2.4 SPECIFICATIONS

2.4.1 Vehicle Dimensions (Fig. 2-1)

With Standard 12-ply 13.00-24 Tires

Ref.	Description	
A.	Length (without attachment)	221.0" (5613 mm)
B.	Width	98.0" (2489 mm)
C.	Height (boom lowered)	91.75" (2330 mm)
D.	Wheelbase	122.0" (3099 mm)
E.	Tread	84.0" (2134 mm)
F.	Ground Clearance	17.0" (432 mm)
G.	Turning radius, curb to curb	138.0" (3505,2 mm)
H.	Turning radius, clearance	180.5" (4584,7 mm)
I.	Maximum lift height, boom extended	36' 2" (11023,6 mm)
J.	Maximum lift height, boom retracted	18' 6" (5638,8 mm)
K.	Maximum below grade depth, boom extended	2' 5" (736,6 mm)
L.	Maximum reach, from front of front tires	24' 8" (7518,4 mm)
M.	Maximum reach at maximum lift angle, boom extended	67.2" (1707 mm)
N.	Maximum reach at maximum lift angle, boom retracted	-26.2" (-665,48 mm)
O.	Maximum reach at minimum lift angle, boom extended	24' 2" (7366 mm)
P.	Maximum boom lift angle	68°
Q.	Minimum boom lift angle	-3.8°
R.	Angle of approach	N/A
S.	Angle of departure	33°

Fork tilt angle:

T.	At minimum boom angle up	8.1°
U.	At minimum boom angle down	-108.3°
V.	At maximum boom angle up	80.8°
W.	At maximum boom angle down	-21.8°

Frame tilt angle *(not shown)*:

Right	10.0°
Left	10.0°

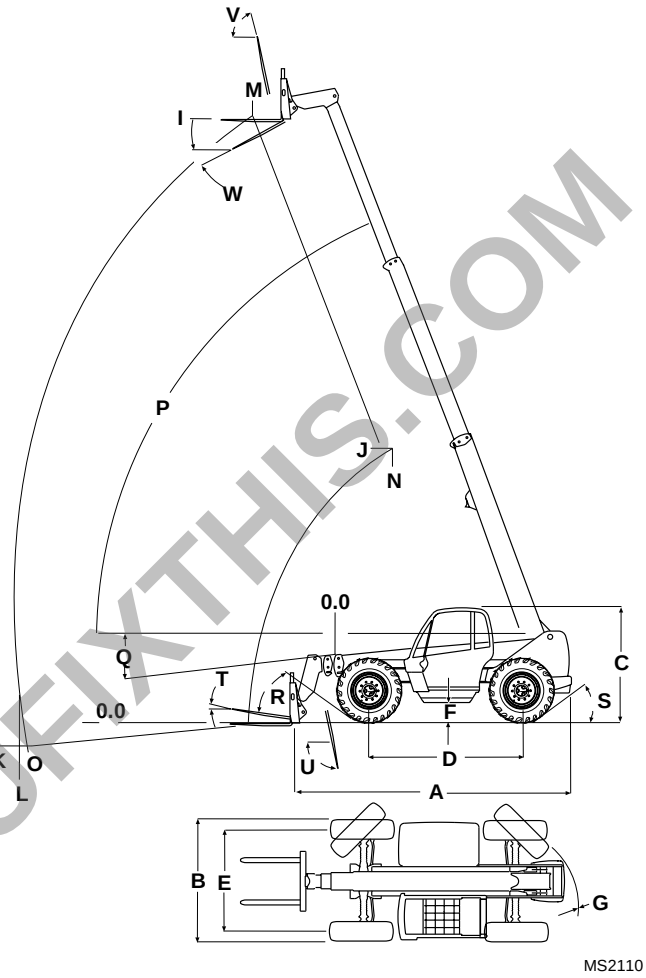


Figure 2–1. Vehicle dimensions with standard tires.

2.4.2 Performance Specifications

Performance criteria is based on full throttle engine speed unless otherwise specified or not applicable:

A. Travel Speed (standard tires, no load)

	4-SPEED	3-SPEED
First gear	4.3 mph (6,9 km/hr)	4.2 mph (6,8 km/hr)
Second gear	9.1 mph (14,6 km/hr)	9.2 mph (14,8 km/hr)
Third gear	15.3 mph (24,6 km/hr)	17.7 mph (28,5 km/hr)
Fourth gear	20.8 mph (33,5 km/hr)	N/A

B. Braking Distance (standard tires, no load)

	4-SPEED	3-SPEED
From road speed to stop	29.0 ft (8,8 m)	21.4 ft (6,5 m)

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2.12 MAINTENANCE INSTRUCTIONS

Maintenance Introduction

WARNING: DO NOT perform service or maintenance on the vehicle with the engine running. Contact with moving parts can cause serious injury or death.

This section contains a routine equipment checklist and a maintenance schedule and checklist with references to pertinent procedures and instructions. To help prevent problems before they occur, follow the maintenance schedule.

Note: Lubrication and Maintenance Chart decals are located inside the engine compartment cover (Fig. 2–3). These decals contain a general maintenance schedule that should be followed to maintain the vehicle in good operating condition. The same schedule information is presented in this manual, except that it contains a more detailed account of how to perform these specific maintenance operations.

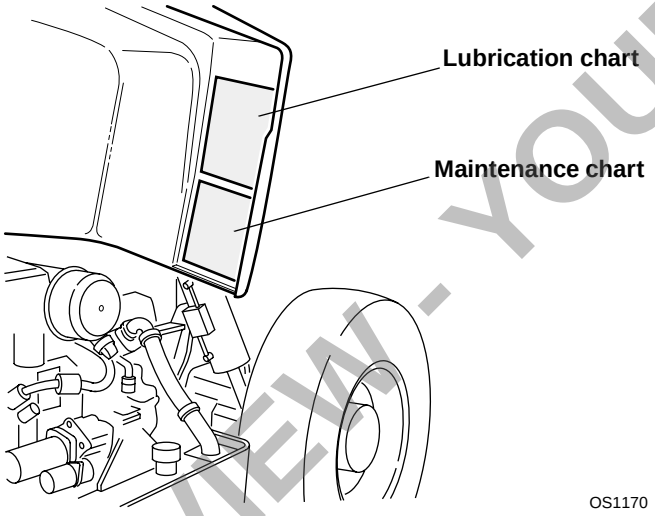


Figure 2–3. Lubrication and maintenance charts are located inside the engine cover.

2.12.1 Maintenance Schedule and Checklist

A. 10 Hour Intervals

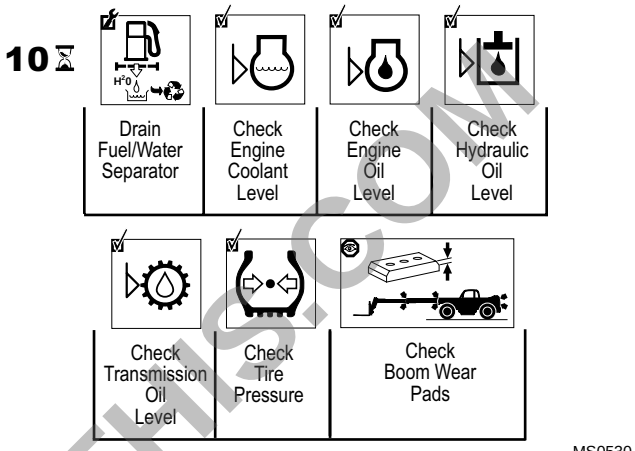


Figure 2–4. Ten-hour interval maintenance schedule and checklist.

