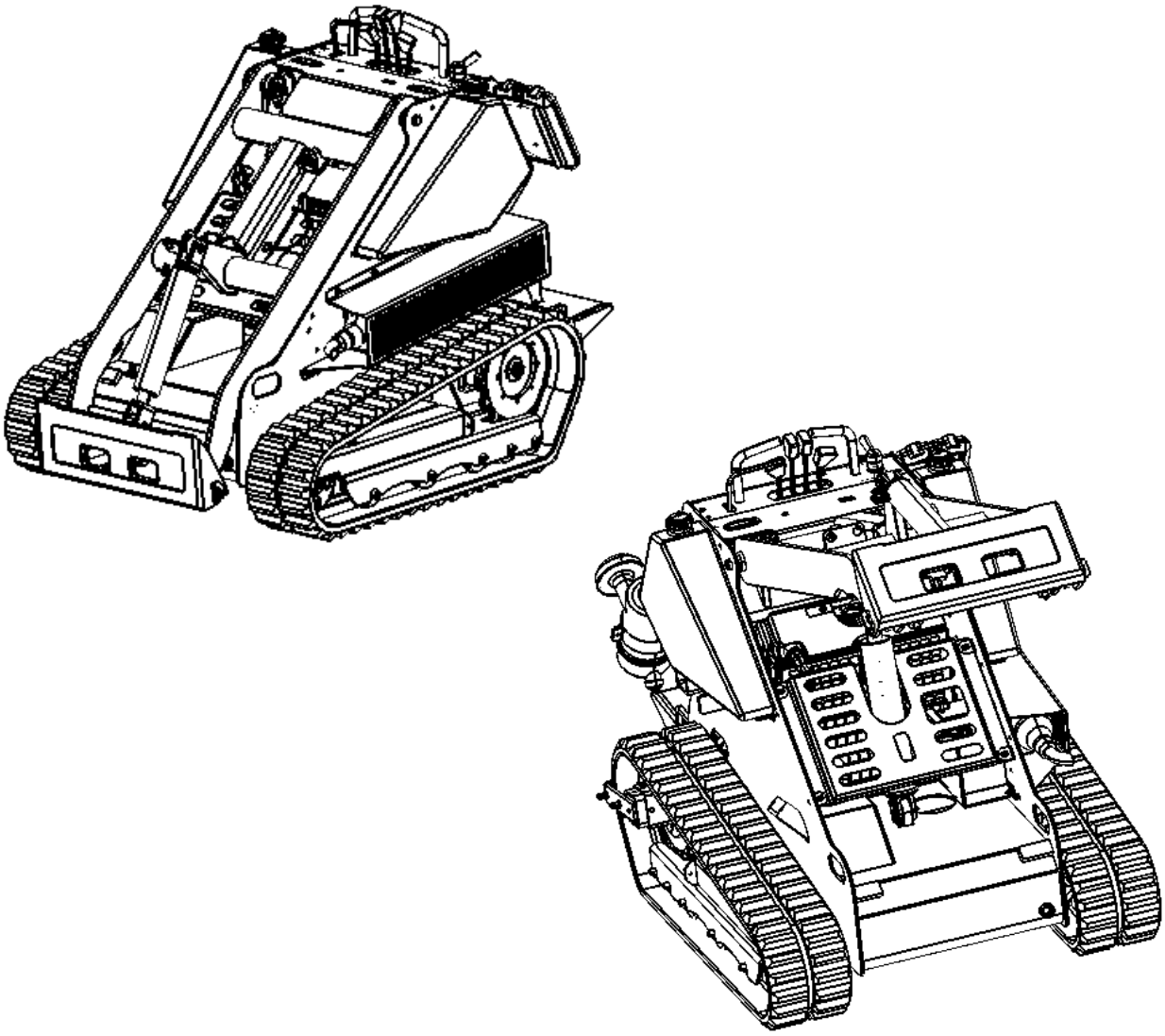
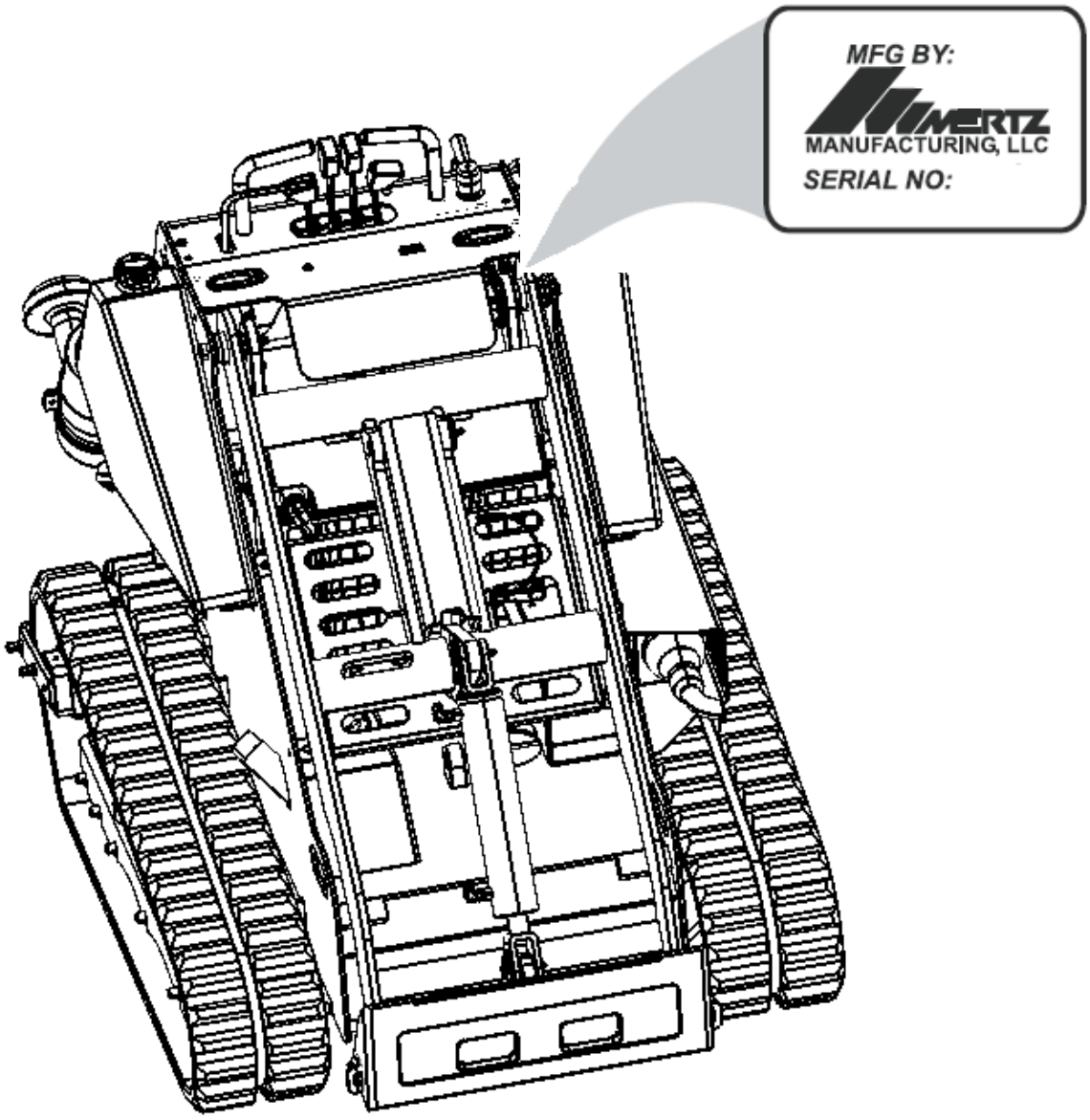
BOXER

BIG POWER IN ALL PLACES



425D Safety and Operator's Manual

Write your machines Serial Number in the space below for future reference. The serial number is located on the metal tag on the left side of the machine. Remove the service access panel to locate the Serial Number plate.



Record SERIAL Number Here

Boxer Product Warranty

WARRANTY AND LIABILITY LIMITATIONS

Mertz Manufacturing, LLC warrants each new Compact Utility Loader manufactured (hereinafter referred to as the equipment) by us to be free from defects in materials and workmanship, for a period of one (1) year or 1000 operational hours, whichever occurs first from the date of delivery. This warranty is effective provided that the equipment warranted hereunder is operated by the purchaser in accordance with generally approved practices, is properly maintained in accordance with the instructions contained in this owner's manual, and is operated within the manufacturer's rated capacity limitations.

Any parts of the equipment found to be defective within the warranty period shall be repaired or replaced, at Mertz Manufacturing, LLC's sole option. Repairs must be performed at Mertz Manufacturing, LLC facilities or at an authorized dealer facility.

Any part or parts proving defective within the above specified time will be repaired or replacement parts furnished, F.O.B. Ponca City, Oklahoma, providing such parts are returned, transportation prepaid, and found to be defective by the manufacturer.

The purchaser is responsible to keep maintenance records to substantiate proper maintenance. If a defect becomes apparent, it is the purchaser's responsibility to notify Mertz Manufacturing, LLC or an authorized dealer of said defect. The purchaser agrees to return the defective equipment or parts to Mertz Manufacturing, LLC or to an authorized dealer facility, freight prepaid, within fifteen (15) days after the defective condition is discovered.

All warranties, if any, extended to Mertz Manufacturing, LLC by manufacturers and suppliers of component parts, accessories, or other goods included in the manufacturing of Mertz Manufacturing, LLC products will be assigned, if contractually permitted, to the purchaser. Specific component warranty details will be provided to the purchaser upon request.

This warranty excludes the following: maintenance items including, but not limited to, seals, track grousers, roller bearings, filters and spark plugs, equipment that has been repaired, replaced, or altered by someone other than Mertz Manufacturing, LLC or an authorized service facility without prior approval from Mertz Manufacturing, LLC unless, however; if Mertz Manufacturing, LLC, in its sole opinion, determines that the defective condition of the equipment was in no way caused by or was attributable to said repairs, replacements, or alternatives.

Mertz Manufacturing, LLC and the purchaser agree that, in consideration of the above expressed warranty, all other warranties other than title, either expressed or implied, whether arising under law or equity including warranties of merchant ability and fitness for a particular purpose are excluded from this contract, further, the foregoing warranty is made solely to the first purchaser and may not be transferred in any form.

The sole liability of Mertz Manufacturing, LLC and the exclusive remedy of the purchaser arising out of the manufacture, sale, or use of the equipment provided hereunder, on warranties or otherwise, shall be limited to the cost of repair or replacement of defective parts as herein specified. Further Mertz Manufacturing, LLC's maximum liability hereunder arising from any cause whatsoever, including but not limited to, breach of contract or tort (including negligence), shall not exceed the contract price of the equipment furnished hereunder. Mertz Manufacturing, LLC shall not be responsible for work done, equipment or parts furnished, or for parts or repairs made by others unless the work is specifically ordered by Mertz Manufacturing, LLC. In no event shall Mertz Manufacturing, LLC be liable for removing defective parts or for reinstalling said parts when repaired or replaced by anyone other than Mertz Manufacturing, LLC or an authorized service facility or for any costs incurred with such removal or reinstallation.

CONSEQUENTIAL DAMAGES

Notwithstanding any other provision of this agreement, in no event shall Mertz Manufacturing, LLC be liable, whether arising under contract, tort (including negligence) or otherwise, for loss of anticipated profits, loss of use of capital or revenue, non-operational expenses, increased expense of operation cost of purchased or replacement equipment, damage to loads or contents of the equipment, transportation expenses due to repairs, claims of customers, cost of money, or for any special, incidental or consequential loss or damage of any nature arising at any time or from any cause whatsoever.

This Warranty Agreement shall be governed by, and construed and enforced in accordance with the laws of the State of Oklahoma. Any litigation under this warranty will be held in Kay County in accordance with the laws of Oklahoma.

Mertz Manufacturing, LLC P.O. Box 150 Ponca City, OK 74602

PO BOX 150 (74602) / 1701 N WAVERLY / PONCA CITY, OK 74601
PHONE: (580) 762-5646 / FAX: (580) 767-8411 / NT FAX: (580) 765-3934
www.boxerequipment.com

Boxer Warranty Registration

Dear Customer,

Mertz Manufacturing, LLC wishes to thank you for your purchase. We are committed to providing our customers with the finest products and product support available in any market today. To do this, we need to update our database with some specific information. Currently, the warranty start date is listed as the date the Boxer Compact Utility Loader left Mertz Manufacturing, LLC. This may be several months before you ever received the product. Mertz Manufacturing, LLC will restart the warranty date if you will complete the information below and return this form to us. We will continue to use the date the Boxer Compact Utility Loader left the factory as the warranty start date of record until we are told differently through receipt of this form. Not returning the form could result in your being denied some of your warranty entitlements.

To have Mertz Manufacturing, LLC reset the warranty start date, please complete the form below and mail or fax it back to: Mertz Manufacturing, LLC, P.O. Box 150, Ponca City, OK 74602, Fax: 580-767-8411.

Please take the time to complete and return this warranty form.

Fold

Name: _____

Address:_____

City: _____ State: Zip: _____

Telephone No. _____

Location Purchased: _____

Date Purchased: _____ Salesman: _____

____ I have received a copy of the Owners Manual for my engine.

____ I need a copy of the Owners Manual for my engine.

Signed: _____

Model No. _____ Serial No. _____

Affix
Stamp
Here

Mertz Manufacturing, LLC
P.O. Box 150
Ponca City, OK 74602

Be Prepared - Get to Know All Operating and Safety Instructions

This is the Safety Alert Symbol.



Wherever it appears, either in this manual or on safety signs on the machine, you should be alert to the potential for personal injury or accidents. Always observe safety precautions and follow recommended procedures.

Learn the Signal Words Used with the Safety Alert Symbol

The words **"DANGER"**, **"WARNING"**, and **"CAUTION"** are used throughout this manual and on labels on the machine indicate hazards or unsafe practices. All three statements indicate that safety is involved. Observe the precautions indicated whenever you see the Safety Alert symbol no matter which signal word appears next to the Safety Alert symbol.

⚠ DANGER

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, IS VERY LIKELY TO CAUSE DEATH OR EXTREMELY SERIOUS INJURY. IT MAY ALSO BE USED TO ALERT AGAINST EQUIPMENT THAT MAY EXPLODE OR DETONATE IF HANDLED OR TREATED CARELESSLY.

⚠ WARNING

Indicates a hazardous situation that, if not avoided, could result in serious injury or death. It may also be used to alert against a highly unsafe practice.

⚠ CAUTION

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a generally unsafe practice.

IMPORTANT

This type of statement is used to draw attention to a procedure that needs to be followed to prevent machine damage.

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Section 1 – Safety Precautions

Since Mertz Manufacturing LLC. has no direct control over machine application or operation, following the proper safety practices is the responsibility of the owner and/or operator. Remember that this unit is only as safe as those who operate it. Safety tips shown throughout this Operator's Manual must be followed at all times.

GENERAL SAFETY

- Never operate the Boxer without first completely reading and understanding this Owner's Manual.
- Only authorized, qualified, and trained personnel are allowed to operate this machine.
- Never operate the machine under the influence of alcohol, awareness altering drugs, or medications that would affect your ability to operate safely.
- KEEP CHILDREN CLEAR FROM THE WORK SITE AREA AT ALL TIMES!
- NEVER ALLOW A CHILD TO OPERATE OR RIDE ON THE MACHINE
- Serious injury or death involving children can occur. Stay ALERT and be aware of your surroundings at all times. Stop operations if children wander onto the job site. Resume work only when the operating area is clear.
- Keep all non-operating personnel away from the machine during operation.
- Passengers must never be allowed to ride on the machine or any attachment.
- Wearing protective clothing and gear, such as hard hats, safety glasses, safety shoes, hearing protection, breathing protection, and long pants and shirts is highly recommended. Do not operate in clothing or shoes which will expose skin or feet to possible flying debris.
- Clothing should be relatively close fitting. Loose clothing, rings, and other jewelry should be avoided because of the danger of catching them on machine parts or controls or on any rotating parts, either on the machine or any attachment.
- Keep hands/fingers clear from all rotating parts.
- Never touch engine parts or machine components while they are hot.
- Always perform the "Standard Shut Down Procedure" shown in this manual, if the unit will be left unattended for any length of time.
- Use only original CPI or approved replacement parts and attachments. Imitation parts may lead to unit damage and/or injury to personnel. The machines' warranty may be voided if unauthorized parts and attachments are used.

OPERATING SAFETY

- Plan ahead and learn as much as possible about your job-site area before beginning any work.
- Know the exact location of overhead power lines or obstructions.
- Have all buried lines such as; gas, electric, water, telephone and cable TV, marked by the proper authorities.
- Prior to use, perform the “Pre-Start Inspection” and Daily Maintenance to make sure that the unit is in safe operating condition.
- Never operate a malfunctioning unit!
- Keep hands, gloves, shoes, control knobs, and operator platform clean. Slippery controls can cause you to lose control, which may result in an accident.
- Always keep a firm grip on the hand rails located at the operator's platform during travel and operations to prevent falling off the unit.
- When working on an unfamiliar construction site, review, understand and follow job site safety rules.
- Keep the work site clear of all non-operating personnel. Should a person enter the work area, stop machine operation until the work area is clear.
- Prior to unloading the unit and starting to work, inspect the path you will travel and work site area for potential hazards. Some of the hazardous conditions you may encounter are:
  – Holes
  – Deep ditches or excavations
  – Drop-offs
  – Soft un-compacted soil
  – Culverts
  – Deep mud / Standing Water
  – Large rocks
  – Slippery surfaces
  – Steep slopes
  – Tall grass, trees, or shrubs

  If any of these conditions exist, correct the hazard or obstruction. If any of these conditions can not be corrected, avoid operating or traveling near them.
- Be extremely cautious traveling through or near trees, brush, shrubs or any obstacles which might obscure your vision. These might hide potential hazards, such as the edge of a steep slope, deep holes, large rocks, etc.
- Never operate near a ditch or embankment where loose or soft ground conditions could cause the surface to give way under the machine causing it to become unstable.
- Never exceed the rated capacity of the machine. When using attachments, know their capacity ratings and unit limitations. Unit specifications can be found in the Operator's Manual

- Never attempt to operate any attachment without first understanding proper installation and operating procedures. The center of gravity, stability, and operating characteristics of the entire machine will change with the use of different attachments.
- Operate all controls slowly and smoothly and never abruptly stop any function. This can cause the machine to become unstable.
- Always look in the direction of travel.
- Come to a complete stop prior to reversing travel directions.
- Reduce speed and proceed with caution when traveling in reverse or turning.
- Never travel with the loader boom or attachment raised. Lower the boom or attachment as soon as possible and travel with the boom at the lowest safe height.
- When traveling with a loaded bucket or forks, the load should be level and the bucket or forks tilted back to reduce spilling or loosing the load.
- Approach corners slowly, turning too fast or sharp may cause the machine to tip over.
- Stay alert when operating near traffic or roadways.
- If the unit should begin to tip or become unstable, DO NOT try to stabilize the unit with your legs or arms.
- If the unit is involved in an accident or inadvertently damaged during operation, stop and perform a thorough inspection. Make sure the unit is in safe operating condition prior to resuming work.
- Be alert to any unusual reaction to any of the controls. If anything unusual is noticed, shut the machine down and thoroughly inspect it to determine the cause of the problem. Do not operate the machine until all required repairs have been made.
- If the unit must be left unattended, shut the machine down and make sure that it can not be started by an unauthorized individual.
- Operating on steep slopes can be dangerous and there is a greater risk of the machine tipping over or becoming unstable. The list of rules below must be understood and followed for maximum safety:
  – Avoid excessively steep slopes or unstable surfaces. If travel on a slope is necessary, keep the load low and proceed with extreme caution.
  – DO NOT travel ACROSS excessively steep slopes under any circumstances.
  – Travel straight up and down slopes with the heavy end of the machine pointing up the incline. When the machine has no load, the operator's platform end of the machine is considered the heavy end. When the machine is loaded or has an attachment on the front of the machine, the front is considered the heavy end.
  – Turning on slopes is not a recommended practice, however if you must turn on slopes; reduce travel speed to as slow as possible, and exercise extreme caution. Avoid sharp turns or sudden movements.
  – Wet or slick ground conditions should be avoided as reduced traction could cause the machine to slide down the slope.
  – Do not attempt to install or remove attachments on a slope.
  – Never park the unit on a slope

SERVICE & MAINTENANCE SAFETY

Maintenance work can be hazardous if not done in a careful manner. All personnel should realize the hazards and strictly follow safe maintenance practices. Failure to comply with these safety precautions may result in serious personal injury and/or death.

• Use only CPI supplied or approved replacement parts and attachments. Imitation parts may lead to unit damage and/or injury to personnel. Warranty may be voided if unauthorized parts and attachments are used.

• Wear the proper protective clothing and personal safety equipment necessary to perform the maintenance or service required.

• Keep the machine free of grass, leaves, or other debris build-up.

• Clean up fuel spillage

⚠ WARNING

Fuel or oil leaks or spills can create a fire or explosion hazard.

• Prior to performing maintenance or service, park the unit in a level area away from obstructions and/or work site hazards.

• Be sure the area has adequate light and is well ventilated. NEVER operate the machine inside a closed area.

• Clean-up any oil, grease, mud, water, or snow which might cause the floor surface to be slippery. Put a tag at the control panel and remove the ignition key.

• If maintenance or repairs require the boom to be raised, the "Hydraulic Cylinder Lock" must be installed.

• Know where all pinch points and rotating parts on the unit are. These areas must be avoided to prevent serious injury.

• Remove only those guards or covers on the component being serviced and replace them immediately upon completion of the work.

• Never attempt to adjust or service engine or machine components while they are hot.

ELECTRICAL SYSTEM HAZARDS

• Prior to working on the electrical system:

• Disconnect battery cables, removing the battery ground cable first.

• When re-connecting the battery, connect the battery ground cables last.

• Never allow battery cables to contact hydraulic lines or rub against sharp edges.

Battery Hazards

Before working with batteries, the following are important points about battery safety that you should be aware of:

- Batteries are always surrounded by extremely explosive gases. This is especially true when the battery is being charged. To avoid explosion:
  – Do not smoke near batteries.
  – Keep arcs, sparks and open flames away from batteries.
  – Perform battery service work only in a well ventilated area.
- Electrolyte Hazards:
  NOTE: The batteries on the machine may be either be “wet cell” or gel cell. It is still important to know and follow these warnings and cautions.
  Battery electrolyte in standard “wet cell” batteries contains sulfuric acid which is poisonous and can cause severe chemical burns. To avoid personal injury:
  – Wear a face shield to prevent sulfuric acid contact with your eyes
  – Wear chemical resistant gloves and clothing to keep acid off your skin and clothing.
  – Since wet cell batteries give off explosive gases, use a flashlight to check the electrolyte level, not an open flame such as a match.
  – Never check the battery by placing a metal object across the battery posts. The resulting spark could ignite anything flammable, causing fire or an explosion.
  – If electrolyte is splashed into your eyes, flush them immediately with clean water and seek medical attention.
  – If electrolyte is swallowed, seek medical attention immediately.
  – If electrolyte is splashed onto exposed skin or clothing, flush and clean the area immediately with clean water and seek medical attention if necessary.

Jump Starting/Battery Charging Hazards

Follow the instructions for jump starting or battery charging in the engine owner's manual. You must be at the operator's platform when attempting to start the unit with booster batteries and jumper cables so that you are at the controls when the engine starts.

Here are some general safety rules you must follow for jump starting the machine:

- Make sure to connect the positive jumper cable to the positive (RED) remote starter lug on the right side of the machine chassis.
- Connect the negative cable to the engine, machine chassis or the furthest ground point away from the battery. Never make the final connection at the starter or dead battery. Sparks may ignite the explosive gases surrounding the battery.
- When disconnecting cables after jump starting, remove the negative cable first and then the positive cable. IMPORTANT: DO NOT let the cable clamps touch when disconnecting them. Severe damage can occur to the booster battery or machine.
- Never charge a battery or attempt to jump start a frozen battery. The sudden surge in electrical power could cause the battery to explode.

Hydraulic System Hazards

The hydraulic system is under pressure whenever the engine is running and may hold pressure even after the engine is shut off. Cycle all hydraulic controls after the loader boom is resting on the ground. Some components will retain residual or trapped pressure. Use extreme caution when removing any hydraulic component.

During inspection of the hydraulic system:

- Cycle all hydraulic controls to release residual pressure.
- Wait for the hydraulic fluid to cool down before disconnecting any hydraulic lines. Hot hydraulic fluid can cause severe burns.



