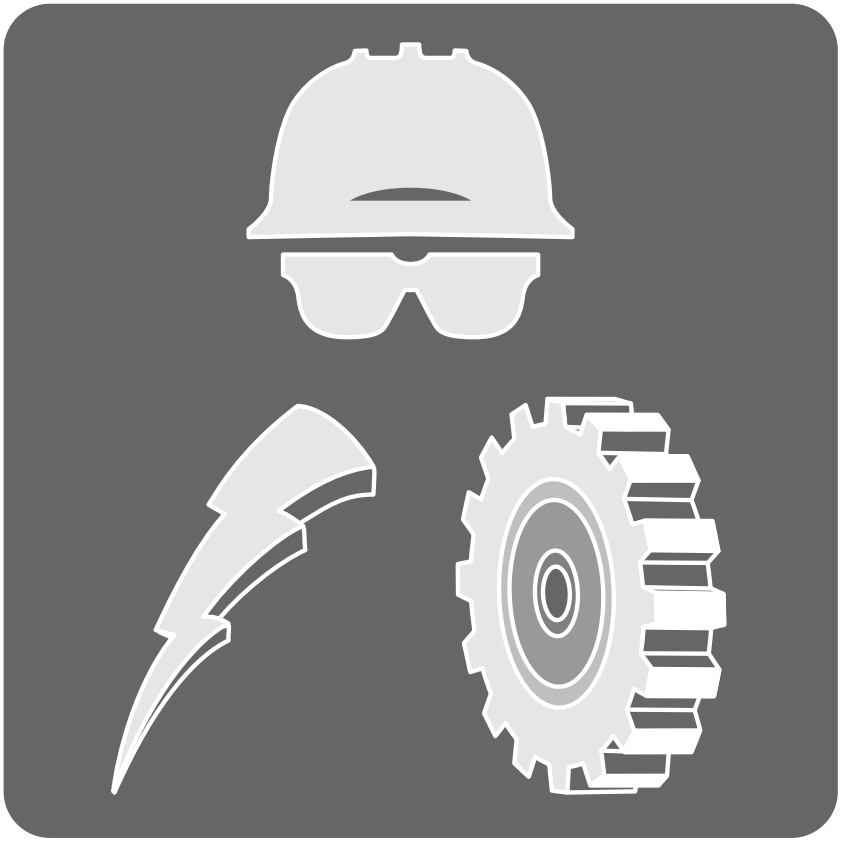
KOMATSU

P&H

Safety Instructions For Surface Wheel Loaders — Gen3

Section 01–02



Manual Number

Preface

This Manual is provided as a guide to personnel involved with the operation, maintenance and repair of Komatsu Mining Corp. equipment. We recommend that such personnel review and become familiar with the general procedures and information contained within this manual. In addition, we recommend that this manual be kept readily available for reference when repairs or maintenance are necessary.

Read and become familiar with this Manual and any other general safety practices before attempting any procedures.

Due to the complexities of mining equipment and the environment in which it operates, situations may arise which are not directly discussed in detail in this Manual. When such a situation arises, past experience, availability of equipment and common sense play a large part in what steps are to be taken. In addition, a Komatsu Mining Corp. service center representative is available to answer your questions and assist you upon request.

Komatsu Mining Corp. reserves the right to continually improve its products and associated documentation. Therefore, physical alterations to Komatsu equipment may not be identified in this Manual. Revisions may be frequently made to this Manual in an effort to ensure that information contained within is current as alterations occur to the equipment. If you find an error or have other feedback regarding this Manual, please contact Product Training and Publications at *Pro.Train.Pub@joyglobal.com*.

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Scope of Publication, Section 01–02

This publication contains general and specific safety precautions. The operator and maintenance personnel should read these safety precautions carefully and understand them before operating, or performing maintenance operations to the machine

NOTICE

Komatsu cannot anticipate every possible circumstance that might involve a potential hazard. The Warnings and Cautions in this publication and on the product are therefore not all inclusive. These rules will not apply to all situations. If a tool, procedure, work method, or operating technique not specifically recommended by Komatsu is used, the owner must be satisfied that it is safe for all personnel. Also, ensure that the product will not be damaged or made unsafe by the operation, lubrication, maintenance, or repair procedures chosen. Operating the machine on different job sites and under various environments can create safety hazards unique to that particular situation. If a dangerous situation develops under these circumstances, only the alertness of the operator and their proficiency in operating the machine are available to cope with the situation. Only properly trained personnel are allowed to operate this machine.

Local legislation rules, laws, and regulations shall be obeyed for accident prevention and environmental protection during operation, service, maintenance, parking, or storage of the machine.

Any unusual or unexpected sounds heard during the operation of the machine, should be investigated before continuing operation. Any damage or defect determined to affect the operation of the machine shall be repaired before continuing operation.

Values used in this document are subject to change without notice. Always check the latest version of schematics, troubleshooting charts, service information letters, service alerts, specifications, and all other appropriate documentation before performing any type of work on the equipment. Online documentation of values can be accessed through the local service center.

Generation 3 Machines

Generation 3 machines have a Kinetic Energy Storage System (KESS). The KESS is composed of one or more ESD's (Energy Storage Devices), converter panels, and fuses. Typically, an ESD looks like a large motor, mounted on the rear frame. That is the most visual way to identify a Gen 3 machine. Some information within this manual may reference only Generation 3 machines. Before servicing a machine, first determine whether it is a Gen 3 machine.

Figure 1: Typical Generation 3 Machine

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Safety

This publication contains special instructions that pertain to safety, operation, maintenance, and repair of the machine. Listed below are the signal words and symbols that precede these instructions and their meanings:

DANGER

The danger label indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

The warning label indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

The caution label, used with the safety alert symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury (includes the safety alert symbol

).

CAUTION

The caution label (without safety alert symbol) is used to address practices not related to personal injury – only equipment damage.

NOTICE

The NOTICE graphic is to indicate areas of importance to the reader that are not related to personal injury or machine damage.

Safety, Warnings, and Cautions

It is important that all personnel read and understand all SAFETY, WARNINGS, and CAUTIONS before operating, or working on or near the machine. The following CAUTIONS and WARNINGS are a summary of those found throughout this document.

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⚠ WARNING

CRUSH HAZARD

- **Crush hazards exists if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.**
- **Crush hazards exist if the operator seat belt or harness is improperly adjusted or improperly maintained. Improper adjustment or maintenance of the seat belt or harness could result in loss of machine control during operation, resulting in a crush hazard. Adjust the seat and seat belt or harness for proper access to all controls and fasten seat belt or harness before operating the machine. Always check the condition of the operator seat belts and mounting hardware before operating the machine. Failure to do so could result in serious injury. Loss of machine control could cause a crush hazard resulting in serious injury or death to personnel in the operating area.**
- **Crush hazards exist if the machine is operated outside the safe operating parameters of the tires and loss of machine control occurs. Speed, distance, and weight load (as well as other factors), can affect tire reliability, safety and possibly warranty. Refer to tire manufacturer tramming guidelines before operating the machine outside of truck loading cycles. Failure to consult with the tire manufacturer to determine safe tramming guidelines can cause crush hazards from loss of machine control, resulting in serious injury or death.**
- **Crush hazards exist under rear of machine. Counter weight mounted under the rear frame. Do not enter this area unless the counterweights have been externally supported to prevent falling. Do not loosen the bolts for the counterweight structure unless the counter weights are externally supported. Entering the area under the counterweights or loosening the counterweight bolts without externally supporting the counterweights could cause a crush hazard resulting in serious injury or death.**
- **Crush hazards exist when operating the loader. Komatsu equipment is designed as off-highway equipment for use in open pit applications that are in remote locations. Due to their very large size they must work in an area with few machines, and their only proximity to buildings would be for routine maintenance or repair. They are not to be operated near office buildings or residential areas. Operating the loader near office buildings or residential areas can cause crush hazards resulting in serious injury or death.**

CRUSH, SHOCK, OR OTHER HAZARDS

- **Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, mechanical, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, rotating components, electrical power, air pressure, etc.). Risk of crushing, electrical shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.**

STRUCK-BY OR STRUCK AGAINST HAZARDS

- **Explosion hazard exists when working on the fire suppression system. Only personnel trained by the system's manufacturer should service the system. Certain components of the system contain a compressed charge that can cause serious personal injury if not handled properly. Failure to use trained personnel when working on the fire suppression system can cause explosion hazard resulting in serious injury or death.**
- **Struck-by hazards exist when around hydraulic fluid, air, fuel, or grease that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a struck-by hazard with deadly force. DO NOT tighten or loosen hydraulic, air, fuel, or grease lines without first relieving the pressure. DO NOT make adjustments to any fluid pressures while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety**

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goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly pressurized liquids or air. Failure to use proper PPE or to shut down the machine before making adjustments can cause a struck-by hazard resulting in serious injury or death.

- Struck-by hazards exist when around hydraulic fluid, fuel, air, or grease that is under pressure. Do not work around pressurized hoses. Hoses can rupture or come loose from connections and strike with deadly force. DO NOT tighten or loosen hydraulic, fuel, or grease lines without first relieving the pressure. DO NOT make adjustments to any fluid pressures while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly pressurized liquids or air. Failure to use proper PPE or to shut down the machine before making adjustments or working around pressurized hoses can cause a struck-by hazard resulting in serious injury or death.

FALL HAZARD

- Fall hazard exists when working at elevated locations. Take appropriate ‘fall arrest” safety precautions as required by local rules, regulations, and procedures when working at heights on the machine, as example, on the rear and front frames. Follow all required statutory regulations for working at height. Failure to follow all locally required “fall arrest” procedures can cause a fall hazard, resulting in serious injury or death.
- Fall hazard exists when working at elevated heights without wearing a fall restraint device. Always wear a fall restraint device, as provided by local rules and regulations, when working at elevated heights. Follow all local rules, regulations, and laws regarding working at elevated heights, while working on the machine. Failure to follow all local rules and regulations for working at elevated heights can cause a fall that might result in serious injury or death.

FALL AND CRUSH HAZARDS

- Fall hazard or crush hazard exists if the bucket or lift arms are used to lift personnel. Never allow personnel to be lifted in the bucket or by use of the lift arms. Lifting personnel with the bucket or lift arms can cause falls and crush hazards that might result in serious injury or death.

ELECTRICAL SHOCK HAZARD

- Risk of fatal electrical shock or injury by contact in the electrical cabinet is possible if the engine is running, the LINCS software indicates voltage on the bus, or the red bus LED’s in the electrical cabinet are illuminated. All Generation 2 SR equipment has the ability to produce voltage at low throttle. Even with the engine off, there may be a residual of 12-15VDC on the bus. Do not enter the electrical cabinet or touch any components in the electrical cabinet without performing the Bus Discharge Verification Procedure. Failure to do so may result in fatal electrical shock or other injury.
-

  Risk of shock or equipment damage by use of an improperly rated meter is possible. Use a CAT III 1000V rated volt meter to take voltage readings. Shock or other injury may result from using improperly rated test equipment.
- Electrical shock hazard exists inside the electrical converter cabinet when the red LED lights inside the cabinet are illuminated. DO NOT ENTER the electrical converter cabinet if the engine is running. Do not enter the electrical converter cabinet if the bus voltage indicator LED’s on the SR converter assemblies are illuminated. Do not enter the electrical converter cabinet if the machine park brake is not set. Do not touch any electrical component, assembly or electrical connection on the machine if the bus voltage indicator LED’s on the SR converter assemblies are illuminated. Check ALL converter

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panel LED's for voltage. Entering the electrical cabinet or touching electrical components anywhere on the machine while the red LED lights are illuminated or there is voltage on the electrical bus might cause electrical shock, resulting in serious injury or death.

- **Electrical shock hazard exists if touching the dynamic braking grids when the drive is enabled. High voltage is present when the drive is enabled. Do NOT touch the braking grids (or any electrical connection on the machine) when the key switch is ON, or the generator is primed, or until five minutes after the engine has been shut down and the absence of bus voltage is verified. Contact with the braking grid can cause fatal electrical shock, resulting in serious injury or death.**
- **Electrical shock hazard exists if opening the electrical converter cabinet while the engine is running. NEVER open the electrical converter cabinet while the engine is running. High voltage is present when the drive is enabled (at any throttle speed) and may be present even if the machine is shut down. Do not touch any drive system component electrical connection on the machine for at least 5 minutes after the machine is shut down. Always verify the absence of bus voltage before touching drive system component electrical connections. If inspection or service procedures involve contact with any electrical component of the drive system, opening the converter cabinet, or removing axle access covers, or touching drive system electrical component connections, the key switch must be off, the machine not running, the electrical system MUST be locked out by using the battery isolation switch, and the absence of bus voltage verified. Accidental contact with energized terminals or components could result in serious injury or death.**
- **Electrical shock hazard exists inside the axle if axle access panel on either axle is removed without locking out the electrical system. Always verify the absence of bus voltage before removing the axle access panels and touching any electrified component inside the axle. Failure to lockout the electrical system, and touching electrified components inside the axle could cause electrical shock which might result in serious injury or death.**

ENTANGLEMENT HAZARD

- **Entanglement hazard exists if attempting to work on rotating equipment. Do not work on the machine with the engine running unless specifically instructed to do so by the engine manufacturer or so stated within a specified work procedure. KEEP CLEAR OF ROTATING SHAFTS. The shaft between the Hydraulic Pump Drive (HPD) and the generator rotates any time the engine is rotating, even while the engine is being cranked. Wrapping, entanglement, or contact of clothing or extremities may cause an entanglement hazard that results in serious injury or death.**

LEAD PRESENCE HAZARD

- **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California, USA to cause cancer and birth defects or other reproductive harm. Do not handle battery posts, terminals or related accessories containing let or lead compounds without wearing proper personal protective equipment (PPE) as required by local rules, regulations, or policies.**

SICKNESS OR ASPHYXIATION HAZARDS

- **Sickness or asphyxiation hazard exists from diesel fumes if the equipment is operated in an area that does not have adequate atmospheric ventilation. If necessary to start the engine in an enclosed area, be sure adequate ventilation is provided. Running the equipment in an area without adequate ventilation could cause sickness or asphyxiation from lack of oxygen, resulting in serious injury or death.**

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- **Inhalation hazard exists when working around engine exhaust. Always have proper ventilation when working around engine exhaust. Failure to use proper ventilation can cause inhalation hazard resulting in serious injury or death.**

> **⚠WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.**
>
> **– Always start and operate the engine in a well-ventilated area.**
>
> **– If in an enclosed area, vent the exhaust to the outside.**
>
> **– Do not modify or tamper with the exhaust system.**
>
> **– Do not idle the engine except as necessary.**
>
> **– For more information go to www.P65warnings.ca.gov/diesel.**

SKIN INJECTION HAZARD

- **Skin injection hazard exists if diesel fuel, hydraulic fluid, or grease under pressure penetrates the skin. Avoid all fluids under pressure and wear the proper personal protective equipment (PPE) for working around fluids under pressure. If any fluid is injected into the skin, it must be removed as soon as possible by a doctor familiar with treating this type of injury. Failure to avoid fluids under pressure can cause skin injection which could result in serious personal injury, blindness, or death.**

BURN HAZARDS

- **Burn hazards exist when the machine is running and for some time after the machine is shut down. Fluids such as hydraulic fluid, converter panel coolant, or engine coolant will remain hot for some period of time. Always allow these fluids to cool before breaking any connection, or opening any fill or drain component on any system that uses them for coolant or lubrication. Working on systems containing hot fluids can cause burn hazards resulting in serious injury or death.**
- **Burn hazards exist when around hot hydraulic fluid that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a burn hazard from leaks or spraying. DO NOT tighten or loosen hydraulic fluid hoses without first relieving the pressure. DO NOT make adjustments to any fluid pressures or flow while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly hot pressurized liquids. Failure to use proper PPE or to shut down the machine before making adjustments can cause a burn hazard resulting in serious injury or death.**

ADDITIONAL CRUSH HAZARDS

- **Crush hazards exist when operating the loader. Komatsu equipment is designed as off-highway equipment for use in open pit applications that are in remote locations. Due to their very large size they must work in an area with few machines, and their only proximity to buildings would be for routine maintenance or repair. They are not to be operated near office buildings or residential areas. Operating the loader near office buildings or residential areas can cause crush hazards resulting in serious injury or death.**
- **Crush hazard exists when using stands while performing any type of work on or around the machine. Do not use stands that are not engineered for the specific purpose, weight, or design to support specific component(s). Stands shall be made of appropriate size and design to support the weight and shape being held. Failure to use appropriate stands when performing any type of work on, or around the machine can cause crush hazards resulting in serious injury or death.**

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⚠ CAUTION

STRUCK BY HAZARDS

- **Struck by hazard exists if the park brake is set while the machine is in motion. This will stop the machine suddenly, possibly causing the operator to be thrown unexpectedly and rapidly against the seat belt or harness. Do not use the park brakes to stop the machine unless in an EMERGENCY situation. Use the service brake to stop the machine during normal operation. Using the park brake to stop the machine can cause the operator to be thrown forward rapidly against the seat belt or harness, resulting in serious injury.**

FALL AND SLIPPING HAZARDS

- **Slipping and falling hazards are present when mounting or dismounting the machine. Before mounting or dismounting the machine, ensure the ground conditions are stable, to prevent slipping or falling when climbing onto or stepping off the ladder. Always ensure firm ground before releasing the ladder/handrail. Slipping and falling hazards are present which could result in serious injury.**

BURN HAZARDS

- **Burn hazards exist when the machine is running and for some time after the machine is shut down. Some components such as engine, generator, pumps, hoses, pipes and others are hot when the machine is running and for some time after the machine is shut down. Allow components to cool before working on them. Failure to allow components to cool before working on them can cause burn hazards resulting in serious injury.**

Environmental Precautions

NOTICE

Some environmental hazards can exist during the performance of a maintenance, repair, or adjustment procedure. Komatsu cannot anticipate all hazards present during a specific procedure. The following suggestions/requirements are provided to help avoid hazards that may have been identified during some procedures.

Be prepared to prevent environmental spills by catching/containing all fluids, such as:

- *Engine radiator coolant*
- *Electrical converter system coolant*
- *Engine oil*
- *Hydraulic fluid*
- *Battery acid*
- *Engine fuel (diesel)*
- *Lubricating grease*
- *Window washer fluid*
- *Oil in pressure gauges*
- *Other*

Dispose of all materials such as (but not limited to): fluids, tires, wiper blades, used filters, hoses, wiring, metal, plastic, or glass parts, rubber, gaskets, and batteries, as required by local regulations, rules, and laws.

Decommissioning of the machine requires specialization. Contact your Komatsu Service Center for any available instructions on decommissioning.

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Safety Standards

Komatsu endeavors to comply with the purposes and the applicable occupational safety and health standards as set forth by the Mine Safety and Health Administration (MSHA), Society of Automotive Engineers (SAE), Institute of Electrical and Electronics Engineers (IEEE), and International Standards Organization (ISO).

The customer should acknowledge that compliance with the above applicable organizations under the law is the responsibility of each employer, and the employer should take all actions necessary to maintain and operate the Komatsu equipment or accessories according to applicable standards. Carefully review the procedures given in this manual with all operators ANNUALLY. It is essential that all operators be familiar with, AND FOLLOW, safety precautions. Operating instructions must be given to everyone using the machine before operation and at least once a year thereafter.

Machine Safety and Instructional Labels

Safety and instructional labels/placards are attached to the machine near areas that have been identified as having specific hazards. Other hazards may exist on the machine.

Label/Placard Maintenance

These guidelines should be followed in the maintenance of the safety and instructional labels/placards affixed to the machine:

These labels/placards should be inspected daily and any that are damaged, deteriorated or missing should be replaced as soon as possible. Make sure that all safety and instruction labels/placards can be read. Clean or replace these labels/placards if the words or pictures cannot be read or seen.

The safety and instructional labels/placards on the machine should be legible for many years under normal conditions.

When cleaning the signs, use a cloth, water, and soap. Do not use solvent, gasoline or high-pressure washer, etc.

Refer to illustration “IDENTIFICATION AND SAFETY GROUP” for information on the location and type of labels/placards found on the machine.

NOTICE

If a safety or instructional sign is on a part that is replaced, make sure a new sign is installed on the replaced part.

Refer to PARTS MANUAL for information on ordering replacement labels.

