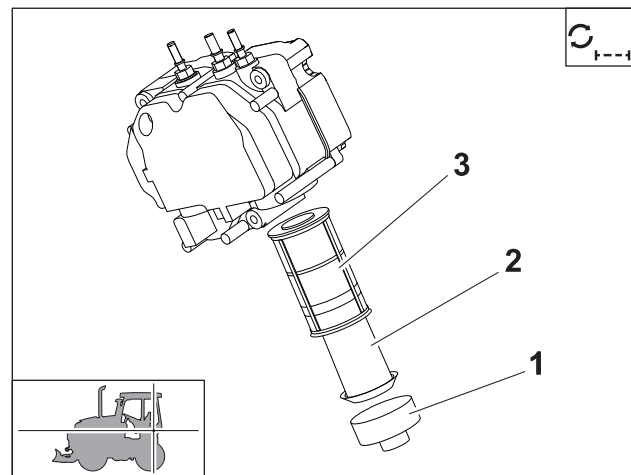


Change DEF Filter

Change DEF filter every 500 hours.

To change:

1. Remove DEF filter cover.
2. Pull out DEF filter insert and compensation body.
3. Insert new DEF filter insert and compensation body and ensure both are seated correctly.
4. Replace cover and torque to 15-18 ft•lb (20-25 N•m).



1000 Hour

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

Tractor

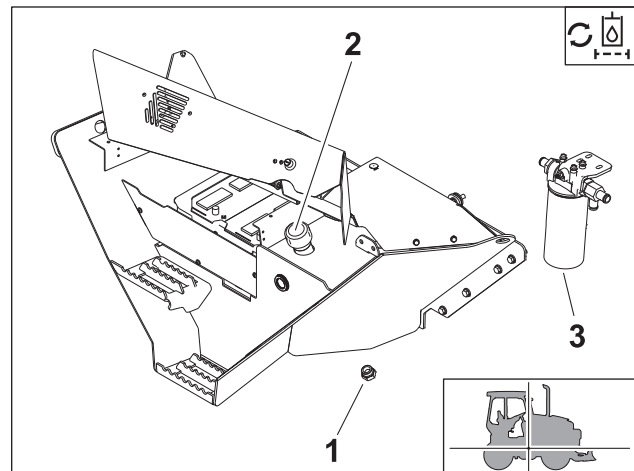
Change Hydraulic Fluid and Filter

Change hydraulic fluid and filter every 1000 hours.

NOTICE: If normal ambient operating temperature exceeds 100°F (38°C) 50% of the time, change every 500 hours.

To change:

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



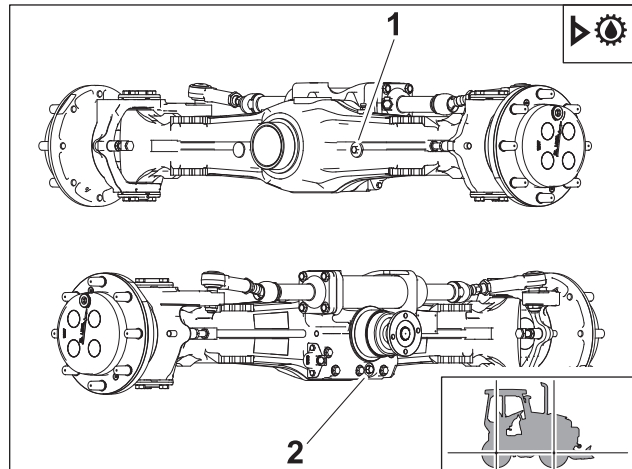
t50om020h.eps

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).



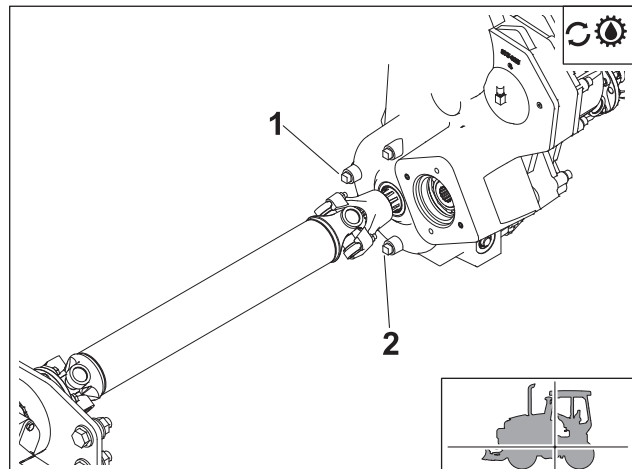
t50om022h.eps

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).



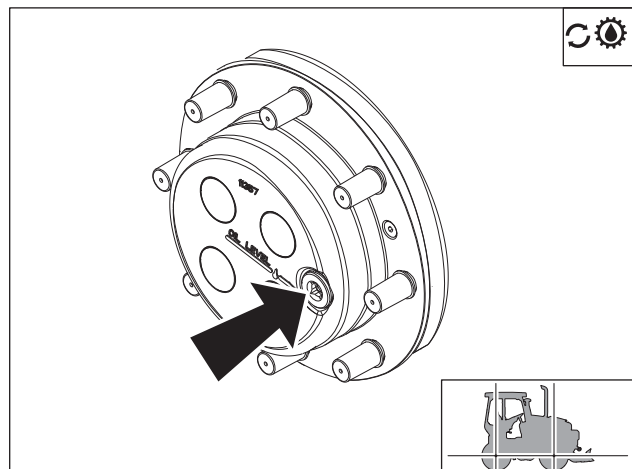
t52om012h.eps

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.