At ten hour intervals, perform the following:

- Drain the fuel/water separator (see 2.12.7).
- Check the engine coolant level (see 2.12.5).
- Check the engine oil level (see 2.12.6).
- Check the hydraulic reservoir oil level (see 2.12.9).
- Check the transmission oil level (see 2.12.10).
- Check the air pressure in the tires (see 2.12.14).
- Check boom wear pad thickness (see 2.12.2).

B. At First 50 Hours of Use

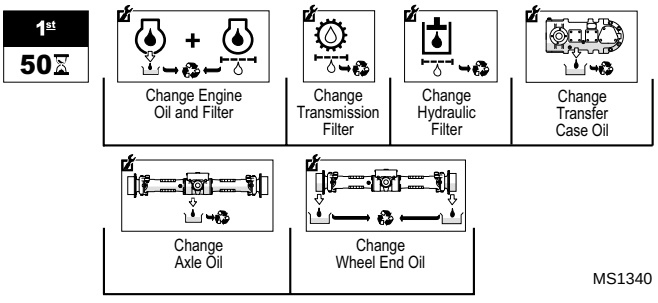


Figure 2–5. First 50 hour interval maintenance schedule and checklist.

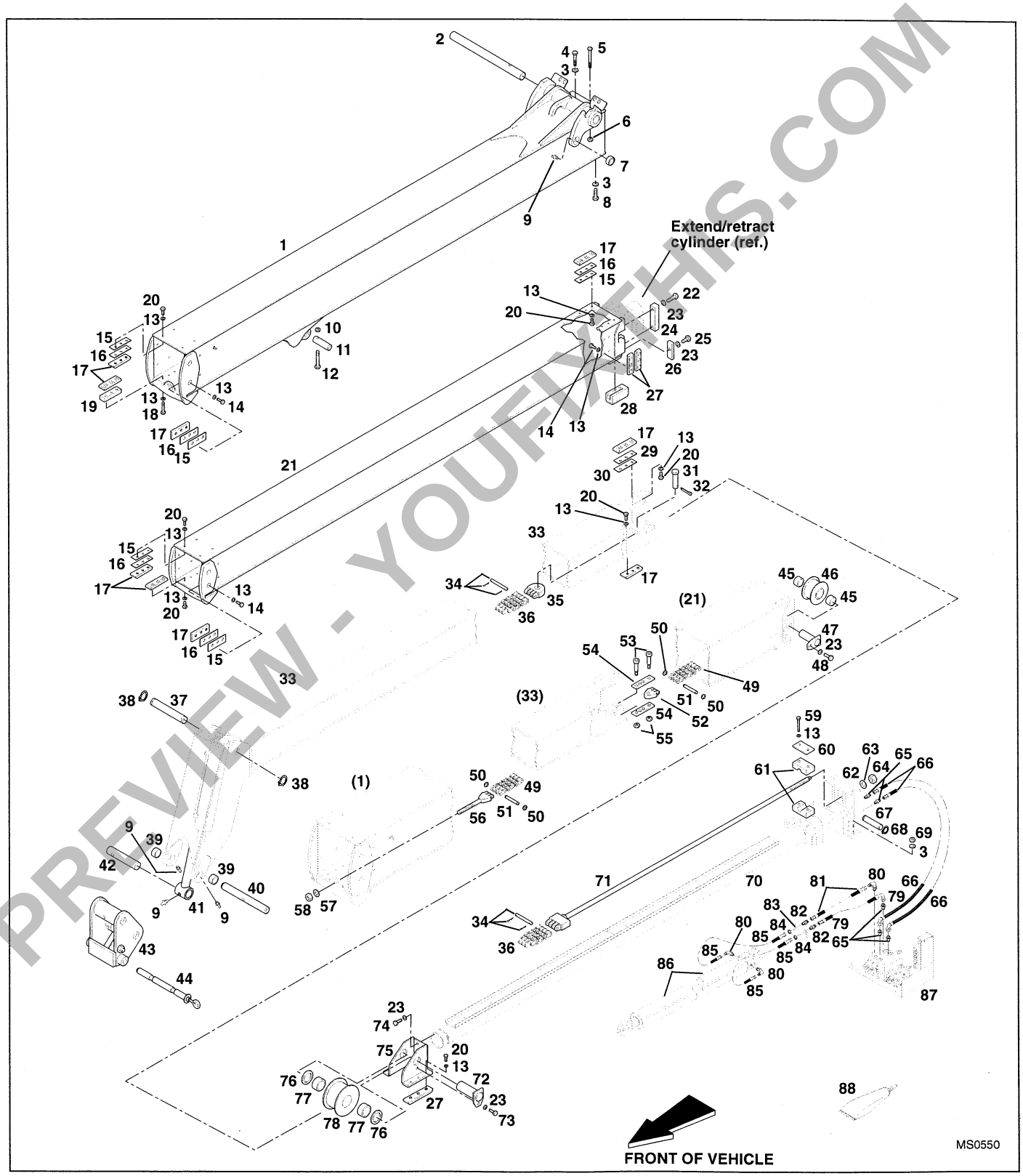
When the vehicle completes its first 50 hours of use, perform the following:

- Change the engine oil and filter (see 2.12.6 C).
- Change the transmission filter (see 2.12.10).
- Change the hydraulic filter (see 2.12.9).
- Change the transfer case oil (see 2.12.13).
- Change the axle oil (see 2.12.11).
- Change the wheel end oil (see 2.12.12).

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General Overview



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3.4 TROUBLESHOOTING

This section provides an easy reference guide covering the most common problems that occur during operation of the boom.

Boom Troubleshooting

Problem	Cause	Remedy
1. Fails to extend or to retract.	1. Broken hydraulic line and/or connection leaks.	1. Locate break and/or stop leaks.
	2. Faulty extend/retract cylinder.	2. Repair cylinder.
	3. Faulty components in extend/ retract circuit.	3. Troubleshoot components; repair or replace.
	4. Broken chains or chain connections.	4. Repair or replace chains.
2. Fails to raise or lower.	1. Broken hydraulic line and/or connection leaks.	1. Locate break and/or stop leaks.
	2. Faulty hoist cylinder.	2. Repair cylinder.
	3. Faulty components in hydraulic raise/lower circuit.	3. Troubleshoot components; repair or replace.
3. Excessive boom pivot pin or cylinder pivot pin wear.	1. Improper grease intervals.	1. Replace worn pins and lubricate at regular intervals.
	2. Worn bearings.	2. Replace bearings and lubricate at regular intervals.
4. Rapid boom pad wear.	1. Improper wear pad shimming.	1. Check shim adjustment and shim properly.
	2. Excessive loads, rapid cycle times.	2. Reduce cycle times.
	3. Contaminated, corroded or rusted wear pad sliding surfaces (due to improper preparation for long term storage).	3. Prep boom properly for long-term storage.
5. Dropping chain, or jerky boom extend or retract functions.	1. Chain(s) out of adjustment.	1. Readjust chain(s).
	2. Chain(s) stretched.	2. Replace chain(s).
6. Attachment ("grille") tilt or auxiliary hydraulic circuit line failures.	1. Improper hose placement or hose misalignment.	1. Reset hoses properly.
	2. Cracked and/or broken hose.	2. Replace hose(s).
7. Excessive chain wear.	1. Chain out of adjustment.	1. Replace and readjust chains properly.
	2. Improper chain lubrication.	2. Replace chain(s) and lubricate at regular intervals.