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Figure 2: Identification and safety group (sheet 1 of 12)

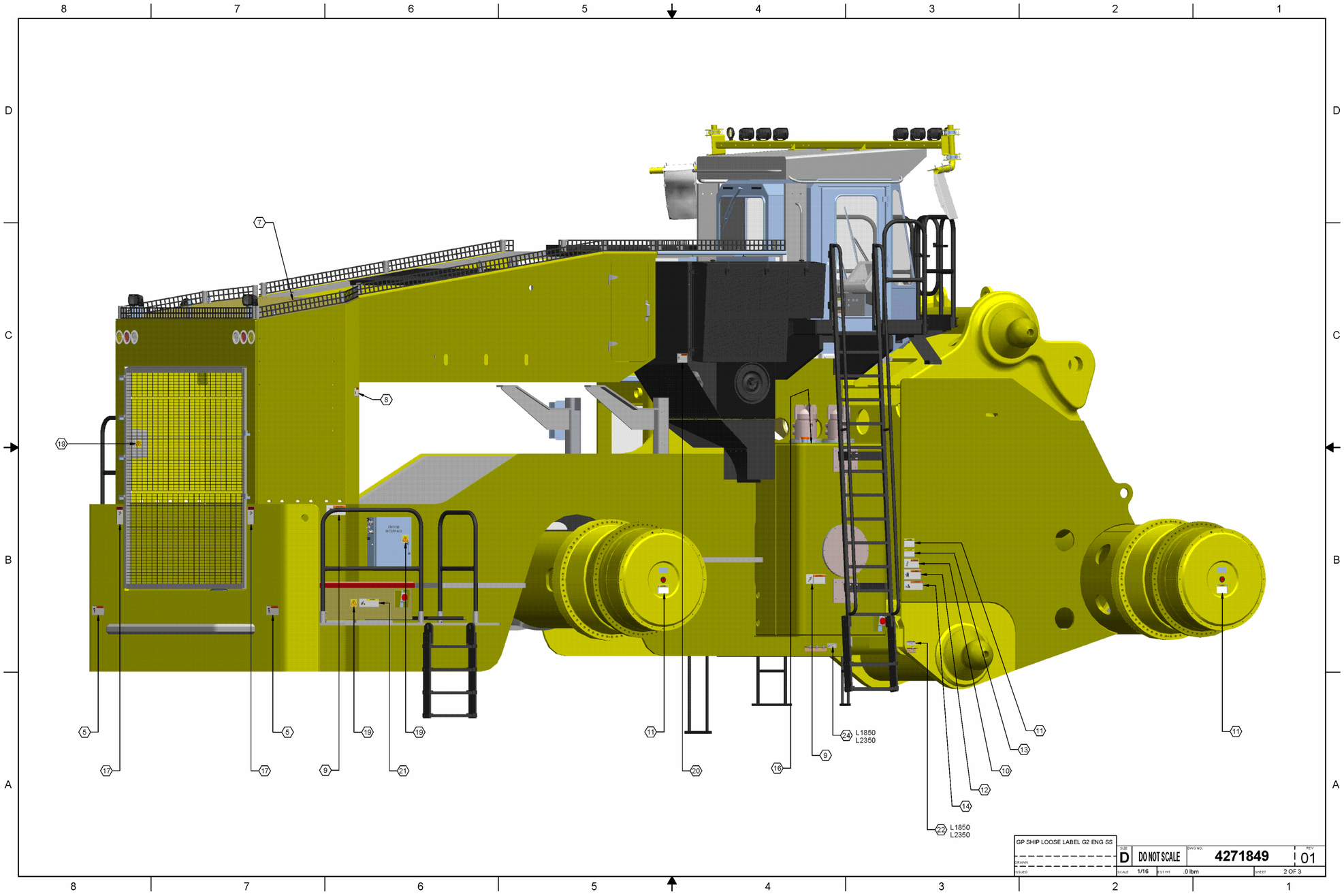

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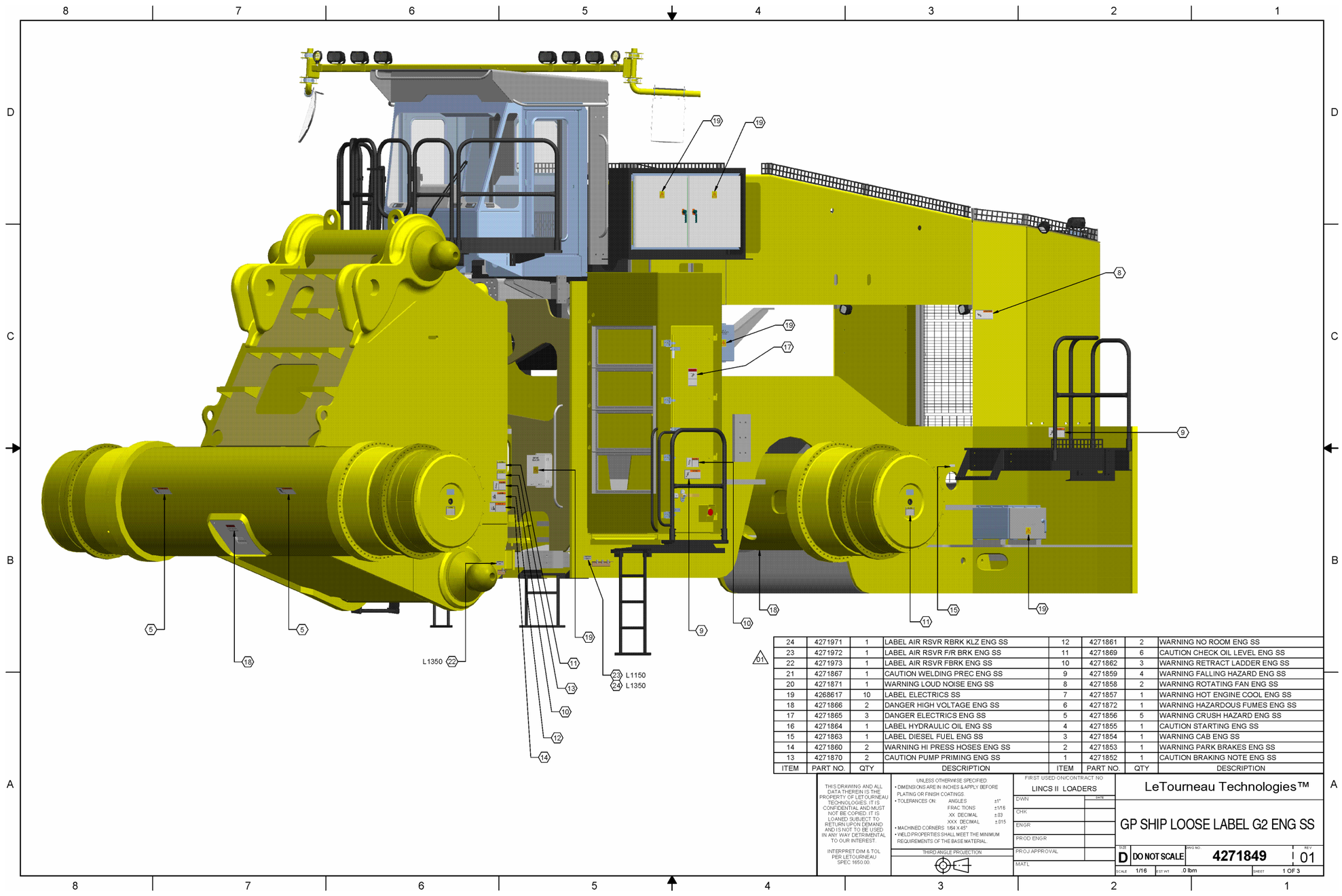
Figure 3: Identification and safety group (sheet 2 of 12)



ITEM	PART NO.	QTY	DESCRIPTION	ITEM	PART NO.	QTY	DESCRIPTION
24	4271971	1	LABEL AIR RSVR RBRK KLZ ENG SS	12	4271861	2	WARNING NO ROOM ENG SS
23	4271972	1	LABEL AIR RSVR F/R BRK ENG SS	11	4271869	6	CAUTION CHECK OIL LEVEL ENG SS
22	4271973	1	LABEL AIR RSVR FBRK ENG SS	10	4271862	3	WARNING RETRACT LADDER ENG SS
21	4271867	1	CAUTION WELDING PREC ENG SS	9	4271859	4	WARNING FALLING HAZARD ENG SS
20	4271871	1	WARNING LOUD NOISE ENG SS	8	4271858	2	WARNING ROTATING FAN ENG SS
19	4268617	10	LABEL ELECTRICS SS	7	4271857	1	WARNING HOT ENGINE COOL ENG SS
18	4271866	2	DANGER HIGH VOLTAGE ENG SS	6	4271872	1	WARNING HAZARDOUS FUMES ENG SS
17	4271865	3	DANGER ELECTRICS ENG SS	5	4271856	5	WARNING CRUSH HAZARD ENG SS
16	4271864	1	LABEL HYDRAULIC OIL ENG SS	4	4271855	1	CAUTION STARTING ENG SS
15	4271863	1	LABEL DIESEL FUEL ENG SS	3	4271854	1	WARNING CAB ENG SS
14	4271860	2	WARNING HI PRESS HOSES ENG SS	2	4271853	1	WARNING PARK BRAKES ENG SS
13	4271870	2	CAUTION PUMP PRIMING ENG SS	1	4271852	1	CAUTION BRAKING NOTE ENG SS

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INTERPRET DIM & TOL PER LETOURNEAU SPEC 1650.00.

UNLESS OTHERWISE SPECIFIED:
- DIMENSIONS ARE IN INCHES & APPLY BEFORE PLATING OR FINISH COATINGS
- TOLERANCES ON: ANGLES ±1° FRACTIONS ±1/16 .XX DECIMAL ±.03 .XXX DECIMAL ±.015
- MACHINED CORNERS 1/64 X 45°
- WELD PROPERTIES SHALL MEET THE MINIMUM REQUIREMENTS OF THE BASE MATERIAL

THIRD ANGLE PROJECTION

FIRST USED ON/CONTRACT NO: LINCS II LOADERS

		DATE
DWN		
CHK		
ENGR		
PROD ENGR		
PROJ APPROVAL		
MATL		

LeTourneau Technologies™

GP SHIP LOOSE LABEL G2 ENG SS

SIZE D | DO NOT SCALE | DWG NO. 4271849 | REV 01

SCALE 1/16 | WT .0 lbm | SHEET 1 OF 3

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Figure 4: Identification and safety group (sheet 3 of 12)

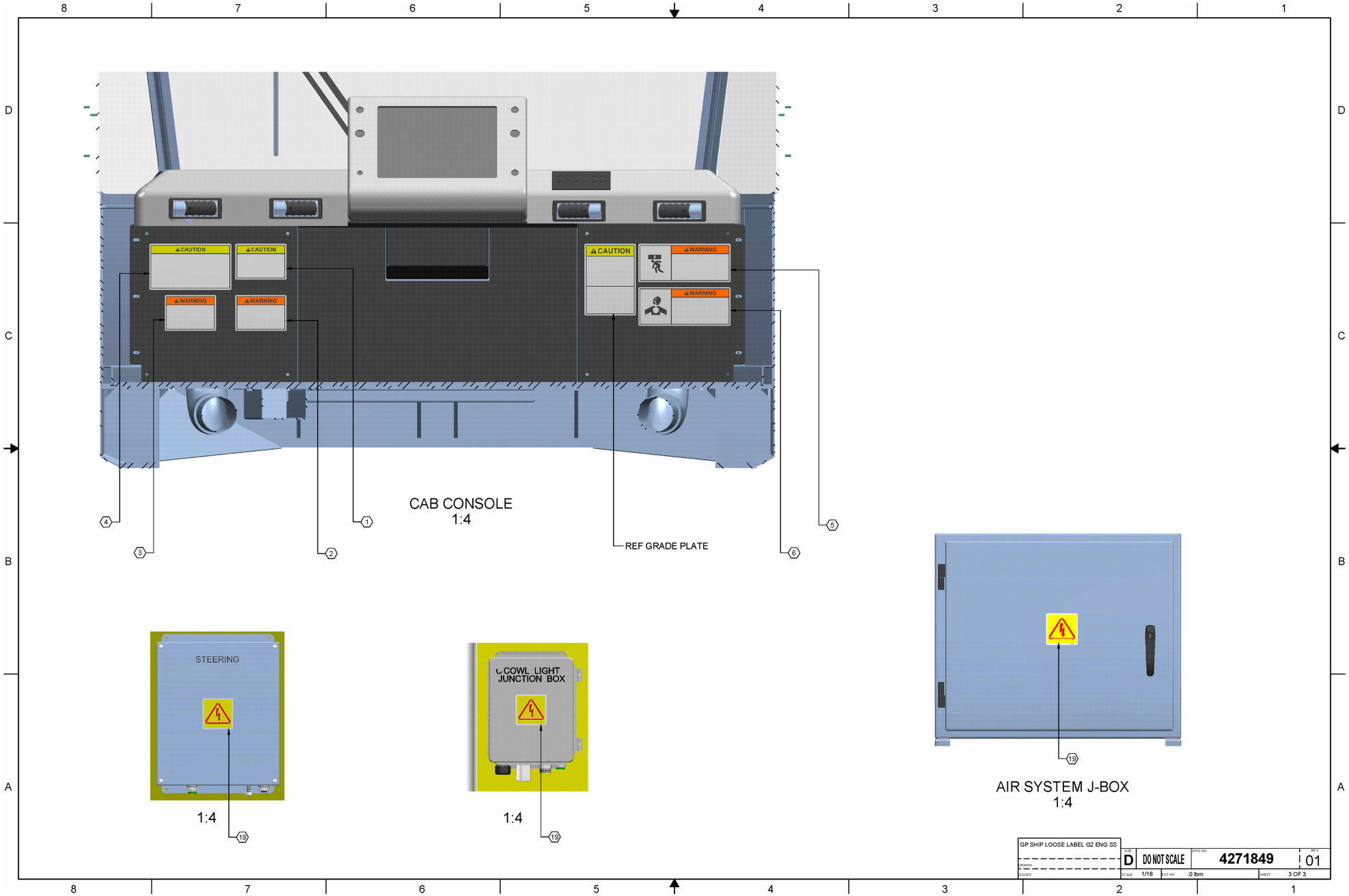

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Figure 5: Identification and safety group (sheet 4 of 12)

English

1

⚠CAUTION

DO NOT USE left hand pedal for normal braking.

4271852

2

⚠WARNING

USE OF PARKING BRAKES

- Set the motor brakes for parking and when men are working on the equipment.
- Use only in emergencies for stopping the equipment.

4271853

3

⚠WARNING

NEVER LEAVE OPERATOR'S CAB

- With a load suspended.
- With engine running at high throttle.
- With the park brakes released.

4271854

4

⚠CAUTION

BEFORE STARTING ENGINE:

- Study the controls and operating instructions sections of the service manual.
- Read all safety signs on machine.
- Clear the area of other persons.
- Learn and practice SAFE use of controls before operating.

It is your responsibility to understand and follow the manufacturer's instructions on machine operation and service, and to observe pertinent laws and regulations. The service manual and operator's handbook may be obtained through your equipment dealer.

4271855

5

⚠WARNING

CRUSH HAZARD when raising machine.

Use proper jacks and blocking whenever raising the machine.

Do not use bucket and lift arm hydraulic system to raise front of machine for service or maintenance.

Loss of hydraulic pressure can cause serious injury or death.

4271856

Spanish

1

⚠PRECAUCIÓN

NO USE el pedal lado izquierdo para frenado normal en trabajo.

4271902

2

⚠ADVERTENCIA

USO DE FRENOS DE ESTACIONAMIENTO

- Aplique los frenos mecánicos para estacionar o cuando hayan personas trabajando en la máquina.
- Use solo en casos de emergencias para detener el equipo.

4271906

3

⚠ADVERTENCIA

NUNCA ABANDONE LA CABINA DEL OPERADOR

- Con carga suspendida.
- Con el Motor Diesel corriendo en altas revoluciones.
- Con el freno de estacionamiento liberado.

4271907

4

⚠PRECAUCIÓN

ANTES DE ENCENDER EL MOTOR:

- Estudie las instrucciones de control y operación en el manual de servicio.
- Lea todos los letreros de seguridad de la maquina.
- Despeje el área de otras personas.
- Aprenda y practique el uso SEGURO de los controles antes de la operación.

Es su responsabilidad entender y seguir las instrucciones de fabricante en la operación y servicio de la máquina para observar regulaciones y leyes pertinentes. El manuales de servicio y del operador podrían ser obtenidos a través del representante del equipo.

4271888

5

⚠ADVERTENCIA

RIESGO DE GOLPE
Cuando suba a la máquina.

Utilice gatas hidráulicas y bloquee las ruedas cuando se levante la máquina.

No utilice el sistema hidráulico de blade y brazos de levante para levantar el chasis delantero de la máquina para servicio o mantenimiento.

Fugas de presión hidráulica puede causar serias lesiones o muerte.

4271889

Portuguese

1

⚠PRECAUÇÃO

NÃO USE o pedal esquerdo para frenagem normal.

4271905

2

⚠ADVERTÊNCIA

UTILIZAÇÃO DOS FREIOS DE ESTACIONAMENTO

- Aplique os freios de estacionamento para estacionar e quando o equipamento estiver em manutenção.
- Utilize somente em emergências para parar o equipamento.

4271906

3

⚠ADVERTÊNCIA

NUNCA SAIA DA CABINE DO OPERADOR

- **Com a carga elevada.**
- **Com o motor em alta rotação.**
- **Com o freio de estacionamento liberado.**

4271907

4

⚠PRECAUÇÃO

ANTES DE DAR PARTIDA NO MOTOR:

- Estude a seções de controles e instruções de operação do manual de serviço.
- Leia toda a sinalização de segurança da máquina.
- Afaste outras pessoas da área.
- Aprenda e pratique o uso SEGURO dos controles antes de operar a máquina.

Esua responsabilidade entender e sequir as instruções do fabricante na operação, manutenção e observar as leis e regulamentos pertinentes, os manuais de serviço e operação da máquina, os quais podem ser obtidos através dos revendedores dos equipamentos.

4271888

5

⚠ADVERTÊNCIA

PERIGO DE ESMAGAMENTO durante o levantamento da máquina.

Use cilindros adequados e bloqueamento sempre que levantar a máquina.

Não use o sistema hidráulico do braço de levantamento e da caçamba para levantar a parte frontal da máquina para serviço ou manutenção.

A perda de pressão hidráulica pode causar ferimentos sérios ou morte.

4271890

Chinese

1

⚠ 注意

正常制动不要
使用左踏板

4271873

2

⚠ 警告

停车制动的使用

- 当有人操作机器时　要使用电机制动来停车
- 仅用于紧急情况下停车

4271874

3

⚠ 警告

以下情况绝对不能离开驾驶室

- 有负载时
- 发动机高怠速
- 泊车制动释放

4271875

4

⚠ 注意

启动发动机前

- 学习维修手册中的控制和操作指导部分
- 阅读机器上的所有警示
- 清除作业区内的人员
- 操作前学习 和练习控制功能的安全使用

操作人员有责任按照厂商的指导操作和维护保养机器并遵守相关的法律法规　维修手册和操作手册 可以通过代理商获得

4271876

5

⚠ 警告

挤压危险
当举升机器时

举升机器时　必须使用合适的起重设备和垫块

维修服务时不要使用铲斗和大臂的液压系统抬起机器前部

液压系统失压能导致严重伤害或死亡

4271877

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Figure 6: Identification and safety group (sheet 5 of 12)

English

1

⚠CAUTION

DO NOT USE left hand pedal for normal braking.

4271852

2

⚠WARNING

USE OF PARKING BRAKES

- Set the motor brakes for parking and when men are working on the equipment.
- Use only in emergencies for stopping the equipment.

4271853

3

⚠WARNING

NEVER LEAVE OPERATOR'S CAB

- With a load suspended.
- With engine running at high throttle.
- With the park brakes released.

4271854

4

⚠CAUTION

BEFORE STARTING ENGINE:

- Study the controls and operating instructions sections of the service manual.
- Read all safety signs on machine.
- Clear the area of other persons.
- Learn and practice SAFE use of controls before operating.

It is your responsibility to understand and follow the manufacturer's instructions on machine operation and service, and to observe pertinent laws and regulations. The service manual and operator's handbook may be obtained through your equipment dealer.

4271855

5

⚠WARNING

CRUSH HAZARD when raising machine.

Use proper jacks and blocking whenever raising the machine.

Do not use bucket and lift arm hydraulic system to raise front of machine for service or maintenance.

Loss of hydraulic pressure can cause serious injury or death.

4271856

French

1

⚠MISE EN GARDE

NE PAS UTILISER
la pédale de gauche pour le freinage normal.

4275240

2

⚠ATTENTION

UTILISATION DU FREIN DE STATIONNEMENT

- Engager le frein de stationnement pour stationner et lorsque le personnel d'entretien intervient sur la machine.
- N'utiliser qu'en cas d'urgence pour arrêter la machine.

4275241

3

⚠ATTENTION

NE JAMAIS QUITTER LA CABINE

- **Avec une charge en hauteur.**
- **Avec le moteur à haut régime.**
- **Sans avoir engagé le frein de stationnement.**

4275242

4

⚠MISE EN GARDE

AVANT DE DÉM ARRER LE MOTEUR:

- Lire les sections des contrôles et d'opération du manuel d'entretien.
- Lire toutes les étiquettes de sécurité sur la machine.
- Dégager l'endroit de tout personnel.
- Apprendre et pratiquer l'utilisation sécuritaire des contrôles avant l'opération.

Il est de votre responsabilité de comprendre et de suivre les recommandations d'opération et d'entretien du manufacturier ainsi que de vous conformer aux lois et réglements en vigueur. Les manuels d'entretien et d'opération sont disponibles auprès de votre concessionnaire.

4275243

5

⚠ATTENTION

DANGER D'ECRASEMENT en levant la machine.

Utiliser vérins, chandelles et outre outillage sécuritaire pour soulever la machine.

Ne pas se servir du godet et du système hydraulique des bras de levage pour soulever le devant de la machine lors d'interventions.

La perte de pression hydraulique peut cause des blessures graves ou la mort.

4275244

Turkish

1

⚠DİKKAT

KULLANMAYIN:
normal frenleme için sol pedalı kullanmayın.

4279600

2

⚠UYARI

PARK FRENLERİNİN KULLANIMI

- Park etmek için ve ekipman üzerinde çalışılırken motor frenlerini kullanın.
- Yalnızca ekipmanın durdurulmasını gerektiren acil durumlarda kullanın.

4279601

3

⚠UYARI

AŞAĞIDAKİ DURUMLARDA OPERATÖR KAB İNİNDEN ASLA AYRILMAYIN:

- Asılı bir yük varsa.
- Motor yüksek devirde çalışıyorsa.
- Park frenleri serbestse.

4279602

4

⚠DİKKAT

MOTORU ÇALIŞTIRMADAN ÖNCE:

- Servis kılavuzunun denetimler ve çalıştırma talimatlarına ilişkin bölümlerini okuyun.
- Makine üzerindeki tüm güvenlik işaretlerini okuyun.
- Alanda diğer kişilerin bulunmadığından emin olun.
- Çalışmadan önce denetimlerin EMNİYETLİ kullanımını öğrenin ve alıştırma yapın.

Makinenin çalıştırılması ve servisine ilişkin üreticinin talimatlarını anlamak ve izlemek ve ilgili yasa ve düzenlemeleri dikkate almak sizin sorumluluğunuz altındadır. Servis kılavuzu ve operatör el kitabı ekipman tedarikçinizden elde edilebilir.

