Caterpillar 277

Undercarriage Repair Manual

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Undercarriage Repair Manual

Product Safety

This section contains product safety information for your Track Loader. Read and understand all product safety information before attempting to service any Compact Track Loader.

Safety Alert Symbol
This symbol means: Attention! Be alert! Your safety is involved!

The safety alert symbol is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

This symbol is used as an attention-getting device throughout this manual as well as on decals and labels fixed to the machinery to assist in potential hazard recognition and prevention.

Property or equipment damage warnings in this publication are identified by the signal word "NOTICE".

NOTICE
“NOTICE” Indicates a hazardous situation which, if not avoided, could result in property or equipment damage.

The word “Note” is used throughout this manual to draw your attention to specific topics or to supplement the information provided in that section.

Improper or incomplete maintenance/repair of a Compact Track Loader can be dangerous and may result in machine damage, injury or death.

Do not attempt to perform any type of repair or maintenance on a Compact Track Loader until you have read and fully understood both this manual and the machine specific operation and maintenance manual.

Refer to the Operation and Maintenance manual for instructions regarding proper machine operation and maintenance techniques before operating or servicing any Compact Track Loader.

The person(s) in charge of servicing a Compact Track Loader may be unfamiliar with many of the systems on the machine. This makes it especially important to use caution when performing service tasks. Familiarize yourself with the affected system(s) and components before attempting any type of maintenance or service.

It is not possible to anticipate every potential hazard. The safety messages included in this document and displayed on the machine are not all-inclusive. They are intended to make you aware of potential risks and encourage a safe approach to performing service work. If you use a tool, procedure, work method or operating technique that is not specifically recommended by the manufacturer, you must satisfy yourself that it is safe for you and others. You must also ensure that the machine will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

Basic Precautions

Safety Labels
Safety labels have been included and are displayed in various places throughout the machine to serve as warnings of potentially dangerous conditions. Read and understand all "Safety" labels on any Compact Track Loader before attempting to operate, maintain or repair it. Replace any damaged, illegible or missing labels immediately, prior to service.

Personal Protective Equipment
Personal protection equipment is recommended when performing maintenance or service on a machine. Always wear appropriate protective equipment for working conditions when working on or around the machine. Loose clothing should not be worn and long hair should be restrained. Wear hard hats, protective face/eyewear, safety shoes and any other equipment necessary to ensure your safety and the safety of others around you as you work.
Entering and Exiting
Always use steps and handholds when entering or exiting a Compact Track Loader. Clean any mud or debris from steps or work platforms before using them. Always face the machine when using steps and handholds. When it is not possible to use the designed entry/exit system, utilize ladders, scaffolds, or work platforms to safely gain access to the machine.

Lifting
Use a hoist when lifting components that weigh 50 lb (23 kg) or more, to avoid back injury. Make sure all chains, hooks, slings, etc., are in good condition and are of the correct capacity. Be sure hooks are positioned correctly and equipped with a spring latch. Lifting eyes are not to be side loaded during a lifting operation.

Hot Fluids and Components
Stay clear of hot components and system fluids of the engine, exhaust, radiator/oil cooler and hydraulic lines/tubes. Also, use caution when removing fill caps, breathers and plugs on the machine. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. Be especially careful if the machine has been operated recently, fluids may still be hot.

To ensure your safety, allow the machine to cool before attempting any service procedure that involves hot fluids or components.

Corrosion Inhibitor
Corrosion inhibitor contains alkali. Avoid contact with eyes. Avoid prolonged or repeated contact with skin. Do not take internally. In case of contact, wash skin immediately with soap and water. For eyes, flush with large amounts of water for at least 15 minutes. Call Physician. Keep out of reach of children.

Batteries
Do not smoke when inspecting the battery electrolyte level. Never disconnect any charging unit circuit or battery circuit cable from the battery when the charging unit is operating. A spark can cause an explosion from the flammable vapor mixture of hydrogen and oxygen that is released from the electrolyte through the battery outlets. Do not let electrolyte solution make contact with skin or eyes. Electrolyte solution is an acid. In case of contact, immediately wash skin with soap and water. For eyes, flush with large amounts of water for at least 15 minutes. Call Physician. Keep out of reach of children.

Pressurized Items
1. Do not use hands or any other body part to check for fluid leaks in the hydraulic system. Always use a solid material like wood or metal to check for this type of leak. Leaking fluid under pressure can penetrate body tissue. Fluid penetration can cause serious injury and even death. If fluid is injected into your skin, get treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

2. Relieve pressure from the hydraulic system before disconnecting or removing any lines, fittings or related items. Do this by relaxing all hydraulic actuators. If the lift arms are raised, make sure they are securely braced. Be alert for possible pressure release when disconnecting any device from a pressurized system.

