

SK350

Operator's Manual



CMW®

Issue 1.0



054- 137

Overview



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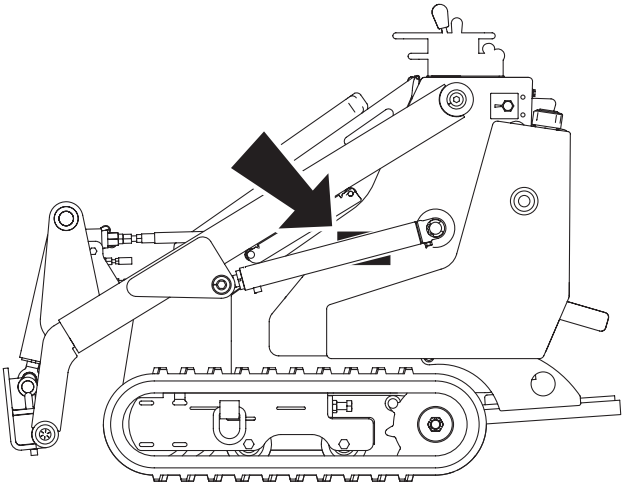
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Serial Number Location

Record serial numbers and date of purchase in spaces provided. Unit serial number is located as shown.



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Item	
date of manufacture	
date of purchase	
unit serial number	
engine serial number	

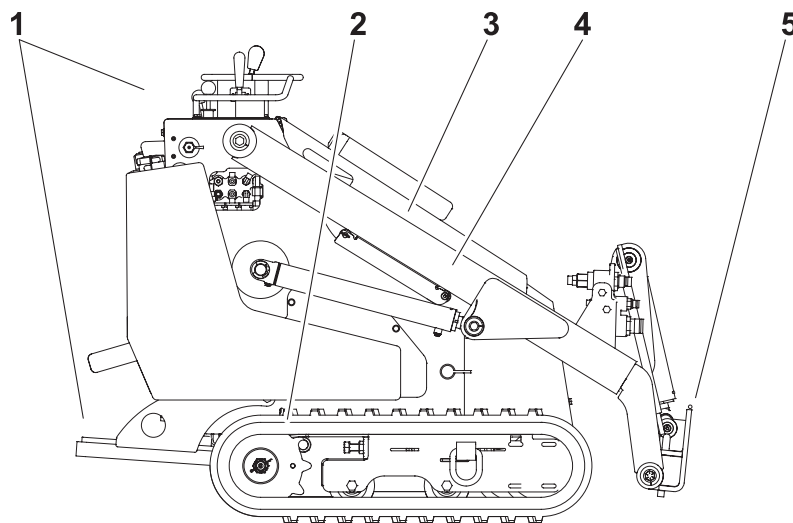
Intended Use



The SK350 is a platform rubber track mini skid steer unit designed for compact construction work. The SK350 has a quick attach mount plate which makes it easy for an operator to connect different attachments. The unit is designed for operation in temperatures typically experienced in earth moving and construction work environments. Provisions may be required to operate in extreme temperatures. Contact your Ditch Witch dealer. Use in any other way is considered contrary to the intended use.

The SK350 should be operated, serviced, and repaired only by persons familiar with its particular characteristics and acquainted with the relevant safety procedures.

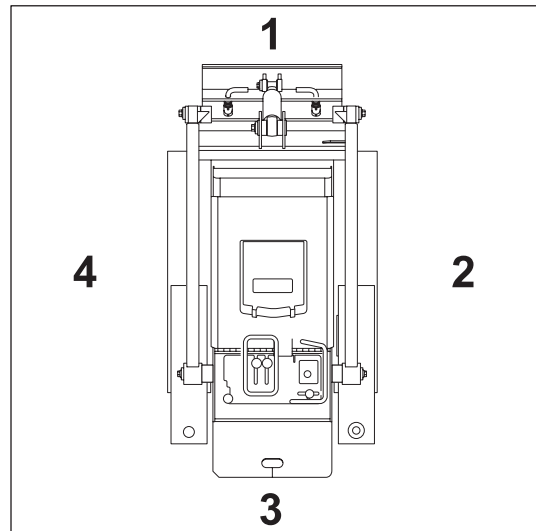
Unit Components



1. Operator station
2. Tracks
3. Engine compartment
4. Lift arms
5. Mount plate

Operator Orientation

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



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About This Manual

This manual contains information for the proper use of this machine. 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.

"Continued" Indicators



indicates that a procedure is continued on the next page.

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.

**SK350
Operator's Manual**

Issue number 1.0/OM-X/05

Part number 054-137

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Safety

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Guidelines

Follow these guidelines before operating any jobsite equipment:

- Complete proper training and read operator's manual before using equipment.
- Contact One-Call (888-258-0808) and any utility companies which do not subscribe to One-Call. Have all underground pipes and cables located and marked before operating equipment. If you damage a utility, contact utility company.
- Classify jobsite based on its hazards and use correct tools and machinery, safety equipment, and work methods for jobsite.
- Mark jobsite clearly and keep spectators away.
- Wear personal protective equipment.
- Review jobsite hazards, safety and emergency procedures, and individual responsibilities with all personnel before work begins. Safety videos are available from your Ditch Witch dealer.
- Replace missing or damaged safety shields and safety signs.
- Use equipment carefully. Stop operation and investigate anything that does not look or feel right.
- Do not operate unit where flammable gas is present.
- Contact your Ditch Witch dealer if you have any question about operation, maintenance, or equipment use.

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.



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



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



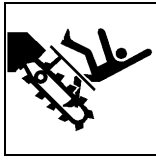
indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

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

NOTICE can keep you from doing something that might damage the machine or someone's property. It can also alert you against unsafe practices.

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

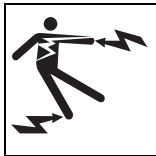
Safety Alerts

**⚠ DANGER**

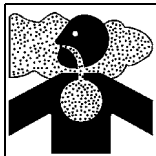
Moving digging teeth will kill you or cut off arm or leg. Stay away.

**⚠ DANGER**

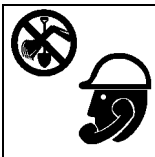
Turning shaft will kill you or crush arm or leg. Stay away.

**⚠ DANGER**

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

**⚠ DANGER**

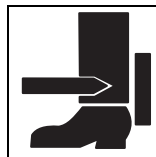
Deadly gases. Lack of oxygen or presence of gas will cause sickness or death. Provide ventilation.

**⚠ WARNING**

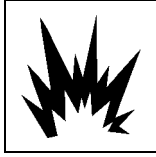
Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

**⚠ WARNING**

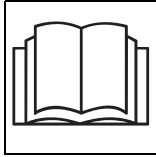
Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

**⚠ WARNING**

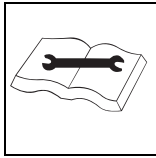
Moving parts could cut off hand or foot. Stay away.



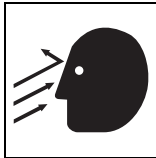
⚠ WARNING Explosion possible. Serious injury or equipment damage could occur. Follow directions carefully.



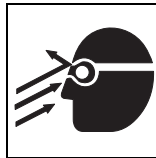
⚠ WARNING Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.



⚠ 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.



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



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



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

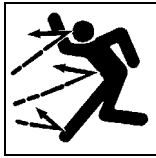


⚠ WARNING Fire or explosion possible. Fumes could ignite and cause burns. No smoking, no flame, no spark.

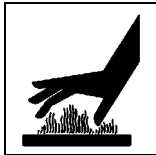




⚠ WARNING Moving traffic - hazardous situation. Death or serious injury could result. Avoid moving vehicles, wear high visibility clothing, post appropriate warning signs.



⚠ CAUTION Flying objects may cause injury. Wear hard hat and safety glasses.



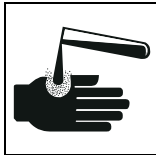
⚠ CAUTION Hot parts may cause burns. Do not touch until cool.



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



⚠ CAUTION Fall possible. Slips or trips may result in injury. Keep area clean.



⚠ CAUTION Battery acid may cause burns. Avoid contact.



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

Emergency Procedures

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

EMERGENCY SHUTDOWN - Turn ignition switch to STOP.



Electric Strike Description

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. Almost one-third of 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

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

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

If a Fiber Optic Cable is Damaged

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

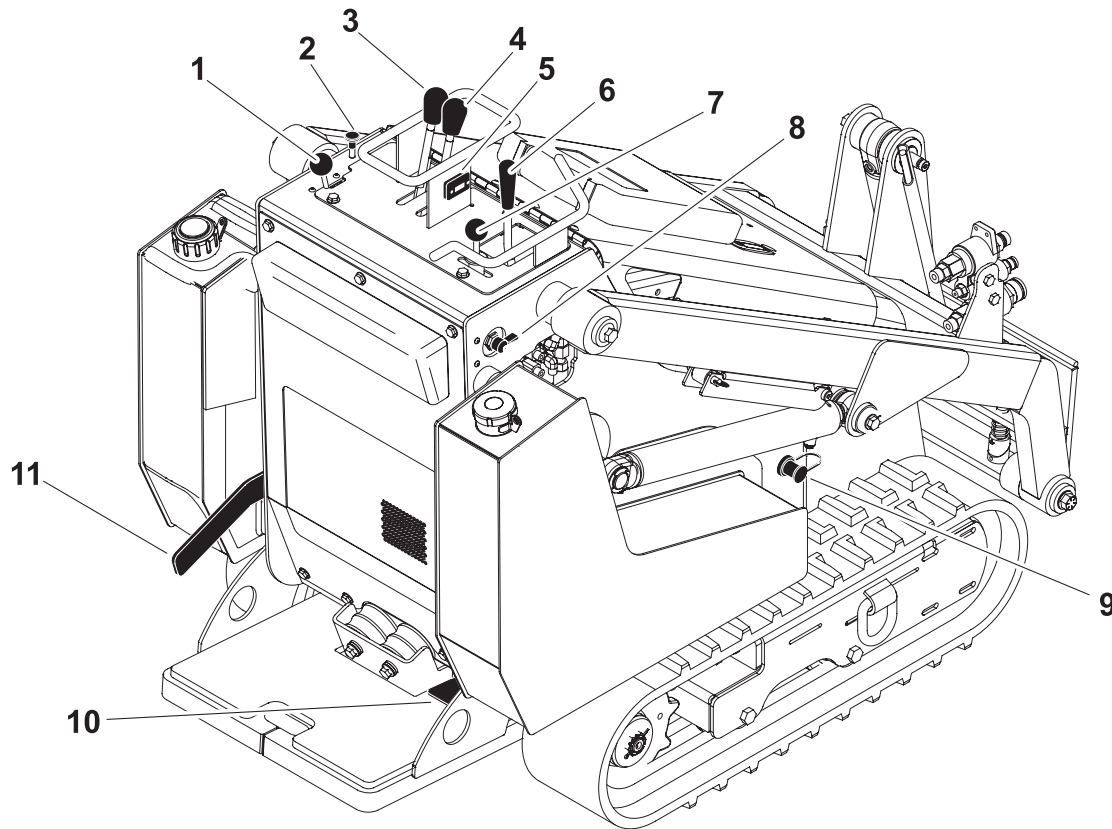
If Machine Catches on Fire



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

- Immediately move battery disconnect switch (if equipped) 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.

