CATERPILLAR®

Service Manual

Models
TL642C
TL943C

S/N THG00150 & After
S/N THL00150 & After
S/N THH00150 & After
S/N SXH00150 & After

31200794

Revised
October 14, 2014

1.6 SAFETY INSTRUCTIONS

Following are general safety statements to consider ***before*** performing maintenance procedures on the telehandler. Additional statements related to specific tasks and procedures are located throughout this manual and are listed prior to any work instructions to provide safety information before the potential of a hazard occurs.

For all safety messages, carefully read, understand and follow the instructions ***before*** proceeding.

1.6.1 Personal Hazards

PERSONAL SAFETY GEAR: Wear all the protective clothing and personal safety gear necessary to perform the job safely. This might include heavy gloves, safety glasses or goggles, filter mask or respirator, safety shoes or a hard hat.

LIFTING: **NEVER** lift a heavy object without the help of at least one assistant or a suitable sling and hoist.

1.6.2 Equipment Hazards

LIFTING OF EQUIPMENT: Before using any lifting equipment (chains, slings, brackets, hooks, etc.), verify that it is of the proper capacity, in good working order, and is properly attached.

NEVER stand or otherwise become positioned under a suspended load or under raised equipment. The load or equipment could fall or tip.

DO NOT use a hoist, jack or jack stands only to support equipment. Always support equipment with the proper capacity blocks or stands properly rated for the load.

HAND TOOLS: Always use the proper tool for the job; keep tools clean and in good working order, and use special service tools only as recommended.

1.6.3 General Hazards

SOLVENTS: Only use approved solvents that are known to be safe for use.

HOUSEKEEPING: Keep the work area and operator cab clean, and remove all hazards (debris, oil, tools, etc.).

FIRST AID: Immediately clean, dress and report all injuries (cuts, abrasions, burns, etc.), no matter how minor the injury may seem. Know the location of a First Aid Kit, and know how to use it.

CLEANLINESS: Wear eye protection, and clean all components with a high-pressure or steam cleaner before attempting service.

When removing hydraulic components, plug hose ends and connections to prevent excess leakage and contamination. Place a suitable catch basin beneath the machine to capture fluid run-off.

It is good practice to avoid pressure-washing electrical/electronic components. In the event pressure-washing the machine is needed, ensure the machine is shut down before pressure-washing. Should pressure-washing be utilized to wash areas containing electrical/electronic components, it is recommended a maximum pressure of 750 psi (52 bar) at a minimum distance of 12 in (30,5 cm) away from these components. If electrical/electronic components are sprayed, spraying must not be direct and for brief time periods to avoid heavy saturation,

Check and obey all Federal, State and/or Local regulations regarding waste storage, disposal and recycling.

2.3.2 Metric Fastener Torque Chart

Values for Zinc Yellow Chromate Fasteners (Ref 4150707)*							
CLASS 8.8 METRIC (HEX/SOCKET HEAD) BOLTS CLASS 8 METRIC NUTS							
Size	Pitch	Tensile Stress Area	Clamp Load See Note 4	Torque (Dry or Loctite® 263™)	Torque (Lube)	Torque (Loctite® 262™ or 271™ or Vibra-TITE™ 131)	Torque (Loctite® 242™ or 271™ or Vibra-TITE™ 111 or 141)
		Sq mm	KN	[N.m]		[N.m]	[N.m]
3	0.5	5.03	2.19	1.3	1.0	1.2	1.4
3.5	0.6	6.78	2.95	2.1	1.6	1.9	2.3
4	0.7	8.78	3.82	3.1	2.3	2.8	3.4
5	0.8	14.20	6.18	6.2	4.6	5.6	6.8
6	1	20.10	8.74	11	7.9	9.4	12
7	1	28.90	12.6	18	13	16	19
8	1.25	36.60	15.9	26	19	23	28
10	1.5	58.00	25.2	50	38	45	55
12	1.75	84.30	36.7	88	66	79	97
14	2	115	50.0	140	105	126	154
16	2	157	68.3	219	164	197	241
18	2.5	192	83.5	301	226	271	331
20	2.5	245	106.5	426	320	383	469
22	2.5	303	132.0	581	436	523	639
24	3	353	153.5	737	553	663	811
27	3	459	199.5	1080	810	970	1130
30	3.5	561	244.0	1460	1100	1320	1530
33	3.5	694	302.0	1990	1490	1790	2090
36	4	817	355.5	2560	1920	2300	2690
42	4.5	1120	487.0	4090	3070	3680	4290

