

Controls and Operations For Wheel Loaders— Gen3

Section 01–04



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 Section 01–04 — Operation and Controls, Surface Wheel Loaders

CONTROLS AND OPERATION contains the identification and function of the controls, instruments and indicators on the instrument panel. This section also contains basic instructions for non-material and material handling operations. It is essential that the operator(s) receive the following instructions and training before operating the machine in material handling operations.

It is essential that the operator(s) read and understand the information contained in this manual before operating the machine.



WARNING

Multiple hazards exist if the machine is not operated by a trained operator. Unexpected or unplanned machine movement can cause crush and other hazards. The machine shall only be operated by a trained operator. Failure to operator the machine with a trained operator can cause crush and other hazards resulting in serious injury or death.

The operator(s) must acquire a thorough knowledge of the function of each control and each indicator light described herein before operating the machine.

The operator(s) must also be trained in the complete operation of the machine and any special requirements of a specific job site where the machine will be operated, before operating the machine.

The operator(s) must read and understand any special starting, operating and maintenance instructions contained in the engine manufacturer operator's manual.

Customer Responsibilities and Warranty Advisories

P&H wheel loaders are warranted in accordance with the warranty policy provided with the machine. The recommended operating and maintenance procedures set forth shall be followed to ensure warranty coverage is not jeopardized. Failure to comply with recommended operating and maintenance procedures may void machine warranty.

Any questions or problems relating to warranty policy or administration should be directed to Komatsu Service Center. Include the model and serial number, in-service date of the machine, and hour meter reading. We especially draw your attention to the following safety advisors.

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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 label indicates 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.



WARNING

CRUSH HAZARD

- Crush hazards exist from unexpected machine movement if settings are changed during actual loading operation cycle. DO NOT set or change any settings during an actual loading operation or cycle. Before entering any information, or making/changing any settings on any screen in the LINCOS system, ensure the machine is in an area clear of ALL hazards and personnel. Failure to do so could result in unexpected machine movement, resulting in serious injury or death to personnel.

- Crush hazards exist from leaving the cab without setting the park brakes, which could result in unplanned and uncontrolled movement of the machine. The operator should never leave the cab with the park brake released. Set the park brake before leaving the cab. Leaving the cab without setting the park brake could cause a crush hazard from unexpected machine movement, resulting in property damage, serious injury or death.
- Crush hazards exist if the operator seat is improperly adjusted which causes loss of machine control during operation. Adjust the seat for proper access to all controls and fasten seat belt or harness before operating the machine. 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 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 attempting to transport personnel on the machine. There are no provisions on the Komatsu built wheel loader 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.
- Crush hazards exist if the park brake is not set before operating the ladder. Before raising or lowering the ladder, set the machine park brake. Uncontrolled machine movement could cause a hazardous condition when trying to enter or exit the ladder, which could result in serious injury or death.
- Crush hazards exist from uncontrolled machine movement if the auxiliary steering system fails. Auxiliary steering is ONLY a backup system. If something occurs in the normal steering system, auxiliary steering should only be used to steer the machine to a stopped position. It should NEVER be used in material handling operations. Loss of steering could cause a crush hazard by uncontrolled machine movement resulting in serious injury or loss of life.
- Crush hazards exist when using the Manual Bleed Valve Assembly to relieve pressure from the hoist and bucket circuits if personnel are in the area of the bucket or lift arms. Always depressurize the hydraulic hoist and bucket circuit when working on the hoist and bucket hydraulic circuit. Operating the manual bleed valve may cause the lift arms and bucket to descend rapidly. All personnel shall stand clear of the lift arms and bucket areas before the Manual Bleed Valve Assembly is used to relieve hoist and bucket circuit pressure. Before performing any procedure on any hydraulic component within the hoist and bucket circuit, the valves shall be used to relieve residual system pressure from the hoist and bucket circuits. The Hoist and Bucket Hydraulic Circuit Manual Bleed Valve Assembly shall not be operated when the engine is running. Failure to clear the bucket and lift arm areas of personnel prior to operating the valve assembly can cause a crush hazard resulting in serious injury or death.
- Crush hazards exist if exceeding the parameters shown in figure "Allowable Grade Parameters". This could result in machine rollover/tip-over. Do not exceed the parameters shown in "Allowable Grade Parameters" shown below. Machine rollover/tip-over can cause crush hazards which could result in equipment damage, serious injury or death.
- Crush hazards exist if uncontrolled machine movement occurs. Before starting the engine, ensure the machine is in a place that is safe for operations. The machine should be on a level area, and all personnel and equipment must be clear of the area. After the starting procedures and observations have been made, and it is determined the loader is safe to operate, it can be moved. Starting the machine in an area that is not safe to operate could cause a crush hazard resulting in serious injury or death.
- Crush hazards exist if uncontrolled machine movement occurs. Do not test the functionality of the hoist/bucket, steering, or brakes, unless the machine is in a place that is safe for operations. The machine should be on a level area, and all personnel and equipment must be clear of the area. After the starting procedures and observations have been made, and it is determined the loader is safe to operate, it can be moved. Crush hazard is possible from uncontrolled machine movement and could result in serious injury or death.

- Crush hazards exist if the machine is started or moves while inspections are being conducted. Place bucket flat and level on the ground. Lock out the machine's starting capability before performing any inspection. Follow all lockout tag out rules, local rules, and local regulations to return the machine back to service. Failure to follow all lockout tag out rules, local rules, and local regulations for returning the machine back into operating condition could cause unexpected equipment component movement for personnel in the area, resulting in serious injury or death.
- Crush hazards exist from unexpected equipment component movement. When inspection and service is complete, follow all lockout tag out rules, local rules, and local regulations to return the machine back to service. Failure to follow all lockout tag out rules, local rules, and local regulations for returning the machine back into operating condition could cause unexpected equipment component movement for personnel in the area, resulting in serious injury or death.

STRUCK BY AND CRUSH HAZARDS

- Struck by or Crush hazards exist if personnel are in the travel area of the ladder when it is being lowered or raised. The ladder lowers and raises rapidly when engaged. Before lowering or raising the ladder, make sure all personnel are clear of the area. Being struck by the ladder or thrown off the machine could result in serious injury or death.
- Struck by or Crush hazards exist if personnel are in the travel area of the ladder when it is being lowered by using the back-up bleed down valve. When lowering the ladder, be certain all personnel are a safe distance from the ladder. Lowering the ladder without power by activating the "Back-up Bleed Down Valve" causes the ladder to RAPIDLY lower NON-STOP until reaching ground level. Releasing the "Back-up bleed Down Valve" knob or cable will NOT stop the ladders' rapid decent to ground level. Being struck or crushed by the ladder could result in serious injury or death.
- Struck by or Crush hazards exist if the ladder is not de-energized prior to performing maintenance work on it. Place the ladder in the "DOWN" position and use Battery Isolation Switch to de-energize the ladder prior to performing any service operations to the ladder. Failure to de-energize the ladder prior to working on it could cause personnel to be struck by or crushed by the ladder, resulting in serious injury or death.
- Struck by or Crush hazards exist if the ladder is not de-energized prior to performing maintenance work on it. Place the ladder in the "DOWN" position and use Battery Isolation Switch to de-energize the ladder prior to performing any service operations to the ladder. Failure to de-energize the ladder prior to working on it could cause personnel to be struck by or crushed by the ladder, resulting in serious injury or death.

FALL HAZARD

- Fall hazard exists due to uncontrolled ladder movement if it is not placed in the full down position before entering or exiting the ladder. Place the ladder in the full DOWN position before entering or exiting the ladder. Serious injury is possible if the ladder is not in the full DOWN and LOCKED position before entering or exiting the machine.

FALL AND CRUSH HAZARDS

- Fall hazard or Crush hazards exist if personnel rides the ladder up or down. Never ride the ladder up or down when it is being activated. Being struck by, crushed by, or thrown off the ladder could result in serious injury or death.
- Fall hazard or crush hazards exists when operating the ladder or using it to enter or exit the machine. To avoid personal injury and component damage it is essential that all personnel using the ladder be familiar with its operation and all indicators and alarms. Falls and crush hazards are possible if personnel are not familiar with the ladder operation before using it, which could result in serious injury.

ENTANGLEMENT HAZARDS

- Entanglement in the drive shaft or engine belts, burns if working on the engine exhaust or around hydraulic fluid or engine fluid, cuts/dismemberment if working on the radiator fan, electrical shock if working on the electrical system, skin Injection from hydraulic fluid if working on high pressure side of hydraulic system, hearing loss from sonic sounds if working inside KLENZ system and other hazards exist. ALWAYS sound the horn for 2-3 seconds prior to starting the engine to alert personnel on the machine or in close proximity to it that the engine is about to start. Allow at least 30 seconds for them to clear the area before starting the engine. Check wing mirrors and all sides of machine from a seated position. If the horn is inoperable (see the following NOTICE), and if allowed by local rules and regulations, dismount the machine, and walk around it to be sure no one is on the machine or in close proximity to it before starting the engine. Always follow all local startup procedures before starting the machine. Failure to allow ample time for personnel to leave the area before starting the engine could cause entanglement, burns, cuts/dismemberment, electrical shock, hearing loss, skin injection, and other hazards resulting in serious injury or death.

ELECTRICAL SHOCK AND CRUSH HAZARDS

- Electrical shock and crush hazards exist if lights are serviced while the machine electrical system is energized or not locked out and unexpected machine movement occurs. Always de-energize and lock out the machine electrical system before servicing the lights. Electrical shock is possible, resulting in serious injury or death. If the machine is started up while the lights are being serviced, a crush hazard is possible from unexpected machine movement, resulting in serious injury or death.
- Electrical shock and crush hazards from uncontrolled machine movement exist if the appropriate safety procedures have not been followed and all electrical connections are not de-energized to prevent electrical shock or uncontrolled movement of the machine. Always follow all local required safety procedures and procedures in this manual before working on or starting the machine. Failure to follow procedures can cause electrical shock or uncontrolled machine movement resulting in serious injury or death.

HEARING DAMAGE OR EYE INJURY HAZARDS

- Hearing damage or eye injury hazard exists if the KLENZ™ Enable Switch is not turned to the OFF position before performing any service work to the machine. Bleed air pressure to zero psig before performing any service or repair work to the KLENZ™ system or other components powered by the compressed air system. Failure to bleed the air pressure to zero in the compressed air system can cause hearing damage or eye injury from a sonic blast within the KLENZ system resulting in serious injury.

LEAD PRESENCE HAZARD

- Battery posts, terminals and related accessories contain lead and lead components, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Do not handle lead components without proper personal protective equipment (PPE).

SPECIAL HAZARDS

- Special hazards may exist. Before operating the equipment, it must be determined if special hazards exist in the operating area, such as toxic gasses, or ground (underfoot) conditions, that require special precautions or measures to eliminate or reduce the hazard. If special hazards exist (e.g. lines: gas, electricity) in the ground: close overhead electric lines: below ground in enclosed areas: contaminated areas: other special conditions: local rules and regulations shall be followed. Serious injury or death is possible.

MULTIPLE HAZARDS

- Multiple hazards exist if the machine is not operated by a trained operator. Unexpected or unplanned machine movement can cause crush and other hazards. The machine shall only be operated by a trained operator. Failure to operator the machine with a trained operator can cause crush and other hazards resulting in serious injury or death.

- Multiple hazards exist if operating the machine on less than four wheel motors, or with any of the converter panels disabled. Operation of the machine on less than four wheel motors, or with any of the converter panels disabled, will result in a reduction in electric (dynamic) braking and could possibly lead to an overspeed on grades and/or longer stopping distances when using dynamic braking. Failure to properly employ the service brake under these conditions could lead to the loss of machine control which poses an impact hazard to nearby personnel that may result in death or serious personal injury, as well as substantial equipment damage.
- Multiple hazards exist if operating the machine with less than four service brakes. The machine should only be operated with less than four service brakes in order to move the machine away from a dangerous situation. Do not tram the machine or operate the machine in production with less than four service brakes. The service brakes must be maintained and working properly (e.g., disks in spec, pads in spec, gaps in spec, pressures in spec, no leaks, etc.). Failure to properly inspect and maintain all four service brakes may compromise braking capability leading to the loss of machine control which poses an impact hazard to nearby personnel that may result in death or serious personal injury, as well as substantial equipment damage.
- Multiple hazards exist if failing to appropriately reduce the machine's speed while descending a grade with disabled converter panels and/or disabled motor. Failure to appropriately reduce the machine's speed while descending a grade with disabled converter panels and/or disabled motors can create the risk of a machine runaway leading to the loss of machine control which poses an impact hazard to nearby personnel that may result in death or serious personal injury, as well as substantial equipment damage.

INHALATION HAZARD

- 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.



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 dynamic braking, then use the service brake if necessary 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 personal injury.
- Struck by hazard exists if using the emergency stop switch inside the cab to shut down the machine. This will immediately set the brakes and stop the machine suddenly, possibly causing the operator to be thrown unexpectedly and rapidly against the seat belt or harness. Use the emergency stop switch only in an emergency situation. Use the dynamic braking and then the service brake to stop the machine during normal operation. Using the emergency stop switch to stop the machine can cause the operator to be thrown forward rapidly against the seat belt or harness, resulting in injury.

STRUCK-BY OR PINCH POINT HAZARDS

- Struck-by or pinch point hazards exist if the operator seat backrest upholstery is removed for cleaning or maintenance and the backrest frame is not supported. The backrest frame must be supported, for example held in place, before the backrest adjuster is operated. If this is not done, there is a danger that the backrest frame may jerk forward and cause a struck-by or pinching injury.

HEARING DAMAGE OR EYE INJURY HAZARDS

- Hearing damage or eye injury hazard exists if the KLENZ™ Enable Switch is not turned to the OFF position before performing any service work to the machine. Bleed air pressure to zero psig before performing any service or repair work to the KLENZ™ system or other components powered by the compressed air system. Failure to bleed the air pressure to zero in the compressed air system can cause hearing damage or eye injury from a sonic blast within the KLENZ system resulting in serious injury.

BURNS AND STRUCK-BY HAZARDS

- Burns and struck-by hazards are present if pressure is not relieved before removing the hydraulic fluid reservoir filler cap. Hot oil could be present and could be unexpectedly expelled from the system when opening the reservoir filler cap if the reservoir is not depressurized. Burns from hot oil is possible. Air pressure in the reservoir could cause uncontrolled movement of the cap if it is removed without depressurizing the reservoir. Always release air pressure in the hydraulic reservoir before servicing or repairing anything requiring removal of the reservoir filler cap. Release of the reservoir air pressure is done by turning the manual air release valve to the OPEN position. The air pressure in the reservoir will be released, and at the same time, the valve will lock in the air pressure in the rest of the system. After servicing, repairing or inspecting the hydraulic oil reservoir, make certain to turn the manual air release valve (refer to “Hydraulic reservoir air release valves”) to the CLOSED position to pressurize the reservoir. Failure to release the air pressure from the hydraulic reservoir before removing the filler cap could cause burns or struck-by hazards resulting in injury.

BURN HAZARD

- Burn hazard exists from hot fluids or steam when removing the radiator cap if it is not allowed to cool down before opening. Allow the engine cooling system to cool before removing the radiator cap. Do not remove radiator cap while pressure remains in the system. Hot fluids escaping can cause serious burns.

FALL AND SLIPPING HAZARDS

- Fall hazards and slipping hazards exist if ground conditions are not checked before dismounting the machine. Before dismounting, ensure the ground conditions are such that slipping or falling does not occur when stepping off the ladder. Always ensure firm ground before releasing the ladder. Slipping and falling could result in serious injury.

CAUTION

WELDING HAZARDS

- To prevent damage to the Detroit or Cummins electronic control system, disconnect the following **BEFORE** welding: battery power, ground cables, and the power connector at the Detroit or Cummins engine electronics. Failure to isolate the engine electronics system from high current possible occurrence as a result of welding) can result in severe electronics damage. Typical examples of engine electronics are DDEC, ADEC, and ECM.

COLD DAMAGE

- If the machine is to sit outside when not working with the ambient temperature below -20°C , the engine must be running at high idle with
 - With Drive system de-energized.
 - With Park Brake set.
 - Or all heaters must be operational and plugged in to a power supply external to the machine if the engine is not running.
 - Failure to comply with these instructions could result in serious damage to the engine or other components.

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Mounting and Dismounting the Machine

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



WARNING

Crush hazards exist if attempting to transport personnel on the machine. There are no provisions on the Komatsu built wheel loader 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.

Step 1: Always use “three-point support” with the machine, and face the ladder while you enter or leave 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

Fall hazards and slipping hazards exist if ground conditions are not checked before dismounting the machine. Before dismounting, ensure the ground conditions are such that slipping or falling does not occur when stepping off the ladder. Always ensure firm ground before releasing the ladder. Slipping and falling 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 above text.

Powered Access Ladder

Power Step Model RL1001 & RL1002

Some P&H wheel loaders are optionally equipped with a powered access "Power Step Model RL1001" ladder mounted on the left rear of the rear frame.

Safe operation of the ladder depends on adherence to the safety warnings and cautions, and all safety rules required in the user's area of operation. Periodic inspection and service must also be performed to the ladder to ensure safe and trouble-free operation.



WARNING

Struck by or Crush hazards exist if personnel are in the travel area of the ladder when it is being lowered or raised. The ladder lowers and raises rapidly when engaged. Before lowering or raising the ladder, make sure all personnel are clear of the area. Being struck by the ladder or thrown off the machine could result in serious injury or death.



WARNING

Struck by or Crush hazards exist if personnel are in the travel area of the ladder when it is being lowered by using the back-up bleed down valve. When lowering the ladder, be certain all personnel are a safe distance from the ladder. Lowering the ladder without power by activating the "Back-up Bleed Down Valve" causes the ladder to RAPIDLY lower NON-STOP until reaching ground level. Releasing the "Back-up bleed Down Valve" knob or cable will NOT stop the ladders' rapid decent to ground level. Being struck or crushed by the ladder could result in serious injury or death.



