CEAM033902

Operation & Maintenance Manual

980E-5

DUMP TRUCK

SERIAL NUMBERS **980E-5 A50003 and up**

ENGINE **18V170**

It is our policy to improve our products whenever it is possible and practical to do so. We reserve the right to make changes or improvements at any time without incurring any obligation to install such changes on products sold previously.

Due to this continuous program of research and development, revisions may be made to this publication. It is recommended that customers contact their distributor for information on the latest revision.

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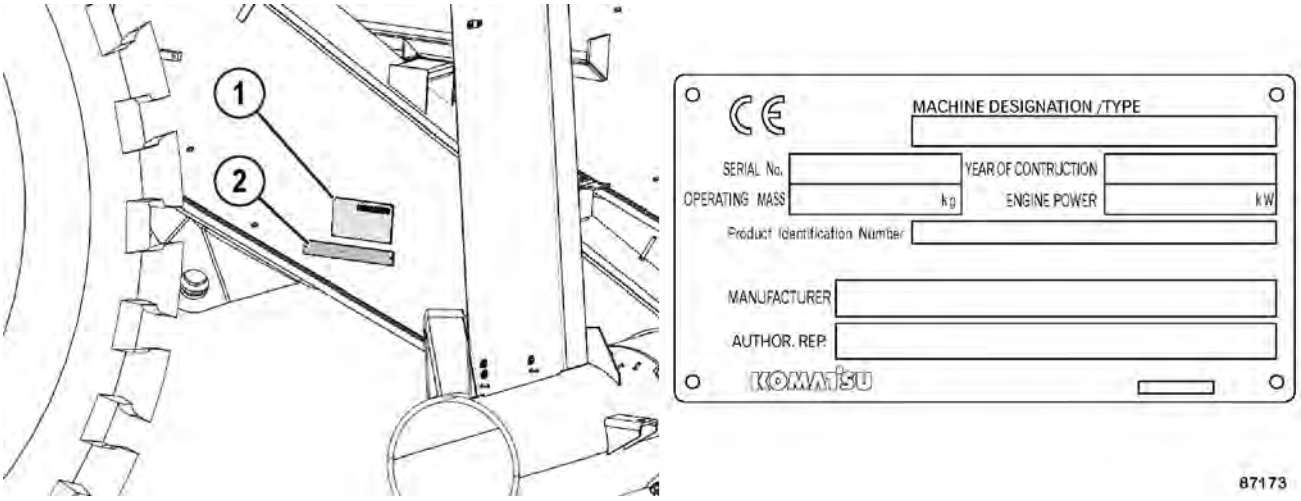
PRODUCT INFORMATION A.8-0000076318

When requesting service or ordering replacement parts, please inform your Komatsu distributor of the following items: Product Identification Number, Machine Serial Number, EPA Regulations and Engine Number, and requested information from your service meter.

Product Identification Number (Pin) / Machine Serial No. Plate

The PIN / Machine Serial Number plate (1, Figure 1-1 PIN / MACHINE SERIAL NUMBER. PLATE, page 1-7) is located on the frame in front of the right side front wheel. The design of the nameplate differs according to the territory and engine options.



1. Machine Serial Number Plate
2. Engine Serial Number Plate

Figure 1-1 PIN / MACHINE SERIAL NUMBER. PLATE

Payload Designations

Operating Mass or the Gross Vehicle Weight (GVW) is the total weight of the vehicle (Empty Vehicle Weight (EVW) + Fuel and Lubricants + Payload). The allowable payload is the GVW less the EVW. Exceeding the allowable payload will reduce the expected life of the truck components.

REMARK *Accumulations of mud, frozen material, etc. become a part of the EVW and reduces the allowable payload. To maximize payload and to keep from exceeding the GVW rating, remove these accumulations.*

Operating Mass or GVW determines the load on the drive train, frame, tires and other components.

Environmental Protection Agency (EPA) Regulations, Engine Serial Number Plate

The EPA engine serial number plate (2) is located below the pin plate on the frame in front of the right side front wheel.

Fluorinated Greenhouse Gases Decal

Fluorinated greenhouse gases are those gases which contribute to the greenhouse effect.

KOMATSU MACHINE OPERATOR PRIVACY POLICY A.2-0000076316

This Privacy Policy governs the processing of personal data which takes place when operators based in the European Economic Area or EEA (which consists of the EU, Norway, Liechtenstein or Iceland) operate Komatsu machines equipped with Machine Monitoring Systems such as KOMTRAX, KOMTRAX Plus, K-plus 2, iMC or Smart Construction Cloud system (hereinafter together referred to as "Machine Monitoring Systems" or "MMS"), i.e. systems that allow the wireless monitoring of Komatsu machines.

The MMS are globally managed and maintained by Komatsu Limited, a Japanese corporation having its principal place of business at no. 3-6, Akasaka 2-Chome, Minato-Ku, Tokyo, Japan ("Komatsu"). MMS are made available in the EEA by Komatsu Europe International NV, a corporation organized and existing under the laws of Belgium, with registered office at 1800 Vilvoorde, Belgium, Mechelsesteenweg 586, registered in Brussels under number RPR/CER(0)404.968.268 ("Komatsu Europe", together with the other Komatsu subsidiaries in the EEA referred to as "we" or "us"). Komatsu Europe acts as Komatsu's representative in the EU with respect to MMS.

1. Who is responsible?

   Komatsu, Komatsu Europe, Komatsu distributors and dealers, as well as the owner of the machine and your employer (when your employer is not the owner) are all responsible for the processing of your personal data through MMS.

2. How are responsibilities allocated?

   To arrange for the aforementioned shared responsibility, Komatsu, Komatsu Europe, the distributors, dealers, owners and your employer have put in place contractual arrangements between them which govern this shared responsibility.

   The essence of these arrangements is that you can always direct your questions and requests regarding the processing of your personal data (i.e. storage, collection, transfer etc. of all information that relates to you as operator) to the party with whom you have most direct relationship.

   In principle this means that you should first and foremost refer to your employer (if you are an employee) or your customer (if you are an independent contractor). Komatsu, Komatsu Europe, Komatsu distributors and dealers, as well as the owner of the machine and your employer/customer (if he is not the owner) will liaise between each other to ensure that your questions, requests and rights regarding the processing of your personal data are given due regard.

   To be clear:

   - For staff members of Komatsu Europe or of other Komatsu subsidiaries in the EEA, the request can be directed directly to Komatsu Europe by sending an e-mail to PrivacyOffice@komatsu.eu
   - For staff members or independent contractors of a distributor, a dealer or an owner, meaning you either work for or on behalf of a distributor, a dealer or an owner, you are to contact the distributor, the dealer or the owner with your questions or requests.
   - For staff members or independent contractors of another entity than the ones referred to above, you are to contact first and foremost your employer or customer.

   If you are unsure who to contact, please send an e-mail to Komatsu Europe at PrivacyOffice@komatsu.eu stating your full name, function title and entity you work for, and we will refer your request to the appropriate responsible party.

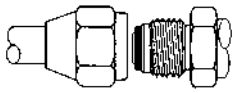
3. What sort of personal data is processed?