4279603

5

⚠UYARI

EZİLME TEHLİKESİ makineyi kaldırırken.

Makineyi kaldırmak için her zaman uygun krikolar ve blokajlar kullanın.

Servis veya bakım amacıyla makinenin önünü kaldırmak için kepçe ve kaldırma kolu hidrolik sistemini kullanmayın.

Hidrolik basınç kaybı ciddi yaralanmaya veya ölüme neden olabilir.

4279604

Russian

1

⚠ОСТОРОЖНО

Не используйте
левую педаль для обычного торможения.

4275320

2

⚠ВНИМАНИЕ

Использован тормозовие стояночных

- Всегда при<<парковке>>и когда люди работают на оборудовании.
- Использовать только в экстренных случаях для остановки оборудования.

4275321

3

⚠ВНИМАНИЕ

НИКОГДА НЕ ПОКИДАЙТЕ КАБИНУ ОПЕРАТОРА

- Когда загруженный ковш в верхнем положении.
- Когда двигатель работает на высоких оборотах.
- Когда отпущены стояночные тормоза.

4275322

4

⚠ОСТОРОЖНО

ИЕРЕД ЗАПУСКОМ ДВИГАТЕЛЯ:

- Изучите инструкции по управлению и эксплуатации из разделов руководства по обслуживанию.
- Освободите территорию от посторонних лиц.
- Прочтите все знаки безопасности на машине.
- Изучите и попрактикуйтесь в БЕЗОПАСНОМ использованиир ычагов управления перед началом работы.

Воборудования,ы обязаны понимать и следовать инструкциям производителя по эксплуатации и обслуживанию машины, соблюдать соответствующие законы и правила. руководство по обслуживанию и руководство оператора, которые могут быть получены через дилера вашего

4275323

5

⚠ВНИМАНИЕ

Повышенная опасность при подъёмо машины.

Всегда используйте надлежащие подъёмные устройства при подъёме машины.

Не используйте ковш v стрелу погрузчика гидравлической системы для поднятия передней части машины для ремонта или технического обслуживания.

Потеря гидравлического давления может привести к серьёзным травмам или смерти.

4275324

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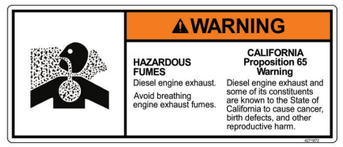
Figure 7: Identification and safety group (sheet 6 of 12)

English

6



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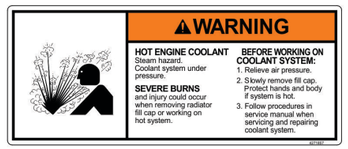

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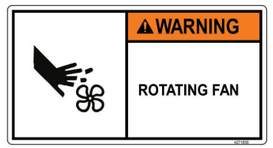

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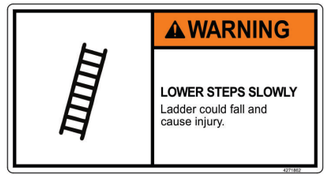

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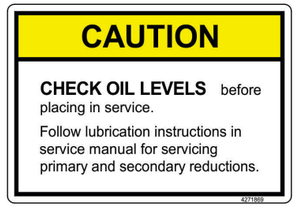

Spanish

6

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9

10

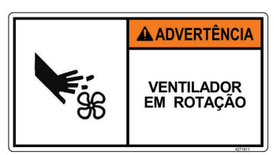
11

Portuguese

6

7

8



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Chinese

6

7

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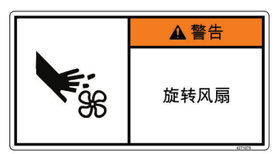

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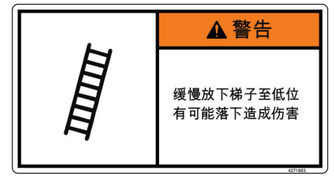

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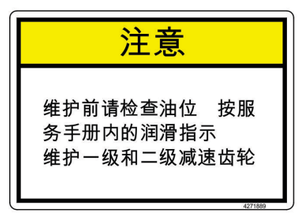

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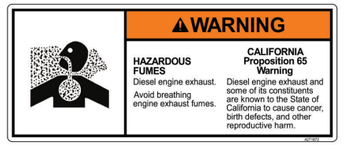
Figure 8: Identification and safety group (sheet 7 of 12)

English

6



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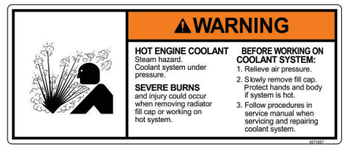

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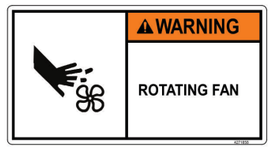

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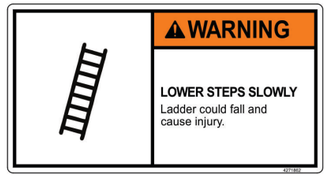

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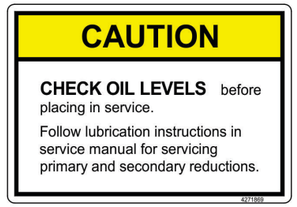
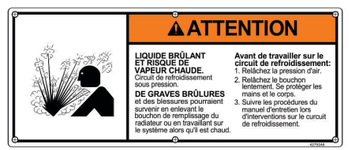


French

6

7



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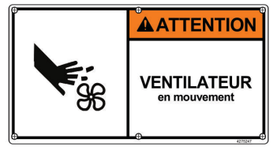

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10

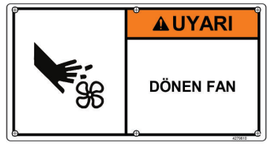
11

Turkish

6

7

8



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10

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Russian

6

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8

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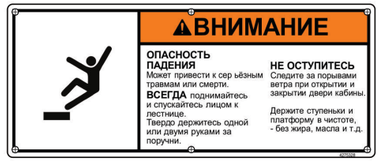

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11

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Figure 9: Identification and safety group (sheet 8 of 12)

English

12

⚠WARNING

NO ROOM for a man in this area when machine is steered.

DO NOT STAND or work in this area when machine is running.

USE SAFETY LINK when servicing machine.

4271861

13

CAUTION

PUMP PRIMING

Prior to starting engine, ensure hydraulic reservoir is pressurized.

All pumps must be re-primed whenever hydraulic oil is changed or hydraulic system is maintained.

4271870

14

⚠WARNING

HIGH PRESSURE

Hydraulic hoses with special thick flange fittings.

Improper parts installation could cause serious injury or death.

- Use forged flange clamp halves. (P/N 4186401)
- Use grade-8 bolts, with 3/4-inch minimum thread engagement.
- Use hardened washers. (P/N 4210349)
- Torque to 80 lb-ft lubricated.

4271860

15

DIESEL FUEL

4271863

16

HYDRAULIC OIL

4271864

17

⚠DANGER

750 VOLTS can be present whenever keyswitch is on.

750 VOLTS can be present up to five (5) minutes after batteries have been isolated.

4271869

Spanish

12

⚠ADVERTENCIA

NO HAY ESPACIO para personas en esta área cuando la máquina vira.

NO PARARSE o trabajar en esta área cuando la máquina esté en movimiento.

UTILICE BARRA DE SEGURIDAD cuando la máquina esté en revisión, relleno de fluidos o mantenimiento.

4271934

13

PRECAUCIÓN

CEBADO DE BOMBAS

Previo al encendido del motor, asegúrese que el tanque hidráulico esta presurizado.

Todas las bombas deben ser sangradas cuando el aceite hidráulico es cambiado o el sistema hidráulico es mantenido.

4271942

14

⚠ADVERTENCIA

ALTA PRESIÓN

Mangueras hidráulicas con terminales de espesor adecuado.

Instalación de componentes inapropiados podrían causar serias lesiones o muerte.

- Utilice bridas hidráulicas forjadas (P/N 4186401).
- Utilice pernos de grado 8. Con 3/4 de pulgada de hilo como mínimo.
- Utilice gollilas templadas (P/N 4210349).
- Torque de 80 Lb-pies lubricado.

4271933

15

COMBUSTIBLE DIESEL

4271936

16

ACEITE HIDRAULICO

4271937

17

⚠PELIGRO

ALTO VOLTAJE puede estar presente todo el tiempo que la llave contacto está posición encendida (ON).

ALTO VOLTAJE puede estar presente hasta de cinco (5) minutos después que se han desconectado las baterías.

4271938

Portuguese

12

⚠ADVERTÊNCIA

NÃO HÁ ESPAÇO para uma pessoa nesta área, quando a máquina estiver articulada.

NÃO PERMANEÇA OU TRABALHE nesta área quando a máquina estiver em operação.

USE BARRAS DE SEGURANÇA quando a máquina estiver em manutenção.

4271914

13

PRECAUÇÃO

ESCORVAMENTO DA BOMBA

Antes de dar partida ao motor assegure-se que o sistema hidráulico está pressurizado.

Todas as bombas precisam ser escorvadas sempre que for trocado o óleo hidráulico ou após manutenção do sistema hidráulico.

4271922

14

⚠ADVERTÊNCIA

ALTA PRESSÃO

Mangueiras hidráulicas com terminais flangeados de espessura especial.

Instalação inadequada das peças pode causar ferimentos sérios ou morte.

- Use abraçadeira meio flange, forjada. (P/N 4186401)
- Use parafusos de grau 8, com 3/4 de polegada de comprimento mínimo de rosca.
- Use arruelas tratadas. (P/N 4210349)
- Torqueie com 80 lbs/pé, lubrificado.

4271915

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COMBUSTÍVEL DIESEL

4271916

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ÓLEO HIDRÁULICO

4271917

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⚠PERIGO

ALTA VOLTAGEM pode estar presente sempre que a chave estiver ligada.

ALTA VOLTAGEM pode estar presente até cinco (5) minutos após as baterias terem sido desconectadas.

4271918

Chinese

12

⚠ 警告

转向时　此区域不得有人

机器运行时　不得在此区域逗留或作业

维护机器时　使用安全连杆

4271892

13

注意

泵排气

起动发动机前　确保液压油箱有压力　在更换液压油和液压系统维护后　所有的泵必须排气

4271890

14

⚠ 警告

高压液压管配殊加重的法兰　有特接头

- 使用 锻造 对开 法兰 (P/N 4186401)
- 使用 美制　8级强 度螺 栓螺纹 配合 至少 20mm 以上
- 使用 硬化 垫圈 (P/N 4210349)
- 螺栓润滑 扭矩　80 lb-ft.

不正确的安装可能导致严重伤害或死亡

4271881

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柴 油

4271884

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液压油

4271885

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⚠危险

当开关打开时随时会出现 **750**伏 高压电

电池断开后 **750**伏 高压电还会持续 **5**分 钟

4271882

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Figure 10: Identification and safety group (sheet 9 of 12)

English

12

⚠WARNING

NO ROOM for a man in this area when machine is steered.

DO NOT STAND or work in this area when machine is running.

USE SAFETY LINK when servicing machine.

4271862

13

CAUTION

PUMP PRIMING

Prior to starting engine, ensure hydraulic reservoir is pressurized.

All pumps must be re-primed whenever hydraulic oil is changed or hydraulic system is maintained.

4271870

14

⚠WARNING

HIGH PRESSURE Hydraulic hoses with special thick flange fittings.

Improper parts installation could cause serious injury or death.

- Use forged flange clamp halves. (P/N 4186401)
- Use grade-8 bolts, with 3/4-inch minimum thread engagement.
- Use hardened washers. (P/N 4210349)
- Torque to 80 lb-ft lubricated.

4271860

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DIESEL FUEL

4271863

16

HYDRAULIC OIL

4271864

17

⚠DANGER

750 VOLTS can be present whenever keyswitch is on.

750 VOLTS can be present up to five (5) minutes after batteries have been isolated.

4271865

French

12

⚠ATTENTION

PAS D'ESPACE pour un travailleur dans cet endroit quand la machine est articulée.

NE PAS SE TENIR ou travailler dans cette région quand la machine est en opération.

INSTALLER LA BARRE DE SÉCURITÉ avant d'intervenir sur la machine.

4275251

13

MISE EN GARDE

AMORÇAGE DES POMPES

Avant de démarrer le moteur, s'assurer que le réservoir hydraulique est sous pression.

Toutes les pompes doivent être réamorcées chaque fois que l'huile hydraulique est remplacée ou qu'il y a intervention sur le système hydraulique.

4275252

14

⚠ATTENTION

HAUTE PRESSION Boyaux hydrauliques avec raccords à embouts épais.

L'installation incorrecte des pièces pourrait causer des blessures graves ou la mort.

- Utiliser seulement des brides forgées. (REF: 4186401)
- Utiliser des vis grade 8, avec une longueur de filetage de 19 mm au minimum.
- Utiliser des rondelles trempées (P/N 4210349)
- Serrage avec lubrifiant 80 lb-ft.

4275253

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CARBURANT DIESEL

4275254

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HUILE DYDRAULIQUE

4275255

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⚠DANGER

HAUTE TENSION peut être présente quand la clé est à la position "ON".

HAUTE TENSION peut demeurer présente jusqu'à cinq (5) minutes après que les batteries aient été isolées.

4275256

Turkish

12

⚠UYARI

KİMSE OLMAMALI: makine direksiyonu çevirirken bu alanda hiç kimse bulunmamalıdır.

DURMAYIN: makine çalışırken bu alanda durmayın veya çalışmayın.

GÜVENLİK BAĞLANTISI KULLANIN: makine bakımını yaparken güvenlik bağlantısı kullanın.

4279616

13

DİKKAT

POMPA HAZIRLAMA

Motoru çalıştırmadan önce hidrolik deposunun basınçlı olduğundan emin olun.

Hidrolik yağı değiştirilince veya hidrolik sisteminin bakımı yapılınca tüm pompalar yeniden çalıştırmaya hazırlanmalıdır.

4279615

14

⚠UYARI

YÜKSEK BASINÇ Özel kalın flanş fitingli hidrolik hortumlar.

Yanlış parça montajı ciddi yaralanmaya veya ölüme neden olabilir.

- Dövme flanş kelepçe yarılarını kullanın. (P/N 4186401)
- En az 3/4 inç vidalama boylu 8 kalite cıvatalar kullanın.
- Sertleştirilmiş pullar kullanın. (P/N 4210349)
- Yağlanmış olarak 80 lb-ft torka kadar sıkın.

4279618

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DİZEL YAKIT

4279617

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HİDROLİK YAĞI

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⚠TEHLİKE

YÜKSEK GERİLİM: kontak anahtarı açık konumdayken yüksek gerilim olabilir.

YÜKSEK GERİLİM: aküler izole edildikten beş (5) dakika sonrasına kadar yüksek gerilim bulunabilir.

4279619

Russian

12

⚠ВНИМАНИЕ

Не находитесь в близи поворачивающейся машины.

Не стойте и не работайте в месте, где работает машина.

Используйте предохранительный рычаг при обслуживании машины.

4275331

13

ОСТОРОЖНО

ТОПЛИВНЫЙ НАСОС

Перед запуском двигателя убедитесь, что гидравлический резервуар находится под давлением.

Все насосы должны быть повторно закачаны маслом, когда меняется гидравлическое масло или обслуживается гидравлическая система.

4275332

14

⚠ВНИМАНИЕ

ВЫСОКОЕ ДАВЛЕНИЕ

Гидравлические шланги с утолщёнными фланцами. Неправильная установка деталей может привести к серьёзным травмам или смерти.

- Используйте кованые половины зажимов фланца. (N детали 4186401)
- Используйте болты класса 8, с минимальным 3/4-дюймовым зацеплением резьбы.
- Используйте закалённые шайбы. (N детали 4210349)
- Закручивайте до 80 фунтов, смазывайте.

4275333

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ДИЗЕЛЬНОЕ ТОПЛИВО

4275334

16

ГИДРАВЛИЧЕСКОЕ МАСЛО

4275335

17

⚠ОПАСНО

ВЫСОКОЕ НАПРЯЖЕНИЕ когда включён пусковой включатель.

ВЫСОКОЕ НАПРЯЖЕНИЕ может оставаться до 5 минут после отключения аккумуляторных батарей.

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Figure 11: Identification and safety group (sheet 10 of 12)

English

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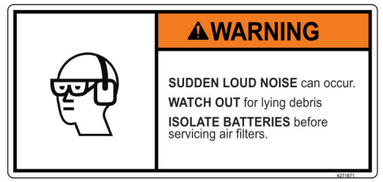

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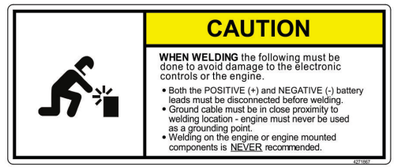

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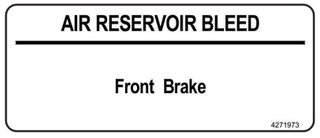

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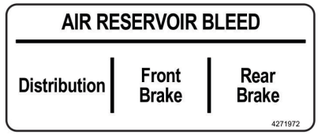

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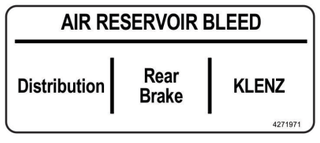

Spanish

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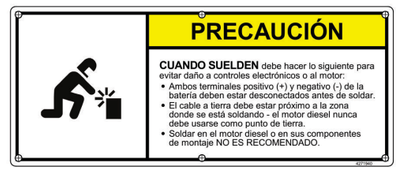

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Portuguese

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Chinese

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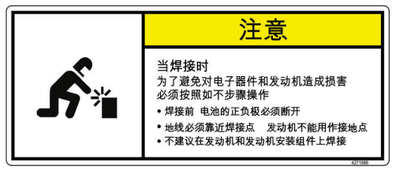

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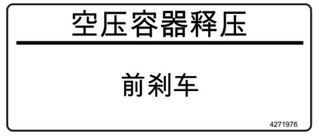

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Figure 12: Identification and safety group (sheet 11 of 12)

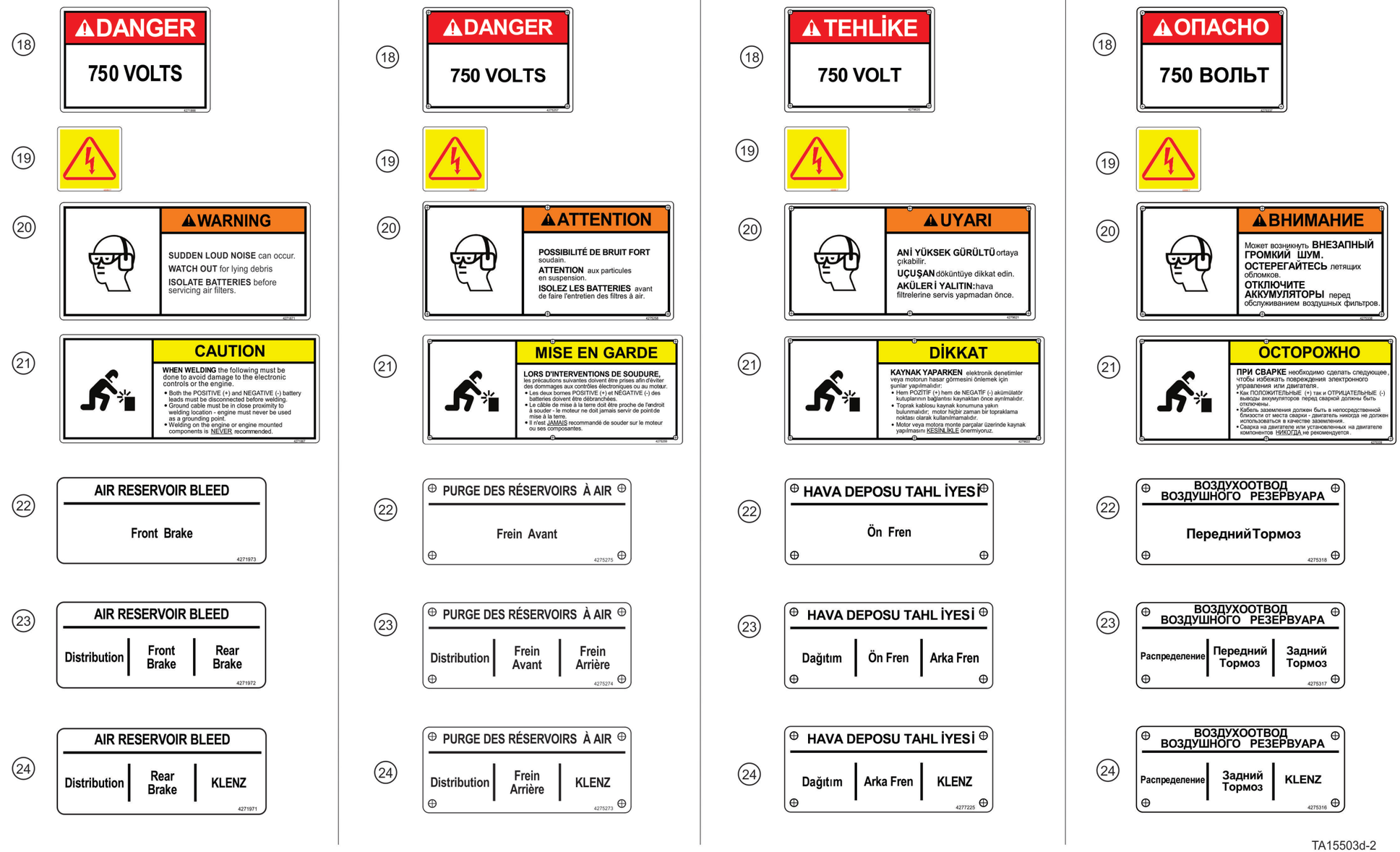

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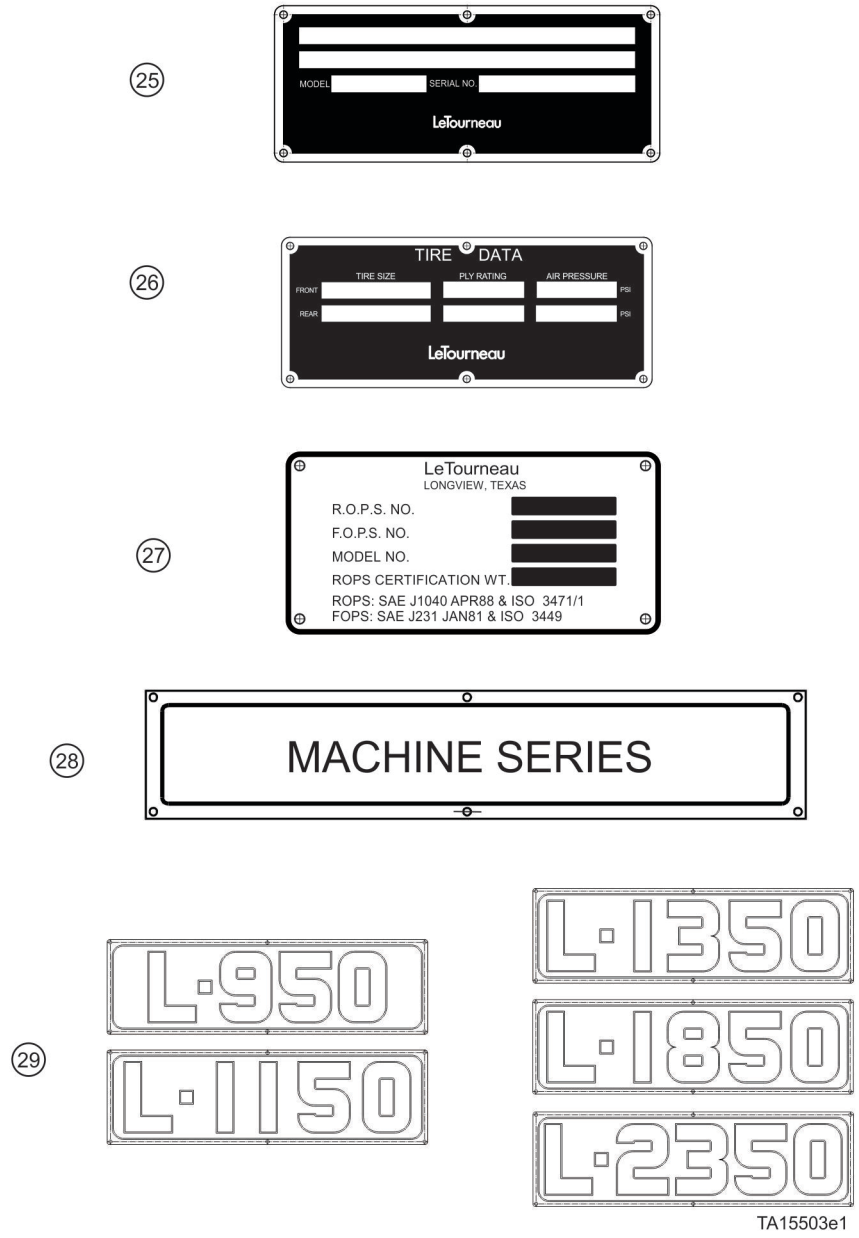
Figure 13: Identification and safety group (sheet 12 of 12)