WARNING

Fall hazard or Crush hazards exist if personnel rides the ladder up or down. Never ride the ladder up or down when it is being activated. Being struck by or crushed by the ladder could result in serious injury or death.

CAUTION

Component damage can result from attempting to ride the ladder up or down during operation. Do not ride the ladder up or down. Riding the ladder will void the manufacturer's warranty and could result in component damage.



WARNING

Struck by or Crush hazards exist if the ladder is not de-energized prior to performing maintenance work on it. Place the ladder in the "DOWN" position and use Battery Isolation Switch to de-energize the ladder prior to performing any service operations to the ladder. Failure to de-energize the ladder prior to working on it could cause personnel to be struck by or crushed by the ladder, resulting in serious injury or death.



WARNING

Crush hazards exist if the park brake is not set before operating the ladder. Before raising or lowering the ladder, set the machine park brake. Uncontrolled machine movement could cause a hazardous condition when trying to enter or exit the ladder, which could result in serious injury or death.



WARNING

Fall hazard exists due to uncontrolled ladder movement if it is not placed in the full down position before entering or exiting the ladder. Place the ladder in the full DOWN position before entering or exiting the ladder. Serious injury is possible if the ladder is not in the full DOWN and LOCKED position before entering or exiting the machine.



WARNING

Fall hazard or crush hazards exists when operating the ladder or using it to enter or exit the machine. To avoid personal injury and component damage it is essential that all personnel using the ladder be familiar with its operation and all indicators and alarms. Falls and crush hazards are possible if personnel are not familiar with the ladder operation before using it, which could result in serious injury.



WARNING

Fall hazard or Crush hazards exist if personnel rides the ladder up or down. Never ride the ladder up or down when it is being activated. Being struck by, crushed by, or thrown off the ladder could result in serious injury or death.



WARNING

Fall hazard or crush hazards exists when operating the ladder or using it to enter or exit the machine. To avoid personal injury and component damage it is essential that all personnel using the ladder be familiar with its operation and all indicators and alarms. Falls and crush hazards are possible if personnel are not familiar with the ladder operation before using it, which could result in serious injury.

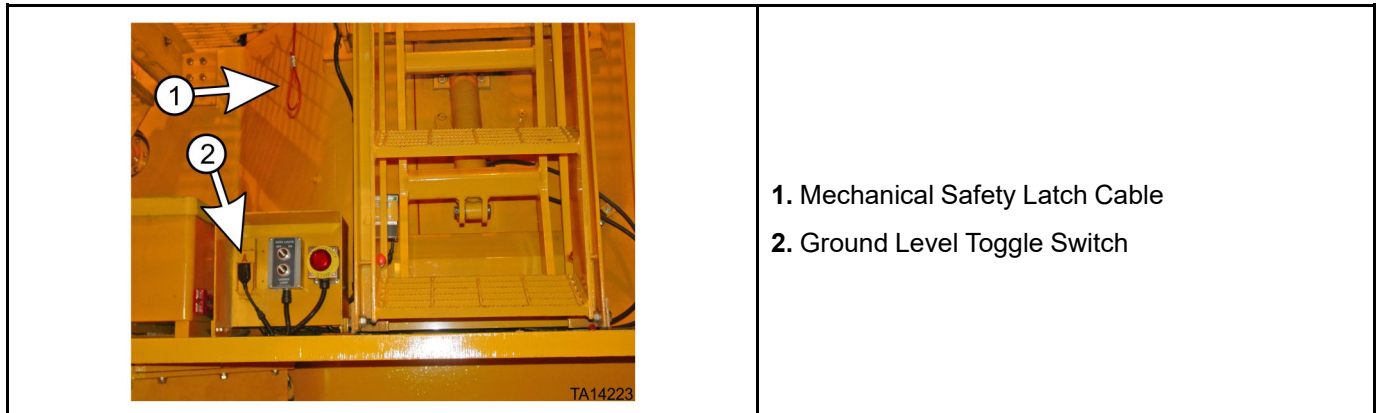
Normal Operation

Two switches are provided to raise and lower the ladder. One switch operates the ladder at ground level, the other operates the ladder from an elevated level. A ground-level switch is mounted to the left of the ladder. The elevated-level switch is mounted at the ladder dismount area. Both locations have access to the mechanical safety latch that must be disengaged before raising or lowering the ladder. Access to a "Back-up Bleed Down Valve" used to lower the ladder without power is provided at both ground and elevated levels.

Ground Level Ladder Operation

To raise the ladder from ground location: Move the electrical toggle switch to the UP position and hold it until the ladder reaches the UP position. Refer to illustration "Ground level ladder controls". The ladder will rise and lock in the UP position. DO NOT attempt to operate the machine unless you are certain the ladder is LOCKED in the UP position.

Figure 1: Ground level ladder controls



WARNING

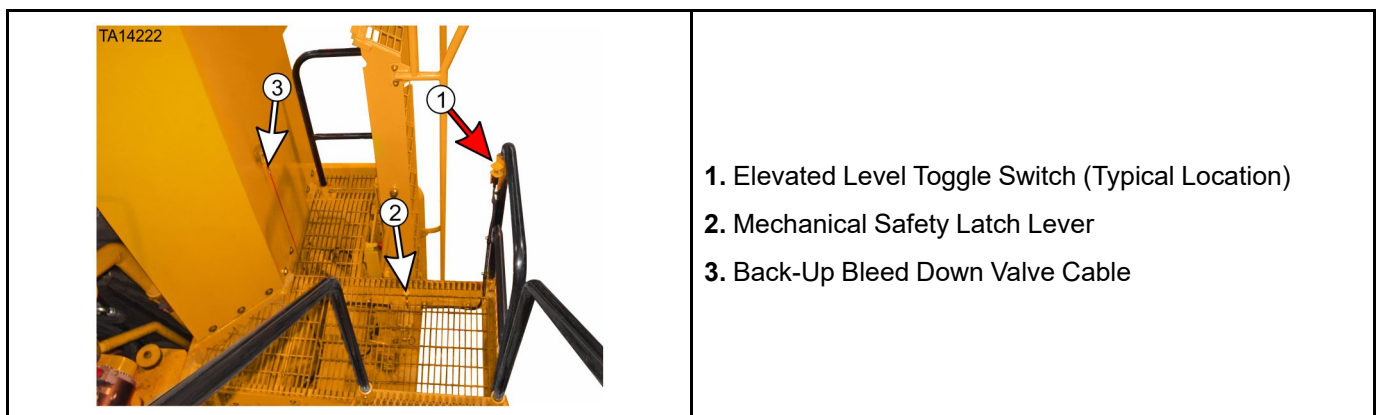
Struck by or Crush hazards exist if personnel are in the travel area of the ladder when it is being lowered or raised. The ladder lowers and raises rapidly when engaged. Before lowering or raising the ladder, make sure all personnel are clear of the area. Being struck by the ladder or thrown off the machine could result in serious injury or death.

To lower the ladder from the ground location: Pull the hanging cable (Refer to illustration Ground level ladder controls) to disengage the mechanical safety latch, then move the electrical switch to the DOWN position and hold it until the ladder reaches the DOWN position. The mechanical latch cable can be released once the ladder clears the mechanical latch. The ladder will lower and lock in the DOWN position.

Elevated Level Ladder Operation

To raise the ladder from elevated location: Move the electrical toggle switch to the UP position and hold it until the ladder reaches the UP position. Refer to illustration Elevated level ladder controls. The ladder will rise and lock in the UP position. **DO NOT attempt to operate the machine unless you are certain the ladder is in the UP position.**

Figure 2: Elevated level ladder controls



To lower the ladder from the elevated location: Step on the "Mechanical Latch Activation Lever" to disengage the mechanical safety latch, then move the electrical switch to the DOWN position and hold it until the ladder reaches the DOWN position. Refer to illustration Elevated level ladder controls. The Mechanical Latch Activation Lever can be released once the ladder clears the mechanical latch. The ladder will lower and lock in the DOWN position.

Operating the Ladder without Electrical Power

If loss of electrical power to the ladder occurs, a "Back-up bleed Down Valve" is provided to allow hydraulic fluid release within the system, allowing the ladder to be lowered. The ability to actuate the "Back-up bleed Down Valve" is provided at the ground location (by direct access to the valve) and elevated location (by use of a cable attached to the valve).



WARNING

Struck by or Crush hazards exist if personnel are in the travel area of the ladder when it is being lowered by using the back-up bleed down valve. When lowering the ladder, be certain all personnel are a safe distance from the ladder. Lowering the ladder without power by activating the "Back-up Bleed Down Valve" causes the ladder to RAPIDLY lower NON-STOP until reaching ground level. Releasing the "Back-up bleed Down Valve" knob or cable will NOT stop the ladders' rapid decent to ground level. Being struck or crushed by the ladder could result in serious injury or death.

To lower the ladder from the ground location without electrical power: Pull the hanging Mechanical Safety Latch Cable to disengage the mechanical safety latch, then pull out the Back-up bleed Down Valve knob. The mechanical latch cable can be released once the ladder clears the mechanical latch. The ladder will lower and lock in the down position. Refer to illustrations "Mechanical safety latch cable (ground location) and Back-up bleed down valve (ground location access)" for details.

Figure 3: Mechanical safety latch cable (ground location)

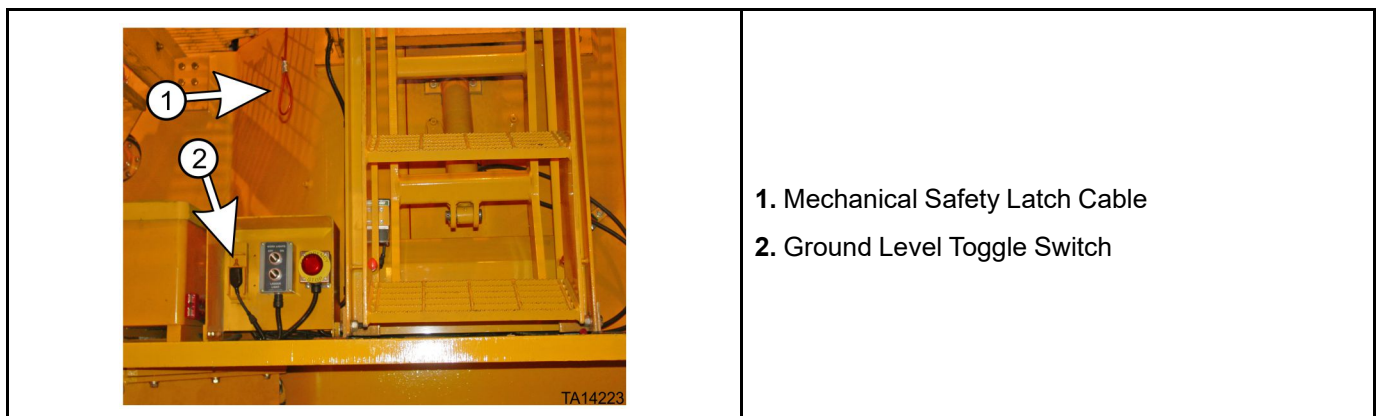
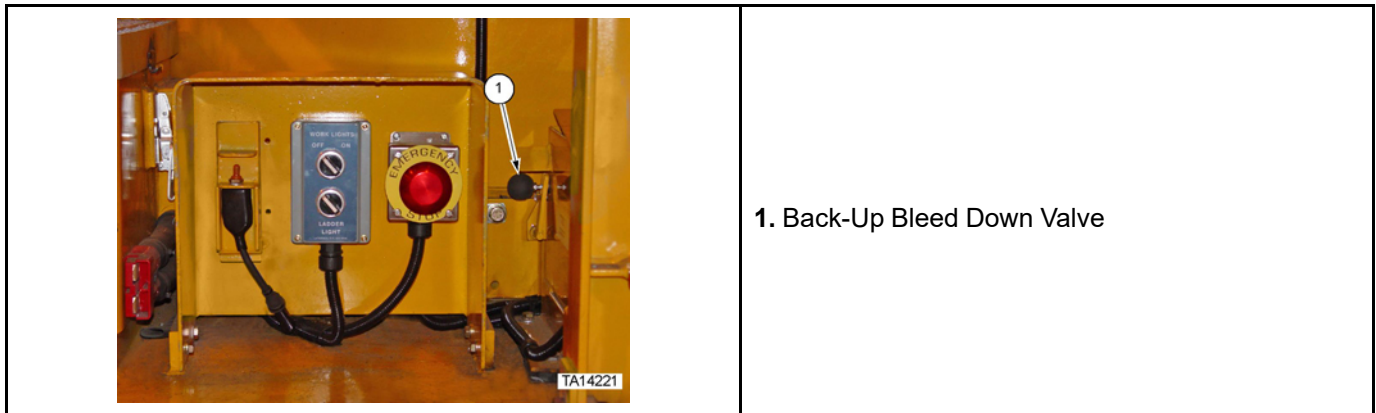
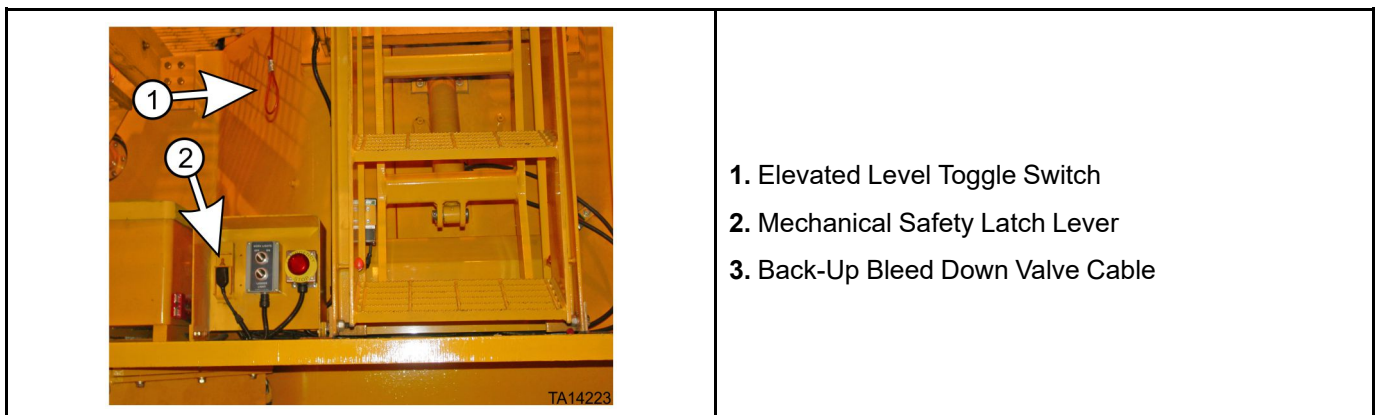


Figure 4: Back-up bleed down valve (ground location access)



To lower the ladder from the elevated location without electrical power: Step on the Mechanical Safety Latch Lever to disengage the mechanical safety latch, then pull the Back-up Bleed Down Valve cable (refer to Back-up bleed down valve cable (elevated location access)). The Mechanical Latch Activation Lever can be released once the ladder clears the mechanical latch. The ladder will lower and lock in the DOWN position.

Figure 5: Back-up bleed down valve cable (elevated location access)



NOTICE

Before operating the ladder in normal mode, once power is restored, the "Back-up bleed Down Valve" must be reset by pushing it in until it reaches its' original position.



WARNING

Crush hazards exist from leaving the cab without setting the park brakes, which could result in unplanned and uncontrolled movement of the machine. The operator should never leave the cab with the park brake released. Set the park brake before leaving the cab. Leaving the cab without setting the park brake could cause a crush hazard from unexpected machine movement, resulting in property damage, serious injury or death.

Service, Inspection and Lubrication

Please refer to the vendor in Section 03 of the Service Manual.

Powered Access Ladder Hedweld Model “C”

Some machines are optionally equipped with a “Hedweld” model, powered access ladder mounted on the left rear of the rear frame.

Safe operation of the ladder depends on adherence to all safety warnings and cautions, and all safety rules required in the users area of operation. Periodic inspection and service must also be performed to the ladder to ensure safe and trouble-free operation.



WARNING

Struck by or Crush hazards exist if personnel are in the travel area of the ladder when it is being lowered or raised. The ladder lowers and raises rapidly when engaged. Before lowering or raising the ladder, make sure all personnel are clear of the area. Being struck by the ladder or thrown off the machine could result in serious injury or death.

Struck by or crushed hazard exists if personnel are in the travel area of the ladder when it is being lowered by using the back-up bleed down valve. When lowering the ladder, be certain all personnel are a safe distance from the ladder. Lowering the ladder without power by activating the "Back-up Bleed Down Valve" causes the ladder to RAPIDLY lower NON-STOP until reaching ground level. Releasing the "Back-up bleed Down Valve" knob or cable will NOT stop the ladders' rapid decent to ground level. Being struck or crushed by the ladder could result in serious injury or death.



WARNING

Fall hazard or Crush hazards exist if personnel rides the ladder up or down. Never ride the ladder up or down when it is being activated. Being struck by or crushed by the ladder could result in serious injury or death.

CAUTION

Component damage can result from attempting to ride the ladder up or down during operation. Do not ride the ladder up or down. Riding the ladder will void the manufacturer's warranty and could result in component damage.



WARNING

Struck by or Crush hazards exist if the ladder is not de-energized prior to performing maintenance work on it. Place the ladder in the "DOWN" position and use Battery Isolation Switch to de-energize the ladder prior to performing any service operations to the ladder. Failure to de-energize the ladder prior to working on it could cause personnel to be struck by or crushed by the ladder, resulting in serious injury or death.



WARNING

Crush hazards exist if the park brake is not set before operating the ladder. Before raising or lowering the ladder, set the machine park brake. Uncontrolled machine movement could cause a hazardous condition when trying to enter or exit the ladder, which could result in serious injury or death.

⚠ WARNING

Fall hazard exists due to uncontrolled ladder movement if it is not placed in the full down position before entering or exiting the ladder. Place the ladder in the full DOWN position before entering or exiting the ladder. Serious injury is possible if the ladder is not in the full DOWN and LOCKED position before entering or exiting the machine.