   When you use a machine equipped with MMS, the following types of personal data are collected and processed:

   - personal identification data (e.g. names)
   - current employment (e.g. function title and employer details)
   - details regarding:
     - your use and operation of the machine

JIC 37° Swivel Nuts

Table 2-7

Torque Chart For JIC 37° Swivel Nuts With Or Without O-ring Seals				
				
Size Code	**Tube Size (OD)**	**Threads UNF-2B**	**Newton meters (N·m)**	**Foot Pounds (ft·lb)**
– 2	0.125	0.312 – 24	5 ± 1	4 ± 1
– 3	0.188	0.375 – 24	11 ± 4	8 ± 3
– 4	0.250	0.438 – 20	16 ± 4	12 ± 3
– 5	0.312	0.500 – 20	20 ± 4	15 ± 3
– 6	0.375	0.562 – 18	24 ± 7	18 ± 5
– 8	0.500	0.750 – 16	40 ± 7	30 ± 5
– 10	0.625	0.875 – 14	54 ± 7	40 ± 5
– 12	0.750	1.062 – 12	75 ± 7	55 ± 5
– 14	0.875	1.188 – 12	88 ± 7	65 ± 5
– 16	1.000	1.312 – 12	108 ± 7	80 ± 5
– 20	1.250	1.625 – 12	136 ± 14	100 ± 10
– 24	1.500	1.875 – 12	163 ± 14	120 ± 10
– 32	2.000	2.500 – 12	312 ± 27	230 ± 20

Precautions For High Temperature Fluids

Immediately after machine operation, engine coolant, engine oil, and hydraulic oil are hot and pressurized. If the cap is removed or the system is opened in any way, there is danger of serious burns.

Allow heat and pressure to dissipate before performing such tasks and follow proper procedures as outlined in the service manual.

To prevent hot coolant from spraying:

1. Stop the engine, and wait for the coolant temperature to decrease.
2. Depress the pressure relief button on the radiator cap.
3. Turn the radiator cap slowly to allow pressure to dissipate.

To prevent hot engine oil spray:

1. Stop the engine.
2. Wait for the oil temperature to cool down.
3. Turn the cap slowly to allow pressure to dissipate.

Asbestos Dust Hazard Prevention

Asbestos dust is hazardous to your health when inhaled. If you handle materials containing asbestos fibers, follow the guidelines below:

- Never use compressed air for cleaning.
- Use water for cleaning and to control dust.
- Operate the machine or perform tasks with the wind to your back, whenever possible.
- Use an approved respirator, when necessary.

Fire Prevention

NOTE: *DO NOT operate the machine near open flames. Always ensure a fire extinguisher is present and in proper working condition.*

Remove any debris from the engine compartment. Check and repair any fuel, lubrication, and hydraulic systems leaks. Clean any excess oil, fuel or other flammable fluids, and dispose of properly.

Keep oil and fuel in a designated location and accessible by authorized personnel only. Fuel, oil, and antifreeze can be ignited by a flame. These fluids are extremely flammable and hazardous.

When handling fuel and oil obey the following guidelines:

- Keep flames away from flammable fluids.
- Stop the engine while refueling.
- Never smoke while refueling.
- Tighten all fuel and oil tank caps securely.
- Refuel and maintain oil in well ventilated areas.

Preventing Injury From Work Equipment

Never position any part of your body between movable parts such as the dump body, chassis or cylinders. If the work equipment is operated, clearances will change and may cause serious bodily injury or death.

OPERATING THE MACHINE A.6-0000076289

General Information

While operating the truck obey the following guidelines:

- Wear seat belts at all times. Only authorized persons are allowed to ride in the truck.
- Passengers must be in the cab and belted in the passenger seat.
- DO NOT allow anyone to ride on the decks or on the steps of the truck.
- DO NOT allow anyone to get on or off the truck while it is in motion.
- DO NOT move the truck in or out of a building without a signal person present.
- Keep serviceable fire fighting equipment on hand. Report used extinguishers for replacement or refilling.
- Always move the directional control lever to PARK (this will apply the parking brake) when the truck is parked and unattended. DO NOT leave the truck unattended while the engine is running.

NOTE: *DO NOT use wheel brake lock when parking the truck.*

- Park the truck a safe distance away from other vehicles as determined by the supervisor.
- Stay alert at all times! In the event of an emergency, be prepared to react quickly and avoid accidents. If an emergency arises, know where to get prompt assistance.
- Know and obey hand signal communications between the operator and spotter. Use a signal person when other machines and personnel are present, the operator must move in and out of buildings, and traveling through traffic.
- Immediately report any adverse conditions on haul road, pit or dump area that may cause an operating hazard.

⚠ DANGER

- **A tire and rim assembly may explode if subjected to excessive heat. Personnel must move to a remote or protected location if there is a fire near the tire and wheel area or if the smell of burning rubber or excessively hot brakes is evident.**
- **If the truck must be approached, such as to fight a fire, those personnel must do so only while facing the tread area of the tire (front or back), unless protected by use of large heavy equipment as a shield. Stay at least 15 m (50 ft) from the tread of the tire.**
- **In the event of fire in the tire and wheel area (including brake fires), stay away from the truck for at least 8 hours or until the tire and wheel are cool.**

- Check for flat tires periodically during a shift. If the truck has been operating on a “flat”, the truck must not be parked indoors until the tire cools. DO NOT stand in front of the rim and locking ring when inflating a tire mounted on the machine. Observers must not be permitted in the area and must be kept away from the side of such tires.

Starting The Engine

- DO NOT attempt to start the machine by shorting across the starter terminals. This may cause fire, or serious injury or death to anyone in machine’s path.
- DO NOT start the engine if a warning tag has been attached to the controls.

When starting the engine, sound the horn as an alert. Start and operate the machine only while seated in the operator’s seat. DO NOT allow any unauthorized persons in the operator's compartment or any other place on the machine.

Starting Engine in Cold Weather

When starting the engine in cold ambient conditions, or when the engine is cold, the engine rpm will not increase above low idle speed until the engine controller determines it is safe to do so. This time delay will vary from 30 seconds to 11 minutes which allows the coolant and engine oil to warm up. Before operating the vehicle the warm up process must finish.

Use extreme care when washing the electrical control cabinet. DO NOT allow water to enter the control cabinet around the doors or vents. DO NOT allow any water to enter the cooling air inlet duct above the electrical control cabinet. If water enters the control cabinet (through any opening or crevice) major damage to the electrical components may occur.

Adding Fuel Or Oil To The Machine

When adding fuel or oil to the machine, obey the following guidelines:

- Spilled fuel and oil may cause slipping. Always clean up spills, immediately.
- Always tighten the cap of the fuel and oil fillers securely.
- Never use fuel for washing any parts.
- Always stop the engine before adding fuel or oil.
- Always add fuel and oil in a well-ventilated area.

Radiator Coolant Level

If it is necessary to add coolant to the radiator, stop the engine. Allow the engine and radiator to cool down before adding the coolant. Lift the pressure relief lever on the radiator cap and slowly loosen the cap to relieve pressure during removal.

Use Of Lighting

When checking fuel, oil, coolant, or battery electrolyte, always use lighting with anti-explosion specifications. If lighting without this protection is used, there is a danger of explosion.

Handling High Pressure Hoses

DO NOT bend high-pressure hoses or hit them with hard objects. DO NOT use any bent or cracked piping, tubes or hoses. They may burst during use. Always repair any loose or broken hoses. Fuel and/or oil leaks may result in a fire.