25 Plate, model/serial number

26 Plate, tire data

27 Plate, roll bar approval

28 Machine series placard

29 Placard, (machine model specific)

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General Operational Safety Guidelines

Be Prepared Before Starting

These guidelines should be followed before attempting to operate the machine.

Step 1: KNOW THE EQUIPMENT: Read all sections of this manual thoroughly. BE SURE to understand all control functions, capacities, clearances, limitations, and routine maintenance required for safe operation. Support personnel should also be familiar with this information. Learn the location and function of ALL controls, indicators, warning devices and caution instructions. Improper operation or improper maintenance of this machine can result in hazardous conditions.

NOTICE

Always operate this machine as explained by the information and instructions contained in this manual.

⚠ WARNING

Crush hazards exist when operating the loader. Komatsu equipment is designed as off-highway equipment for use in open pit applications that are in remote locations. Due to their very large size they must work in an area with few machines, and their only proximity to buildings would be for routine maintenance or repair. They are not to be operated near office buildings or residential areas. Operating the loader near office buildings or residential areas can cause crush hazards resulting in serious injury or death.

Step 2: Be familiar with the machine's safety devices (if so equipped) such as:

- Seat belts
- Rollover protective structure (ROPS) and falling object protective structure (FOPS)
- Articulated steering frame lock
- Shields and guards
- Visual and audible warning devices
- Manual fire suppressor or the fire suppression system
- Isolation and Control Switch Box
- Battery Isolation switch
- Starter Isolation switch
- Emergency Stop buttons
- Rearview mirrors
- All lighting

Step 3: Know the work area; clear away trash and debris. Remove anything that could puncture a tire.

Step 4: Check overhead clearances. Know the size of doorways and canopies. Know how much clearance there is under power and telephone lines.

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Step 5: Complete the daily walk-around inspection and services. Perform the inspections and maintenance per Section 02. Check thoroughly for visual defects, such as leaks, cracks, frayed hoses, worn insulation, and loose parts. Pre-operation/pre shift inspections are a vital step in the safe operation of the equipment. Maintaining equipment in a safe operating condition ensures the operator can operate the equipment safely. Some items to consider are:

- Brakes
- Steering components
- Lighting
- Sounding devices such as a horn or back up warning system
- Unobstructed view of direction of travel and of surroundings in general, mirrors, etc.
- Seat belts.

Step 6: The operator should know many factors, before and during operation of the machine, including but not limited to considerations such as:

- The local safety programs
- The grades on which the equipment will be operating
- Traffic patterns, routes, and road conditions
- Limitations of the equipment

Mounting and Dismounting the Machine

These guidelines should be followed when mounting and dismounting the machine:

Ladder and Walkway to Cab

⚠ WARNING

Fall and slipping hazards exist if persons are transported other than the operator. Do not allow the transportation of any other person other than the operator, seated in the operator seat, unless a training seat is provided. There are no provisions on any P&H wheel loaders to accommodate the transportation of any persons other than the operator alone, unless a training seat in the cab is optionally provided. Ladders and catwalks attached to the machine are designed for servicing of the machine while the machine is stopped only. They are NOT designed for transporting riders at any time. Crush hazards and falling could occur, resulting in serious injury or death.

⚠ WARNING

Crush hazards exist if attempting to transport personnel on the machine. There are no provisions on the machine to accommodate the transportation of any persons other than the operator alone, unless a training seat in the cab is optionally provided. Ladders and catwalks attached to the machine are designed for servicing of the machine while the machine is stopped only. They are NOT designed for transporting riders at any time. Do not transport personnel or allow riders on the machine. A crush hazard is present while riding on any location of the machine other than the cab Operator's seat or training seat (if so equipped), which could result in serious injury or death.

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Step 1: Always use “three-point support” with the machine, and face the ladder while entering or leaving it. “Three point support” means that three out of four arms and legs are in contact with the machine at all times during mount and dismount.

⚠ CAUTION

Slipping and falling hazards are present when mounting or dismounting the machine. Before mounting or dismounting the machine, ensure the ground conditions are stable, to prevent slipping or falling when climbing onto or stepping off the ladder. Always ensure firm ground before releasing the ladder/handrail. Slipping and falling hazards are present which could result in serious injury.

Step 2: Clean shoes and wipe hands before attempting to climb on the machine.

Step 3: Look for icy conditions that could make use of a ladder or stairway treacherous. Follow all local work rules used during icy conditions.

Step 4: Use handholds, ladders, or steps (as provided) when mounting and dismounting.

Step 5: NEVER attempt to mount or dismount a moving machine.

Step 6: NEVER jump off the machine.

Step 7: NEVER try to climb on or off the machine when carrying tools or supplies. Use a hand line to pull equipment up onto the platform.

Step 8: Observe proper shutdown procedures before dismounting.

Ladder Mounted On Hydraulic Reservoir

A ladder is mounted on the hydraulic reservoir. When using this ladder, refer to instructions in “Mounting and Dismounting the Machine”, as previously explained in this document.

Start Up Safely

These guidelines should be followed in the normal operation of the machine:

Step 1: Do not wear loose clothing or jewelry that can catch on controls or other parts of the machine.

Step 2: Make certain all protective guards and covers are secured in place on the machine.

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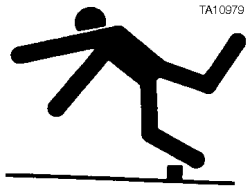
Step 3: Keep the machine, especially walkways, platforms and steps, free of foreign material, such as debris, oil, tools, and other items that are not part of the machine.

Step 4: Secure all loose items such as lunch boxes, tools, and other items that are not part of the machine.



Step 5: Start up safely. Use all local procedures such as blowing the horn before starting up.

- Allow at least 30 seconds for anyone working on or around the machine to exit the area. The operator should also inspect the machine before the shift and after work breaks to be sure no one is around it before starting.
- Visually determine the area is clear before moving the machine.

⚠ WARNING

Crush hazard is present when the machine is steered (articulated). Do not allow anyone to stand in area of the machine, particularly between the tires when the engine is running. There is no clearance for persons in this area when the machine is steered. Failure to clear the area of personnel before moving the machine could cause a crush hazard that results in serious injury or death.

Step 6: Attach the frame lock before performing service work or lifting the machine or transporting on another vehicle. Before operating, be sure the frame lock is removed and securely stored.

Step 7: Follow the engine manufacturer's recommended starting procedure. After the engine has been started, check all gauges and instruments to be sure that everything is operating properly.

⚠ WARNING

Sickness or asphyxiation hazard exists from diesel fumes if the equipment is operated in an area that does not have adequate atmospheric ventilation. If necessary to start the engine in an enclosed area, be sure adequate ventilation is provided. Running the equipment in an area without adequate ventilation could cause sickness or asphyxiation from lack of oxygen, resulting in serious injury or death.

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Step 8: Operate bucket and hoist controls through a complete cycle when area conditions permit — check for faulty operation. Report any sluggishness, binding, or over travel to the appropriate personnel.

Step 9: To be sure direction of travel and speed can be controlled, move the direction control switch to forward and reverse positions, and press the accelerator pedal slowly.

Step 10: Test brakes before operating. Test park brakes to make sure the machine will be able to stop and stay stopped. (when first moved, check dynamic braking).

Step 11: Check lights, backup alarm or other warning and safety devices.

Step 12: Sit properly, in an alert position. Check out controls in a safe area while moving slowly. STEER MACHINE BOTH RIGHT AND LEFT to be sure steering is operating properly.

Step 13: Never carry an unauthorized rider. The operator's cab is designed for one person only (unless equipped with a training seat). If a training seat is used, make certain the training seat belt restraint is used at all times.

⚠ WARNING

Fall hazard or crush hazard exists if the bucket or lift arms are used to lift personnel. Never allow personnel to be lifted in the bucket or by use of the lift arms. Lifting personnel with the bucket or lift arms can cause falls and crush hazards that might result in serious injury or death.

Step 14: Watch out for overhead dangers. Keep a safe distance from overhead power lines.

Safety in Material Handling Operations

Knowing and understanding essential information concerning the safe operation of equipment is vital to everyone's safety. The operator shall use undivided attention for the operation and to the condition of the equipment, and to the surroundings, when operating the equipment. Maintaining full control of the mobile equipment being operated is not only needed to safely perform operation duties, but it's also the law.

Before and during operation, think of others and ask questions such as:

- Is visibility obstructed?
- Where are they now?
- What are they doing?

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- Do they know what I plan on doing?
- Can they see me?

When in proximity to equipment being operated, ask the same questions.

Effective communication plays a key role in preventing accidents and can often be the difference between life and death in a mine environment. Failure to communicate movements to others could lead to an accident. Miners use many methods to communicate their intentions and to acknowledge messages received from others, such as:

- Cap lamps
- Horns
- Bells
- Hand signals
- Their voices, and two way radios

NOTICE

Watch for overhead dangers, such as overhanging trees or falling rocks. Do not undercut banks. Keep a safe distance from overhead power lines – and check for buried power and utility lines before digging.

NOTICE

***NEVER**enter a dust cloud or a dark area such as an underpass or building before checking it for obstructions or hazards that cannot be seen.*

NOTICE

There are two entry/exit doors (left and right) in the cab. During an emergency, determine which door is to be used as the emergency exit.

NOTICE

Remember these rules when working with the machine in mining operations:

- Stay out of the turning radius of a machine and limit exposure to the equipment's pathway.
- Go slowly in congested areas, over rough ground and on slopes. Keep the machine's speed slow enough to be in COMPLETE CONTROL AT ALL TIMES. Follow all local rules and regulations concerning operation of equipment near a high wall.
- Give loaded vehicles the right of way. Follow local traffic rules for the job site. Watch out for other vehicles.
- Position the bucket three or four feet above the ground and rolled back so it does not block vision when traveling.
- The bucket should not be used as a brake except in an emergency if all other means fail.
- Load, carry and unload safely. Start and stop smoothly when carrying a load.
- Stay back from the edge of banks and pits. Edges can cave off or the machine can lose its footing and slide over the edge.

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- Know the employer’s hand signals. It is important to know the exact meaning of all hand signals applicable to and used during operation. Failure to correctly respond to a hand signal could result in severe injury or death. Accept operational signals from one person only, but accept an emergency shutdown signal from anyone who gives it.
- Be alert. Be aware of what is going on around the machine. Maintain a safe operating distance between the machine and other equipment and personnel.
- DO NOT CONTACT THE HAUL VEHICLE with the loader lift arms, bucket or tires when dumping into hauling vehicles.
- Use caution on slopes. Operate straight up and down slopes whenever possible. Use extreme caution during any side hill operations. NEVER DESCEND A GRADE FASTER THAN THE MACHINE COULD CLIMB THAT SAME GRADE. Refer to Grade Plate located in the cab for grade operation requirements.
- Keep the bucket close to the ground for stability. If an overload causes the machine to tip forward, DO NOT PANIC - - LOWER THE LOAD TO THE GROUND and the machine will stabilize.
- Be careful in a hazardous area. Whenever possible, two people should work together in hazardous areas - one to operate the machine and the other to direct and watch for dangers.
- Report a malfunctioning machine. EVEN A MINOR PROBLEM CAN BECOME SERIOUS. Report any mechanical problems to supervision.

If The Machine Must Be Left Unattended

1. Lower the bucket to ground.
2. Set the park brake switch.
3. Push the engine select switch to the LOW position and let it idle for four to five minutes.
4. Turn the key switch to the OFF position.
5. Place a "DO NOT OPERATE" sign on the controls if the machine must be left unattended and safety or maintenance deficiencies exist. Follow all local rules for each situation.

End The Operating Period Safely

Step 1: Park in an unobstructed, flat area.

Step 2: Lower the bucket flat and level with the ground.

Shutdown Properly

Step 1: Set the park brake switch.

Step 2: Push the engine select switch to the LOW position and let the engine idle for four or five minutes.

Step 3: Place all controls in the OFF position and turn the key switch to the OFF position.

Step 4: To prevent unauthorized starting, remove the ignition key.

Step 5: To prevent tampering, lock the cab door.

Proximity Detection System

If the machine is equipped with a proximity detection system, the operator must be trained in its use before operating the machine. Various settings, such as warning distance, can be set to various distances, depending on local rules and regulation requirements.

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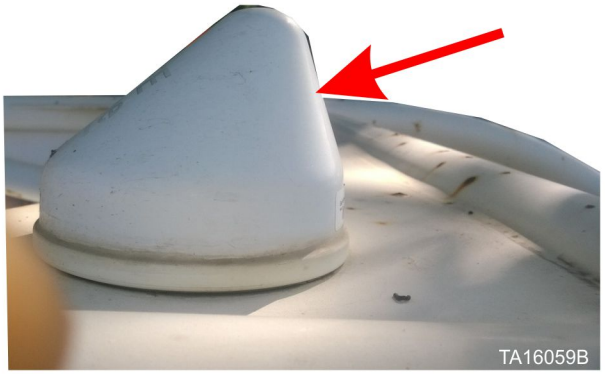
The system consists of a panel in the cab for visual and audible alarms and an external receiver/transmitter. The system detects other vehicles (with installed systems) and provides visual or audible warnings when the machines come within the set detection distance.

Follow the manufacturer recommendations for operation and maintenance.

Figure 14: Typical proximity detection system components

	
Monitoring panel	Transmitter/Receiver

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Safety in Service and Repair Operations

The following guidelines are provided as a process to remove stored energy within various systems before performing maintenance, service, or repair procedures.

Safety Preparations

Use the following process and local rules, requirements, and regulations to help remove stored energy and to reduce the possibility of crush hazards before performing any work process on or around the machine.

Machine Shutdown and lockout

⚠ WARNING

Crush hazards exists if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Place bucket flat and on level ground.

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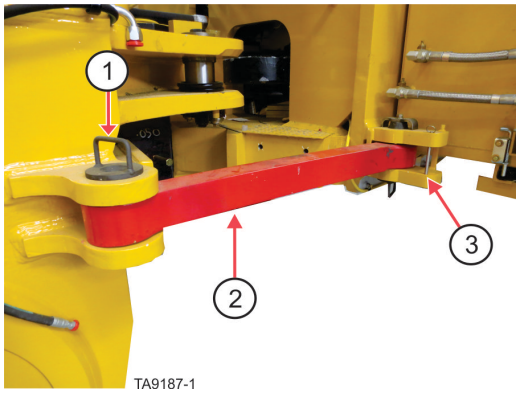
Step 3: Move the frame lock to the locked position so that the frame cannot be steered.

⚠ WARNING

Crush hazard exists if the frame lock is not locked to prevent machine articulation while personnel are in the machine articulation area. Do not enter this area unless you have verified that the operator has control over the steering and that you have good communication with the operator. Crush hazard is possible if personnel are in this area while the machine is articulated, which could result in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Fame lock in locked position

Step 4: Set the parking brakes.

Step 5: Shut off the engine.

Step 6: Place wheel chocks in front and behind each wheel.

- Chocking against motion must be done using chocks rated for the equipment being chocked. Heavy mobile equipment must be chocked with appropriate chocks. Factors such as machine weight, size, wheel diameter, ground grade and others must be considered when selecting chocks.

Step 7: Lock out the machine's starting capability before performing any cleaning, inspections, or installation and repair procedure.

⚠ WARNING

Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, mechanical, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, rotating components, electrical power, air pressure, etc.). Risk of crushing, electrical shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

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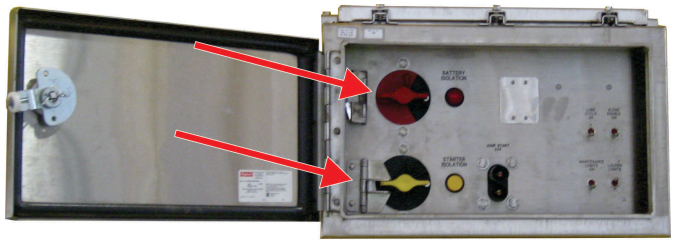
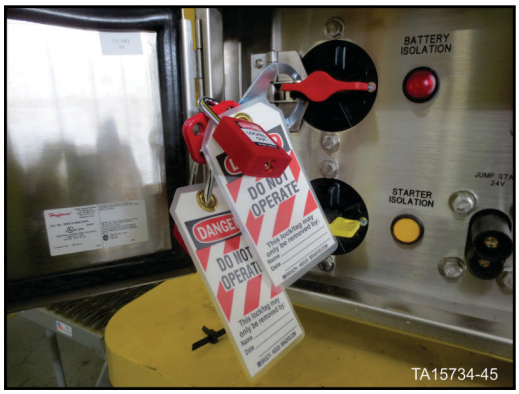
Step 8: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

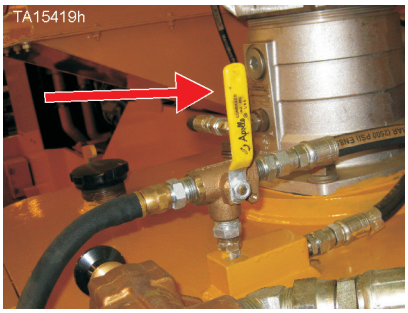




Isolation and Control switches assembly – Battery isolation switch in OFF position with locks in place

Step 9: Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

Step 10: Turn the handle to the up position as shown.



Hydraulic reservoir air valve handle UP

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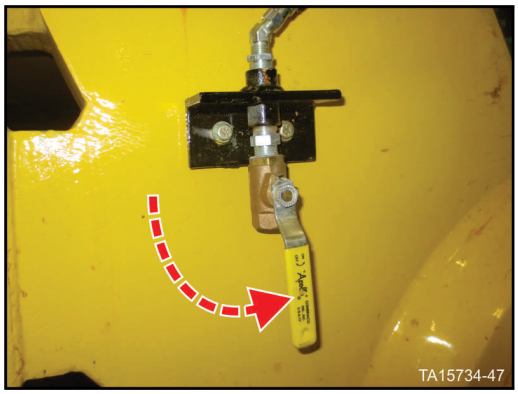
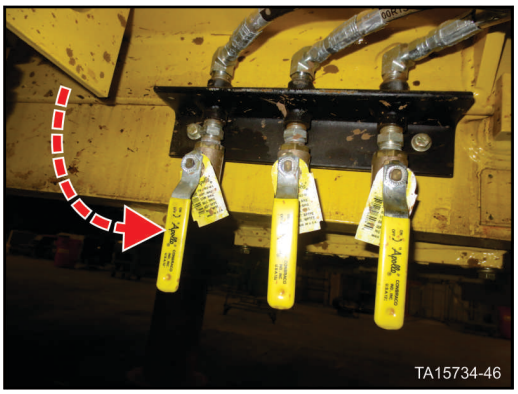
Step 11: Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Figure 15: Open air reservoir bleed valves





Three valves on right side of rear frame under hydraulic reservoir

One valve on right side of front frame near hoist cylinder ball cap

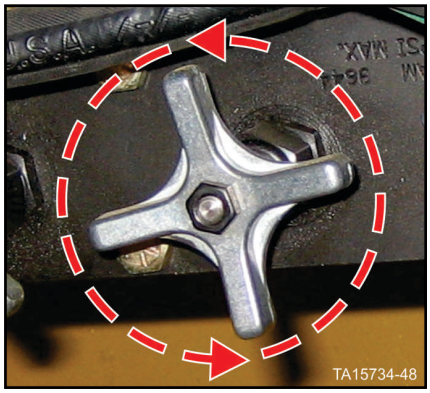
⚠ WARNING

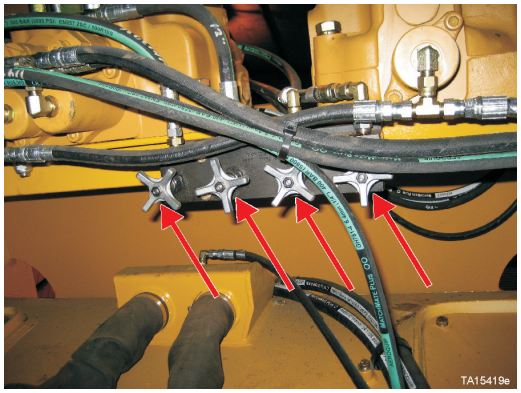
Crush hazard exists by the lift arms or bucket if all personnel are not cleared from the bucket and lift arm area before using the hydraulic hoist and bucket pilot pressure bleed down valves to relieve pressure from the hoist and bucket pilot circuit. Clear all personnel from the area around the bucket and lift arms before operating hydraulic hoist and bucket pilot pressure bleed down valves. Using the hydraulic bleed down valves could result in some movement of the lift arms and bucket which could cause injury or death.