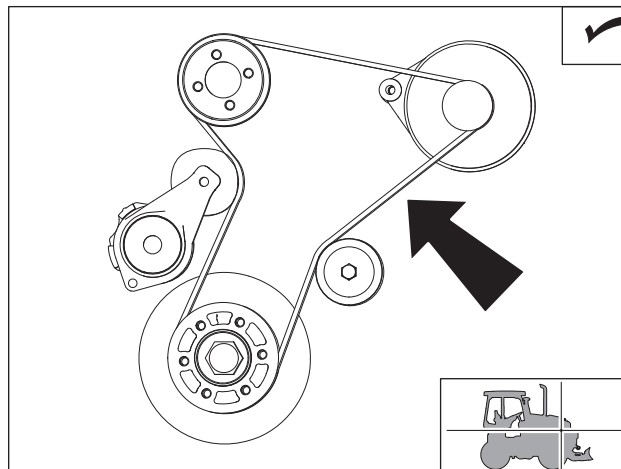


t50om024h.eps



Check Drive Belt

Check engine drive belt every 1000 hours for cracks and wear. If damaged, replace belt. See "Change Engine Drive Belt" on page 153.



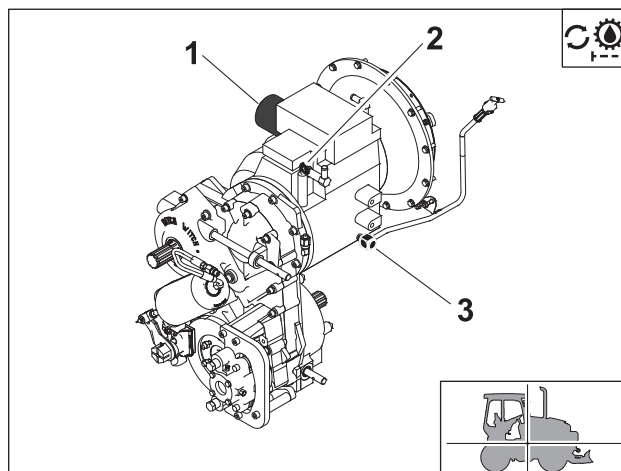
t50om025h.eps

Change Transmission Fluid and Filter

Change transmission fluid and filter (1) every 1000 hours.

To change:

1. While fluid is warm, remove drain plug (3), screen, and filter (1).
2. Drain fluid and reinstall plug, screen, and new filter.
3. Add approximately 6 qt (5.6 L) of PTF at fill (2).
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.



t52om005h.eps

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.

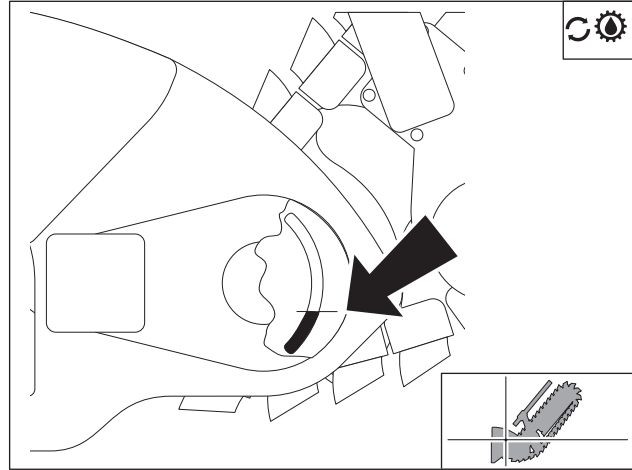
NOTICE:

- Transmission damage can occur if oil is not maintained to the correct level.
- See "Recommended Lubricants/Service Key" on page 121 for more information.

Trencher

Change Trencher Gearbox Oil

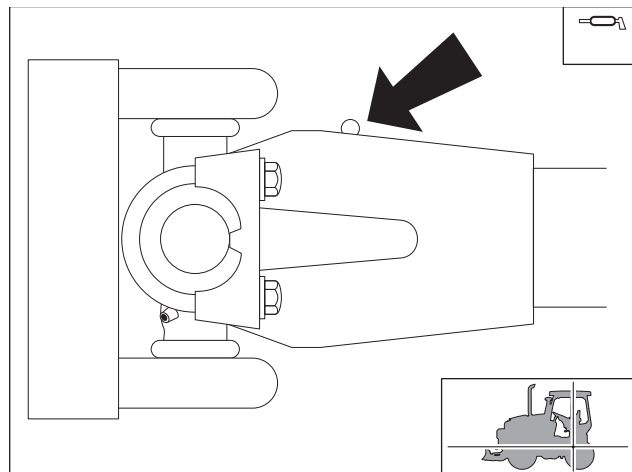
Change trencher gearbox oil every 1000 hours. Drain at plug. Replace drain plug and add MPL until fluid level is at lowest line on sight tube.



t30om061h.eps

Lube Attachment Driveshaft Slip Yoke

Lube attachment driveshaft slip yoke every 1000 hours with EPG.



t52om019h.eps



2000 Hour

Location	Task	Notes
TRACTOR	Change engine coolant	DEAC
	Inspect seat belt	
	Change engine drive belt	

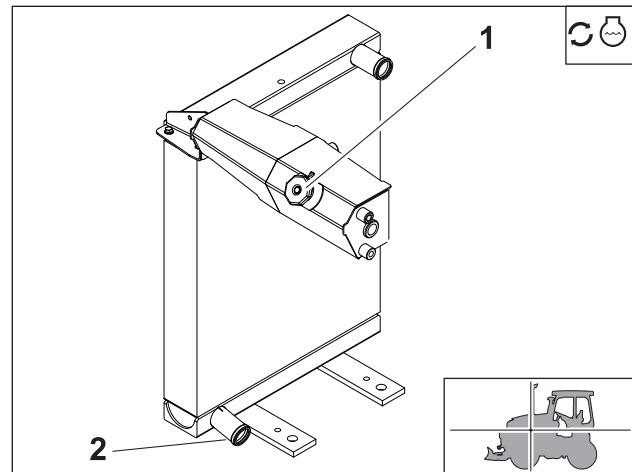
Tractor

Change Engine Coolant

NOTICE:

- The use of non-approved coolant may lead to engine damage or premature engine failure and will void engine warranty.
- See "Approved Coolant" on page 123 for list of approved coolants.