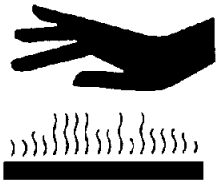
Precautions With High Pressure Oil

When working with high pressure oil, obey the following guidelines:

- Always remember that work equipment circuits are always under pressure.
- DO NOT add oil, drain oil, or perform maintenance or inspections before completely releasing the internal pressure.
- Small, high pressure pin-hole leaks are extremely dangerous. The jet stream of high-pressure oil can pierce the skin and eyes. Always wear safety glasses and thick gloves. Use a piece of cardboard or a sheet of wood to check for oil leakage.
- If you are hit by a jet of high-pressure oil, consult a doctor immediately for medical attention.

Maintenance Near High Temperatures And High Pressures

Immediately after stopping the truck, the engine coolant and operating oils are at high temperature and under high pressure.



In these conditions, opening the system or replacing filters may result in burns or other injury. Wait for the temperature to cool and pressure to subside before performing the inspection and/or maintenance as outlined in the service manual.

Rotating Fan And Belts

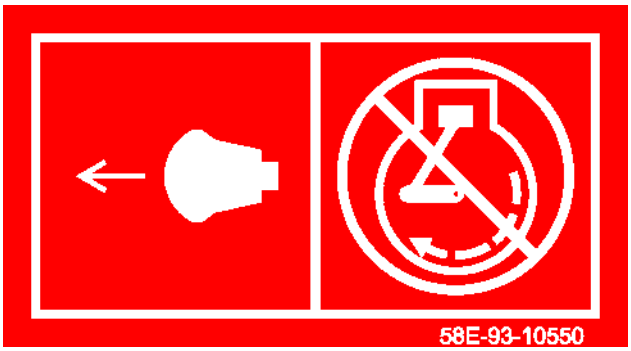
Keep a safe distance from rotating parts such as the radiator fan and fan belts. Serious bodily injury may result from direct or indirect contact with rotating parts and flying objects.

WARNING AND CAUTIONS

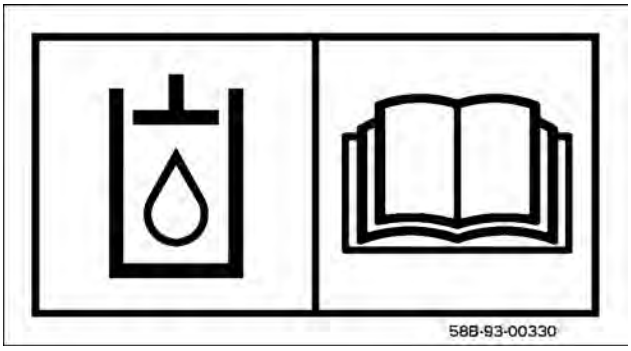
This decal is on the LH front post in the operator cab. Place the directional control lever in Park before exiting the cab. Failure to do so could cause the machine to roll forward or reverse. Read the Operation & Maintenance Manual before operating this machine.

This decal is located below the emergency engine stop switch in the cab. To activate the emergency engine stop pull the switch towards you.

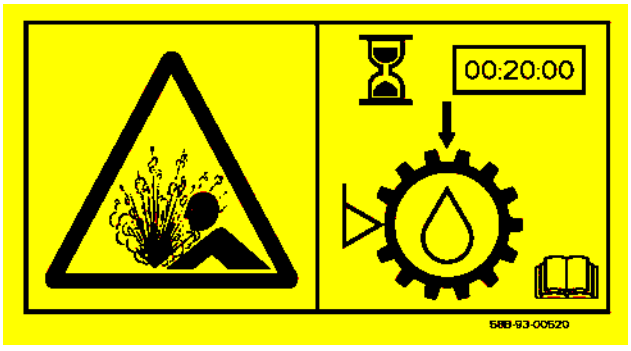
NOTE: *Only use emergency engine stop in emergency to prevent possible damage to engine.*



A decal is attached above the hydraulic oil fill port on the hydraulic tank. Check hydraulic oil level with body down, engine stopped, and key switch OFF. Add oil per filling instructions, if oil level is below the top of sight glass. (Refer to HYDRAULIC SYSTEM SERVICE, page 7-2).



A wheel motor oil level decal is attached to the gear cover on both electric wheel motors. This decal stresses the fact that the truck must be on a level surface and parked for 20 minutes prior to checking the oil level. This is necessary in order to get an accurate reading.



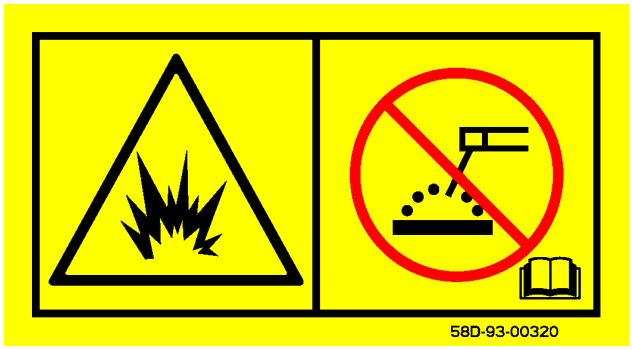
This decal is placed on the retarding grid box. The hazard is stepping on top of the retarding grid does not meet ISO standards for access nor handrail height. Access on top of the retarding grid box is restricted to authorized personnel only.

This decal is on the front of the battery box to alert servicing technicians that before doing any welding on the truck, always disconnect the battery charging alternator lead wire before making any welding repairs.

Turn the key switch to the OFF position and wait for the engine to stop. After the engine has stopped, wait two minutes, and if no warning message is displayed, then turn the battery disconnect switches to the OFF position. Then disconnect the battery charging alternator lead wire.

NOTE: *Always fasten the welding machine ground (-) lead to the piece being welded; grounding clamp must be attached as near as possible to the weld area.*

Never allow welding current to pass through ball bearings, roller bearings, suspensions, or hydraulic cylinders. Always avoid laying welding cables over or near the vehicle electrical harnesses. Welding voltage could be induced into the electrical harness and possibly cause damage to components.