Step 12: Use the hydraulic pressure bleed down valves located in the front frame underneath the Husco valves to bleed any stored pressure in the hoist and bucket circuit.

Step 13: Turn each valve slowly counterclockwise as shown below and allow the pressure to bleed down.

Step 14: Open the valve completely and leave it open during repairs.





Step 15: Drain the hydraulic reservoir if applicable to the procedure being performed.

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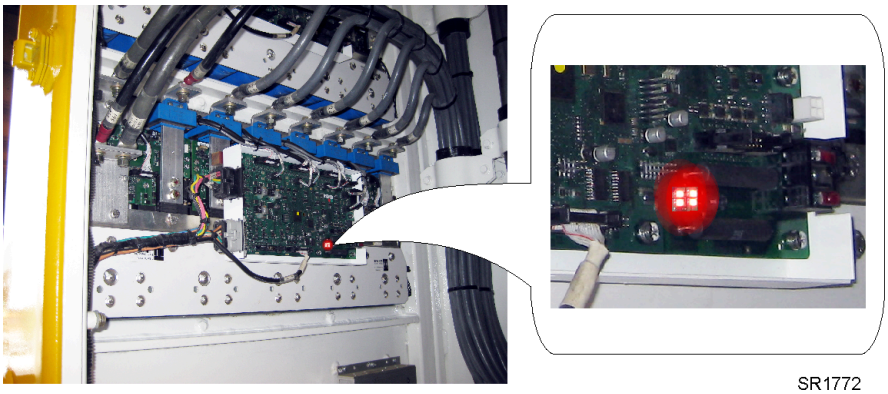
Converter Bus Voltage

WARNING

Risk of fatal electrical shock or injury by contact in the electrical cabinet is possible if the engine is running, the LINCS software indicates voltage on the bus, or the red bus LED's in the electrical cabinet are illuminated. All Generation 2 SR equipment has the ability to produce voltage at low throttle. Even with the engine off, there may be a residual of 12-15VDC on the bus. Do not enter the electrical cabinet or touch any components in the electrical cabinet without performing the Bus Discharge Verification Procedure. Failure to do so may result in fatal electrical shock or other injury.

Figure 16: Converter assembly bus LED's



There are three different methods that are combined to verify when it is safe to enter the electrical cabinet. All three methods are required in order to assure that the system is properly discharged.

1. LINCS II display in cab
2. visual indication in electrical cabinet
3. physical measurement

Verification of the Absence of Bus Voltage

There are three different methods that are combined to verify when it is safe to enter the electrical cabinet.

1. LINCS II display in cab
2. Visual indication in electrical cabinet
3. Physical measurement

   These steps are required in order to ensure that the system is properly discharged.

In Cab Verification Using LINCS II Display

Before You Begin

Make sure that the LINCS II system is booted (key switch ON) with the engine NOT running and the park brake SET.

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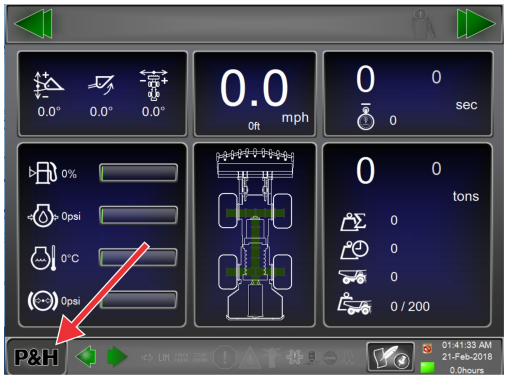
Step 1: As shown in the following figure, on the touch panel in the dash, press the Main Menu button in the lower left corner, then select Data Logging and Logging/Monitoring.

Figure 17: LINCS logging/monitoring menu access



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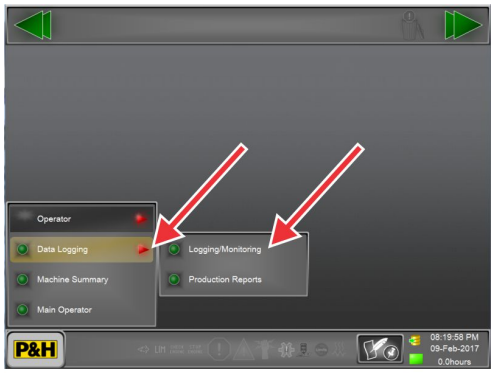
Main Menu Button

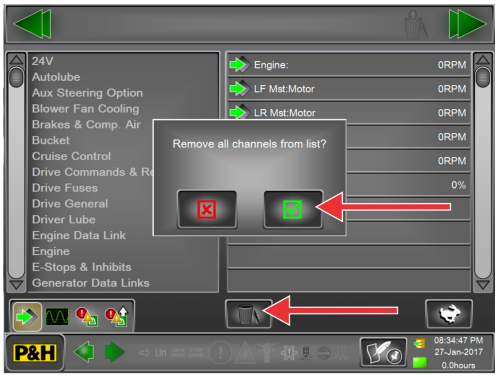


TA15639-PH

Data Logging & Logging/Monitoring

Step 2: Select the Trash Can icon and select the Check Mark to clear any selection on the right hand side of the screen (if applicable).

Figure 18: Remove channels



TA15638a-PH

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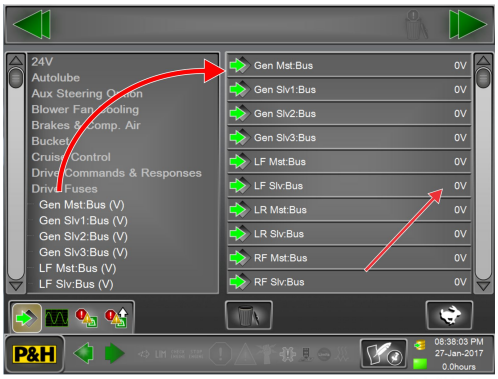
Step 3: Scroll down the left hand list until Drive Fuses is displayed.

Figure 19: Left hand scroll

Step 4: Drag the Drive Fuses category to the right hand side of the screen, all of the bus voltage channels should now be visible.

Figure 20: Bus voltage indication



Step 5: Verify bus voltage is less than 24VDC.

NOTICE

Should any voltage (greater than 24VDC) be present on any of the DC busses, allow the system to discharge for a period of no less than 10 minutes. Re-test the bus voltages prior to continuing.

Step 6: Turn the key switch to the OFF position and proceed to the next step in the verification process.

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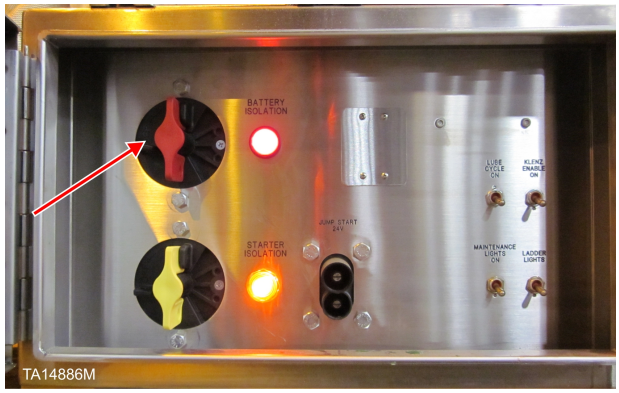
Verification by Visual Indication

Following the verification by LINCS II software, the next step is to verify the existence of bus voltage by the array of four LED indicators located on the main SR control board on each converter assembly.

To conduct this test, ensure that:

- The 24V DC power is isolated at the battery disconnect (turned off and locked out) per site requirements.

Figure 21: Isolation and control switch assembly

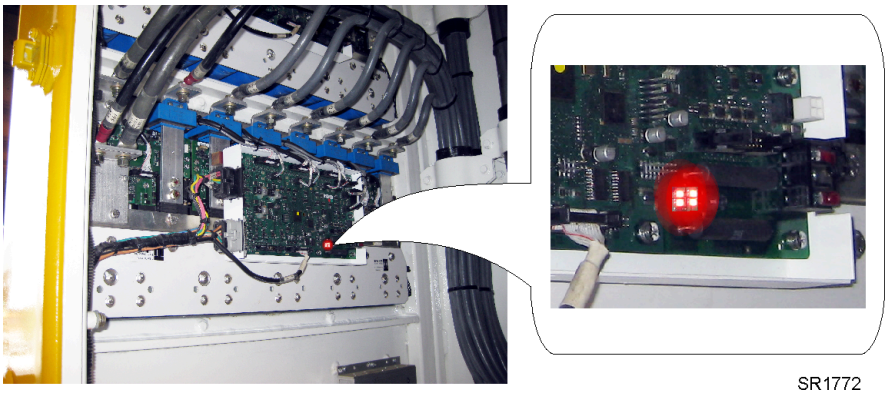


Isolate the battery and lockout the machine

- The SR electrical converter cabinet door can now be opened.
- DO NOT enter the cabinet at this time.

View the LED arrays on each of the converter assemblies and verify the LED's are not illuminated. The LED's will be illuminated when a potential of greater than approximately 35VDC is present on the DC bus connections on the converter assemblies. The light intensity varies with voltage and a greater intensity indicates a higher bus voltage.

Figure 22: Bus voltage LED array on SR control board



Once verified that the LED's are NOT illuminated, proceed with Verification by Physical Measurement of the main bus bars.

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Verification by Physical Measurement Main Bus Bars

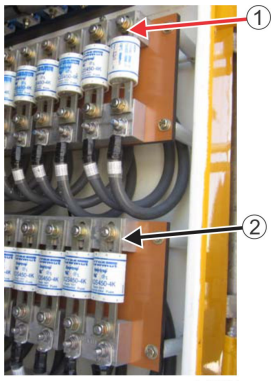
Once the visual indicators have been verified, the bus voltage should be physically measured. The bus voltage should be fully discharged based on the previous checks.

Step 1: Measure between the positive and negative bus bars using a voltmeter rated for 1000V. The potential voltage on a bus that has not discharged could be over 700VDC. A properly discharged bus should be less than 24VDC as verified by the completion of LINCS system verification.

WARNING

Risk of shock or equipment damage by use of an improperly rated meter is possible. Use a CAT III 1000V rated volt meter to take voltage readings. Shock or other injury may result from using improperly rated test equipment.

Figure 23: Main bus bars



1) Positive bus bar, **2)** Negative bus bar

KESS (Kinetic Energy Storage System) Discharge Verification

The KESS (Kinetic Energy Storage System) is composed of one or more ESD's (Energy Storage Device), converter panels, and fuses, controlled by the Vehicle Control Unit (VCU).

If the KESS is not discharged, the ESD can continue to rotate for two hours once the machine has been shut down.

Before performing any work procedures on the KESS system, verify the ESD is not rotating. Verification can be accomplished by using the LINCS II software to view the ESD RPM.

The purpose of the KESS discharge procedure is to dissipate potential energy so that the KESS system components may be serviced or repaired. If for any reason, the KESS cannot be discharged, service on the machine must be delayed for two hours, giving the ESD time to come to a complete stop.

NOTICE

To discharge the KESS system, the engine must be running, LINCS booted up and the engine in LO engine speed.

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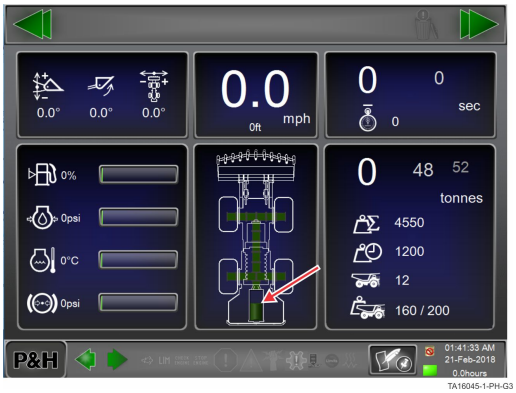
⚠ WARNING

Electrical shock hazard exists after the KESS system ESD has stopped rotating. Stopping the ESD rotation does not discharge the electrical bus system. Before touching any electrical components or connections, perform the "Bus Discharge Verification Procedure". Failure to perform the Bus Discharge Verification Procedure before touching any electrical components or connections could cause electrical shock hazard resulting in serious injury or death.

Figure 24: Operator Screen — KESS at 60%



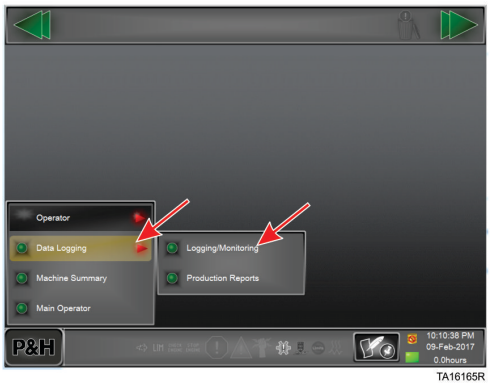
Step 1: Ensure Park Brake is SET.

TA16219L

Step 2: Place machine in LO engine speed. The button is located on the overhead keypad.

Step 3: Access the LINCS II screen. LINCS must be booted up. The operator screen must be ON.

- **a.** Select LINCS II Main Menu button.
- **b.** Select Data Logging.
- **c.** Select Logging/Monitoring.



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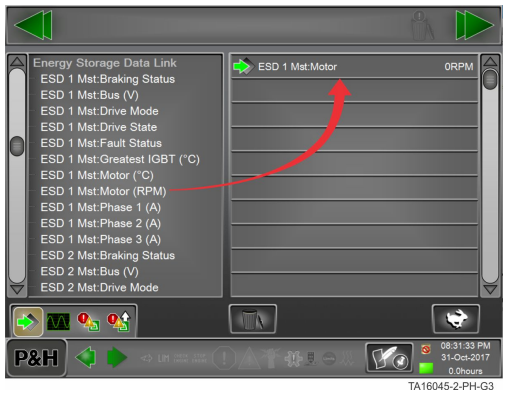
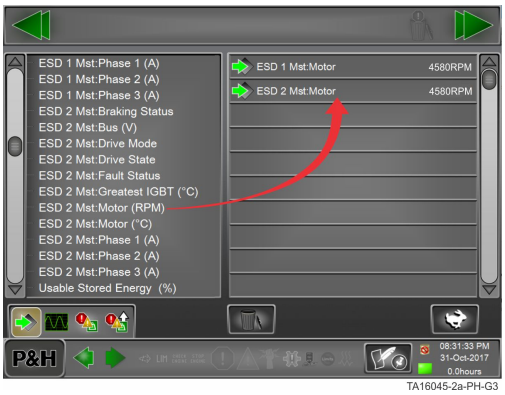
d. Select Drive Commands and Responses.

e. Move ESD 1 Mst:Motor (RPM) and ESD 2 Mst:Motor (RPM) to right column by clicking and dragging.

Figure 25: ESD Motor Channel Select





Step 4: Verify ESD rotation speed.

The speed of the ESD(s) rotation can be viewed in the upper right-hand corner of the screen after dragging the channels to the column on the right. The speed is displayed in RPM.

Figure 26: ESD RPM reading

Step 5: Press the Drive Enable switch.

It does not have to be held down.

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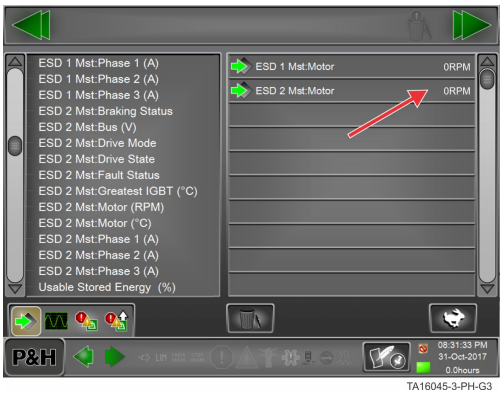
Figure 27: Drive Enable Switch

Step 6: The ESD Mst:Motor RPM will start to decline and will reach 0 RPM in approximately 35 seconds.

Figure 28: ESD Motor RPM



ESD (Energy Storage Device) Rotation Verification Procedure

The KESS (Kinetic Energy Storage System) is composed of one or more ESD's (Energy Storage Device), converter panels, and fuses, controlled by the Vehicle Control Unit (VCU).

If the KESS is not discharged, the ESD can continue to rotate for two hours once the machine has been shut down.

Before performing any work procedures on the KESS system, verify the ESD is not rotating. Verification can be accomplished by using the LINCS II software to view the ESD RPM.

NOTICE

The engine does not have to be running to determine ESD RPM. The LINCS system must be booted up and the operator screen must be ON.

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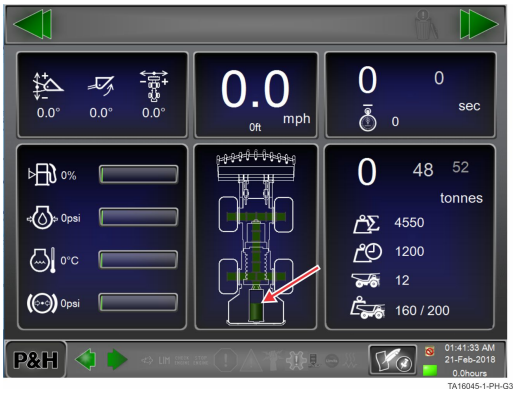
WARNING

Electrical shock hazard exists after the KESS system ESD has stopped rotating. Stopping the ESD rotation does not discharge the electrical bus system. Before touching any electrical components or connections, perform the "Bus Discharge Verification Procedure". Failure to perform the Bus Discharge Verification Procedure before touching any electrical components or connections could cause electrical shock hazard resulting in serious injury or death.

Figure 29: Operator Screen — KESS at 60%



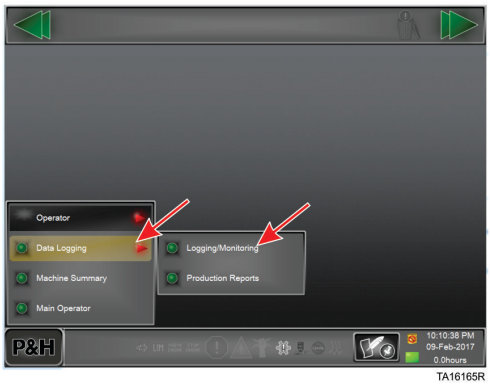
Step 1: Ensure Park Brake is SET.

Step 2: Access the LINCS II screen. LINCS must be booted up. The operator screen must be ON.

a. Select LINCS II Main Menu button.

b. Select Data Logging.

c. Select Logging/Monitoring.



d. Select Drive Commands and Responses.

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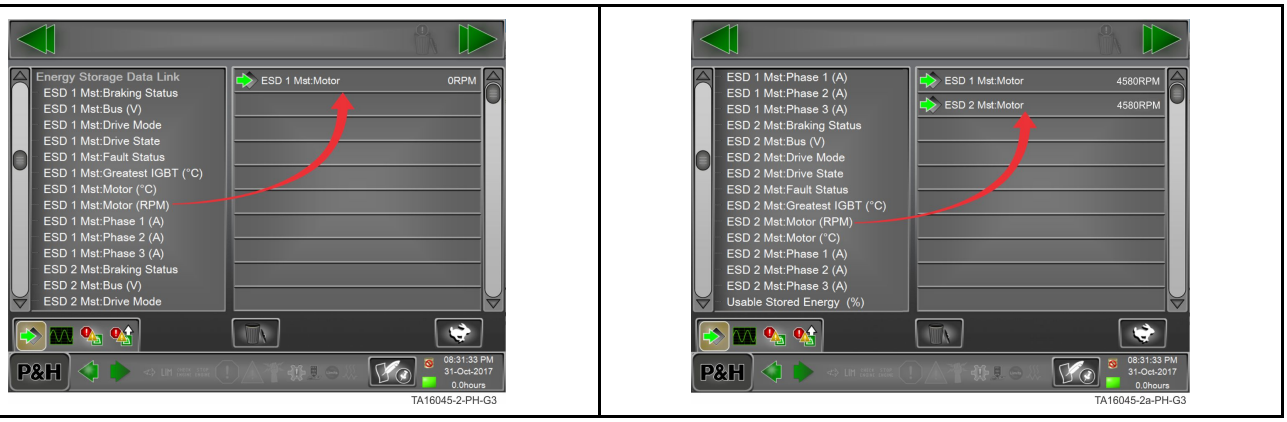
e. Move ESD 1 Mst:Motor (RPM) and ESD 2 Mst:Motor (RPM) to right column by clicking and dragging.