Hydraulic oil under pressure can penetrate body tissue causing serious injury and possible death. When troubleshooting a hydraulic system for leaks, always use cardboard or wood as a detector. DO NOT USE YOUR BARE HANDS. If you are injected with hydraulic oil or any other fluids, immediately seek treatment by a doctor trained in the treatment of penetrating fluid injuries.

- Hydraulic fluid can cause permanent eye injury. Wear safety glasses or a full face shield to provide appropriate eye protection.
- When venting or filling the hydraulic system, loosen the filler cap slowly to allow any pressure in the hydraulic tank to be released and remove the cap gradually.

Fueling Hazards

Most fuels are highly flammable. Observe the following precautionary practices to reduce the possibility of a serious accident:

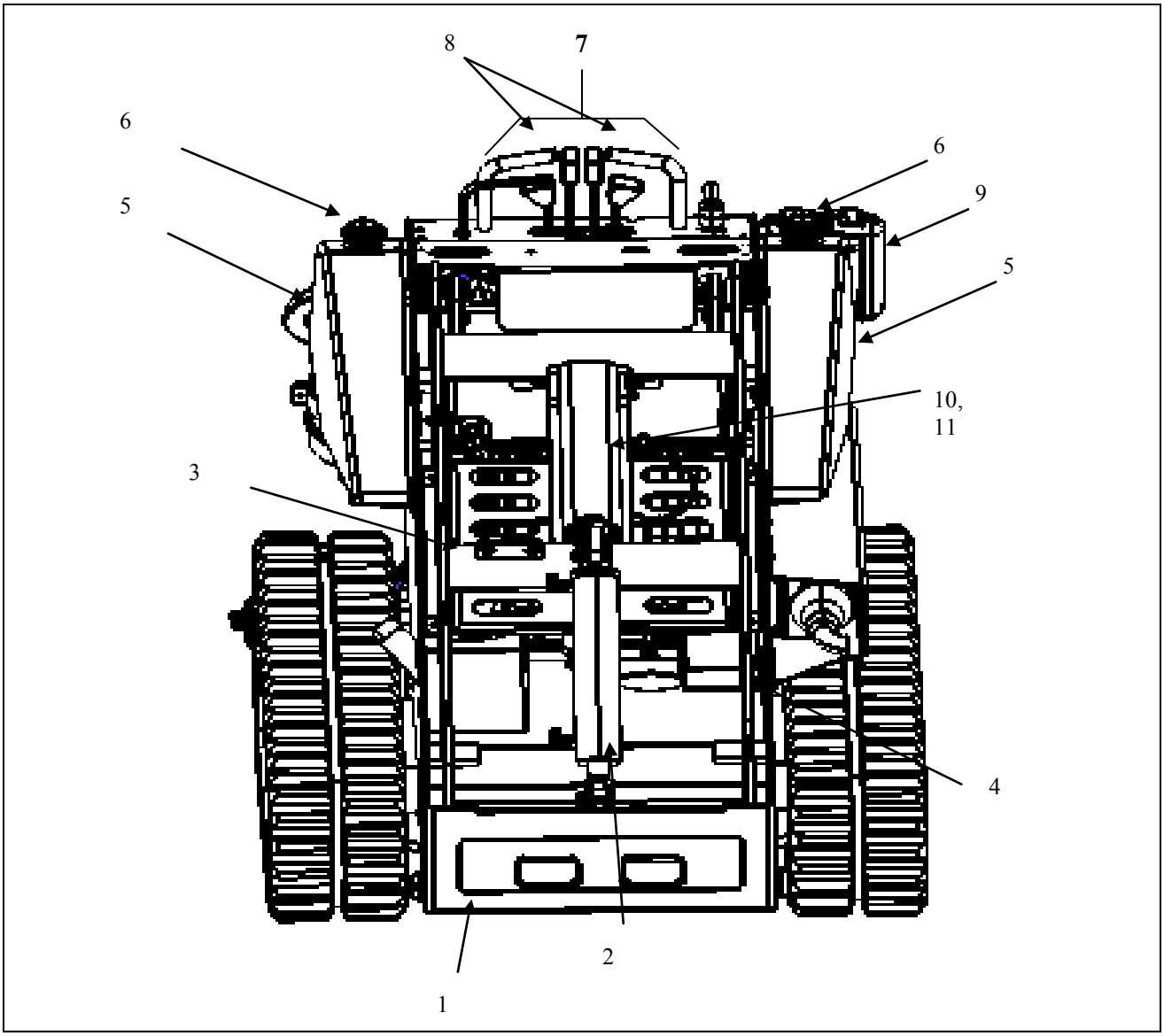
• Always refuel the unit in an open, well ventilated area away from sparks or open flames.



Diesel Engines:

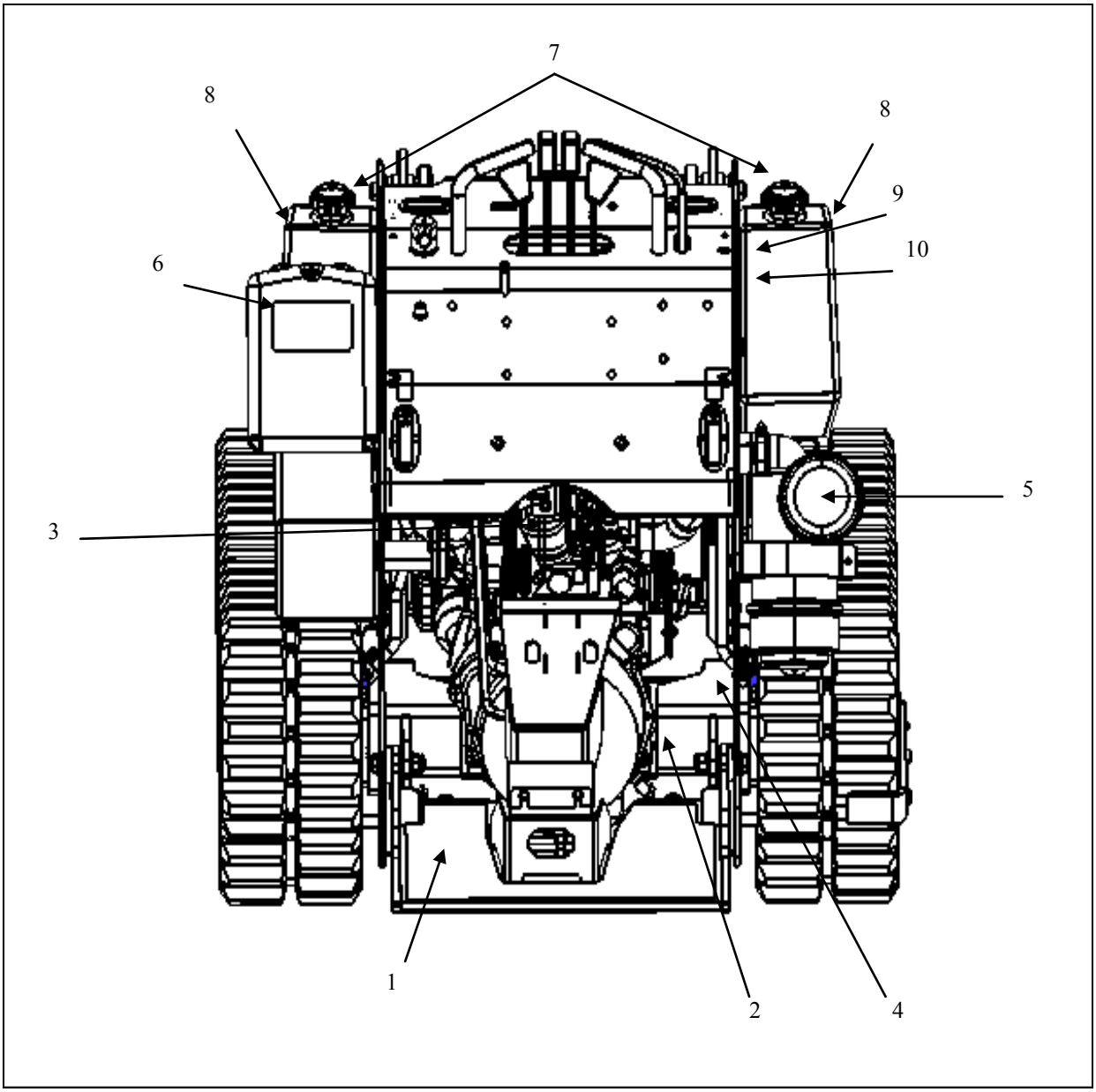
- **Shut the engine off before attempting to fuel the machine. Never refuel a unit while it is running.**
- **Allow engine to cool before re-fueling**
- **Always use a funnel or pour spout when filling the tanks.**
- **If you are filling the fuel tanks from a service vehicle, make sure to connect the service vehicles ground cable to the machine before beginning the fueling process and keep the fuel nozzle in constant contact with the rim of the machines fuel tank.**
- **To avoid static sparks when using a portable fuel container, keep the fuel container nozzle in contact with the tank opening during filling.**
- **Make sure to move the unit from the transport truck or trailer and only refuel the unit on the ground, using an approved container.**
- **When filling a portable fuel container, always place it on the ground. Never fill a portable fuel container while it is inside a vehicle, truck, pick-up bed, or any surface.**
- **Keep sparks and flames away from fuel.**
- **Due to the potential for static discharge, do not use any handheld electronic devices, i.e. cell phones, etc. while fueling the machine.**
- **Do not smoke while refueling or when handling the fuel container.**
- **Never cut or weld on or near fuel lines, tanks or containers.**
- **Never overfill the tank.**
- **Clean up spilled fuel immediately.**
- **Store fuel in an approved container and keep out of the reach of children.**

Component Locations, Front View



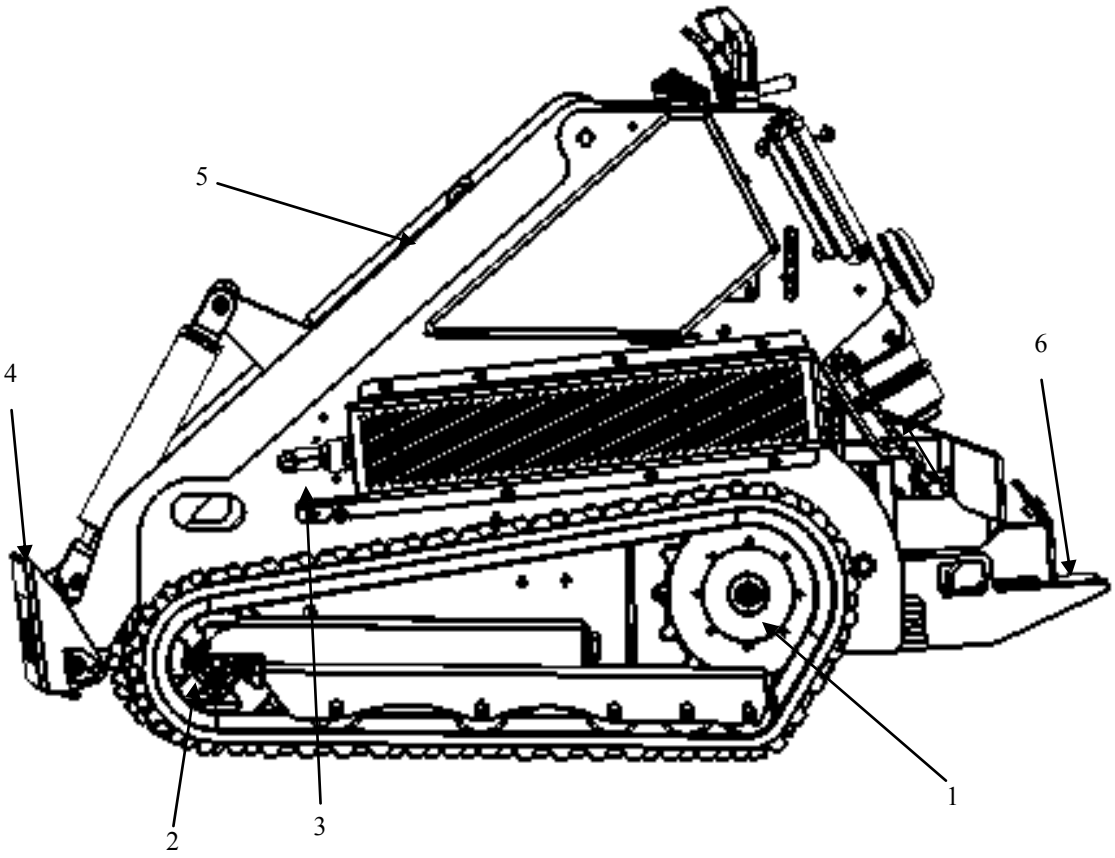
Item No.	Description
1	Attachment mounting plate
2	Tilt cylinder
3	Auxiliary hydraulic quick connects
4	Boom
5	Fuel tank
6	Fuel filler cap
7	Operating controls
8	Hand grab rail
9	Manual holder
10	Lift cylinder lock
11	Lift cylinder (beneath cylinder lock)

Rear View



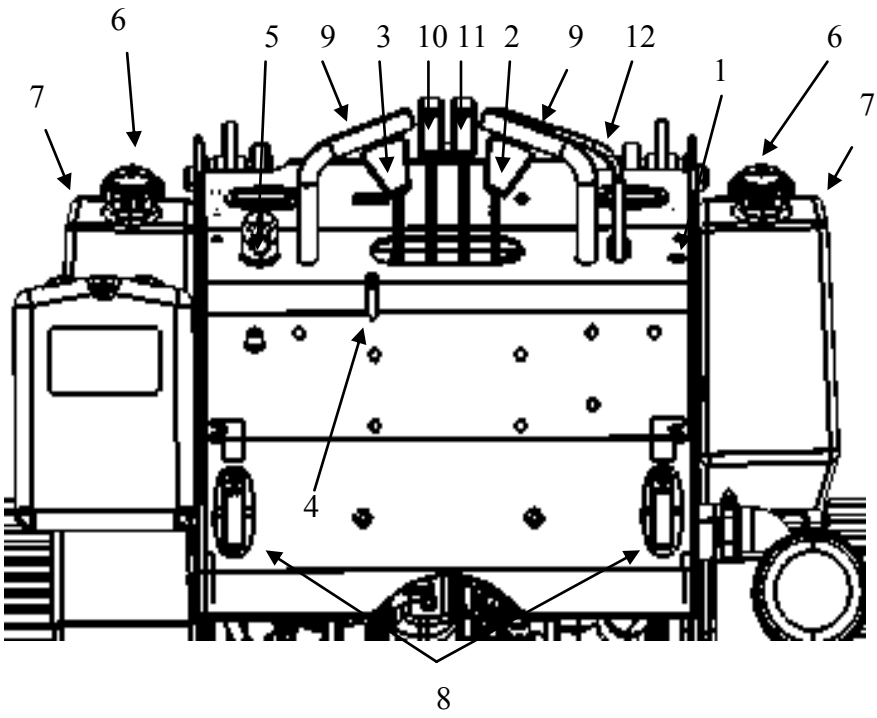
Item No.	Description
1	Operator's platform
2	Engine oil dip stick
3	Engine
4	Engine Fuel Filter
5	Air cleaner assembly
6	Manual holder
7	Fuel filler cap
8	Fuel tank
9	Ignition switch and key
10	Engine hour meter

Side View



Item No.	Description
1	Rear drive sprocket
2	Front Idler/ Tensioner
3	Muffler/ Exhaust Tip
4	Attachment mounting plate
5	Boom
6	Operator's platform

Operating Controls

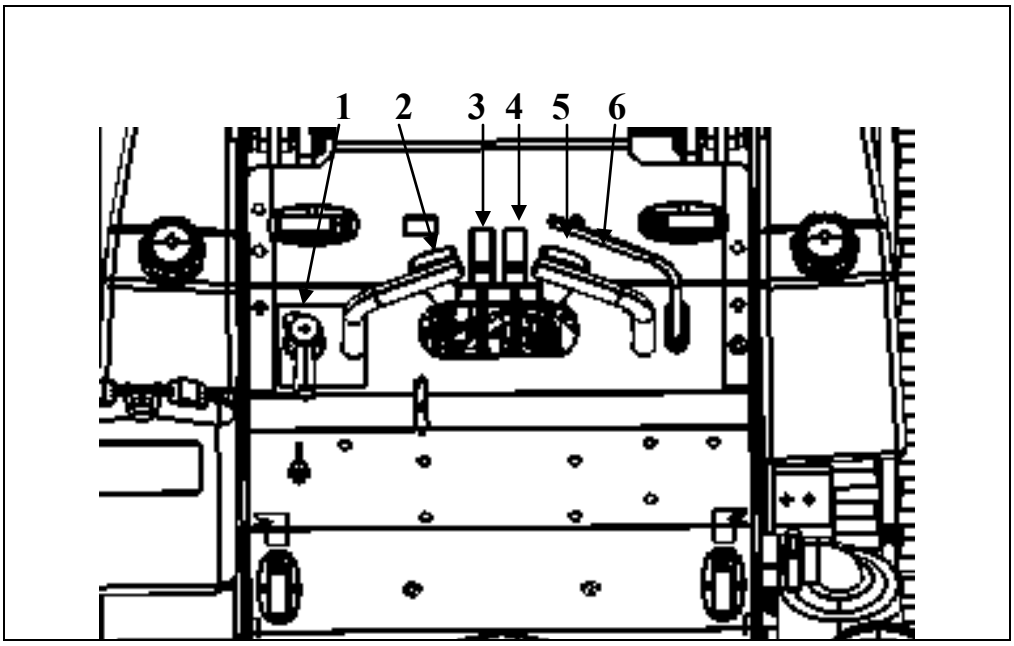


Item No.	Description
1	Speed range selector switch
2	Attachment tilt control
3	Attachment raise control
4	Engine throttle
5	Travel creep speed control
6	Fuel filler cap
7	Fuel tank
8	Service panel lock
9	Hand grip rail
10	Left travel motor control
11	Right travel motor control
12	Auxiliary attachment hydraulic control

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Operating Controls Description



1. **Creep** – When a hydraulically powered auxiliary attachment is in use, this control allows the operator to adjust the machine travel speed.
2. **Boom Raise and Lower** – This lever controls the raising and lowering of the boom assembly.
3. **Left Travel Motor Control** – Pushing the lever forward rotates the left side wheels for forward travel. Pulling the lever backwards rotates the left side wheels for reverse travel.
4. **Right Travel Motor Control** – Pushing the lever forward rotates the right side wheels for forward travel. Pulling the lever backwards rotates the right side wheels for reverse travel.
5. **Attachment Tilt** – Pushing the lever forwards tilts the attachment plate forwards, lowering the attachment. Pulling the lever backwards tilts the attachment plate backwards, raising the attachment.
6. **Attachment Activation Lever** – With your right hand, squeeze the AUXILIARY attachment control lever towards the hand hold to activate the attachment in the FORWARD motion.

NOTE: The lever is spring loaded and when released, will automatically move from the FORWARD motion position to NEUTRAL stopping attachment motion. If you want to reverse the operation of the attachment, move the auxiliary control lever to the REVERSE position. The control lever will remain in the REVERSE position detent until it is moved to the NEUTRAL position.

NOTE: If using the auger, FORWARD activates clockwise rotation, BACKWARD activates counter-clockwise rotation.

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DANGER

IMPROPER USE OF THE COMPACT UTILITY LOADER COULD CAUSE SERIOUS INJURY OR DEATH. BEFORE OPERATING THE WHEEL LOADER, OR PERFORMING MAINTENANCE, THE OPERATOR MUST READ AND UNDERSTAND THE ENTIRE OPERATOR'S MANUAL, REVIEW MACHINE CONTROLS, LOCATE AND REVIEW ALL WARNINGS AND SAFETY PLACARDS AND RELEVANT OPERATOR SAFETY MATERIALS INCLUDING WRITTEN, VISUAL, VIDEO OR VERBAL INSTRUCTIONS.

Pre-Start Inspection

It is very important to do a visual inspection of the machine before beginning operation. This inspection should include:

- Check all decals and warning signs for damage.
- Check engine oil.
- Check and refill gas tanks.
- Check hydraulic lines and hoses for signs of damage or leaks.
- Inspect the machine for any signs of damage or loose fasteners.
- Check fluid levels and any signs of leaking fluids.
- Do all Daily Service Checks.
- Check machine controls to make sure that they automatically return to the neutral position.

NOTE: The following procedures have several additional service checks and adjustments that will need to be followed if your machine is equipped with a track drive system.

The following information presents details on these inspection points and service checks.

Daily Service Checks

Table 1: Service Cycle Table

Activity	Daily (10 Hours)
Fuel	√ and A
Engine Oil	√ and A
Engine Oil Filter	
Air Filter	√
Fuel Filter	
Battery	
Hydraulic Fluid	√
Grease	√
Tracks	√***
Visual Check For Loose/Missing Fasteners	√

Service Cycle - R = Replace = Check

***Under very wet, muddy, dusty or dirty working conditions more frequent lubrication may be required.

Do the following pre-start service checks:

1. Check condition of all warning and instructional decals. Replace any damaged decals with genuine CPI replacement decals.
2. Check engine oil -
   - Make sure that the engine is OFF.
   - Pull out the dipstick and look for both the full and add oil lines indicated by the letters “F” and “A”. The correct oil level is between those two lines.
   - If the engine oil level is below the add line, indicated by the letter “A” on the dipstick, carefully add the proper amount of oil through the engine oil filler tube (Item 1, Figure 3–1). It is important to add the correct type of engine oil as stated in the engine manual.

     NOTE: Extremely dusty or dirty working conditions may require more frequent checking, filling and/or changing of engine oil.
   - After filling the oil, wait a few minutes and check the oil level again.

IMPORTANT

Make sure to securely reinstall the dipstick into the dipstick tube before starting the engine. Check engine fuel and fill as needed - be sure engine is OFF

3. The Boxer has two saddle fuel tanks. Each of the tanks has a fuel gauge located in the filler cap. Remove cap and visually inspect fuel level to make sure that the indicator is showing the proper fuel level. Make sure that each tank has been filled on a daily basis.

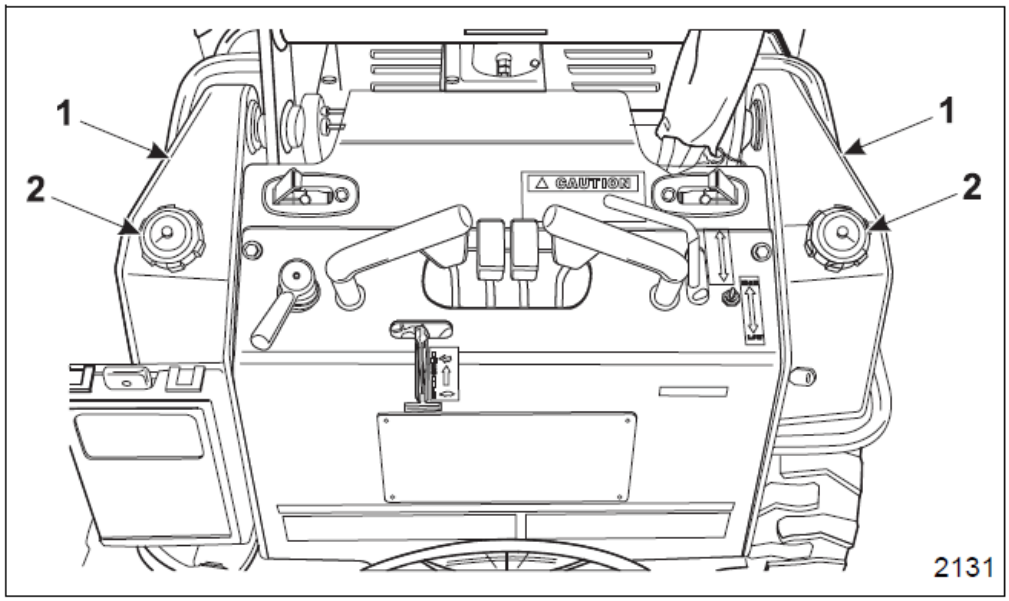


Figure 3–2 Fuel Level Check

• Carefully pour the gas into the tank, not exceeding the max fill on the fuel gauges.

⚠ CAUTION

- **Allow engine to cool before filling fuel tanks.**
- **Do not overfill because gas could spill onto hot engine parts and ignite or explode.**

4. Check all hydraulic hoses, lines and fittings.

⚠ WARNING

Hydraulic oil under pressure can penetrate body tissue causing serious injury and possible death. When troubleshooting a hydraulic system for leaks, always use cardboard or wood as a detector. DO NOT USE YOUR BARE HANDS. If you are injected with hydraulic oil or any other fluids, immediately seek treatment by a doctor trained in the treatment of penetrating fluid injuries.

- Visually inspect all of the hydraulic hoses, lines and fittings for signs of damage, wear or leaking.
- If any signs of damage are visible, do not operate the machine until repairs have been made.