1. While completing the walk around inspection look for any leaks, worn parts, and damage. Also visually check for wires cuts, short-circuits, or loose terminals. Contact maintenance to repair any issues found.
2. Start at left front of the truck. While performing the walk around inspection, visually inspect all lights and safety equipment for external damage from rocks or misuse. Ensure lenses are clean and unbroken. Make sure that the battery box covers are in place and secure.
3. Check KomVision (if equipped) cameras and harness for damage. Clean the lens surface.
4. Check all grease hoses for signs of damage and inspect each lubrication point for a bead of lubricant around the seal as you walk around the truck. Report to maintenance if any hoses need to be replaced (follow autolube checkout procedure in the Shop Manual if a hose needs to be replaced) or if a lubrication point is dry (trouble shoot and repair).
5. Visually check the intake air cleaner Vacuator® valve for any damage. If damage is found contact maintenance. Maintenance should refer to INTAKE AIR CLEANER SERVICE, page 7-6.
6. Move in front of the left front tire. Inspect the hub and brake assemblies for leaks and any abnormal conditions.
7. Visually inspect AC and fan belt for obvious signs of wear. Check the security and condition of the AC and fan guards. Visually check for engine leaks and abnormal noises and vibration. Inspect air intake tubes, turbos, and exhaust tube for leaks and integrity. Visually check for any loose hardware. Care must be taken due to the extremely high temperature of engine components.
8. Check that all suspension attaching hardware is secure and inspect the mounting key area for evidence of movement. Check that the suspension rod extension is correct, and that there are no leaks. Ensure the suspension protective boot is in good condition. Inspect the hub and brakes for any unusual conditions. Check the entire area for leaks.
9. Inspect the anchor end of the steering cylinder for proper greasing and all parts are secure.
10. Move outside of the front wheel. Inspect tires for proper inflation and wear. Check for embedded debris and remove if possible, otherwise call maintenance. Visually inspect for damaged, loose, or missing wheel mounting nuts and studs.
11. Move behind the front wheel and ensure the steering cylinder is properly greased and that the mounting hardware is tight. Ensure all suspension attaching hardware is secure and inspect the mounting key area for evidence of movement. Check that the suspension rod extension is correct, and that there are no leaks. Ensure the suspension protective boot is in good condition. Inspect the hub and brakes for any unusual conditions. Check the entire area for leaks.
12. Check for damaged or missing latches on traction alternator inspection covers. Check for any cracks or damage to the traction alternator blower.
13. Pull hydraulic tank ladder down.
14. Inspect the sight glasses on hydraulic tank. With the engine stopped and the body down, the hydraulic oil level must be visible in the center of the upper sight glass.
15. Put hydraulic tank ladder back up, ensuring that it is secured. Report any damage to maintenance for repair.
16. Move around the hydraulic tank and in front of the rear dual tires. Inspect hoist cylinder for any damage and leaks. Inspect both upper and lower hoist cylinder pins for integrity and for proper greasing.
17. Look under the lower edge of the chassis to ensure the flexible duct that carries the air from the blower to the final drive housing is in good condition with no holes or breakage. Also, look up at the main hydraulic pumps to see that there is no leakage or any other unusual condition with the pumps or the pump drive shafts.
18. Move around the left side dual tires. Use mirror, if needed, to visually look between the dual tires to ensure that all wheel nuts/studs are in place. Inspect the wheel for any oil that would indicate brake leakage or wheel motor leakage. Contact maintenance to tighten wheel nuts/studs or repair any other issues found.
19. Check the dual tires for cuts, damage or bubbles. Check for evidence of incorrect tire inflation. If the truck has been operating on a flat tire, the tire must be cool before moving the truck inside a building. Check for any rocks that might be lodged between the dual tires.

Machine Operation On The Haul Road

While traveling on the haul road, obey the following guidelines:

- Always stay alert. If unfamiliar with the haul road, drive with extreme caution. Cab doors must remain closed at all times if the truck is in motion or unattended.
- Obey all road signs. Keep the truck under control at all times. Govern truck speed by the road conditions, weather and visibility. Report poor haul road conditions immediately. Muddy or icy roads, pot holes or other obstructions can present hazards.
- Initial propulsion with a loaded truck must begin from a level surface whenever possible. At times, starting on a hill or grade cannot be avoided. Refer to Starting On A Grade With A Loaded Truck, page 5-17 in this chapter.
- Before traveling in reverse, give a backup signal of three blasts with the horn and wait until the area is clear. Before starting forward, signal with two blasts with the horn and wait until the area is clear. These signals must be given each time the truck is moved forward or backward.
- Use extreme caution when approaching a haul road intersection. Maintain a safe distance from oncoming vehicles.
- Maintain a safe distance when following another vehicle. Never approach another vehicle from the rear, in the same lane, closer than 15 m (50 ft). When driving on a down grade, this distance must not be less than 30 m (100 ft).
- If the warning light on the dash panel illuminates and a warning message is displayed on the dash panel during operation, steer the truck immediately to a safe area away from other traffic, if possible, and stop the truck.
- DO NOT stop or park on a haul road unless unavoidable. If the truck must be stopped on a haul road, park in a safe place, move the directional control lever to PARK, and shut the engine off before leaving the cab. Block the wheels securely and notify maintenance personnel for assistance.
- While driving on a slope, maintain a speed that will ensure safe driving and provide effective retarding under all conditions. Refer to Dynamic Retarding, page 6-5. Refer to the grade/speed retard chart in the operator's cab to determine maximum safe truck speeds for descending various grades with a loaded truck.
- When operating the truck in darkness, or when visibility is poor, DO NOT move the truck unless all headlights, clearance lights, and tail lights are on. DO NOT back the truck up if the back-up alarm or lights are inoperative. Always dim the headlights when approaching oncoming vehicles.
- Check the tires for proper inflation during each shift. If the truck has been operating on a flat or under-inflated tire, the truck must remain outside of any buildings until the tire cools.

Starting On A Grade With A Loaded Truck

Initial propulsion with a loaded truck should begin from a level surface whenever possible. If the truck must be started on a hill or grade, use the following procedure:

1. Apply the wheel brake lock.
2. Release the service brake pedal. Do not use the retarder to hold the truck on the grade.
3. With the brake lock applied, move the directional control lever to a drive position (FORWARD or REVERSE) and increase the engine RPM with the throttle pedal.
4. As the engine RPM approaches maximum RPM, and the operator senses the propulsion effort working against the wheel brake lock, release the brake lock and let truck movement start. As the truck speed increases above 5-8 kph (3-5 mph), the drive system controller (DSC) will drop the propulsion if the retarder is applied.

NOTE: *Releasing and reapplying dynamic retarding during a hill start will result in loss of propulsion.*

Retarding On A Grade

The grade/speed retard chart provides the recommended maximum retarding limits for descending grades with a fully loaded truck.

The operator must reference this chart before descending any grade with a loaded truck. Proper use of dynamic retarding will maintain a safe speed.

The speed chart is provided, for showing continuous retarding and the truck's maximum Gross Vehicle Weight (GVW). The rating is a guideline for proper usage of the retard function on downhill grades.

Cameras And Radars

1. RH Front Camera
2. LH Front Camera
3. LH Rear Camera
4. Radar 2
5. Radar 1
6. Radar 8
7. Radar 7

Figure 5-10 FRONT AND LEFT

Initial Setting Screen

If the initial setting screen is shown on the monitor display, the KomVision system's initial settings must be input before it can be operated. Contact your Komatsu representative for service.