Drain cooling system at drain (2) every two years or 2000 hours. Add approved coolant at fill (1) until fluid is visible in sight glass on expansion tank.



t50om026h.eps

Inspect Seat Belt

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

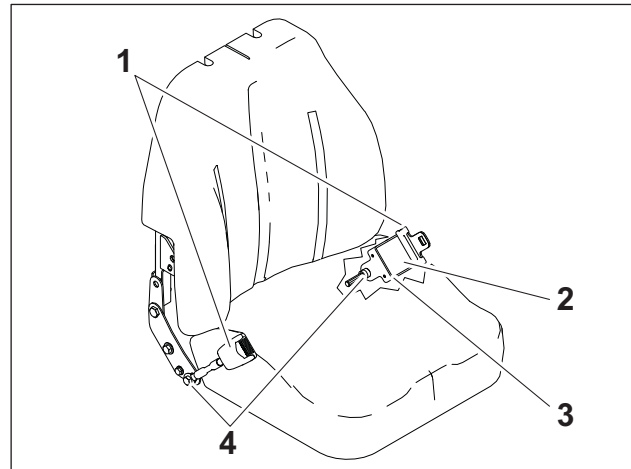
Inspect seat belt webbing (2) to ensure that it is not cut, frayed or showing signs of extreme or unusual wear. Check the area near the buckle and latch and anywhere the seat belt has contact with equipment or seat.

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.



t48om033w.eps

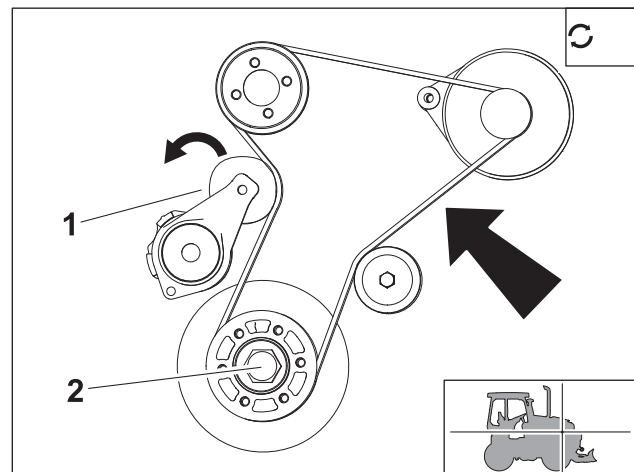


Change Engine Drive Belt

Change engine drive belt every 2000 hours.

To change:

1. Relieve tension on the belt (shown) by moving tension roller (1) in the direction shown until a retaining pin can be inserted into the assembly bore (2).
2. Remove belt from tension roller.
3. Remove belt completely.
4. Install new belt.
5. Holding tension roller with pin wrench, move retaining pin.
6. Remove pin wrench, allowing tension roller to fall back into place.
7. Tension belt using tension roller. Ensure belt is correctly seated.



t50om027h.eps

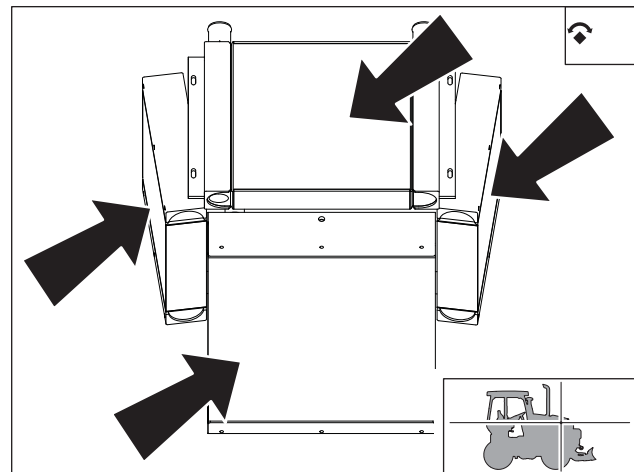
As Needed

Location	Task	Notes
TRACTOR	Clean radiator	
	Change air filter	
	Drain water separator on primary fuel filter	
	Check engine compartment	
	Adjust brake pedal	
	Check batteries	
	Charge battery	
TRENCHER	Replace digging chain	
BACKHOE	Replace pins and bushings	

Tractor

Clean Radiator

Clean out radiator 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.



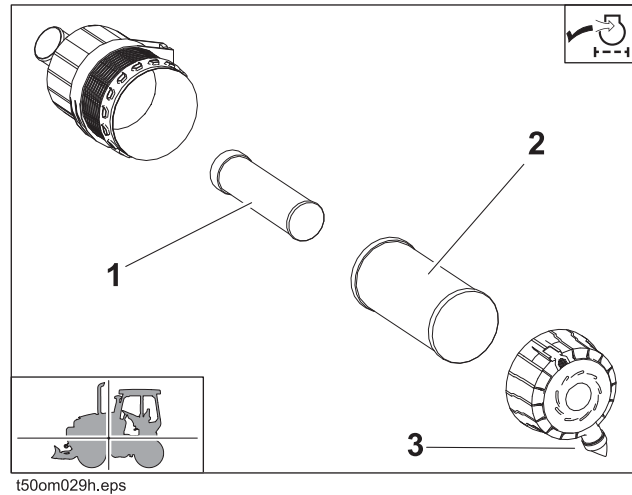
t50om028h.eps

Change Air Filter

Change air filter when pop-up message appears.

To change:

1. Remove air filter cover and remove primary (1) and secondary (2) elements.
2. Wipe inside of housing and wash cover and clean dust ejector valve.
3. Clean dust trap (3).
4. Insert new secondary element and ensure it is seated correctly.
5. Insert new primary element.
6. Replace cover. If cover does not fit, element is not properly locked into housing. Remove cover and primary element and repeat step 4.



NOTICE: Only open the air filter canister when pop-up message appears. Change the elements. Do not attempt to clean them.

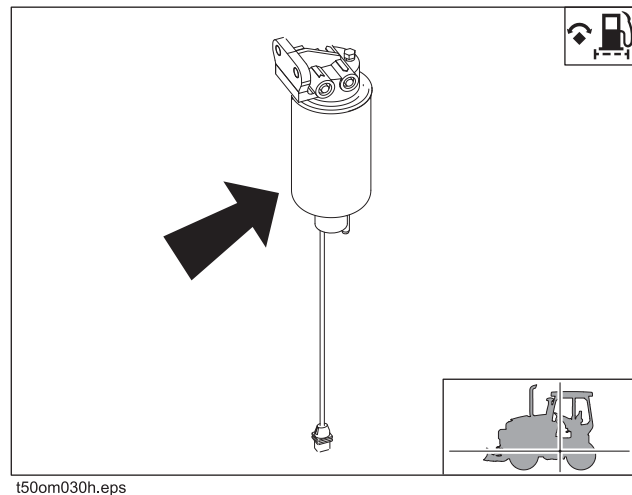
- Improperly installed primary element can lead to premature engine failure.
- Compressed air or water may damage filter elements.
- Tapping filter elements to loosen dirt may damage the elements.