3. Lower the lift arms before performing any work on the machine. If this cannot be done, make sure they are securely braced to prevent them from dropping unexpectedly during service.

4. Loose or damaged fuel, oil, hydraulic, lines, tubes and hoses can cause fires. Do not bend or strike high pressure lines or install ones that have been bent or damaged. Check lines, tubes and hoses carefully. See item 1 for precautions on checking for fluid leaks.

5. Pressurized air or water can also cause injury. When pressurized air or water is used for cleaning, wear a protective face shield, protective clothing, and protective shoes. The recommended maximum air pressure for cleaning purposes is 30 psi (205 kPa). When using a pressure washer, keep in mind that nozzle pressures are typically very high. Generally, pressures are well above 2000 psi (13790 kPa). Follow all recommended practices provided by the pressure washer manufacturer.
Repair

Accidental machine starting can cause injury or even death to personnel working on a Compact Track Loader.

As a precaution, disconnect the battery cables from the battery terminals, tape the battery clamps and remove the key from the ignition switch prior to performing any service work on a Compact Track Loader.

Place a “Do Not Operate” tag prominently on the machine to inform personnel that the machine is being serviced.

1. Disconnect the battery and discharge any capacitor before beginning work on a machine. Attach a Do Not Operate tag in the cab to alert any operator that service is in progress.
2. If possible, make all repairs with the machine parked on a level, hard surface. Use blocks to prevent the machine from rolling while working on or under the machine.
3. Do not work on or under any machine that is supported only by a hydraulic jack or hoist. Always use suitable mechanical supports to ensure that the machine will not fall.
4. Make sure the work area around the machine is safe and make yourself aware of any hazardous conditions that may exist. If the engine needs to be started inside an enclosure, make sure that the engine’s exhaust is properly vented.
5. Be sure all protective devices including guards and shields are properly installed and functioning correctly before beginning any service task. If a guard or shield must be removed to perform the repair work, use extra caution.
6. Always use the appropriate tools for the work to be performed. Tools should be in good condition and you should understand how to use them properly before performing any service work.
7. When replacing fasteners, use parts of equivalent grade and size. Do not use a lesser quality fastener if replacements are necessary.
8. Be prepared to stop an engine if it has been recently overhauled or the fuel system has been recently serviced. If the engine has not been assembled correctly, or if the fuel settings are not correct, the engine can possibly overspeed and cause bodily injury, death or property damage. Be prepared to shut off the fuel and air supply to the engine in order to stop the engine.
9. Be careful when removing cover plates. Gradually back off the last two bolts or nuts located on opposite sides of the cover. Then, pry the cover loose to relieve any spring or other pressure before removing the last two nuts or bolts completely.
10. Repairs requiring welding should be performed only by personnel adequately trained and knowledgeable in welding procedures and with the guidance of appropriate reference information. Determine the type of metal being welded and select the correct welding procedure and filler material to provide a weld that is as strong or stronger than the original weld.

NOTICE

Prior to welding, disconnect the following to prevent component damage:
• Negative battery cable
• Engine ECU (firewall)
• Main controller (firewall)
• Output module (firewall)
• Display (machine)

A proper ground is essential to protect the machine from damage when welding. Improper grounding can cause damage to mechanical, hydraulic and electrical components.

As a precaution, connect the welding ground clamp as close as possible to the weld area.

11. Take precautions to avoid damaging wiring during removal and installation operations. Carefully route wires so that they will not contact sharp corners, objects or hot surfaces during operation.
12. When performing service that requires the lift arms to be in the raised position, always utilize the lift arm brace located on the rear of the loader tower.
13. Relieve hydraulic system pressure by relaxing all hydraulic actuators prior to attempting any hydraulic maintenance or repair.
14. Always tighten connections to the correct torque specification. Make sure that all shields, clamps and guards are installed correctly to avoid excessive heat, vibration or unwanted contact between parts during operation. Shields that protect exhaust components from oil spray in event of a line, tube or seal failure must be correctly installed.
15. Do not operate a machine if any rotating part is damaged or contacts other parts during operation. Any high speed rotating component that has been damaged or altered should be checked for balance before reusing. Make sure all protective devices, including guards and shields, are properly installed and functioning correctly before starting the engine or operating the machine.
Attachments

Only use compatible attachments as defined by the machine specific operation and maintenance manual.

Make sure that all necessary guards and protective equipment are in place and functioning prior to operating any attachment.

Wear protective glasses and protective equipment as required by conditions or as recommended in the attachment’s operation manual.