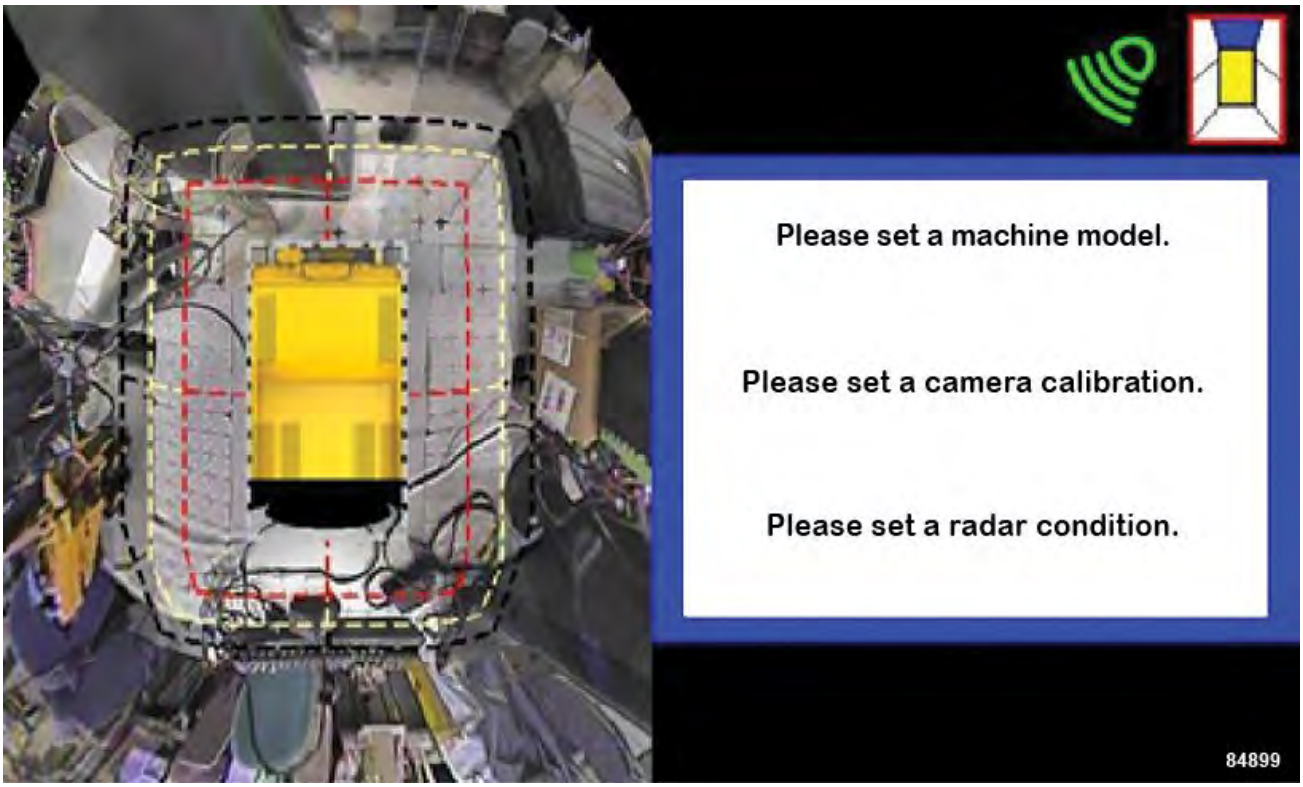


Figure 5-18 INITIAL SETTING SCREEN

Radar System

Object Detection Range

The radar system is activated only when the truck is stopped or the truck speed is less than 15 kph (9 mph).

The active range of object detection around the truck is 7.6 m (25 ft) to the front and rear, and 3.6 m (12 ft) to both sides. The radar system is used to detect large objects such as utility vehicles. Smaller objects, such as a person, may not be detected by the radar system.

TOWING A.15-0000076338

⚠ WARNING

- **Before towing a truck, many factors must be carefully considered. Serious personal injury and/or significant property damage may result if important safety practices, procedures and preparation for moving heavy equipment are not observed.**

⚠ CAUTION

- **The disabled truck must be emptied before towing.**
- **Do not use any other locations.**

A disabled machine may be towed after the following precautions have been taken.

- Use of towing points should be limited to a non-functioning, empty truck.
- Tow with a solid tow bar. Do not tow with a cable.
- Use a towing device with appropriate rated capacity.
- The towing vehicle must have adequate pulling and braking capacity to both move and stop the towed truck under all conditions, including towing on a grade.
- Never tow a machine on a side slope.
- Do not allow anyone to go between the towing machine and the disabled machine when connecting a machine to be towed.
- During the towing operation, never stand between the towing machine and the disabled machine.
- Set the coupling of the disabled machine in a straight line with the towing portion of the tow machine and secure it in position.
- Do not stand next to the towing device while the truck is moving.
- Always release the parking brake before towing. Refer to Operating Instructions - TOWING PROCEDURE, page 5-48 for the towing procedure.

The machine has towing hooks on the front bottom of the frame (Figure 5-26 FRONT TOWING HOOKS, page 5-47) and under the rear suspension at the rear of the truck (Figure 5-27 REAR TOWING HOOKS, page 5-48). Use only these hooks when towing,

Towing can be done under various conditions, so it is impossible to determine beforehand the requirements for towing. Towing on flat level roads will require the minimum rim pull, while towing on slopes or on uneven road surfaces will require the maximum rim pull.

NOTE: *Special tow bar (not provided) must be used in towing process.*

- The hooks on the front or the hooks on the rear must be hooked up at the same time.
- When a machine is in tow, it should be towed at a low speed of 8 km/h (5 mph) or less.
- Each single towing connection point is capable of 600,510 N (135,000 lbf) with tow angles not exceeding ±15° in the vertical direction or ±10° in the horizontal direction.

NOTE: *Any equipment used should be rated accordingly.*

Keep the angle of the tow bar as small as possible.

Figure 5-26 FRONT TOWING HOOKS

1. Towing Hooks

Measurement Accuracy

Payload measurements are typically repeatable within 1%. Accuracy for a particular scale test depends on specific combinations of pressure sensors and payload meters as well as the specifics of each scale test. Comparisons from different scale tests are often made without considering the differences introduced by the specific installation and operation of the scales for each test. In addition, each pressure sensor and PLM introduces it's own nonlinearity. Each truck becomes an individual combination of sensors and PLM. Errors from these sources can introduce up to a ±7% bias in the PLM calculations for a specific scale test, for an individual truck.

Because the PLM calculates a new empty tare for each payload, a detailed scale test must weigh the trucks empty and loaded for each haul cycle. Using a simple average of two or three empty truck weights as an empty tare for the entire scale test will introduce significant errors when comparing scale weights to PLM IV weights.

SOURCES FOR PAYLOAD ERROR A.4-0000073398

Payload Error

The number one source of errors in payload calculation is improperly serviced suspensions. The Payload Meter (PLM) calculates payload by measuring differences in the sprung weight of the truck when it is empty and when it is loaded. The sprung weight is the weight of the truck supported by the suspensions. The only method for determining sprung weight is by measuring the pressure of the nitrogen gas in the suspensions. If the suspensions are not properly maintained, the PLM cannot determine an accurate value for payload. The two critical factors are proper oil height and proper nitrogen charge.

Critical Suspension Factors:

- Proper oil height.
- Proper charge with nitrogen to the correct suspension extension. See service manual for correct extension.

If the suspensions are overcharged, the PLM will not be able to determine the empty sprung weight of the truck. The suspension cylinder must be able to travel up and down as the truck drives empty. The pressure in an overcharged suspension can push the suspension rod to full extension. In this case, the pressure inside the cylinder does not accurately represent the force necessary to support that portion of the truck.

If the suspensions are undercharged, the PLM will not be able to determine the loaded sprung weight of the truck. The suspension cylinder must be able to travel up and down as the truck drives loaded. If the pressure in an undercharged suspension cannot support the load, the suspension will collapse and make metal-to-metal contact. In this case, the pressure inside the cylinder does not accurately represent the force necessary to support that portion of the truck.

Low oil height can also introduce errors by not correctly supporting a loaded truck. This is why the correct oil height and nitrogen charge are the most critical factors in the measurement of payload. If the suspensions are not properly maintained, accurate payload measurement is not possible. In addition, suspension maintenance is very important to the life of the truck.

Loading Conditions

Brake Lock engagement without using the Park Brake is critical during the loading process.

NOTE: *Only by engaging the Brake Lock with the truck in Neutral, No Park Brake, will the Payload Meter properly calculate swingloads.*

In addition, this condition reduces stress on the suspensions, drive system, brakes, and frame. A large number of "Continuous Loading" flags in payload data can be an indication of poor loading site practices. Addressing these "Continuous Loading" flags will create an opportunity for site improvement leading to better production.