• Some examples of common hydraulic hose damage are shown in Figure 3–3.

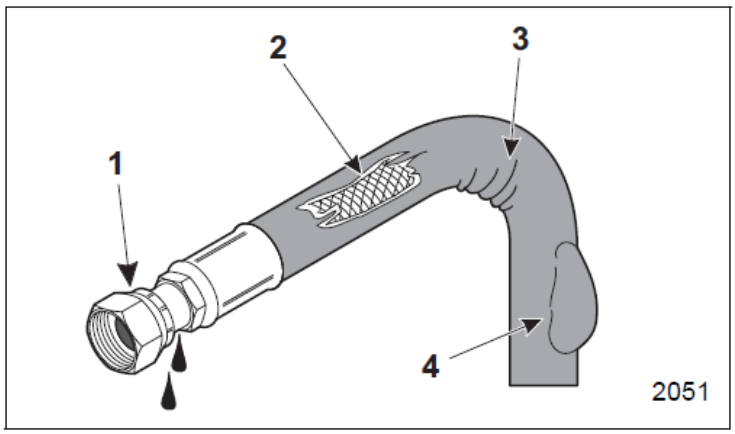


Figure 3–3 Hydraulic Hose Damage

1. End fittings damaged or leaking
2. Outer covering chafed or cut, and wire reinforcing is exposed
3. Hose shows signs of kinking or crushing
4. Outer covering ballooning

5. Check for loose or missing fasteners
   • Inspect for any loose or missing bolts.
   • Tighten or replace any missing bolts immediately.
6. While you are performing the daily maintenance, inspect the machine for any signs of damage, such as missing or damaged components, cracked welds, etc.
7. Check the track assemblies to make sure that:
   – The tracks are in good condition and are not showing any signs of wear.
   – Track tension is properly set.
   – Track drive motors are not leaking oil or hydraulic fluid.
8. Grease pivot shafts with proper type of grease. There are 10 grease points on this machine, see Figure 3–4, and Figure 3-5.

⚠ CAUTION

Before starting the engine:

• Move all hydraulic control levers forward and release the lever. Make sure that each lever automatically returns to the Neutral position.
• Move all hydraulic control levers rearward and release the lever. Make sure that each lever automatically returns to the Neutral position.
• The Auxiliary Control Lever will remain in either the Forward or Reverse position detents until it is manually moved to the Neutral position.
• If any of the levers, other than the Auxiliary Control Lever, does not automatically return to the Neutral position, DO NOT use the machine until repairs have been completed.

Lubrication Points

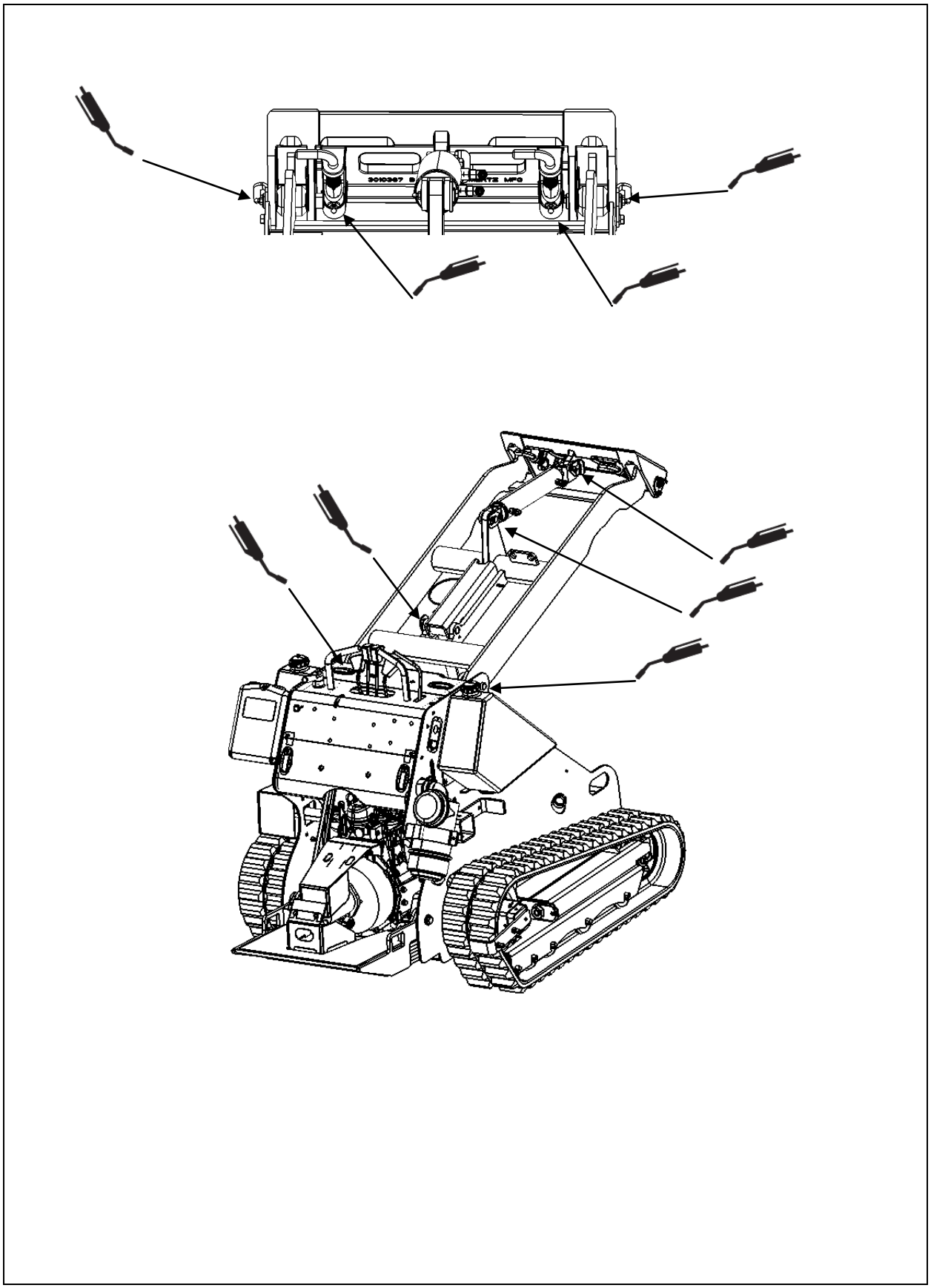


Figure 3–4 Lubrication Points

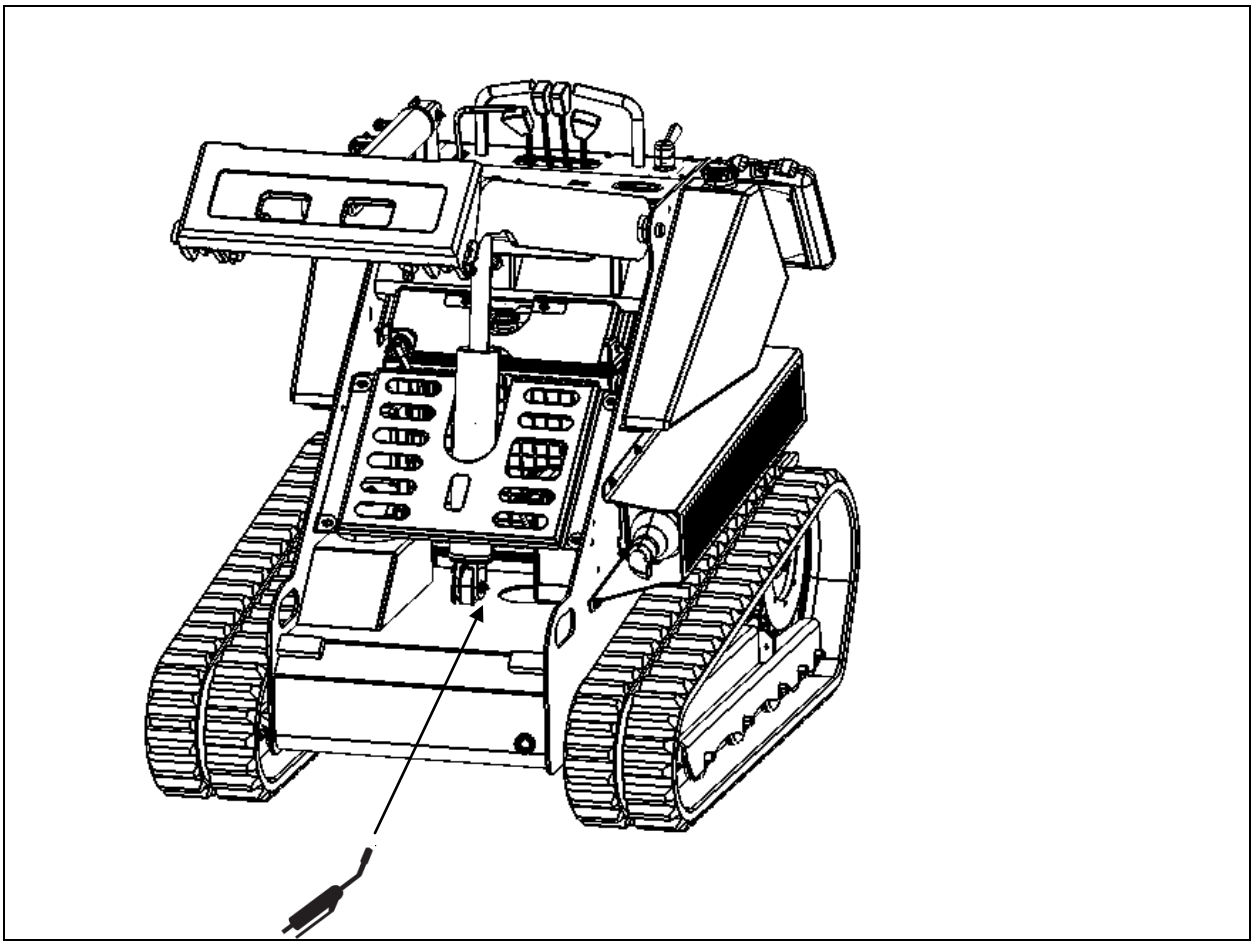


Figure 3–5 Loader Arm Lift Cylinder Base Lubrication Point

NOTE: Extremely dusty or dirty working conditions may require more frequent service/ replacement.

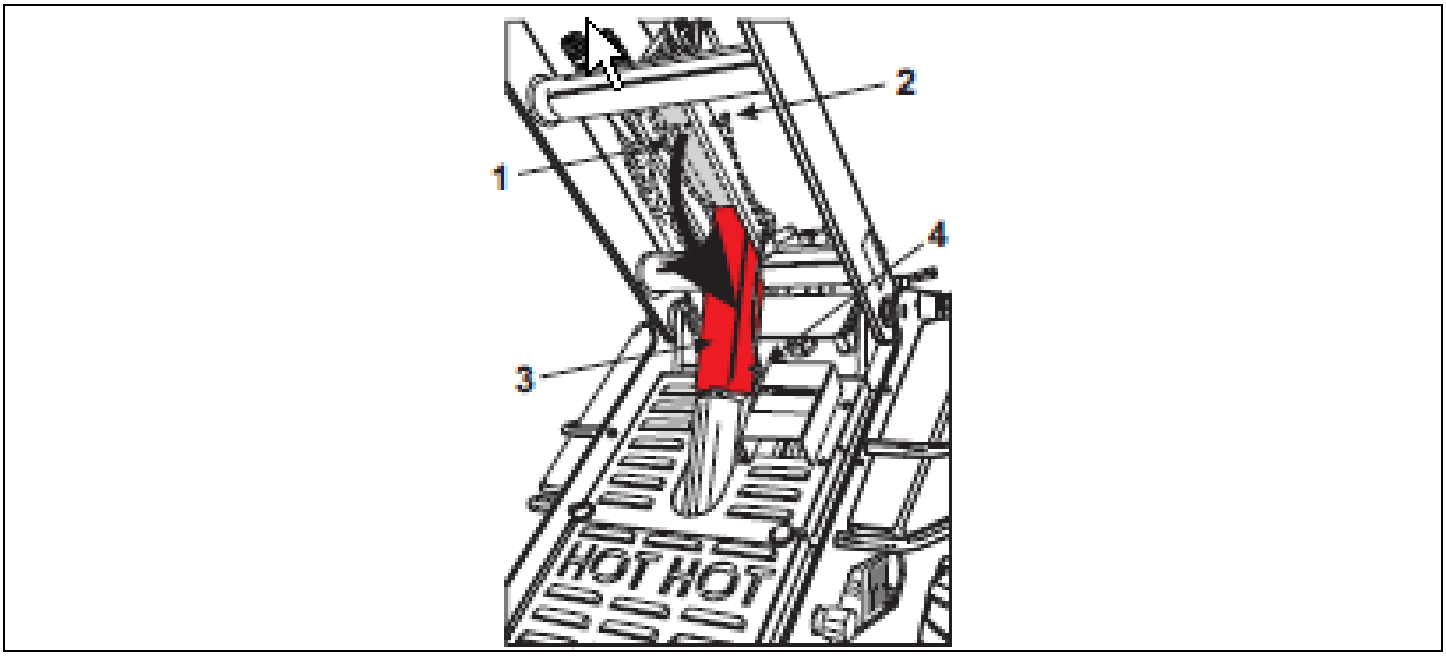
⚠ CAUTION

Make sure to install the cylinder lock before performing any service work underneath the raised loader arm assembly.

Cylinder Lock Installation

1. Start the engine. (See Machine Start-up in this section for engine starting instructions).
2. Fully raise the loader arm.
3. Shut off the engine.
4. While holding the loose end of the cylinder lock (Item 1, Figure 3–6), pull the safety lock pin (Item 2, Figure 3–6) outwards, releasing the cylinder lock.
5. Pivot the cylinder lock downwards to the support position (Item 3, Figure 3–6).
6. Fully reinsert the safety lock pin (Item 4, Figure 3–6), securing the cylinder lock in the support position.

   NOTE: Make sure that the safety lock pin goes behind the loader arm cylinder.
7. Lower the loader arm assembly until it is supported by the cylinder lock.



Cylinder Lock Removal

1. Start the engine and raise the loader arm to its full height.
2. Shut off the engine.
3. Pull the safety lock pin (Item 4, Figure 3–6) fully outwards.
4. Rotate the cylinder lock (Item 3, Figure 3–6) upwards to the storage position (Item 1, Figure 3–6).
5. Fully insert the safety lock pin (Item 2, Figure 3–6) to secure the cylinder lock in the storage position.

Operating Instructions

Machine Start-up

To start the machine, the operator must:

1. Stand on the operator's platform (Item 1, Figure 3–7).

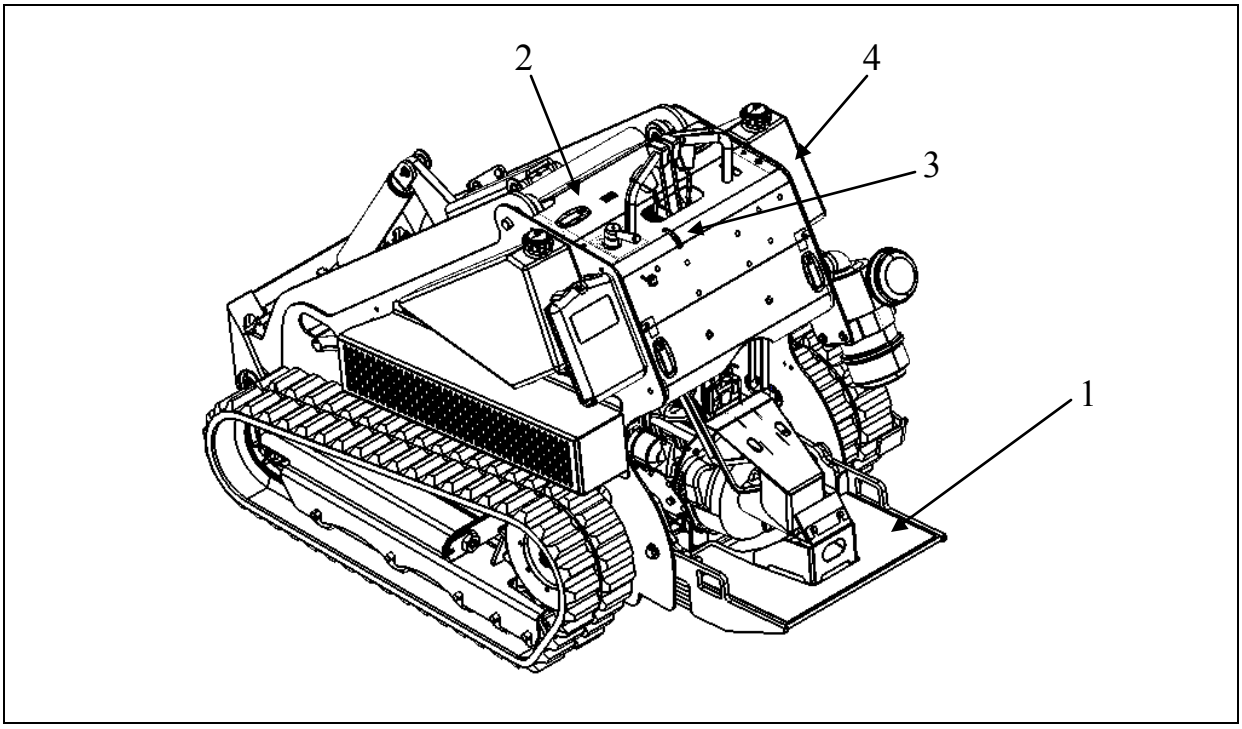


Figure 3–7 Operator's Platform and Safety Treadle

2. Push Glow Plug Button to activate the Glow Plugs (Item 2, Figure 3–7).
3. Move the throttle lever (Item 1, Figure 3–7) to about half way between fast and idle engine speeds.
4. Rotate and hold the start switch (Item 4, Figure 3–7) in the START position until the engine starts.

   NOTE: The low engine oil pressure warning horn will sound when the ignition key is turned to the “ON” position. When the engine starts and oil pressure reaches normal, the horn will shut off.
5. As soon as the engine starts, release the starter key. The key will automatically return to the RUN position.
6. Slowly push the choke knob inwards. If the engine begins to sputter, pull the choke knob outwards slightly until the engine smoothes out. As soon as the engine warms up and begins to run rough, push the choke knob inwards to the normal operating position.
7. Leave the throttle setting at about the halfway position and allow the engine to idle. This will begin warming the hydraulic oil.

   NOTE: In cold weather (32º F [0º C]) after about 5 minutes of engine idling, operate all of the main hydraulic controls to cycle warmed hydraulic oil through the hydraulic lines into the cylinders and hydraulic motors. Allow the engine to idle for another 5 minutes before beginning any machine operations.

IMPORTANT

If the engine oil drops below the engine manufacturers required levels, a warning horn will sound. Immediately shut down the engine to prevent severe damage.
DO NOT use the machine until repairs have been made.

Machine Shut-down

To safely shut the machine down, the operator must:

1. Park the machine on a solid, level area.
2. Lower the loader arm and attachment to the ground.
3. Idle the engine for 5 - 10 minutes to allow the machine to cool down.
4. Shut off the engine.
5. Clean off any accumulated mud and/or dirt from the machines operating surfaces, i.e. operator's platform, drive wheels, etc.

Transportation

1. Move the throttle control lever to the mid-range engine speed and set the transport speed to the LOW range. Raise the attachment so that it will clear the ramp of the transport trailer.
   NOTE: The longer the attachment, like the trencher, the more the attachment needs to either be tilted or raised. It is recommended to back the machine onto the transport trailer and position the machine so that the heaviest weight (center of balance) is towards the front (hitch end) of the trailer. See Figure 3–10.

⚠ CAUTION

The Boxer is designed for maximum working balance. When traveling on an incline, always have the heaviest portion of the machine pointing uphill.

2. Follow general load carrying safety. Always carry the heaviest load pointing uphill.
   NOTE: When operating without an attachment, the operator becomes the load.

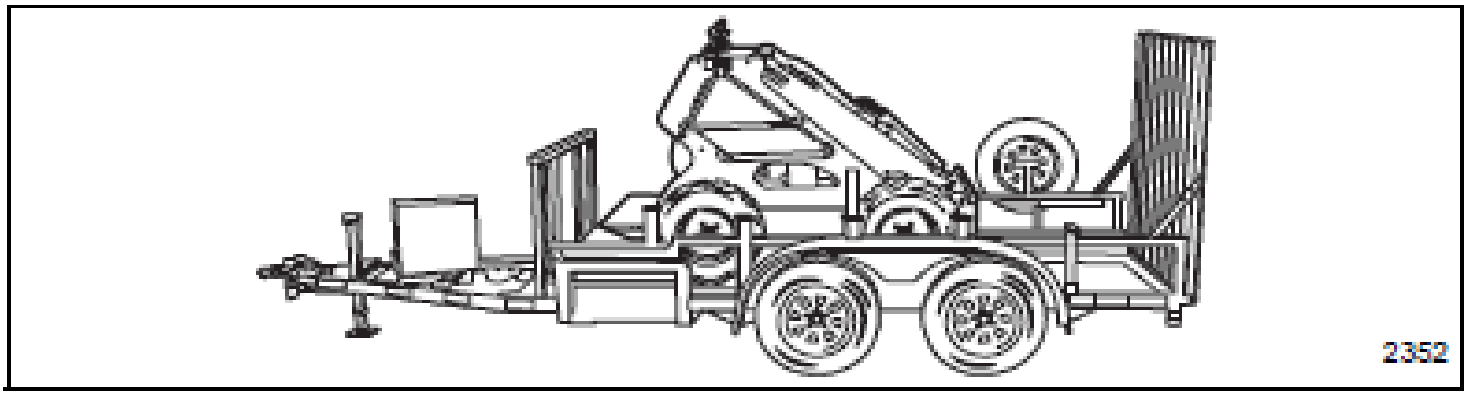


Figure 3–10 Transport Position on Trailer

3. When the machine is positioned on the trailer properly, lower the attachment to the trailer deck.
4. Shut the engine off and remove the key.
5. Secure the unit to the transport vehicle with DOT (Department of Transportation) approved chains, binders, and DOT guidelines. Make sure to use the appropriate tie-down locations on the machine and trailer.

NOTE:

- Never tow or pull the machine. Damage to the hydraulic motors could result.
- If the machine is totally in-operable, using lifting straps or cables and a machine that can safely lift 4,000 lbs (1820 Kg), lift the machine and place on a trailer.

Machine Travel Controls

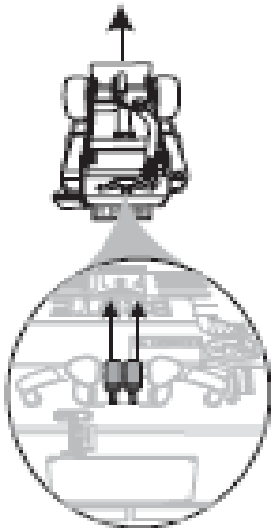
⚠ WARNING

- Levers and controls should return to the neutral position when they are released.
- Make sure that all of the controls are in the neutral (middle) position before starting the engine.
- Operate the controls gradually and smoothly. Excessive speed and quick control movements without regard for working conditions could cause an unsafe situation.
- Make sure to maintain your grip on both of the hand grips any time the machine is in motion.

NOTE: If your machine is equipped with a track drive system, additional safety systems have been built into the track drive. Due to the spring tension system built into the track drive system as a safety mechanism, the machine can be put into an extreme situation during which the drive sprocket will bypass the rubber track guide holes causing a popping noise, called "cogging". This situation is part of the track drive systems safety design, and indicates that this portion of the safety system is functioning properly. The "cogging" condition is most likely to occur while operating in a reverse direction pulling a heavy load, and during the first 50 hours of track usage. It is caused by the tension spring being fully compressed due to high track load. If a cogging condition occurs, immediately stop machine travel and auxiliary functions and reverse travel direction slightly to de-compress track tension. Continued cogging will cause the track drive sprocket to seat into the rubber track incorrectly, and cause damage to the track. If cogging occurs, stop travel function and check for and remove any debris or foreign matter in the drive system, check track for proper tension as shown in Section 4 of this manual, and resume operation.

Forward Travel

Push both control levers forwards to travel straight forward. The farther these are moved, the faster the machine will travel. See Figure 3–12.

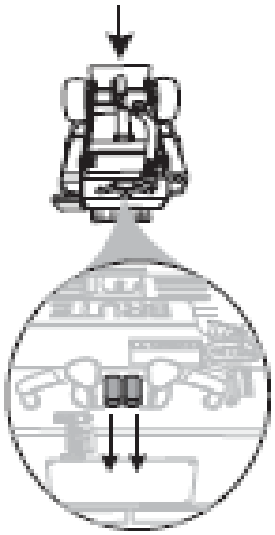


2135

Figure 3–12
Forward Travel

Reverse Travel

Pull both control levers backwards to travel straight backwards. The farther these are moved, the faster the machine will travel. See Figure 3–13.