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9.8.4 Frame Tilt Circuit

a. Frame Tilt LEFT

With the two frame tilt select buttons on the joystick depressed and held, and the joystick moved to the left, the spool valve in the frame tilt directional control valve (Fig. 9–21) of the main control valve assembly (see Fig. 9–22) is shifted by pilot pressure. System pressure is directed to ports A-D (Fig. 9–21), then B-F of the spool valve (in the main control valve), and from there to the base end of the frame tilt cylinder. Oil from the rod end of the frame tilt cylinder flows through a check valve, unseated by system pressure, to the stabilizer cylinder, through the solenoid valve, back to the spool valve through ports E-C to the return filter and the reservoir.

b. Frame Tilt RIGHT

With the two frame tilt select buttons on the joystick depressed and held, and the joystick moved to the right, the spool valve in the frame tilt directional control valve of the main control valve assembly is shifted by pilot pressure.

System pressure is directed to ports D-A then B-E of the spool valve (Fig. 9–21), then to the stabilizer cylinder, through the solenoid valve, back to the frame tilt cylinder, where it flows to the rod end of the cylinder. Oil from the base end of the cylinder flows through the check valve, which was unseated by system pressure, then to ports F-C of the spool valve, to the return filter and the hydraulic fluid reservoir.

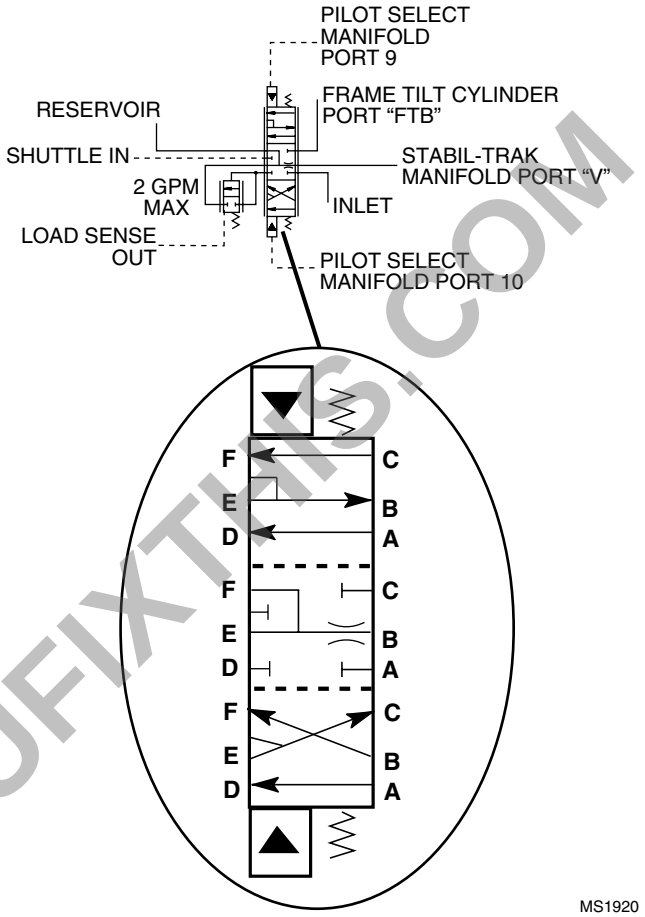


Figure 9–21. Frame tilt spool valve circuit schematic.

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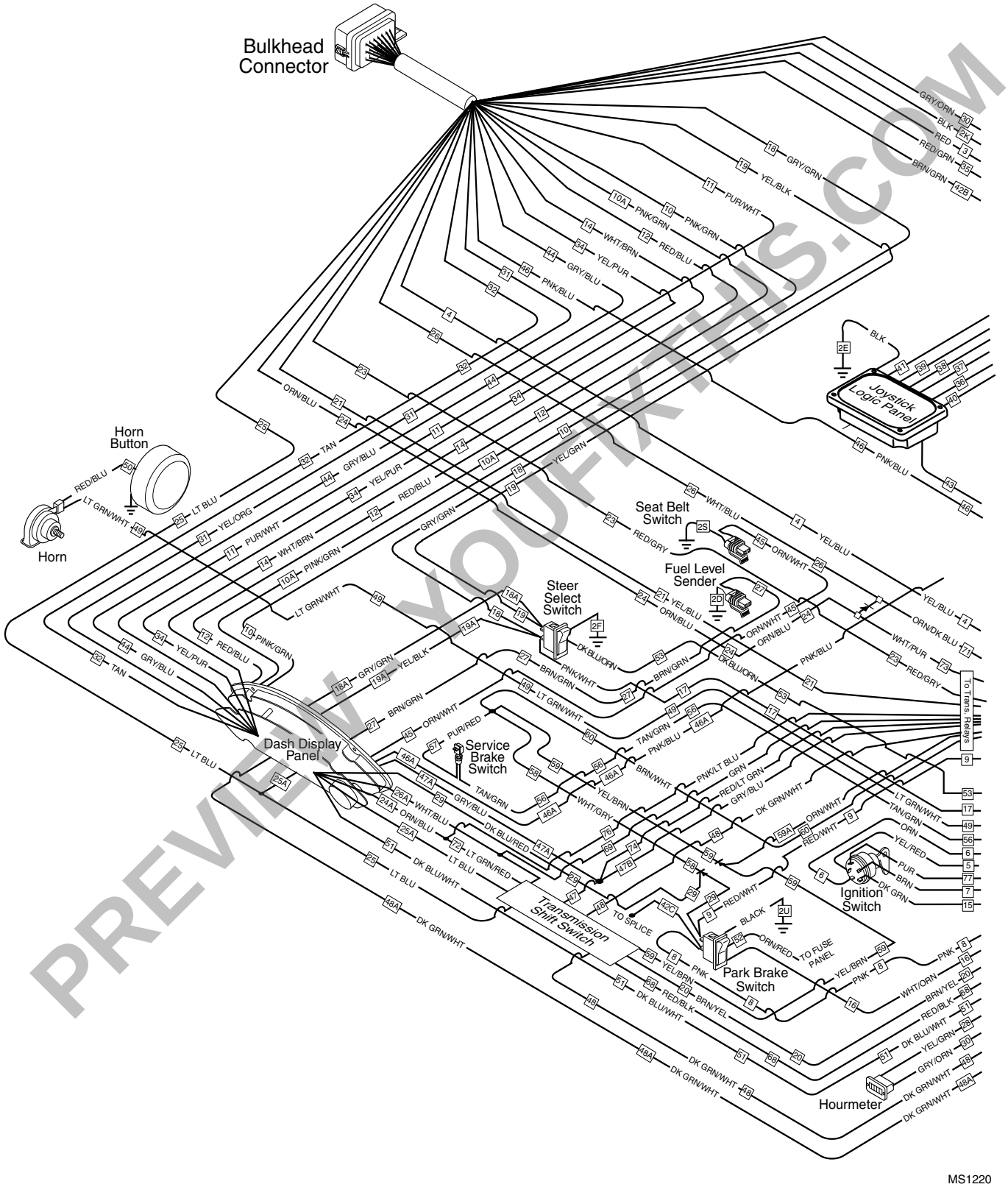


Figure 10-5. Cab wiring diagram (S/N 8249 and before), left side.