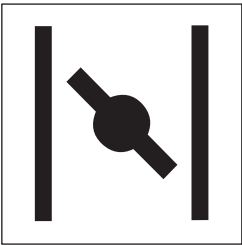
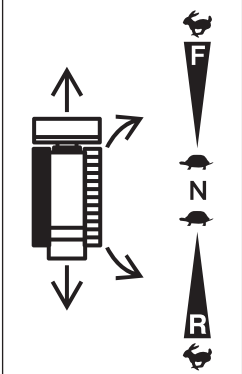
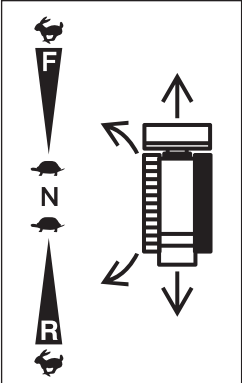
Controls

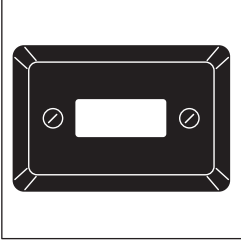
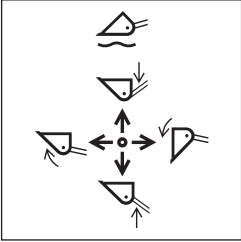
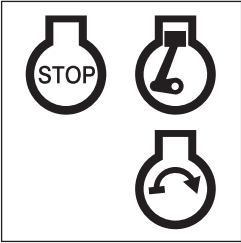


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- | | |
|------------------------------|-----------------------------------|
| 1. Throttle | 7. Attachment drive control |
| 2. Choke | 8. Ignition switch |
| 3. Left track drive control | 9. Jumper terminal |
| 4. Right track drive control | 10. Attachment drive foot control |
| 5. Tachometer/Hourmeter | 11. Parking brake lever |
| 6. Lift arm control | |



Item	Description	Notes
1. Throttle  c00ic007c.eps	To increase engine speed, push. To decrease engine speed, pull.	Increasing engine speed also increases attachment speed.
2. Choke  c00ic054c.eps	To help start cold engine, pull knob. When engine has warmed, push in completely.	
3. Left track drive control  c00ic282h.eps	To move forward, push. To move backward, pull. To go faster in either direction, move control farther from neutral. To stop, move to neutral.	To turn right, move left control forward and right control back. To turn left, move right control forward and left control back. To counter-rotate in either direction, move controls fully to ends in the directions indicated above.
4. Right track drive control  c00ic283h.eps	To move forward, push. To move backward, pull. To go faster in either direction, move control farther from neutral. To stop, move to neutral.	To turn right, move left control forward and right control back. To turn left, move right control forward and left control back. To counter-rotate in either direction, move controls fully to ends in the directions indicated above.

Item	Description	Notes
5. Tachometer/Hourmeter  c00ic051c.eps	Displays engine speed and operating time.	Use hourmeter to schedule service. Flashes "Lube & Chg Oil" alerts for 2 hours at 25-hour intervals.
6. Lift arm control  c00ic284h.eps	To move lift arms down, push. To float, push forward to end. To move lift arms up, pull. To curl attachment up, move to left. To curl attachment down, move to right.	IMPORTANT: - Do not exceed rated operating capacity when lifting loads. See page 69. - In float, weight of attachment allows attachment to follow ground contour.
7. Attachment drive control  c00ic285h.eps	To engage attachment drive in reverse, lift lever release then push to left. To engage attachment drive in forward, lift lever release, then push right.	IMPORTANT: See attachment drive foot control on page 22.
8. Ignition switch  c00ic065h.eps	To start engine, insert key and turn clockwise. To stop engine, turn key counterclockwise.	IMPORTANT: If engine does not start or stalls, turn key to STOP and then restart.
9. Jumper terminal	Use to start engine when battery is dead.	IMPORTANT: See "Park service vehicle close to disabled equipment but do not allow vehicles to touch." on page 67.



Item	Description	Notes
10. Attachment drive foot control	Attachment drive control handle must be engaged before using the foot pedal. To hold attachment drive in forward position, press pedal. To return attachment drive control to neutral, release pedal.	IMPORTANT: Use this control to hold attachment control in the on position when hands are busy operating lift arm controls or track drive.
11. Parking brake lever ENGAGE (P) ↑ PARKING BRAKE ↓ (P) DISENGAGE c00ic052c.eps	To disengage, push down. To engage, push down and outward, then pull up.	IMPORTANT: - Lever locks into position under tab. - Lever must be moved outward to clear tab.

Prepare

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Connect Attachment 29



Gather Information

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

All Jobs

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.

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.

Ground-Penetrating Jobs

Notify One-Call Services

Call area One-Call or similar services and have existing lines located and marked. Call any utilities in your area that do not subscribe to One-Call.

Above-Ground Jobs

Locate Overhead Lines

Note location and height of all overhead lines in jobsite and ensure that fully lifted attachment and/or load will not touch lines.

Inspect Site

Inspect jobsite before transporting equipment. Check for the following:

- changes in elevation such as hills or other open trenches
- obstacles such as buildings, railroad crossings, or streams
- signs of utilities (See "Inspect Jobsite" on page 26.)
- traffic
- access
- soil type and condition

Identify Hazards

Identify safety hazards and classify jobsite if attachment will penetrate ground. See "Classify Jobsite" on page 26.



WARNING

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

NOTICE:

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

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

Classify Jobsite

Inspect Jobsite

- Inspect jobsite and perimeter for evidence of underground hazards, such as:
 - “buried utility” notices
 - utility facilities without overhead lines
 - gas or water meters
 - junction boxes
 - drop boxes
 - light poles
 - manhole covers
 - sunken ground
- Follow U.S. Department of Labor regulations on excavating and trenching (Part 1926, Subpart P) and other similar regulations.
- Contact One-Call (888-258-0808) and any utility companies which do not subscribe to One-Call.
- Have an experienced locating equipment operator sweep area within 20' (6 m) to each side of work path. Verify previously marked line and cable locations.
- Mark location of all buried utilities and obstructions.
- Classify jobsite.

Select a Classification

Jobsites are classified according to underground hazards present.

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

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

Apply Precautions

Once classified, precautions appropriate for jobsite must be taken.

Electric Jobsite Precautions

Use one or both of these methods.

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

Natural Gas Jobsite Precautions

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

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



Crystalline Silica (Quartz) Dust Precautions

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

Other Jobsite Precautions

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

Check Supplies and Prepare Equipment

Supplies

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

Fluid Levels

- fuel
- hydraulic fluid
- battery charge
- engine oil

Condition and Function

- digging chain and teeth
- filters (air, oil, hydraulic)
- tracks
- pumps and motors
- hoses and valves
- signs, guards, and shields

Accessories

Fire Extinguisher

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

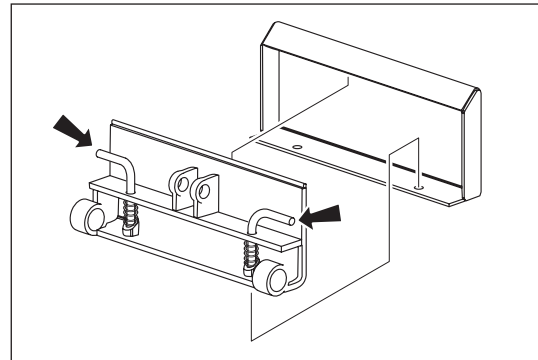
Connect Attachment

IMPORTANT: Use only Ditch Witch-approved attachments. Attachments can change the stability and operating characteristics of the unit.

Attachment

IMPORTANT: Before connecting attachment to unit, ensure that mount and receiver plates are free of dirt and debris.

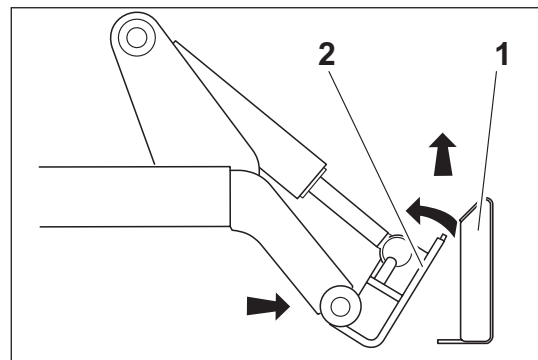
1. Position attachment on level surface with enough space behind it to accommodate unit.
2. Ensure that lock pin handles (shown) on mount plate are turned away from center of attachment.
3. Start engine.



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4. Tilt mount plate (2) forward.
5. Position mount plate in the upper lip of the receiver plate (1) on attachment.
6. Raise lift arms while tilting back mount plate.

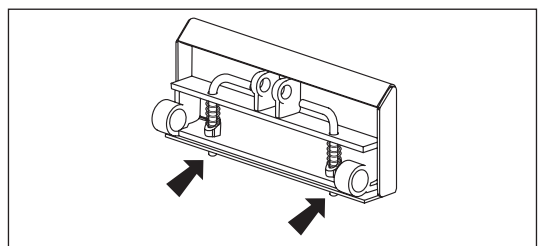
IMPORTANT: Attachment should be raised enough to clear the ground. Mount plate should be tilted back fully.



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7. Ensure that all controls are in neutral position.
8. Apply parking brake.
9. Turn ignition switch off and remove key.
10. Rotate lock pin handles toward center of mount plate to secure attachment to lift plate.