Drain Water Separator on Primary Fuel Filter

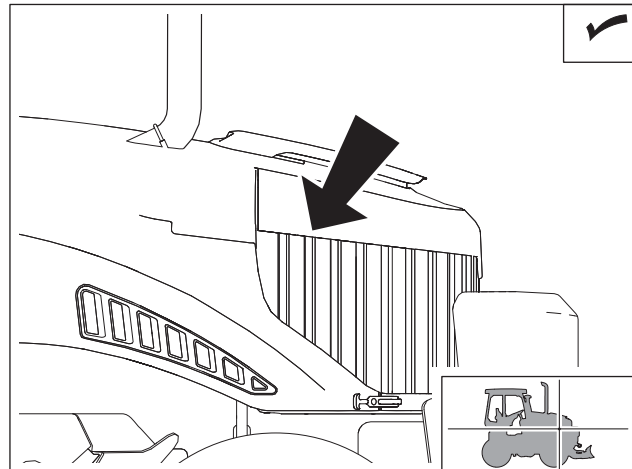
Drain water separators on primary fuel filter as needed. WIF (water in fuel) indicator will indicate need.

Drain at plug as needed until water is removed and fuel runs from drain.



Check Engine Compartment

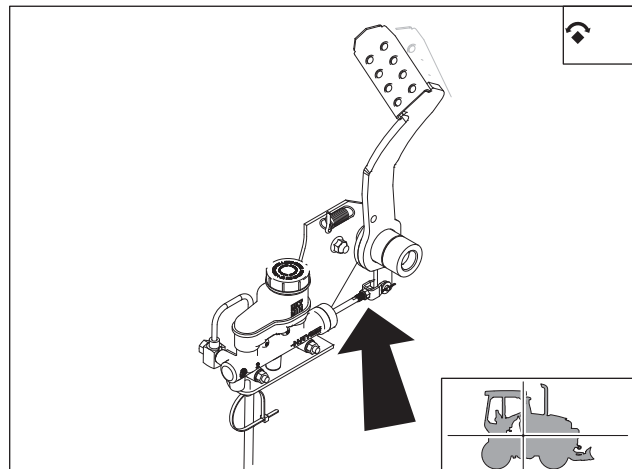
Check engine compartment for debris as needed. Do not use water or compressed air to remove debris from engine compartment. Check more often if operating in large brush, grassy conditions or being stored.



t50om048h.eps

Adjust Brake Pedal

Adjust brake pedal as needed. When properly adjusted, there is 1/4-1/2" (6-13 mm) free play in pedal.



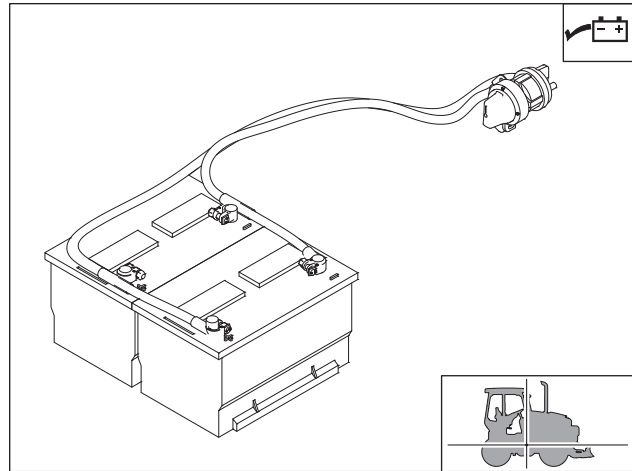
t52om008h.eps

Check Batteries

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. Connect battery cable clamps, **positive (+)** cable first.
7. Tighten any loose connections.
8. Ensure that battery tiedowns are secure.
9. Turn battery disconnect switch to the on position.



t50om032h.eps



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

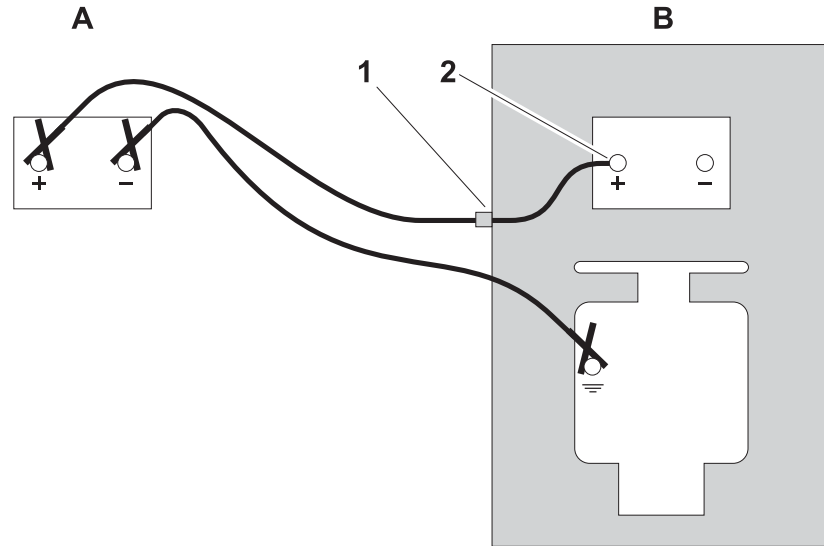
Electronic components can be easily damaged by electrical surges. Jump starting can damage electronics and electrical systems, and is not recommended. Try to charge the battery instead. Use quality large diameter booster cables capable of carrying high currents (400 amps or more). Cheap cables may not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

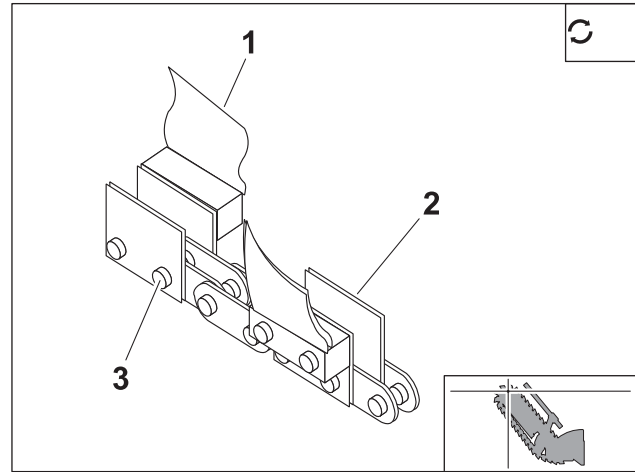
Replace Digging Chain

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.