When replacement parts are required for your machine, use only genuine OEM replacement parts or parts that meet or exceed original specifications including, but not limited to physical dimensions, type, strength and material.

Installing lesser components can lead to premature failures, product damage, personal injury or death.

Ensure that all personnel are far enough away from the work area so they will not be struck by flying objects.

Stay clear of the cutting edges, pinching surfaces or crushing surfaces of the attachment while performing any attachment maintenance, testing or adjustments.

Machine Labels and Decals

Labels and decals placed on the machine provide safety information and operating instructions. Familiarize yourself with the location and significance of these labels to ensure your safety.

Safety Label Examples

Examples of the labels and decals displayed on the machine are shown on this page.
Improper operation or maintenance of this equipment can result in death or serious injury.

Read and understand operator’s manual and all safety signs before using or maintaining machine. If you do not understand the information in the manuals, consult your supervisor, the owner or the manufacturer.

Flammable debris can collect near hot components and lead to a fire.

Read Operator’s Manual
Keep the engine, exhaust and chassis areas free of debris.

Machine rollover can result in death or serious injury.

Stay off of bucket or attachment.

Overturning this machine can result in death or serious injury.

Carry loads low. Load unload and turn on level ground. Travel on inclines with heaviest end of machine uphill.

Contact with hot surfaces can cause burns.

Do not touch hot components!

Allow the machine to cool thoroughly prior to servicing.

Keep all flames/sparks away!

No Smoking!

Read and understand all manuals prior to operation.

Will cause death, burns or blindness due to ignition of explosive gasses or contact with corrosive acid.

• Keep all flames/sparks away!
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Undercarriage Maintenance

Personal Safety

WARNING!

Improper or incomplete maintenance/repair of a Rubber Track Loader can be dangerous and may result in machine damage, injury or even death.

Do not attempt to perform any type of repair or maintenance on a Rubber Track Loader until you have read and fully understood the information in this manual.

Refer to the Operation and Maintenance manual for instructions regarding proper machine operation techniques before operating any Rubber Track Loader.

Prior to performing any type of service work on a Rubber Track Loader, read and understand Pages 1-5 (Product Safety) for personal safety information.
Jacking Procedure
Occasionally, your machine may need to be suspended off of the ground to perform maintenance. Use extreme caution when jacking your machine. Always use a jack that is capable of safely lifting your machine and support its weight with approved jack stands while suspended. Never work on a machine supported only by a jack.

To safely jack your machine:

1. Remove any attachments that may be fastened to the machine and raise the lift arms.

2. Install the lift arm brace as directed on page 11.

3. Once the lift arms are secured, carefully exit the machine.

4. Roll or slide your jack under the front of the machine and center the lifting pad directly under the middle of the front torsion axle (H). (fig. 1, 2)

5. Once in place, jack the machine upward making sure it remains stable until it has reached sufficient height to install an approved jack stand beneath the machine.

6. Slide the jack stand into place making sure it is centered under the machine (left to right when viewed from the front) and far enough back for the machine to remain stable when the jack is lowered and the front of the machine rests on the stand. (fig 3)

7. Once the stand is in place, slowly lower the machine onto the stand and then remove the jack.

Repeat steps 11-7 of this procedure at the rear of the machine should both ends of the loader need to be off of the ground for service.

**CAUTION!**

Lift the machine under the torsion axles only! Jacking the machine in any other place will cause machine damage.
Grease Fittings
The undercarriage is equipped with grease fittings at pivot points at the front and rear. The illustration above shows the location of the fittings on the left side of the machine. An identical fitting exists on the right side of the machine for each identified in the illustration. Lubricate all fittings daily or after every 10 hours of operation to ensure proper operation and maximize component life. (fig. 4)

Undercarriages
These undercarriage assemblies typically operate in harsh working conditions. They work in mud, gravel, debris and various other abrasive materials during operation. A daily inspection is recommended of the undercarriage assemblies and cleaning if necessary.

Materials that are particularly sticky or abrasive like clay, mud, or gravel should be cleaned from the undercarriages more often to minimize component wear. A pressure washer works well for cleaning materials from the undercarriages. At times when a pressure washer is not available, use a bar, shovel or similar device to remove foreign materials.

When cleaning, pay particular attention to the drive motors/sprockets and the front and rear wheels where debris is likely to accumulate. If working in scrap or debris, inspect more often and remove foreign objects that may wrap around or lodge themselves between components causing premature wear and damage.

Operating the undercarriage in loamy sand or on turf or other finished surfaces may require less frequent cleaning, but daily inspection is still advised.