NOTICE: To ensure proper connection, verify that bottoms of lock pins are visible under attachment receiver plate (shown).

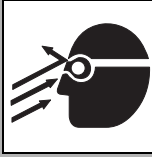


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Hydraulic Hoses

If attachment requires hydraulic power for operation, connect hydraulic hoses.



WARNING

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

NOTICE:

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

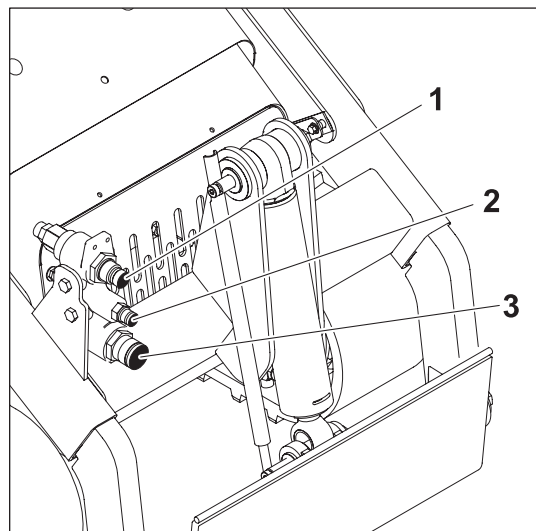


CAUTION

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

NOTICE: Hydraulic couplers, hoses and fluid may be hot. Wear gloves when connecting and disconnecting hydraulic hoses and wait until unit has cooled before touching hydraulic components.

1. Cycle attachment drive control to relieve residual pressure at hydraulic couplers.
2. Ensure that all controls are in neutral position.
3. Remove dirt and debris from hydraulic couplers.
4. Connect male coupler on attachment to female coupler (3) on unit.
5. Connect female coupler on attachment to male coupler (1) on unit.
6. Connect female coupler on case drain hose to case drain coupler (2) on unit, if attachment requires it.
7. Ensure that connections are secure by pulling on hoses.



t170m005h.eps

Drive

Chapter Contents

Start Engine 32

Drive 32

Shut Down 33



Start Engine

1. Ensure all controls are in neutral.
2. If necessary, choke cold engine.
3. Move throttle to half open.
4. Turn ignition switch to start position and release when engine starts.

NOTICE: If jump starting is required, see "Park service vehicle close to disabled equipment but do not allow vehicles to touch." on page 67.

5. Push in choke after engine is warm.

EMERGENCY SHUTDOWN: Turn ignition switch to STOP.

Drive

General Operation

1. Disengage parking brake.
2. Pull lift arm control to raise mount plate (and attachment) off ground.
3. Move both track drive controls to forward or reverse. See page 20.

IMPORTANT: If needed for attachment operation, push attachment drive foot control to hold attachment control in the forward position while operating track drive and lift arm controls.

4. Adjust throttle as needed.

Slope Operation Guidelines

NOTICE: Keep attachment/load low when operating on a slope. Drive slowly and cautiously at all times.

- Operate up and down slopes with heavy end of unit uphill. Weight distribution changes based on attachments and load. For example, an empty bucket makes the rear of the unit the heavy end while a full bucket makes the front of the unit the heavy end. Most Ditch Witch-approved attachments make the front of the unit the heavy end.
- Avoid starting, stopping, or turning on slopes. If you must turn, keep the heavy end of the unit uphill.
- Do not park unit on slope without lowering attachment to the ground, returning all controls to neutral position, turning ignition switch to STOP, and applying parking brake.

Shut Down

1. Lower lift arms to ground.
2. Move all controls to neutral position.
3. Apply parking brake.
4. Run engine at low idle for three minutes to cool.
5. Turn ignition switch to STOP.
6. Remove key.

NOTICE:

- Unit should not be parked on a slope unless parking brake is engaged.
- Move all controls to neutral position when stopped.



Transport

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- Points36
- Procedure36

Haul 37

- Inspect Trailer37
- Hitch Trailer37
- Load38
- Tie Down39
- Unload40
- Unhitch Trailer40

Tow 41



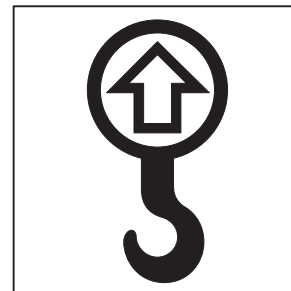
Lift

**⚠ WARNING**

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

Points

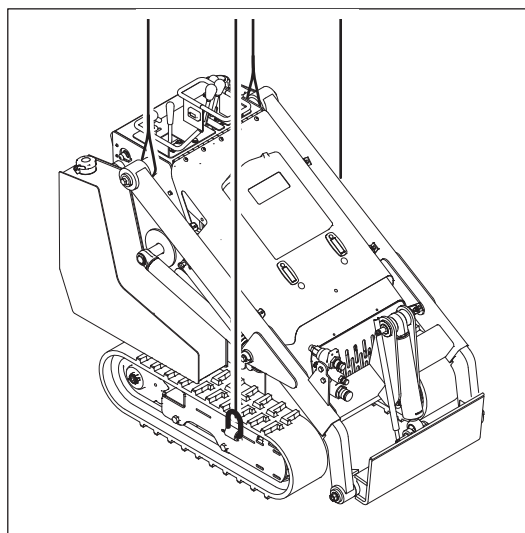
Lifting points are identified by lifting decals. Lifting at other points is unsafe and can damage machinery.



ic1319a.eps

Procedure

Use a hoist capable of supporting the equipment's size and weight. See "Specifications" on page 69 or measure and weigh equipment before lifting. Use four lift points. Attach securely to cross members.



t170m006h.eps

Haul

IMPORTANT: For complete information, see the trailer manufacturer's manual.

Inspect Trailer

- Check hitch for wear and cracks. Lubricate if needed.
- Check battery for 12V charge, if installed.
- Inspect lights for cleanliness and correct operation. Inspect reflectors and replace if needed.
- Check tire pressure. Check lug nut torque with a torque wrench. Adjust if needed.
- If equipped, ensure trailer brakes are adjusted to come on in synchronization with tow vehicle brakes.
- Check ramps and trailer bed for cracks.

Hitch Trailer

1. Back tow vehicle to trailer.
2. Put manual transmission into first or reverse gear or automatic transmission into park. Turn off ignition. Set parking brake.
3. Connect trailer drawbar, lunette or coupler to tow vehicle hitch and lock in place with lock pin. If needed, adjust drawbar, lunette or coupler height to level load.
4. Connect safety chains to tow vehicle.

IMPORTANT: Do not connect safety chains to pintle hook or hitch ball.

5. If equipped, connect breakaway switch cable to tow vehicle.

IMPORTANT: Do not connect breakaway switch cable to pintle hook or hitch ball.

6. If equipped, plug trailer electrical connector into tow vehicle connector.
7. If equipped, use jack crank to raise jack base and stow.
8. Remove wheel blocks.



Load



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

NOTICE:

- Load and unload trailer on level ground.
- Attach trailer to vehicle before loading or unloading.
- Ten to fifteen percent of total vehicle weight (equipment plus trailer) must be on tongue to help prevent trailer sway.
- Incorrect loading can cause trailer sway.

1. Disengage parking brake.
2. Start engine.
3. Adjust throttle to low speed.
4. Pull lift arm control to raise mount plate (and attachment) clear of trailer, but keep it low.
5. Move unit to rear of trailer and align with ramps.
6. Move both track drive controls forward and slowly move unit onto trailer until tiedown position is reached.

NOTICE:

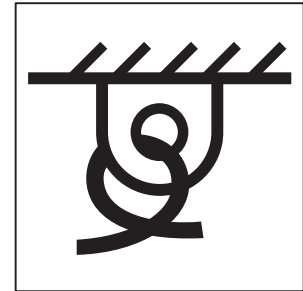
- If loading onto tilt-bed trailer, be prepared for trailer to tilt.
- Move all controls to neutral position when stopped.

7. Push lift arm control to lower mount plate (and attachment) to trailer bed.
8. Apply parking brake.
9. Ensure that all controls are in neutral position.
10. Turn ignition switch to STOP.
11. Tie down unit.

Tie Down

Points

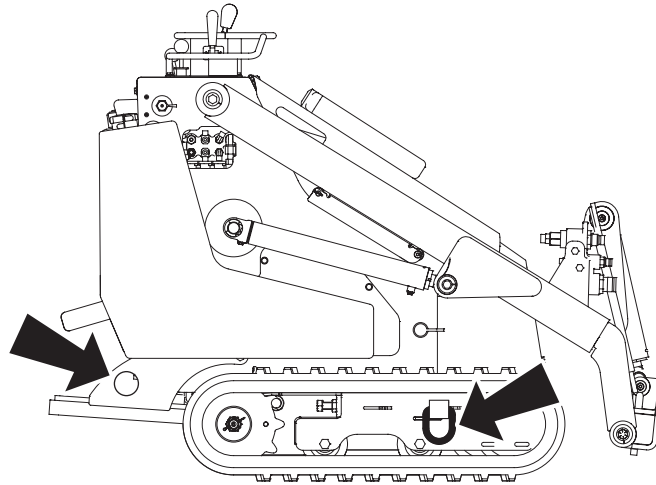
Tiedown points are identified by tiedown decals. Securing to truck or trailer at other points is unsafe and can damage machinery.



ic1320a.eps

Procedure

Loop tiedowns around unit at tiedown points. Make sure tiedowns are tight before transporting.



t170m007h.eps



Unload



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

NOTICE:

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

1. Prepare trailer and ramps for unloading.
2. Remove tiedowns.
3. Disengage parking brake.
4. Start engine.
5. Pull lift arm control to raise mount plate (and attachment) off ground, but keep it low.
6. Adjust throttle to low speed and slowly back unit down trailer or ramps.

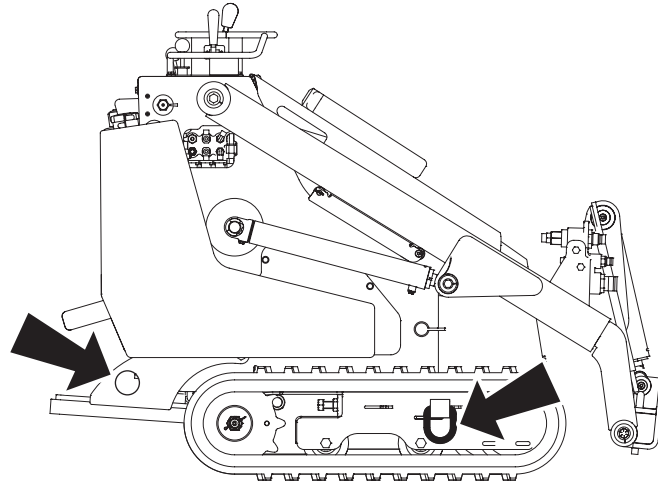
NOTICE: If unloading from tilt-bed trailer, be prepared for trailer to tilt.