NOTES: 1. THESE TORQUE VALUES DO NOT APPLY TO CADMIUM PLATED FASTENERS 5000059K

2. ALL TORQUE VALUES ARE STATIC TORQUE MEASURED PER STANDARD AUDIT METHODS TOLERANCE = ±10%

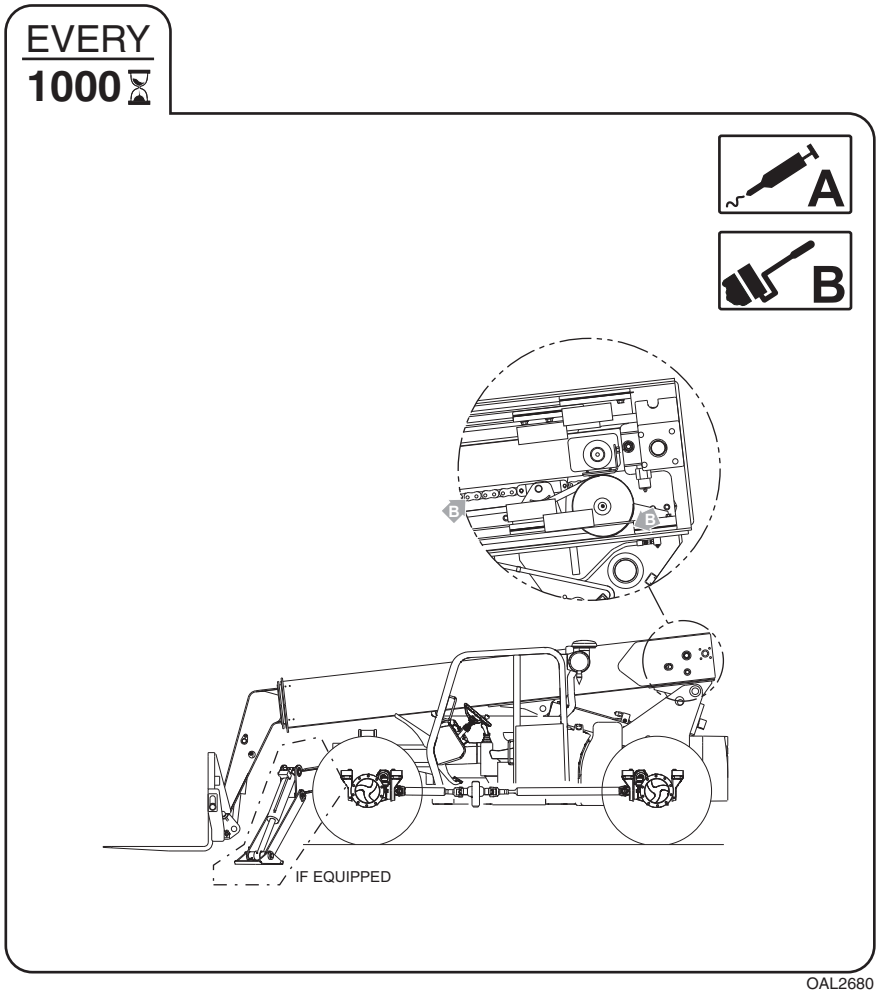
3. * ASSEMBLY USES HARDENED WASHER

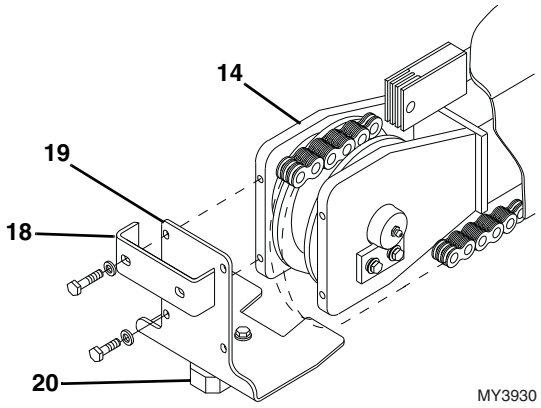
4. CLAMP LOAD LISTED FOR SHCS IS SAME AS GRADE 8 OR CLASS 10.9 AND DOES NOT REPRESENT FULL STRENGTH CAPABILITY OF SHCS. IF HIGHER LOAD IS REQUIRED, ADDITIONAL TESTING IS REQUIRED.

Compartment or System	Type and Classification	Viscosities	Ambient Temperature Range			
			°F		°C	
			Min	Max	Min	Max
Boom Wear Pad Grease	CAT Advanced 3Moly	NLGI Grade 2	-4	104	-20	40
Cylinder and Axle Grease	CAT Multipurpose	NLGI Grade 2	-22	104	-30	40
Boom Chain Lubricant	Schaffer 200S Silver Streak					
Engine Coolant	Cat DEAC (Glycol and Water)	50/50 Mix	Standard			
		60/40 Mix	Cold Weather			
Fuel	#2 Diesel	Ultra Low Sulfur (S ≤ 15 mg/kg)	Standard			
	Blend of #1 diesel and #2 diesel fuels (“winterized” #2)		Cold Weather			
Air Conditioning	Refrigerant R-134a	Tetrafluorethane				

Note: *Friction Modifier (CAT Brake Oil Additive P/N 197-0017) required for axle differentials, see Section b, “Capacities.”*

c. 1000 Hour





7. Remove the guide bar (**18**) and chain retainer (**19**). Remove the push beam wear pad (**20**).
8. Lower the push beam assembly and remove the pry bars.
9. Push/pull the push beam assembly along with the extend chain, to the front of the third boom section.

NOTICE

Guide the push beam/extend/retract cylinder assembly over the top of the retract chain anchor at the rear of the third boom section being careful not to damage any components.

10. Place a sling around the push beam assembly. Lift and slowly pull the push beam assembly approximately half way out of the third boom section. Lower the push beam onto a suitable support.
11. Relocate the sling or using two slings for better stability, balance the push beam assembly and slowly pull the push beam assembly out of the third boom section. Lower the push beam assembly onto suitable supports.
12. Remove all remaining brackets, clevises, hoses, wear pads, shims, backing plates and hardware from the second and third boom sections. Label all parts and hardware being removed from each section.

Note: *Inspect all chains, hoses and sheaves for wear and/or damage and replace as needed.*

3.5.4 Push Beam - Extend/Retract Cylinder Installation and Third Boom Section Assembly

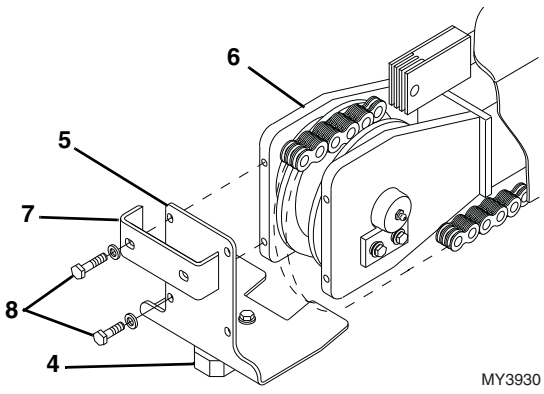
Note: *Inspect the wear pad surfaces of the second and third boom sections. Verify all areas are clean and free of any weld spatter, paint, etc., before beginning the re-assembly procedure.*

Note: *Inspect and lubricate all extend and retract chains before re-assembly. Refer to Section 3.12, "Boom Extend and Retract Chains," for detailed information.*

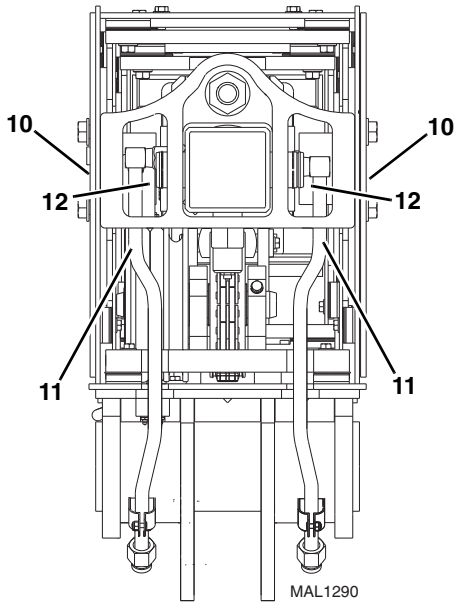
1. Place the third boom section onto suitable supports.
2. Clean and lubricate the bottom and sides of the third boom section where the push beam guide bar travels.
3. Place a sling or using two slings for better stability, lift and slowly push the push beam assembly approximately half way into the third boom section. Lower the push beam onto a suitable support.
4. Relocate the sling and slowly insert the push beam assembly into the front of the third boom section.

NOTICE

Guide the push beam/extend/retract cylinder assembly over the top of the retract chain anchor at the rear of the third boom section being careful not to damage any components.



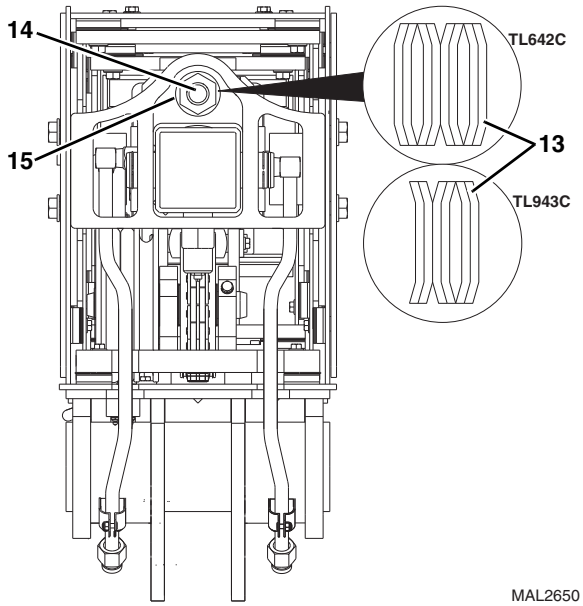
5. Install the push beam wear pad (**4**) to the previously removed chain retainer (**5**) using two bolts and two washers. Torque as required.
6. Lift the push beam assembly (**6**) with pry bars using the access holes on each side of the third boom section and install the guide bar (**7**) and chain retainer (**5**) using the previously removed hardware (**8**). Torque to 25-30 lb-ft (34-41 Nm).