Track Tension
Proper track tension must be maintained for optimal performance and track/undercarriage life. Running a track that is too loose may cause the track to misfeed possibly causing damage to the track and or undercarriage components. Running a track that is too tight may cause track stretch, premature bearing failure, or other preventable damage to the machine. As a rule, a track should only be tightened to the point where there is no visible sag. Never tighten the tracks beyond this point.

Note: During the first 50 hours of operation the tracks will “break-in” and will most likely require adjustment.

Track Tension Inspection
To check for proper adjustment, place a 100lb weight on the track extending from the sprocket to the top tensioner axle assembly. Measure the sag in the track from the weight to the track in the center. Proper sag should be 0.5”. Figure 5.
Track Adjustment

Required Tool:
Tensioner Tool (Found In Engine Compartment.)

Tightening

1. Remove tool (3) from engine compartment and install between tensioner bracket and front torsion axle.
2. Ratchet tool to relieve pressure on adjustment bolts. Remove two adjustment bolts, washers and nuts. (2)
3. To tighten, ratchet tool to pivot idlers to move to the next adjustment holes.
4. Re-install bolts, washers and nuts. Torque to 89 lb ft.
5. Remove tool and return to engine compartment.

Relieving Tension

1. Remove tool (3) from engine compartment and install between tensioner bracket and front torsion axle.
2. Ratchet tool to relieve pressure on adjustment bolts. Remove two adjustment bolts, washers and nuts. (2)
3. To loosen, ratchet tool to pivot idlers backwards to move to the next adjustment holes.
4. Re-install bolts, washers and nuts. Torque to 89 lb ft.
5. Remove tool and return to engine compartment.

Out of Adjustment

If idler has been adjusted to the maximum tension, an adjustment may be made by adjusting the track frame into the second set of adjustment holes.

Adjusting The Drive Frame

1. Refer To Track Tensioning Section and lower track tensioner wheels completely to remove tension from the track.
2. Remove bolts 1 and 3 that secure the drive frame (See Diagram).
3. Remove bolt 2 from drive frame (see diagram). Bolt is on opposite side of machine from bolt (3). Must raise machine to access the bolt.
4. Install tensioner tool into brackets (A). Position the tool so that the fixed end of the tool is positioned inside the hooks. Slide the pin that is located on the other end of the tool through the holes in the undercarriage in order to secure the tool. Ratchet the tool in order to move the drive frame backward. Continue to move the drive frame until the second set of mounting holes are visible and the three bolts can be reinstalled. It may be necessary to use a pry bar to lift the frame upward when you move the frame rearward.
5. Confirm that the drive lugs of the track do not touch the front axle.
6. Tighten the bolts. Adjust the track tension.
Undercarriage Maintenance

Track Removal and Installation

1. Place machine on solid level ground.
2. Remove all attachments.
3. Secure loader with brace. (Refer to complete manual for instructions, not provided in this manual.)
4. Refer to Page 9 to remove tension from track.
5. Using proper jacking procedures provided on Page 7, raise track until it is almost off of the ground and place approved jack stands to block up the machine.
6. Refer to steps 1-4 in the “Adjusting The Drive Frame” Section on Page 9. After installing the adjusting tool, slide the frame forward to remove pressure. To reinstall, you will use steps 4 and 5 to return the frame to the proper position.

7. Remove bolts and locknuts on sprocket frame assembly (7) and (5). Remove plate (6) from sprocket frame. **Note:** When reinstalling, Bolts, ref (5) should be tightened to 89 ± 15 lb ft. Bolts, ref (7) should be tightened to 77 ± 15 lb ft.
8. Remove the bolts (4) that secure the sprocket assembly to the drive motor. **Note:** When reinstalling, tighten to 199 ± 30 lb ft.
9. Using approved device, raise track in order to remove the sprocket assembly. When sprocket is removed, lifting device can be set aside.
10. Holding the track from above the drive sprocket frame, pull the track upward and outward over the bogie wheel assemblies. Then lift the track off of the front idlers.
11. Reverse steps to reinstall track.
12. Tension track according to procedures on page 9.

Drive Sprocket Rollers

The rubber track loaders utilize rollers on the drive sprockets to drive the track. These rollers help minimize friction between the track and the drive sprocket to prolong track life.

The rollers rotate around hardened steel pins and usually wear on their inside surfaces. As they wear, the rollers become thinner, but will continue to function as long as they rotate freely around the pins. Sprocket rollers should be inspected every 50 hours of operation and replaced if cracked or worn to less than 35% of original thickness. (.088")

![Figure 8: Drive Sprocket Rollers](image)

**New Roller**  
**Normal Wear**  
**35% life**

![Figure 9: Track Loader Parts](image)

Track Loader Parts  6543 Chupp Road  Atlanta, Georgia  30058  USA  (800)616-815
To replace worn rollers:
1. With the machine turned off and parked in a safe working area, follow the track removal procedure on page 10 to expose the sprocket for roller replacement.