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2.1 REPLACEMENT PARTS AND WARRANTY INFORMATION

The replacement of any part with any other than a Sky Trak authorized replacement part can adversely affect the safety, performance, or durability of the vehicle, and may void the warranty. Sky Trak International assumes no liability whatsoever for unauthorized replacement parts.

A warranty registration form must be filled out by the Sky Trak distributor, signed by the purchaser, and returned to Sky Trak when the vehicle is sold and/or put into use. Registration activates the warranty period and helps to assure that warranty claims are promptly processed. To guarantee full warranty service, verify that the distributor has returned the business reply card of the warranty registration form to Sky Trak.

2.2 SERIAL NUMBER LOCATIONS

When ordering replacement parts or making service inquiries about the vehicle, various serial numbers are required to help assure the provision of correct parts and information. Before ordering parts or initiating service inquiries, make note of the pertinent serial numbers.

2.3 TORQUE VALUES

2.3.1 Fastener Rating

All fasteners (nuts, bolts, washers, etc.) are equal to SAE Grade 5 (PC8.8) and are plated, unless otherwise specified.

Unless otherwise specified, the following values apply for Grade 5 (PC8.8) nuts and bolts:

Size	Torque		Size	Torque	
Inch	lb/ft	Nm	mm	Nm	lb/ft
1/4	9	12	6.0	10	7
5/16	18	24	8.0	25	18
3/8	31	42	10.0	50	37
7/16	50	68	--	--	--
1/2	75	102	12.0	80	59
9/16	110	150	14.0	130	95
5/8	150	203	16.0	200	146
3/4	250	340	20.0	360	263
7/8	380	515	22.0	510	372
1.0	585	793	24.0	650	475

2.3.2 Straight Thread O-ring Fitting (non-adjustable)

When the vehicle leaves the factory, it is equipped only with straight thread O-ring fittings. Customer-added accessories may differ; therefore, consult the manufacturer's product literature for information.

1. Verify that both threads and sealing surfaces are free of burrs, nicks, scratches, and any foreign material.
2. Lubricate the new O-ring with a light coating of hydraulic oil.
3. Tighten fitting to the proper torque according to the following chart:

SAE Size	Torque	
	lb/ft	Nm
4	22-26	30-35
6	46-54	62-73
8	95-105	129-142
10	125-135	170-183
12	165-175	224-237
16	245-255	332-346
20	270-290	366-393
24	365-385	495-522

2.3.3 Straight Thread O-ring Fitting (adjustable)

When the vehicle leaves the factory, it is equipped only with straight thread O-ring fittings. Customer-added accessories may differ; therefore, consult the manufacturer's product literature for information.

1. Verify that both mating parts are free of burrs, nicks, scratches, and any foreign material.
2. Lubricate the new O-ring with a light coat of hydraulic oil.
3. Back off the locknut as far as possible.
4. Screw the fitting into the port by hand until the backup washer contacts the face of the port and is pushed all the way towards the locknut.
5. To position the fitting, unscrew by the required amount, but not more than one full turn.

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Safety

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5. Clean and reinstall the drain plug. Remove the axle fill/level plug from the axle housing.
6. Fill the axle with a premium grade of SAE 80W90 or SAE 80W140 axle oil. Filling is accomplished through the axle fill/level hole. Fill until the axle oil level is even with the plug hole. The axle capacity is three gallons (11,5 liters).
7. Reinstall the axle fill/level plug into the axle housing.

2.12.12 Wheel End Oil

WARNING: DO NOT perform service or maintenance on this vehicle with the engine running. Contact with moving parts can cause serious injury or death.

A. Wheel End Oil Level Check

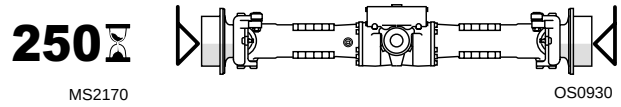


Figure 2–54. Every 250 hours of engine operation, check the wheel-end oil level for all four wheel-ends.

1. With the vehicle on level ground, move forward or backward enough to align the oil level line (Fig. 2–55) horizontally.
2. Ground the carriage, place the travel select lever in NEUTRAL (N), engage the parking brake switch and shut the engine off.
3. Clean the area around the wheel end fill/drain plug. Slowly remove the plug; pressure may be present. Check the oil level. It should be even with the bottom edge of the hole.

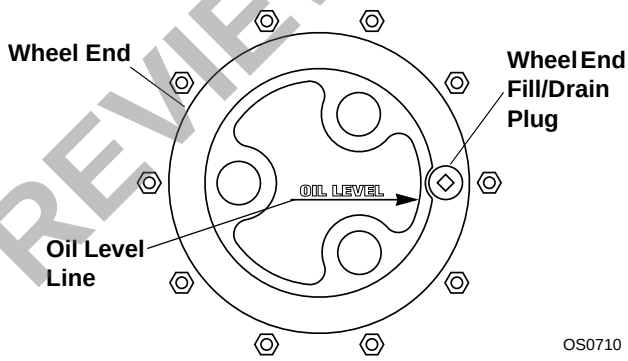


Figure 2–55. Wheel-end oil should be even with the bottom edge of the fill/drain plug hole.

4. As required, add a premium grade of SAE 80W90 or SAE 80W140 axle oil to bring the level up and even with the plug hole.
5. Clean and reinstall the wheel end fill/drain plug.

B. Wheel End Oil Change

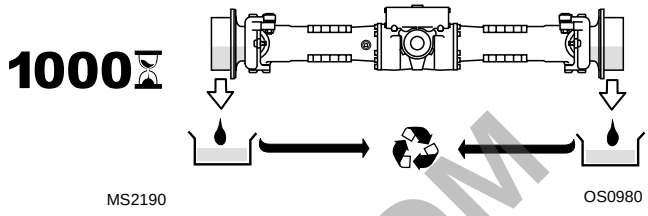


Figure 2–56. Every 1,000 hours of engine operation, change the wheel-end oil level at all four wheel-ends.

1. Position the vehicle on level ground and move the vehicle forward or backward to place the wheel end fill/drain plug in the six o'clock position (Fig. 2–57).