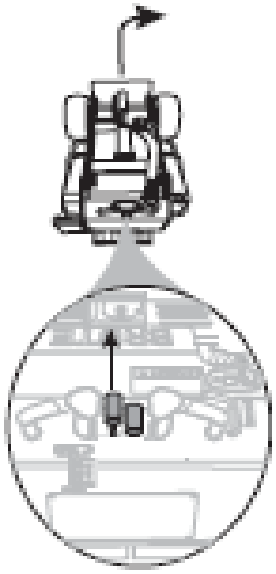


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Figure 3–13
Reverse Travel

Right Turn During Forward Travel

To turn to the right, move the left hand control lever farther forward than the right control lever. The farther forward the left control is moved, the faster the right turn will be made. See Figure 3–14.

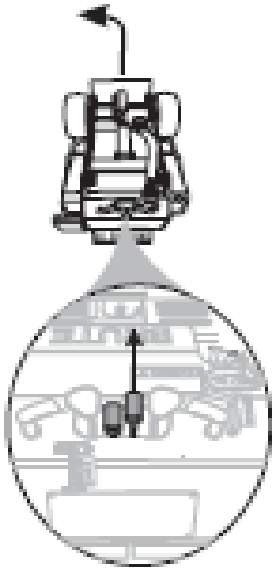


2137

Figure 3–14
Right Hand Turn
in Forward

Left Turn During Forward Travel

To turn to the left, move the right hand control lever farther forward than the left control lever. The farther forward the right control is moved, the faster the left turn will be made. See Figure 3–15.

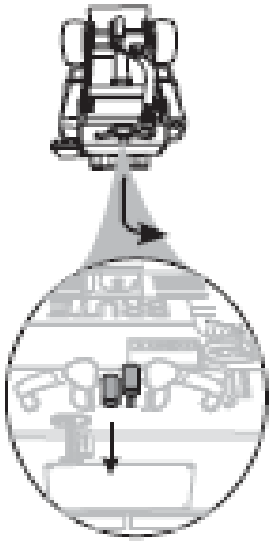


2138

Figure 3–15
Left Hand Turn
in Forward

Right Turn During Reverse Travel

Move the left hand control lever farther backward than the right control lever. The farther forward the left control is moved, the faster the right turn will be made. See Figure 3–16.

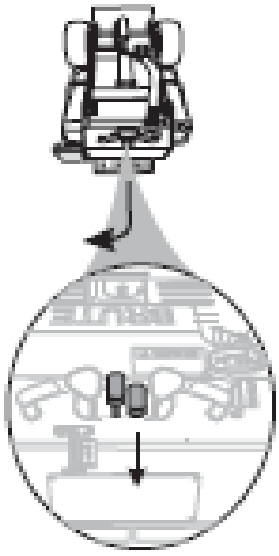


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Figure 3–16
Right Hand Turn
in Reverse

Left Turn During Reverse Travel

Move the right hand control lever farther backwards than the left control lever. The farther forward the right control is moved, the faster the left turn will be made. See Figure 3–17.



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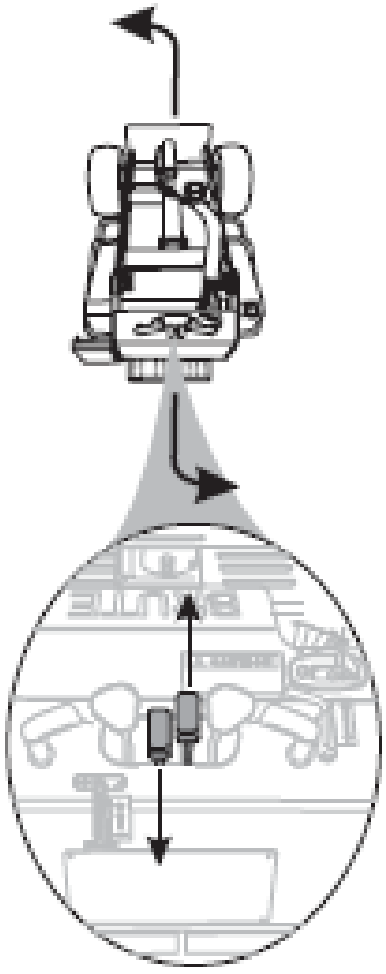
Figure 3–17
Left Hand Turn
in Reverse

Spin Turn

⚠ CAUTION

Make sure to use the machine hand holds while doing a spin turn to maintain your balance.

Move the travel control levers in opposite directions to spin the machine on it axis. To spin left, move the right control lever forward while pulling the left control lever backwards; to spin turn to the right, push the left control lever forwards and while pulling the right control lever backwards. Figure 3–18.



2141

Figure 3–18 Spin Turn

⚠ WARNING

- **Do not travel up or across a slope steeper than 15°. See Figure Figure 3–19.**
- **Make sure that the tracks are extended to their widest position, providing the broadest stance for the machine.**
- **Keep attachments as low as possible when traveling on slopes or rough terrain.**

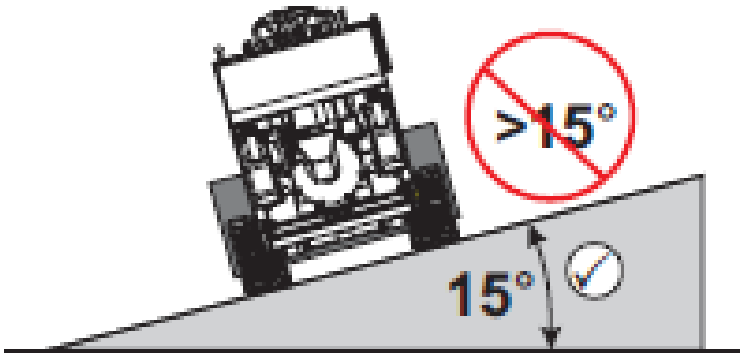


Figure 3–19 Slide Slope Travel

- **Keep the heavy end of the machine towards the uphill direction when traveling up or down a slope. NOTE: When the machine has no attachment or load, the heavy end is the operator's platform end of the machine. See Figure Figure 3–20.**

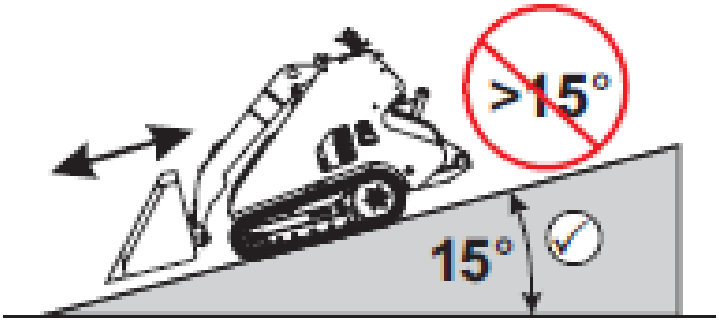


Figure 3–20 Uphill/Downhill Travel

Attachment Installation and Removal

Attachment Lock Pins

The mounting plate located at the front of the machine provides for the easy installation and safe use of the wide variety of available attachments. This system is very easy to use, but requires the proper use of the attachment lock pins. There are two positions for the attachment lock pins, the unlocked position and the locked position.

Once the machine has picked up an attachment, shut off the engine and rotate the attachment locks into the "locked" position (Item 1, Figure 3–21). As you rotate the lock pin, it will drop downwards, securing the attachment to the machine. If the lock pin does not drop into the locked position, start the engine and either raise or lower the attachment slightly until the lock pins snap into place.

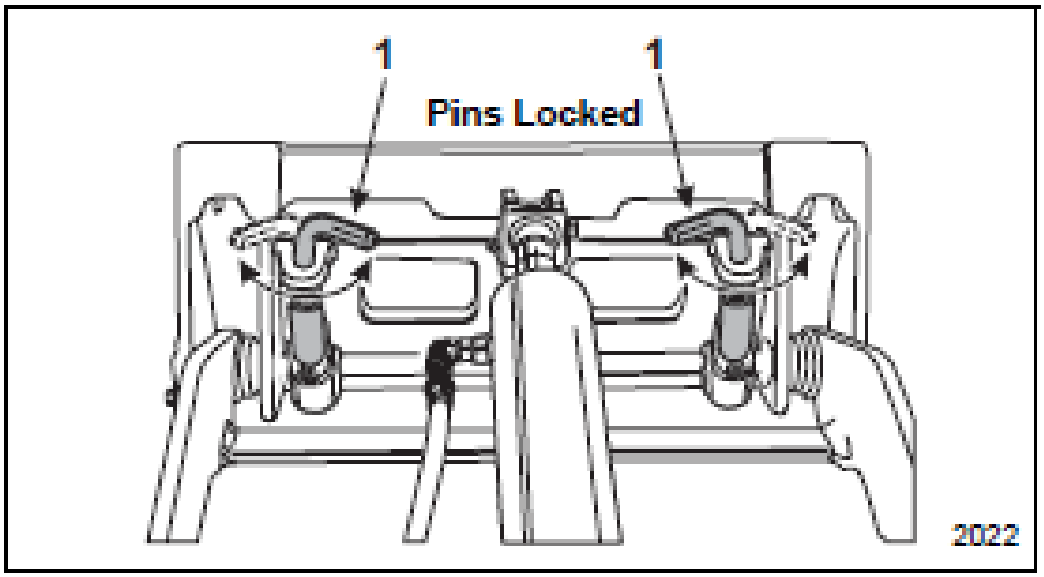


Figure 3–21 Attachment Locks in Locked Position

⚠ CAUTION

Until the attachment lock pins are fully in the locked position, the attachment has not been safely secured to the machine. Do not stand near the attachment until it is fully secured to the machine.

To release an attachment, rotate the attachment locks to the "unlocked" position (Item 1, Figure 3–22). The lock pins will automatically rise, releasing the attachment from the machine. If the pins do not release the attachment or are very hard to rotate, start the engine and tilt the attachment slightly forwards or backwards until the pins can be rotated.

⚠ CAUTION

Make sure to keep your hands and feet away from the attachment during the unlocking process. As the attachment becomes free from the machine, it may move.

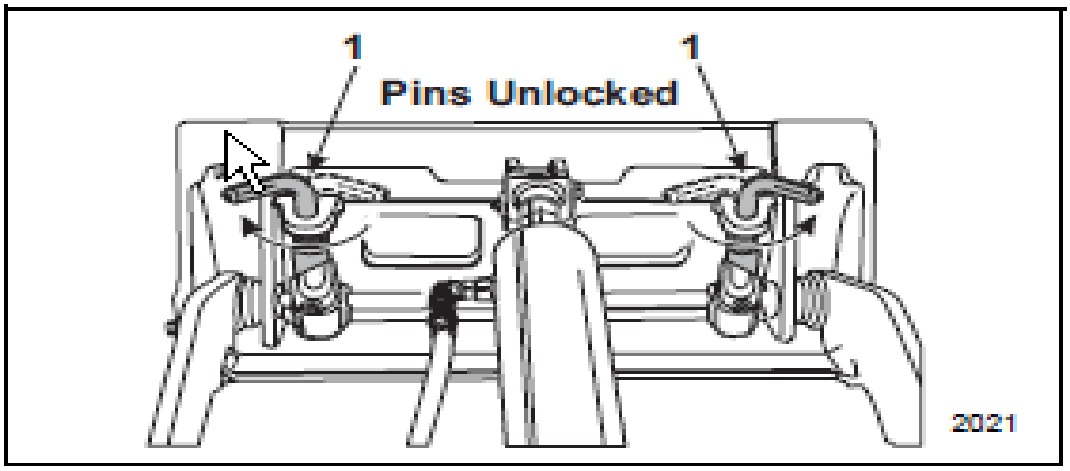


Figure 3–22 Attachment Locks in Unlocked Position

Installation of Non-Hydraulically Powered Attachments

There are many available attachments that are very easy to install. To install any of the non-hydraulically powered attachments:

1. Position the attachment on a level surface.

   NOTE: Clean the inside lower edge of the female attachment mounting plate to remove any debris that might interfere with the attachment installation.

2. Start the machines engine, lower the loader arm and tilt the mounting plate forwards.

   NOTE: Make sure that both of the attachment lock pins (Item 1, Figure 3–22) are in the "unlocked" position. See Attachment Lock Pins earlier in this section.

3. Slowly drive towards the attachment and align the top edge of the male mounting plate (Item 1, Figure 3–23) and the upper lip of the female attachment mounting plate (Item 2, Figure 3–23). Tuck the upper edge of the male mounting plate into the upper lip of the female attachment mounting plate.

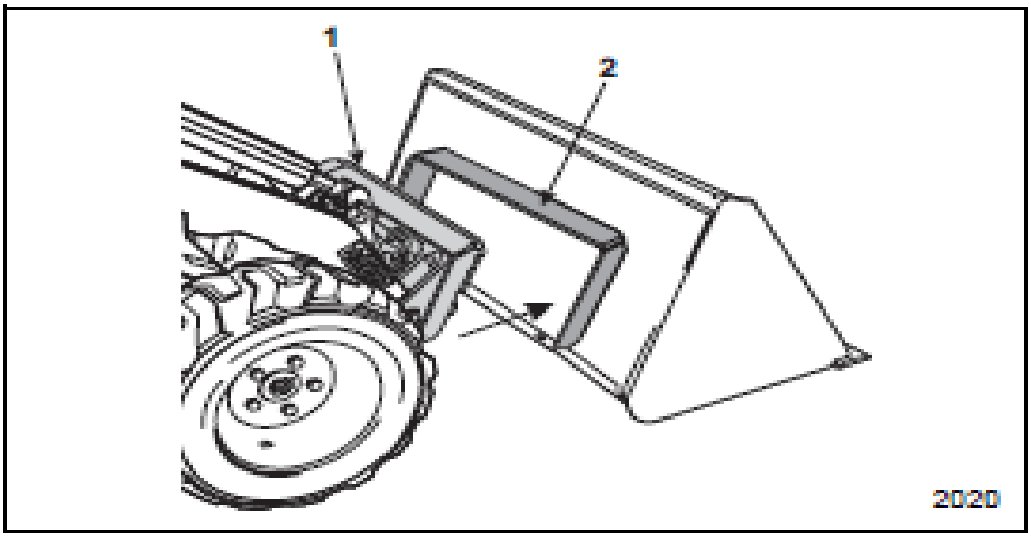


Figure 3–23 Non-powered Attachment Installation

4. When the machines mounting plates top edge is seated in the attachment mounting plate, curl the machines mounting plate backwards slightly to allow the lower edge of the machines mounting plate to slide into position. See Figure 3–24.

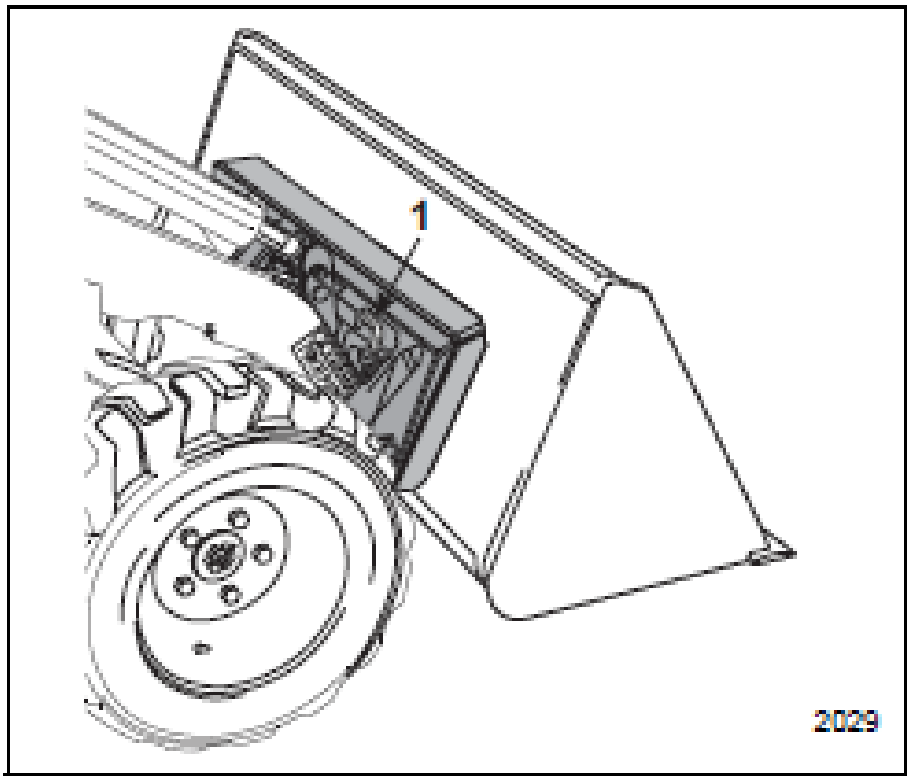


Figure 3–24 Attachment Installed

5. Shut the engine off.
6. Rotate the attachment lock pins (Item 1, Figure 3–24 and Item 1, Figure 3–25) into the locked position, securing the attachment to the machine.

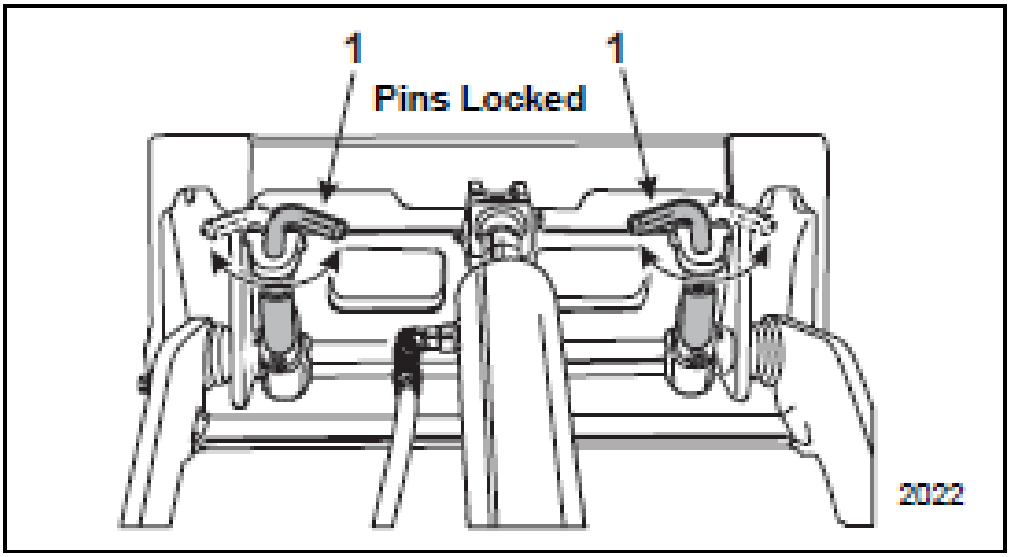


Figure 3–25 Attachment Locks in Locked Position

7. Test the security of the attachment connection by fully lowering with loader arm and tilting the attachment downwards until the front tires slightly lift off the ground.

Removal of Attachment

1. Lower the attachment onto a firm, level surface.
2. Shut off the machine engine.
3. Rotate the attachment lock pins to the UNLOCKED position (Item 1, Figure 3–26).

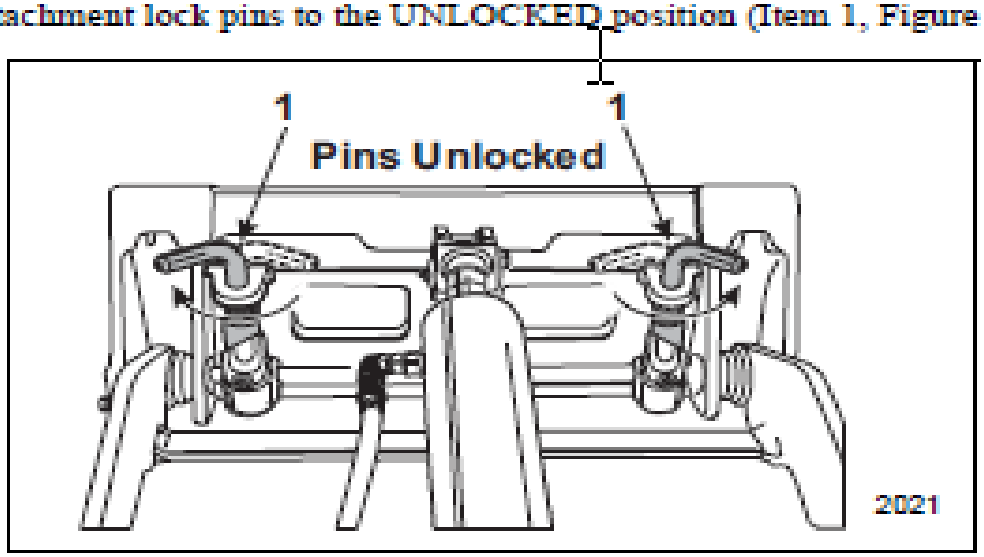


Figure 3–26 Attachment Locks in Unlocked Position

4. Start the engine and rotate the mounting plate downwards.
5. Back away from the attachment.

   NOTE: It may be necessary to lower the loader arm assembly slightly to fully disengage from the attachment.

Installation of Hydraulically Powered Attachments

There are many hydraulically powered attachments available that are very easy to install. To install any of these attachments:

1. Position the attachment on a level surface.

   NOTE: Clean the lower edge of the female attachment mounting plate to remove any debris that might interfere with the attachment installation.

2. Start the machine engine, lower the loader arm and tilt the mounting plate forwards.

   NOTE: Make sure that both of the attachment lock pins (Item 1, Figure 3–27 and Item 3, Figure 3–28) are in the "unlocked" position.

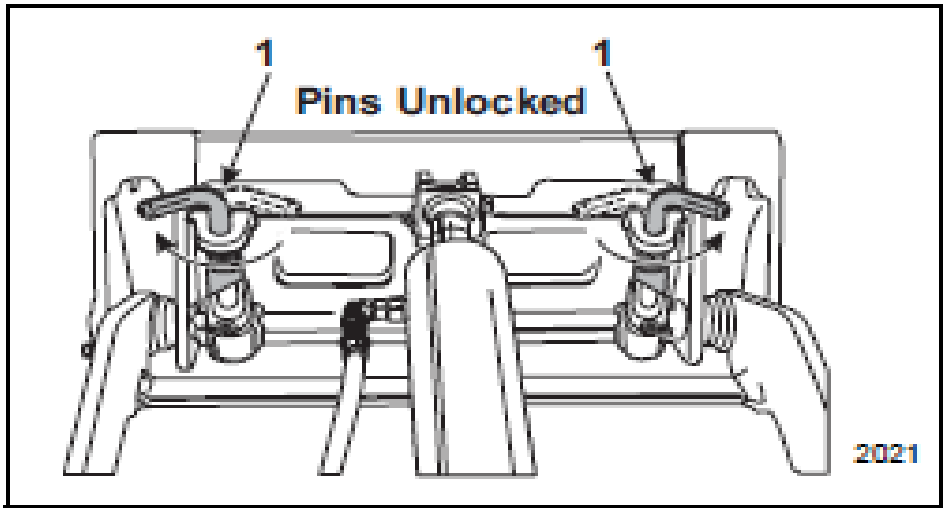


Figure 3–27 Attachment Locks in Unlocked Position

3. Slowly drive towards the attachment and align the top edge of the male mounting plate (Item 1, Figure 3–28) and the upper lip of the female attachment mounting plate (Item 2, Figure 3–28).

NOTE: Make sure to position the attachments hydraulic hoses (Item 4, Figure 3–28) so that they are not damaged during the installation process. Tuck the upper edge of the male mounting plate into the upper lip of the female attachment mounting plate.