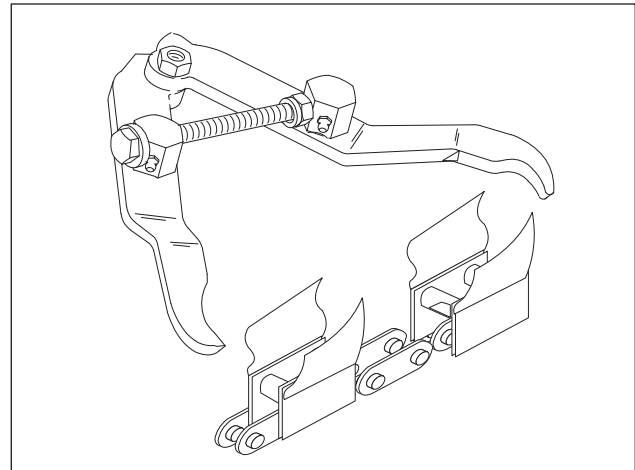
IMPORTANT: Replace sprockets when a new chain is installed.

To remove chain:

1. Fasten and adjust seat belt.
2. Start tractor. See page 74 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. Set 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.



t30om063h.eps



Digging_Chain_Remove_01.eps

RT105M Operator's Manual As Needed

Service - 161

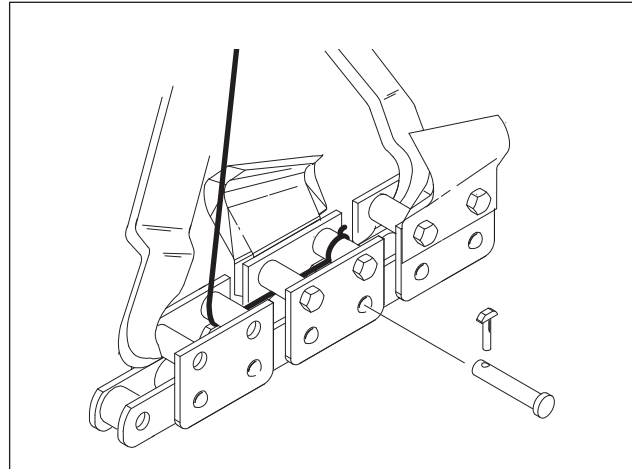
8. Loop cable through links nearest connector pin.



⚠ WARNING Pressurized fluid or air could pierce skin and cause severe injury. Refer to operator's manual for proper use.

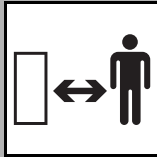
To help avoid injury:

- 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.



Digging_Chain_Remove_02.eps

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. Stay away.

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



To install chain:

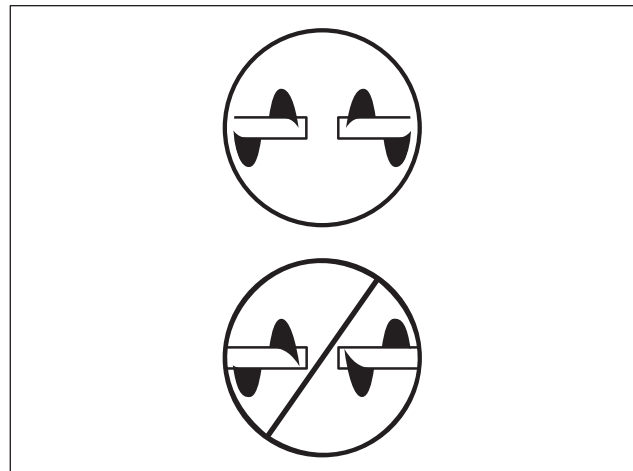
1. Lay chain on ground with teeth down and pointed toward unit.
2. Fasten and adjust seat belt.
3. Start tractor. See page 74 for start-up procedures.
4. Release parking brake and verify parking brake indicator is off.
5. Move ground drive control to reverse.
6. Back unit up until chain extends past head shaft about 1' (305 mm).
7. Move ground drive control to neutral.
8. Lower backfill blade to ground.
9. Lower boom to horizontal position.
10. Set 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.