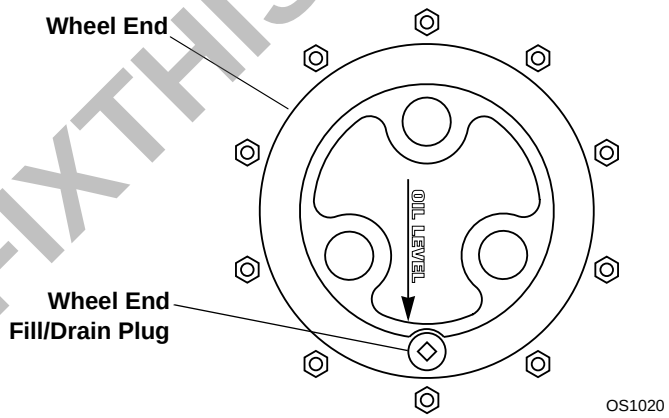


Figure 2–57. Drain each wheel-end every 1,000 hours of engine operation.

2. Ground the carriage, place the travel select lever in the NEUTRAL (N) position, engage the parking brake switch and shut the engine off.
3. Clean the area around the wheel end fill/drain plug. Slowly loosen the plug. Hold a receptacle under the wheel end and remove the plug from the wheel end.
4. Allow the axle oil to drain completely into the receptacle. Transfer the axle oil to a container with a cover and label the container as used oil. Dispose of properly.
5. Reposition the vehicle so the oil level line is placed horizontally.
6. Fill the wheel end with a premium grade of SAE 80W90 or SAE 80W140 axle oil. The wheel end is full when the oil is level with the bottom of the plug hole. Wheel end oil capacity is approximately 1.4 quarts (1,3 liters).
7. Clean and reinstall the wheel end fill/drain plug.

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4.2.2 Cab Installation

WARNING: Explosion and fire hazard. Cap or safely cover the fuel tank and beaded hose tee openings.

WARNING: Wear protective footwear with reinforced toe caps and slip-resistant soles. Failure to comply can result in foot injury from falling objects or other bodily injury from slipping or falling.

WARNING: NEVER lift a heavy object without the help of at least one assistant or a suitable sling and hoist. Failure to comply can result in serious personal injury.

IMPORTANT: Transfer and install cab panels and other components as needed *after* the cab is securely mounted on the vehicle.

1. Cap or safely cover any fuel-tank or fuel-fitting openings. Inspect vehicle parts that are exposed with the cab removed. Repair or replace as required.
2. **Block all four wheels** to help prevent the vehicle from moving. Assure that there is sufficient overhead and side clearance for cab installation.
3. Disconnect the cable at the battery negative (-) terminal (Fig. 4–2) as required.
4. Install cab isolators (item 20 in the *General Overview* illustration on page three) into the mounting holes on the cab mount.
5. Use a hoist or overhead crane and sling attached to the cab (1). Carefully begin to lower the cab onto the cab mount. Stop and check that wiring, fuel tank components, hydraulic hoses, etc., will not be pinched or damaged as the cab is lowered.
6. Route the throttle cable (Fig. 4–4) from beneath the cab to the engine compartment by simply positioning the cable under the frame, then up between the transmission and engine. Bring the cable across the side of engine to the throttle cable bracket. **DO NOT** attach the cable to the throttle lever extension on the engine at this time.
7. Carefully and slowly lower the cab (item 1 in the *General Overview* illustration) onto the cab mount. Align the cab with the cab isolators (20) as the cab is lowered. Readjust the position of the sling as needed to help balance the cab during installation.
8. Install the cab-to-cab-mount attaching hardware (items 12, 21, 22 and 23). At the rear of the cab, install but **DO NOT** tighten the two 3/4-10 hex-lock elastic nuts (12), two rebound washers (21) and two 3/4-10 x 3-3/4" Grade 8 hex-head capscrews (22) that secure the cab (1) to the cab mount (ref.). Tap the capscrews into the cab isolators (20) from below, as required, but **DO NOT** distort or damage the cab isolators.

Note: ALWAYS replace elastic-lined nuts with new elastic-lined nuts to help ensure proper fastening.

9. At the front of the cab (1), install but **DO NOT** tighten the two 3/4-10 hex-lock elastic nuts, two 3/4" lock washers (23), two rebound washers (21) and two 3/4-10 x 3-1/2" Grade 8 hex-head capscrews (22). Tap the capscrews into the cab isolators (20) from below, as required, but **DO NOT** distort or damage the cab isolators.

Note: ALWAYS replace elastic-lined nuts with new elastic-lined nuts to help ensure proper fastening.

10. From behind the cab, position the lower clamp (Fig. 4–3) on the fuel hose. Remove any cap or safety cover from the fuel tank opening. If needed, secure the fuel filler to the cab and the top end of the fuel hose to the fuel filler.
11. Slip the lower end of the fuel hose onto the fuel hose neck on the fuel tank and tighten the lower clamp.
12. Position a clamp on the fuel breather hose (Fig. 4–3). Remove any cap or safety cover from the beaded hose tee. If needed, secure the top end of the fuel breather hose to the fuel filler with another clamp.
13. Secure the bottom end of the fuel breather hose to the beaded hose tee.
14. From beneath the cab, route and connect the cab wiring harness (Fig. 4–6). Install plastic conduit as required to protect the wiring as it passes through metal openings. Secure wiring with plastic wire ties as needed.
15. Route the joystick, power steering and service brake hydraulic hoses from the frame into the cab. Using the hose labels made and attached earlier, connect the hoses at the joystick, power steering valve and brake control valve. Wipe up any spilled hydraulic fluid.
16. Check that the cab is not distorting, pinching, crushing or damaging the throttle cable, wiring or hydraulic hoses. Make adjustments as necessary.
17. Tighten the cab-to-cab-mount hardware (refer to the *General Overview* illustration). Torque the 3/4-10 hex-lock elastic nuts (12) and 3/4-10 x 3-1/2" Grade 8 hex-head capscrews (22) to 280 lb/ft (380 Nm).
18. After the cab is securely mounted to the vehicle, install all parts in the cab as required.
19. Connect the throttle cable at the engine (Fig. 4–4) and, if necessary, to the throttle pedal.

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7.4 TRANSMISSION MAINTENANCE

7.4.1 Maintenance Introduction

WARNING: To help avoid severe burns, **DO NOT** attempt this procedure when the engine, cooling, and hydraulic systems are hot. Wait until they have cooled before proceeding.
- Exercise extreme care to help avoid skin rashes, fire hazards and inhalation of harmful vapors when using solvent and caustic cleaners.
- Exercise extreme care when using a steam cleaner to help avoid burns.

IMPORTANT: These instructions cover only the routine maintenance of the transmission. Refer to the *Clark-Hurth T 12000 Powershift Transmission 3, 4, & 6 Speed Intermediate Drop Maintenance and Service Manual*, part number *SM T12-3,4,6 ID* for information on transmission diagnosis and internal component replacement. Cleanliness is of extreme importance. Before attempting any repairs, thoroughly clean the exterior of the transmission to help prevent dirt from entering while performing maintenance checks and procedures.

Section 7.4.2 Transmission Maintenance Schedule provides a suggested maintenance schedule with references to pertinent procedures and instructions in this manual. To help prevent transmission problems before they occur, follow the maintenance schedule.