13. Install both push beam pins (**10**) being careful to align the pin mounting bolt holes.

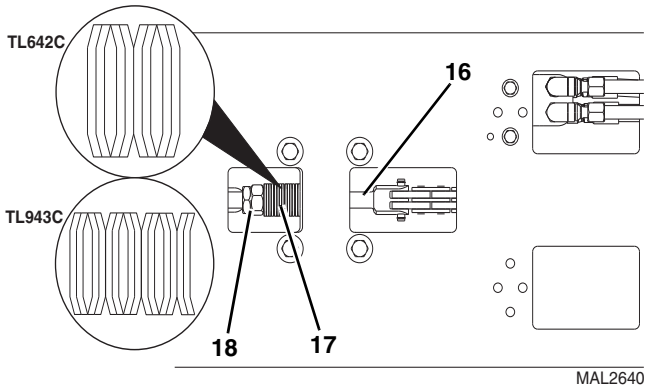
Note: *Disconnecting one or both extend/retract hydraulic tubes (**11**) may be required to gain access to the hose guide mounting bolts. After installing both hose guides, re-connect one or both extend/retract hydraulic tubes BEFORE preceding.*

14. Install the tilt cylinder hose guide (**12**) and the auxiliary hose guide from the rear of the third second section.



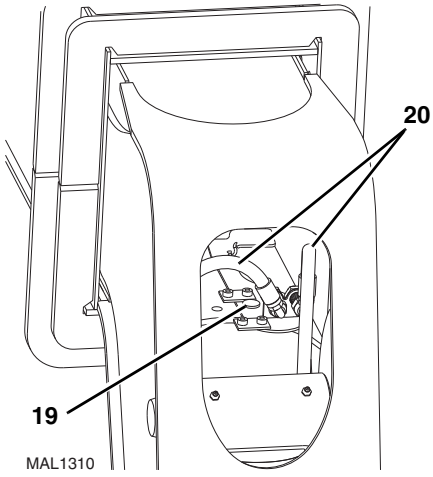
Note: *Note the position of the belleville washers for reassembly.*

15. Install the belleville washers (**13**) to the extend chain anchor (**14**) as previously removed at the rear of the first boom section.
16. Install the adjustment and lock nut, (**15**) to the extend chain anchor (**14**) at the rear of the first boom section.



17. Remove the rope or wire from the retract chain (**16**).
18. Install the belleville washers (1**7**) to the retract chain clevis (1**6**) as previously removed at the bottom front of the first boom section.
19. Install the adjustment and lock nut (**18**) to the retract chain clevis (**16**) at the bottom front of the first boom section.

Note: *Note the position of the belleville washer for reassembly.*



20. Install both hose retainer brackets (**19**).
21. Remove the plugs and caps from the tilt hoses and auxiliary hoses.
22. Connect both tilt hoses (**20**) and both auxiliary hoses (not shown) to the hose retainer brackets (**19**) at the bottom front inside the boom.
23. Properly connect the battery.

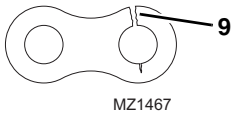
Cracked Plates

Inspect the chains very carefully, front and back as well as side to side, for any evidence of cracked plates. If any one crack is discovered, the chain should be replaced in its entirety.

It is important, however to determine the cause of the crack before installing a new chain so the condition does not repeat itself.

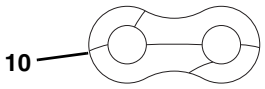
The types of cracks are:

- **Fatigue Cracking** - Fatigue cracks (**9**) are a result of repeated cyclic loading beyond the chain's endurance limit.



MZ1467

- **Stress Corrosion Cracking** - The outside link plates are particularly susceptible to stress corrosion cracking (**10**).

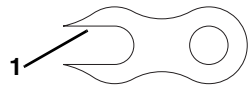


MZ1468

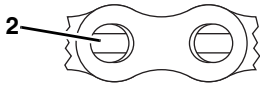
- **Corrosion Fatigue Cracking** - Corrosion fatigue cracks are very similar to fatigue cracks in appearance. Corrosion fatigue is the combined action of an aggressive environment and cyclic stress.

Other Modes of Failure

- **Ultimate Strength Failure** - These types of failures are caused by overloads far in excess of the design load. Either fractured plates (**1**) or enlarged holes (**2**) can occur. If either of these failures occurs, the chain should be replaced immediately.

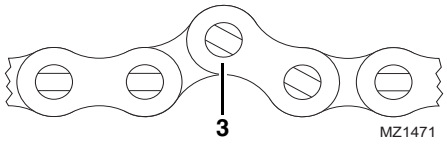


MZ1469



MZ1470

- **Tight Joints** - All joints in the chain should flex freely. Tight joints (**3**) resist flexing.



MZ1471

If the problem is caused by dirt or foreign substance packed in the joints, clean and lubricate thoroughly before re-installing the chain.
If the problem is caused by corrosion and rust or bent pins, replace the chain.

3.12.4 Chain Lubrication

After inspection and before being returned to service, chains must be lubricated. Refer to Section 2.5, "Fluids and Lubricant Capacities," for proper lubricant.

The lubricant must penetrate the chain joint to prevent wear. Applying lubricant to the external surfaces will prevent rust, but the chains should be articulated to make sure the lubricant penetrates to the working surfaces between the pins and links.

To prepare the chain for lubrication, the chain plates should be brushed with a stiff brush or wire brush to clear the space between the plates so that lubricant can penetrate to the working surfaces.

Lubricant may be applied with a narrow paint brush or directly poured on, but the chain should be well flooded with lubricant and the boom should be extended and retracted to be sure that the lubricant penetrates to the working surfaces. All surplus lubricant should be wiped away from the external surfaces. DO NOT use a solvent for this wiping operation.

Regular application of lubricant is necessary to make sure that all working surfaces are adequately lubricated. In extremely dusty conditions, it may be necessary to lubricate the chains more often. Refer to Section 2.6, "Service and Maintenance Schedules," and Section 2.7, "Lubrication Schedules," for detailed information.

Lubrication of chains on machines working consistently in extreme hot or cold conditions requires special consideration. Contact the local Caterpillar dealer for guidance.

4.2 OPERATOR CAB

WARNING

DO NOT service the machine without following all safety precautions as outlined in the "Safety Practices" section of this manual.

4.2.1 Cab Safety

WARNING

The protection offered by this ROPS/FOPS will be impaired if subjected to any modification or structural damage, at which time replacement is necessary. ROPS/FOPS must be properly installed using fasteners of correct size and grade, and torqued to their specified value.

WARNING

DO NOT weld, grind, drill, repair or modify the cab in any way. Any modification or damage to cab structural components requires cab replacement. Refer to the Operation & Maintenance Manual.

To help ensure optimum safety, protection and performance, replace the cab if it is damaged. Refer to the appropriate parts manual for ordering information.