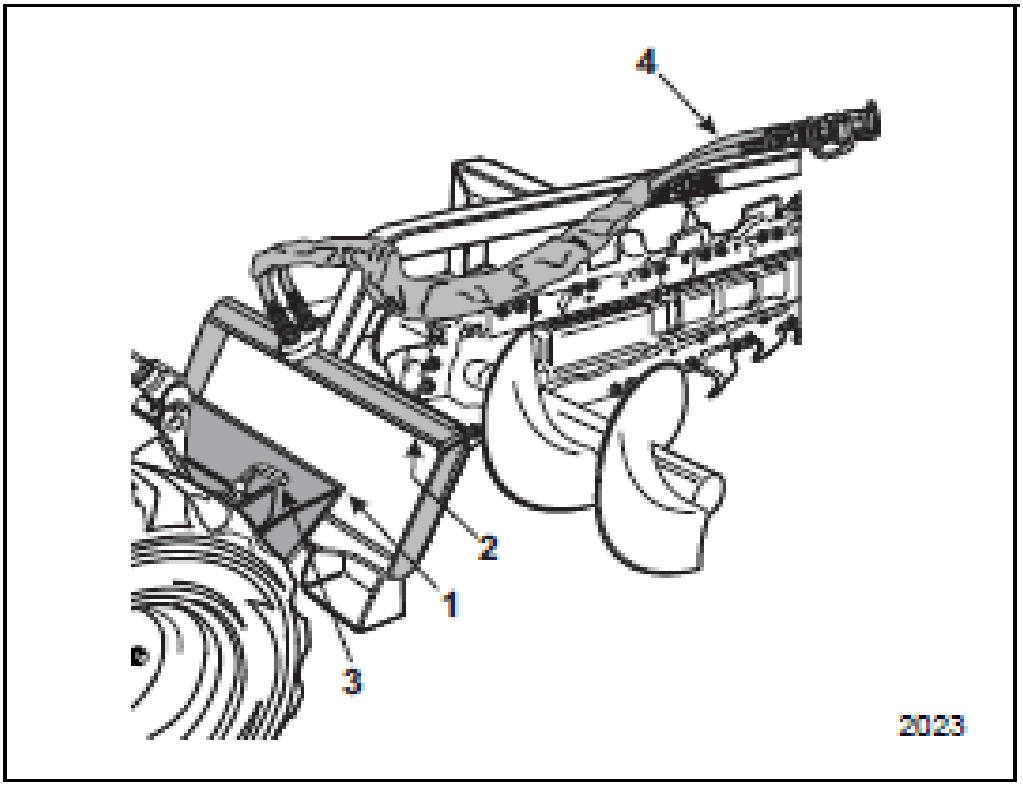


Figure 3–28 Hydraulically Powered Attachment Installation

4. When the machines mounting plates top edge is seated in the attachment mounting plate, curl the machines mounting plate backwards slightly to allow the lower edge of the machines mounting plate to slide into position. See Figure 3–29.

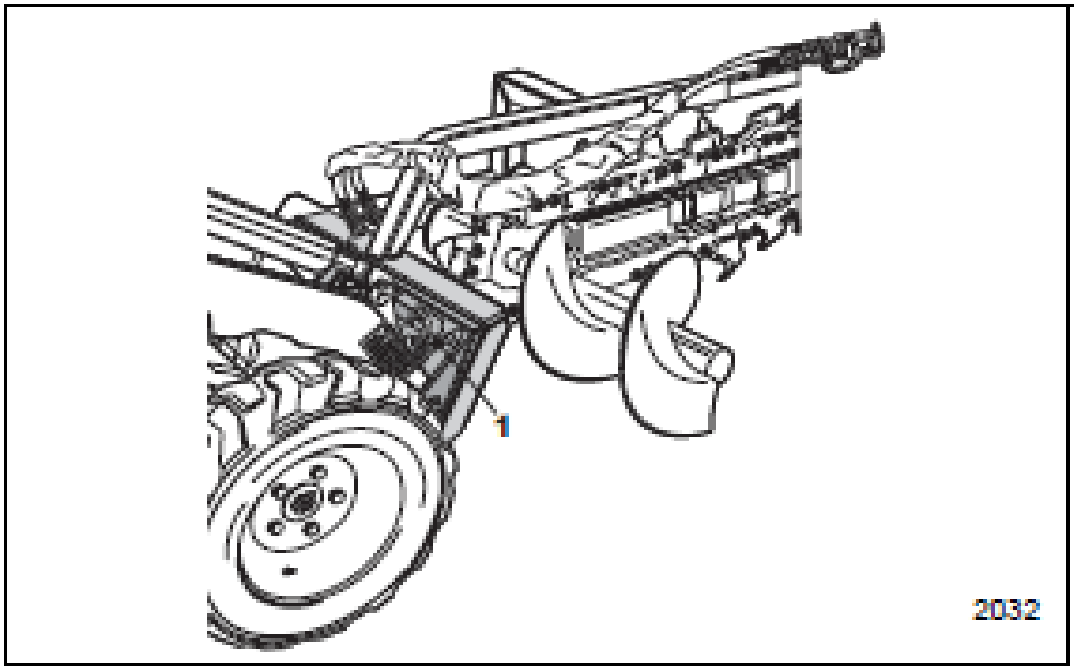


Figure 3–29 Hydraulically Powered Attachment Installed

5. Shut the engine off.
6. Rotate the attachment lock pins (Item 1, Figure 3–29, Item 1, Figure 3–30) into the locked position securing the attachment to the machine.

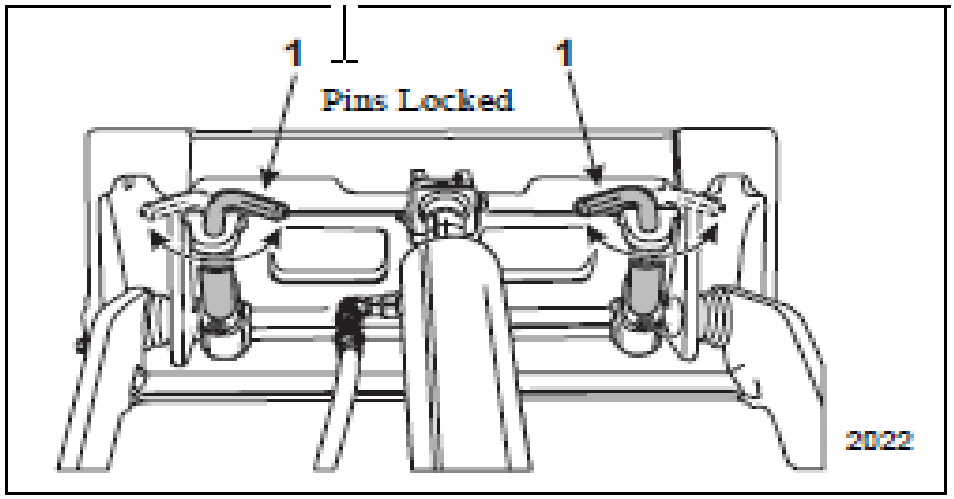


Figure 3–30 Attachment Locks in Locked Position

7. Start the engine and test the security of the attachment connection by fully lowering with loader arm and tilting the attachment downwards until the front tires slightly lift off the ground.
8. Shut off the engine.
9. Move any of the main hydraulic controls forward and backward to release any stored hydraulic pressure.
10. Attach the hydraulic hoses to the quick connects. See Figure 3–31.

NOTE: There are two hydraulic hoses that need to be connected. The quick connect system prevents you from incorrectly connecting the hydraulic hoses, but both hoses need to be connected for the attachment to operate.

a. With the engine OFF, move the AUXILIARY control lever (Item 1, Figure 3–31) toward the hand hold, or the FORWARD position, or move the lever BACKWARD into the REVERSE detent position. This will release the hydraulic pressure locked in the auxiliary hydraulic lines. Leave the control lever in the REVERSE detent position.

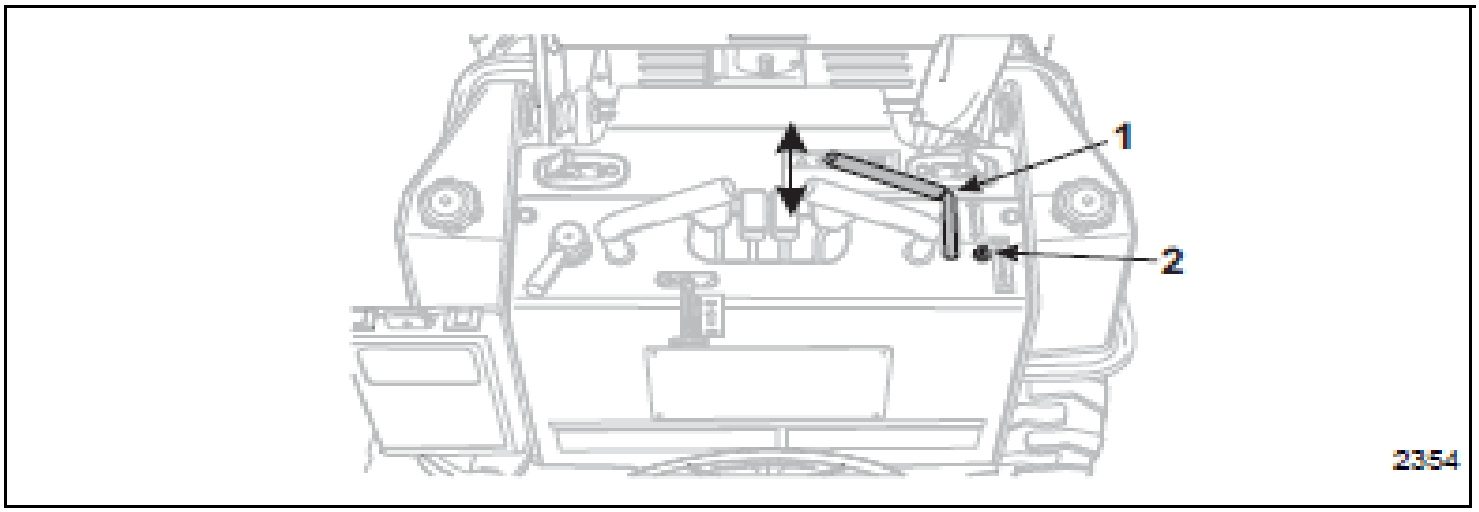


Figure 3–31 Auxiliary Control Lever

11. Make sure that the hydraulic hoses are routed so that they will not be in the way or damaged during machine operation. Figure 3–33 shows how the hoses might be routed to keep them out of the way during operation and prevent them from being damaged.

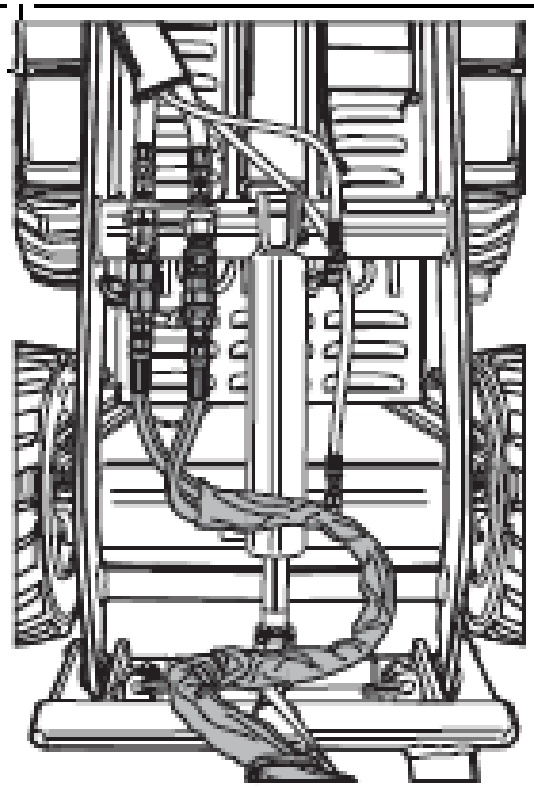


Figure 3–33 Attachment Hydraulic Hose Routing

12. The attachment is now ready to use.

⚠ CAUTION

Before starting the engine, make sure that the Auxiliary Hydraulic control lever is in the NEUTRAL position. If this control is left in either the forward or reverse position and the engine is started, the attachment will begin to function.

b. Remove the protective covers (Items 2, 6, Figure 3–32) from the attachment quick connectors.

c. Wipe off the end of each of the connectors (Items1, 3, Figure 3–32) to remove any dirt or debris.

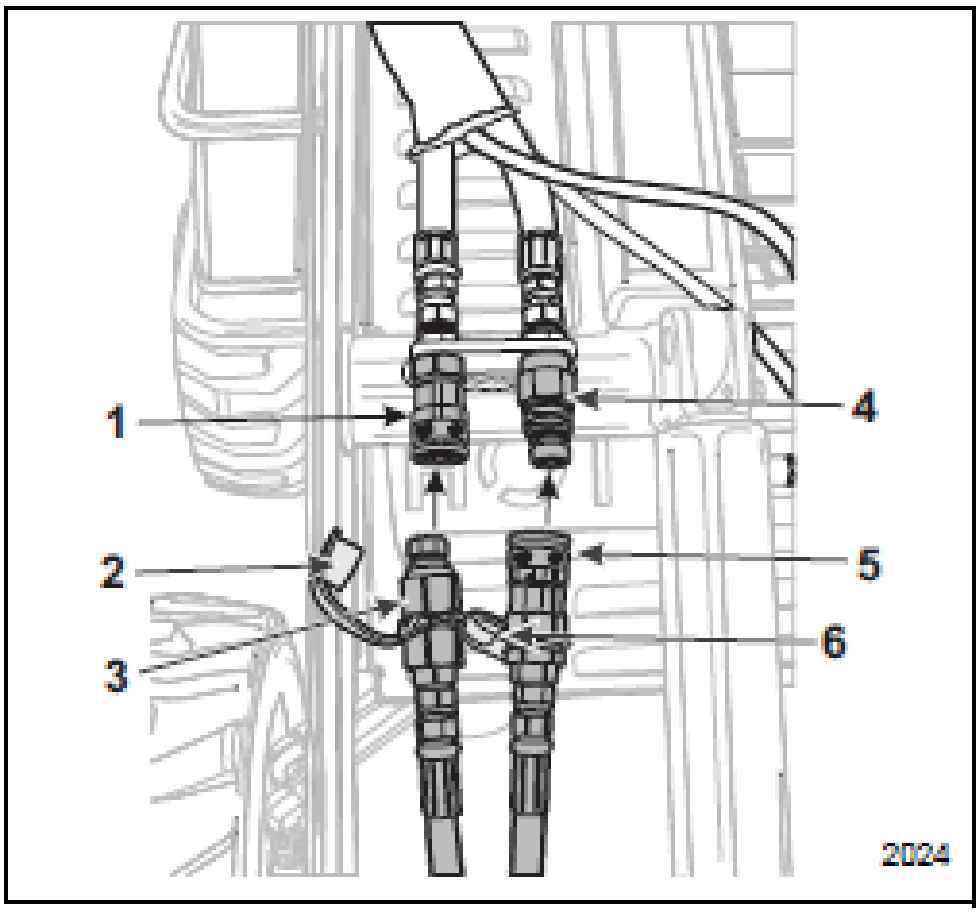


Figure 3–32 Auxiliary Hydraulic Quick Connects

d. Insert the attachments' male coupling (Item 3, Figure 3–32) into the female bulkhead quick connect coupling (Item 1, Figure 3–32) on the machine and push until the connector locks into position.

e. Repeat the above process to connect the attachments' female quick connect (Item 5, Figure 3–32) on the other hose to the male bulkhead connector (Item 4, Figure 3–32) on the machine.

f. Check the security of both connections by gently tugging on the attachment hoses to make sure that the quick connects are seated properly.

Operating Instructions for a Hydraulic Attachment

1. Move the engine throttle to the full speed setting.
   Raise the attachment off the ground and position it for use.

⚠ CAUTION

- **Make sure that you are standing on the operator's platform. DO NOT step off of the platform when the auxiliary attachment's power is engaged.**
- **If you release the AUXILIARY hand control/operator presence control, the attachment will automatically stop all motion.**
- **The Auxiliary Hydraulics will not function properly unless the HIGH/LOW switch in set to the HIGH position.**

2. Set the HIGH/LOW switch (Item 2, Figure 3–34) to the HIGH position before activating the AUXILIARY control lever. If this switch is not set properly, the auxiliary hydraulics and travel controls will not function properly.
3. With your right hand, squeeze the AUXILIARY attachment control lever (Item 1, Figure 3–34) towards the hand hold to activate the attachment in the FORWARD motion.

   NOTE: The lever is spring loaded and when released, will automatically move from the FORWARD motion position to NEUTRAL stopping attachment motion.

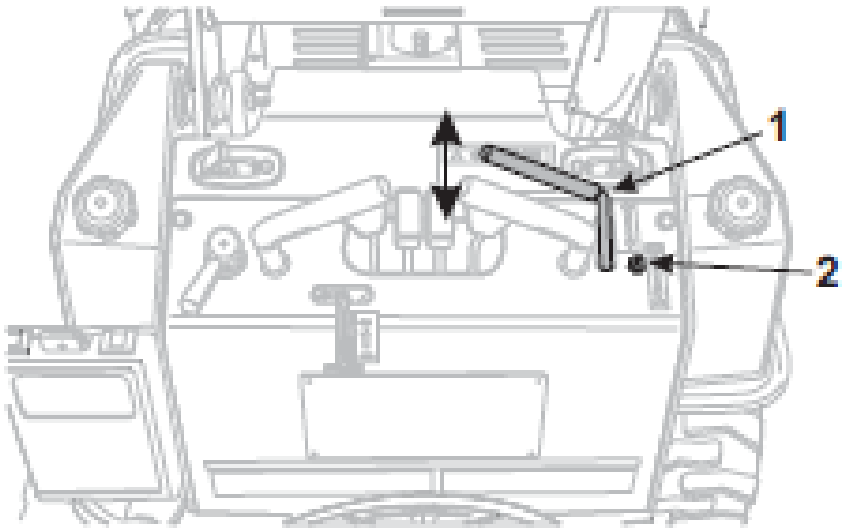


Figure 3–34 Auxiliary Attachment Controls

4. Lower the attachment to begin work.
5. If you want to reverse the operation of the attachment, move the auxiliary control lever (Item 1, Figure 3–34) to the REVERSE position. The control lever will remain in the REVERSE position detent until it is moved to the NEUTRAL position.

Travel Creep Control

The travel system on the machine can be adjusted to make the attachment more effective in tough digging situations. The travel "creep" control allows the travel speed to be adjusted from full speed forward or reverse to no movement at all. To adjust the travel speed using the creep control, move the engine throttle lever to the maximum engine speed and:

NOTE: Make sure that the High/Low travel speed switch (Item 2, Figure 3–34) is in the HIGH position.

1. Move the AUXILIARY control lever (Item 1, Figure 3–34) to either the FORWARD or REVERSE position. The travel speed CREEP control (Item 1, Figure 3–35) is now active.
2. Start with the CREEP control in the fully engaged position (rotate control fully clockwise), which will send all hydraulic power to the attachment and the machine will not travel. .

   NOTE: The OFF position for the creep control lever is straight downwards. This position turns the control system off. Rotating the CREEP control lever fully clockwise to the top will send all of the hydraulic power to the attachment with no power going to the travel system.
3. Hold the main travel control levers in either the fully forward or reverse position.
4. Rotate the CREEP control lever (Item 1, Figure 3–35) to adjust the travel speed as needed.

   NOTE: Rotating the creep control lever controls travel speed:

   - *counter-clockwise* increases the travel speed from very slow to full operating speed. The faster the machine travels, the less hydraulic power will be directed to the attachment;
   - *clockwise* decreases the travel speed from full operating speed to full stop. The slower the machine travels, the more hydraulic power will be directed to the attachment.
5. Lower the attachment to the work position.
6. Rotate the CREEP control lever to adjust the machines travel speed to match the working conditions.

   NOTE: When the creep travel speed has been set properly, steering and direction control can be adjusted by using either or both of the travel control levers.
7. To return to full operating speed, release both travel control levers and rotate the CREEP control lever downwards past the highest speed setting into the "detent" OFF position. The full speed control range will be returned to the main travel control levers.

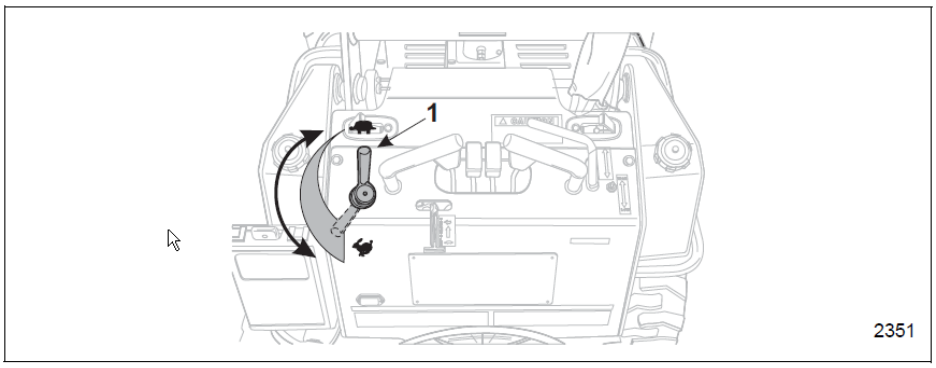


Figure 3–35 Creep Control Lever

Removal of Hydraulically Powered Attachments

⚠ CAUTION

After use, the quick couples and hydraulic fluid will be very hot. Wear gloves when disconnecting the auxiliary hydraulic lines.

To remove a hydraulically powered attachment;

1. Lower the attachment to the ground and shut off the engine.
2. Move the hydraulic control levers forward or backward to release any stored hydraulic pressure.
3. Some of the female couplings will have a lock button preventing accidental disconnection. To release this type of quick connect, rotate the collar on the female quick connect (Item 1, Figure 3–36) to align the notch on the collar with the lock button (Item 2, Figure 3–36).
4. Slide the collar backwards on the female quick connect (Item 4, Figure 3–36) until it stops against the lock button. The male connector will be released. Move the attachment hose away from the bulkhead fitting.
5. If the female connector does not have the lock pin type collar, just slide the collar backwards until the male connector is released.

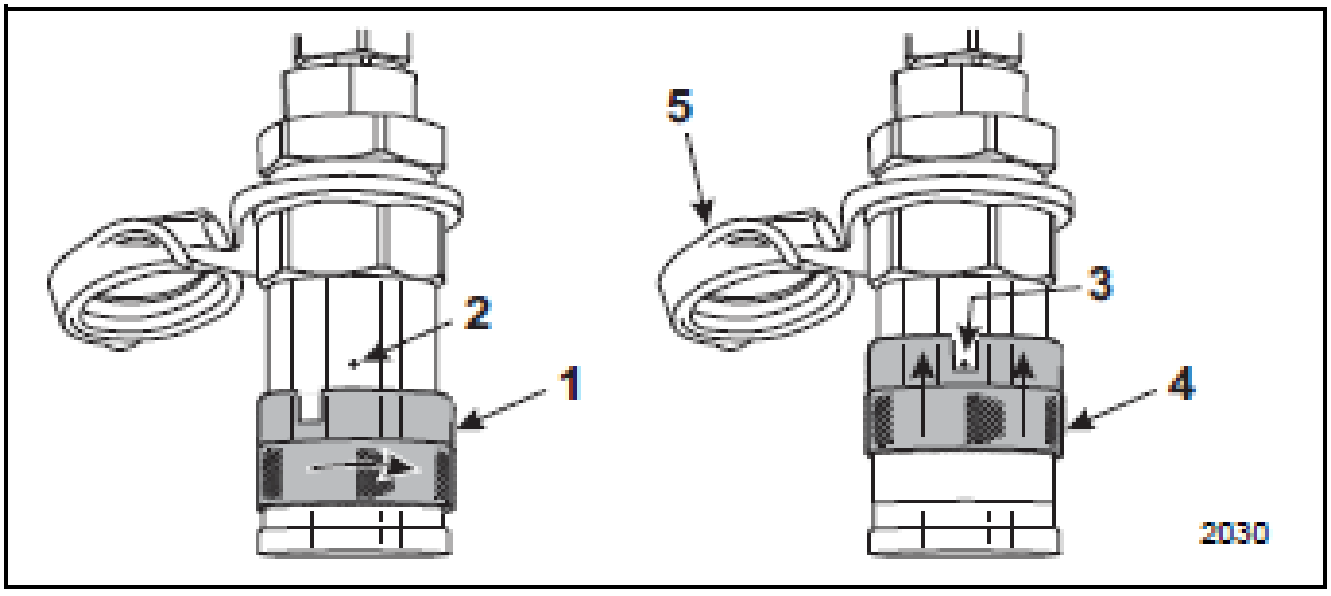


Figure 3–36 Quick Connect Locking Collar

6. Repeat this procedure on the other hydraulic line.
7. Cover the hose connections with the dust caps (Item 5, Figure 3–36) and store the hydraulic hoses to prevent damage.
8. Follow the instructions in "Removal of Attachment" earlier in this section to complete the attachment removal.

Routine Service and Maintenance
The following information presents the routine service and maintenance required to make sure that the machine functions safely and properly. More detailed service information is contained in the Service Manual.