⚠ WARNING

Fall hazard or crush hazards exists when operating the ladder or using it to enter or exit the machine. To avoid personal injury and component damage it is essential that all personnel using the ladder be familiar with its operation and all indicators and alarms. Falls and crush hazards are possible if personnel are not familiar with the ladder operation before using it, which could result in serious injury.

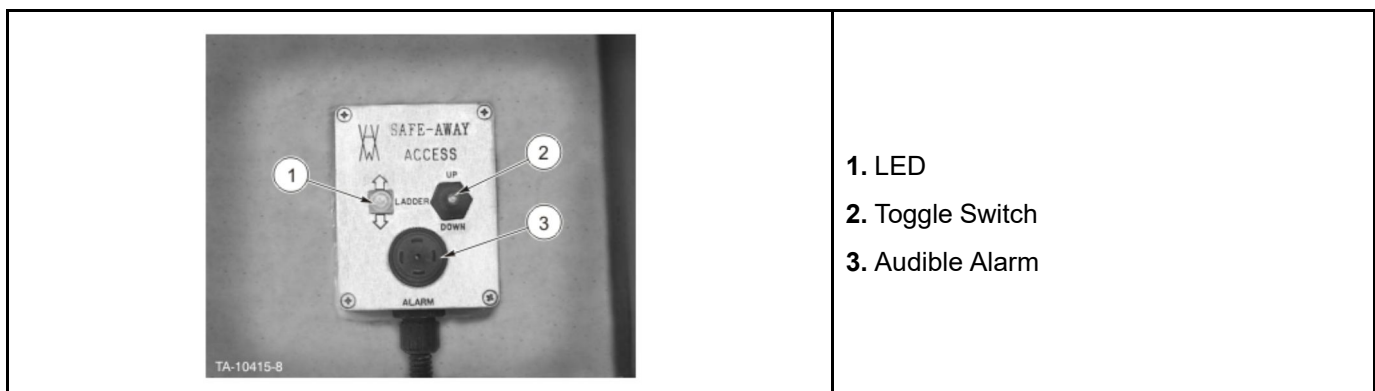
Normal Operation

Two box-mounted three-position momentary toggle switches are provided to raise and lower the ladder. One switch operates the ladder at ground level, the other operates the ladder from an elevated level. A lower, ground-level switch is mounted to the left of the ladder. The upper switch box is provided to allow operation after climbing and dismounting the ladder. (Refer to illustration Upper ladder switch).

Typical Operation at Ground or Elevated Levels

To raise the ladder: Push either switch to the UP position and release it. The ladder will rise to the UP position. The switches have a green LED that flashes while the ladder is in the UP cycle. Once the ladder is in the up position the green LED will remain illuminated without flashing. **DO NOT attempt to operate the machine unless you are certain the ladder is in the UP position.**

Figure 6: Upper ladder switch



To lower the ladder: Push either switch to the DOWN position and release it. The ladder will lower in the DOWN position. The switches have a red LED that flashes while the ladder is in the DOWN cycle. Once the ladder is in the down the red LED will remain illuminated without flashing.

NOTICE

If the park brake is released with the ladder in the DOWN position, an alarm is posted on the touch screen. Tractive power is inhibited until the operator raises the ladder to the full UP and LOCKED position. The park brake must be set again and re-released before the park brakes will release.

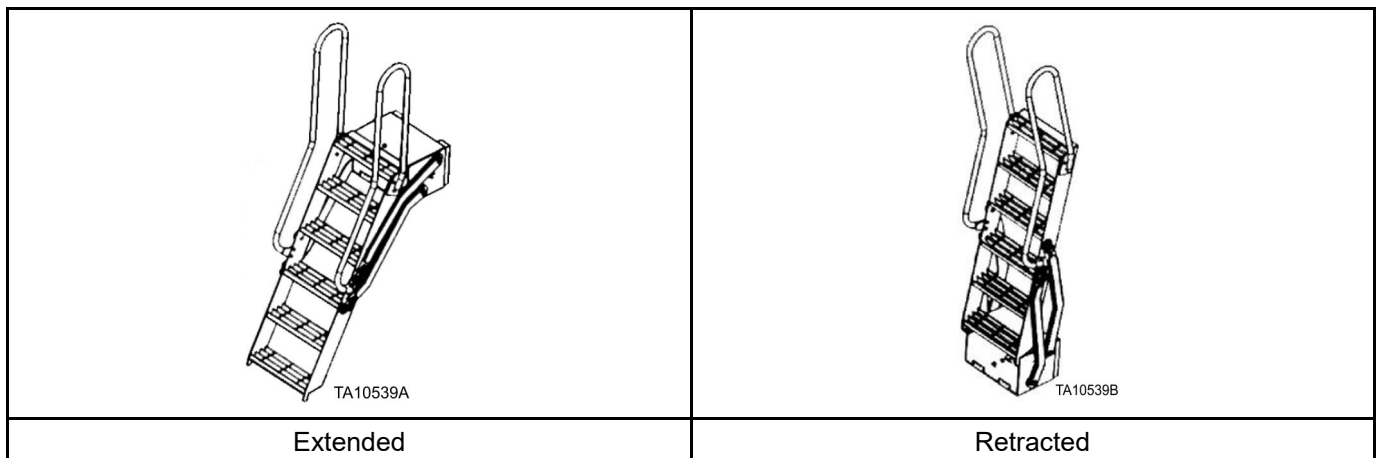


WARNING

Crush hazards exist from leaving the cab without setting the park brakes, which could result in unplanned and uncontrolled movement of the machine. The operator should never leave the cab with the park brake released. Set the park brake before leaving the cab. Leaving the cab without setting the park brake could cause a crush hazard from unexpected machine movement, resulting in property damage, serious injury or death.

Alarms: Prior to ladder operation, the green or red LED (as applicable to the ladder’s position) should be illuminated and NOT flashing. A flashing red, green, or orange LED, prior to ladder operation, is an indication of a problem and the ladder should not be operated until it is repaired. Problems occurring during ladder operation result in an audible alarm accompanied by rapidly flashing, dim, or constantly on LEDs during the ladder’s up/down cycles. Troubleshooting information for problems indicated by the various alarm codes is provided in the manufacturer’s information, located in Section 03 of the Service Manual.

Figure 7: Powered access ladder



Operating the Ladder without Electrical Power

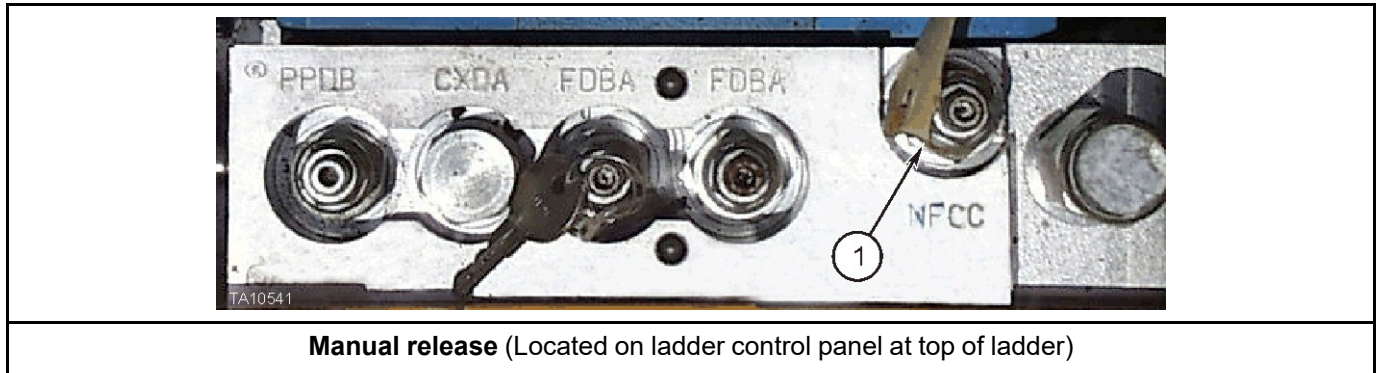
Should an emergency situation or mechanical problem occur, which results in loss of electrical power to the ladder, the ladder can still be lowered.

Loss of power to the ladder is sensed by the ladder’s control system. When the up/down switches on either box are moved to the DOWN position, the emergency down circuit is actuated. A charged 24 VDC capacitor powers the ladder to the down position. The capacitor has power to lower the ladder only one time, it is recharged by reapplying power to the ladder.

Manual Release

The ladder can be manually raised or lowered by loosening the Allen-head screw on the ladder's control panel. Access the control panel is gained by raising the metal plate at the top of the ladder (Refer to illustration Ladder manual release).

Figure 8: Ladder manual release



Service, Inspection and Lubrication

Please refer to Section 03 of the Service Manual.

Komatsu Model

Some machines are optionally equipped with a “Komatsu” model, powered access ladder mounted on the left rear of the rear frame.

Safe operation of the ladder depends on adherence to all safety warnings and cautions, and all safety rules required in the users area of operation. Periodic inspection and service must also be performed to the ladder to ensure safe and trouble-free operation.

WARNING

Struck by or Crush hazards exist if personnel are in the travel area of the ladder when it is being lowered or raised. The ladder lowers and raises rapidly when engaged. Before lowering or raising the ladder, make sure all personnel are clear of the area. Being struck by the ladder or thrown off the machine could result in serious injury or death.

WARNING

Fall hazard or Crush hazards exist if personnel rides the ladder up or down. Never ride the ladder up or down when it is being activated. Being struck by or crushed by the ladder could result in serious injury or death.

CAUTION

Component damage can result from attempting to ride the ladder up or down during operation. Do not ride the ladder up or down. Riding the ladder will void the manufacturer's warranty and could result in component damage.



WARNING

Struck by or Crush hazards exist if the ladder is not de-energized prior to performing maintenance work on it. Place the ladder in the "DOWN" position and use Battery Isolation Switch to de-energize the ladder prior to performing any service operations to the ladder. Failure to de-energize the ladder prior to working on it could cause personnel to be struck by or crushed by the ladder, resulting in serious injury or death.



WARNING

Crush hazards exist if the park brake is not set before operating the ladder. Before raising or lowering the ladder, set the machine park brake. Uncontrolled machine movement could cause a hazardous condition when trying to enter or exit the ladder, which could result in serious injury or death.



WARNING

Fall hazard exists due to uncontrolled ladder movement if it is not placed in the full down position before entering or exiting the ladder. Place the ladder in the full DOWN position before entering or exiting the ladder. Serious injury is possible if the ladder is not in the full DOWN and LOCKED position before entering or exiting the machine.



WARNING

Fall hazard or crush hazards exists when operating the ladder or using it to enter or exit the machine. To avoid personal injury and component damage it is essential that all personnel using the ladder be familiar with its operation and all indicators and alarms. Falls and crush hazards are possible if personnel are not familiar with the ladder operation before using it, which could result in serious injury.

Typical Operation

The ladder is powered by an air cylinder which receives pressure from the compressed air system.

Safe operation of the ladder depends on adherence to all safety warnings and cautions, and all safety rules required in the users area of operation. Periodic inspection and service must also be performed to the ladder to ensure safe and trouble-free operation.

Normal Operation at Ground or Elevated Levels

The valve for raising and lowering the ladder is located just behind the cab, on the rear of the Low Voltage Control Cabinet (LVCC). The switch is a lever-operated toggle valve which is pulled up to retract the ladder and pushed down to lower the ladder.

Refer to illustration Powered rear access ladder switch. Powered DO NOT attempt to operate the machine unless you are certain the ladder is in the UP position. Refer to Parts Manual for air schematic.

Figure 9: Powered rear access ladder switch



Service, Inspection and Lubrication

Please refer to the vendor in Section 03 of the Service Manual.

Operator's Cab

The Operator's Cab has doors on each side to allow entry or exit as is convenient for the operator or should egress be required from either side due to an emergency situation. A catwalk extends around the front of the cab to allow the operator to walk around the front of the cab. Refer to "Operator's cab – left side view through cab to right side", "Operator's cab – right side" and "Operator's cab – left side door".

Figure 10: Operator's cab – left side view through cab to right side



Figure 11: Operator's cab – right side



NOTICE

It is recommended that the stairs and walkway on the left side of the machine be used for normal entry and exit.

Figure 12: Operator's cab – left side door



WARNING

Fall hazard or struck by foreign objects hazard is possible while climbing the hydraulic reservoir ladder near the KLENZ™ air filtration system if the system emits a loud “boom” and ejects dust from the hopper. Turn the KLENZ™ Enable Switch OFF before climbing the ladder. The loud “boom” could cause a person on the ladder to be startled and lose their grip, resulting in a fall. DO NOT climb the hydraulic reservoir ladder or stand near the bottom of the ladder of an operational machine unless the KLENZ™ Enable Switch is in the OFF position, except in an emergency situation. Serious injury from a fall or being struck by foreign objects is possible, resulting in serious injury or death.

A grab bar for pulling the doors closed or pushing them open is provided across the inside of each door. The bars have an integral squeeze-to-open handle. Refer to “Grab bar” and “Squeeze-handle to-open”.

Figure 13: Grab bar

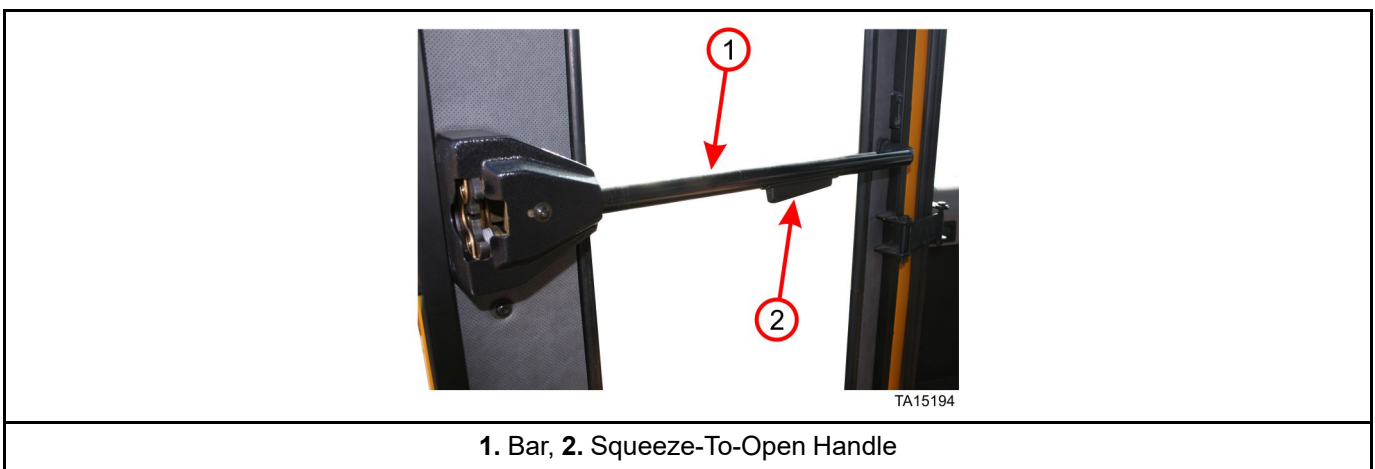


Figure 14: Squeeze-handle to-open door

Ample glass is provided in the windshield and wing panels to provide the operator a panoramic view of the work location. Refer to “Panoramic view from cab”.

Figure 15: Panoramic view from cab

Cab Interior Lights (Dome)

Two dome lights are flush-mounted in the cab ceiling. They have LEDs for lighting and are controlled by a switch on each access door, and a manual switch mounted on the overhead console. Opening either access door actuates the lights.

Cab Interior Lights Manual Switch (Dome)

The Cab Interior Lights Switch is a two position rocker switch mounted to the right of the Overhead Switch Panel.

- Moving the switch up turns the cab interior lights ON.
- Moving the switch down turns the cab interior lights OFF.

Figure 16: Cab dome light switch



Operator's Seat

The machine is equipped with a fully adjustable air-suspension operator's seat. The joystick controls for hoist and bucket or blade (applicable) and steering are mounted on either side of the seat. The operation of the joystick controls is provided in LEFT-HAND JOYSTICK CONTROL and RIGHT-HAND JOYSTICK CONTROL, located within this section of the Service Manual.

⚠ WARNING

Crush hazards exist if the operator seat is improperly adjusted which causes loss of machine control during operation. Adjust the seat for proper access to all controls and fasten seat belt or harness before operating the machine. Loss of machine control could cause a crush hazard resulting in serious injury or death to personnel in the operating area.

Seat Belt Operation and Adjustment


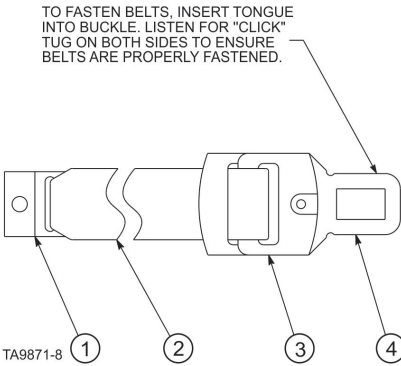
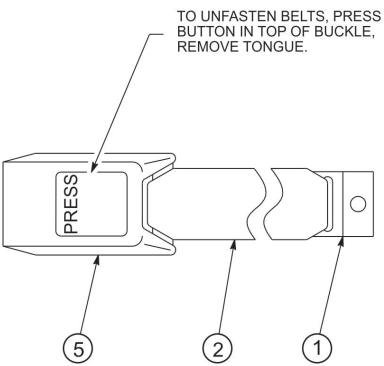
The machine is equipped with an adjustable 4 point seat belt harness to accommodate various requirements of operators. The seat belts are mounted to the operator's seat.

⚠ 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.

1. To fasten belts, insert tongue into buckle. Listen for "Click". Tug on both sides to ensure belts are properly fastened.
2. To unfasten belts, press button in top of buckle. Remove tongue.