Unhitch Trailer

1. Stop tow vehicle and trailer on level ground.
2. Put manual transmission into first or reverse gear or automatic transmission into park. Turn off ignition. Set parking brake.
3. Block trailer wheels.
4. Reverse "Hitch Trailer" steps on page 37 to unhitch trailer from tow vehicle.

Tow

Under normal conditions, unit should not be towed. If unit breaks down and towing is necessary:



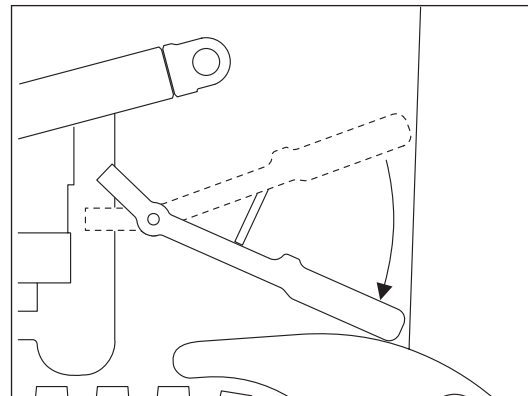
t17om007h.eps

- attach chains to tow points facing towing vehicle
- tow for short distances at less than 1 mph (1.6 km/h)
- do not tow for more than 100' (30 m)
- use no more than 1,300 lb (5800 N) of towing force
- disengage parking brake and open tow valves



Prepare Unit for Towing

1. Disengage parking brake, shown.
2. Ensure that all controls are in neutral.

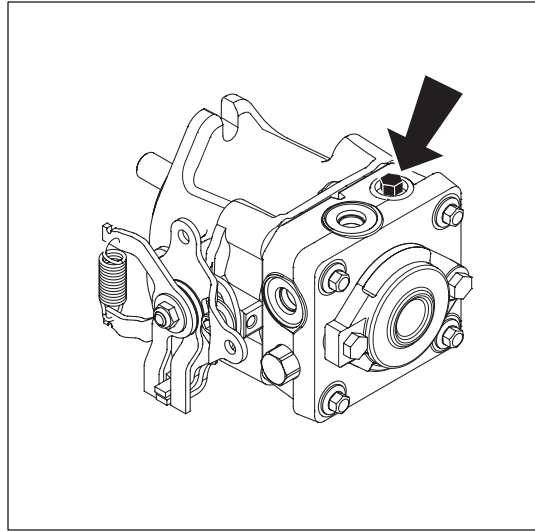


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3. Locate bypass valves on top of each of the upper pumps. Turn each valve two turns counterclockwise to open.
4. After towing, turn each valve two turns clockwise to close.

NOTICE: Bypass valves on BOTH pumps must be opened for towing.



t17om008h.eps

Complete the Job

Chapter Contents

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Disconnect Attachment 44

Stow Tools 44



Rinse Equipment

1. Spray water onto equipment to remove dirt and mud, especially at undercarriage.

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

2. Open hood and remove debris from inside of unit.
3. Remove mud from track sprockets.

Disconnect Attachment

1. Lower attachment to the ground.
2. Ensure that all controls are in neutral.
3. Turn off engine.
4. Apply parking brake.
5. Disengage lock pins by turning handles away from center of attachment.
6. Cycle attachment drive control and disconnect hydraulic hoses, if used.
7. Disengage parking brake.
8. Start engine.
9. Tilt mount plate forward and back unit away from attachment.

Stow Tools

Make sure all tools and accessories are loaded on trailer.

Service



Chapter Contents

Service Precautions 46

Overview 48

Recommended Lubricants/Service Key 49

Oil Temperature Chart 50

10 Hour 51

50 Hour 55

100 Hour 59

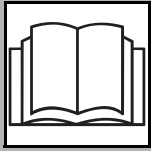
200 Hour 60

250 Hour 61

500 Hour 62

As Needed 63

Service Precautions

**WARNING**

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

NOTICES:

- Unless otherwise instructed, all service should be performed with engine off.
- Stop engine and apply parking brake before opening hood for inspection or service.
- Allow engine to cool before performing any service.
- Refer to engine manufacturer's manual for engine maintenance instructions.
- Before servicing equipment, lower unstowed attachments to ground.

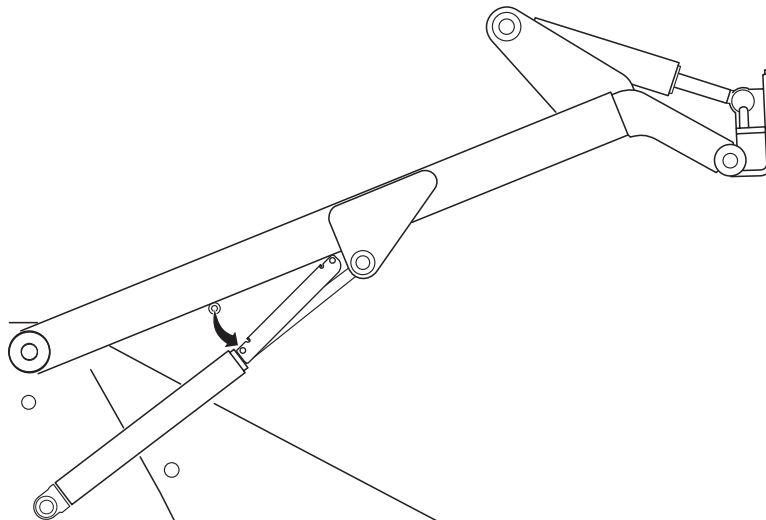
Working Under Raised Lift Arms

**WARNING**

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

NOTICE: Support both lift arms before working under raised lift arms.

Use safety supports as indicated when working under raised lift arms.



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Jump Starting Precaution



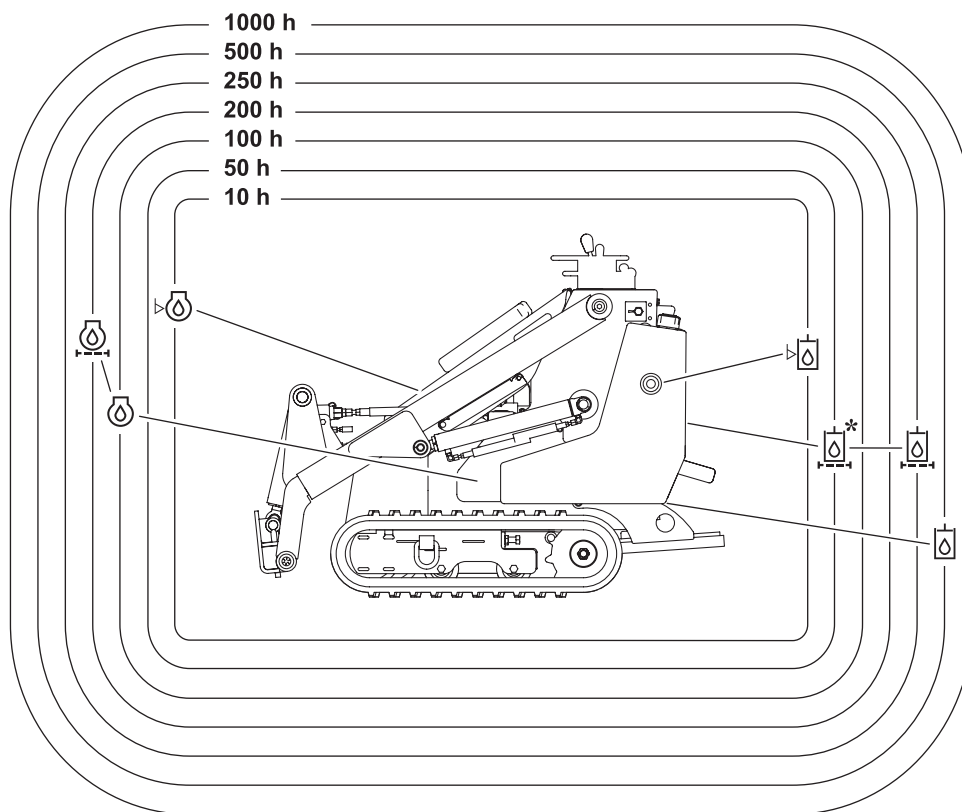
WARNING

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

NOTICE:

- Sparks can cause battery to explode.
- Electronic components can be easily damaged.
- Jump starting is not recommended except in extreme circumstances. Follow procedures on page 65 if jump starting is necessary.

Overview



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Recommended Lubricants/Service Key



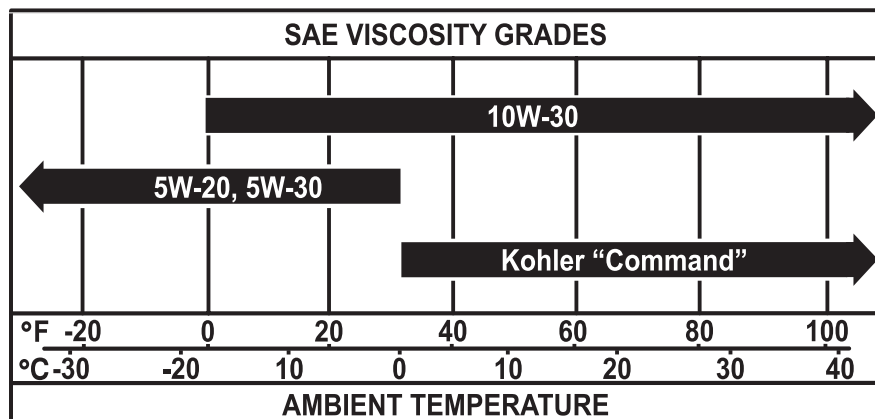
Item	Description
 GEO	Gasoline engine oil meeting or exceeding SG, SH, or SJ per the API service classifications and SAE viscosity recommended by engine manufacturer (SAE 10W30)
 THF	Tractor hydraulic fluid, similar to Phillips 66 HG, Mobilfluid 423, Chevron Tractor Hydraulic Fluid, Texaco TDH Oil, or equivalent
	Check level of fluid or lubricant
	Check condition
	Filter
	Change, replace, adjust, service or test

Proper lubrication and maintenance protects Ditch Witch equipment from damage and failure. Service intervals listed are for minimum requirements. In extreme conditions, service machine more frequently. Use only recommended lubricants. Fill to capacities listed in "Fluid Capacities" on page 71.