Figure 30: ESD Motor Channel Select



Step 3: Verify ESD rotation speed.

The speed of the ESD(s) rotation can be viewed in the upper right-hand corner of the screen after dragging the channels to the column on the right. The speed is displayed in RPM.

Figure 31: ESD RPM reading

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Fire Suppression Systems

Step 1: If creating a significant heat source such as grinding, cutting, or welding on the machine or machine components, remove the fire suppression circuit monitor panel's in-line fuse.

CAUTION

Before performing heat generating processes such as grinding, cutting, or welding on a machine, the fire suppression system circuit monitors panel's in-line fuse must be removed (if present). The fuse (on some models) is located in the battery box on the loader. Failure to do so may cause the system to actuate and/or damage the solid-state components of the system. Replace the in-line fuse before the machine has been started or after all welding operations have been completed. Only personnel that are qualified by the fire suppression manufacturer should remove or replace the fire suppression fuse (if present).

Figure 32: Fire suppression in-line fuse located in loader battery box.

Step 2: If creating a significant heat source such as grinding, cutting, or welding on the machine or machine components, remove the fire suppression internal battery, if present.

NOTICE

Some fire suppression systems have an internal battery and are not hard wired to the machine batteries. This fuse will not exist on these machines. Before beginning any heat producing work on the machine, appropriate steps must be taken to prevent the heat producing activity from activating the fire suppression system. Only allow personnel qualified/approved by the fire suppression system manufacturer to remove the battery or work on the system.

CAUTION

Have qualified fire watch personnel present, and keep a fire extinguisher that meets all statutory regulations nearby during all cutting and welding operations.

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Working at Elevated Locations

WARNING

Fall hazard exists when working at elevated locations. Take appropriate 'fall arrest" safety precautions as required by local rules, regulations, and procedures when working at heights on the machine, as example, on the rear and front frames. Follow all required statutory regulations for working at height. Failure to follow all locally required "fall arrest" procedures can cause a fall hazard, resulting in serious injury or death.

Suspended Loads

WARNING

Crush hazard exists when a load is suspended. Suspended loads can fall. Never work under suspended loads. Working under suspended loads could cause a crushing hazard which might result in serious injury or death.

When all procedures are complete, follow all lockout tag out rules, local rules, and local regulations to return the machine back to service.

Pre-Service or Repair Preparations and Cautions

The machine's large size and diesel-electric power unit make it necessary to take special precautions to ensure a safe working environment.

The following precautions and procedures should be adhered to anytime the machine is brought in for service or repair: All local rules should also be followed.

NOTICE

In addition to the following instructions, anyone performing service operations to the machine should be familiar with the location and operation of all service switches and connections as described in "SERVICE SWITCHES", located in Section 01 of the Service Manual.

WARNING

Electrical shock hazard exists inside the electrical converter cabinet when the red LED lights inside the cabinet are illuminated. DO NOT ENTER the electrical converter cabinet if the engine is running. Do not enter the electrical converter cabinet if the bus voltage indicator LED's on the SR converter assemblies are illuminated. Do not enter the electrical converter cabinet if the machine park brake is not set. Do not touch any electrical component, assembly or electrical connection on the machine if the bus voltage indicator LED's on the SR converter assemblies are illuminated. Check ALL converter panel LED's for voltage. Entering the electrical cabinet or touching electrical components anywhere on the machine while the red LED lights are illuminated or there is voltage on the electrical bus might cause electrical shock, resulting in serious injury or death.

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⚠ WARNING

Struck-by hazards exist when around hydraulic fluid, air, fuel, or grease that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a struck-by hazard with deadly force. DO NOT tighten or loosen hydraulic, air, fuel, or grease lines without first relieving the pressure. DO NOT make adjustments to any fluid pressures while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly pressurized liquids or air. Failure to use proper PPE or to shut down the machine before making adjustments can cause a struck-by hazard resulting in serious injury or death.

⚠ WARNING

Burn hazards exist when the machine is running and for some time after the machine is shut down. Fluids such as hydraulic fluid, converter panel coolant, or engine coolant will remain hot for some period of time. Always allow these fluids to cool before breaking any connection, or opening any fill or drain component on any system that uses them for coolant or lubrication. Working on systems containing hot fluids can cause burn hazards resulting in serious injury or death.

NOTICE

SR converter assemblies are inverted on the opposite wall of the high voltage cabinet.

Electrical Hazards

Figure 33: High voltage indicator lights

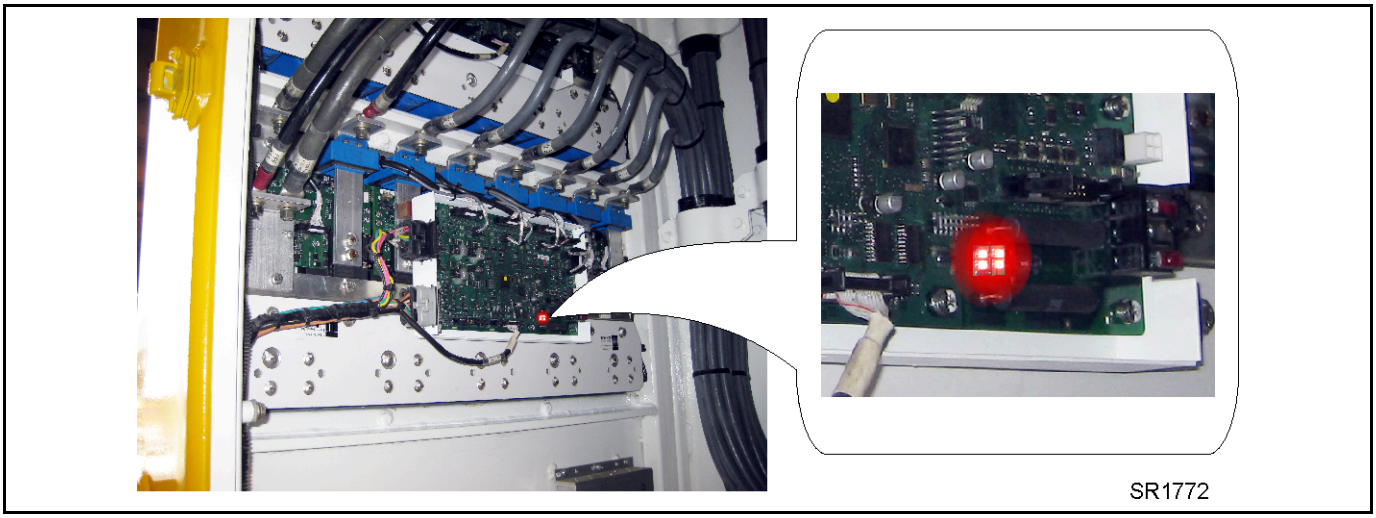

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Figure 34: Typical braking grid (shock hazards)

Braking grids on other models might appear different, located at rear of machine

WARNING

Electrical shock hazard exists if touching the dynamic braking grids when the drive is enabled. High voltage is present when the drive is enabled. Do NOT touch the braking grids (or any electrical connection on the machine) when the key switch is ON, or the generator is primed, or until five minutes after the engine has been shut down and the absence of bus voltage is verified. Contact with the braking grid can cause fatal electrical shock, resulting in serious injury or death.

Figure 35: Electrical converter cabinet (shock hazard)

WARNING

Electrical shock hazard exists if opening the electrical converter cabinet while the engine is running. NEVER open the electrical converter cabinet while the engine is running. High voltage is present when the drive is enabled (at any throttle speed) and may be present even if the machine is shut down. Do not touch any drive system component electrical connection on the machine for at least 5 minutes after the machine is shut down. Always verify the absence of bus voltage before touching drive system component electrical connections. If inspection or service procedures involve contact with any electrical component of the drive system, opening the converter cabinet, or removing axle access covers, or touching drive system electrical component connections, the key switch must be off, the machine not running, the electrical system MUST be locked out by using the battery isolation switch, and the absence of bus voltage verified. Accidental contact with energized terminals or components could result in serious injury or death.

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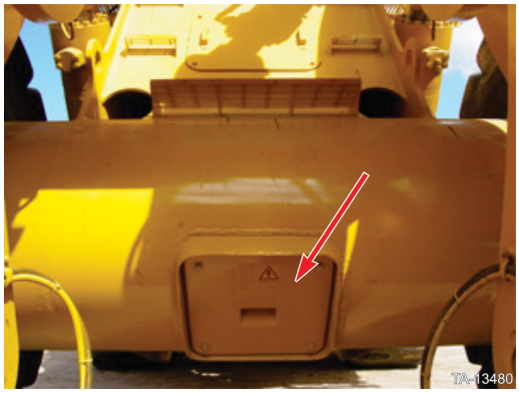
⚠ WARNING

Electrical shock hazard exists inside the axle if axle access panel on either axle is removed without locking out the electrical system. Always verify the absence of bus voltage before removing the axle access panels and touching any electrified component inside the axle. Failure to lockout the electrical system, and touching electrified components inside the axle could cause electrical shock which might result in serious injury or death.

Figure 36: Front axle access panel (shock hazards)



Some Warning labels/placards may not be shown in above photo. Similar access panel is found on rear axle.

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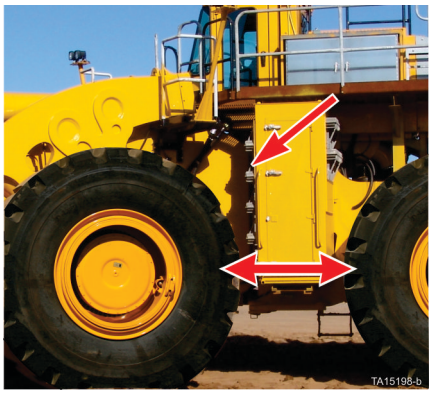
Frame Lock

Figure 37: Crush hazard areas

WARNING

Crush hazard exists because there is no room for a person in the pivot area or the area between the tires when the machine turns (articulates). The frame lock should be moved to the locked position EACH TIME service or repair operations are being conducted. This is especially important when energized tests of components are performed, when work is being done in the pivot area of the machine, or if the machine is jacked up. Service personnel should enter this area only when absolutely necessary. Entering the pivot area or the area between the tires can cause a crush hazard, resulting in serious injury or death.



WARNING

Crush hazard exists on both sides of machine in the articulation area and the area between the tires. Do not enter these areas when the machine is running. Entering the articulation area or the area between the tires when the machine is turning can cause a crush hazard, resulting in serious injury or death.

MACHINE STEERED STRAIGHT**(Arrows indicate crush hazard areas-present on BOTH sides of machine)**

Area between front and rear of machine (crush hazard areas) machine articulated to left

(Arrows indicate crush hazard areas-present on BOTH sides of machine.)

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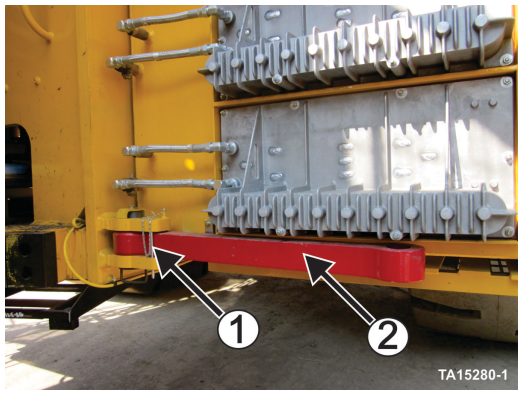
Figure 38: Move frame lock into unlocked position and secure with retaining pin (crush hazard areas)



NOTICE

Some models have a holding pin (#1), on the frame lock pivot bracket, that holds the frame lock (#2) in position when the frame is not locked.

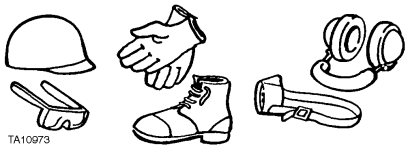
CAUTION

Following completion of service or repair operations, it is critically important that the frame lock be removed from the locked position and properly secured in the unlocked position or machine damage will result.

(Left side of machine at pivot area)

General Service or Repair Precautions

Step 1: Wear a hard hat, protective glasses and other protective equipment as required by job conditions.



Step 2: NEVER use an open flame to check the battery, fuel, coolant, or to look for leaks anywhere on the machine. Use lights as provided or a flashlight.

Step 3: DO NOT make unauthorized modifications to the machine. These modifications may impair the function and safety and affect machine life.

Step 4: NEVER put maintenance fluids such as oils, solvents, diesel, etc. into glass containers.

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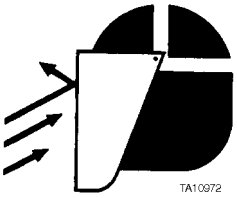
Step 5: NEVER use gasoline for cleaning purposes.

Step 6: Pressurized air can cause personal injury. When using pressurized air for cleaning, wear a face shield, protective clothing, and a vented nozzle.



Step 7: Use approved access per local safety standards to reach service or repair points.

Step 8: The operator should use assistance from other personnel, when moving the machine around the service area, and into and out of buildings.

Step 9: Ensure ramps, floors, doors, and aisles are adequate to support and clear the machine when moving in and out of a building. Refer to “GENERAL INFORMATION”, located in Section 01, for dimensions and weight of the machine.

Step 10: Consider the size and weight of the machine and its components when jacking it up or removing components and assemblies. BE SURE to have adequate hoisting devices, tools and support facilities to accommodate the weight of the machine or its components.

Step 11: If possible, conduct all service and repair operations with the machine parked on a level, hard surface

NOTICE

If the machine becomes disabled in the field, it is recommended that only sufficient repairs be made at the machine failure location to allow the machine to be moved. Then, move the machine to a safe work area for completion of repairs. Test the machine, as required by the nature of the repairs, before returning it to work.

⚠ CAUTION

Burn hazards exist when the machine is running and for some time after the machine is shut down. Some components such as engine, generator, pumps, hoses, pipes and others are hot when the machine is running and for some time after the machine is shut down. Allow components to cool before working on them. Failure to allow components to cool before working on them can cause burn hazards resulting in serious injury.

⚠ WARNING

Crush hazards exist under rear of machine. Counter weight mounted under the rear frame. Do not enter this area unless the counterweights have been externally supported to prevent falling. Do not loosen the bolts for the counterweight structure unless the counter weights are externally supported. Entering the area under the counterweights or loosening the counterweight bolts without externally supporting the counterweights could cause a crush hazard resulting in serious injury or death.

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⚠ WARNING

Burn hazards exist when around hot hydraulic fluid that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a burn hazard from leaks or spraying. DO NOT tighten or loosen hydraulic fluid hoses without first relieving the pressure. DO NOT make adjustments to any fluid pressures or flow while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly hot pressurized liquids. Failure to use proper PPE or to shut down the machine before making adjustments can cause a burn hazard resulting in serious injury or death.

NOTICE

Component weights are provided in Section 01 of the Service Manual.

Step 12: Block the machine to prevent it from rolling while working on or under it.

Step 13: Lower the bucket to the ground and use the main bleed valve assembly to vent pressure in the hoist and bucket circuit before beginning inspection, service, or repair operations. Refer to Section 04 in the Service Manual for information to vent pressure in the hoist and bucket circuit.

Step 14: Set the park brakes.

Step 15: Turn the Klenz enable switch to the OFF position. The KLENZ enable switch is located inside the Isolation and Control Switch Box Assembly, mounted on the left side, near the rear of the machine.

Figure 39: Isolation and control switch box assembly

Located on left rear of machine

1) Auto lube switch inside

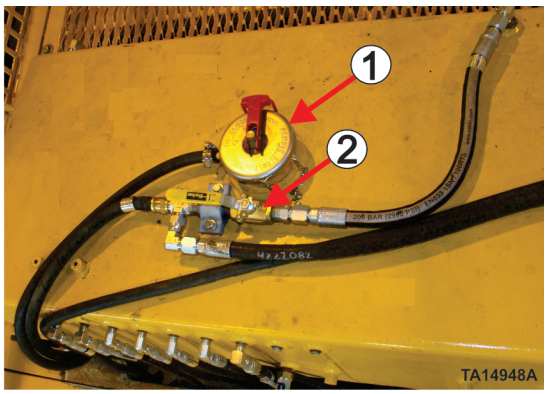
2) KLENZ enable

3) Ladder lights

4)Maintenance lights

Step 16: BE CAREFUL when working with or around a hot cooling system. Liquid cooling systems build up pressure as the engine gets hot. Before removing the radiator cap, stop the engine and let the system cool. Remove the radiator cap (slowly) only after the coolant is cold and de-pressurized. Refer to illustration “Radiator cap” below. A drain hose will drain hot coolant down to ground level near the radiator/engine area. Be aware of hot coolant that can be expelled automatically or manually any time the system is pressurized.

Figure 40: Radiator cap and vent valve

<table>
<tr><td> 
</td><td>1) Radiator cap
2) Vent valve</td></tr>
<tr><td colspan="2">(Located on top of rear frame)</td></tr>
</table>

Step 17: Keep clear of all rotating components. Wrapping, entanglement, or contact by clothing or extremities may result in serious injury or death.

⚠ WARNING

Entanglement hazard exists if attempting to work on rotating equipment. Do not work on the machine with the engine running unless specifically instructed to do so by the engine manufacturer or so stated within a specified work procedure. KEEP CLEAR OF ROTATING SHAFTS. The shaft between the Hydraulic Pump Drive (HPD) and the generator rotates any time the engine is rotating, even while the engine is being cranked. Wrapping, entanglement, or contact of clothing or extremities may cause an entanglement hazard that results in serious injury or death.

⚠ WARNING

Skin injection hazard exists if diesel fuel, hydraulic fluid, or grease under pressure penetrates the skin. Avoid all fluids under pressure and wear the proper personal protective equipment (PPE) for working around fluids under pressure. If any fluid is injected into the skin, it must be removed as soon as possible by a doctor familiar with treating this type of injury. Failure to avoid fluids under pressure can cause skin injection which could result in serious personal injury, blindness, or death.

Fluid leaks under pressure may not be visible. When searching for leaks, NEVER use your hand; use a piece of metal. Wear work gloves and keep your hand well away from the possible source of leakage. DO NOT tighten or loosen fuel, hydraulic, or grease lines without first relieving the pressure. Wear safety goggles for eye protection.

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Step 18: Hot oil and components can cause personal injury. Do not allow hot oil or components to contact the skin.

Step 19: Avoid prolonged and repeated skin contact with used oil. With prolonged and repeated contact, serious skin or bodily injury may develop. Wash thoroughly after contact.

Step 20: BE CAREFUL with fluids under pressure. The hydraulic system is under pressure whenever the engine is running and will hold pressure after shutdown.

⚠ WARNING

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California, USA to cause cancer and birth defects or other reproductive harm. Do not handle battery posts, terminals or related accessories containing let or lead compounds without wearing proper personal protective equipment (PPE) as required by local rules, regulations, or policies.

Step 21: Refer to safety instructions in Section 03 in the Service Manual before inflating, deflating, removing, or installing tires and rims.

Fall Arrest Attachment Points

⚠ WARNING

Fall hazard exists when working at elevated heights without wearing a fall restraint device. Always wear a fall restraint device, as provided by local rules and regulations, when working at elevated heights. Follow all local rules, regulations, and laws regarding working at elevated heights, while working on the machine. Failure to follow all local rules and regulations for working at elevated heights can cause a fall that might result in serious injury or death.

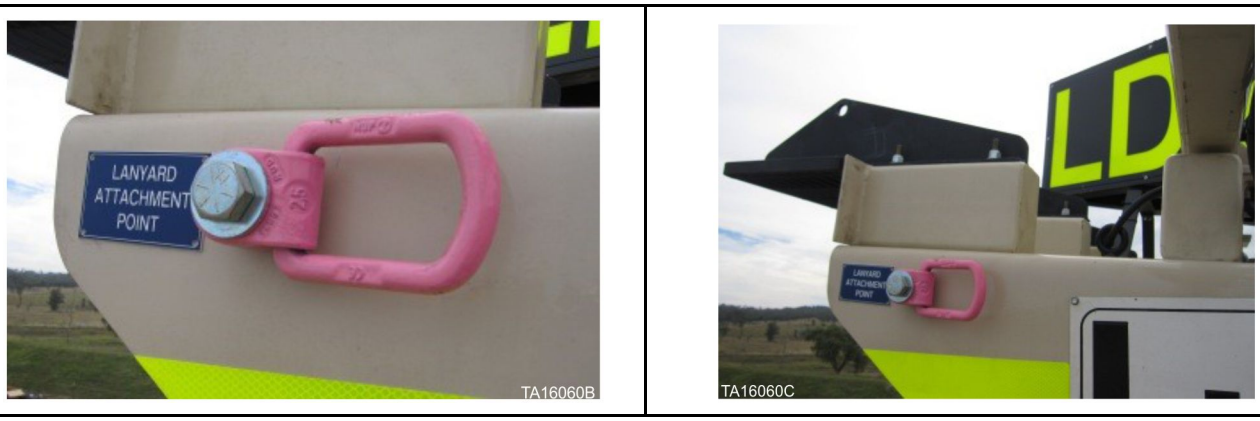
Machines may be fitted with fall arrest attachment points. If available, use the fall arrest attachment points located on the machine in areas where it is typically necessary to use a safety harness, in order to access that area safely. The areas where the attachment points are located are:

- One either side of the main hood above the engine safety filters access door.

Figure 41: Fall arrest attachment points-main hood

- One either side of the Falling Object Protection Structure (FOPS) used when accessing either left hand or right hand front wing platforms.

Figure 42: Fall arrest attachment points-FOPS sides



- One located at the front of the FOPS used when accessing the top front frame area between the lift arms.

Figure 43: Fall arrest attachment points-main hood-FOPS front

Sound Abatement Panels

Machines may be fitted with sound abatement panels (optional) designed to lower the sound emitted by the power unit components. One panel is opened by using a locking handle latch on the outside of the panel. The companion panel can be opened by releasing the latch inside the panel by simultaneously pulling up on the bottom latch and pulling down on the top latch and pulling it open.