The final load is calculated as the truck travels away from the shovel. Variations in road conditions and slope are compensated for in the complex calculations performed by the PLM.

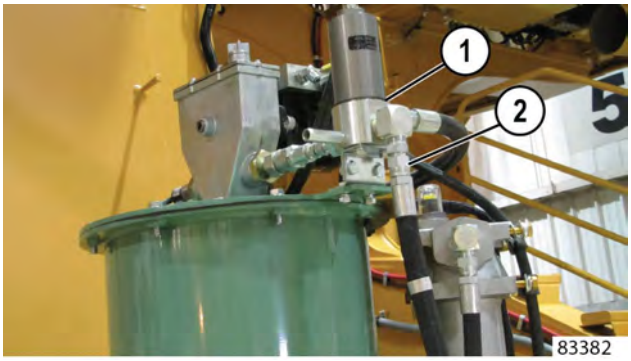
Pressure Sensors

Small variations in sensors can also contribute to payload calculation errors. Every pressure sensor is slightly different. The accuracy differences of individual sensors along the range from 0 to 4000 psi can add or subtract from payload measurements. This is also true of the sensor input circuitry within individual payload meters. These differences can stack up 7% in extreme cases. These errors will be consistent and repeatable for specific combinations of payload meters and sensors on a particular truck.

- -32° to 32°C (-25° to 90°F) - Use NLGI No. 1 multipurpose grease (MPG).
- Below -32°C (-25°F) - Refer to local supplier for extreme cold weather lubricant requirements.

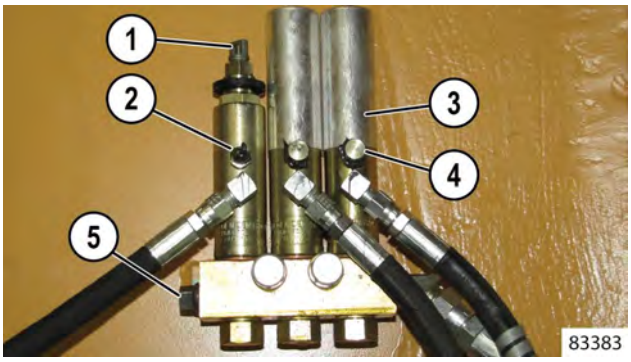
Priming The Automatic Lubrication System

The system must be full of grease and free of air pockets to function properly. After maintenance, if primary or secondary lubrication lines were replaced, it will be necessary to prime the system to eject all entrapped air.



1. Vent Valve
2. Main Supply Line

Figure 5-46 AUTO LUBE MAIN SUPPLY LINE



1. Injector Indicator
2. Injector Grease Zerk
3. Injector Cover
4. Injector Grease Zerk Cap
5. Injector Manifold Plug

Figure 5-47 INJECTOR MANIFOLD

To prime the main supply lines, perform the following:

1. Fill lube reservoir with lubricant, if necessary.
2. Remove injector manifold plug (5, Figure 5-47 INJECTOR MANIFOLD, page 5-67) from injector manifold. Always start with the injector manifold closest to the pump. The last grease line to be purged should be the main grease line to the rear axle (longest grease line).
3. Disconnect main supply line (2, Figure 5-46 AUTO LUBE MAIN SUPPLY LINE, page 5-67) from vent valve (1). Connect an external grease supply to main supply line (2).
4. Pump grease in main supply line (2) until grease appears at the injector manifold plug.
5. Re-install the injector manifold plug. Repeat for remaining injector groups.

After all main supply lines are purged of air, the injector circuits must now be primed.

To prime the secondary supply lines, perform the following:

1. If necessary, disconnect an injector grease line from the component that particular injector supplies grease to.
2. Remove injector grease zerk cap (4, Figure 5-47 INJECTOR MANIFOLD, page 5-67) from each injector and connect an external grease supply to injector grease zerk (2) on the injector.
3. Pump grease into the injector until grease appears at the far end of the individual grease line or the joint being greased.
4. Reconnect injector grease line to the component, remove the external grease supply, and reinstall injector grease zerk cap.
5. Repeat steps 1 through 4 until all secondary supply lines have been primed.
6. After all grease lines are primed, use the override switch to cycle the automatic lubrication pump a few times to lube the components, allowing enough time between for injectors to reset.

PREVENTIVE MAINTENANCE PROCEDURES E.6-0000051465

Use the following maintenance procedures to ensure proper system operation.

Daily Lubrication System Inspection

1. Check the grease reservoir level after each shift of operation. Grease usage should be consistent from day-to-day operations. Lack of lubricant usage would indicate an inoperative system. Excessive usage would indicate a broken supply line.
2. Check filter bypass indicator when filling reservoir. Replace element if bypassing.

Select FORWARD drive by moving the control lever to the F position.

Select REVERSE drive by moving the control lever to the R position. DO NOT allow the control lever to travel too far and go into the PARK position when REVERSE is desired.

NOTE: *If applying the park brake while the truck is traveling faster than 0.5 MPH a red warning lamp in the dash will be triggered with an A230 code "Park Brake Request While Moving".*

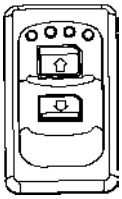
Override / Fault Reset Switch

The override/fault reset switch (5) is spring-loaded to the OFF position. When pushed in and held, this switch may be used for several functions. The functions are as follows:

1. This switch permits the operator to override the body-up propel limit switch and move the truck forward when the directional control lever is in FORWARD, the dump body is raised, and the brakes are released. Use of the override switch for this purpose is intended for emergency situations only!
2. The push button deactivates the retard pedal function when truck speed is below 5 kph (3 mph)
3. The override switch is also used to reset a GE system fault when the truck is stopped. This may allow the truck to be moved to a more suitable area for maintenance. The feature is enabled and active only for specific faults in which limited propulsion is available. Further limitations based on drive system parameters may exist.
4. The override switch may allow the truck to be moved to the shop or tie down area/berm in the event of a fault.

Window Control Switches

The window control switch (2, 3) controls the operation of the window. The switch is spring-loaded to the OFF position.



- Pushing the front of the switch raises the cab window.
- Pushing the rear of the switch lowers the window.

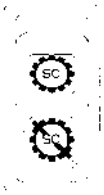
Traction Control Switch

Traction control switch (1) is a rocker switch. When in the OFF position, the traction control feature is turned off.

This can be used in dry operating conditions when the chance of slipping or sliding is minimal so that the drive system will always put maximum power to the ground.

Speed Control Switch

Speed control switch (8) is a rocker switch. When in the ON position, the speed control lever on the steering column can be used as a “cruise control” function.

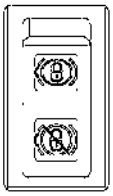


Wheel Brake Lock Control Switch

⚠ WARNING

- **DO NOT use the wheel brake lock control switch to stop the truck unless the foot-operated treadle valve is inoperative. Use of this switch applies rear service brakes at a reduced, unmodulated pressure. DO NOT use the brake lock for parking. With the engine stopped, hydraulic pressure will bleed down, allowing the brakes to release.**

Wheel brake lock switch (7) should be used with engine running for dumping and loading operations only. The brake lock switch actuates the hydraulic brake system which locks the rear wheel service brakes only.