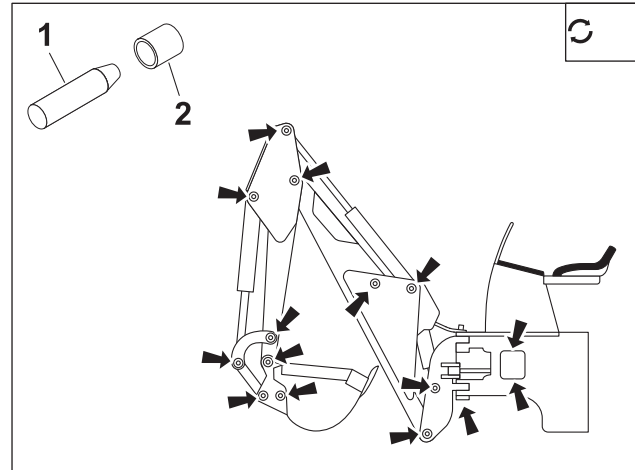


Augers_Adjust.eps

Backhoe

Replace Pins and Bushings

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

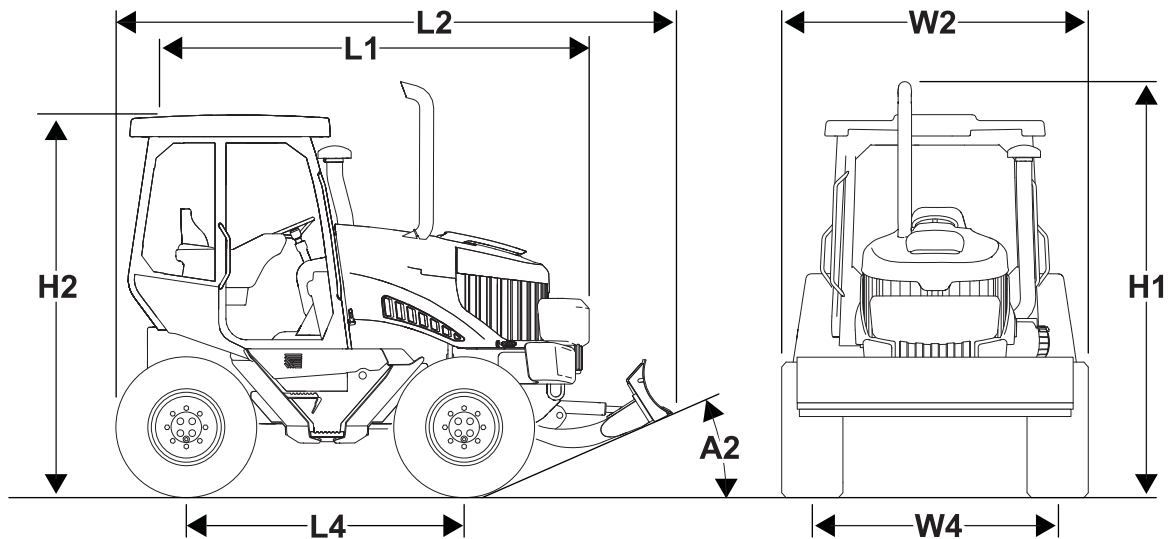


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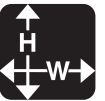
Specifications

RT105 Tractor



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Dimensions		U.S.	Metric
A2	Angle of approach	25°	25°
H1	Height	115 in	2.92 m
H2	Height	105 in	2.67 m
L1	Nose to rear mount length	125 in	3.18 m
L2	Length - transport	154 in	3.91 m
L4	Wheelbase	79 in	2.01 m
W2	Width	82 in	2.1 m
W4	Tread	64 in	1.63 m



Operation		U.S.	Metric
Forward speeds			
	Crowd	0.6 mph	0.96 km/h
	Low	6.2 mph	9.9 km/h
	High	9.2 mph	14.9 km/h
Reverse speeds			
	Crowd	0.6 mph	0.96 km/h
	Low	6.2 mph	9.9 km/h
	High	9.2 mph	14.9 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	356 mm
Basic unit weight		9700 lb	4400 kg
Maximum allowable tractor weight		21500 lb	9752 kg
Front counterweight		1300 lb	590 kg
Side counterweight (each)		250 lb	114 kg

Backfill Blade	U.S.	Metric
Blade width	80 in	2.0 m
Blade height	17 in	430 mm
Lift height above ground	26 in	660 mm
Blade drop below ground	10 in	254 mm
Maximum swing angle (left/right)	30°	30°
Tilt angle (up/down)	12°	12°

RT105M Operator's Manual

RT105 Tractor

Specifications - 165

Power		U.S.	Metric
Engine: Deutz® TCD3.6L4, 4-cylinder diesel			
Cooling medium: liquid			
Injection: direct			
Aspiration: turbocharged, charge-air cooled			
Displacement		221 in ³	3.6 L
Bore		3.86 in	98 mm
Stroke		4.72 in	120 mm
Engine manufacturer's gross power per SAE J1995		107 hp	80 kW
Estimated net power per SAE J1349		99.3 hp	74 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 (highly regulated countries)		EPA Tier 4 Final	EU Stage IV
Emissions compliance (less regulated areas)		EPA Tier 4i	EU Stage IIIb



Power Train
Ground drive transmission: Powershift (driving), Powershift with Hydrostatic (trenching), Hydrostatic (crowd)
Differentials: planetary front and rear with optional rear steering
Service brake: Disc, foot operated
Parking brake: Disc, spring applied hydraulic release
Tires: 38 x 18.00-20 14-ply bar lug flotation
Attachment drive transmission: powershift, lever-operated speed infinitely variable from zero to maximum forward with limited stroke reverse.

Hydraulic System	U.S.	Metric
Crowd circuit drive/steer pump capacity at 2300 rpm	11.3 gpm	42.7 L/min
Ground drive pump capacity at 2300 rpm	11.5 gpm	43 L/min
Ground drive pump relief pressure	3100 psi	213 bar
Auxiliary pump capacity at 2300 rpm	5.1 gpm	19.3 L/min
Auxiliary pump relief pressure at 2300 rpm	3000 psi	206 bar

Fluid Capacities	U.S.	Metric
Fuel tank	38 gal	144 L
Engine oil	8.5 qt	8 L
Hydraulic reservoir	25 gal	95 L
Hydraulic system	30 gal	114 L
Cooling system	4.25 gal	16.1 L
DEF tank	2.6 gal	10 L

Battery (2 used)
Group 65, SAE res. cap 165 min., SAE cold crank @ 0° F (-18° C), 875 amp
Auxiliary power outlet - 12 volt, 10 amp

Vibration Level

Average vibration transmitted to the operator's hand and whole body during normal operation is 5.98 m/s² and 0.64 m/s² respectively.*

Average vibration transmitted to the operator's hand and whole body during normal trenching operation is 2.915 m/s² and 1.275 m/s², respectively.*

Noise Levels

Operator ear sound pressure level is 94 dBA per ISO 6394.

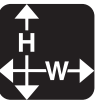
Operator ear sound pressure level (with cab) is 77 dBA per ISO 6396.

Exterior sound power level is 107 dBA per ISO 6393.