Figure 17: Seat belt components and fastening/unfastening procedures (typical)

	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>TO FASTEN BELTS, INSERT TONGUE INTO BUCKLE. LISTEN FOR "CLICK" TUG ON BOTH SIDES TO ENSURE BELTS ARE PROPERLY FASTENED.</p>  </div> <div style="width: 45%;"> <p>TO UNFASTEN BELTS, PRESS BUTTON IN TOP OF BUCKLE, REMOVE TONGUE.</p>  </div> </div> <p style="font-size: small; margin-top: 5px;">TA9871-8</p>
<p>Operator Seat Belt Adjustment Points</p>	<p>1. Mount Bracket, 2. Belt, 3. Lock Bar, 4. Tongue, 5. Buckle</p>

Fastening and Unfastening the Belt

Fastening the 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 Belt

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

Adjustments

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

Lengthening the Belt

With the belt unfastened, move the lock bar slide toward the buckle.

Pull on the buckle until the slack is removed from the outer belt loop.

Readjust the belt if it does not fit snugly.

Shortening the Belt

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

Seat Belt Inspection

Step 1: Inspect for worn or frayed webbing.

Step 2: Check for worn or damaged buckle or lock bar. Replace the entire assembly if worn or damaged.

Step 3: Inspect the belt and harness mounting hardware. Replace any damaged or worn hardware. Keep the mounting bolts tight.

Automatic and Manual Seat Adjustments and Controls

(Refer to “Operator’s seat”)

The operator’s seat has the following adjustments:

(1) WEIGHT ADJUSTMENT - The seat should be adjusted for the operator’s weight by briefly pulling the actuator lever of the automatic weight and height adjuster (arrow) with the vehicle at a standstill and the operator sitting on the seat. The operator must sit completely still during adjustment. The setting for the operator’s weight must be checked and adjusted as necessary before the machine is driven.

(2) HEIGHT ADJUSTMENT - The seat height can be pneumatically and is infinitely adjustable. The seat height can be altered by pulling or pressing the actuator lever fully out or in (arrow). If the adjustment reaches the top or bottom end stop, the height is adjusted automatically, to guarantee a minimum of spring travel. To avoid damage, do not operate the compressor more than one minute.

(3) SEAT PAN ANGLE ADJUSTMENT - The angle of the seat pan can be individually adjusted. To adjust the angle of the seat pan, lift the left-hand handle (arrow). By exerting pressure on or off, the seat pan can be moved to the desired position.

(4) SEAT DEPTH ADJUSTMENT - The depth of the seat pan can be individually adjusted. To adjust the depth of the seat cushion, lift the right-hand handle (arrow). By moving the seat cushion backwards and forwards, the desired seating position can be reached.

(5) ABSORBER - The absorber adjustment setting of the seat can be varied to suit the on- and off-road driving conditions. The cushioning effect can be individually adjusted for this purpose. Turn the lever to the desired position and release for either hard or soft.

(6) ARMREST ADJUSTMENT - The inclination of the armrests can be modified by turning the adjustment knob (arrow).

(7) ARMREST HEIGHT ADJUSTMENT - The armrests can be folded up if desired and height individually adjusted. To adjust the armrests for height, separate the round cap (arrow) from the cover, loosen the hexagon nut (13mm) and adjust the armrest to the desired height and tighten the nut again.

(8) HEADREST - The headrest can be individually adjusted for height by pulling it upward over the various increments up to the end stop. By pushing forward or backward, the angle of the headrest can be adjusted individually. To remove the headrest, pull it over the end stop.

(9) LUMBAR SUPPORT - The curve of the backrest cushion can be individually adjusted by turning the knob on the back of the seat.

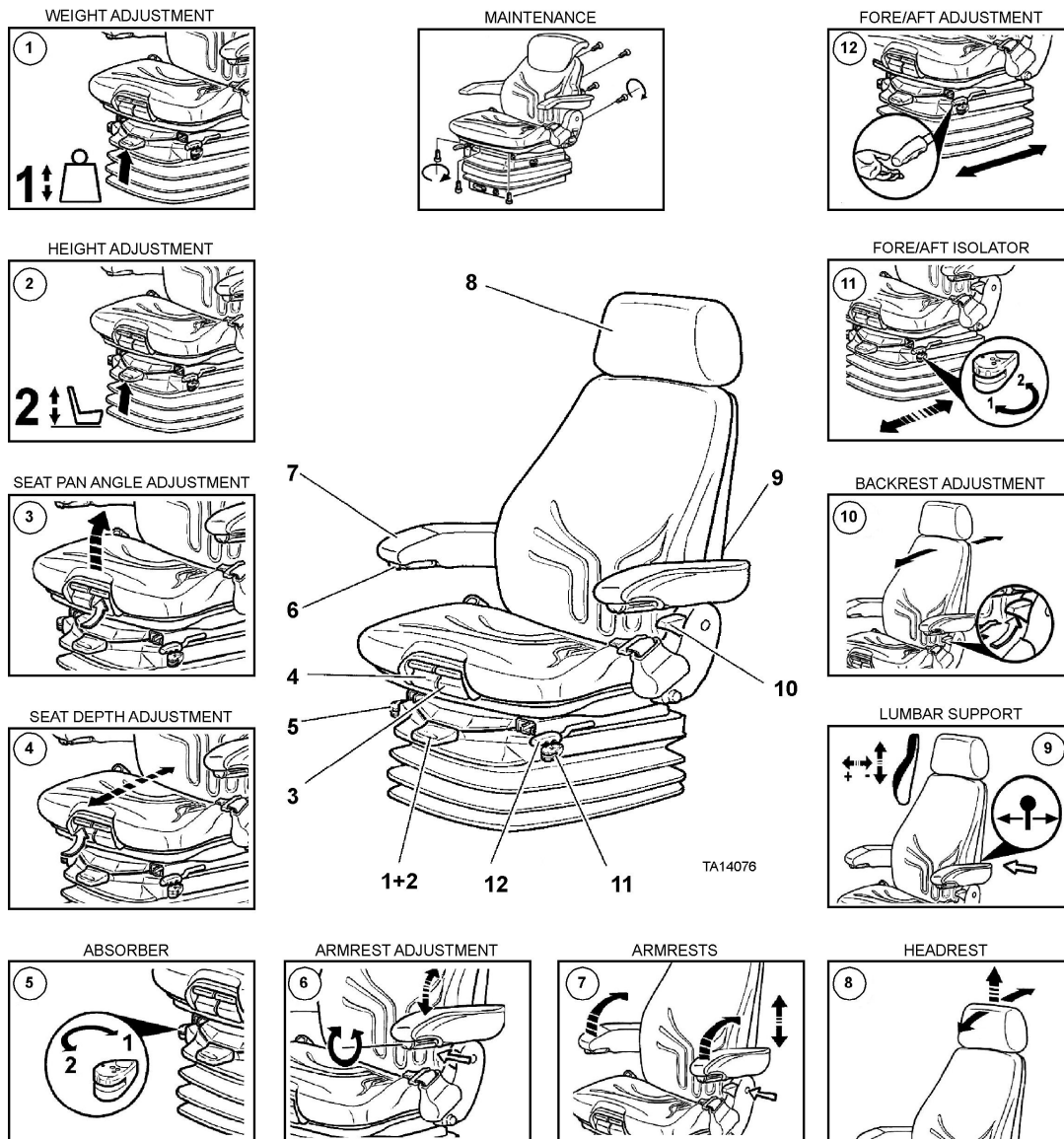
(10) BACKREST ADJUSTMENT - The backrest is adjusted using the locking lever (arrow). The locking lever must latch into the desired position. It should not be possible to move the backrest into another position when it is locked.

(11) FORE/AFT ISOLATOR - Under certain driving conditions, it is useful to activate the fore/aft isolator. This means that shock impacts in the driving direction can be better absorbed by the seat. Position 1 = fore/aft isolator on, Position 2 = fore/aft isolator off.

(12) FORE/AFT ADJUSTMENT - The fore/aft adjustment is released by lifting the locking lever. The locking lever must latch into the desired position. It should not be possible to move the seat into another position when it is locked.

OPERATOR ENTRY AND EXIT - The seat will not swivel. Either armrest will pivot upward to aid in operator entry and exit.

Figure 18: Operator's seat (typical)



Maintenance of the Operator Seat

Dirt can impair the function of the seat. It is essential to make sure the seat is kept clean. Upholstery can be quickly and simply removed from the seat frame for easy cleaning or replacement. During cleaning, the upholstery should not be soaked through. Use a commercially available, standard upholstery cleaning agent when cleaning the seat. Test first for compatibility on a small, concealed area and follow manufacturer recommendations.

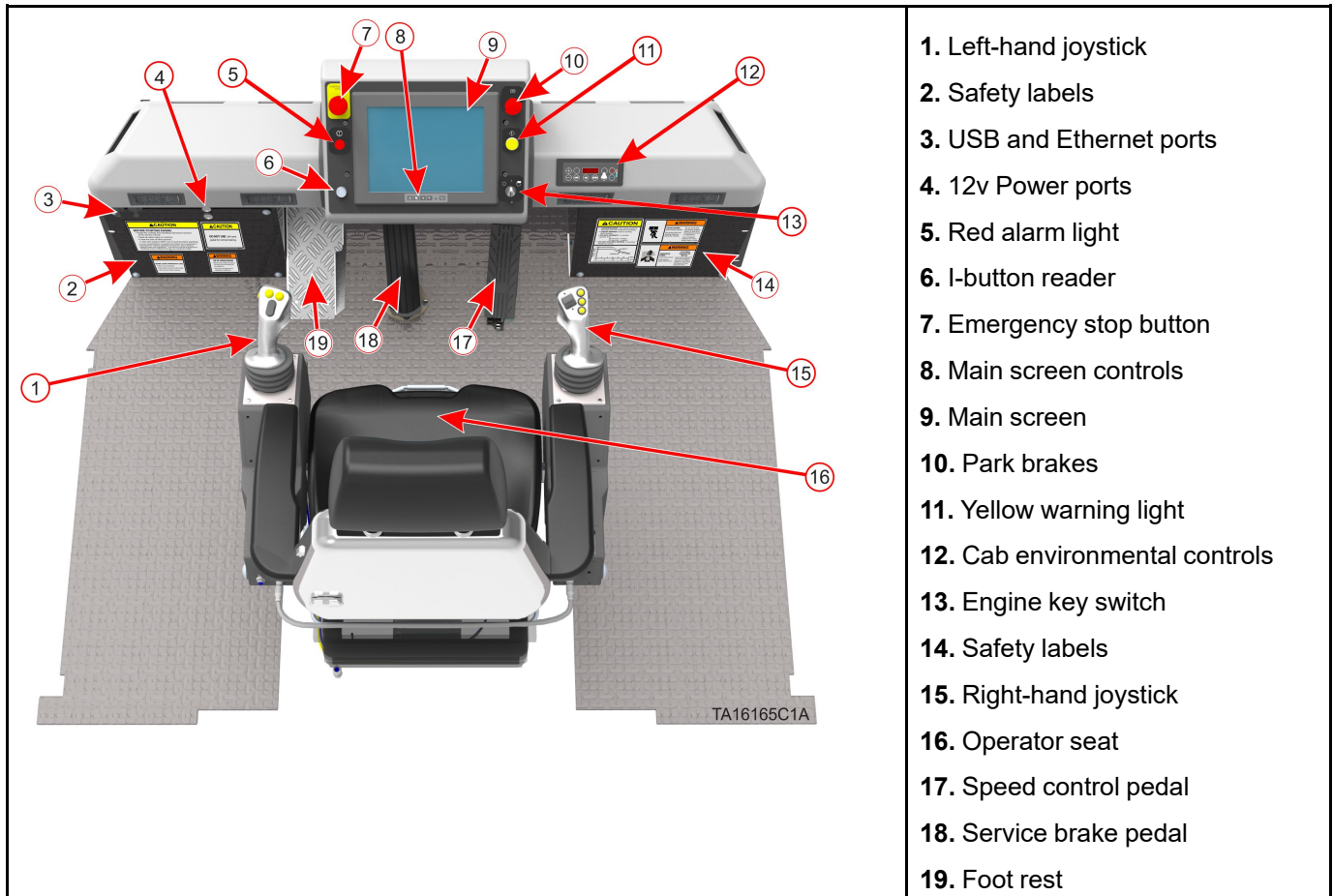
⚠ CAUTION

Struck-by or pinch point hazards exist if the operator seat backrest upholstery is removed for cleaning or maintenance and the backrest frame is not supported. The backrest frame must be supported, for example held in place, before the backrest adjuster is operated. If this is not done, there is a danger that the backrest frame may jerk forward and cause a struck-by or pinching injury.

Overview of Operational Controls and Instruments

The following provides a brief overview of the operator's controls and instruments of the Loader:

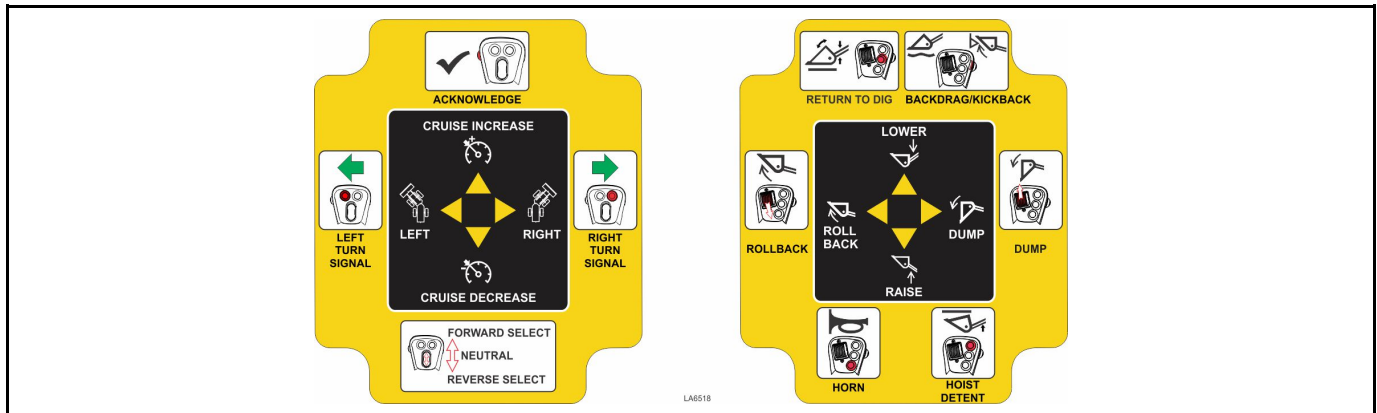
Figure 19: Operational controls



1. Left-hand joystick
2. Safety labels
3. USB and Ethernet ports
4. 12v Power ports
5. Red alarm light
6. I-button reader
7. Emergency stop button
8. Main screen controls
9. Main screen
10. Park brakes
11. Yellow warning light
12. Cab environmental controls
13. Engine key switch
14. Safety labels
15. Right-hand joystick
16. Operator seat
17. Speed control pedal
18. Service brake pedal
19. Foot rest

The Loader is equipped with joystick controls for hoist, bucket, steering functions and cruise speed adjustment as well as others (see below). The joystick controls are mounted on support structures, attached to the operator's seat. The following pages of instructions explain the functions of each joystick as shown in "Joystick operation labels" below. The respective left/right label is located beside each joystick.

Figure 20: Joystick operation labels



Ground speed and dynamic braking are controlled by the foot-operated Speed Control Pedal. The speed control pedal is pressed to move the machine and released to actuate dynamic braking. The Service Brake Pedal is provided for holding the machine on grades or when in close proximity to a transport vehicle.

Switches for controlling various lights, accessories and other service functions of the loader are mounted on the operator's console and an overhead panel (see below for more information).

A touch screen panel provides pertinent information such as ground speed, hour meter, various gauge readings, fuel level, compressed air system pressure, etc.

The operator is alerted to a potential problem that might require the shutdown of the machine or the call for repair by warning lights, an audible alarm or text messages on the touch screen. The touch screen provides repair technicians with some operational data and fault messages in the event of a pneumatic, mechanical, electrical, or hydraulic malfunction.

The operator's cab is pressurized and has a climate control system.

NOTICE

When operating in cold climates, the oil pressure indications will be higher after starting, during engine warm-up, and when HI throttle is selected. It will take longer for the oil to warm-up and for the oil pressure to reach normal operating temperature.

CAUTION

- **If the machine is to sit outside when not working with the ambient temperature below -20° C, the engine must be running at high idle with**
 - **With Drive system de-energized.**
 - **With Park Brake set.**
 - **Or all heaters must be operational and plugged in to a power supply external to the machine if the engine is not running.**
 - **Failure to comply with these instructions could result in serious damage to the engine or other components.**

Left-Hand Joystick Control - Directional Control

(Refer to illustration “Joystick operation labels”)

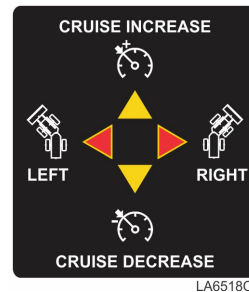
- The dual-axis Directional Control Joystick has:
- Steer Left/Right
- Turn Signals
- Directional Control Switch
- Acknowledge Button
- Cruise Speed Adjustment

NOTICE

The left and right sides of the loader are determined when standing behind it or sitting in the operator's seat. Engine left and right bank is determined by viewing the engine from the flywheel end.

Steer Left/Right

Moving the left directional joystick from side to side controls the left and right directional articulation of the machine

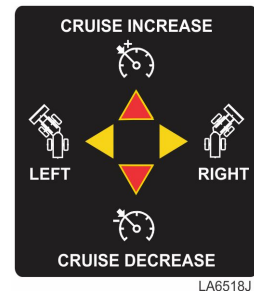


- Moving the directional joystick control to the left from center steers the machine to the left.
- Moving the directional joystick control to the right from center steers the machine to the right.
- The speed of steering is proportional to the distance the joystick is moved from center.
- The directional joystick control automatically returns to center when released. The machine will not automatically steer back to a straight articulation.