The panels should be lubricated with grease as needed to ensure free operation.

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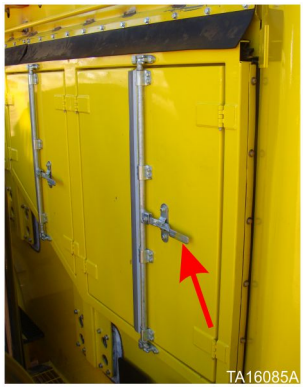
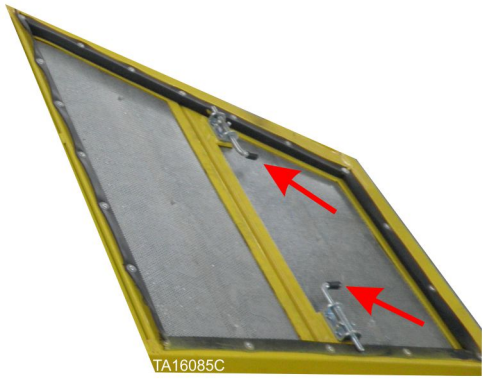
WARNING

Fall hazard or struck-by hazard exists when opening the sound abatement panels. If the loader is on a slight incline or in high wind, the panel could quickly swing wide open. The panels are heavy. Do not stand in front of the panel when releasing the handle or internal latches. Stand on the opposite side of the door hinge when opening the door. Standing in front of the door can cause a fall or a struck-by injury that results in serious injury or damage to the panel and hinges.

Figure 44: Typical sound abatement panel handle latch and inside latches

	
Panel handle latch	Latches inside panels (top and bottom)

Wheel Chocks

Wheel chocks and mounting brackets are optionally provided on some models. Wheel chocks are used to block the tire to deter equipment movement during work procedures.

A chock should be placed in front of and behind each tire. Failure to prevent equipment movement could result in serious injury or death.

WARNING

Crush hazard exists if not using wheel chocks to prevent machine movement, as necessary. When chocks are not provided as an option, chocks shall still be used according to local rules and regulations. Local rules and regulations shall be used to determine appropriate chock size to prevent equipment movement. Failure to use wheel chocks could cause a crush hazard which might result in serious injury or death.

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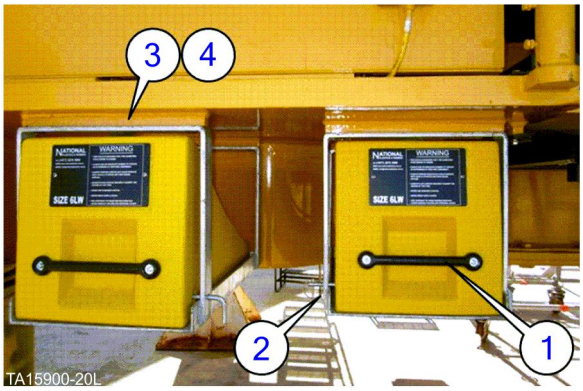
Figure 45: Wheel chocks and mount brackets (optional)



1) Wheel chock, **2)** Wheel chock holder bracket, **3)** Screws, **4)** Wheel chock mount bar

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Roll Over Protective Structure (ROPS) and Falling Object Protective Structure (FOPS)

The machine is equipped with a Roll Over Protective Structure (ROPS) and a Falling Object Protective Structure (FOPS). The ROPS provides the operator crush protection in a rollover and the FOPS provides protection from objects falling onto the cab from above. The FOPS is bolted to the top of the ROPS. Refer to illustration “Rollover protection structure and falling object protective structure assembly”. Refer to Section 03 in the Service Manual for service requirements of the FOPS and ROPS.

NOTICE

The ROPS structure is certified per government regulations. Any modifications to the ROPS, such as welding on or drilling holes in the structural members will affect the capability of the ROPS to provide adequate protection. Any modification or repair to the ROPS without the specific approval of Komatsu will void its certification. Contact your authorized Komatsu distributor before making any modifications or repairs to ensure that such will not void the certification.

Figure 46: Typical torque nut as used on ROPS

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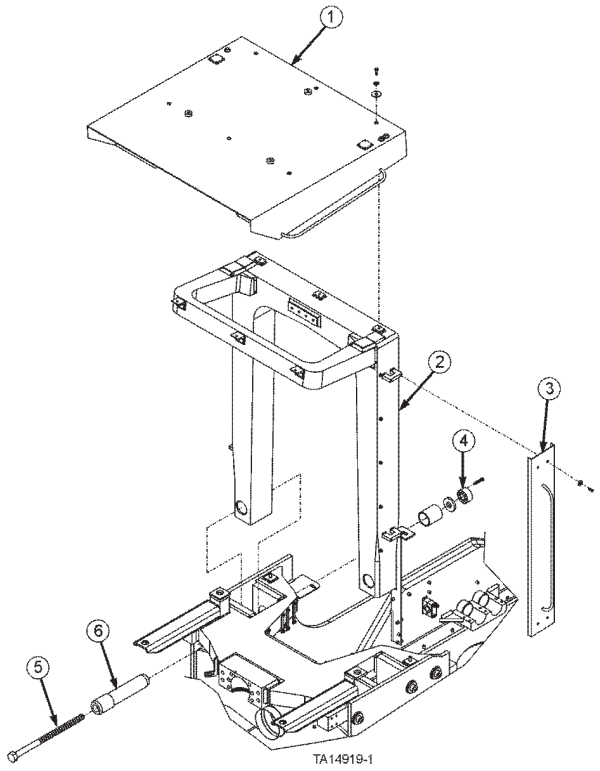
Figure 47: Rollover protection structure and falling object protective structure assembly (typical)



1. Falling object protective structure (FOPS)

2. Roll over protective structure (ROPS)

3. Cover structure

4. Torque nut

5. Bolt

6. Pin

NOTICE

For exact illustration, refer to Parts Manual for specific machine model/serial#

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Emergency Shutdown Switches

A palm operated, (push to actuate, twist to release), pushbutton type emergency shutdown switch is provided on the operator console in standard applications. Refer to illustration “Emergency shutdown switch” below.

Four ground-level emergency shutdown switches are provided on the machine. These switches are palm operated (push to actuate, pull to release), pushbutton type switches. Two are mounted on each side of the machine (right and left rear). One is located at the bottom of the hydraulic reservoir on the right of the machine, and one is located at the bottom of the high voltage cabinet. Refer to illustration “Emergency shutdown switches – typical locations” for the typical mounting locations on the machine. Number and mounting locations for the switches may vary depending on machine model, configuration, or options.

NOTICE

Locations may vary depending on model. Check the machine and note of all switch locations before operating machine.

Figure 48: Emergency shutdown switches

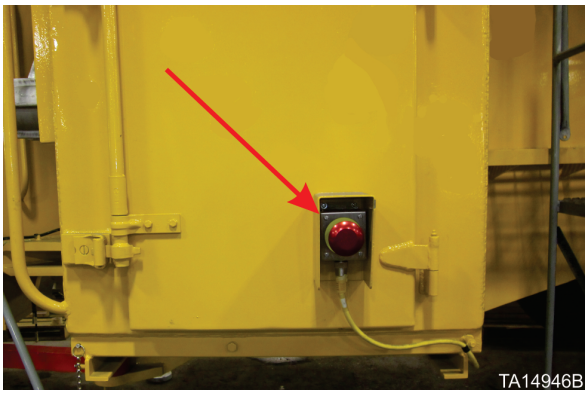
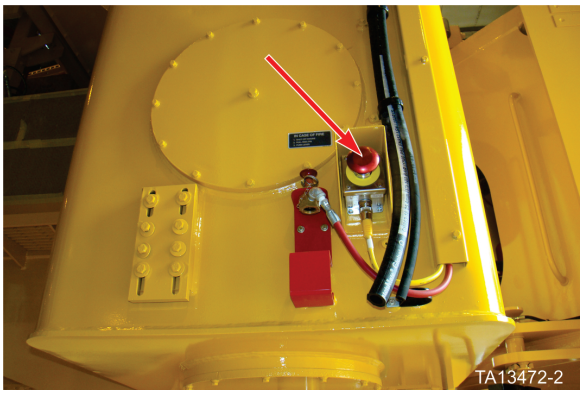
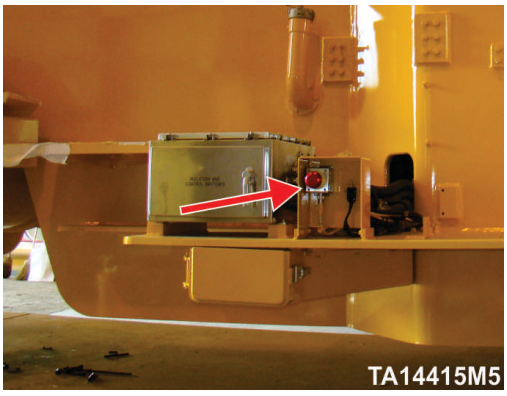
<table>
<tr><td> 
</td><td>
</td></tr>
<tr><td>Mounted on electrical converter cabinet</td><td>Console mounted (inside cab)</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Mounted on right side, on hydraulic reservoir</td><td>Mounted on left side, near rear of machine</td></tr>
</table>

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Figure 49: Emergency shutdown switches (continued)

Mounted on right side, near rear of machine

Figure 50: Emergency shutdown switches - typical locations

1. Right rear, right side of rear frame,

2. Hydraulic reservoir,

3. Operator's cab (on console),

4. Bottom of electrical converter cabinet,

5. Left rear, left side of rear frame

NOTICE

Any time the emergency shutdown function has been activated, the engine must be inspected by a qualified and experienced technician before placing the machine back in service.

Operation of Emergency Shutdown Switches

When pressed, these switches remove engine ignition electrical power, which in turn kills the engine. Most DC control voltages are deactivated when the emergency shutdown circuit is actuated. The park brake is immediately set.

After an emergency stop has been pushed, normal startup procedures must be followed to start the machine, including a complete reboot of the LINCS II system.

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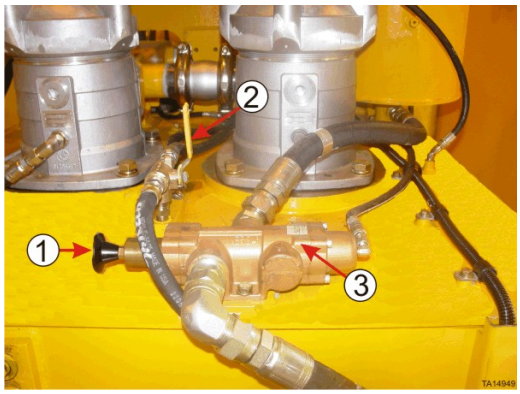
When the emergency shutdown or fire suppression systems are actuated, the automatic air release valve, located on top of the hydraulic reservoir, will automatically release air pressure from the hydraulic reservoir. Once tripped, the valve must be manually reset by pushing the button IN to the closed position. Refer to illustration “Hydraulic reservoir air release valve” below.

Figure 51: Hydraulic reservoir air release valve

	**1.** Reset button **2.** Manual air release valve **3.** Automatic air release valve

⚠ CAUTION

Struck by hazard exists if the park brake is set while the machine is in motion. This will stop the machine suddenly, possibly causing the operator to be thrown unexpectedly and rapidly against the seat belt or harness. Do not use the park brakes to stop the machine unless in an EMERGENCY situation. Use the service brake to stop the machine during normal operation. Using the park brake to stop the machine can cause the operator to be thrown forward rapidly against the seat belt or harness, resulting in serious injury.

CAUTION

Use of the emergency stop buttons can cause engine turbo damage. Follow the proper engine shutdown process if there is not an emergency to stop the machine. Use the emergency stop switches only in an emergency. Immediate machine shutdown could result in damage to the engine turbochargers.

Switch Testing Procedure

Refer To Section 02-01-08 “PM 24VDC System”.

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Rearview Mirrors

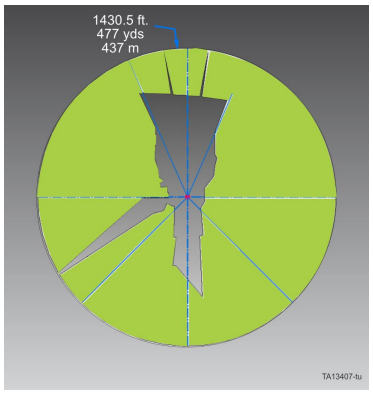
Side Rearview Mirrors

Side rearview mirrors are mounted on each side of the operator's cab to provide a rectangular view of each side of the machine. The operator can use the rearview mirrors to check most blind areas when BACKING UP or MOVING SLOWLY, to see if people, equipment, or other obstacles are in a dangerous position for operation of the machine.

NOTICE

The side rearview mirrors do not eliminate all potential blind spots behind and to the side of the machine. The operator must be continually aware of other personnel, vehicles, and objects within the work area. Advise support personnel to ALWAYS maintain a safe distance and visual contact with the operator when in the area of machine operation. If unsure of location of personnel or vehicles in the work area, exit the cab and look!

Figure 52: Typical "blind" areas on the machine (not model specific)

 Illustration not to scale	**Visibility** (including use of mirrors) **Green-** visible **Gray-** blind

NOTICE

Due to the size of the machine, the end-user must provide for a secured and controlled working environment. Komatsu cannot anticipate all possible scenarios.

Adjustments for Viewing

The view scene includes the top edge of the rear frame and rear tire ground contact area. The angles of view are approximately 70º vertical and 48º horizontal (refer to illustration "Recommended side rearview mirror adjustment and approximate field of vision").

The mirrors are convex with a spherical radius of 30" and are rectangular 20" long by 12" wide. The support and mounting system provides protection from most contact with solid objects. The mirrors also have a protective top cover that will readily swing aside if pushed by another object.

The mirror's sub-assemblies, consisting of hold down plates, clamps, friction rings, and fasteners are designed to perform two functions (refer to "Side rearview mirror installation"):

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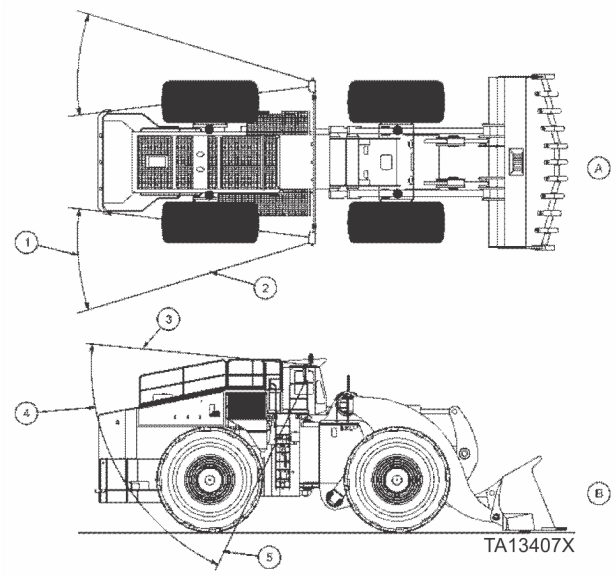
The first function is to allow easily and accurately adjusted angle positioning of the tubular support, with the fasteners tightened sufficiently to hold the arm in trial positions.

The second function is to prevent damage to the mirrors by destructive forces such as caused by the mirror's encounter with an obstruction. This requires additional tightening of the fasteners as described below. The U-bolt fasteners that attach the mirrors to the support arm are not intended to slip during use. They are loosened only during adjustment.

Figure 53: Recommended side rearview mirror adjustment and approximate field of vision



A. Plain View of Loader

B. Right Side View

1. Approximate 24° (each mirror)

2. Approximate sideways limit of vision

3. Approximate upper limit of vision

4. Approximate 70° (each mirror)

5. Approximate lower limit of vision

Pan, Tilt, and Reach Adjustments

To make mirror adjustments the operator should be seated in his normal position and operating posture. An additional person should be positioned on the platform outside the cab to adjust the mirrors as directed by the operator. Refer to illustration "Side rearview mirror installation" for component locations described in the following instructions.

Step 1: Loosen the post clamps and U-bolts enough for easy movement but tight enough to prevent undesired position change during adjustment.

Step 2: Move the mirror up and down (rotate around support arm) for vertical tilt angle adjustment.

Step 3: Slide the mirror housing inboard and outboard on the support arm for reach adjustment.

Step 4: Swing the support post for horizontal pan angle adjustment.

NOTICE

The best possible mirror adjustment will produce a view scene including the top rear of the rear frame and the bottom of the rear tire, and without losing too much of the side of the rear frame and tire, and as large an area as possible to each side of the machine. This must be accomplished with the reach adjustment locating the mirror as near to the machine as possible.

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Step 5: After the mirror is moved to the desired position, fully tighten the pipe clamps.

Step 6: Tighten the four fasteners on the top friction assembly so that when pressing at the outboard end of the support arm pipe, maximum possible thumb-only pressure will swing the arm. Loosen these four fasteners exactly two turns.

Step 7: Repeat Step ”f” with the bottom friction assembly, except in this case, after thumb pressure test, leave as adjusted and retighten the top friction assembly exactly two turns of each fastener.

Step 8: Check final adjustment with two thumbs.

Step 9: If support arm extends more than two inches outboard from the mirror, cut off the excess.

Maintenance of the Mirrors

Step 1: Replace damaged parts when necessary. Refer to the PARTS MANUAL for ordering replacement parts

Step 2: Keep mirror glass clean by using window washing solution and wiping with paper towel.

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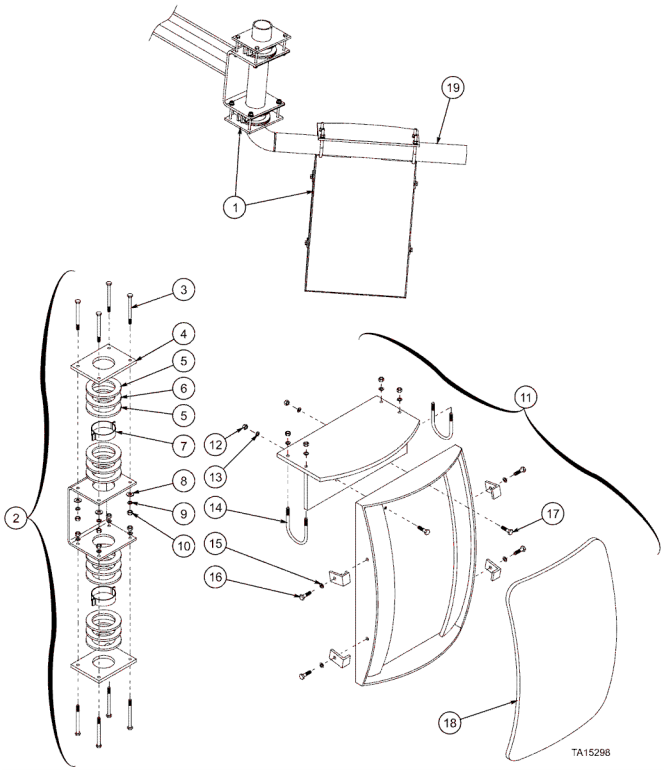
Step 3: If paint touch up is required, use RUSTOLEUM® #659.

Figure 54: Side rearview mirror installation



NOTICE

Typical cab light/bar light installation shown. Actual machine installation and light model may vary

1. Mirror assembly and mounting group	**8.** Flatwasher	**15.** Lockwasher
2. Mounting hardware kit	**9.** Lockwasher	**16.** Bolt
3. Bolt	**10.** Nut	**17.** Bolt
4. Plate, hold down	**11.** Mirror assembly, convex	**18.** Mirror, convex
5. Ring, friction - polyethylene	**12.** Nut	**19.** Pipe structure, mirror
6. Ring, friction - steel	**13.** Lockwasher	
7. Clamp half, support post	**14.** Clamp, u-bolt	

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Seat Belt Operation and Adjustment

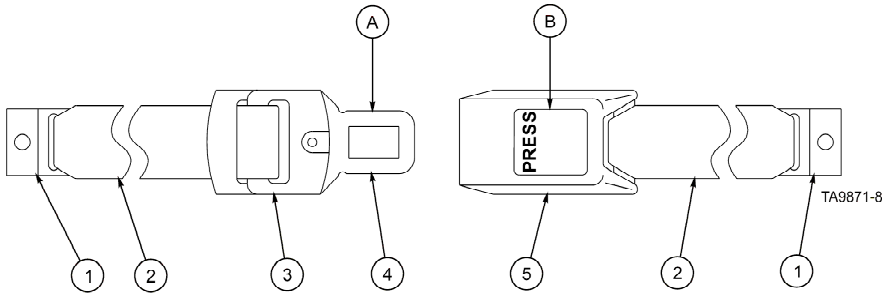
The machine is equipped with an adjustable four point seat belt harness to accommodate various requirements of operators. The seat belts are mounted to the operator's seat.

⚠ WARNING

Crush hazards exist if the operator seat belt or harness is improperly adjusted or improperly maintained. Improper adjustment or maintenance of the seat belt or harness could result in loss of machine control during operation, resulting in a crush hazard. Adjust the seat and seat belt or harness for proper access to all controls and fasten seat belt or harness before operating the machine. Always check the condition of the operator seat belts and mounting hardware before operating the machine. Failure to do so could result in serious injury. Loss of machine control could cause a crush hazard resulting in serious injury or death to personnel in the operating area.

Figure 55: Seat belt components and fastening/unfastening procedures (typical)

Operator seat belt adjustment points



A. To fasten belts, insert tongue into buckle. Listen for "click". Tug on both sides to ensure belts are properly fastened.

B. To unfasten belts, press button in top of buckle, remove tongue.

1. Mount bracket

2. Belt

3. Lock bar

4. Tongue

5. Buckle

Fastening the Seat Belt

Insert the tongue into the buckle. Listen for the "click" that indicates the belts are fastened. Tug on the belt to be sure it is securely fastened. Adjust the vertical straps until the entire seat harness is properly adjusted.

Unfastening the Seat Belt

Press the release button in the buckle and pull the tongue from the buckle.