When pulling into shovel or dump area, stop the truck using the foot-operated service brake pedal. When truck is completely stopped and in loading position, move the directional control lever to NEUTRAL, then apply the brake lock by pressing the top of the rocker switch. To release the brake, press the bottom of the rocker switch.

NOTE: *The wheel brake lock will not function if the directional control lever is in the PARK position.*

Use at shovel and dump only to hold the truck in position.

can fully be depressed with minimal effort. Minimal recline angle should be used to keep distance from back of head to headrest as low as possible and to ensure proper seat belt operation. Ensure backrest does not contact cab after adjustment.

- **Headrest -** Move headrest (2) up or down to the desired position, adjustment amount is 100mm (4.3 in). It can also be tilted forward by pulling on the top of the headrest. There are four positions for a total adjustment of 30 degrees. Pulling the headrest completely forward will release the ratchet mechanism and return the headrest to the furthest back position.
- **Lumbar Support -** Increase or decrease lumbar support by manually turning the knob (3).
- **Armrest Tilt -** Rotate armrest tilt (5) until the armrest is in desired position.
- **Seat Belt -** The cab is equipped with a 3 inch lap seat belt (12) that has a 2 inch high visibility orange shoulder belt. The operator must have seat belt buckled in place and properly adjusted whenever vehicle is in motion.
- **Seat Tether -** Tether belts (6) should be adjusted with the seat in the highest position and all the way forward. With the seat in this position, adjust the tether belts so they have some slack. This allows for a slight extension when the seat deflects and rebounds.
- **Shoulder Height Adjustment Knob -** Push knob (1) to move height adjuster up or down creating a comfortable space between neck or shoulders.

  The height adjustments should be made as follows:

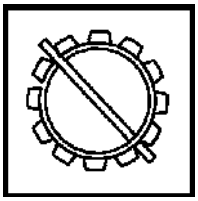
  ◦ Adjustment amount: 100mm (3.9 in)

  ◦ Number of stages for adjustment: 6

  ◦ Adjustment per stage: 20mm (0.8 in)

  Release lever and gently tug belt to ensure adjuster is locked in place.
- **Seat Cushion Tilt -** Lift seat slope lever (9) and hold to adjust the slope of the seat. Release the lever to lock the adjustment; range is +/-4 degrees.
- **Fore/Aft Location of Lower Seat Cushion -** Lift and hold lever (11) and move the lower seat cushion to a comfortable position; total adjustment = 60mm (2.4 in) in 10mm increments. Release the lever to lock the position adjustment.

No Propel



The no propel indicator will illuminate when a fault has occurred which has eliminated the propulsion capability. If this condition occurs, the operator must safely stop the truck, move directional control lever to PARK, shut down the engine, and notify maintenance personnel immediately.

Assisted Brake Management (ABM)

At startup, the ABM Inhibit indicator flashes indicating the truck is enabled. In the ready mode the indicator flashes signifying a fault has been logged.

If the red triangle indicator is flashing and accompanied with an audible warning, no operator has been detected then the brake will be released.

If the ABM Inhibit indicator is solid on, the ABM feature is inhibited. If the indicator is OFF, this feature is not enabled or feature is fully active.

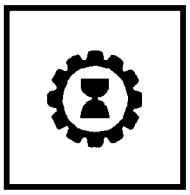
Wheel Brake lock is illuminated when ABM is applying Brake lock.

Engine Shutdown Delay

When the key switch has been turned OFF, and certain conditions have been met, this indicator light will illuminate to indicate that the shutdown timing sequence has started. The engine could operate for up to three minutes.

- If the directional control lever is moved out of PARK, the engine will stop immediately.
- If the key switch is turned back ON, the engine stop sequence will be terminated, and the engine will remain running.

Propel System Not Ready



Propulsion system not ready indicator will illuminate during start-up to indicate the Drive System CPU is in the process of performing the self-diagnostics and set-up functions at start-up. Propulsion will not be available at this time.

Dynamic Retarding

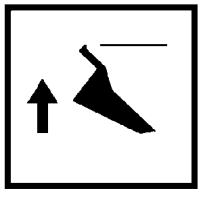
The dynamic retarding indicator will illuminate whenever the Drive System is in the Retard mode, this can be due to Retard Pedal, automatic over speed control, or if the speed control lever on the steering column has been set to control speed.

Parking Brake

The parking brake indicator will illuminate when the parking brake is applied. The parking brake is applied by placing the directional control lever in the PARK position.

If the directional control lever is in the PARK position and the interface module (IM) detects any parking brake abnormalities, this light will not illuminate. The red warning light on the dash will flash, the warning buzzer will sound intermittently and an error code will be displayed. If the red warning light and buzzer are active, the operator must not leave the cab. Notify maintenance personnel immediately.

Body Up



The body up indicator will illuminate when the body is not completely down on the frame. The truck must not be driven, other than to fully discharge the load until body is down and the light is off.

VEHICLE ELECTRICAL CENTER

90 **A.2-0000075886**

Vehicle Electrical Center 90 is located inside the auxiliary control cabinet.