Cruise Speed Adjustment

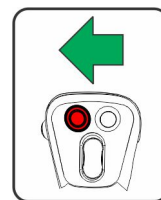
After setting the cruise speed, moving the joystick forward **INCREASES** the cruise speed and moving the joystick backward **DECREASES** the cruise speed.

- The cruise button is located on the overhead keypad.
- Once activated, pressing the button again on the overhead keypad disables the cruise control.
- Actuating the service brake.

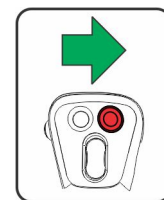


Turn Signal Switches

Two pushbutton switches to actuate the turn signal lights on the front and rear of the machine, are located on top of the left joystick. These switches have yellow covers.



Left Turn Signal

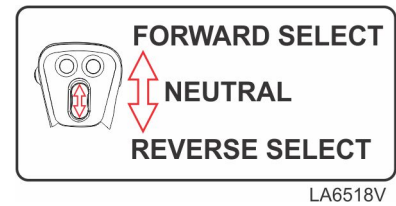


Right Turn Signal

- Pressing the left button actuates the left turn signal light on the rear of the machine, the left turn signal light on the front of the machine and the left arrow indicator on the touch screen.
- Pressing the right button actuates the right turn signal light on the rear of the machine, the right turn signal light on the front of the machine and the right arrow indicator on the touch screen.
- Pressing either button a second time will cancel the turn signal. When the machine approaches straight articulation, the turn signal will also cancel. If the machine is articulated to the right, the left turn signal cannot be activated until the degree of turn reaches close to straight. When articulated to the left, the right signal cannot be turned on until reaching near straight articulation.

Directional Control Switch

The directional control switch is a three-position maintained rocker-type switch mounted on the steering joystick control. It is used to select forward, neutral, or reverse direction of machine movement.



- Moving the switch to the front position selects FORWARD machine movement.
- Moving the switch to the back position selects REVERSE machine movement.
- Moving the switch to the center position selects NEUTRAL machine movement.

When the directional switch is moved to the reverse position, the backup alarm will sound and the backup lights will come on. They will remain on until the switch is moved to the neutral or forward position.

The machine's direction, FORWARD or REVERSE, can be selected without releasing the speed control pedal. Once the directional control switch is moved to the opposite direction, the machine's control system automatically applies dynamic braking, slows the machine to a complete stop, and then changes the machine's direction. While this change of direction is being processed by the control system, the speed control pedal can remain fully depressed. This will ensure that cycle times are maximized.

The center position is the neutral position. The directional switch must be in the center position to start the engine. When the switch is in the center position, the loader will not be powered in either direction if the speed control pedal is pressed.

Acknowledge Button

NOTICE

- *The Acknowledge button is located on the side of the directional control (left) joystick. Pressing the button acknowledges the WARNING, ALERT or NOTICE screens on the touch screen.*
- *Pressing and holding the acknowledge button for two (2) seconds will bypass the engine shutdown timer.*

Figure 21: Acknowledge button



Right-Hand Joystick Control - Hoist and Bucket Control

(Refer to illustration “Joystick operation labels”)

The dual-axis Hoist/Bucket control joystick has the following command functions:

- Forward and backward positions for raising and lowering the lift arms

Lowering the lift arms also controlled by using buttons

Hoist Detent

Return to Dig

- Side-to-side (left or right) positions for bucket rollback and dumping.

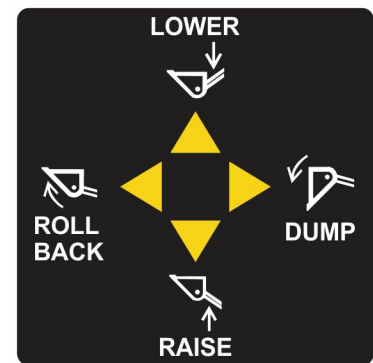
Also controlled by **Bucket Control Roller Potentiometer** on top of the joystick.

- **Return to Dig Switch:** Lowers the lift arms to a preset distance from the ground and positions the bucket to a preset position.
- **Backdrag/Kickback Switch:** Below a certain lift arm angle, drop the bucket to the ground by placing the hoist lower function in a float mode. Above a certain height, the button rolls the bucket back to a level position.
- **Hoist Detent Switch:** raises the lift arms to full height or alternative height if “alt height” is active.
- **Horn Switch:** actuates the horn solenoid while held.

Hoist and Bucket Control Using Right Joystick

Speed of lift arm and bucket movement is proportional to the distance the joystick is moved from neutral (center). The further the joystick is moved from center the faster the lift arms or bucket move in the commanded direction.

- Moving the hoist control joystick backward from neutral (center) causes the lift arms to RISE (power up).
- Moving the hoist control joystick forward from neutral (center) causes the lift arms to LOWER (power down).

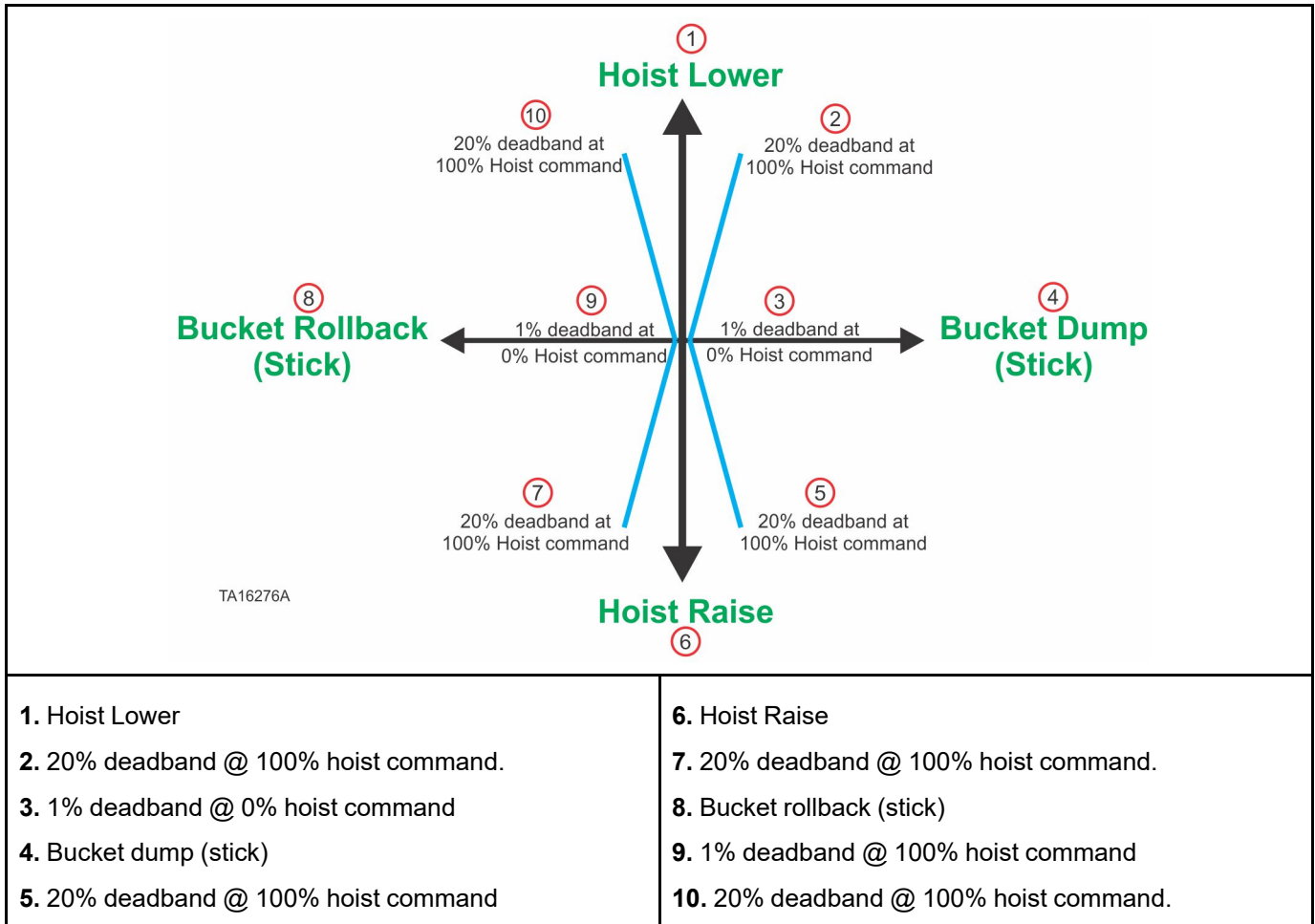


LA6518A

The center position is the neutral position. Moving the hoist control joystick toward the center position, from either position (forward or backward), causes the lift arms motion to slow. When the joystick reaches center, the lift arm motion will stop. The hoist/bucket control joystick automatically returns to center when released.

- Moving the joystick to the left moves the bucket toward rollback position (until the joystick is released).
- The rollback position is used to load the bucket and to transport the load.
- Moving the joystick to the right causes the bucket to dump.
- Moving the joystick to a quadrant between those described above causes both actions to occur simultaneously (bucket function takes priority). See “Simultaneous Right Joystick, Switch, or Roller Command Functions” for examples.

Figure 22: Right Joystick dead band explanation



Joystick Control Switches and Roller

Hoist and bucket movements can also be controlled by using the three pushbutton switches or the roller switch on the joystick control.

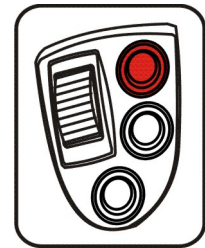
NOTICE

Joystick commands override pushbutton switch commands.

Bucket Control Roller overrides bucket commands via joystick movement.

Hoist Detent Switch

The hoist detent switch is a pushbutton switch that causes the lift arms to rise to the height determined by the bucket height switch or to full height if the bucket height switch is in the OFF position. The lift arms rise at full speed.

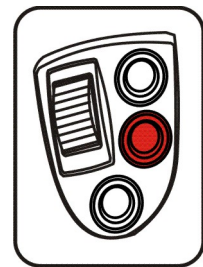


LA6495-21

Return to Dig Control Switch

The Return to Dig control switch is a pushbutton switch. Pressing this switch with auto leveling enabled, causes the bucket to descend or rise to the set position. The bucket will not free fall under this condition but will descend as rapidly as fluid being expelled from the lift cylinders will allow.

The Return to Dig command is cancelled if a power down or hoist up command is given by the joystick



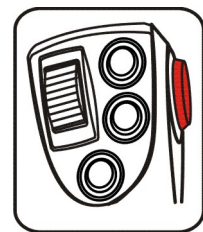
LA6495-22

Backdrag/Kickback Switch

Backdrag Switch:

If the bucket is close to the ground and the Backdrag switch is pressed, the lift arms will transition from a hydraulically held position to a sequence of “power down” then float position. The float position hydraulically connects the hoist cylinder base and rod ports together. This allows the bucket to rest on the ground with the bucket floating across the pit floor. The bucket can still be operated as normal in either a held position, dumped forward (teeth down), or be rolled back (loading). This float function allows for pit floor cleanup or the ability to cut grades or follow material seams.

The Backdrag command is cancelled if a power down or hoist up command is given by the joystick.



LA6495-23

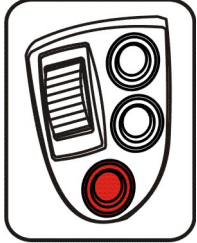
Kickback Switch:

When the bucket is higher than the normal loading range (higher than about 6 feet) the kickback function will function when the switch is pressed. Above this level, this switch, when depressed will roll the bucket back (only if the bucket is in a dumped / teeth down position) until the floor of the bucket is parallel to the ground. This allows the operator to roll the bucket back to a level position with the press of a button. Typically this function is used when dumping into a truck that has taller side boards than the maximum dumped bucket lift height of the loader. By “kicking back” the bucket lip to parallel to the ground, contact to the side of a truck body should be avoided while reversing the machine.


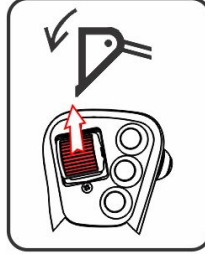
Horn Button

NOTICE

There is approximately a 1/2 second delay between the time the horn button is pressed and when the horn sounds.

<p>The air horn sounds until the button is released or air pressure drops to a level that will no longer cause the horn to actually make sound. The horn is actuated by a solenoid mounted on top of the cab, close to the actual horn. The switch has to be active for approximately 200 milliseconds before the horn solenoid energizes. This allows the operator to reset truck weight without sounding the horn.</p>	 <p>LA6495-24</p>
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Bucket Control Roller

<p>The spring-centered roller controls bucket rollback and dump movements. Rolling the roller back from center rotates the mouth of the bucket upward (roll back). Rolling the roller forward from center rotates the mouth of the bucket downward (dump). Bucket rollback and dump movement speed is proportional to how far the roller is rolled forward or backward from neutral (center). Releasing the roller causes it to return to the neutral (center) position. Bucket movement will stop and hold at the position where the roller is released.</p>	 <p>LA6518T</p> <p>Rollback</p>	 <p>LA6518U</p> <p>Dump</p>
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To move the bucket in the opposite direction, the roller must be rolled either forward or backward, as required. If the Return to Dig button is pressed, the bucket will automatically return to the pre-set location (if the auto level switch is ON – LED is illuminated).

The Bucket Control Roller controls the speed and direction of bucket movement. Once initiated, the bucket motion will continue until reaching full position, until the roller is released or until another command is initiated by the roller (past center into opposite direction). Greater (distance) roller movement affects the speed of the bucket dump or rollback, not the distance it travels (unless the roller is released).

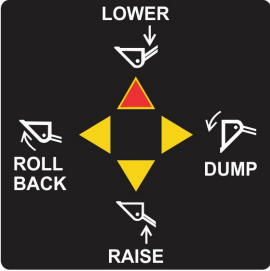



The Bucket Control Roller controls movement of the bucket in both directions and over-rides an opposing joystick command. See “Simultaneous Right Joystick, Switch, or Roller Command Functions” below for examples.



<p>The following RIGHT JOYSTICK commands will continue until the joystick is moved to another position or until the final lift arm or bucket position is reached.</p>	
Right Joystick Location	Causes this movement

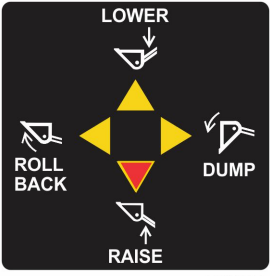
<p>LA6518B</p>	<ul style="list-style-type: none"> The lift arms lower and the bucket moves toward dump position.
<p>LA6518C</p>	<ul style="list-style-type: none"> The lift arms rise slowly and the bucket moves toward dump position.
<p>LA6518D</p>	<ul style="list-style-type: none"> The lift arms rise slowly and the bucket moves toward rollback position.
<p>LA6518E</p>	<ul style="list-style-type: none"> The lift arms lower and the bucket moves toward rollback position.

Simultaneous Right Joystick, Switch, or Roller Command Functions



The following examples describe what movement occurs when the joystick is used to command various lift arm or bucket movements, then a joystick switch is pressed.




 <p style="text-align: center;">LA6518F</p>	<p>Joystick Power Down (lower) is actuated and held:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> • The lift arms are slightly above “centerline-level”. • Bucket Auto Level is ON. <p>Bucket is level</p> <ul style="list-style-type: none"> • Joystick Power Down is commanded (Joystick moved forward). <p>Lift arms begin movement downward toward ground elevation.</p>
<p>Then a command switch is pressed</p>	
<p>Switch Pressed</p>	<p>This movement occurs</p>
 <p style="text-align: center;">BACKDRAG/KICKBACK TA16219B</p> <p>Backdrag/Kickback</p>	<ul style="list-style-type: none"> • Power Down continues as lift arms lower
 <p style="text-align: center;">HOIST DETENT TA16219C</p> <p>Hoist Detent</p>	<ul style="list-style-type: none"> • Hoist Detent command has no effect. • Lift arms continue to lower.
 <p style="text-align: center;">RETURN TO DIG TA16219D</p> <p>Return to Dig</p>	<ul style="list-style-type: none"> • Return to Dig command has no effect • Power Down continues as lift arms lower <p>Lift arms lower when the joystick is held in Power Down command position.</p>
<p>Or the roller is actuated</p>	<p>This movement occurs</p>

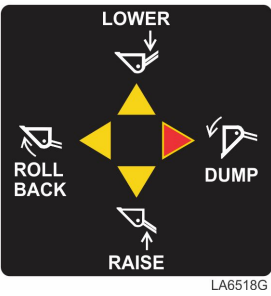

 <p>DUMP TA16219E</p> <p>Dump</p>	<ul style="list-style-type: none"> Lift arms travel downward Bucket lip travels downward toward Dump position <p>As long as the roller is held (command is demanded by potentiometer). Until full bucket dump position is reached.</p>
 <p>ROLLBACK TA16219F</p> <p>Rollback</p>	<ul style="list-style-type: none"> Lift arms travel downward Bucket travels upward toward Rollback position <p>As long as roller is held (command is demanded by potentiometer). Until full roll back position is reached.</p>


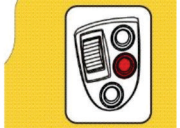

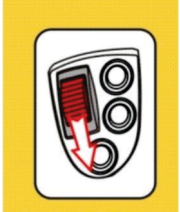
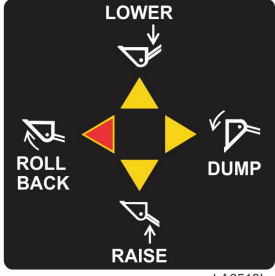
 <p>LA6518H</p>	<p>Joystick Power Up (raise) is actuated and held:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> The lift arms are at “ground level” Bucket Auto Level is ON. Bucket is level Joystick Power Up is commanded (Joystick moved fully backward) <p>Lift arms begin movement upward toward fully raised position.</p>
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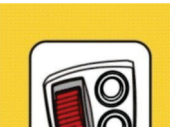
Then a command switch is pressed

Switch Pressed	This movement occurs
 <p>BACKDRAG/KICKBACK TA16219G</p> <p>Backdrag/Kickback</p>	<ul style="list-style-type: none"> Power up continues and lift arms rise
 <p>HOIST DETENT TA16219C</p> <p>Hoist Detent</p>	<ul style="list-style-type: none"> Power up continues and lift arms rise

	<ul style="list-style-type: none"> Power up continues and lift arms rise
<p>Or the roller is actuated This movement occurs</p>	
	<ul style="list-style-type: none"> Power up continues and lift arms rise Bucket travels to Dump position as lift arms rise As long as roller is held (command is demanded by roller). Until full position is reached
	<ul style="list-style-type: none"> Power up continues and lift arms rise Bucket travels to Rollback position as lift arms rise As long as roller is held (command is demanded by potentiometer). Until full position is reached


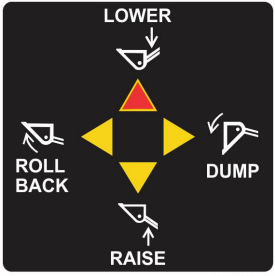
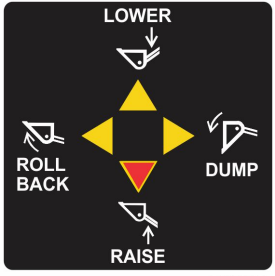
	<p>Joystick Dump is actuated and held:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> The lift arms are slightly above “centerline-level” Bucket Auto Level is ON. Bucket is level Joystick Dump is commanded (Joystick moved fully right) Bucket begins moving lip downward toward dump position.
<p>Then a command switch is pressed</p>	
<p>Switch Pressed</p>	<p>This movement occurs</p>
	<ul style="list-style-type: none"> Bucket Dump continues.