NOTICE:

- Use only genuine Ditch Witch parts, filters, and approved lubricants to maintain warranty.
- Use the "Service Record" on page 77 to record all required service to your machine.

Engine Oil Temperature Chart



t170m010h.eps

Temperature range anticipated before next oil change

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

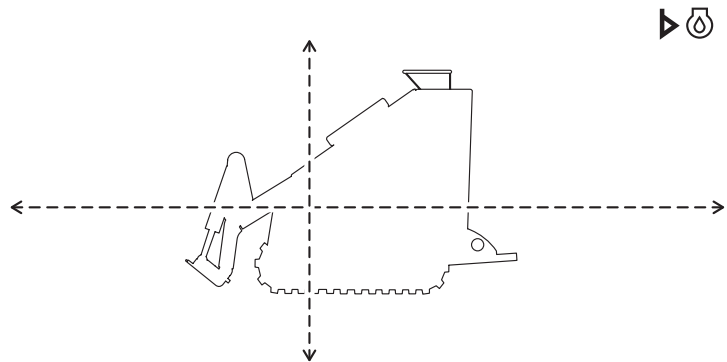
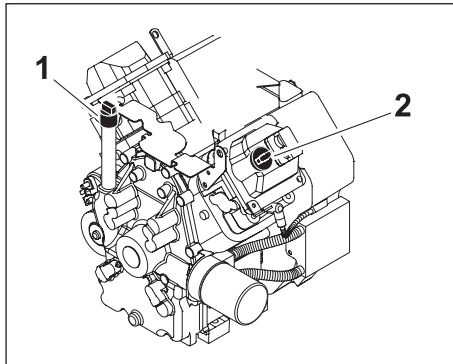
10 Hour



Location	Task	Notes
Traction Unit	Check engine oil level	GEO (SAE 10 W 30)
	Check hydraulic fluid level	THF
	Check hydraulic hoses	
	Check track tension	

Traction Unit

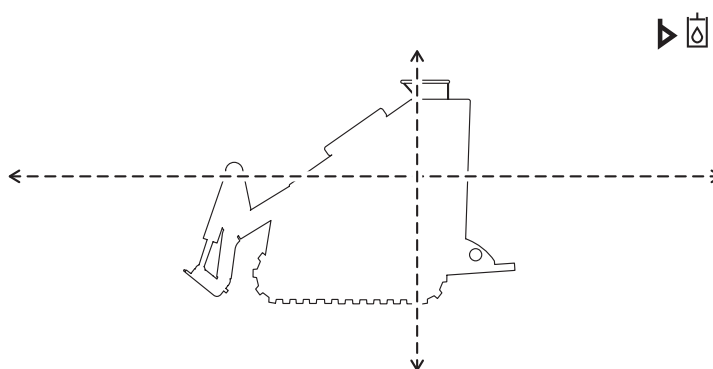
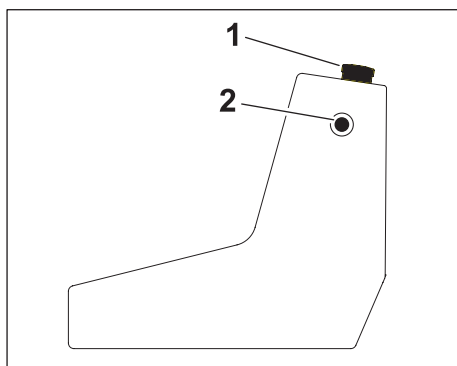
Check Engine Oil Level



t17om012h.eps

Check engine oil level at dipstick opening (shown) every 10 hours. Oil level should be at top of marking. If low, add 10W30. Check with unit on level surface and at least 15 minutes after stopping engine.

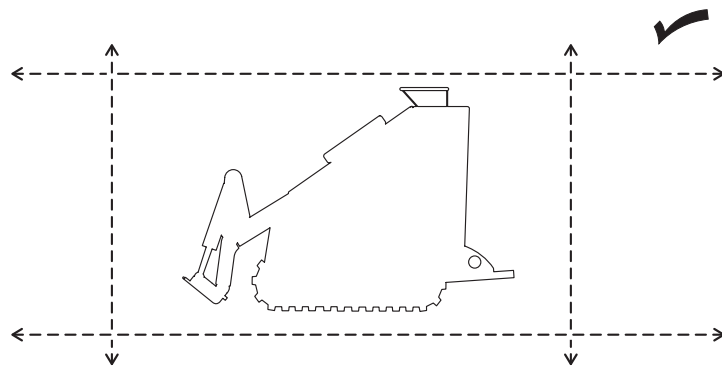
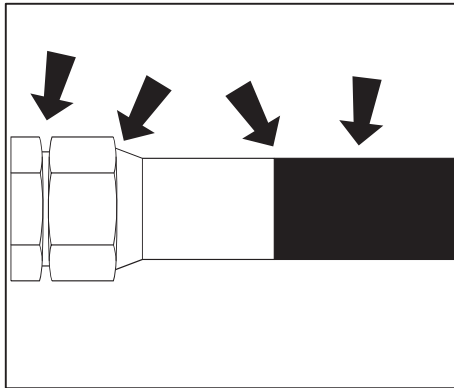
IMPORTANT: Use oil specified in "Engine Oil Temperature Chart" on page 50.

Check Hydraulic Fluid Level

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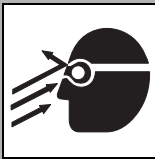
Check hydraulic fluid level every 10 hours. Maintain fluid level at halfway point on sight glass (1), when engine is off and fluid is cool. If low, add THF at fill (2).

Check Hydraulic Hoses



t09om012c.eps

Check hydraulic hoses for leaks every 10 hours.



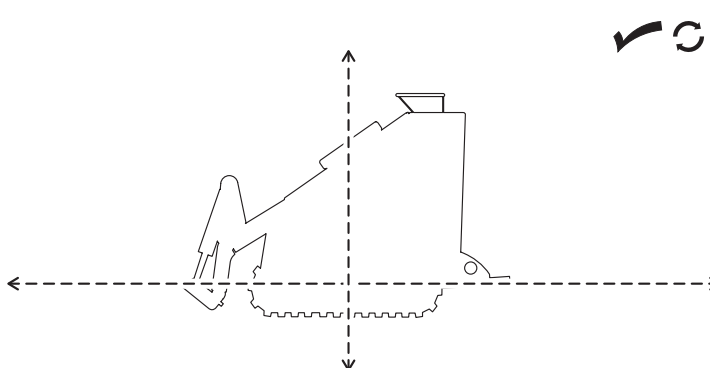
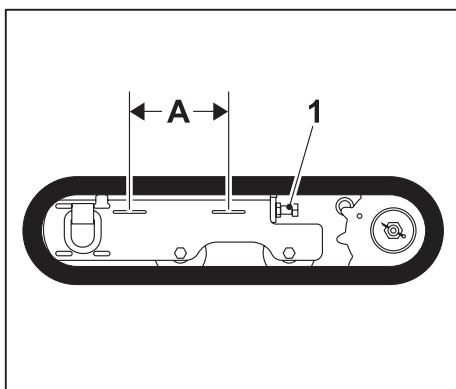
⚠ WARNING

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

NOTICE:

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



Check Track Tension

t09om013c.eps

Check track tension every 10 hours and adjust as needed. Turn bolt (1) clockwise to tighten and counterclockwise to loosen. Track tension is correct when dimension A is 8 5/8" (219 mm) $\pm$.250" (6.4 mm).

IMPORTANT: Dimension A is the overall spring length, compressed.

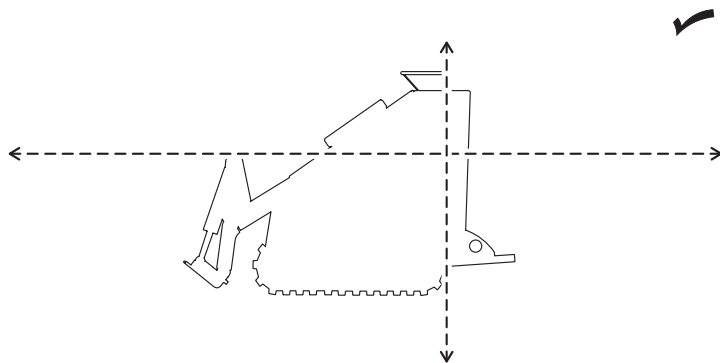
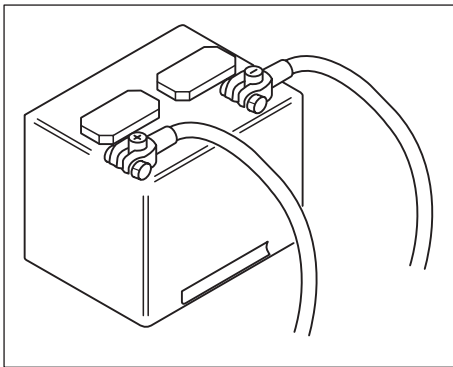
50 Hour



Location	Task	Notes
Traction Unit	Check battery	
	Check drive belt	
	Check air filter	
	Clean oil cooler	
	Change hydraulic filter	break in only

Traction Unit

Check Battery



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Check battery every 50 hours. Keep battery and terminals clean and free of corrosion.