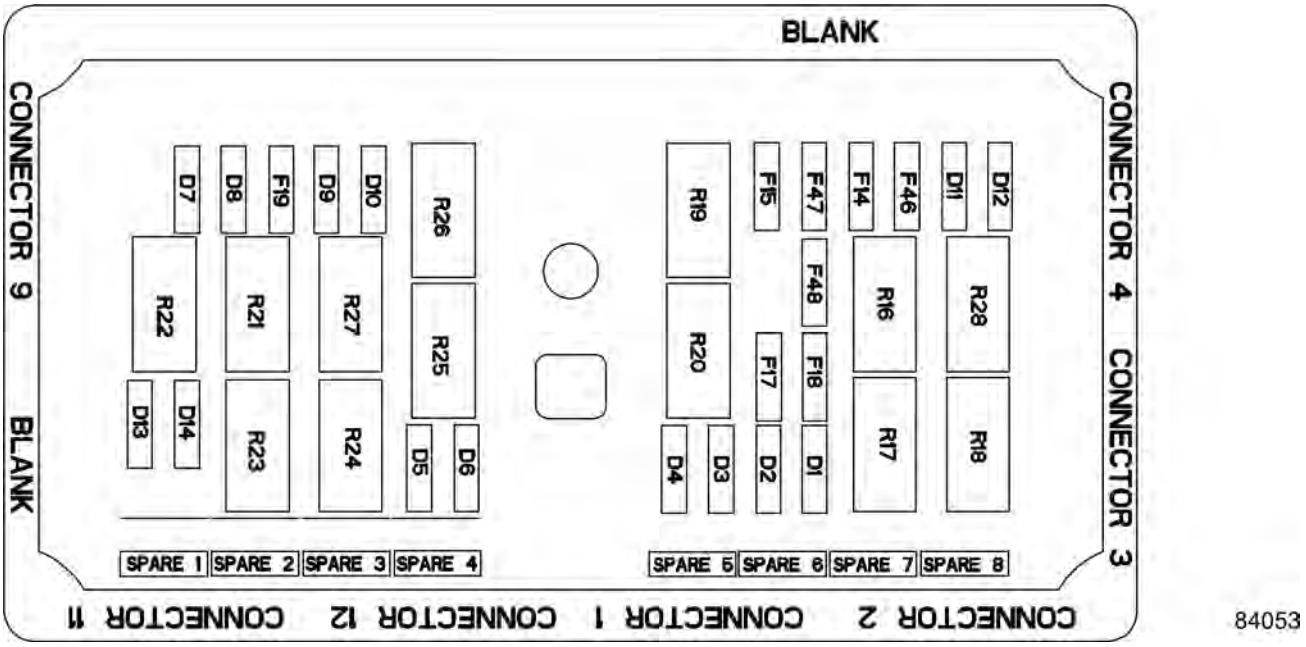
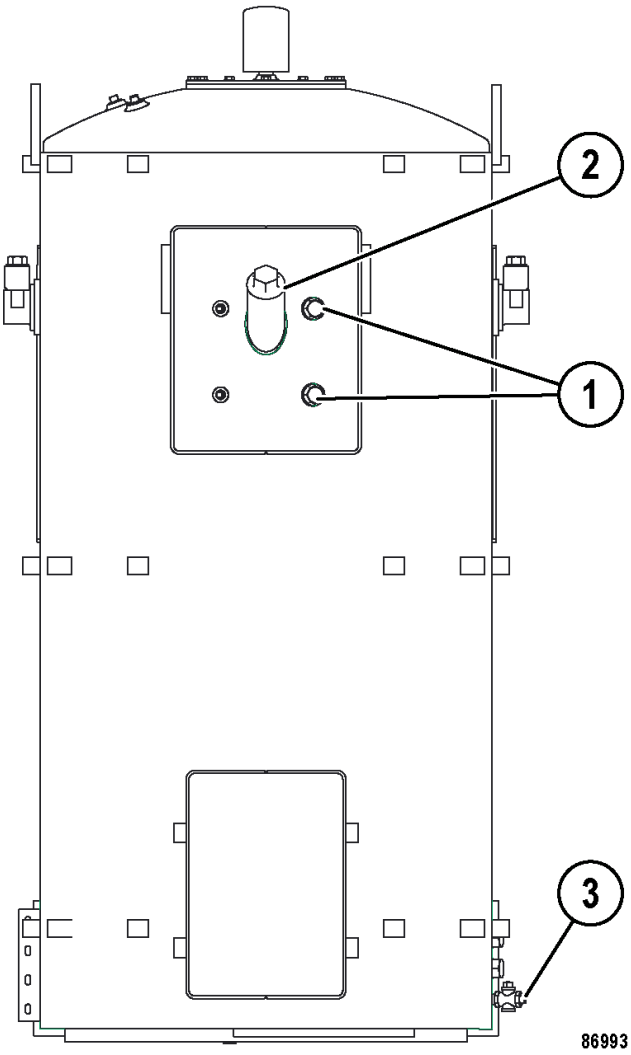


Figure 6-16 VEHICLE ELECTRICAL CENTER 90

VEHICLE ELECTRICAL CENTER 90		
LOCATION	**AMPS**	**DEVICE(S) PROTECTED**
F14	5	Payload Lamps
F15	5	Park Brake Status
F17	5	Payload Meter
F18	15	Ground Level Shutdown Switch
F19	10	Park Brake Control
F46	5	Payload Meter Key Switch Power
F47	5	KOMTRAX Plus 2 Key Switch Power
F48	5	Modular Mining Conn Key Switch Power
SP1	5	Spare
SP2	5	Spare
SP3	10	Spare
SP4	10	Spare
SP5	10	Spare
SP6	15	Spare
SP7	15	Spare
SP8	15	Spare
D1	3	Key Switch Run Diode
D2	3	Shift Selector Forward Diode



1. Sight Gauges
2. Fill Cap
3. Drain Cocks

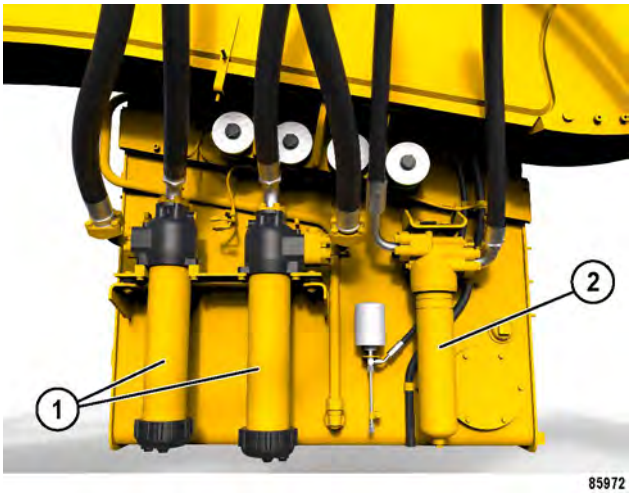
Figure 7-1 HYDRAULIC TANK SERVICE

1. Hydraulic Tank Breathers

Figure 7-2 HYDRAULIC TANK BREATHERS

Hydraulic tank breathers (1, Figure 7-2 HYDRAULIC TANK BREATHERS, page 7-3) need to be replaced every 500 hours.

Hydraulic Filters

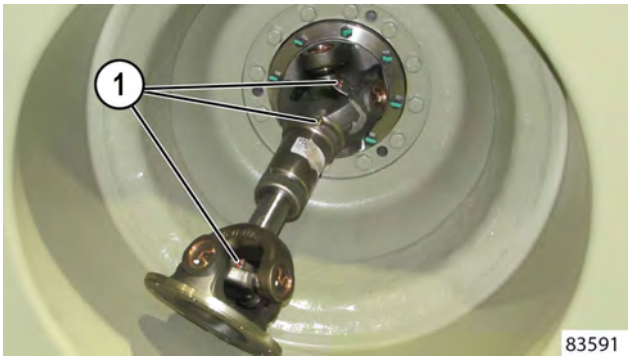


1. Hoist
2. Steering

Figure 7-3 HYDRAULIC FILTERS

Replace filter elements after the initial 50, 100, 250, and 500 hours of operation; then at each 1000 hours of operation thereafter. Torque for the hoist filters and the steering filter is **99 N·m (73 ft lb)**. Check oil level. Add oil as necessary. (Lube Key B).

Hydraulic Pump Drive Shaft



1. Drive Shaft Grease Fittings

Figure 7-4 DRIVE SHAFT LUBRICATION POINTS

Add one or two applications of grease to each drive shaft grease fitting (1, Figure 7-4 DRIVE SHAFT LUBRICATION POINTS, page 7-3). Check that each bearing of the U-joint assembly is receiving grease. Replace bearings if any wear is detected.

INITIAL 100 HOUR LUBRICATION AND MAINTENANCE A.7-0000075344

NOTE: *These checks are required only after the initial 100 hours of operation (such as: the commissioning of a new truck, or after a new or rebuilt component installation).*

INITIAL 100 HOUR LUBRICATION AND MAINTENANCE INSPECTION	
Item	**Task**
HYDRAULIC SYSTEM FILTERS	Replace filter elements only after the initial 50, 100, 250, and 500 hours of operation; then at each 1000 hours of operation thereafter.

EVERY 18000 HOUR MAINTENANCE A.23-0000071968

NOTE: *Maintenance requirements for every 50, 250, 500, 1000, 2000, 2500, 3000, 4000, 5000, and 10000 hour Lubrication and Maintenance Checks must also be performed at this time. "Lube Key" references are to the lubrication chart.*

EVERY 18000 HOUR MAINTENANCE	
Item	**Task**
SEAT BELTS AND TETHERS	Even if there are no signs of damage, replace both driver and passenger seat belts five years after seat belt manufacture, or every three years after start of use, whichever comes first.