Note: Lubrication and Maintenance Chart decals are located inside the engine compartment cover (see Fig. 7-2). These decals contain a general maintenance schedule that should be followed to maintain the vehicle in good operating condition (refer to *Section 2 General Information, Specifications and Maintenance Instructions*). The same schedule information is presented in *Section 2.12.10 Transmission Oil and Filter* with a detailed account of how to perform the procedures.

7.4.2 Transmission Maintenance Schedule

Complete transmission maintenance information is located in *Section 2.12.10 Transmission Oil and Filter*.

- At ten hour intervals, check the transmission oil level (see *Section 2.12.10 Transmission Oil and Filter*).
- When the vehicle completes its first 50 hours of use, change the transmission filter. Change the filter only; **DO NOT** change the transmission oil *and* the filter at the first 50 hour maintenance level (see *Section 2.12.10 Transmission Oil and Filter*).
- At 1,000 hour intervals, change the transmission oil and filter (see *Section 2.12.10 Transmission Oil and Filter*).

Periodically

Periodically, depending on operating conditions and other factors, back flush the transmission oil cooler, which is part of the radiator (Fig. 7-3). **ALWAYS** back flush the transmission oil cooler after removing the transmission for repair or replacement. The transmission oil cooler *outlet* hose, routed to the lower radiator fitting, is located on the right or hydraulic reservoir side of the transmission. The transmission oil cooler *inlet* hose, routed to the upper radiator fitting, is located on the left or boom side of the transmission, just below the position occupied by the main hydraulic pump (refer to *Section 8A.5.3 Perkins Engine Radiator and Oil Cooler Replacement*, or to *Section 8B.5.3 Cummins Engine Radiator and Oil Cooler Replacement* for replacement procedures). Disconnect and back flush the oil cooler portion of the radiator with oil and compressed air until all foreign material is removed. If necessary, remove the radiator from the vehicle and clean the oil cooler circuit using oil, compressed air and steam.

IMPORTANT: DO NOT use flushing compounds for cleaning purposes.

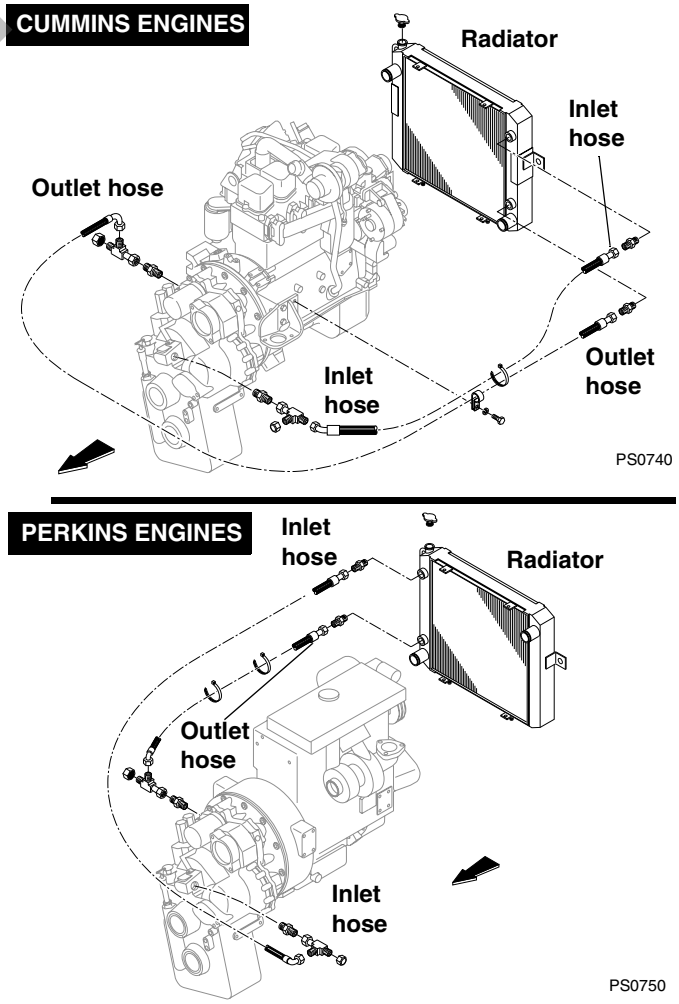


Figure 7-3. Transmission oil cooler hose routings.

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To test a fuel injector:

1. Remove the fuel injector from the cylinder head.
2. Invert the fuel injector with the nozzle facing out, then retighten the unions.
3. Loosen the unions of the other fuel injector pipes (to help avoid the possibility of the engine starting).

> **WARNING: KEEP CLEAR** of spraying fuel. Diesel fuel will spray when venting high pressure lines. The fuel pressure is sufficient to penetrate the skin and cause serious bodily injury. Wear protective clothing and safety glasses.

4. Operate the starter to turn the engine over until fuel sprays from the nozzle. Examine the shape of the spray. If the spray is unduly "wet" or "streaky", or obviously sprays to one side, or if the nozzle "dribbles" fuel, it may only be necessary to probe the nozzle holes to remove blockage.

IMPORTANT: DO NOT attempt to adjust injection pressure without a testing pump and pressure gauge. It is impossible to accurately adjust the setting of fuel injectors without the proper equipment.

A perfect fuel injector, when tested by pumping fuel through it in the open air, gives a short "pinging" sound as the fuel emerges from the holes. After the fuel injector has been in service for some time, the pinging changes to a crackling sound. It is not until the fuel injector sounds "dead" that its condition is likely to affect the running of the engine.

B. Injector Replacement

Preparatory steps:

- Thoroughly clean around the injector(s)
- Disconnect the high-pressure fuel line(s)
- Disconnect the fuel drain manifold

IMPORTANT: The injector must not rotate in the bore of the cylinder head or damage to the cylinder head will occur. If rust has formed on the hold-down nut, soak the nut with rust-penetrating solvent for a minimum of three minutes. Then, tap the injector body with a drift pin to help loosen any rust.

1. Use a 16 mm wrench to prevent the injector body (Fig. 8B–9) from turning. Loosen the hold-down nut with a 24 mm box wrench.

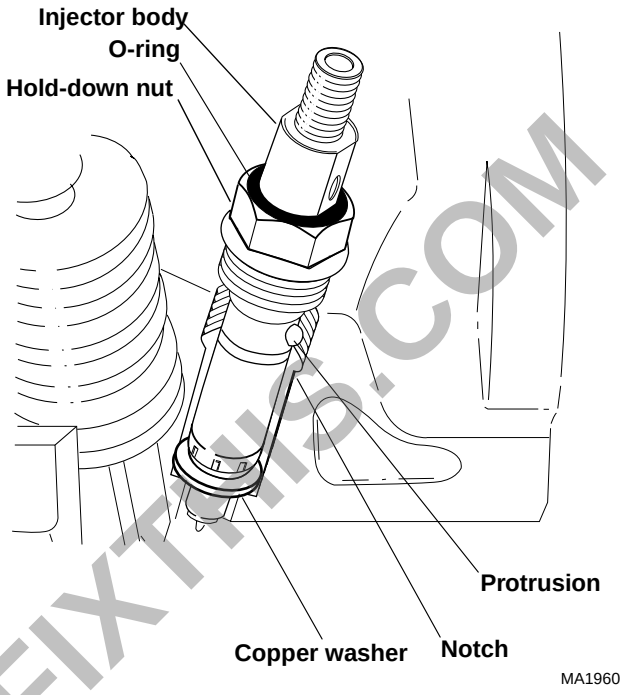


Figure 8B–9. Fuel injector.