4.2.2 Serial Number Decal

The cab serial number decal is located on the left side of the cab, behind the seat. Information specified on the serial number plate includes the cab model number, the cab serial number and other data. Write this information down in a convenient location to use in cab correspondence.

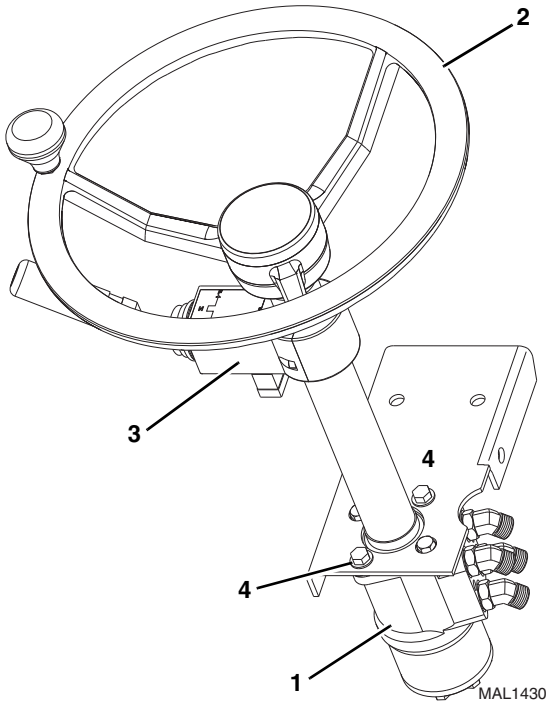
4.3 CAB COMPONENTS

4.3.1 Steering Column and Orbitrol Valve

a. Orbitrol Valve Removal

1. Park the machine on a firm, level surface, level the machine, fully retract the boom, lower the boom, place the transmission control lever in the (N) NEUTRAL position, engage the parking brake and turn the engine OFF.
2. Place a Do Not Operate Tag on both the ignition key switch and the steering wheel.
3. Open the engine cover. Allow the system fluids to cool.
4. Properly disconnect the battery.

Note: *It may be necessary to remove the main dash panel to gain access to the appropriate hydraulic hoses. Refer to Section 9.13, "Gauges and Display Monitor."*



5. Label, disconnect and cap the four hoses from the side of the steering valve (**1**). Cap the fittings on the steering valve. Label, disconnect and plug the load sense hose at the front of the steering valve. Cap the fitting on the steering valve.
6. Remove the steering wheel (**2**), disconnect and remove the travel select lever (**3**), disconnect the instrument panel harness connector.
7. Remove the steering assembly through the dash panel opening.
8. Support the steering valve, and remove the four hex-head capscrews and four lockwashers (**4**).

Note: DO NOT *disassemble the orbitrol valve. The orbitrol valve is not serviceable and must be replaced in its entirety, if defective.*

Section 5
Axles, Drive Shafts, Wheels and Tires

Contents

PARAGRAPH	TITLE	PAGE
5.1	**Axles, Drive Shafts, Wheels and Tires Component Terminology**	**5-2**
5.2	**Axle Serial Number**	**5-3**
5.3	**Axle Specifications and Maintenance Information**	**5-3**
5.4	**Axle Replacement**	**5-3**
5.4.1	Axle Removal	5-3
5.4.2	Axle Installation	5-4
5.4.3	Axle Assembly and Drive Shaft Troubleshooting	5-6
5.5	**Drive Shafts**	**5-9**
5.5.1	Drive Shaft Inspection and Service	5-9
5.5.2	Drive Shaft Maintenance	5-9
5.5.3	Drive Shaft Removal	5-9
5.5.4	Drive Shaft Cleaning and Drying	5-9
5.5.5	Drive Shaft Installation	5-9
5.6	**Wheels and Tires**	**5-10**
5.6.1	Removing Wheel and Tire Assembly from Machine	5-10
5.6.2	Installing Wheel and Tire Assembly onto Machine	5-10
5.7	**Brakes**	**5-11**
5.8	**Towing a Disabled machine**	**5-11**
5.8.1	Manually Releasing the Park Brake	5-11
5.8.2	Manually Resetting the Park Brake	5-11

4. Tighten lug nuts in an alternating pattern as indicated in figure. Torque to 350-400 lb-ft (475-542 Nm).
5. Remove machine from supports.
6. Remove the Do Not Operate Tags from both the ignition key switch and the steering wheel.

5.7 BRAKES

Check the brake disks for wear every 1,000 hours of operation or yearly.

For more information on brake disk inspection, refer to the appropriate axle repair manual;

TL642C

- Service Manual - P/N 31200162

TL943C

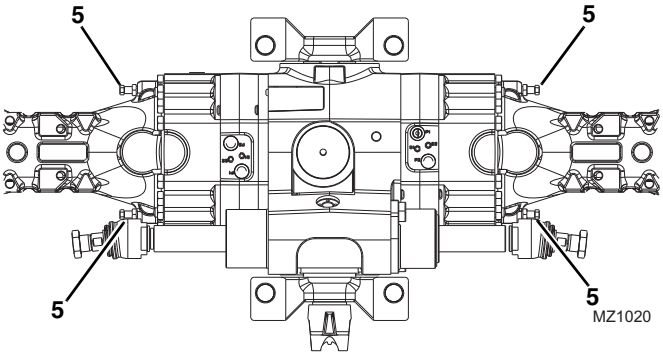
- Service Manual - P/N 31200239

5.8 TOWING A DISABLED MACHINE

Towing a disabled machine should only be attempted as a last resort, after exhausting all other options. Make every effort to repair the machine, and move it under its own power, before using the emergency towing procedures outlined below.

Note: *Block the wheels of the machine BEFORE attempting to release the park brake. Once the park brake is released the machine's park brake AND service brakes are inoperable.*

5.8.1 Manually Releasing the Park Brake

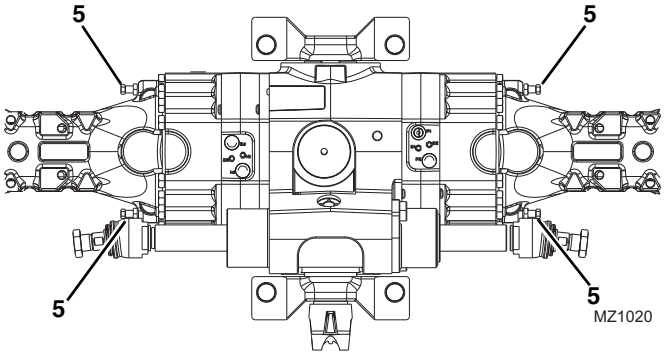


1. Loosen the nuts of the screws (**5**) for the manual release of the braking units. Draw the nuts back approximately 6 mm.
2. Tighten the screws until they are gently seated on the driving plate
3. Carefully tighten each release screw a 1/4 turn at a time in sequence until all have been turned on full turn 360°.
4. Repeat steps 1 thru 3 for the other side of the differential.