Table 1: Service Cycle Table

Activity	Daily (10 Hours)	New Machine (20 Hours)	Weekly (50 Hours)	Monthly (100 Hours)	Annual
Safety Placards	✓ and R				
Fuel	✓ and A				
Engine Oil	✓ and A	R*		R**	
Engine Oil Filter		R*		R**	
Antifreeze Level	✓				
Air Filter	▪		✓	R**	R***
Fuel Filter				R**	
Check and Clean Battery Terminals and Battery			✓	✓	
Hydraulics					
*Hydraulic Filter		R*			R
*Hydraulic Fluid Level	✓ and A				
*Hydraulic Hoses	✓				
Grease	✓				
Visual Check for Loose/Missing Fasteners	✓				
Clean Radiator Cooling Fins	✓				
Check and Adjust Track Tension		✓		✓	

Service Cycle - R = Replace ✓= Check A = Add

* First 20 operational hours, then follow normal service cycle.
** Extremely dusty or dirty working conditions may require more frequent service/replacement.
***Replace every year or every six cleanings of the air cleaner element.

Daily Maintenance Procedures

Do the following procedures daily or every 10 operating hours:

- Check condition of all warning and instructional decals. Before operating the machine, replace any missing or damaged decals.

NOTE: Make sure to read and understand all WARNING and SAFETY decals before operating the machine.

- Check engine fuel and fill as needed - be sure engine is OFF

a. The Boxer has a saddle tank (Item 1, Figure 4–1), on each side of the machine.

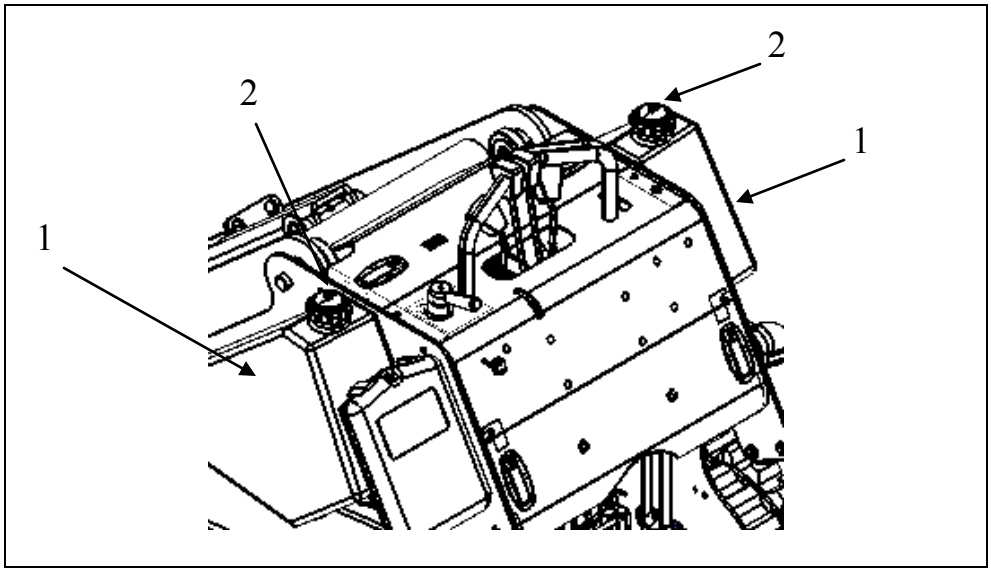


Figure 4–1 Fuel Level Check

b. Each of the tanks has a fuel gauge located in the filler cap (Item 2, Figure 4–1). Remove cap and visually inspect fuel level to make sure that the indicator is showing the proper fuel level. Make sure that each tank has been filled on a daily basis.
Carefully pour fuel into the tank, not exceeding the max fill indication shown by the gauge in the fuel cap.

⚠ CAUTION

• Allow engine to cool before filling fuel tanks.
• Do not overfill because fuel could spill onto hot engine parts and ignite or explode.

- **Check engine oil -**

a. Make sure that the engine is OFF.
b. Pull out the dipstick (Item 1, Figure 4–2) and look for the “FULL” line.

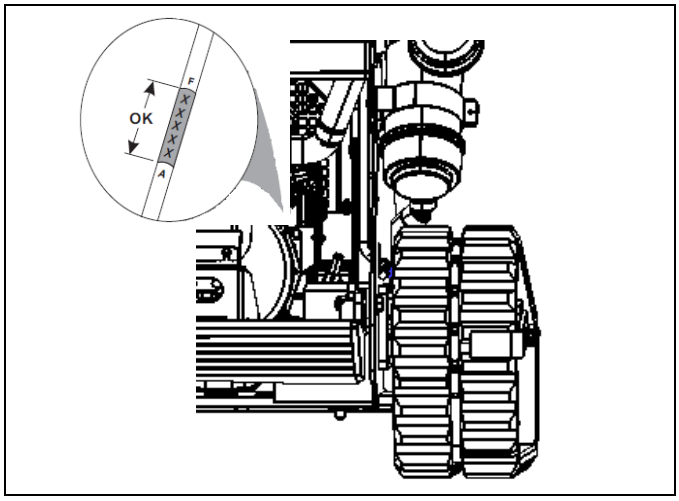


Figure 4–2 Oil Level Check

c. If the oil level is between the FULL and ADD lines, the oil level is within the normal use range. If the oil level is below the ADD line, carefully add the proper amount of oil through the engine oil filler tube (Item 1, Figure 4–2). It is important to add the correct type of engine oil as stated in the engine manual.
NOTE: Extremely dusty or dirty working conditions may require more frequent checking, filling and/or changing of engine oil.
d. After filling the oil, wait a few minutes and check the oil level again.

IMPORTANT

Make sure to securely reinstall the dipstick into the dipstick tube before starting the engine.

- **Release dirt** from separator tube at the bottom of the air filter by squeezing the rubber dust ejector valve (Item 1, Figure 4–3) underneath the air filter.

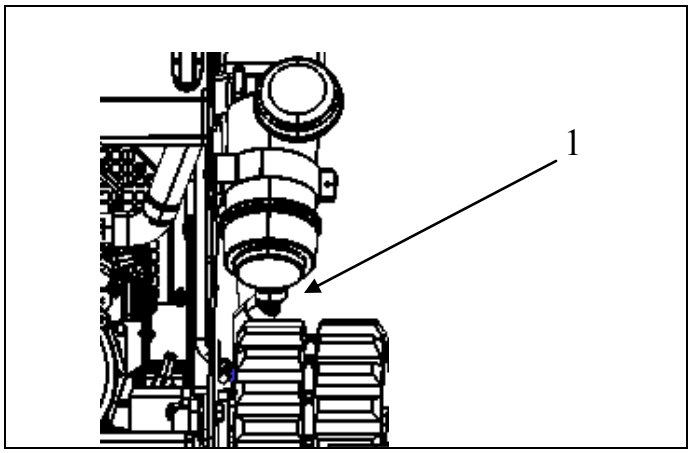


Figure 4–3 Air Filter Dirt Release

- Check hydraulic oil level, fill as needed with the proper hydraulic oil - be sure engine is OFF
  a. Remove the two lock knobs securing the front service cover.
  b. Locate the large hex nut (Item 1, Figure 4–4) Attached to this hex nut you will find the hydraulic level dip stick.
  d. Unscrew and remove the hydraulic fluid dip stick Make sure that the hydraulic fluid is at or slightly above the marker hole in the dip stick.

⚠ CAUTION

If you are checking the fluid level after a period of use, the hydraulic system and hydraulic fluid will be very hot. Wear gloves when inspecting the hydraulic fluid level.

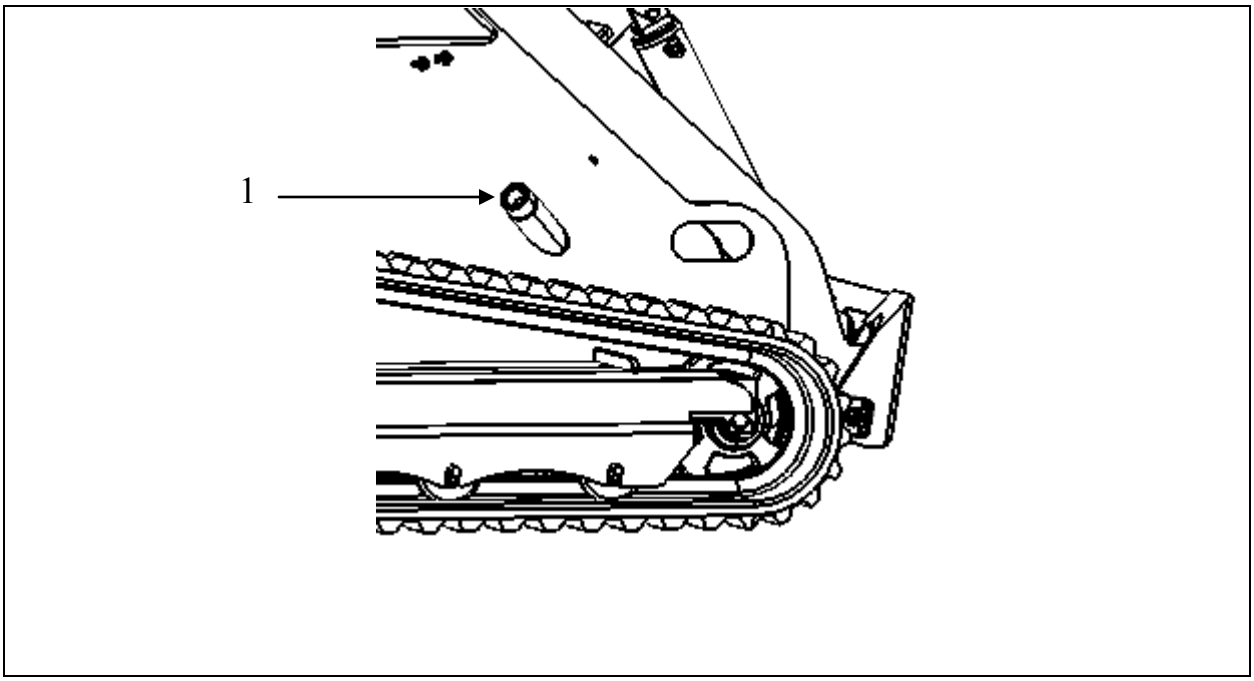


Figure 4–4 Hydraulic Fluid Level Dip Stick

e. Add the proper hydraulic fluid (ISO 46 - premium hydraulic oil or equivalent) until the fluid level is at or slightly above the marker hole in the dipstick.

IMPORTANT

Do not over fill the hydraulic system. Damage to the hydraulic system might result.

6. Check hydraulic hoses.

⚠ WARNING

Hydraulic oil under pressure can penetrate body tissue causing serious injury and possible death. When troubleshooting a hydraulic system for leaks, always use cardboard or wood as a detector. DO NOT USE YOUR BARE HANDS. If you are injected with hydraulic oil or any other fluids, immediately seek treatment by a doctor trained in the treatment of penetrating fluid injuries.

a. Fully raise the loader arm, and secure the safety support.
b. Open the front service cover and secure with the safety support lock pin.

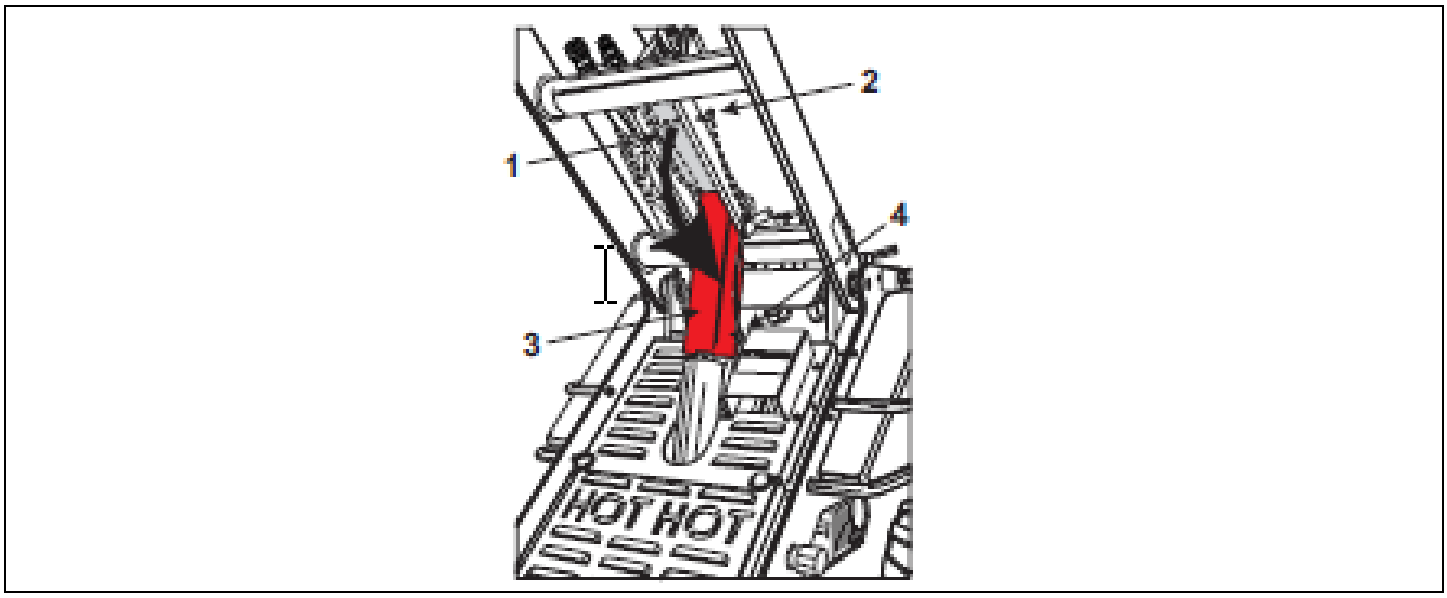


Figure 4–5 Install Safety Support

d. Follow all of the hoses, line and tubes from the control valve to their end (Items 1, 2, 4 and 5, Figure 4–7). Inspect the connections and look for signs of leaking hydraulic fluid, wear or damage. Carefully inspect the quick couples (Item 3, Figure 4–7) to make sure that they are not damaged or leaking.

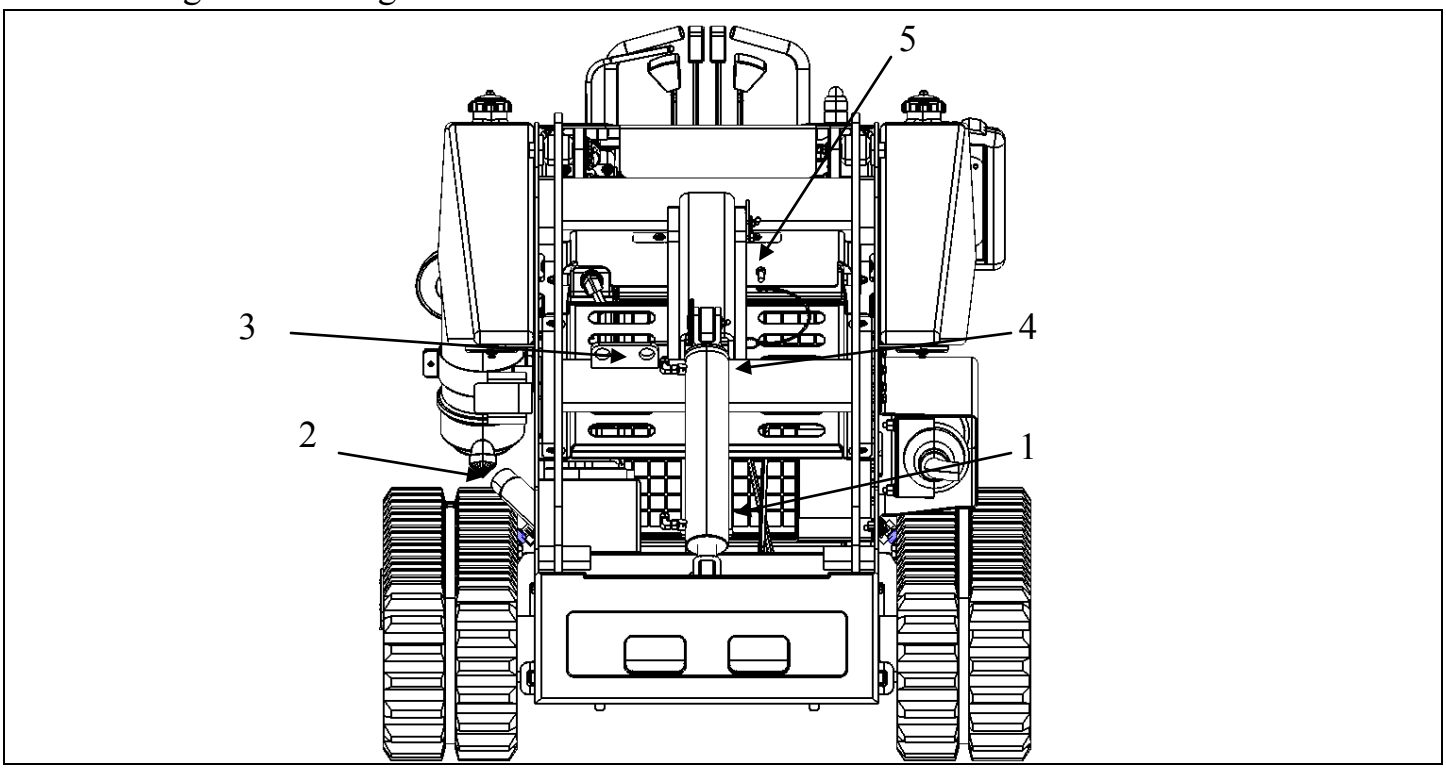


Figure 4–7 Inspect Hydraulic Lines and Fittings

e. If any signs of damage are visible, do not operate the machine until repairs have been made and documented.

f. When the inspection has been completed, reinstall the upper inspection cover and secure it in position by pressing the lock handles downwards.

g. Some examples of common hydraulic hose damage are shown in (Figure 4–8):

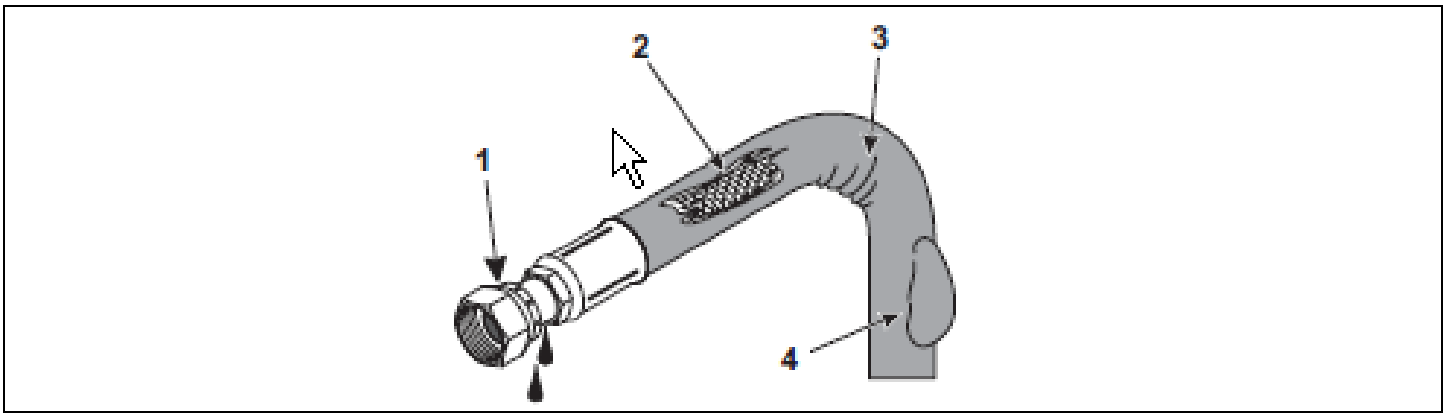


Figure 4–8 Hydraulic Hose Damage

1. End fittings damaged or leaking.
2. Outer covering chafed or cut, and wire reinforcing is exposed.
3. Hose shows signs of kinking or crushing.
4. Outer covering ballooning

4. Check for proper track tension (if equipped).
a. Raise the machine off the ground and support it using a device capable of safely supporting 3000 lbs. See Figure 4–14 for suggested location of the support devices.
b. Tilt the bucket downwards until the cutting edge is touching the ground. See Figure 4–14.
c. Lower the loader arm assembly, pushing the front of the machine upwards. Continue raising the machine until the rear drive sprocket is off the ground. Shut off the engine.
d. Measure the gap between the bottom of the center bogey guide roller (Item 1, Figure 4–14) and the track. The proper tension will be about a 3/8" - 1/2" deflection.
e. If an adjustment is needed, fully remove the adjustment nut keeper (Item 2, Figure 4–14) and rotate the adjustment nut (Item 3, Figure 4–14) until the proper track deflection measurement is achieved. Reinstall and secure the adjustment nut keeper (Item 2, Figure 4–14). **NOTE:** It may be necessary to rotate the adjustment nut slightly to align the adjustment nut keeper bolt.
f. With the tracks still off the ground, start the engine and rotate just the track being adjusted three or four times in both forward and reverse. Shut off the engine after rotating the track.
g. Remeasure the deflection dimension.
h. Repeat the measurement and adjustment procedure on the other track assembly.
i. Lower the machine onto the ground.

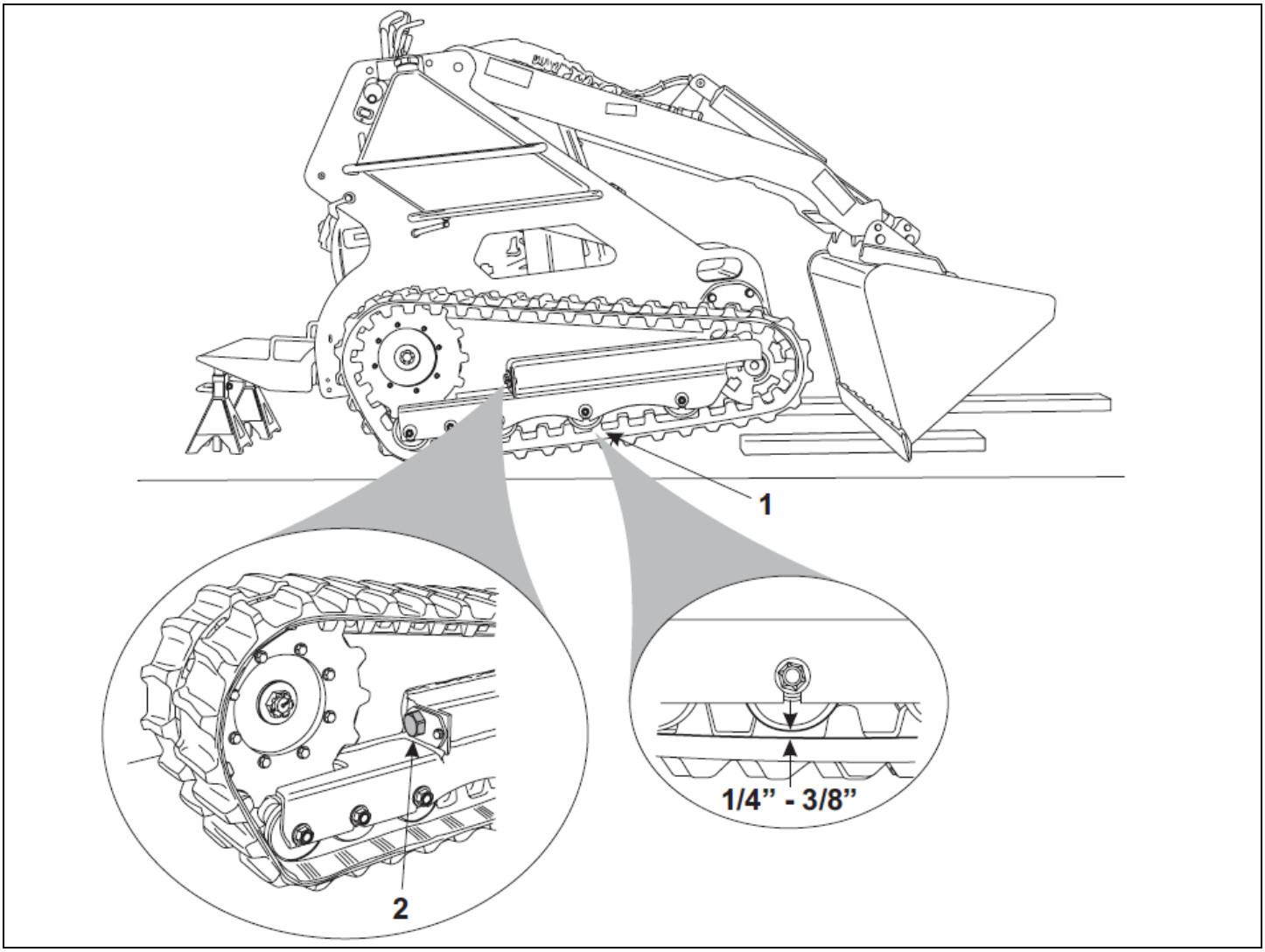


Figure 4–14 Track Tension Adjustment

Track and Tension System Installation

1. Securely elevate the machine. See Figure 4–28 and Track Tensioning instructions.

⚠ CAUTION

- **Make sure that the machine has been securely elevated and that there is no danger of it tipping before beginning this procedure.**
- **To fully stabilize the machine, it may be necessary to insert an additional support at the front of the machine, under the hydraulic tank. When this support has been installed, raise the boom.**

IMPORTANT

If this procedure is being done “in the field”, and to make sure that the machine does not tip over, make sure that the ground you are working on is solid and as level as possible.