Adjusting the Seat Belt

The belt should be tight but comfortable. The vertical straps and horizontal belt have adjustment points that can be tightened or loosened.

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Shortening the Seat Belt

With the belt fastened, pull on the outer loop to tighten the belt.

Inspecting the Seat Belt

Inspect for worn or frayed webbing.

Check for worn or damaged buckle or lock bar. Replace the entire assembly if worn or damaged.

Inspect the belt and harness mounting hardware. Replace any damaged or worn hardware. Keep the mounting bolts tight.

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Fire Prevention and Control

In the event of a fire, the machine is optionally equipped with either a manually operated hand held fire suppressor or a manually activated fire suppression system.

Fire Prevention

Proper machine inspection and maintenance is CRITICALLY IMPORTANT to prevent a disastrous fire. The following guidelines should be followed to reduce the chances of a fire:

Step 1: Daily inspection and preventive maintenance at points where fires are most likely to start - engine block, electrical system, turbochargers, exhaust manifolds, brake system and hydraulic gearbox/pump area is critically important.

Step 2: Regular cleaning of all areas where flammable materials such as fuel, oil, grease, hydraulic fluid, and combustible debris may collect is also critically important.

NOTICE

Refer to Section 02 in the Service Manual for tips on cleaning your machine

Step 3: NEVER smoke while checking fuel level or refueling. Unguarded trouble lights, flames or spark-producing devices should be kept at a safe distance while refueling. ALWAYS stop the engine before refueling the machine.

Step 4: Keep all fuel and lubricants stored in properly marked containers and away from unauthorized persons.

Step 5: Store oily rags or other flammable material in a protective container, in a safe place.

Step 6: Make sure all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing or chaffing against other parts and creating excessive heat during operation.

Step 7: DO NOT weld or cut on pipes, tubes or reservoirs that contain flammable liquids or gases.

Manual Fire Suppressor

Inspect the machine's manual hand-held fire suppressor regularly, and read and understand its operation. This fire suppressor is capable of putting out fires in the following materials: wood, paper, cloth, electrical, gasoline, and oil.

Step 1: If the suppressor is equipped with a gauge, ensure the needle is in the green portion of the gauge.

Step 2: Ensure the pin is installed and the seal has not been broken.

Step 3: Have the fire suppressor inspected and serviced by licensed personnel at the required interval or immediately if it has been discharged.

Step 4: Read and understand your employer's policy in regards to extinguishing fires before attempting to manually extinguish any fire.

Fire Suppression System - AFEX or ANSUL Systems (Optional)

The machine is equipped with either a manual or automatic discharge fire suppression system. Operator safety is greatly enhanced; however, the operator's cab is not protected. It is the responsibility of the equipment owner to ensure operators and service technicians read and understand the manufacturer's owner's manual.

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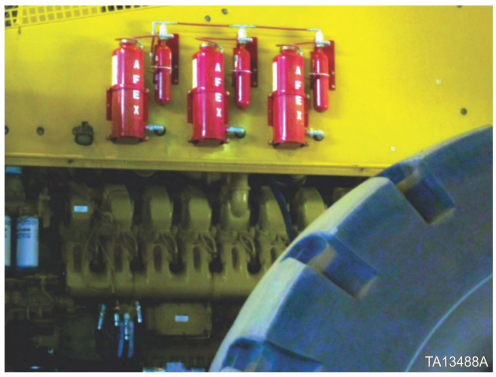
Figure 56: Fire suppression system bottles - AFEX system shown



(Bottles mounted both sides of rear frame)

CAUTION

Before operating the machine, the operator must review the manufacturer literature for operation of the fire suppression system. Manual activation may vary by manufacturer and model. Failure to do so can result in equipment damage.

NOTICE

The fire system provided on the machine is a suppression system only and is not designed or intended to extinguish all fires, particularly when unusual amounts of combustible materials and an ample oxygen supply are present. It is extremely important that alternative firefighting equipment be available in case the system does not totally extinguish a fire.

- *Use extreme care to prevent the accumulation of debris, combustible materials, and fluids that could intensify the fire or cause it to spread to areas where there was no previous potential for fire.*
- *If modifications are made to the machine, or if the fire suppression system is disconnected for any reason, make sure the fire equipment is immediately inspected and tested by an authorized distributor for the system's manufacturer.*
- *The fire suppression system's dry chemical dispersion nozzles are strategically located inside the front and rear frames. The operator's cab is NOT protected. The fire suppression system will NOT suppress fires outside the machine or in the operator's cab. The hand-held portable fire suppressor is recommended and is useful if re-ignition occurs or when fires originate independently of the machine or outside the protected areas.*
- *The discharge of the dry chemical fire suppression agent may create personnel hazards such as obscured vision or temporary breathing difficulties.*
- *Bring machine to a complete stop and shut down engine before deploying. System actuation will result in immediate discharge, which may obscure vision.*
- *The fire suppression system is a MANUALLY OR AUTOMATICALLY DISCHARGED system. Fire detection is optionally provided, but the fire suppression system WILL NOT automatically discharge unless it is equipped with the automatic fire detection activation system.*

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Circuit Monitor Panel - ANSUL System

The fire detection system circuit monitor panel (optional) is mounted inside the cab (refer to illustration “Fire suppression system actuator switches – AFEX and ANSUL systems”). The circuit monitor’s function is to monitor the fire suppression system’s electrical detection and manual actuation circuits and provide the operator with both visual and audible warnings of a fire.

Visual indicators

The circuit monitor panel provides LED indicators for battery, alarm, detection, release, and power to the panel. In the event of fire detection, an audible alarm accompanies the LED Alarm indicator.

Controls

The front panel contains a “DELAY” and “RESET” button. The DELAY button is functional when automatic discharge is used.

The RESET button is used to re-initialize the control panel when depressed; it provides an indication that all LEDs and the audible alarm are functional.

Sequence of Operation

Upon receiving an input signal indicating a fire, the alarm LED will flash and the audible alarm will pulse at the rate of two times per second. Refer to “Manual Actuation – AFEX and ANSUL Systems”, located below.

Figure 57: Circuit monitor panel (CHECKFIRE SC-N)

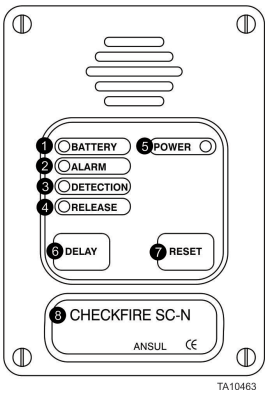	**ANSUL** **1)** Battery **2)** Alarm **3)** Detection **4)** Release **5)** Power **6)** Delay **7)** Reset **8)** Checkfire SC-N

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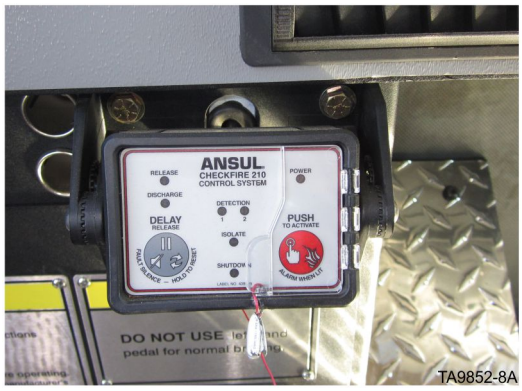
Figure 58: Ansul circuit monitor panel (CHECKFIRE 210)



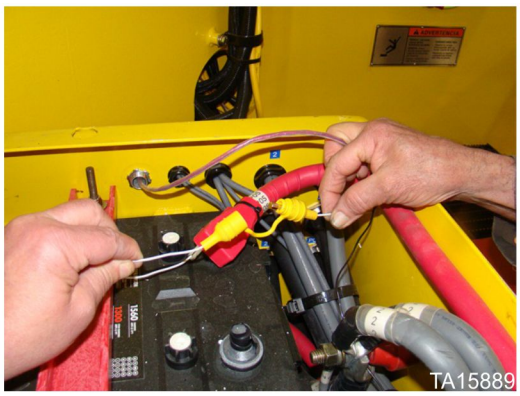
Located on operator dash, left side of left foot rest

CAUTION

Before performing heat generating processes such as grinding, cutting, or welding on a machine, the fire suppression system circuit monitors panel's in-line fuse must be removed. The fuse is located in the battery box on the loader. Failure to do so may cause the system to actuate and/or damage the solid-state components of the system. Replace the in-line fuse before the machine has been started or after all welding operations have been completed.

NOTICE

Some fire suppression systems have an internal battery and are not hard wired to the machine batteries. This fuse will not exist on these machines. Before beginning any heat producing work on the machine, appropriate steps must be taken to prevent the heat producing activity from activating the fire suppression system.



Fire suppression in-line fuse may be located in loader battery box on some machines.

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Circuit Monitor Panel - AFEX System

A circuit monitor panel is mounted on the rear inside cab wall. Refer to “Fire suppression system actuator switches – AFEX and ANSUL systems” and “Circuit monitor panel”. The circuit monitor’s function is to monitor the fire suppression system’s electrical detection and actuation circuits, including the power source, squib (compressed charge which actuates the discharge of the fire suppression agent), and continuity of the detection wiring.

NOTICE

The AFEX fire suppression system retains its manual discharge capabilities should the circuit monitor panel or any of its internal circuitry fail. If the circuit monitor panel must be removed for any reason, the fire suppression system can be wired to retain its manual actuation feature. Refer to the manufacturer’s owner’s manual through their respective website.

The circuit monitor panel provides audible and visual indicators of alarm conditions. The operator can monitor detection and release circuits and power supply. A system reset button and restart time delay is also provided.

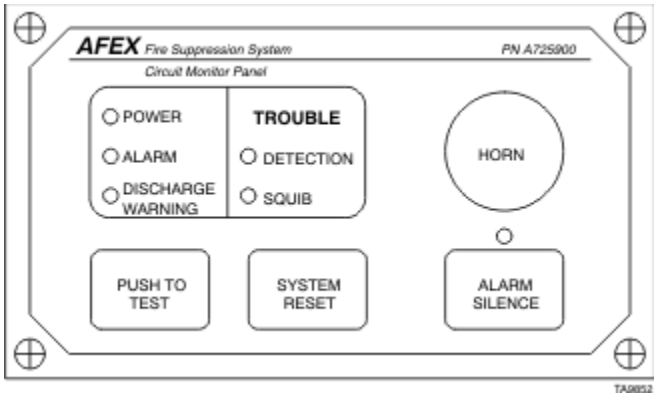
Visual Indicators

- Green LED - Power to circuit monitor panel
- Red LED - Alarm
- Amber LED - Alarm silence activated - Trouble with squib - Trouble with detection circuit

Controls

- Alarm Silence
- Push to test
- System reset
- Push-on, Push-off operation (flush mounted behind panel cover)

Figure 59: Circuit monitor panel



AFEX

CAUTION

Before performing heat generating processes such as grinding, cutting, or welding on a machine, the fire suppression system circuit monitors panel's in-line fuse must be removed. The fuse is located in the battery box on the loader. Failure to do so may cause the system to actuate and/or damage the solid-state components of the system. Replace the in-line fuse before the machine has been started or after all welding operations have been completed.

Fire suppression in-line fuse located in loader battery box.

Manual Actuation - AFEX and ANSUL Systems

The machine is equipped with manual firing mechanisms. One mechanism is located in the operator's cab (refer to illustration "Fire suppression system actuator switches - AFEX and ANSUL systems (inside cab)". The other ground level mechanism locations may vary.

- On the electrical converter cabinet on the left side of the machine.
- On the hydraulic reservoir on the right side of the machine.
- On the right rear side of the machine
- On the left rear side of the machine

Refer to illustration "Typical ground level manual firing mechanism locations (typical)". Check and note locations on the actual machine before operating it.

If the operator notices or is alerted to a fire, the following actions should be taken:

Step 1: Quickly bring the machine to a complete stop and shut down the engine.

Step 2: Manually actuate the fire suppression system.

- Some systems require pulling the safety pin from the neck of the firing mechanism and strike down hard on the push knob/lever (as applicable).
- Some systems are manually activated by using the fire suppression system console.

Step 3: Quickly exit the machine and move to a safe distance away from the machine.

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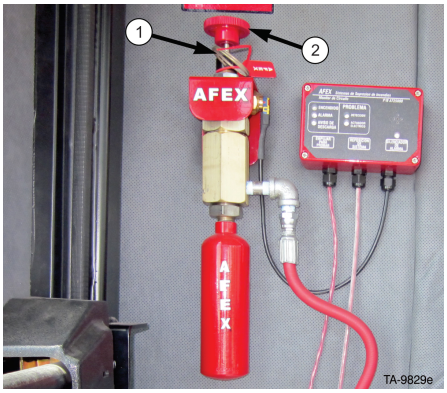
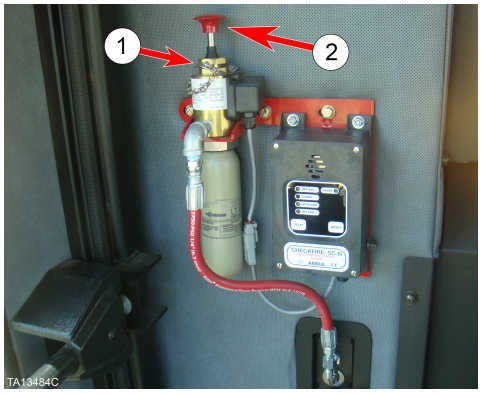
Step 4: Call fire department or mine safety personnel to extinguish the fire.



1) Pull pin, **2)** Strike knob to actuate fire suppression system

AFEX cab mounted firing mechanism with circuit monitoring panel (typical)

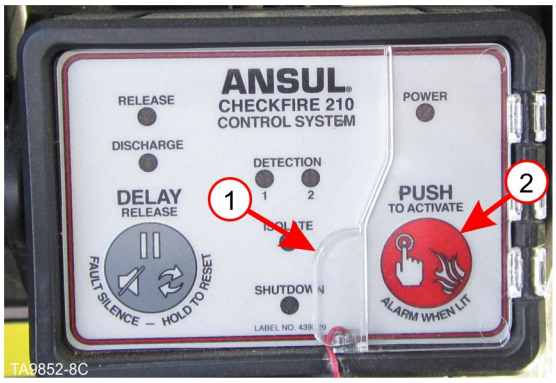
Figure 60: Fire suppression system actuator switches - AFEX and ANSUL systems (inside cab)



1. Pull pin

2. Strike knob to actuate fire suppression system

ANSUL CHECKFIRE SC-N cab mounted discharge mechanism

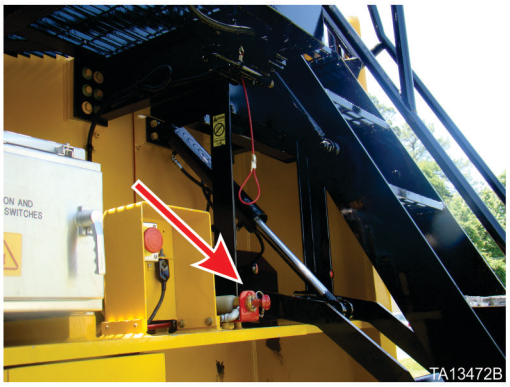


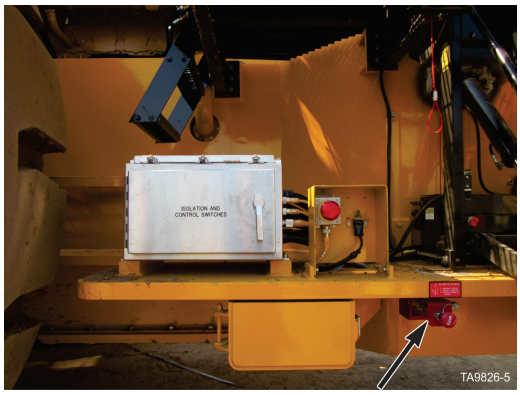
1. Lift protective cover

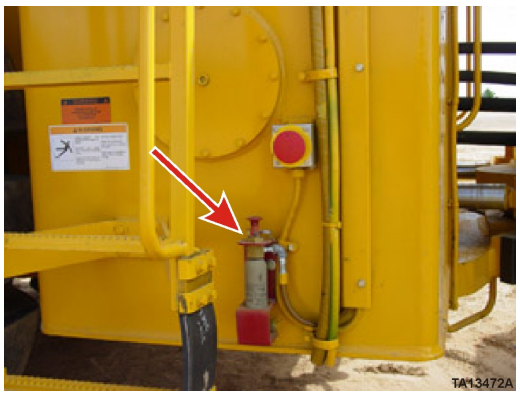
2. Press ‘PRESS to activate”

ANSUL CHECKFIRE 210 cab mounted discharge mechanism

Figure 61: Typical ground level manual firing mechanism locations (typical)







(Pull pin & strike knob to actuate)

NOTICE

When the fire suppression system is discharged, the hydraulic reservoir automatic air release will be tripped. This will release the air pressure in the hydraulic reservoir and in the rest of the hydraulic system. Before restarting the machine, the automatic air release valve must be manually reset by pushing the knob IN to the closed position (refer to “Hydraulic reservoir air release valve”).

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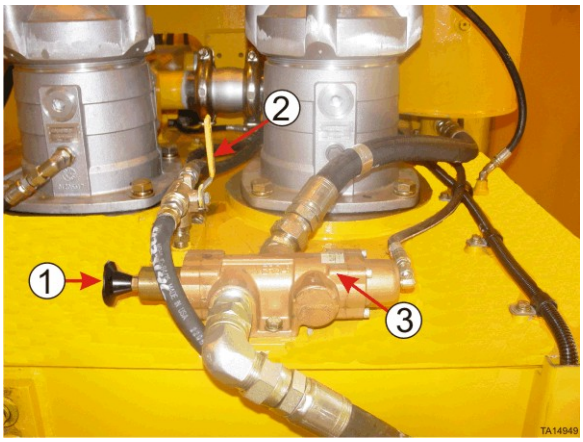
Figure 62: Hydraulic reservoir air release valve



1. Reset button
2. Manual air release valve
3. Automatic air release valve

Fire Detection Engine Shutdown Option

The LINCS II vehicle control system is equipped with an engine shutdown feature that will stop the machine and shut down the engine when the fire suppressant is discharged.

NOTICE

Fire systems, installed at the factory, are either manual or automatic discharge systems. The LINCS II computer system or a factory-installed fire system WILL NOT automatically discharge the fire suppressant in the event of a fire. An electronic fire detection option that will audibly and visually alert the operator of a fire is available through fire system manufacturers. However, the discharge of fire suppressant and actuation of the Fire Detection Engine Shutdown Option may be actuated by discharging the fire suppressant with any of the actuator switches. All operators of the machine should be trained in the operation and capabilities of the fire suppressant system on the machine before operation.

The following sequence of events will occur following discharge of the fire suppressant:

1. Propulsion is disabled.
2. The engine will shut down and park brakes set once vehicle is slowed.
3. The automatic air release valve will release hydraulic reservoir pressure.

Fire Suppression System Maintenance and Troubleshooting

The fire suppression system requires regular inspection and maintenance. The manufacturer's recommended maintenance schedules are also located in the owner's manual, which may be obtained from the manufacturer's website. System troubleshooting and wiring information is also provided in the manufacturer's owner's manual appended to this publication.

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⚠ WARNING

Struck-by or struck against hazard exists if untrained personnel attempt to service the fire suppression system. Only personnel trained by the system's manufacturer should service the system. Certain components of the system contain a high pressure nitrogen charge that can cause serious personal injury if not handled properly. Using the wrong procedures/process during system maintenance could result in struck by/struck against hazards resulting in serious injury or death.

CAUTION

- **Electronic components of the system can be damaged if not handled in the proper manner. Only trained personnel should service the system.**
- **Before performing heat generating processes such as grinding, cutting, or welding on a machine, the fire suppression system circuit monitors panel's in-line fuse must be removed. The fuse is located in the battery box on the loader. Failure to do so may cause the system to actuate and/or damage the solid-state components of the system. Replace the in-line fuse before the machine has been started or after all welding operations have been completed.**

Fire suppression in-line fuse located in loader battery box.

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Figure 63: Locations of fire suppression system actuation switches (typical locations - standard installation)

1. Inside cab, rear wall or operator console
2. Left rear of machine
3. Hydraulic reservoir

NOTICE

Check your machine and make note of all switch locations before operating machine.

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Tires

One advantage of a P&H wheel loader versus a track machine is mobility. The loaders can easily travel, or tram, from one location in the mine to another as necessary. However, utilization of this advantage necessitates that tramming limitations of the tires are not exceeded.

⚠ WARNING

Crush hazards exist if the machine is operated outside the safe operating parameters of the tires and loss of machine control occurs. Speed, distance, and weight load (as well as other factors), can affect tire reliability, safety and possibly warranty. Refer to tire manufacturer tramming guidelines before operating the machine outside of truck loading cycles. Failure to consult with the tire manufacturer to determine safe tramming guidelines can cause crush hazards from loss of machine control, resulting in serious injury or death.

Machine Operation: Normal, Tramming and Load/Carry

The tires for a loader application are designed for low speed loading and will typically heat up rapidly when exposed to load and carry operation or continuous high speeds.

- **Normal operation:** Loading a truck from a bank with a short distance between bank and truck. Tires supplied and specified by Komatsu have been designed for this application.
- **Load and carry:** Driving the loader with a loaded bucket more than 100 feet before dumping. This cycle requires special attention to maximum speeds in both the empty and loaded runs to assure critical tire temperatures are not exceeded.
- **Tramming:** (Driving machine at continuous speed over a distance) requires special attention to maximum speeds and time to assure critical tire temperatures are not exceeded.

NOTICE

There are many types of tires available for each machine and each tire manufacturer sets the limits for tramming and load and carry applications considering many factors such as the tire type, tire size, tire construction, ambient temperatures, type of material, loading conditions, use of chains, etc.

CAUTION

Speed restrictions should be determined in consultation with the tire and chain application engineering groups. Failure to consult with the tire manufacturer regarding your specific tire and application can result in severe tire damage or tire failure.

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