Note: *After the machine has been towed to a secure location, reactivate the parking brake. Carefully follow the procedures from start to finish. Consult your local service distributor or service department if you are unsure about any part of the procedure, or for specific instructions concerning your particular situation.*

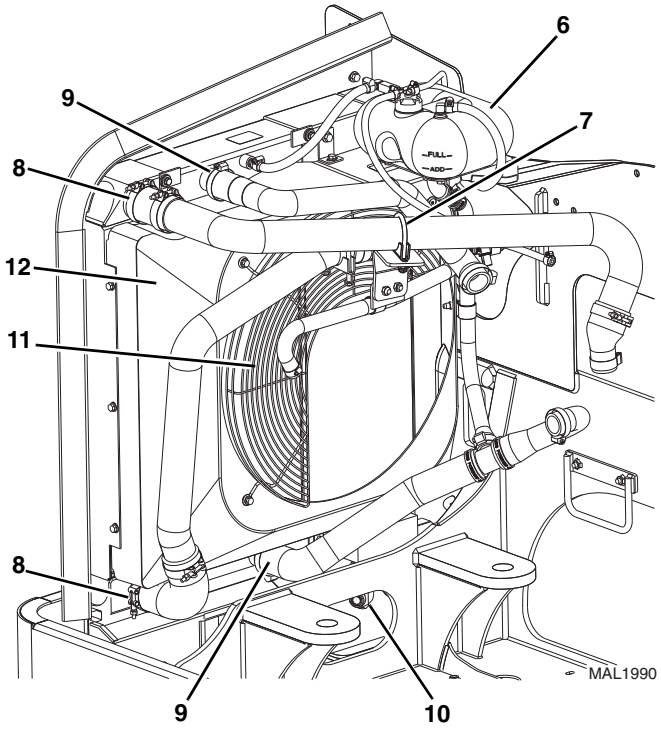
5.8.2 Manually Resetting the Park Brake

Note: *Block the wheels of the machine BEFORE attempting to reset the machine's park brake. Once the park brake is released the machine's park brake AND service brakes are inoperable.*



1. Loosen each release screw (**5**), only 1/4 turn at a time, in sequence, until each screw has lost contact with the guide pin.
2. Remove the screws along with the nuts and seals. Replace the seals, lubricate the screws with a silicone-based grease and re-install the screws along with the nuts.
3. Adjust the nut of the screw heads in relation to the arm by 1.26 in (32 mm).
4. Repeat steps 1 thru 3 for the other side of the differential.
5. After repairs to the machine have been made, start the machine and check the park brake and service brakes for proper function.

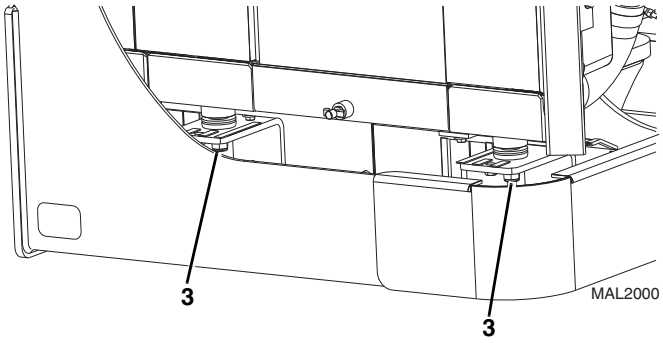
Problem	Cause	Remedy
2. Low or no pump flow or pressure.	1. Low oil level.	1. Fill transmission to correct level with hydraulic oil. Refer to Section 2.5, “Fluids and Lubricant Capacities.”
	2. Transmission filled with incorrect oil, or oil contaminated.	2. Drain transmission and fill to correct level with hydraulic oil. Refer to Section 2.5, “Fluids and Lubricant Capacities.”
	3. Pump suction pipe screen clogged.	3. Clean, repair and/or replace suction pipe.
	4. Central shaft damaged.	4. Replace central shaft.
	5. Pump worn or damaged.	5. Repair or replace pump assembly.
3. Low clutch pressure.	1. Incorrect oil level.	1. Fill transmission to correct level with hydraulic oil. Refer to Section 2.5, “Fluids and Lubricant Capacities.”
	2. Main pressure valve stuck open.	2. Clean the valve spool and housing.
	3. Broken or worn coupling shaft or piston o-rings.	3. Replace coupling and/or o-rings.
	4. Pressure reducing valve stuck open.	4. Clean the valve spool and housing.
4. Lack of power.	1. Park or service brake dragging.	1. Refer to Section 8.4, “Hydraulic Circuits.”
	2. Low engine rpm causes converter stall.	2. Adjust the engine rpm to specifications. Refer to Engine Service Manual.
	3. Pump output pressure is low.	3. Refer to Section 6.7.1, “Transmission Troubleshooting,” **Problem 2.** “Low or no pump flow or pressure.”
	4. Clutch discs worn or damaged.	4. Replace clutch discs.
	5. Transmission overheating.	5. Refer to Section 6.7.1, “Transmission Troubleshooting,” **Problem 5.** “Transmission overheating (oil above 248° F (120° C)).”



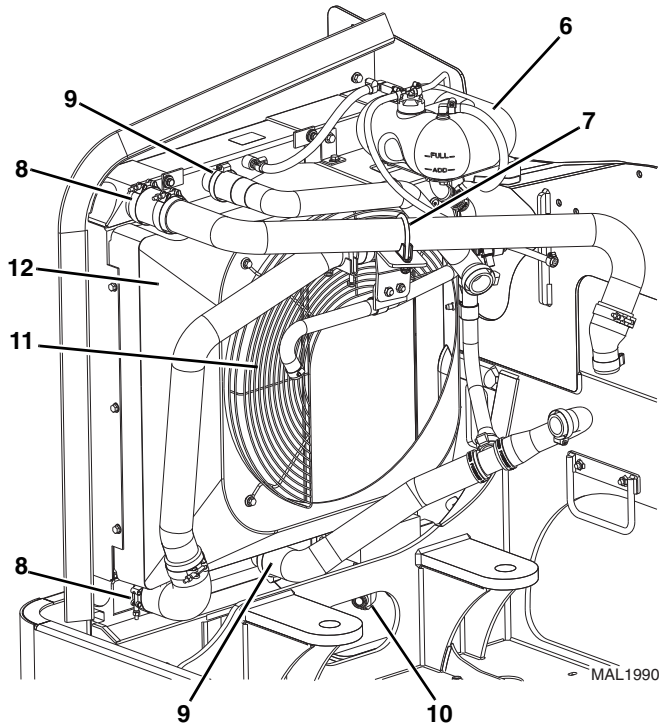
14. Label, disconnect and cap the hose attached to the surge tank (**6**). Remove the surge tank and mounting plate.
15. Loosen the clamp (**7**) on the charge air cooler inlet hose attached to the engine.
16. Loosen the clamps on both hoses attached to the charge air cooler (**8**). Work the hoses and tubes off the charge air cooler. Position the hoses and tubes out of the way to allow radiator removal, or remove the hoses and tubes from the engine. Plug and/or cap the openings on the charge air cooler and tubes to prevent dirt and debris from entering system.
17. Loosen the clamps on both hoses attached to the radiator (**9**). Work the hoses off the radiator. Position the hoses out of the way to allow radiator removal, or remove the hoses from the engine. Inspect the hoses, and replace if necessary. Plug and/or cap the openings on the radiator and hoses to prevent dirt and debris from entering system.
18. Place a suitable container beneath the transmission cooler fittings.Transfer any transmission oil into a properly labeled container. Dispose of properly.
19. Label, disconnect and cap both transmission cooler hoses at the radiator (**10**). Cap all fittings and openings to prevent dirt and debris from entering the transmission.
20. Remove the fan guard (**11**).
21. Loosen and remove the three bolts from the radiator fan shroud (**12**). Pull the fan shroud back and over the fan assembly.
22. Carefully lift the radiator assembly out of the engine compartment.