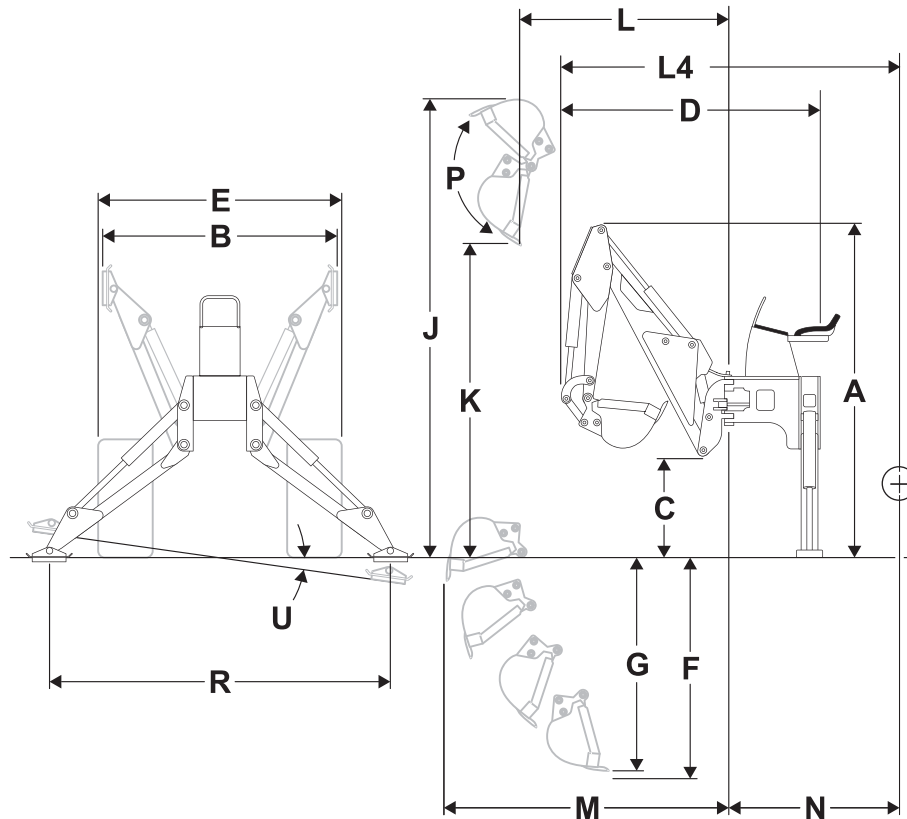
*Actual vibration levels depend on the conditions of the operation being performed.

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.



BH120 Backhoe



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Dimensions		U.S.	Metric
A	Transport height	118 in	2.98 m
C	Ground clearance	29 in	736 mm
D	Backhoe length, stowed	117 in	2.97 m
F	Digging depth, maximum	112 in	2.84 m
G	Digging depth, 2" (0.6 m) flat bottom	109 in	2.77 m
J	Operating height, fully raised	156 in	3.96 m
K	Loading height	104 in	2.64 m
L	Loading reach	78 in	1.98 m
M	Reach from swing pivot	158 in	4.01 m
N	Swing pivot to centerline axle	57 in	1.45 m
P	Bucket rotation	170°	170°
B	Stabilizer spread, transport	86 in	2.18 m

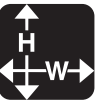
RT105M Operator's Manual

BH120 Backhoe

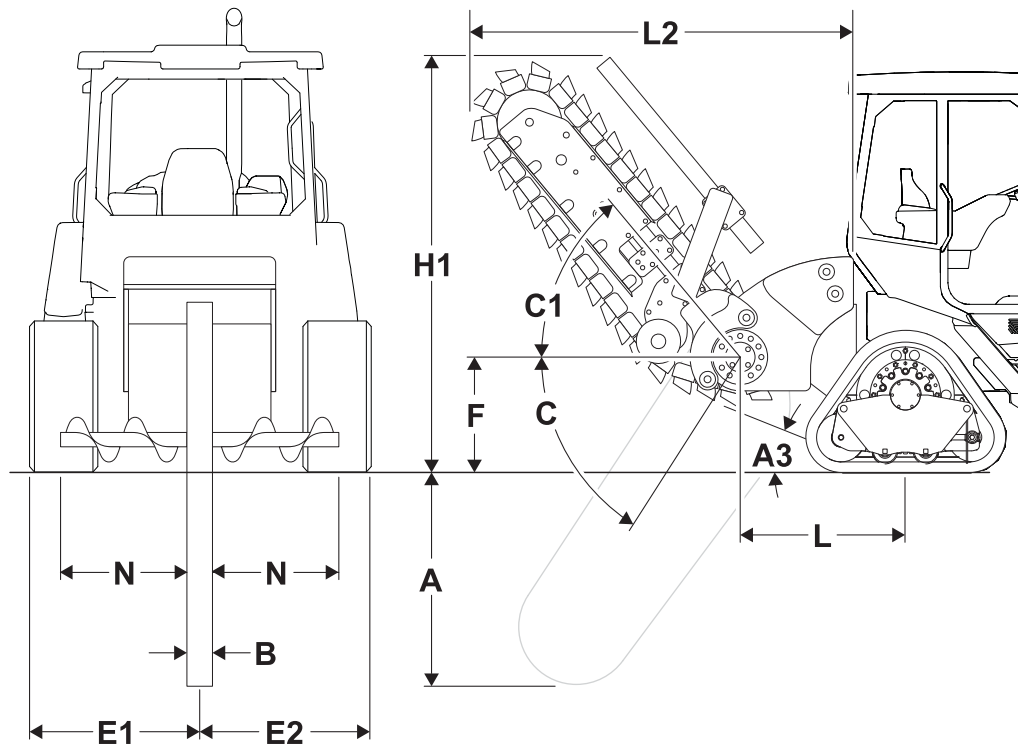
Specifications - 169

E	Backhoe or basic unit width	82 in	2.08 m
R	Stabilizer spread, operating	121 in	3.07 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-.1 m 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.