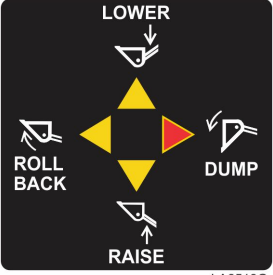
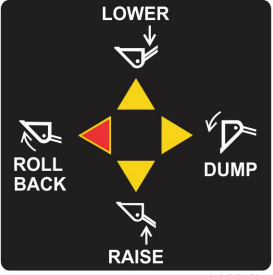
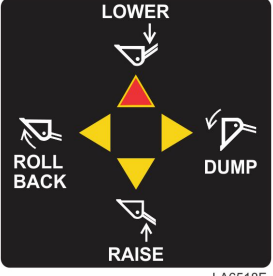
 <p>HOIST DETENT TA16219C Hoist Detent</p>	<ul style="list-style-type: none"> • Bucket Dump continues. • Lift arms begin to rise at a reduced rate of speed.
 <p>RETURN TO DIG TA16219D Return to Dig</p>	<ul style="list-style-type: none"> • Bucket Dump continues.
<p>Or the roller is actuated</p>	<p>This movement occurs</p>
 <p>DUMP TA16219E Dump</p>	<p>Roller is moved forward toward dump position.</p> <ul style="list-style-type: none"> • Bucket Dump continues. <p>Distance of Potentiometer movement controls speed of bucket movement.</p>
 <p>ROLLBACK TA16219F Rollback</p>	<p>Roller is moved forward toward rollback position.</p> <ul style="list-style-type: none"> • Bucket Dump stops. • Bucket roll back begins. <p>Distance of Potentiometer movement controls speed of bucket movement.</p>
 <p>LA6518I</p>	<p>Joystick Rollback is actuated and held:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> • The lift arms are above “ground level” • Bucket Auto Level is ON. • Bucket is level • Joystick Rollback is commanded (Joystick moved fully left) • Bucket lip begins movement upward toward rollback position.
<p>Then a command switch is pressed</p>	

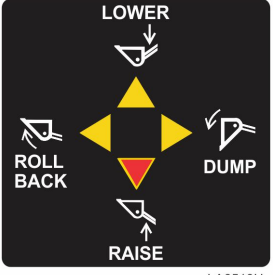
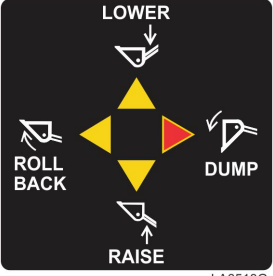
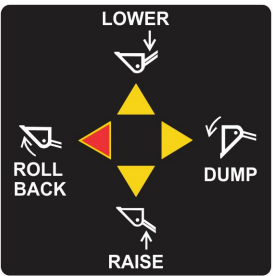
Switch Pressed	This movement occurs
 <p>BACKDRAG/KICKBACK TA16219B Backdrag/Kickback</p>	<ul style="list-style-type: none"> • Bucket Rollback continues.
 <p>HOIST DETENT TA16219C Hoist Detent</p>	<ul style="list-style-type: none"> • Bucket Rollback continues.
 <p>RETURN TO DIG TA16219D Return to Dig</p>	<ul style="list-style-type: none"> • Bucket Rollback continues.
Or the roller is actuated	This movement occurs
 <p>DUMP TA16219E Dump</p>	<ul style="list-style-type: none"> • Bucket rollback stops • Bucket Dump begins.
 <p>ROLLBACK TA16219F Rollback</p>	<ul style="list-style-type: none"> • Bucket Rollback continues.


There is no operational value for simultaneously depressing any combination of Backdrag/Kickback, Hoist Detent or “Return to Dig” buttons. Those combinations are not discussed herein.


The following examples describe what movement occurs when a joystick switch is pressed to demand various lift arm or bucket movements, then the joystick is used to command lift arm or bucket movement.

 <p>BACKDRAG/KICKBACK TA16219B</p> <p>Backdrag</p>	<p>Backdrag Function</p> <p>Backdrag/Kickback Switch is pressed:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> • The lift arms are slightly above “ground level” • Bucket Auto Level is ON. Bucket is level • The Backdrag/Kickback is commanded (Button selected) • Lift arms begin movement downward <div style="background-color: #0056b3; color: white; text-align: center; padding: 10px; font-weight: bold; font-size: 1.2em;">NOTICE</div> <p><i>The lift arms stop moving and hold at the current position.</i></p>
<p>Then a command is initiated by right joystick movement</p>	
<p>100% Command</p>	<p>This movement occurs</p>
 <p>LA6518F</p> <p>Lower</p>	<ul style="list-style-type: none"> • Backdrag/Kickback command is cancelled. • Lift arms move downward when the joystick is held in Lower command position. • Bucket remains in last position before Backdrag/Kickback was cancelled.
 <p>LA6518H</p> <p>Raise</p>	<ul style="list-style-type: none"> • Backdrag/Kickback command is cancelled. • Lift arms move upward when the joystick is held in Raise command position. • Bucket remains in last position before Backdrag/Kickback was cancelled.

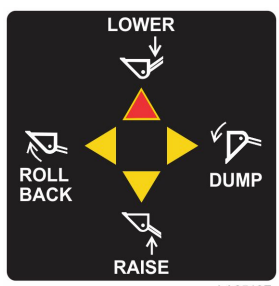
 <p style="text-align: center;">Dump</p>	<ul style="list-style-type: none"> • Lift arms stop downward movement • Bucket lip moves downward toward dump position.
 <p style="text-align: center;">Rollback</p>	<ul style="list-style-type: none"> • Lift arms stop downward movement • Bucket lip moves upward toward rollback position when the joystick is held in rollback command position.
<p>Then a command is initiated by right joystick movement</p>	
<p>100% command</p>	<p>This movement occurs</p>
 <p style="text-align: center;">Lower</p>	<ul style="list-style-type: none"> • Lift arms move downward when the joystick is held in Lower command position. • Bucket remains in last position before Backdrag/Kickback was cancelled.

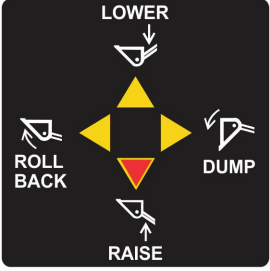
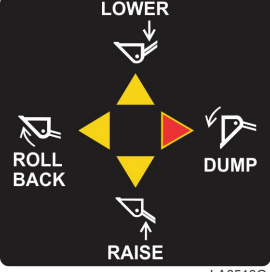
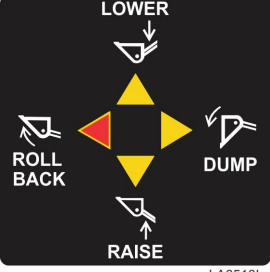
 <p style="text-align: center;">Raise</p>	<ul style="list-style-type: none"> • Lift arms move upward when the joystick is held in Raise command position. • Bucket remains in last position before Backdrag/Kickback was cancelled.
 <p style="text-align: center;">Dump</p>	<ul style="list-style-type: none"> • Backdrag/Kickback command is cancelled. • Lift arms stop downward movement • Bucket lip moves downward toward dump position.
 <p style="text-align: center;">Rollback</p>	<ul style="list-style-type: none"> • Backdrag/Kickback command is cancelled. • Lift arms stop downward movement • Bucket lip moves upward toward rollback position when the joystick is held in rollback command position.


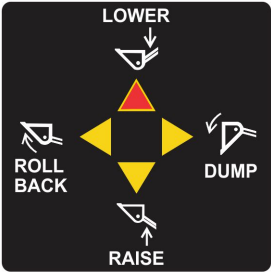
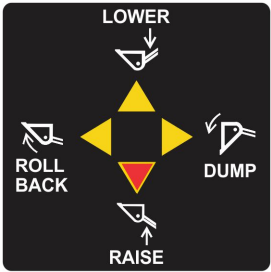
 <p>BACKDRAG/KICKBACK TA16219G</p>	<p>Kickback Function Backdrag/Kickback Switch is pressed:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> • The lift arms are above approximately 6 feet elevation. • Bucket Auto Level is ON. Bucket is level • The Backdrag/Kickback is commanded (Button selected)
<p>NOTICE</p>	
<p><i>The lift arms stop moving and hold at the current position.</i></p>	

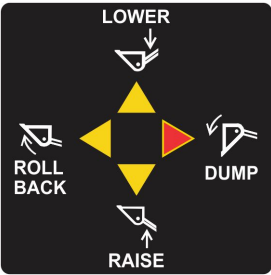
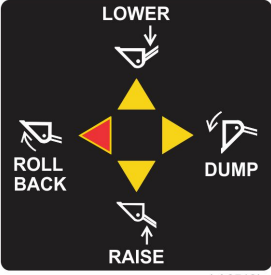
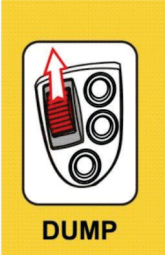
 <p>HOIST DETENT TA16219C</p>	<p>Hoist Detent Switch is pressed:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> • The lift arms are slightly above ground elevation • Bucket Auto Level is ON. Bucket is level • The Hoist Detent is commanded (Button selected) • Lift arms begin movement upward.
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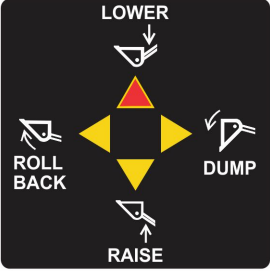
Then a command is initiated by right joystick movement

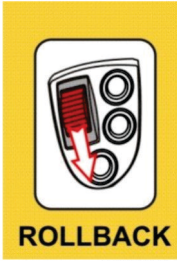
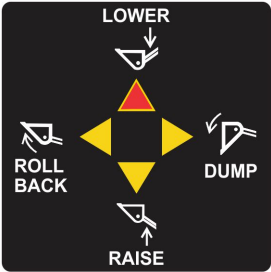
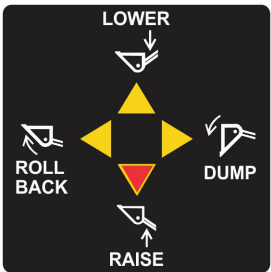
100% Command	This movement occurs
 <p style="text-align: right; font-size: small;">LA6518F</p>	<ul style="list-style-type: none"> • Detent command is cancelled. • Lift arms stop movement upward and immediately begin moving down.
<p>Lower</p>	

 <p style="text-align: center;">Raise</p>	<ul style="list-style-type: none"> • Detent command is cancelled. • Lift arms rise when the joystick is held in “raise” command position.
 <p style="text-align: center;">Dump</p>	<ul style="list-style-type: none"> • Lift arms rise at a reduced rate of speed. • Bucket lip moves downward toward dump position when the joystick is held in dump command position.
 <p style="text-align: center;">Rollback</p>	<ul style="list-style-type: none"> • Lift arms rise at a reduced rate of speed. • Bucket lip moves upward toward rollback position when the the joystick is held in rollback command position.

 <p>RETURN TO DIG TA16219D Return to Dig</p>	<p>Return to Dig Switch is pressed:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> • The lift arms are not at “return to dig” set point. • Bucket Auto Level is ON. Bucket is level • The Return to Dig is commanded (Button selected) • Lift arms begin movement.
<p>Then a command is initiated by right joystick movement</p>	
<p>100% Command</p>	<p>This movement occurs</p>
 <p>LA6518F</p> <p>Lower</p>	<ul style="list-style-type: none"> • Return to Dig command is cancelled. • Lift arms move downward when the joystick is held in Lower command position. • Bucket remains in last position before Backdrag/Kickback was cancelled.
 <p>LA6518H</p> <p>Raise</p>	<ul style="list-style-type: none"> • Return to Dig command is cancelled. • Lift arms move upward when the joystick is held in Raise command position. • Bucket remains in last position before Backdrag/Kickback was cancelled.

 <p style="text-align: center;">Dump</p>	<ul style="list-style-type: none"> • Return to Dig command is cancelled. • Lift arms stop movement. • Bucket moves toward dump position.
 <p style="text-align: center;">Rollback</p>	<ul style="list-style-type: none"> • Return to Dig command is cancelled. • Lift arms stop movement. • Bucket moves toward rollback position.
 <p style="text-align: center;">Dump</p>	<p>Dump is actuated and held:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> • The lift arms are above “ground level” • Bucket Auto Level is ON. Bucket is level • The Dump is commanded (Roller moved forward and held) • Bucket lip begins movement downward
<p>Then a command is initiated by right joystick movement</p>	
<p>100% Command</p>	<p>This movement occurs</p>

 <p style="text-align: center;">LA6518F</p> <p style="text-align: center;">Lower</p>	<ul style="list-style-type: none"> • Bucket lip moves downward to dump • Lift arms lower
 <p style="text-align: center;">LA6518H</p> <p style="text-align: center;">Raise</p>	<ul style="list-style-type: none"> • Bucket lip moves downward to dump • Lift arms rise
 <p style="text-align: center;">LA6518G</p> <p style="text-align: center;">Dump</p>	<ul style="list-style-type: none"> • Bucket lip moves downward toward dump position.
 <p style="text-align: center;">LA6518I</p> <p style="text-align: center;">Rollback</p>	<ul style="list-style-type: none"> • Bucket lip continues movement toward dump.

 <p>ROLLBACK TA16219F Rollback</p>	<p>Rollback is actuated and held:</p> <p>While these conditions exist:</p> <ul style="list-style-type: none"> • The lift arms are above “ground level” • Bucket Auto Level is ON. Bucket is level • The Rollback is commanded (Roller moved backward and held) • Bucket lip begins movement upward
<p>Then a command is initiated by right joystick movement</p>	
<p>100% Command</p>	<p>This movement occurs</p>
 <p>LA6518F</p> <p>Lower</p>	<ul style="list-style-type: none"> • Lift arms move downward • Bucket lip moves upward to full rollback
 <p>LA6518H</p> <p>Raise</p>	<ul style="list-style-type: none"> • Lift arms move upward • Bucket lip moves upward to full rollback

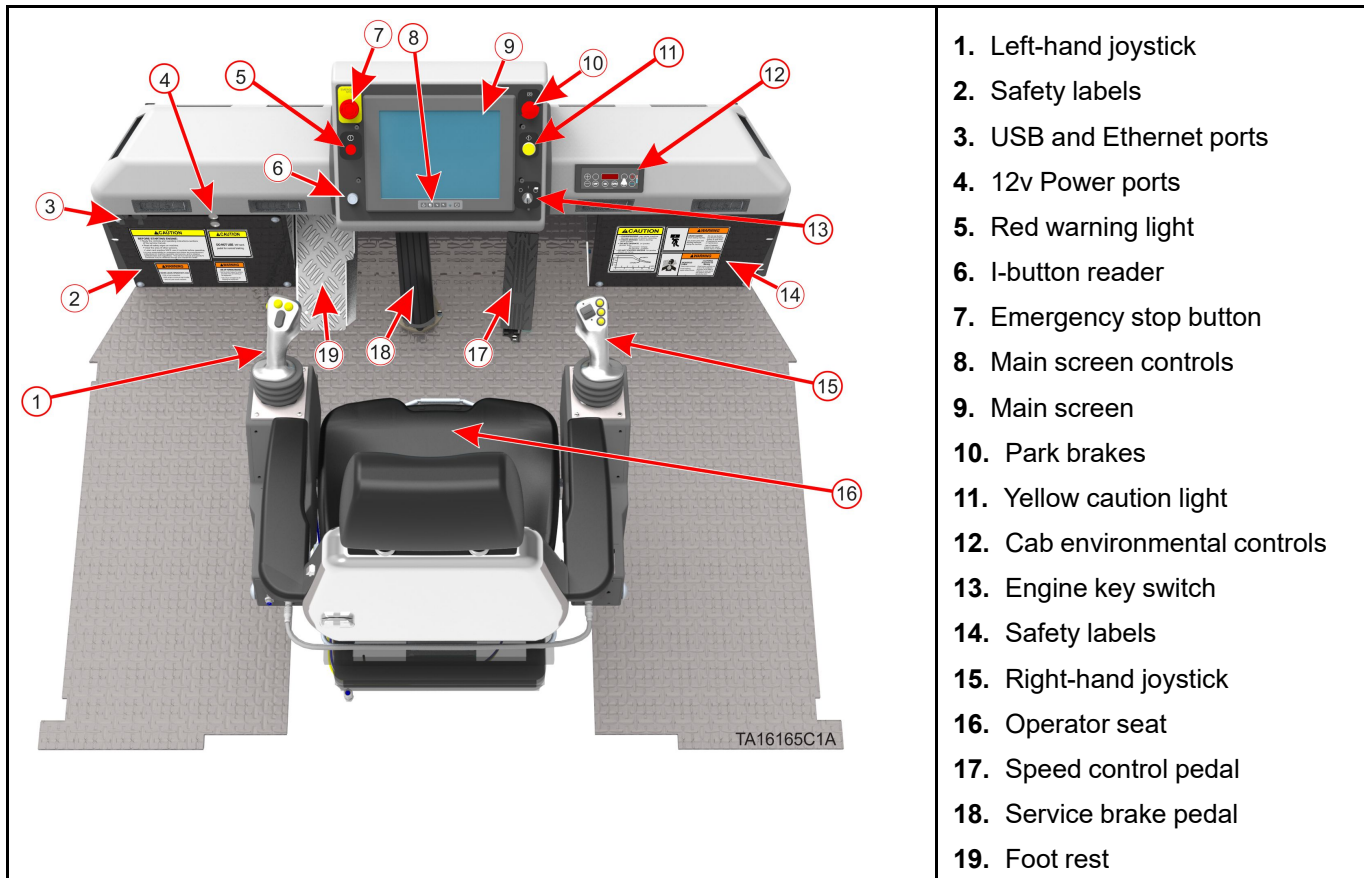
<p style="text-align: center;">LA6518G</p> <p style="text-align: center;">Dump</p>	<ul style="list-style-type: none"> • Bucket lip continues movement toward rollback position.
<p style="text-align: center;">LA6518I</p> <p style="text-align: center;">Rollback</p>	<ul style="list-style-type: none"> • Bucket lip moves upward to full rollback