2. Shut off the engine

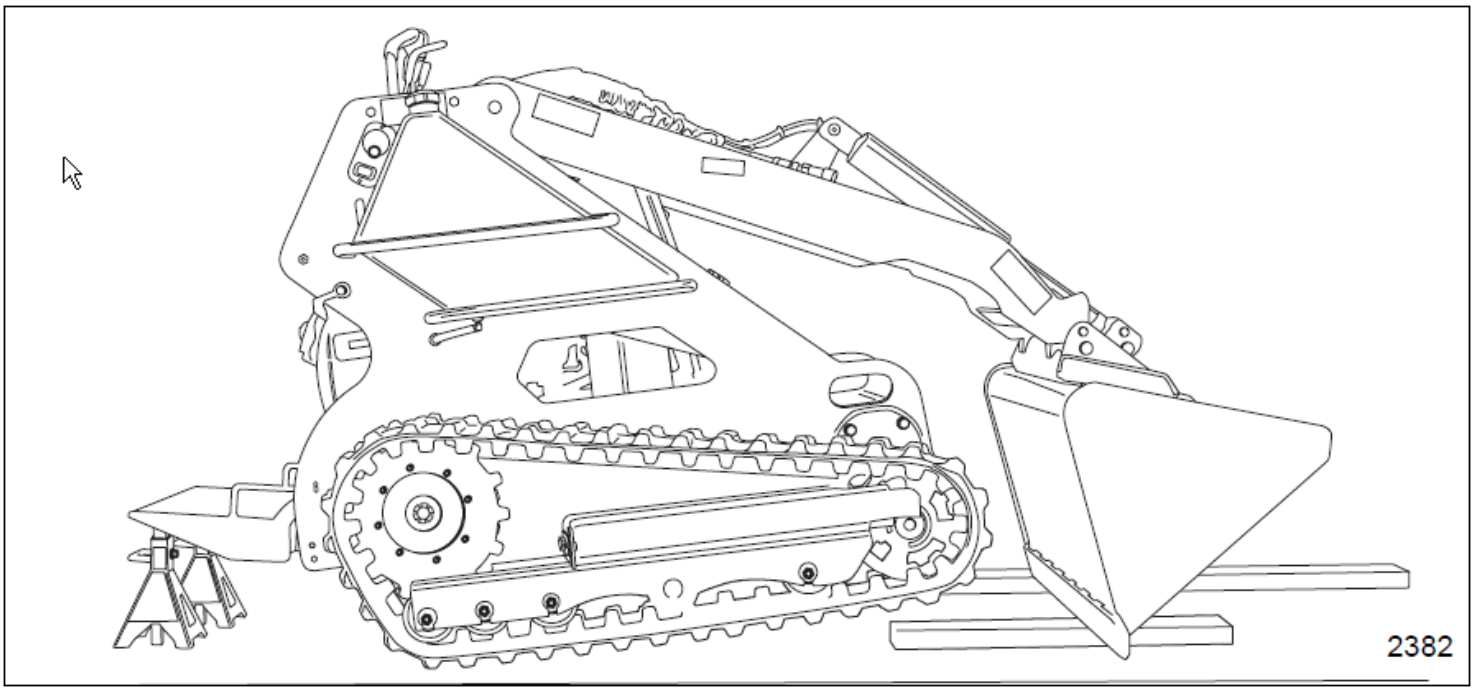


Figure 4–28 Machine Elevation

If any of the track tensioning components have come out of the track tension assembly when the track came off of the machine, proceed to Step 3. If not, skip to Step 6.

3. Install tension bolt and thrust washer (Item 1, Figure 4–29) into track frame.
   NOTE: Make sure that the thrust plate is rotated as far backwards as possible on the tension bolt, releasing all track tension.

4. Install tension spring (Item 2, Figure 4–29) into track frame.
5. Install idler wheel assembly (Item 3, Figure 4–29) into track frame.

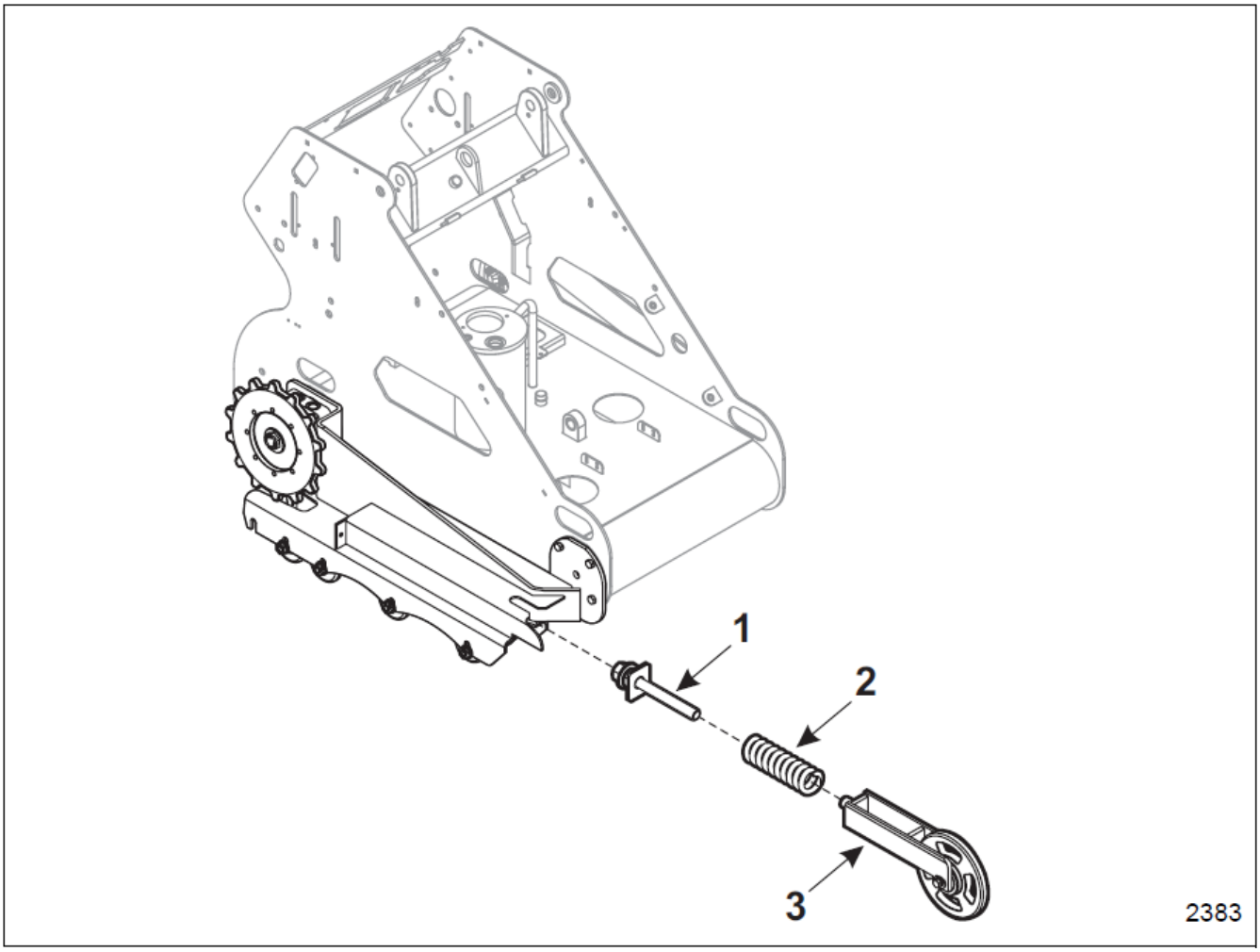


Figure 4–29 Track Drive Components Installed

6. Move rubber track away from the machine.

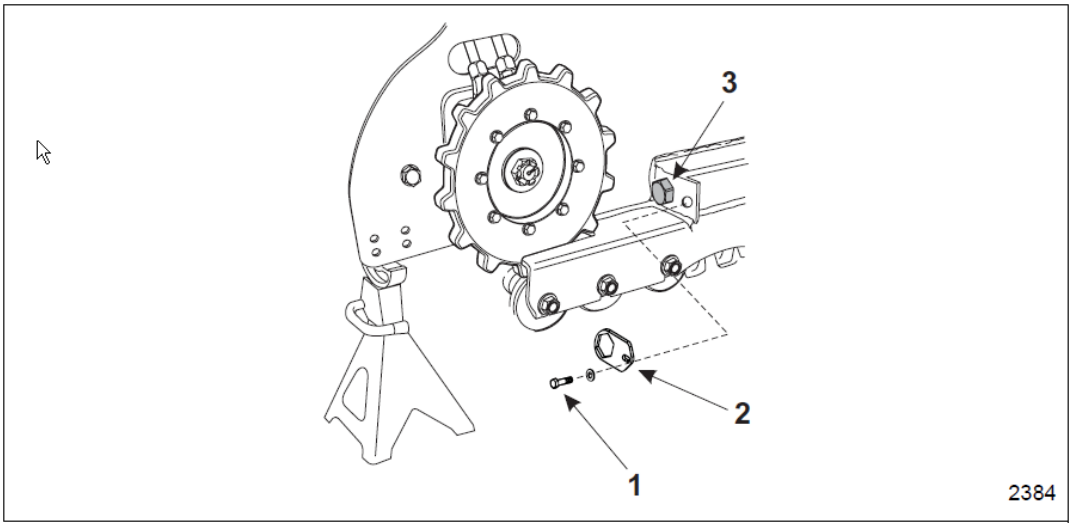


Figure 4–30 Remove Lock Plate

7. Remove track tension bolt lock plate bolt (Item 1, Figure 4–30) using a 9/16" wrench
8. Remove lock plate (Item 2, Figure 4–30).
9. Loosen track tension by rotating the tension bolt (Item 3, Figure 4–30) CLOCKWISE using a 1 5/8" wrench.
   NOTE: on recent models, the track tension wrench is located under the removable service access cover.
10. Using a 9/6" wrench, remove the 8 bolts (Item 2, Figure 4–31) securing the drive sprocket (Item 1, Figure 4–31) to the drive motor hub.
    NOTE: The drive sprocket has a recessed area on the back side of the sprocket. This area seats on the drive hub.

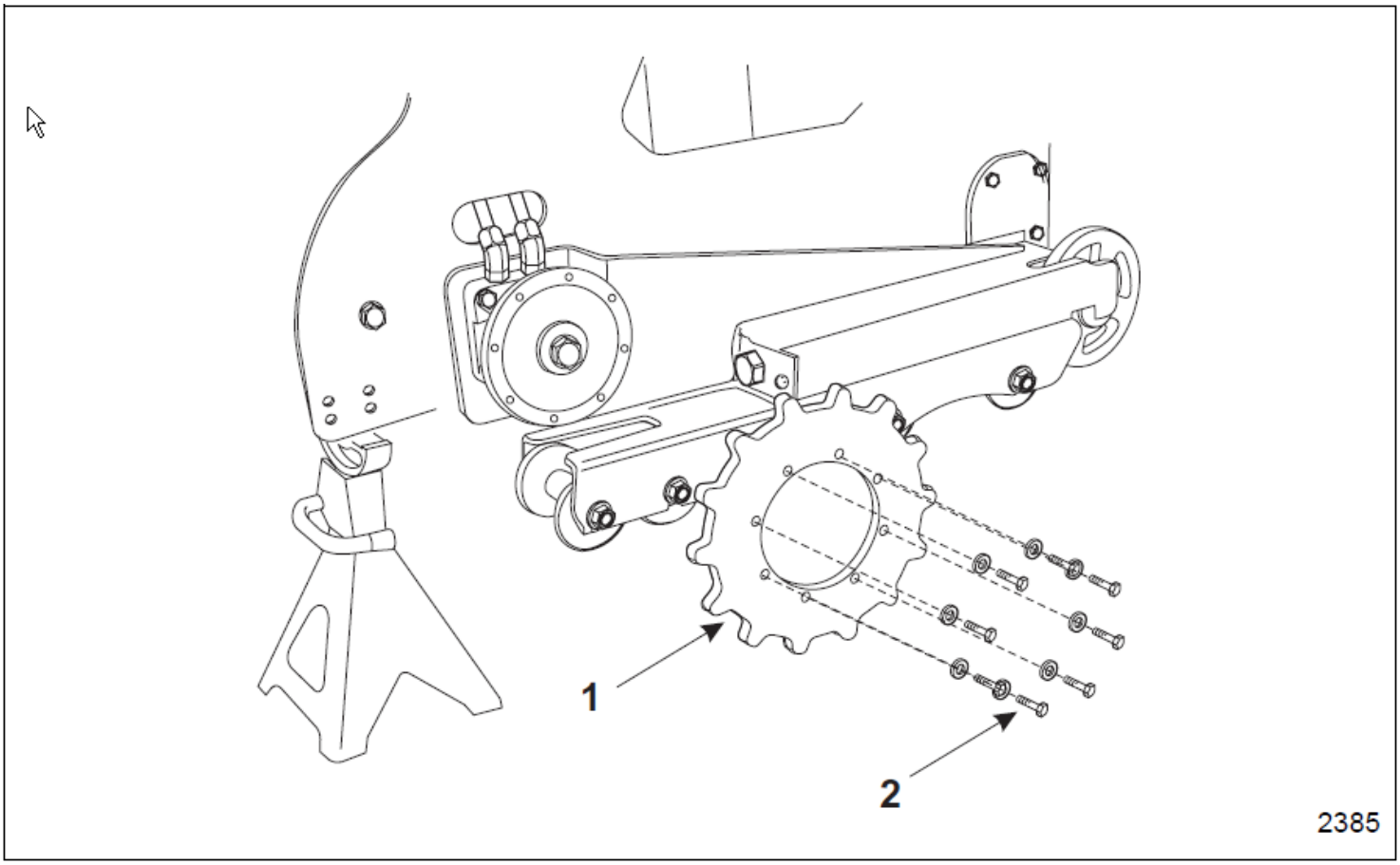


Figure 4–31 Remove Drive Sprocket

11. Slide the track (Item 2, Figure 4–32) on the front idler wheel (Item 1, Figure 4–32) making sure that the track lugs are on each side of the idler wheel.

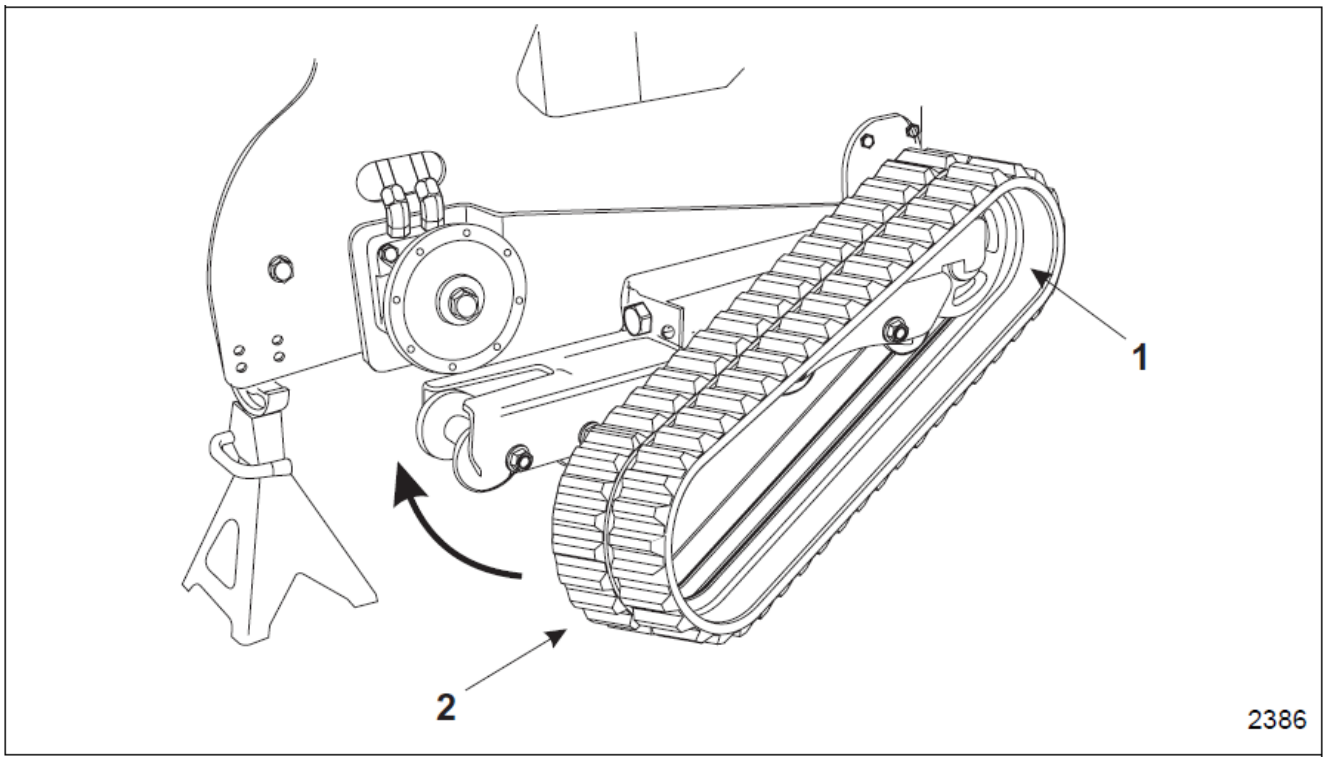


Figure 4–32 Install track onto front idler wheel

12. Slide the track around the rear most bogey guide roller (Item 1, Figure 4–33) at the bottom of the track assembly.
13. Insert the drive sprocket (Item 2, Figure 4–33) into rear of the track, between the track lugs and with the sprocket teeth in the track sprocket holes.

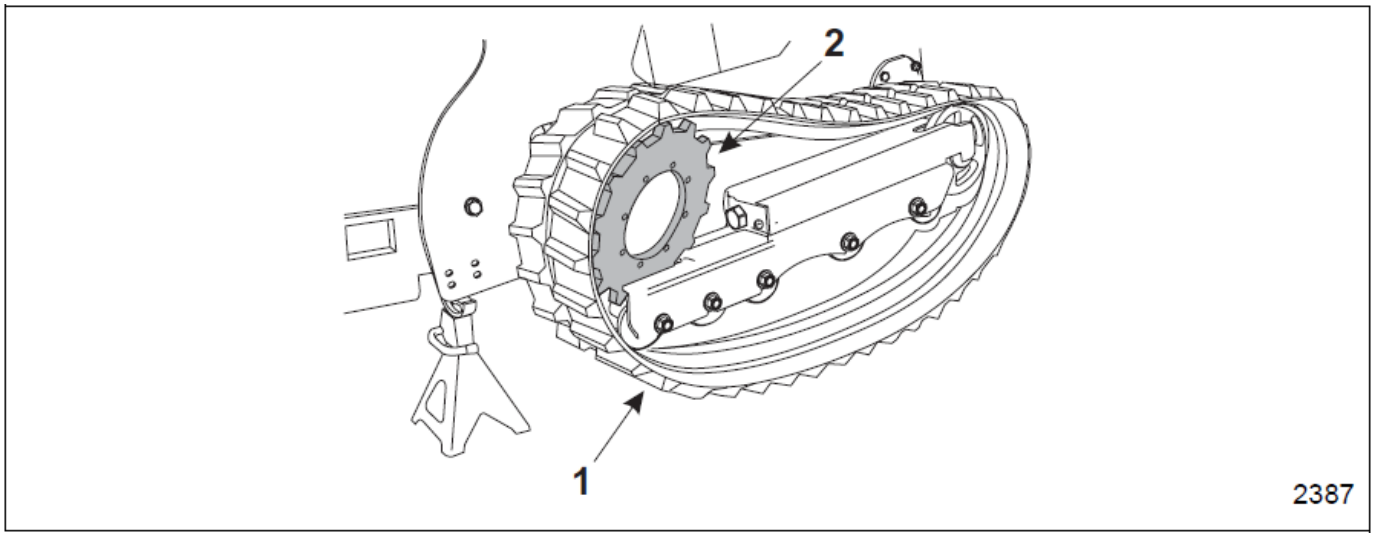


Figure 4–33 Insert Drive Sprocket into Track

14. Slide the drive sprocket into the slot at the top of the track frame assembly and position the drive sprocket and the track onto the drive motor. See Figure 4–33.

NOTE: The drive hub (Item 1, Figure 4–34) seats in the recess in the back of the drive sprocket (Item 2, Figure 4–34) and is secured using the 9/16" bolts (Item 4, Figure 4–34) and washers (Item 3, Figure 4–34).

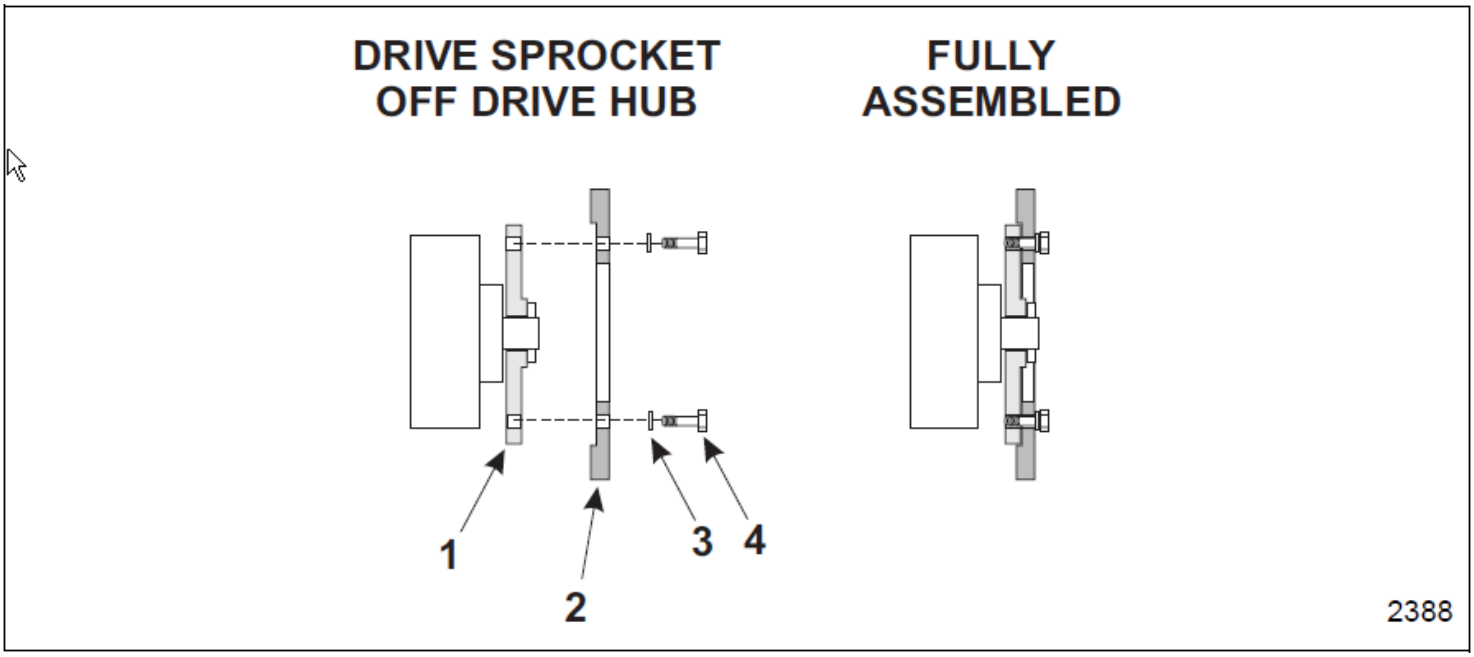


Figure 4–34 Drive Hub Seating in Drive Sprocket

15. Rotate the drive sprocket and track to align the bolt holes.

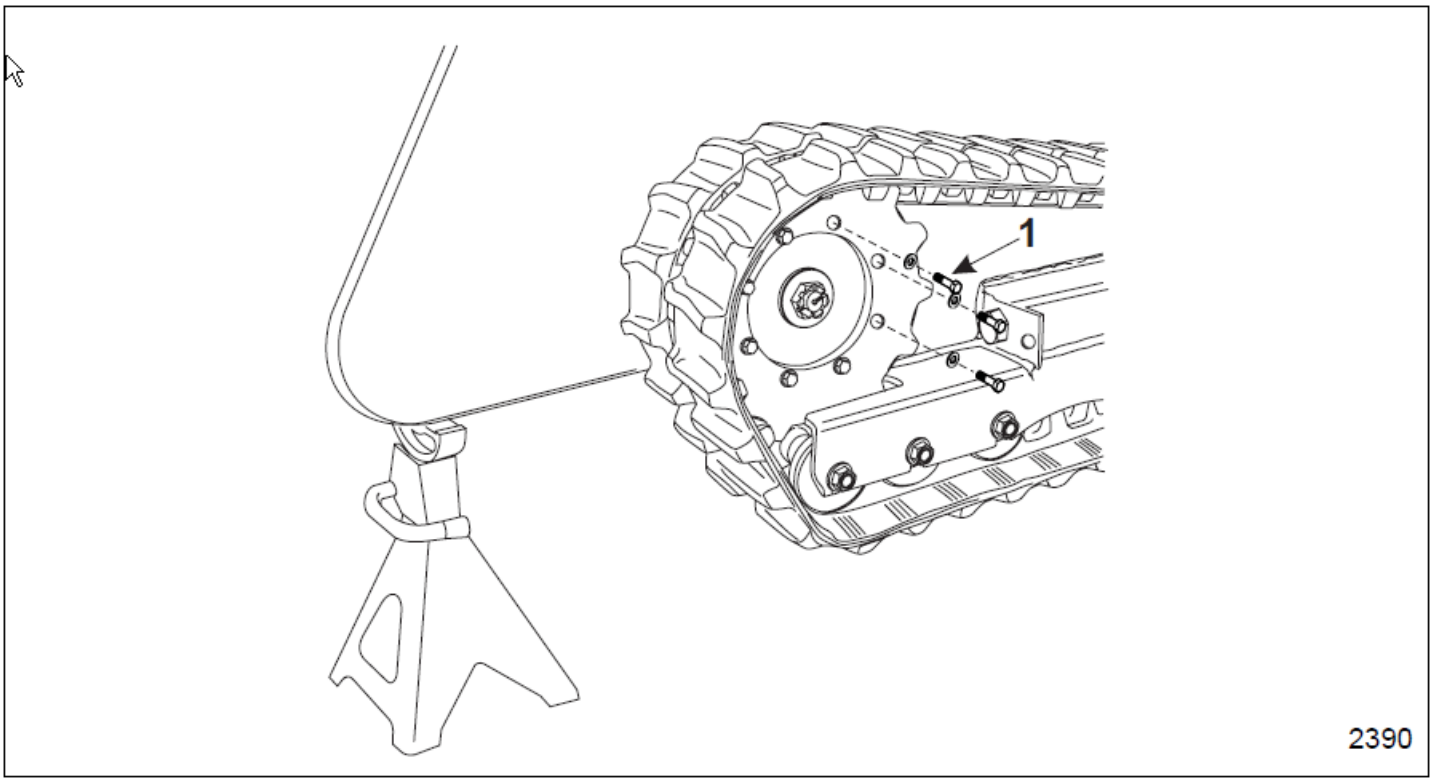


Figure 4–35 Install Track and Drive Sprocket

16. Install and secure the 8 drive sprocket mounting bolts (Item 1, Figure 4–35).
    NOTE: Tighten the bolts evenly around the drive sprocket.
17. Rotate the tension bolt (Item 1, Figure 4–36) COUNTER CLOCKWISE until the correct track tension is set. See Track Tensioning earlier in this manual.