Note: *If more clearance is needed to remove the radiator, the engine fan may be removed for easier access.*

b. Radiator Assembly Installation



1. Place the radiator assembly in the engine compartment and secure using the previously used hardware (**3**).



2. Install the engine fan if previously removed.
3. Install the radiator fan shroud (**12**) with the previously removed hardware.

17. Check that all hydraulic system, electrical system, cooling system, fuel system and exhaust system connections are correct and connected tightly.

Note: *Have an assistant stand by with a Class B fire extinguisher.*

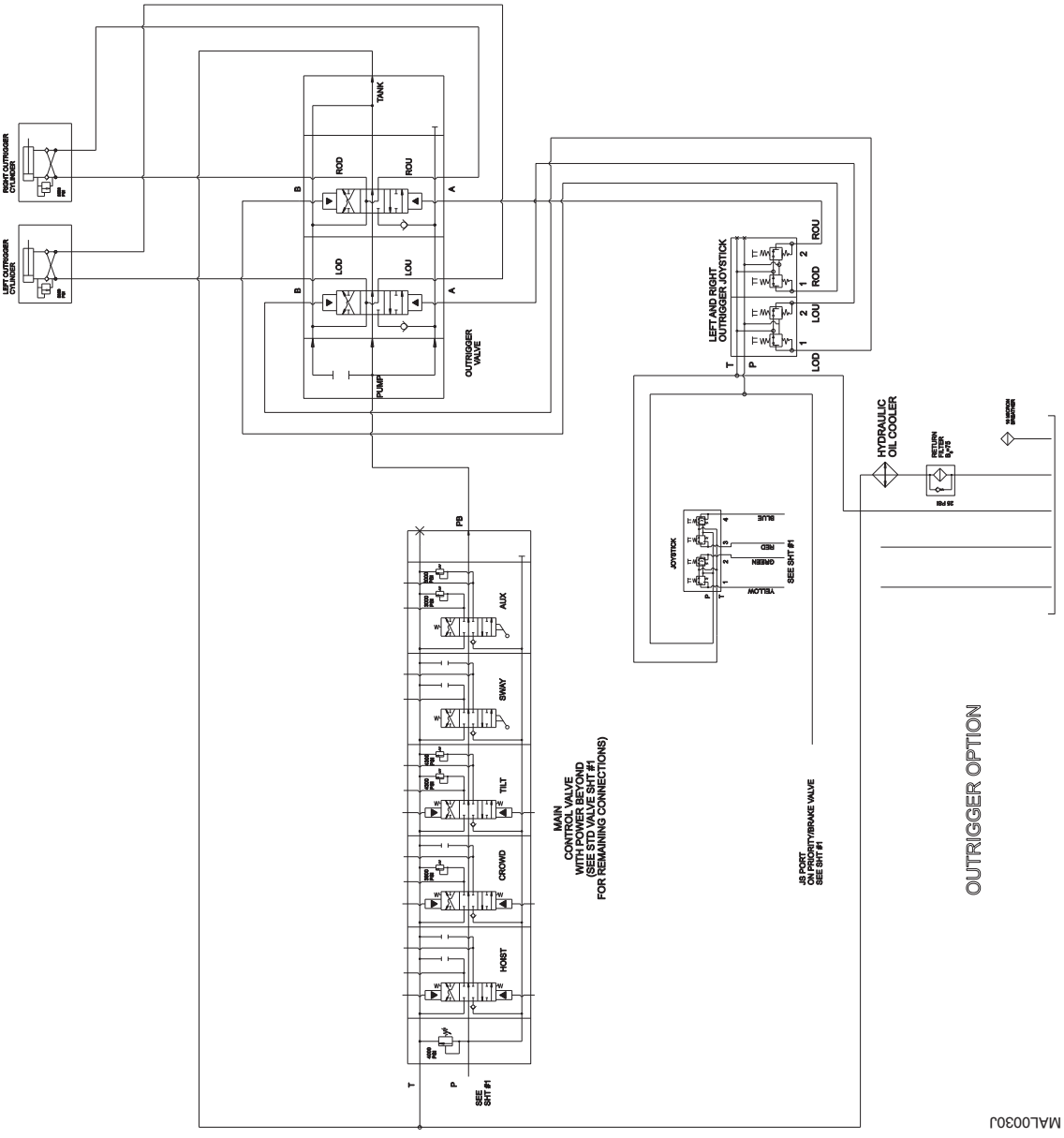
18. Start the engine and run to normal operating temperature then shut off the engine. While the engine is cooling, check for leaks.
19. Allow the engine to cool. Check the surge tank coolant level, and top off with a mixture of ethylene glycol and water. Replace the surge tank cap.
20. Check for leaks from the engine, main hydraulic pump and lines, transmission, hydraulic reservoir and fuel tank. Check the levels of all fluids and lubricants. Fill as required.

Note: *During the full throttle check:*

- **DO NOT** operate any hydraulic function.
- **DO NOT** steer or apply any pressure to the steering wheel.
- Keep the transmission in (N) NEUTRAL.

21. Obtain and connect an appropriate engine analyzer or tachometer. Check the engine rpm at full throttle.
22. Purge the hydraulic system of air by operating all boom functions through their entire range of motion several times. Check the hydraulic oil level.
23. Check for proper operation of all components.
24. Turn the engine OFF.
25. Install the oil pan cover underneath the engine compartment.
26. Close and secure the engine cover.
27. Remove the Do Not Operate Tags from both the ignition key switch and the steering wheel.

8.4.3 Hydraulic Schematic - TL642C (Continued)



6. Label, disconnect and cap the hydraulic hoses connected to the outrigger control valve. Cap all fittings to keep dirt & debris from entering the hydraulic system.
7. Remove the bolts holding the outrigger control valve to the frame.

b. Outrigger Valve Installation

1. Install the outrigger valve onto the machine frame.
2. Uncap and connect the previously labeled hydraulic hoses to the outrigger valve.
3. Check the routing of all hoses, wiring and tubing for sharp bends or interference with any rotating members, and install tie wraps and/or protective conduit as required. Tighten all hose clamps.
4. Properly connect the battery.
5. Start the engine and run at approximately 1/3-1/2 throttle for about one minute without moving the machine or operating any hydraulic functions.
6. Inspect for leaks and check the level of the hydraulic fluid in the reservoir. Shut the engine OFF.

Note: *Check for leaks and repair as required before continuing. Add hydraulic fluid to the reservoir as needed.*

7. Wipe up any hydraulic fluid spillage in, on, near and around the machine, work area and tools.
8. Close and secure the engine cover.
9. Remove the Do Not Operate Tags from both the ignition key switch and the steering wheel.