CT100M Trencher



t48om037w.eps

Dimensions		U.S.	Metric
A3	Angle of departure		
	RT105 with 38 x 18.00-20 tires	23.7°	23.7°
A	Trench depth, maximum		
	RT105 with 38 x 18.00-20 tires	97 in	2.5 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	812 mm
F	Headshaft height, digging chain		
	RT105 with 38 x 18.00-20 tires	32 in	812 mm
H1	Transport height		
	RT105 with 38 x 18.00-20 tires	124 in	3.3 m

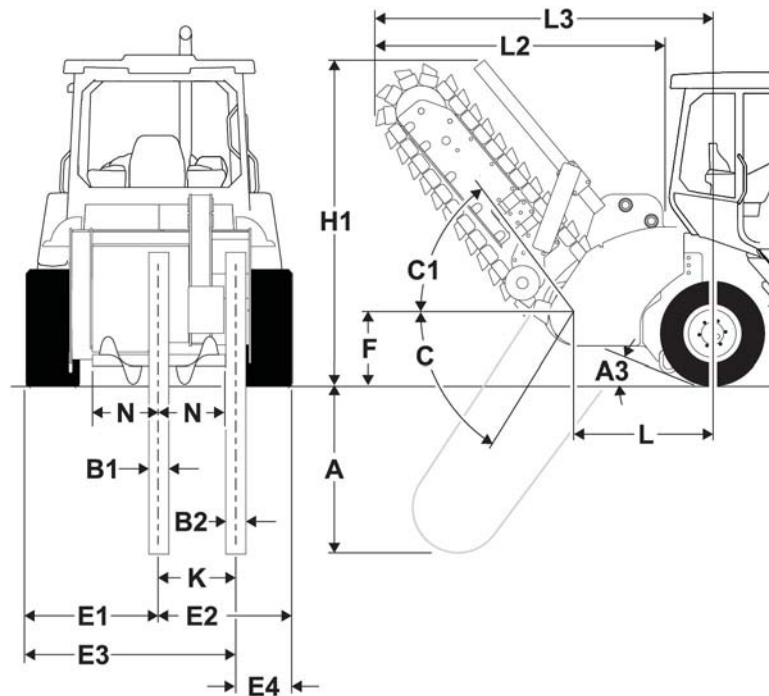
RT105M Operator's Manual
CT100M Trencher**Specifications - 171**

Dimensions		U.S.	Metric
L2	Transport length	115 in	2.9 m
L	Headshaft overhang	43 in	1.1 m
N	Soil discharge reach	32 in	813 mm
	Attachment weight	1750 lb	794 kg

Operation		U.S.	Metric
Headshaft speeds			
	Ratio low	146 rpm	146 rpm
	Ratio standard	196 rpm	196 rpm
	Ratio high	237 rpm	237 rpm
Digging chain speeds			
	Ratio low	417 ft/min	127 m/min
	Ratio standard	558 ft/min	170 m/min
	Ratio high	676 ft/min	206 m/min



DT100M Offset Trencher



t52om001w.eps

Dimensions		U.S.	Metric
A3	Angle of departure		
	RT105 with 38 x 18.00-20 tires	28°	28°
A	Trench depth, maximum		
	RT105 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		
	RT105 with 38 x 18.00-20 tires	32 in	812 mm

RT105M Operator's Manual
DT100M Offset Trencher

Specifications - 173

Dimensions		U.S.	Metric
H1	Transport height		
	RT105 with 38 x 18.00-20 tires	124 in	3.3 m
K	Distance between trencher positions	26 in	660 mm
L2	Transport length	115 in	2.9 m
L	Headshaft overhang	43 in	1.1 m
L3	Transport length from center of rear axle	126 in	3.2 m
N	Soil discharge reach	33 in	843 mm
	Attachment weight	1750 lb	794 kg

Operation		U.S.	Metric
Headshaft speeds			
	Ratio extra low	156-233 rpm	156-233 rpm
	Ratio low	171-257 rpm	171-257 rpm
	Ratio standard	188-282 rpm	188-282 rpm
Digging chain speeds			
	Ratio extra low	445-664 ft/min	136-202 m/min
	Ratio low	487-732 ft/min	148-223 m/min
	Ratio standard	535-804 ft/min	163-245 m/min



Declaration of Conformity Information

Countries in the European Union should have received a Declaration of Conformity (DOC) with this machine similar to the example below.

The Charles Machine Works, Inc.
PO Box 66
1959 West Fir Avenue
Perry, Oklahoma, USA 73077-0066
Phone: 580 572 3784
FAX: 580 572 3525

Declares that the product:

Model: **Ditch Witch® XXXX**
Type: **(machine type)**
Engine Power: **xxx kW**
Serial Number: **CMWXXXXXXXXXXXXXX**

Conforms to the requirements of:

2006/42/EC Machinery Directive
2014/30/EU Electromagnetic Compatibility Directive
2000/14/EC Noise Emission Directive

Measured sound power level (Annex V): **xxx dBA**
Guaranteed sound power level (Annex V): **xxx dBA**

The Technical Construction File is maintained at the manufacturer's location.

The manufacturer's European representative is:

Ditch Witch Barcelona
International Underground Systems, S.L.
C/EL PLA, 130 * Poligon Industrial El Pla
08980 Sant Feliu De Llobregat * Spain
Phone: +34 93 632 7344
FAX: +34 93 632 7343

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 Ditch Witch factory 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 Ditch Witch Product Support (DWPS) or its authorized dealer. DWPS will provide the location of its inspection facilities or its nearest authorized dealer upon inquiry. DWPS reserves the right to supply remanufactured replacement parts under this warranty as it deems appropriate.

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

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 the DWPS department, P.O. Box 66, Perry, OK 73077-0066, or contact your local dealer.

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

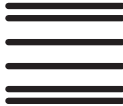
If your equipment was purchased through a Ditch Witch dealer, there is no need to read further.

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

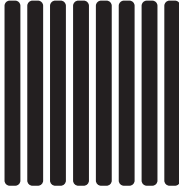
This will enable you to receive updates on this equipment as well as information on new products of interest.

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**



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

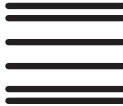
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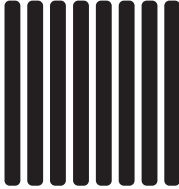
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P.O. Box 66
Perry, Oklahoma 73077-9989**



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		
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		



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