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Cab Control Console (Operator's Console)

The Operator's Console contains the following:

Figure 23: Operator controls



1. Left-hand joystick
2. Safety labels
3. USB and Ethernet ports
4. 12v Power ports
5. Red warning light
6. I-button reader
7. Emergency stop button
8. Main screen controls
9. Main screen
10. Park brakes
11. Yellow caution light
12. Cab environmental controls
13. Engine key switch
14. Safety labels
15. Right-hand joystick
16. Operator seat
17. Speed control pedal
18. Service brake pedal
19. Foot rest

LINCS II Touch Screen

(#1 Illustration on “Cab control console”)



The LINCS II screen is a resistive touch screen that responds to finger touch. Touching the various icons with a finger or stylus operates the system's various functions and navigation from screen to screen.

Clean the monitor's touch screen periodically to keep the display image bright and sharp, and to keep the touch screen functions working properly. First, attempt to clean the screen with a dry soft cloth. When cleaning the screen, a "clean screen" feature is built-in to allow for dry dusting of the screen. This feature deactivates the "touch" feature of the screen for a few seconds. Refer to "Clean Screen" for information about activating this feature before cleaning. If the screen is too dirty to dust clean, a wet cleaner can be used. ALWAYS turn the monitor off before wet cleaning it. Wet cleaning is normally performed prior to shift startup. Use of approved cleaners such as mild glass or window cleaner (ammonia free) with a soft cloth is recommended. If optimum cleaners are not available, use a soft cloth with water and mild detergent. Never spray the monitor with a cleaner. Lightly moisten the soft cloth and gently wipe the screen clean.

CAUTION

NEVER use any cleaners with Ammonia. Using unapproved cleaners can cause component damage. Excessive moisture of any type can damage components. Do not allow liquids to run down to the bottom of the screen at any time. Use mild soap and water to clean screen.

NOTICE

The LINCS II screen illustrations herein are typical examples. Due to software updates, actual screens may be different than those shown in the following text.

NOTICE

If the touch screen is not functional, the vehicle can still be fully operated to navigate to a nearby repair facility.

Log On

Log On is the way a user can apply their individual preferences in LINCS II™. Log On is done with the User Access Key. The User Access Key contains information about the user preferences and security level. The machine can be operated without a User Access Key. However, without it, the user preferences must be manually entered into the machine.

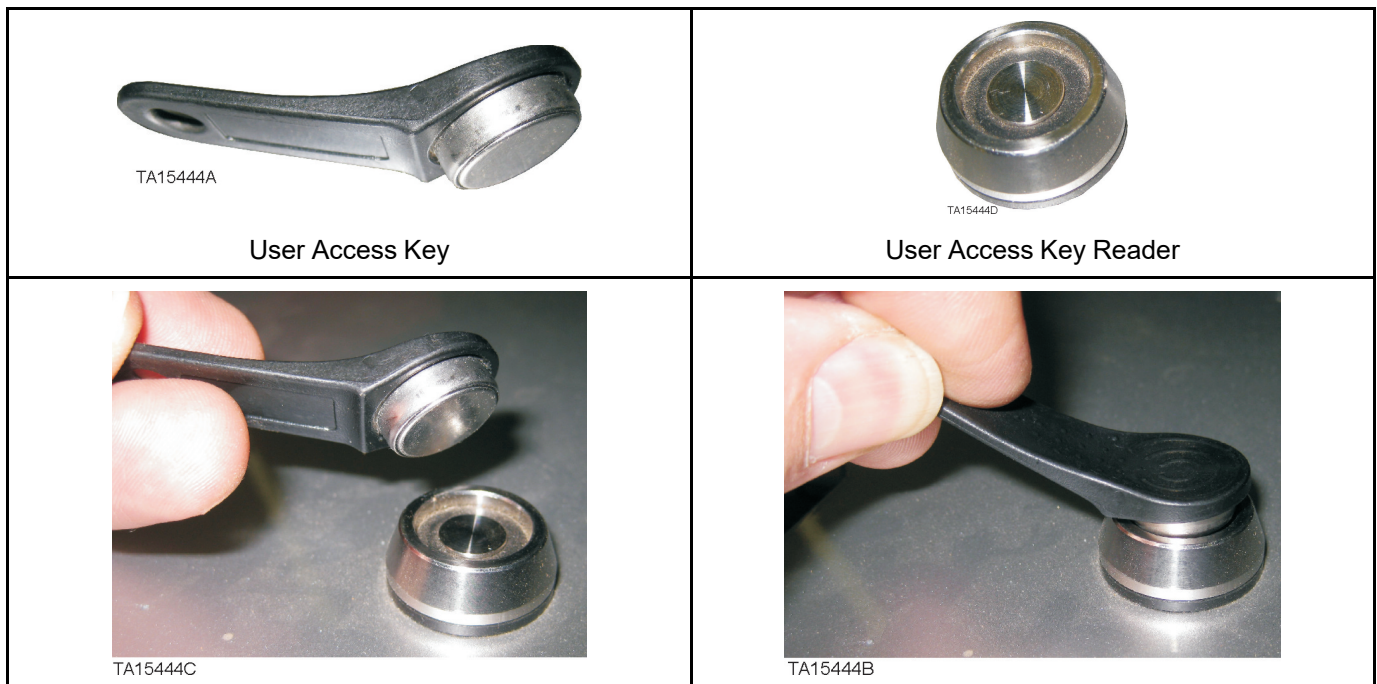
When a machine is turned on, it operates with a set of default preferences until they are changed. (Default preferences are set by a Maintenance Level User.). User preferences can be changed at any time by using a User Access Key or by accessing the User Preferences Screen. Changed preferences are active until LINCS II™ is restarted or until a new User Access Key is used. When a User Access Key is used, an event is stored in the Event Log with the User Name and time.

The following are the user preferences stored in the User Access Key:

1. Language
2. Unit System
3. Clock Format
4. Access Level

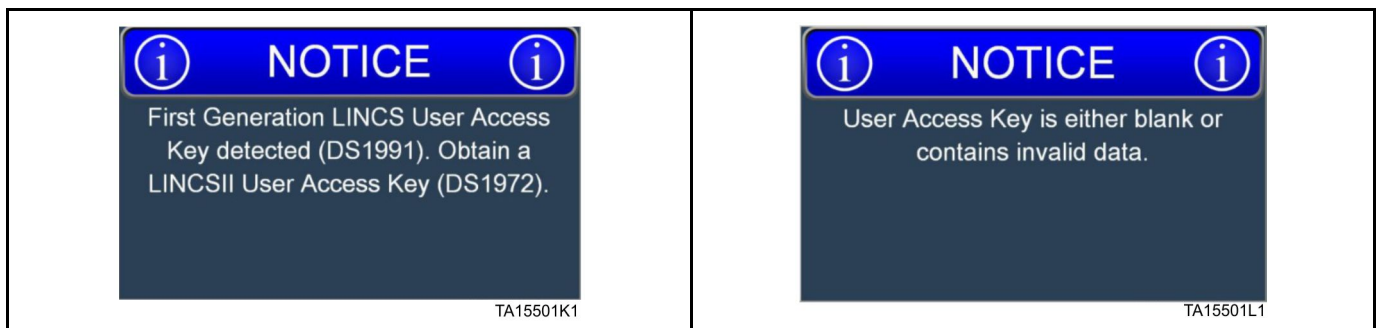
The different User Access Levels (i. e. Operator, Maintenance, etc.) allow access to different menus and different LINCS II functions.

Figure 24: User access key and reader



Using the User Access Key

To use a User Access Key, press and hold the key into the reader. The Password Entry Screen should appear within three seconds. If the Password Entry Screen does not appear, remove the key and try again. If an older generation key (LINCS I-Button) or a blank key is used, a notice will appear on the screen.




Password Entry Screen

The Password Entry Screen appears after the User Access Key is pressed in the reader. It is used to select the User Access Level and the User Preferences. Each User Access Level allows that user access to various levels of machine component function. The onscreen menu is used to type in the password, by touching numbers. After entering the password, touch the Accept Button (green check box).

⚠ WARNING

Crush hazards exist from unexpected machine movement if settings are changed during actual loading operation cycle. **DO NOT** set or change any settings during an actual loading operation or cycle. Before entering any information, or making/changing any settings on any screen in the LINCS system, ensure the machine is in an area clear of ALL hazards and personnel. Failure to do so could result in unexpected machine movement, resulting in serious injury or death to personnel.



<ol style="list-style-type: none"> 1. Displays the name stored in the User Access Key. 2. Displays a masked password entered from the onscreen keypad. 3. The Backspace Button is used to backspace a character when entering the password. 	<ol style="list-style-type: none"> 4. The Cancel Button is used to exit the screen and reset the User Access Level to Operator. 5. The Accept Button is used after the password is entered.
--	---

Action Event, Alarm, Warning, and Notice Screens

LINCSS-II notifies the operator with a message on the display when significant events occur.

Red Alarms

An ALARM is a serious event that means immediate danger to equipment or personnel. The red light on the console turns on, the beeper sounds, and an ALARM message is displayed. The machine should be safely shut down immediately.

Alarms may result in automatic functions to assist the operator in shutting down the machine. When some alarms occur, the Engine automatically goes to low throttle. Typically, a timer appears at the top of the display that gives the minutes until the engine is stopped and the Park Brakes are set. The timer can be manually cleared (and the Engine stopped) by pushing in the Park Brake switch.

The operator can acknowledge the Alarm by pressing the Acknowledge Switch on the left joystick.

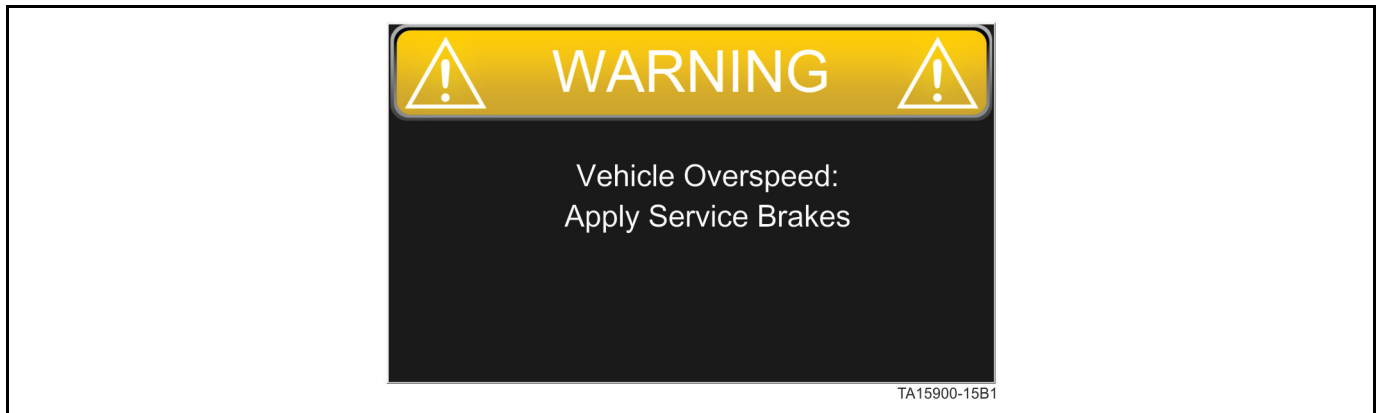
Pressing and holding the acknowledge button for two (2) seconds will bypass the engine shutdown timer.



Yellow Warnings

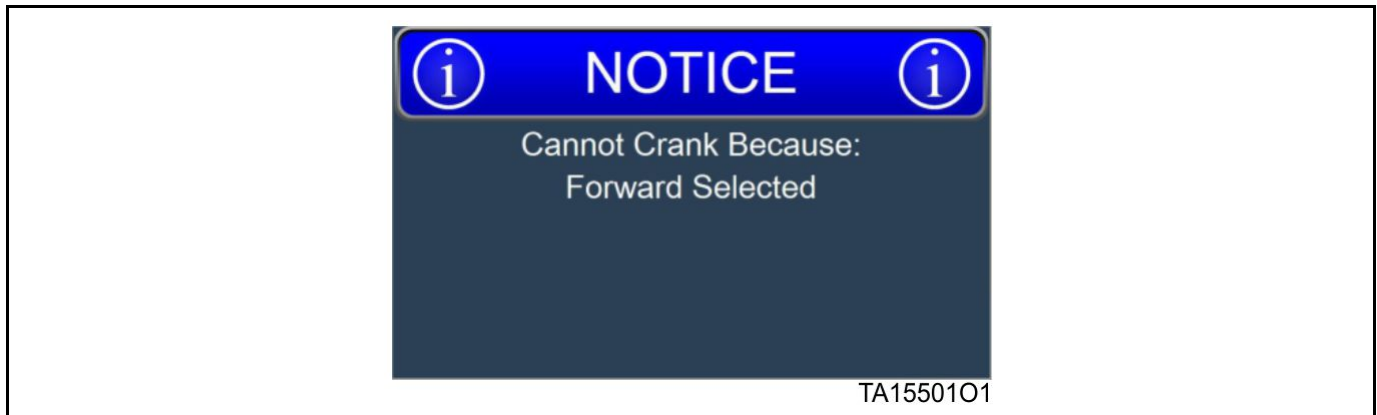
A Yellow WARNING means the equipment has experienced a fault that affects the standard operation and requires an immediate shut down. The yellow light on the console turns on, the beeper sounds, and a WARNING message is displayed. The machine should be safely moved to a safe location and then shut down.

Some Warnings result in automatic changes in machine operation. As examples, over-temperature conditions in the Traction Drive System may result in reduced Motor Torque.



Blue Notices

A NOTICE provides information to the operator as an aid to normal operation. The Notice message will automatically clear after a few seconds. The operator can clear the display early by pressing the Acknowledge Switch on the left joystick.



“Stacked” Action Events, Alarms, Warnings, and Notices

It is possible to have multiple screens stacked on top of each other. They are sorted based on severity. The most severe are shown on top of the other screens and appear on the touch screen in the following order:

- 1) Action Event
- 2) Red Alarm
- 3) Yellow Warning
- 4) Blue Notice

“Stacked” Counter Number (Action Events, Alarms, Warnings, or Notices)

When multiple screens are stacked on top of each other, there is a number in the lower right hand bottom of the screen that counts the total number of screens stacked.

- Each screen must be acknowledged.
- As each screen is acknowledged, the counter number counts downward until all the screens are acknowledged.

In the following example, a Red Alarm was artificially generated and acknowledged.

- Acknowledging the Red Alarm leaves a red “banner” at the top of the screen.
- This particular Red Alarm has a 15 minute countdown as shown by the numbers in the middle of the banner.
- When the counter reaches 00, a sequence of actions occurs and the engine shuts down.

In the following example illustration screen, a combination of 33 Warnings and Notices were artificially created to demonstrate the displayed number (33).

- As the acknowledge button is pressed, the number counts downward until all screens are acknowledged.

NOTICE

The touch screen is deactivated to touch when a Yellow Warning is being displayed on the screen. ALL Red Alarms, Yellow Warnings or Blue Notices must be acknowledged, by using the Acknowledge Button, before the screen becomes active to touch again.

Blue Notices will eventually remove themselves from the monitor screen. They have a timed delay before automatic removal. They can also be manually removed by using the Acknowledge Button.

Figure 25: Countdown number on screen (alarms, warnings, notices)



Main Operator Screen (Menu Navigation)

When LINC S II is started the Main Operator Screen is displayed at the Operator level. Operator, Maintenance or Service personnel can log onto the system with the use of their personalized User Access Key. A User Access Key is not required to operate the machine. While LINC S II is initializing, various information screens will appear.

NOTICE

Screen layout may vary from graphics below.