8.8 HYDRAULIC CYLINDERS

8.8.1 General Cylinder Removal Instructions

1. Remove any attachment from the machine. Park the machine on a firm level surface and fully retract the boom. Allow sufficient work space around the hydraulic cylinder being removed. Support the boom if the lift/lower cylinder is being removed. Place the transmission control lever in (N) NEUTRAL, engage the park brake, shut the engine OFF and chock wheels.
2. Place a Do Not Operate Tag on both the ignition key switch and the steering wheel.
3. Open the engine cover. Allow the system fluids to cool.
4. Properly disconnect the battery.
5. Label, disconnect and cap or plug hydraulic hoses in relation to the cylinder.
6. Attach a suitable sling to an appropriate lifting device and to the cylinder. Make sure the device used can actually support the cylinder.
7. Remove the lock bolt and/or any retaining clips securing the cylinder pins. Remove the cylinder pins.
8. Remove the cylinder.
9. Wipe up any hydraulic fluid spillage in, on, near and around the machine, work area and tools.

a. General Cylinder Disassembly

1. Clean the cylinder with a suitable cleaner before disassembly. Remove all dirt, debris and grease from the cylinder.
2. Clamp the barrel end of the cylinder in a soft-jawed vise or other acceptable holding equipment if possible.

⚠ WARNING

Significant pressure may be trapped inside the cylinder. Exercise caution when removing a counterbalance valve or a pilot-operated check valve from a cylinder.

Note: *Avoid using excessive force when clamping the cylinder in a vise. Apply only enough force to hold the*

9.2 SPECIFICATIONS

Electrical system specifications are listed in Section 2, “General Information and Specifications.”

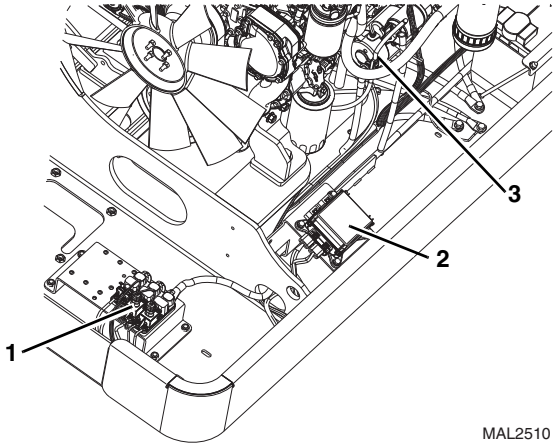
9.3 SAFETY INFORMATION

⚠ WARNING

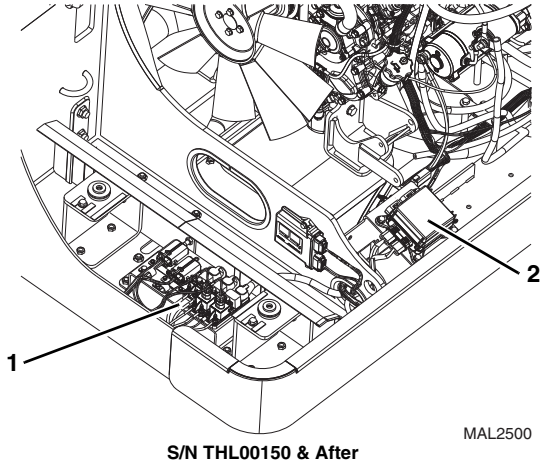
DO NOT service the machine without following all safety precautions as outlined in Section 1, “Safety Practices,” of this manual.

9.4 FUSES AND RELAYS

9.4.1 Engine Compartment



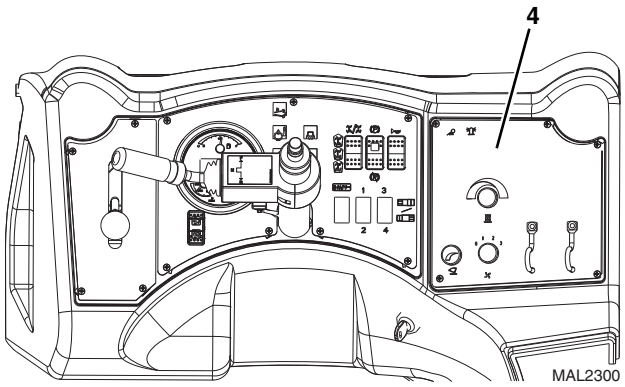
S/N THG00150 & After
S/N THH00150 & After



S/N THL00150 & After
S/N SXH00150 & After

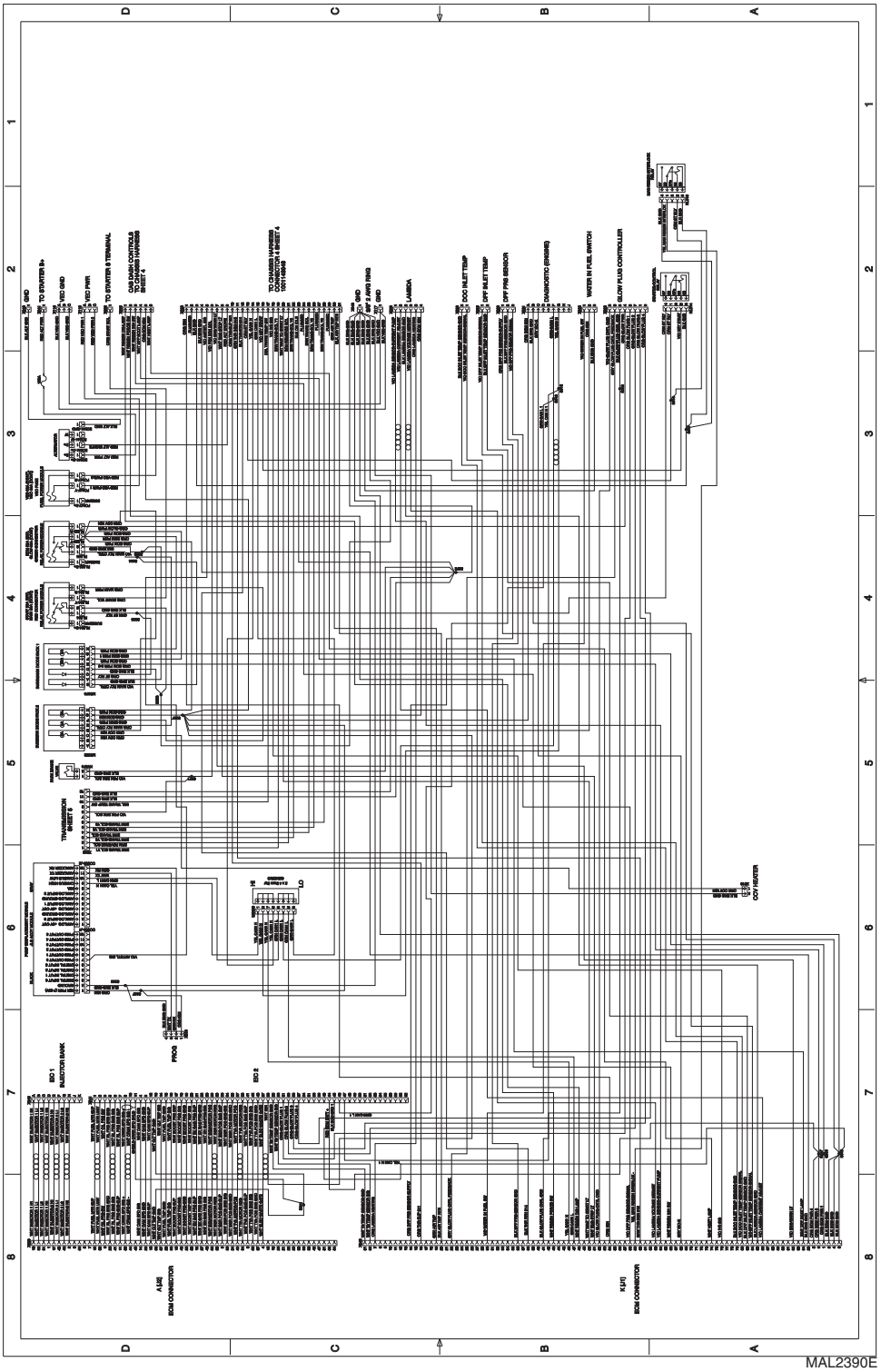
The starter relays (**1**), VEC control module (**2**) and 150 amp in-line fuse (**3**) are located in the engine compartment.