2. Remove the bolt (A) holding the steel pins (B) and rollers (C) in place. The pins and rollers will then fall free from the sprocket.

3. Install the new rollers over the pins.

4. Slide the bolt back through the sprocket and pins and tighten.

5. Repeat this procedure as necessary throughout the sprocket.

6. Follow steps 7-12 in the track installation procedure on page 10 to re-install the drive table and prepare the machine for track tension adjustment.

7. Repeat steps 1-6 of this procedure on the other side of the machine if necessary.

8. Perform the track tension adjustment procedure on page 8 to complete the procedure.

9. During this process it is recommended to inspect the Inner and Outer Sprocket Rings. These rings are engaged by the outer drive roller. As a result wear occurs. Rings must have a minimum thickness of 0.19”. If the thickness falls below this, it is recommended to replace the rings.

10. It is important to check the torque on the sprocket nuts daily. Torque should be maintained at 199 lb ft with a margin of error of plus or minus 30 lb ft.

Note: It is recommended to replace external rollers as a set to simplify inspection and maintain proper sprocket function.

Note: Internal pins should be inspected when replacing rollers. Internal pins do not rotate during operation and may experience uneven wear. If when replacing external rollers, internal pins are worn on one side only and appear to be in good condition otherwise, they may be rotated 180 degrees from their original position and reused. Replace if worn to less than 35% of original thickness.
Undercarriage Disassembly and Assembly

Personal Safety

! WARNING !
Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product until you have read and understood the operation, lubrication, maintenance, and repair information.

Before starting any disassembly or assembly procedures, refer to Pages 1-5. Product Safety – Basic Precautions for personal safety information.

Machine Preparation

! WARNING !
Accidental machine starting can cause injury or death to personnel working on the machine.

To avoid accidental machine starting, disconnect the battery cables from the battery, tape the clamps, and remove the key.

Place a “Do Not Operate” tag prominently on the machine to inform personnel that the machine is being worked on.

Before starting any disassembly or assembly procedures, refer to Pages 1-5. Product Safety – Repair for machine preparation information.

Undercarriage Disassembly and Assembly Procedures

Disassembly and assembly procedures are provided for the following undercarriage components.

- Drive Sprocket
- Drive Motor
- Wheel Replacement

Note: Procedures are provided for only those undercarriage components listed above. However, other helpful information can be obtained from the Rubber Track Loader Parts Manual.

Sprocket Removal and Installation

The tools required for sprocket removal and installation are listed in Table 0-1. Use manufacturer-recommended tools whenever possible.

<table>
<thead>
<tr>
<th>Required Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socket Wrench</td>
</tr>
<tr>
<td>Combination Wrench</td>
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</table>

Sprocket Removal

1. Remove the 7 bolts that fasten the bearing plate to the drive table.
2. Pry the bearing plate off.

3. Remove the soft plug from the end of bearing flange and remove the snap ring on the shaft. The plug may be either metal or rubber depending on the manufacture date of the machine.

Note: To remove the metal plug, tap around the perimeter of the plug to loosen it and remove.

Note: To remove the rubber plug, tap a blade type screwdriver in at the edge of the cap and pry out. The rubber cap must be replaced upon removal.
4. Using a puller, remove the bearing and bearing housing from the shaft.

5. Remove the bolts that fasten the sprocket to the drive motor, then remove the sprocket.

Drive Motor Removal

1. Drain the hydraulic fluid. Remove the bolts which fasten the drive motor to the drive table.

2. Disconnect all hoses from the drive motor.
3. Pull the drive motor free from the drive table housing.
Wheel Inspection

The rubber wheels are designed to wear and should be replaced as follows.

10" Wheels
- Minimum Width: 1.30"
- Minimum Thickness: 0.10"

14" Wheels
- Minimum Width: 1.80"
- Minimum Thickness: 0.10"

Bogie Wheel Replacement

1. Remove carriage assembly from frame.

2. Remove end bolts and remove axle tube from carriage assembly.

3. Unbolt the wheels from the tube and replace (the center wheel is split for easy removal and installation).

Idler Wheel Replacement

1. Unbolt Idler Assemblies from the frame.

2. Unbolt the wheels from the tube and replace (the center wheel is split for easy removal and installation).

3. To reinstall, reverse procedure. Tighten bolts to 88 ± 15 lb ft.