2. Clean the injector nozzle bore.
3. Remove the injector hold-down nut from the injector body.
4. Apply a light coat of anti-seize compound to the new injector surface. Avoid getting anti-seize compound into the fuel drain hole.
5. Install the hold-down nut on the injector body.
6. Install a new O-ring into the recessed groove in the top of the hold-down nut. Make sure the O-ring is not cut or twisted during installation.
7. Apply a light coat of anti-seize compound to the to the threads of the injector hold-down nut.
8. Assemble the injector and new copper washer. Use only ONE copper washer. A light coat of clean 15W40 engine oil placed between the washer and the injector will help keep the washer from falling during installation.
9. Install the injector with the protrusion on the side of the nozzle fitting into the notch in the head.
10. Tighten the hold-down nut and torque to 44 lb/ft (60 Nm).
11. Install the fuel drain manifold and torque to 6 lb/ft (8 Nm).
12. Install the high-pressure fuel lines and torque to 18 lb/ft (24 Nm).
13. Run the engine and check for fuel and air leakage.

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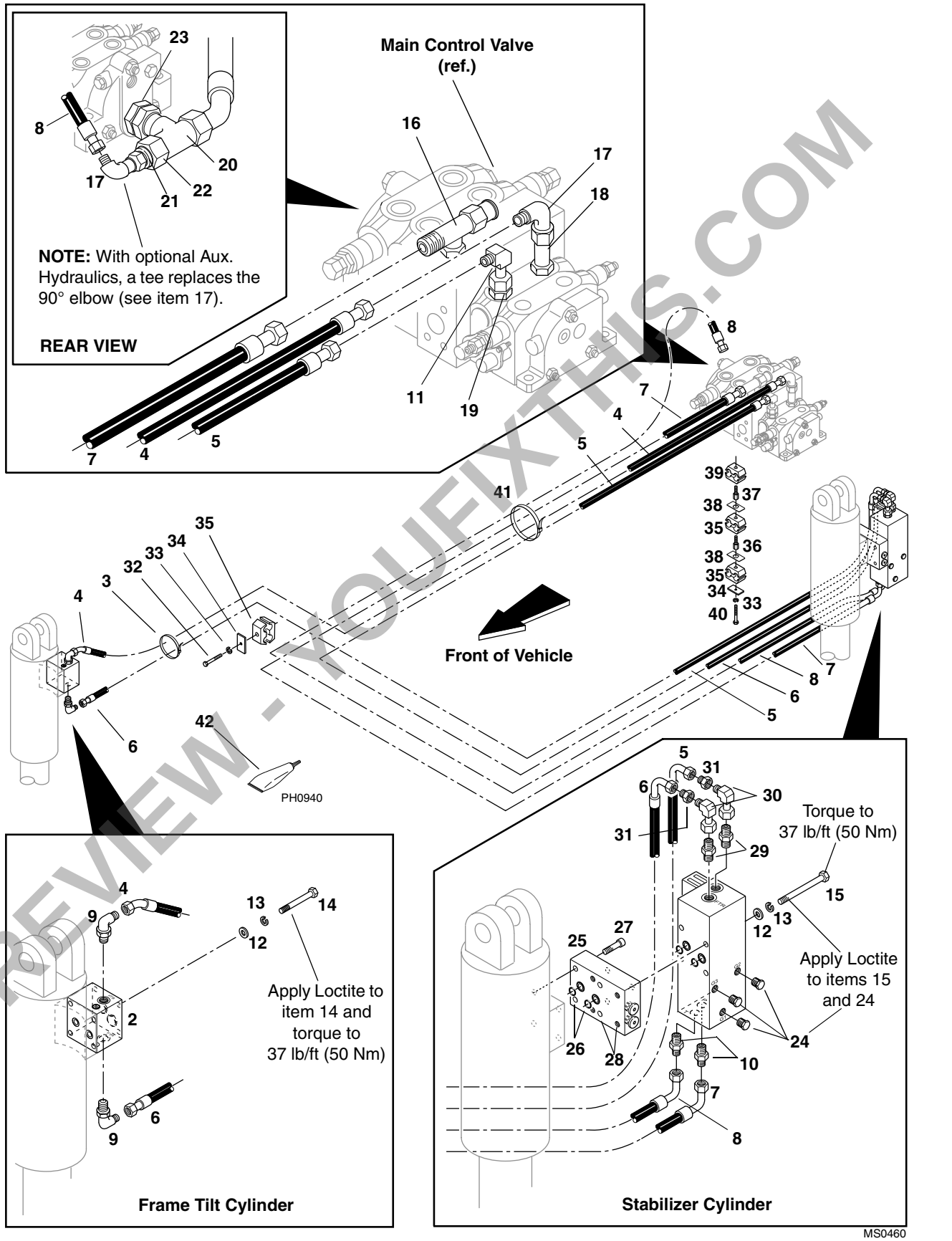


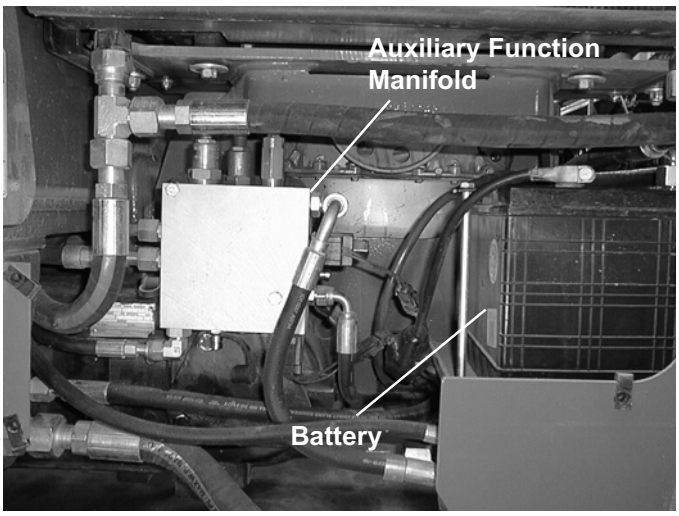
Figure 9–24. Frame tilt and stabilizer components.

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9.9.3 Auxiliary Function Manifold

The auxiliary function manifold (Fig. 9-55) is located near the battery, secured to a bracket at the hydraulic fluid
reservoir/engine mount with two capscrews and lockwashers.



MS2100

Figure 9-55. The auxiliary function manifold is located near the battery.

The auxiliary function manifold (Fig. 9-56) is a machined block with ports for three pressure reducing valves, two solenoid valves, and related hose fittings. The auxiliary function manifold also contains a check valve that can be replaced if defective.

Pressure reducing valve "PS" is set at 2500 psi (172 bar); valve "PB" is set at 550 psi (38 bar), and the pressure relief valve is set at 650 psi (45 bar).