9.4.2 Cab



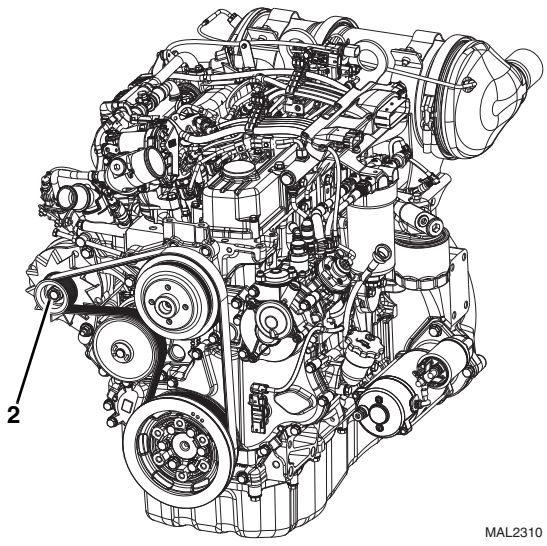
The accessory power distribution unit is located in the cab. For access, remove the screws securing the load chart panel (**4**) to the dash.

f. Engine Harness Schematic



MAL2390E

9.9 CHARGING CIRCUIT



Before using a battery charger, an attempt can be made to recharge the battery by jump-starting the machine (Refer to the appropriate Operation & Maintenance Manual). Allow the engine to run, which will enable the alternator (**2**) to charge the battery.

If the engine alternator charging warning indicator illuminates, perform the following checks:

1. Check all battery cable connections at the battery, and verify that they are clean and tight.
2. Check the external alternator wiring and connections, and verify that they are in good condition.
3. Check the fan belt condition and tension.
4. Run the engine and check the alternator for noise. A loose drive pulley, loose mounting hardware, worn or dirty internal alternator bearings, a defective stator or defective diodes can cause noise. Replace a worn or defective alternator.

9.9.1 Alternator

a. Alternator Removal

1. Park the machine on a firm, level surface, level the machine, fully retract the boom, lower the boom, place the transmission control lever in the (N) NEUTRAL position, engage the parking brake and turn the engine OFF.
2. Place a Do Not Operate Tag on both the ignition key switch and the steering wheel.
3. Open the engine cover. Allow the system fluids to cool.
4. Properly disconnect the battery.
5. Install a drive ratchet into the square hole in the serpentine belt tensioner bracket.
6. While lifting the automatic belt tensioner away from the belt, remove the fan serpentine belt.

Note: *Record how the alternator is installed to ensure correct installation later.*

7. Label and disconnect the wire leads attached to the alternator.
8. Remove the lower mounting capscrew securing the alternator to the lower mounting hole on the engine.
9. While supporting the alternator with one hand, remove the upper (longer) mounting hardware from the upper alternator mount. Remove the alternator from the machine.

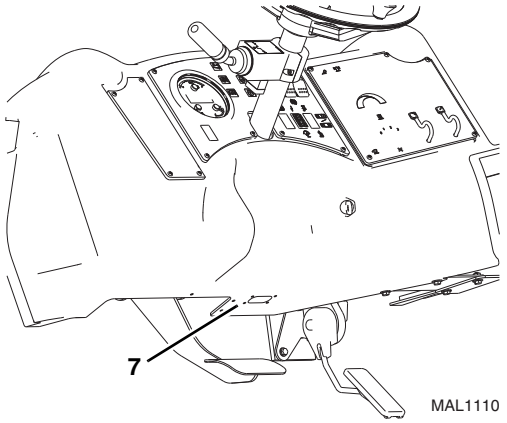
b. Alternator Installation

1. Position the alternator and align with the upper alternator mount on the engine bracket. Insert the upper (longer) mounting hardware through the alternator mount. Thread the longer capscrew into the alternator front mount. **DO NOT** tighten completely at this time.
2. Align the lower alternator mount hole with the lower mounting bracket on the engine, and insert the lower mounting capscrew. Tighten the lower capscrew and upper capscrew securely.
3. Place a drive ratchet into the square hole on the serpentine belt tensioner bracket. Apply pressure against the tensioner bracket and route the serpentine belt onto the alternator and engine pulleys. Release and check the tensioner pulley to verify that it is pivoting freely in order to provide the proper tension on the belt. Check for proper belt alignment. (Refer to the appropriate Operation & Maintenance Manual.)
4. Connect the previously labeled wire leads to the alternator.
5. Properly connect the battery.
6. Close and secure the engine cover.
7. Remove the Do Not Operate Tags from both the ignition key switch and the steering wheel.

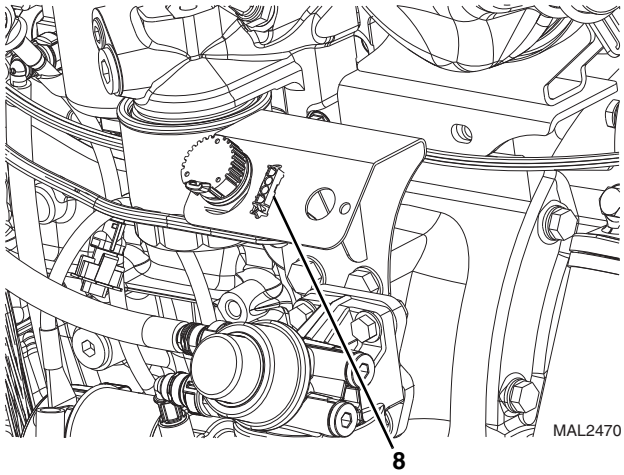
3. Escape Key: To return home or access previous menu.
4. Enter Key: Stores and selects Top Level, Sub Level and Items Menus.
5. Up/Down Arrow Keys: Change adjustable values.
6. Left and Right Arrow Keys: Used to move between Top Level, Sub Levels and Item Menus.

9.15.1 Analyzer Usage

Help messages can be viewed using the Analyzer (P/N 330-5251). The Help messages can be accessed by pressing the ENTER key while viewing the current Help message. The Help message shall be EVERYTHING OK when no fault is present.



The Analyzer cable plugs into the joystick tilt, accessory module connector under the dash (**7**).



The Analyzer cable plugs into the Pump Module connector in at the engine above the fuel filter (**8**).

For more information, contact the local Caterpillar dealer.