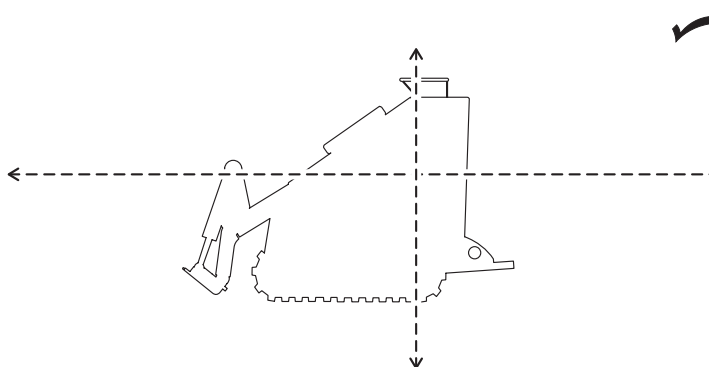
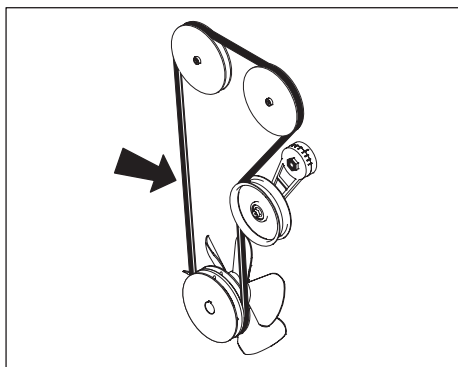


WARNING

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

NOTICE:

- Battery gas can explode. Keep sparks and flames away from battery.
- Always remove negative (-) battery cable first and replace it last.
- Battery electrolyte is sulfuric acid and poisonous. Will burn skin and cause blindness if splashed into eyes. Wash hands after working around battery.
- Never disconnect battery terminals with engine running. Voltage spike may occur and ruin electronic control modules or other components.

Check Drive Belt

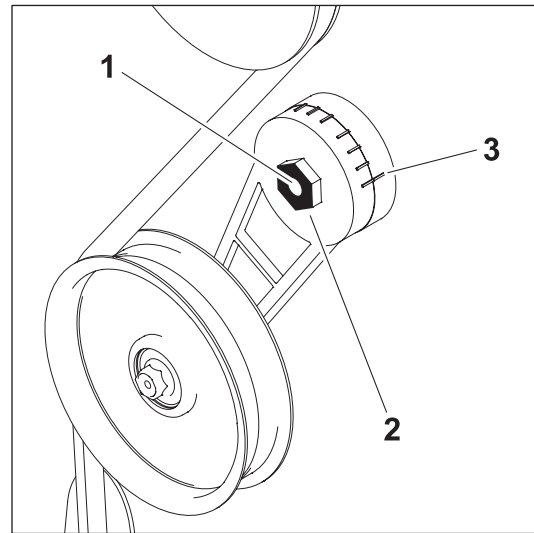
t170m018h.eps

Check drive belt every 50 hours. Adjust belt tension if necessary. Replace if cracked, stretched, or badly worn. Tensioner should be set at 2.5-3 increment marks.

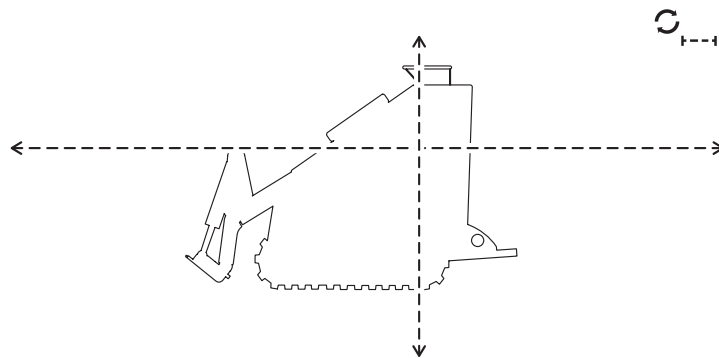
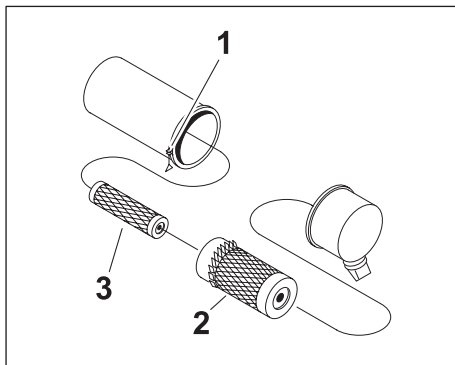
IMPORTANT: See belt changing procedure on page 63.

To adjust:

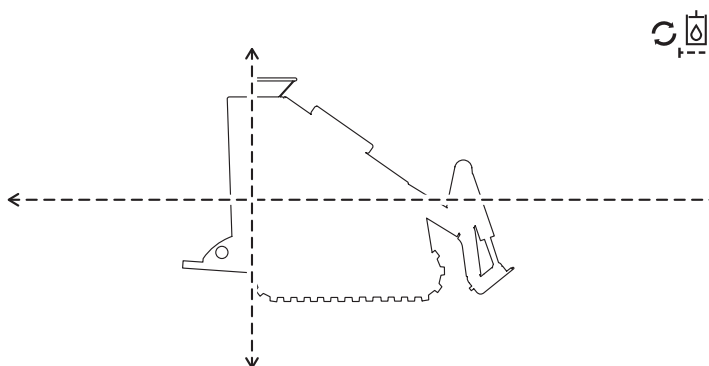
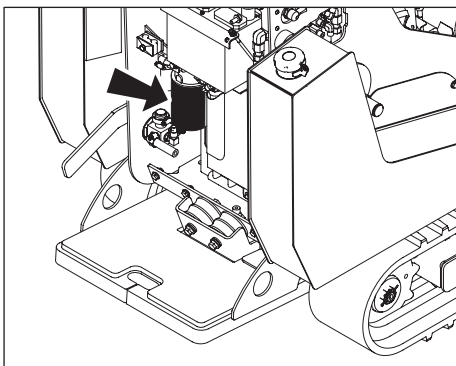
1. Loosen bolt on tensioner (1).
2. Apply wrench to large nut (2).
3. Tighten tensioner until the fixed bar on the base is lined up with the third bar on the tensioner arm as shown (3).



Check Air Filter



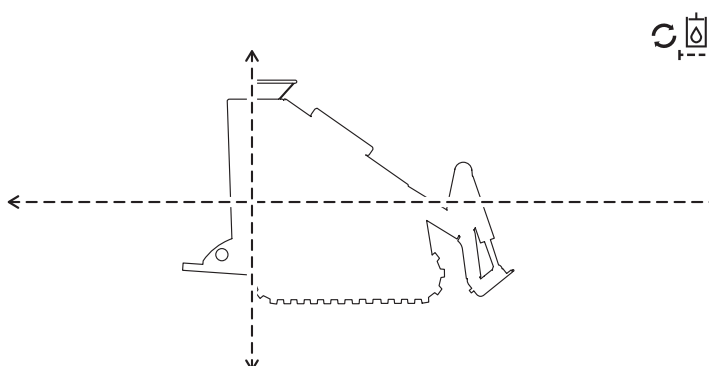
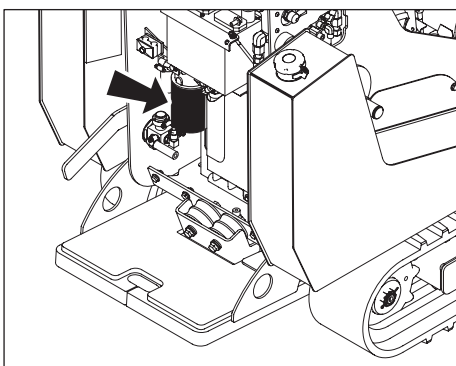
Check air filter for wear or holes every 50 hours. Replace as needed.

Clean Oil Cooler

t17om022h.eps

Clean oil cooler every 50 hours. Clean more frequently if operating in dusty conditions. Clean with compressed air or low pressure water.

NOTICE: Be careful not to damage cooler fins.

Change Hydraulic Fluid Filter (break in only)

t17om022h.eps

Change hydraulic fluid filter at 50 hours for break in process, then change every 250 hours.

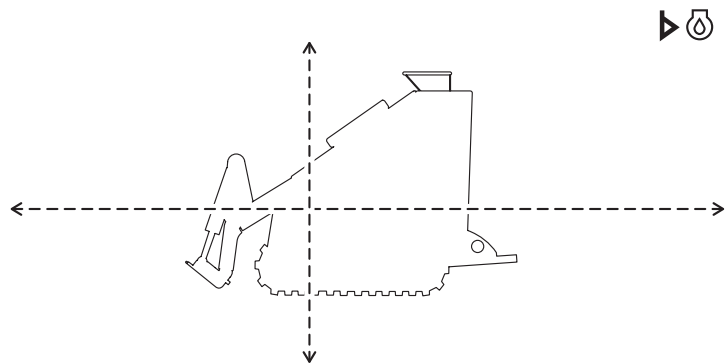
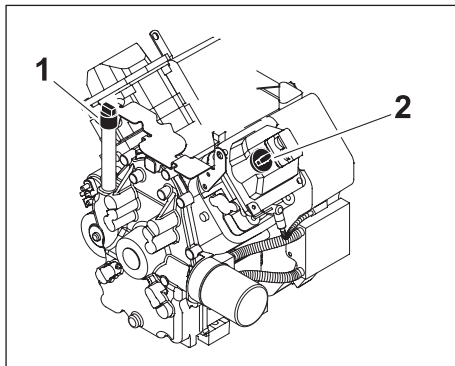
100 Hour



Location	Task	Notes
Traction Unit	Change engine oil	GEO, 10 W 30

Traction Unit

Change Engine Oil



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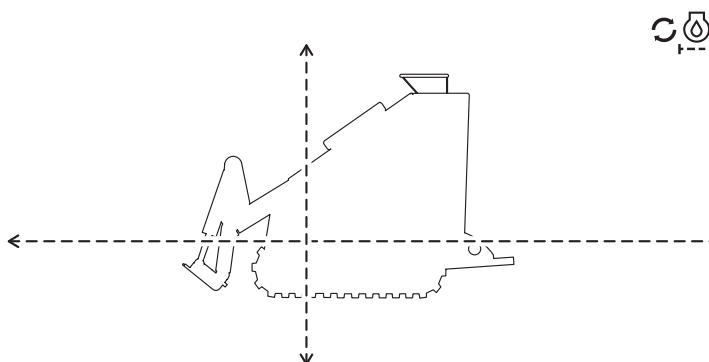
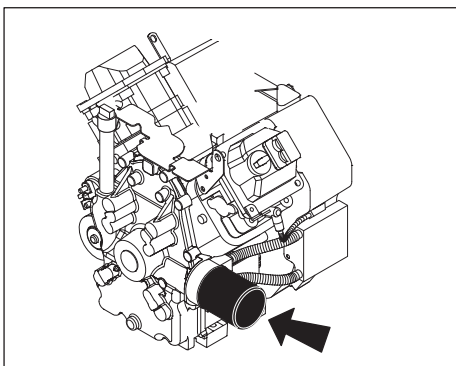
Change engine oil every 100 hours. Drain oil at drain plug (1) and add GEO 10 W 30 at filler (2) until oil level is seen at marking.