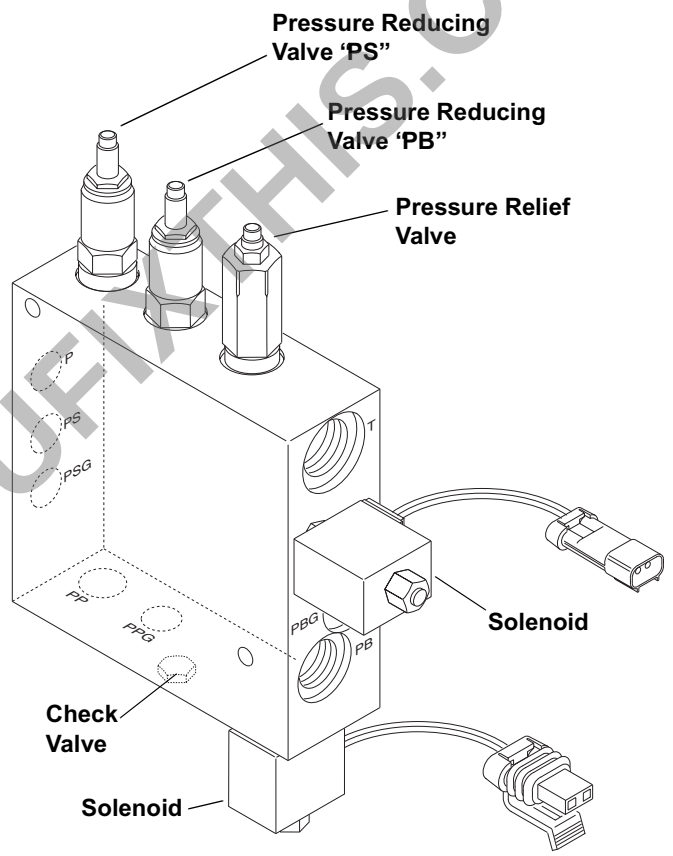
Verify the correct operation of the solenoids before considering replacement of the auxiliary function manifold. The manifold itself is not serviceable and must be replaced in its entirety if replacement of parts does not solve the problem.

DO NOT loosen, disassemble or attempt to adjust any of the pressure valves unless specifically instructed by **Sky Trak** to do so! Tampering with a pressure valve will irrevocably alter pressure in the affected circuits. A new pressure reducing valve will be required to rectify the situation.

a. Auxiliary Function Manifold Replacement

1. Park the vehicle on a firm, level surface, fully retract all hydraulic cylinders, ground the attachment (if any), place the travel select lever in NEUTRAL (N), engage the park brake switch and shut the engine OFF.

> **WARNING:** Hot hydraulic fluid can cause severe burns. Wait for hydraulic fluid to cool before servicing any hydraulic component.



MS2030

Figure 9-56. Auxiliary function manifold components.

1. Unlatch, unlock and open the engine cover. Allow the hydraulic fluid to cool.

> **WARNING:** Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury. Relieve hydraulic pressure before servicing any hydraulic component.

2. Label or otherwise mark the hydraulic hoses in relation to the auxiliary function manifold (Fig. 9-55). Disconnect and cap all hoses, fittings, solenoid wire terminal leads, etc.
3. Remove the auxiliary function manifold from the vehicle. Wipe up any hydraulic fluid spillage in, on, near and around the vehicle.

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Section 10
Electrical System

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4. Use a 1/2" square drive ratchet to raise the tensioner bracket (2). Properly route the fan belt (3) onto the alternator and engine pulleys. Check the tensioner pulley to verify that it is pivoting freely to provide the proper tension on the belt. Check for proper fan belt deflection (refer to *Section 2.12.8 Engine Fan Belt*).
5. Connect the negative (-) battery cable (Fig. 10–37) to the negative (-) battery terminal.

10.7.2 Battery

WARNING: All lead-acid batteries generate hydrogen gas, which is highly flammable. If ignited by a spark or flame, the gas may explode violently, causing spraying of acid, fragmentation of the battery, and possible severe personal injuries. Wear safety glasses when working near batteries. In case of contact with acid, flush immediately with water.

A single, lead-acid type, 12-volt, negative (-) ground, maintenance-free battery rated at 1000 cold-cranking amps is used in this vehicle. Refer to *Section 2.12.15 Battery* for general information.

a. Battery Description

The battery supplies power to the starter and ignition system to crank the engine, and provides extra power when the electrical load requirements of the vehicle exceed the supply from the charging system in the event of an alternator or charging-system failure. The battery also acts as a voltage stabilizer in the electrical system, smoothing out or reducing temporarily high voltage.

With the correct battery cables properly attached, and with the battery properly mounted, the battery does not require periodic maintenance.

When starting the engine, allow the starter to crank for a maximum of 15 seconds only, then wait a minimum of two minutes to help avoid burning out the starter. Also, DO NOT let the engine idle excessively, as low engine RPM can also lead to battery discharge.

Keep the battery from freezing by maintaining a full charge. A completely discharged battery will freeze at 18° F (8° C).

Due to the maintenance-free design, water never has to be added to the battery, so there are no filler caps. Each battery is sealed, except for small vent holes in the cover. The vent holes allow gas and pressure produced in the battery during charging to escape. The special chemical composition inside the battery reduces gassing to a very small amount at normal charging voltages. The special chemistry also greatly reduces the possibility of overcharge damage.

The vents require keeping the battery in an upright position to help prevent electrolyte leakage. Tipping the battery beyond a 45° angle in any direction can allow a small amount of electrolyte to leak out the vent hole.

DO NOT exceed this 45° angle when carrying or installing a battery.

The battery has top-post terminals. Keep the terminals clean, and securely tighten clean cable clamps onto the posts. Grease or special spray sealers may be applied over the connections.

b. Visual Inspection of the Battery

Inspect for damage such as a cracked or broken case or cover that could permit loss of electrolyte. If obvious physical damage is noted, replace the battery. Handle the battery with care. Determine the cause of damage and correct as needed before installing the new battery.

c. Battery Load Test

1. Disconnect both the negative (-) battery cable (first), and the positive (+) battery cable from the battery. Make sure that the negative and positive battery terminal posts are clean to help assure a good electrical connection.
2. Attach voltmeter and battery load tester clamps to the battery terminal posts.
3. Remove the surface charge from any battery that has just been charged (by a battery charger or by the vehicle alternator). DO NOT remove the surface charge from a battery that has been in storage. To remove the surface charge, apply a 300-ampere load across the terminals for 15 seconds. Then turn off the load and wait for 15 seconds to allow the battery to recover and normalize.
4. Battery temperature should be estimated by touch and also by the surrounding temperature it was exposed to during the preceding few hours before testing. Select the nearest estimated temperature from the chart below and determine the minimum voltage that must be maintained while the battery supplies a specified electrical load.
5. Apply a 260-ampere load test to check the charge acceptance of the battery. Observe the voltage after 15 seconds with the load connected, then turn off the load.
6. If voltage is at or above the value determined in step 4, the battery is good and may be returned to service.
7. If voltage is below the value determined in step 4, check the charge acceptance of the battery one more time before discarding it. If the voltage continues to read below the value determined in step 4, replace the battery.

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