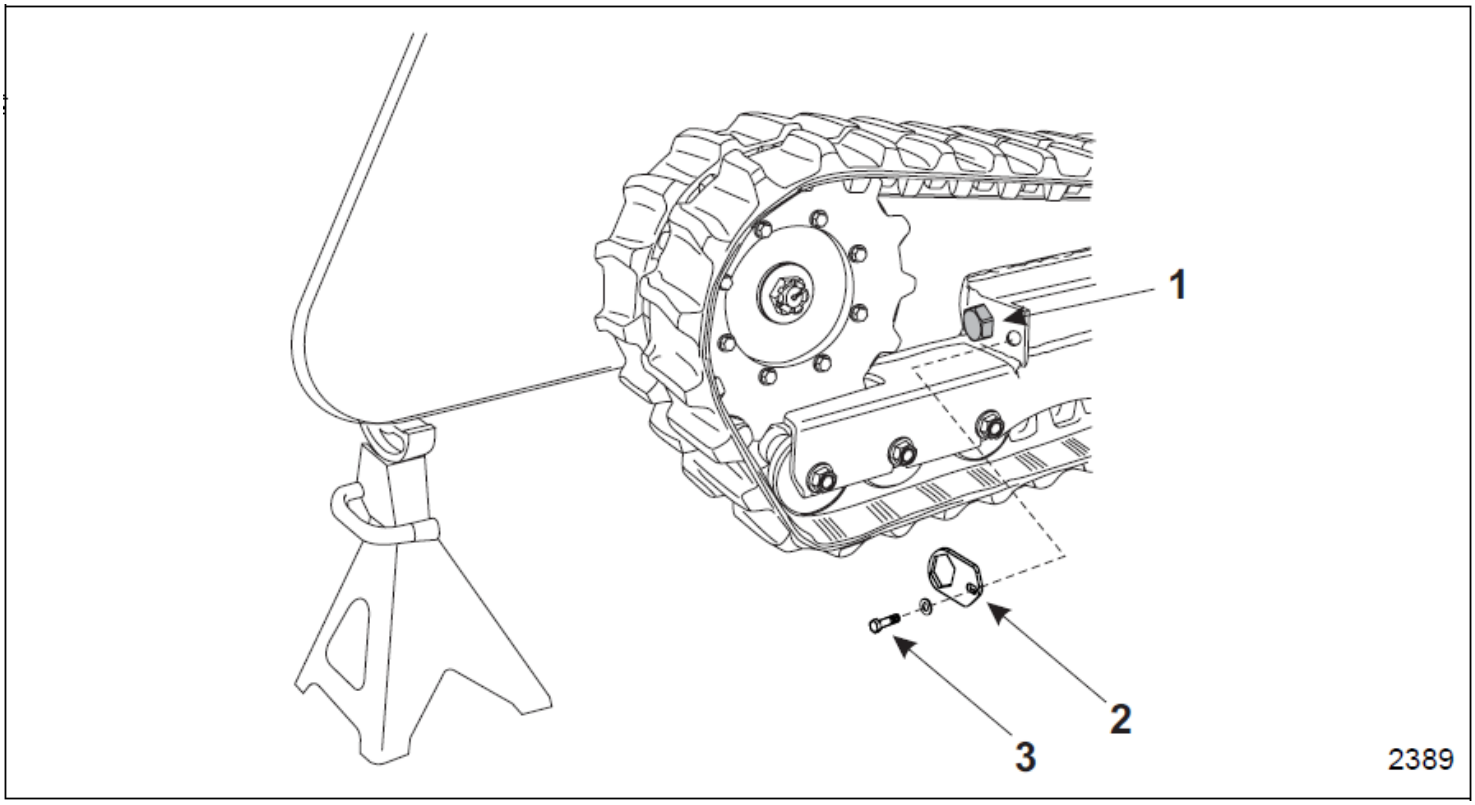


Figure 4–36 Set Track Tension

18. Start the engine and slowly rotate the track forward and backward to make sure that the track is properly seated on the drive sprocket.
19. Fully rotate the track forward and backward several times.
20. Shut off the engine.
21. Double check track tension.
22. Adjust track tension as needed.
23. Install track tension bolt lock plate (Item 2, Figure 4–36) and secure with 9/16" bolt (Item 3, Figure 4–36).
24. Return the machine to service.

Section 5 – Troubleshooting

The following procedures will assist you in determining the potential cause of a machine operating problem.

IMPORTANT

Make sure to follow all safety precautions stated in this manual when doing any work on the machine.

Problem	Possible Causes	Corrective Action
Starter does not turn the engine over.	• Auxiliary hydraulics lever is either in Forward or Reverse position with no hydraulically powered attachment installed.	• Move lever to neutral position.
	• Battery is dead.	• Charge the battery. • If battery does not hold a charge, replace the battery.
	• Electrical connections are corroded or loose.	• Check electrical connections for good contact. • Remove cables from battery terminals and fully clean battery terminals and cable clamps. • If the cable clamps can not be properly cleaned, replace connectors.
	• Relay or starter switch is defective.	• Contact Authorized Service Dealer.
	• Engine is in hydraulic lock due to a cylinder filled with fuel.	⚠ DANGER • Make sure that the spark plug cables have been moved away from the engine block or any other metal surface. A spark could ignite the fuel causing a fire or explosion. • Allow engine to cool before attempting this procedure. • Remove spark plugs and turn engine over to pump excess fuel from engine cylinder.

Problem	Possible Causes	Corrective Action
Engine will not start, starts hard, or fails to keep running.	• Auxiliary hydraulics lever is not in neutral position with a hydraulically powered attachment installed.	• Move lever to neutral position.
	• Fuel tanks are empty.	• Fill fuel tanks with gasoline.
	• Choke is not on.	• Pull choke control fully outwards.
	• Air cleaner is dirty.	• Clean air filter housing and replace the filter elements.
	• Spark plug wires are loose or disconnected.	• Install wires on spark plugs. • If the spark plug wires do not stay connected, contact Authorized Service Dealer.
	• Spark plugs are pitted, fouled, or gap is incorrect.	• Install new, correctly gapped spark plugs.
	• Dirty or contaminated fuel filter.	• Replace fuel filter.
	• Dirt, water, or stale fuel is in fuel system.	• Drain fuel in tanks into an appropriate storage container and dispose of bad fuel properly. • Refill fuel tanks with fresh, clean fuel. • Replace fuel filter.
	• 30 Amp fuse blown.	• Replace fuse.
Engine looses power.	• Engine load is excessive.	• Reduce ground speed. • Reduce speed of attachment.
	• Air cleaner is dirty.	• Clean air filter housing and replace the filter elements.
	• Engine oil level in crankcase is low.	• Add the appropriate engine oil to crankcase. See engine manual for oil specifications.
	• Cooling fins and air passages under engine blower housing are plugged.	• Remove obstruction from cooling fins and air passages.
	• Spark plugs are pitted, fouled, or gap is incorrect.	• Install new, correctly gapped spark plugs.
	• Dirty or contaminated fuel filter.	• Replace fuel filter.
	• Dirt, water, or stale fuel is in fuel system.	• Drain fuel in tanks into an appropriate storage container and dispose of bad fuel properly. • Refill fuel tanks with fresh, clean fuel. • Replace fuel filter.
	• Spark arrestor plugged.	• Clean spark arrestor.

Problem	Possible Causes	Corrective Action
Engine overheats.	• Engine load is excessive.	• Reduce ground speed. • Reduce speed of attachment.
	• Engine oil level in crankcase is low.	• Add the appropriate engine oil to crankcase. See engine manual for oil specifications.
	• Cooling fins and air passages under engine blower housing are plugged.	• Remove obstruction from cooling fins and air passages.
Abnormal engine vibration.	• Engine mounting bolts are loose.	• Tighten engine mounting bolts.
With the machines engine turned off, the boom creeps downward more than 3" per hour (less than 3" per hour is normal for this machine).*	• Valve spool leakage.	• Contact Service Dealer.
	• Cylinder seals are leaking.	• Replace cylinder seals.
With the machines engine turned off, boom drops downward quickly and then stops.	• Cylinder seals are leaking.	• Replace cylinder seals.
The machine does not travel in either forward or reverse directions.	• Engine is not running at full speed.	• Advance throttle to full engine speed.
	• Hydraulic fluid is cold.	• Fully warm hydraulic fluid.
	• Hydraulic fluid level is low.	• Check and fill the hydraulic fluid tank with the appropriate hydraulic fluid.
	• Fuel tanks are empty and engine stops.	• Fill fuel tanks with fuel.
	• If all above has been checked.	• Contact authorized service dealer.
Track is "cogging".	• Travelling in reverse with a heavy load.	• Slow down travel. • Reduce load on machine.
	• Track tension spring fully compressed.	• Stop travel and reverse direction to allow the tension spring to decompress. • Check for debris in track that could cause the track tension spring to fully compress.
	• Track tension not set properly.	• Reset track tension.

*Tested with warm oil and no more than 530 lbs (240 Kg) in the bucket. Measure the downward drop at the attachment lock pins on the back of the mount plate.

Engine Troubleshooting**

When engine trouble occurs, check the simple causes which, at first, may seem too obvious to be considered. For example, a starting problem could be caused by an empty fuel tank. Some general common causes of engine troubles are listed below.

■When it is difficult to start the engine

Cause	Countermeasures
Fuel is thick and doesn't flow.	* Check the fuel tank and fuel filter. * Remove water, dirt and other impurities. * As all fuel will be filtered by the filter, if there should be water or other foreign matters on the filter, clean the filter with kerosene.
Air or water mixed in fuel system	* If air is in the fuel filter or injection lines, the fuel pump will not work properly. * To attain proper fuel injection pressure, check carefully for loosened fuel line coupling, loose cap nut, etc. * Loosen joint bolt stop fuel filter and air vent screws of fuel injection pump to eliminate all the air in the fuel system.
Valve clearance is not as specified.	* Adjust valve clearance to 0.145 to 0.185 mm (0.0057 to 0.0073 in.) when the engine is cold.
Leaking valves	* Grind valve.
Fuel injection timing is not as specified.	* Check injection timing.
Engine oil becomes thick in cold weather and engine cranks slow.	* Change grade of oil according to the weather (temperature).
Low compression	* Bad valve or excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts.
Battery is discharged and the engine will not crank.	* Charge battery. * In winter, always remove battery from machine, charge fully and keep indoors. Install in machine at time of use.

■When output is insufficient

Cause	Countermeasures
Compression is insufficient. Leaking valves	* Bad valve and excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts. * Grind valves.
Fuel is insufficient.	* Check fuel system.
Overheating of moving parts	* Check lubricating oil system. * Check to see if lubricating oil filter is working properly. * Filter element deposited with impurities would cause poor lubrication. Change element. * Check the clearance of bearing are within factory specs. * Check injection timing. * Adjust timing
Valve clearance is not as specified.	* Adjust to proper valve clearance of 0.145 to 0.185 mm (0.0057 to 0.0073 in.) with engine cold.
Air cleaner is dirty	* Clean the element every 100 hours of operation.
Fuel injection pressure is not as specified.	* Check injection pressure. 18.6 MPa(190 kgf/cm^2)
Injection pump wear	* Do not use poor quality fuel as it will cause wear of the pump. Only use No. 2-D diesel fuel. (See "FUEL" in "PERIODIC SERVICE" Section.) * Check the fuel injection pump element and delivery valve assembly and replace as necessary.

NOTE:

- If the cause of trouble can not be found, contact you KUBOTA dealer

■When engine suddenly stops

Cause	Countermeasures
Lack of fuel	* Check the fuel tank and refill the fuel, if necessary. * Also check the fuel system for air or leaks.
Bad nozzle	* If necessary, replace with a new nozzle.
Moving parts are overheated due to shortage of lubrication oil or improper lubrication.	* Check amount of engine oil with oil level gauge. * Check lubricating oil system. * At every 2 times of oil change, oil filter cartridge should be replaced. * Check to see if the engine bearing clearances is within factory specs.

■When color of exhaust is especially bad

Cause	Countermeasures
Fuel governing device bad	* Contact dealer for repairs.
Fuel is of extremely poor quality.	* Select good quality fuel. Use No. 2-D diesel fuel only.
Nozzle is bad.	* If necessary, replace with new nozzle.
Combustion is incomplete.	* Cause is poor atomization, improper injection timing, etc. Because of trouble in injection system or in poor valve adjustment, or compression leakage, poor compression, etc. Check for the cause.

■When engine must be stopped immediately

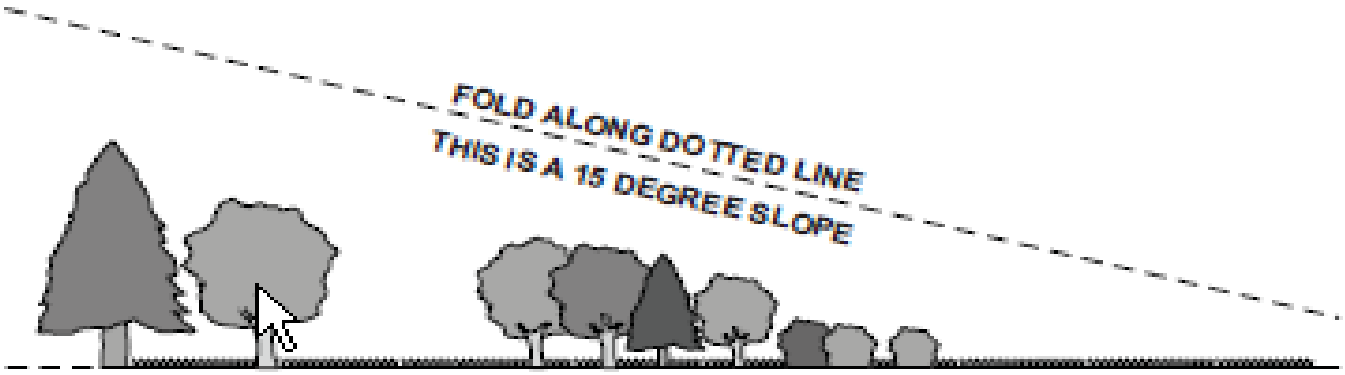
Cause	Countermeasures
Engine revolution suddenly decreases or increases.	* Check the adjustments, injection timing and the fuel system.
Unusual sound is heard suddenly.	* Check all moving parts carefully.
Color of exhaust suddenly turns dark.	* Check the fuel injection system, especially the fuel injection nozzle.
Bearing parts are overheated.	* Check the lubricating system.
Oil lamp lights up during operation.	* Check the lubricating system. * Check, if the engine bearing clearances are within factory specs. * Check the function of the relieve valve in the lubricating system. * Check pressure switch. * Check filter base gasket.

■When engine overheats

Cause	Countermeasures
Engine oil insufficient	* Check oil level. Replenish oil as required.
Fan belt broken or elongated	* Change belt or adjust belt tension.
Coolant insufficient	* Replenish coolant.
Excessive concentration of antifreeze	* Add water only or change to coolant with the specified mixing ratio.
Radiator net or radiator fin clogged with dust	* Clean net or fin carefully.
Inside of radiator or coolant flow route corroded	* Clean or replace radiator and parts.
Fan or radiator or radiator cap defective	* Replace defective parts.
Thermostat defective	* Check thermostat and replace if necessary.
Temperature gauge or sensor defective	* Check temperature with thermometer and replace if necessary.
Overload running	* Reduce load.
Head gasket defective or water leakage	* Replace parts.
Incorrect injection timing	* Adjust to proper timing.
Unsuitable fuel used	* Use the specified fuel.

Section 6 – General Specifications

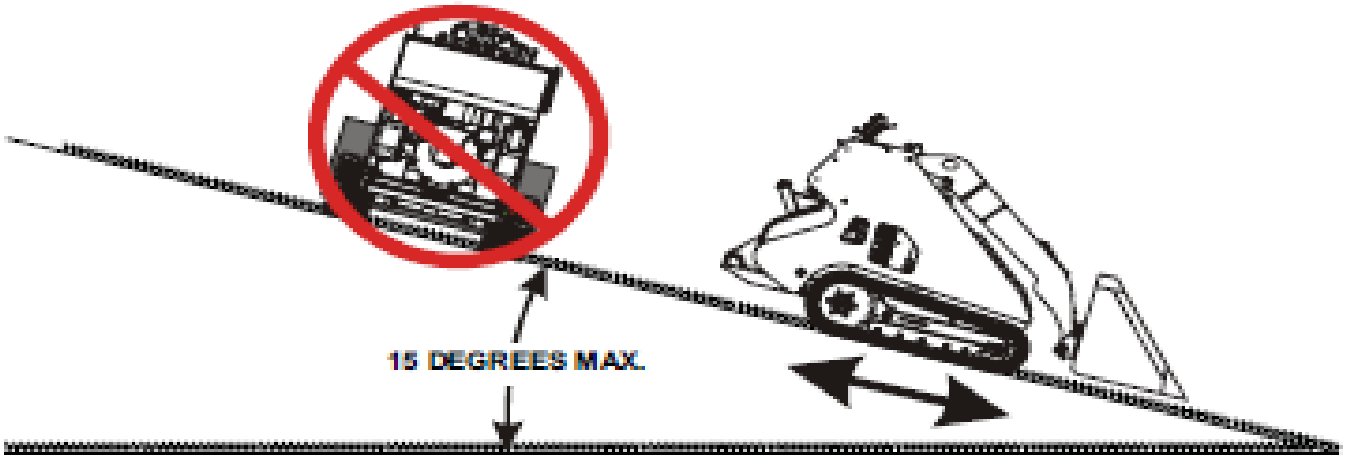
425D Diesel				
Engine System				
Type	Kubota D1105			
Cooling System	Liquid Cooled			
HP / KW	25/18.6			
Fuel Tank	9 Gallons			
Air Cleaner	Heavy-Duty Air Cleaner			
Hydraulic System				
Oil Cooling System	Air to oil cooler			
Pressure (Auxiliary/Boom & Tilt Cylinder Circuit)	3000 psi system relief			
Pressure Ground Drive Circuit	3000 psi system relief			
Flow Auxiliary	12.6 GPM @ 3600 RPM			
Flow Ground Drive	Variable Flow 0 - 12.6 GPM			
Reservoir Capacity	20 Gallons			
Filter	10 Micron			
Electrical System				
Battery	12 Volt			
Control System				
Starting	Keyed ignition switch.			
Throttle/Choke	Remote Mount Throttle - Choke N/A			
Steering	Two spring centered control lever with zero turning type controls.			
Boom/Loader Arms	Three position, spring centered lever control. Up, neutral, down.			
Bucket/Attachment Tilt	Three position, spring centered lever control. Extend, neutral, and curl.			
Auxiliary/Attachment Control	Two position, detented, Third position spring return to neutral.			
Wheel/Track Options	9" Wide Track			
Warranty				
Engine Warranty	Two Year			
Ground Drive System-Dimensions				
Units	**English**		**Metric**	
Wheelbase	37	in.	940	mm
Ground Clearance	6.0	in.	152	mm
Overall Length (w/ Bucket 3101400)	95	in.	2413	mm
Overall Length (without Bucket)	75	in.	1905	mm
Overall Width (Fully Retracted)	N/A	in.	N/A	mm
Overall Width (Fully Extended)	43.5	in.	1105	mm
Overall Height	51	in.	1295	mm
Overall Operating Height (Fully Raised)	92	in.	2337	mm
Hinge Pin Height (Fully Raised)	70	in.	1778	mm
Dump Height	54	in.	1372	mm
Ground Speed (Max)	3.4	mph	5.5	kph
Dump Angle	34	deg.	37	deg.
Reach	28	in.	711	mm
Tip Capacity	1800	lb.	816	kg
Operating Capacity, 35% of tip load.	600	lb.	272	kg
Operating Capacity, 50% of tip load.	900	lb.	408	kg
Weight (without Bucket)(*w/Bucket)	2450	lb.	1111	kg
Ground Pressure	3.7	psi	25.2	kPa

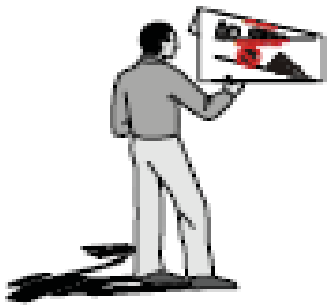


DO NOT TRAVEL ACROSS OR UP AND DOWN
A SLOPE GREATER THAN 15 DEGREES.

SUGGESTED GUIDE FOR SIGHTING SLOPES FOR SAFE OPERATION OF A COMPACT UTILITY LOADER WITH AN ATTACHMENT.

DO NOT REMOVE THIS PAGE FROM THE MANUAL.





⚠ WARNING

- To avoid serious injury, operate your unit up and down the face of slopes.
- Travel across slopes with great caution.
- Do not operate on slopes greater than 15 degrees.
- Make turns gradually to prevent tipping or loss of control.
- Exercise extreme caution when changing direction on slopes.
- Control of the machine may be affected by installed attachments.
- Reduce travel speed on slopes.
- Read and understand all Warnings and Operating Instructions in the Operator's Manual.

1. Fold this page along dotted line indicated above. DO NOT remove the page from the manual.
2. Hold page before you so that its left edge is vertically parallel to a tree trunk or other upright structure.
3. Sight across the fold in the direction of the hill slope you want to measure.
4. Compare the angle of the fold with the slope of the hill.



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