IMPORTANT: Use oil specified in "Engine Oil Temperature Chart" on page 50.

200 Hour

Location	Task	Notes
Traction Unit	Check spark plugs and gap	See engine operator's manual for instructions
	Change oil filter	

Change Oil Filter



t17om021h.eps

Change hydraulic fluid filter every 200 hours.

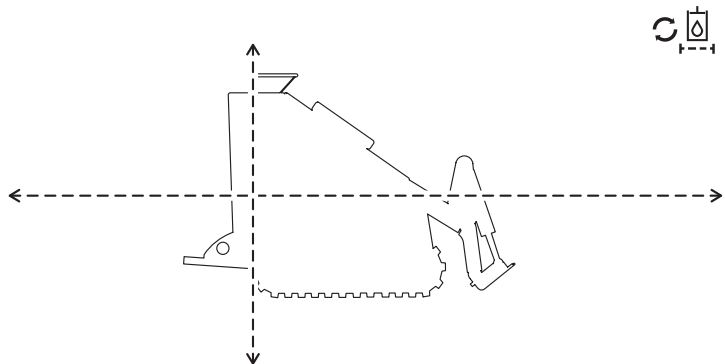
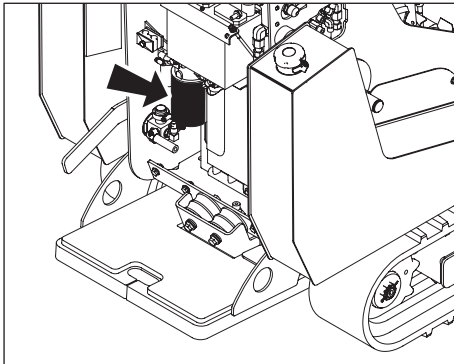
250 Hour



Location	Task	Notes
Traction Unit	Change hydraulic fluid filter	
	Change air filter, check inner element	

Traction Unit

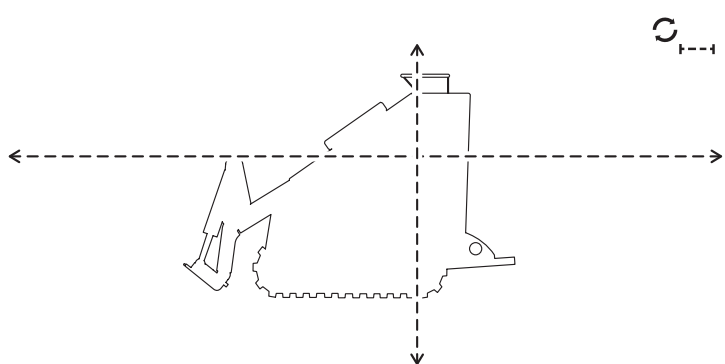
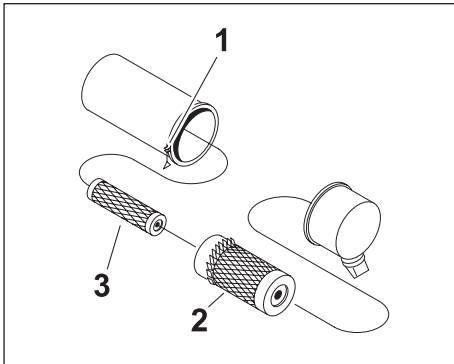
Change Hydraulic Fluid Filter



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Change hydraulic fluid filter every 250 hours.

Change Air Filter



t17om015h.eps

Change air filter every 250 hours.

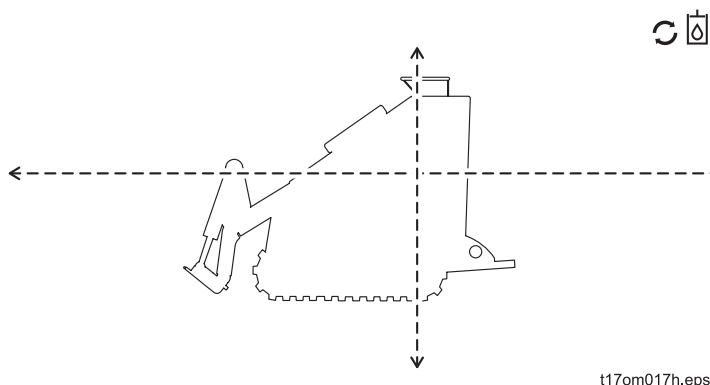
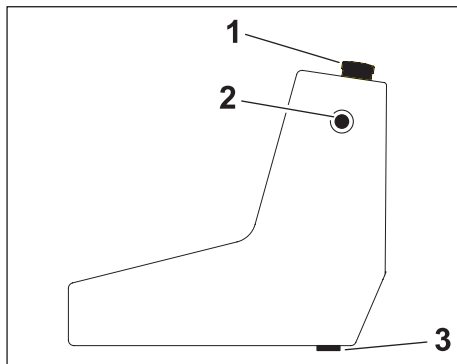
1. Open air filter housing at latches (1).
2. Remove primary (2) and secondary (3) elements.
3. Wipe inside of housing and wash end cup.
4. Insert new primary and secondary elements.
5. Close air filter case.

500 Hour

Location	Task	Notes
Traction Unit	Change hydraulic fluid	

Traction Unit

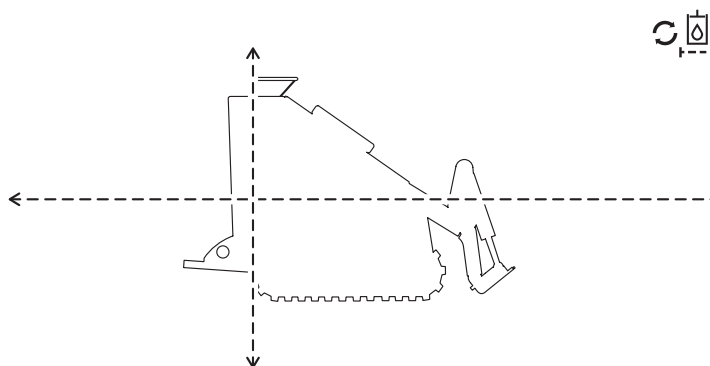
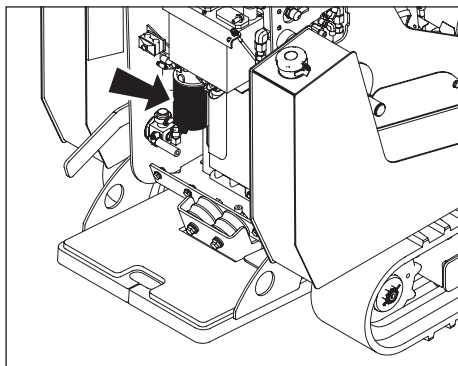
Change Hydraulic Fluid



t17om017h.eps

Change hydraulic fluid every 500 hours. Drain fluid at drain plug (3) and add THF at fill (1) until fluid level is at halfway point on sight glass (2).

Change Hydraulic Fluid Filter



t17om022h.eps

Change hydraulic fluid filter every 500 hours.

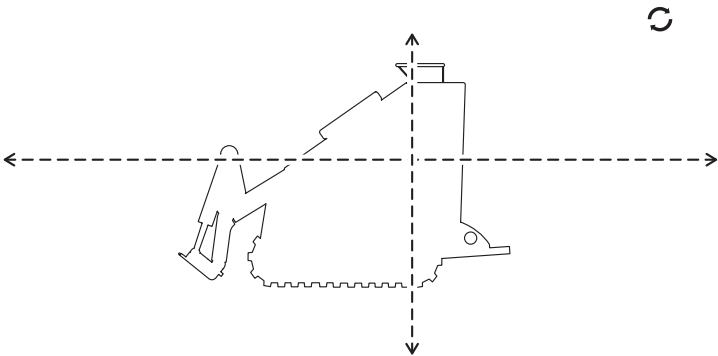
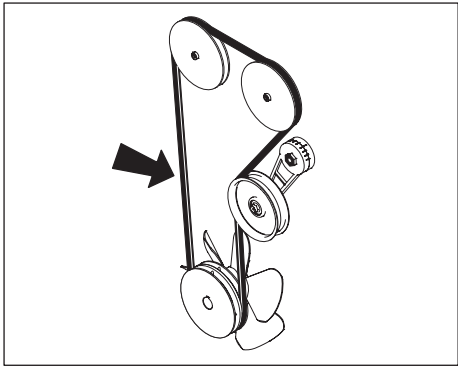
As Needed



Location	Task	Notes
Traction Unit	Change drive belts	
	Jump Start	

Traction Unit

Change Drive Belt



t17om020h.eps

Change drive belt as needed when worn or damaged.



CAUTION

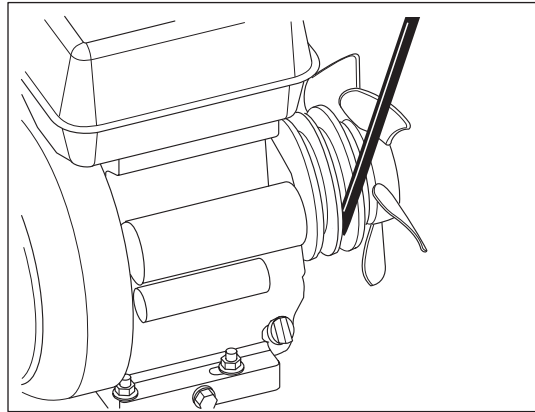
Hot parts may cause burns. Do not touch until cool.

NOTICE: Allow engine to cool before touching parts or performing any service.

1. Stop engine and allow to cool before attempting service.
2. Engage parking brake.
3. Remove key from ignition switch.

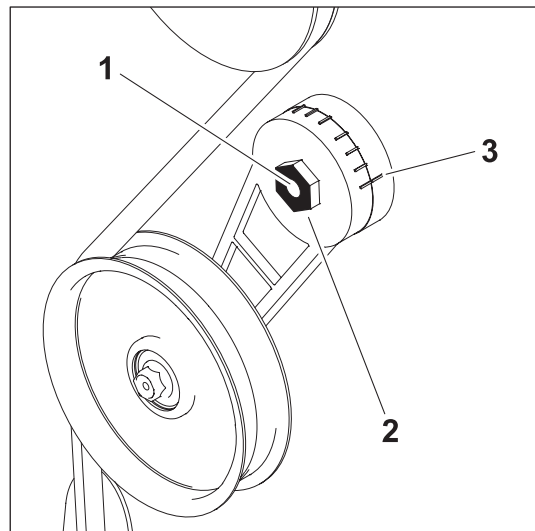


4. Open hood and note routing and alignment of belt. Drive belt goes in pulley groove closest to the cooling fan.



t17om025h.eps

5. Pull tensioner back and slip belt off of the idler pulley.
6. Remove belt from pulleys and carefully work it around fan and through the fan hole.
7. Remove belt through opening.
8. Install new belt in reverse order of removal and position tensioners to contact belt.
9. Adjust belt tension. See page 56 for belt adjustment procedure.



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WARNING

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

NOTICE: Do not open hood for inspection or service with engine running.



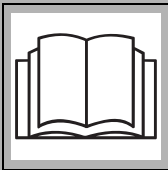
WARNING

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

NOTICE: Do not leave operator station with engine running.

10. Start engine and check operation.
11. Stop engine, open hood, and re-check belt alignment.
12. Close hood.

Jump Start Unit



WARNING

Incorrect procedures could result in death, injury, or property damage. Use equipment correctly.

NOTICES:

- Park on level area.
- Put all drive controls in neutral and lower all unstowed attachments.
- Turn off all electrical loads.
- Turn off engine and remove key from ignition.
- Block wheels or tracks.

**⚠ WARNING**

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

NOTICES:

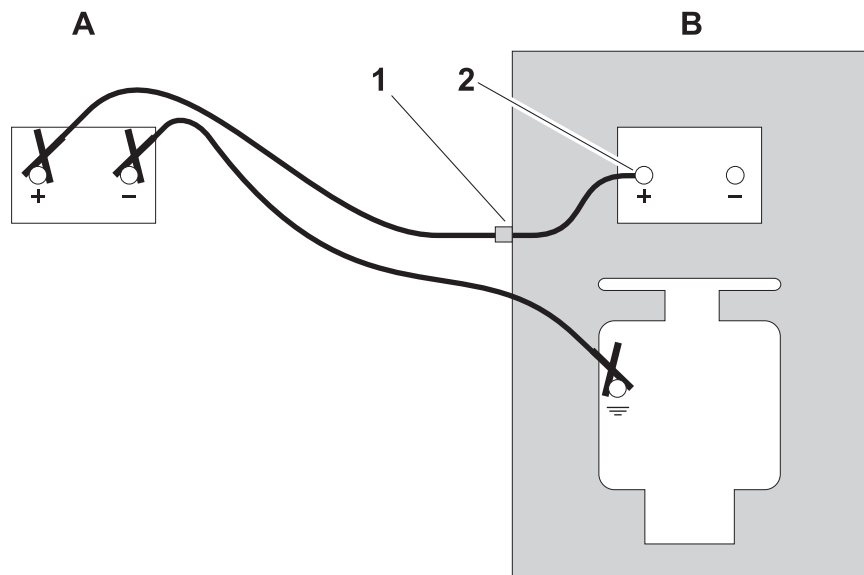
- Lead-acid batteries vent explosive hydrogen gas when charging.
- Do not smoke, create sparks, or use flames around batteries.
- NEVER lean over battery when making connections.
- Do not allow vehicles to touch when jump starting.
- Wear eye protection and remove metal jewelry and watches.
- Do not attempt to jump start a battery that is leaking, bulging, heavily corroded, frozen, or otherwise damaged.
- NEVER short-circuit battery terminals for any reason.
- NEVER hammer on battery posts or cable terminals.

Before You Start

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

Read all steps thoroughly and review illustration before performing procedure.

Jump Start Procedure (Engine Off)



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1. Park service vehicle close to disabled equipment but do not allow vehicles to touch.
2. Engage parking brake in both vehicles.
3. Turn the ignition switch to the OFF position in both vehicles, and turn off all electrical loads.
4. Inspect battery in disabled vehicle (B) for signs of cracking, bulging, leaking, or other damage. Connect red positive (+) jumper cable clamp to positive (+) post (2) of battery in disabled vehicle first.



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

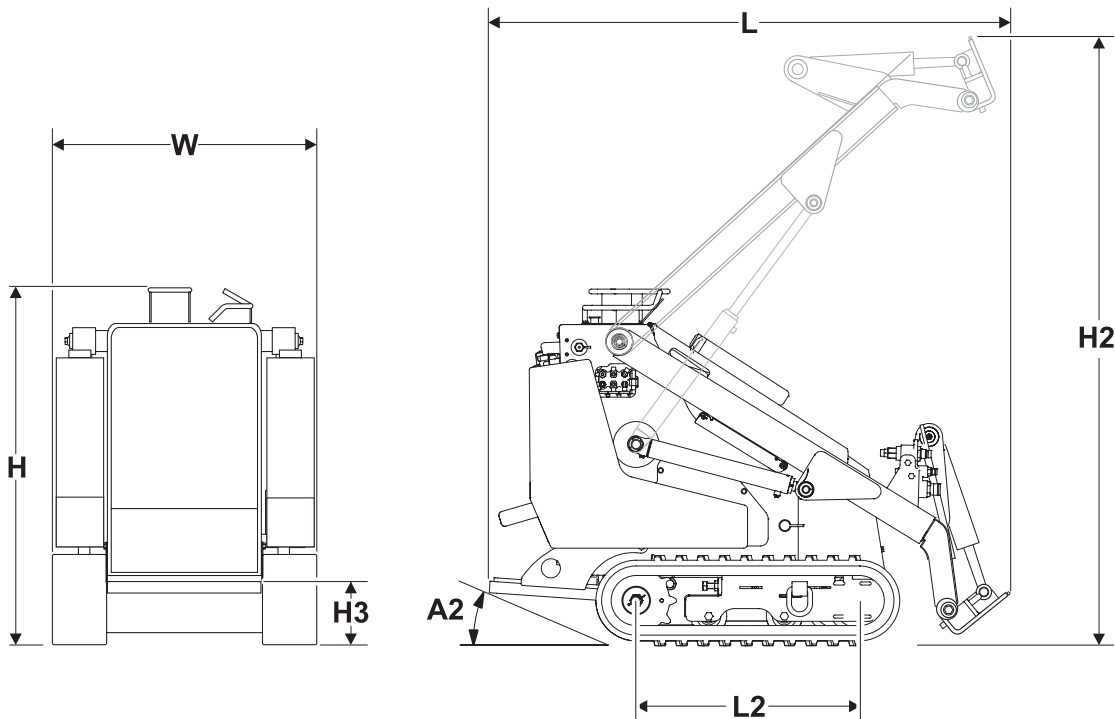
5. Connect the other red positive (+) jumper cable clamp to positive (+) post of battery (A) in the service vehicle.
6. Connect black negative (-) cable clamp to negative (-) post of battery (A) in service vehicle.
7. Connect the other black negative (-) cable clamp to the engine or frame ground on the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

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. If a running jump is necessary, repeat steps above with engine running.

NOTICE: Jumping with engine running can damage the alternator and electronic components on both vehicles, and should be performed only if necessary.

Specifications

Basic Unit



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Dimensions		U.S.	Metric
H	Overall height	42.5 in	1.1 m
L	Overall length	58.2 in	1.5 m
	Weight	1660 lb	753 kg
H2	Hinge pin height, max	70.4 in	1.8 m
L2	Wheelbase/track length	30 in	762 mm
W	Track width, max	35.1 in	892 mm
	Ground clearance	4.0/2.5 in	101 mm/64 mm
H3	Platform height	7.5 in	191 mm
	Tipping capacity	1030 lb	467 kg
	Rated operating capacity (@ 35% of tipping capacity)	350 lb	158 kg

Dimensions		U.S.	Metric
A2	Angle of departure	18°	18°
	Swing radius	35 in	889 mm

Performance		U.S.	Metric
Ground drive speed, forward		3.0 mph	4.8 km/h
Ground drive speed, reverse		3.0 mph	4.8 km/h
Ground pressure with no bucket or operator		3.9 psi	0.27 bar

Hydraulic System		U.S.	Metric
Auxiliary:			
Flow rate		12 gpm	45.5 L/min
Pressure		2300 psi	158 bar

Ground drive: dual hydrostat			
Flow rate		11 gpm	42 L/min
Pressure		2330 psi	162 bar

Power		U.S.	Metric
Engine: Kohler CH20			
Cooling medium		air	
Number of cylinders		2	
Displacement		38 in ³	624 cm ³
Bore		3.03 in	77 mm
Stroke		2.64 in	67 mm
Installed net power per SAE J1349 (@ 3600 rpm)		20 hp	14.9 kW
Maximum governed speed (no load)		3850 rpm	3850 rpm

Fluid Capacities	U.S.	Metric
Fuel tank	7.5 gal	28.4 L
Engine oil, including filter	2 qt	1.9 L
Hydraulic reservoir	7 gal	26.5 L



Battery

SAE reserve capacity 41 min, SAE cold crank @ 0°F (-18°C) 340 amp, 12V electrical system

Noise Levels

Operator 99 dBA sound pressure per ISO 6394
Exterior 82 dBA sound power per ISO 6393

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

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 Parts Limited Warranty Policy

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

Exclusions from Product Warranty

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

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

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

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

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

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

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

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

**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.

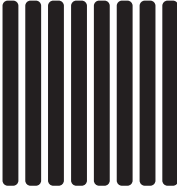
This will enable you to receive updates on this equipment as well as information on new products of interest.

Thanks for using Ditch Witch equipment.

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



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO 23 PERRY OKLAHOMA

POSTAGE WILL BE PAID BY

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



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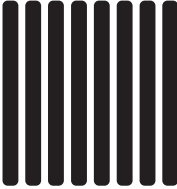
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POSTAGE WILL BE PAID BY

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



Ditch Witch® Registration Card

Please Type or Print All Information

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

Ditch Witch® Registration Card

Please Type or Print All Information

Purchaser's Company Name		
Attention		
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		

Service Record

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