Figure 26: Main operator screen

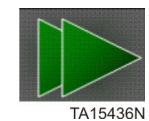
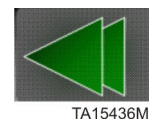


- 1. Left and Right Turn Signal indicators
- 2. Bucket, lift arm info, and steering angle
- 3. Odometer
- 4. Speedometer
- 5. Loading Cycle Timer info.
- 6. Load weigh and production detail

- 7. Energy usage indicator (KES system)
- 8. Machine Status Indicator icons and Menu Navigation buttons
- 9. Brake air pressure
- 10. Engine coolant temperature and
- 11. Engine oil pressure
- 12. Fuel level

Left and Right Turn Signal Indicators

The left and right turn signal indicators blink when the turn signal is active. The turn signal buttons are located at the top of the left joystick. The turn signal will cancel when the machine is steered straight.

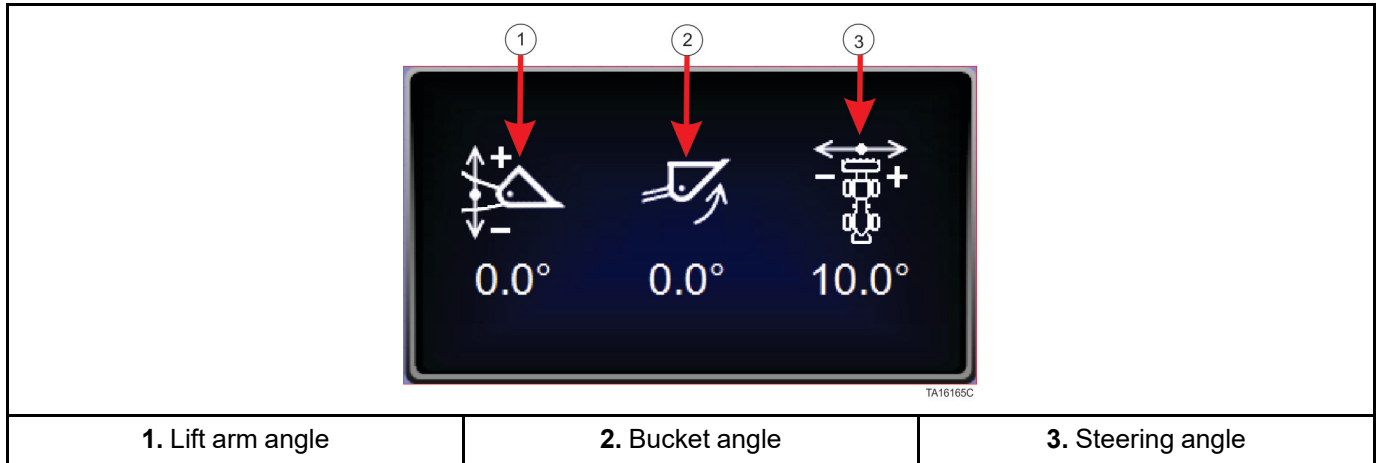


Bucket, Lift Arm, and Machine Articulation Data

Provides current bucket angle, lift arm angle, and machine articulation angle in degrees.

The numbers shown in degrees change continually as the machine lift arms, bucket angle, or machine articulation changes.

The bucket value is calibrated with the Zero Tooth to Ground button located on the User Preferences Screen.

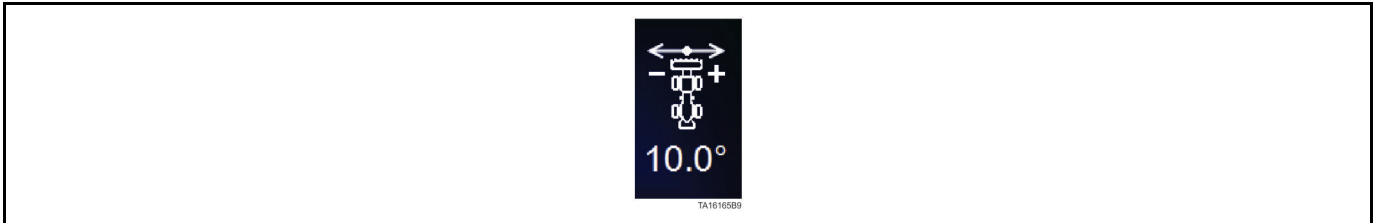


- A Lift arm Angle measurement indicates the angle of the lift arms as compared to the machine frame.
- The Lift arm Angle is zero (0.0°) when the lift arms are horizontal. A positive angle (+°) is shown when the lift arms are above the zero position and a negative angle (-°) is shown when the lift arms are below the zero position.
- The Lift arm Angle is zero (0.0°) when the lift arms are horizontal. A positive angle (+°) is shown when the lift arms are above the zero position and a negative angle (-°) is shown when the lift arms are below the zero position.



- The Bucket Angle measurement shows angle of the bucket as compared to the machine frame.
- The Bucket Angle reads near zero (0.0°) when the bucket is flat and level with the ground. However, the actual “zero” of the Bucket Angle can be changed by the operator. Therefore, the bucket angle measurement may show zero even when the bucket is not horizontal.
- The Bucket Angle zero (0.0°) is set with the “ZERO TOOTH TO GROUND” setting located on the User Preferences Screen.

- A positive angle (+°) is shown when the bucket teeth are above the zero position and a negative angle (-°) is shown when the bucket teeth are below the zero position.
- Refer to “ZERO TOOTH TO GROUND” for more information.
- Articulation data displays the number of degrees the machine is articulated left or right, or straight.



Odometer

<p>The image shows a digital display for the odometer. It displays '0.0' in large digits, with '1284ft mph' below it. A red arrow points to the right. The display is labeled 'TA16165N1' at the bottom.</p>	<p>Odometer</p> <ul style="list-style-type: none"> • The odometer displays distance traveled from one bucket dump to the next bucket dump. Both forward and reverse direction distances are measured as one distance.
--	---

Speedometer



The Speedometer provides digital display of the machine speed.

The Speedometer indicates the speed in both forward and reverse directions.

The display's unit system (Imperial or Metric) is set on the User Preferences Screen by selecting Unit System

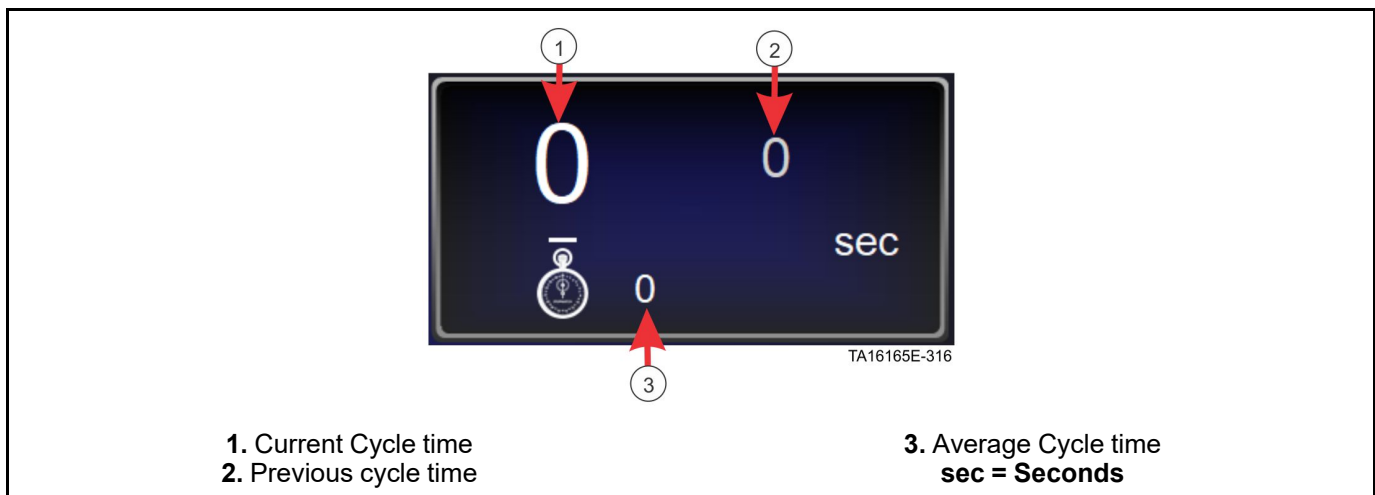
Loading Cycle Timer



The Loading Cycle Timer indicates the length of a loading cycle. A loading cycle is the time recorded between two bucket dumps. A bucket dump is defined as a loaded bucket being rolled forward past 8 degrees (roughly) down of the machine frame angle.

Load Cycle Times

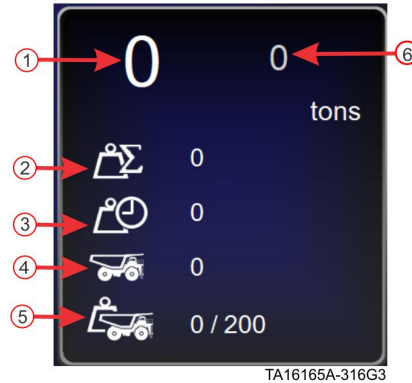
- The current and average cycle times are displayed.
- The Loading Cycle Timer provides data for the current load cycle.
- The last cycle time is displayed
- The timer provides the average time based on previous load cycles. Average cycle times are based on previous cycle times. This average can be reset by selecting the Reset Shift Production button on the User Preferences screen, or by rebooting LINCS.



Load Weigh and Production Detail

Provides information about the operator's and loader's productivity.

The load weigh and production details are displayed in four indicators:



1. Current weight of material in bucket (Load weigh).

A load weight will be registered during a load cycle if the following parameters are met:

- The lift arms pass through horizontal.
- The bucket angle meets predetermined angle requirements (i.e. rolled back).
- The bucket contains at least the minimum load needed to register a load weight.

The Weight measurement shows the current material weight in the bucket. The data can also be displayed in metric units by navigating to the User Preferences Screen and selecting metric units.

The Weight measurement resets when the bucket is dumped after a completed dump cycle, or if the lift arms are brought back down below horizontal.

2. Displays the weight of the material loaded during the shift (tons).

3. Displays the number of tons loaded per hour during the shift.

4. Indicates the number of trucks loaded during the shift.

5. Displays current weight of truck being loaded (tons). This value is reset by pressing the horn button on the right joystick.

- The size of the truck is set on the User Preferences Screen by selecting Truck Capacity.
- The unit system (Imperial or Metric) for indicating weight is set on the User Preferences Screen by selecting Unit System.

6. Previous weight of bucket load weigh.


NOTICE

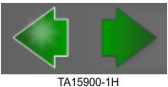
Selecting Reset Production Data on the User Preference screen will set the Shift Production Data to zero. The size of the truck selected will not be changed.


Machine Status Indicator Icons and Menu Navigation Buttons





Some of these icons only appear if the machine is operating in an abnormal mode.









 <p>TA16165G</p>	<p>Main Menu Button</p> <p>Provides access to various options.</p> <ul style="list-style-type: none"> Operator/User Preferences Data Logging Machine Summary Main Operator <p>Located in the left corner of the touch screen</p>
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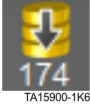


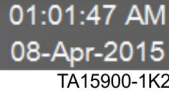
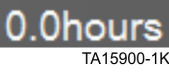
 <p>TA15900-1H</p>	<p>Backward and Forward Button</p> <p>Moves the user selection forward or backward one screen to the Next or Previous screen.</p>
---	--

 <p>TA15900-1Hd</p>	<p>Check Engine (Equipment with DEF systems only)</p> <p>The presence of this icon Indicates that some part of the engine system in an abnormal state.</p>
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 <p>TA15900-1He</p>	<p>Stop Engine (Equipment with DEF systems only)</p> <p>The presence of this icon Indicates that some part of the engine system in an abnormal state.</p>
--	--

 <p>TA15436D4</p>	<p>Alarm</p> <p>The red Alarm Icon appears on the screen when an Alarm occurs and the Alarm Message is displayed. The Red Lamp on the dash illuminates and an audible alarm sounds at the same time. Touching the Alarm Icon selects the Event Screen and displays the list of the most recent alarms. The Alarm Icon remains on the screen after the Alarm Message is acknowledged until the condition that caused the alarm is corrected</p>
--	---

 TA15436D5	<p>Warning</p> <p>The yellow Warning Icon appears on the screen when a Warning occurs and the Warning Message is displayed. The Yellow Lamp on the dash illuminates and an audible alarm sounds at the same time. Touching the Warning Icon selects the Event Screen and displays the list of the most recent warnings. The Warning Icon remains on the screen after the Warning Message is acknowledged until the condition that caused the warning is corrected.</p>
 TA15436D6	<p>Channel Forced</p> <p>The presence of the Forced Channel Icon indicates that at least one of the LINCS-II channels has been manually changed.</p>
 TA15501V-316	<p>Drive System Abnormal</p> <p>The presence of this icon, when illuminated, indicates that some part of the traction system is in an abnormal state or faulted.</p>
 TA15501W	<p>Drive Programming</p> <p>The presence of this icon Indicates that the Drive Control Boards are being programmed.</p>
 TA15436D7	<p>Limits Bypassed</p> <p>The Limits Bypassed Icon appears on the screen when any limits are bypassed such as the Hoist Up Limit. Touching the Limits Bypassed Icon will display the Machine Settings Screen if the user has adequate access.</p>
 TA15436D8	<p>Load Bank</p> <p>The Load Bank Icon appears on the screen when the machine has been placed in the Load Bank testing mode.</p>
 TA15501X	<p>User-Defined Event Button</p> <p>This button generates a User Defined Event that is recorded in the Event Log.</p>
 TA15900-1K3	<p>Database</p> <p>When this icon appears, the database is not actively downloading channel and event files.</p>

 TA15900-1K6	Database Downloading Files
 TA15900-1K7	Database Caught Up
 TA15900-1K4	Connection Status LED Icon
 TA15900-1K2	Date/Time
 TA15900-1K5	Machine Hours

When this icon appears, this database is downloading channel and event files.

When this icon appears, the database is caught up on all channel and event files.

Light Green: Indicates a working connection between the HMI and VCU.

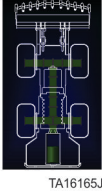

Yellow: Indicates a disrupted connection between the HMI and VCU.


Dark Green: Indicates the HMI and VCU are disconnected.


Displays the current date and time.


Indicates the total engine run time.

Useful Energy Indicator and Gauges

 TA16165J	Useful Energy Indicator
<p>The energy storage gauge displays the percentage of usable stored energy available at any given time. The amount of usable stored energy is the sum of the energy storage device (ESD) and the energy stored in the drive line.</p>	
 TA16165K	Coolant Temperature Gauge
<ul style="list-style-type: none"> • The Coolant Temperature Gauge provides analog and digital display of the engine's coolant fluid. • The digital display's unit system (Imperial or Metric) is set on the User Preferences Screen by selecting Unit System. 	

	<p>Oil Pressure Gauge</p> <ul style="list-style-type: none"> The Oil Pressure Gauge provides analog and digital display of the engine's oil pressure. The digital display's unit system (Imperial or Metric) is set on the User Preferences Screen by selecting Unit System. <div style="background-color: #0056b3; color: white; text-align: center; padding: 10px; font-weight: bold; font-size: 1.2em;">NOTICE</div> <p><i>When operating in cold climates, the oil pressure indicator will be higher after starting during engine warm-up. In cold climates, it takes longer for the oil to warm-up and for the oil pressure to reach normal operating range.</i></p>
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	<p>Fuel Gauge</p> <ul style="list-style-type: none"> The Fuel Gauge provides analog and digital display of the amount of fuel in the fuel reservoir. The digital display indicates the percent (%) full. For example, if the reservoir can hold 500 gallons of fuel, 50% indicates that the reservoir contains 250 gallons of fuel.
---	--

	<p>Brake Pressure Gauge</p> <ul style="list-style-type: none"> Displays air pressure for the brake system.
--	--

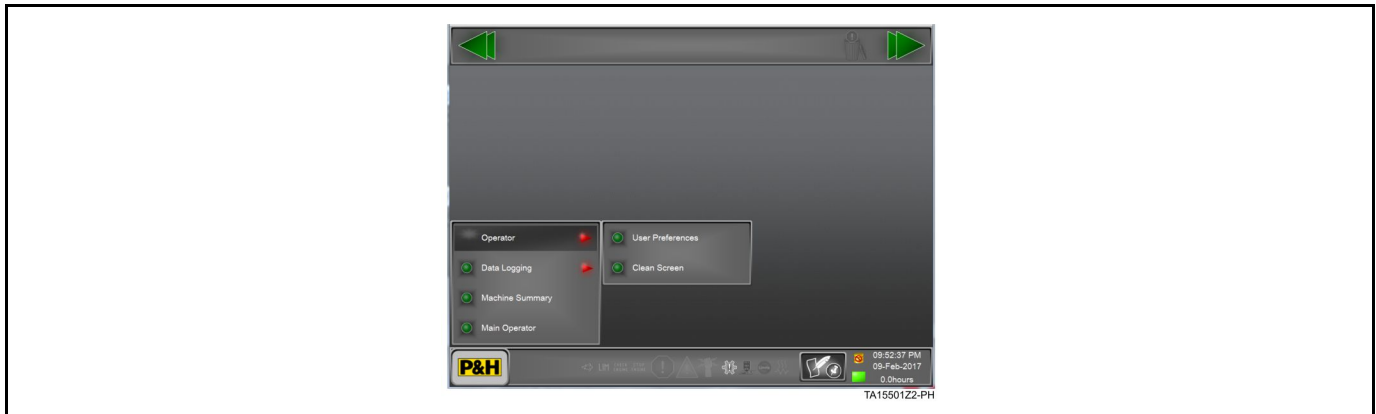
Menu Selections

- Touching the Main Menu Button displays the Main Menu Selections. Touch a Main Menu item to select the screen or function. The list of menu items varies depending on the security level of the User Access Key. Menu items containing a red arrow have sub-selections. Touch the menu item to display the submenu.



Main Menu Sub-Selection

Touch the Main Menu Button to display the Main Menu. The top item in the list contains the name of the user who is currently logged on. Touching the user's name displays the submenu where the user can select either the User Preferences Screen or Log Off. Selecting Log Off will set the User Access to the default Operator level.

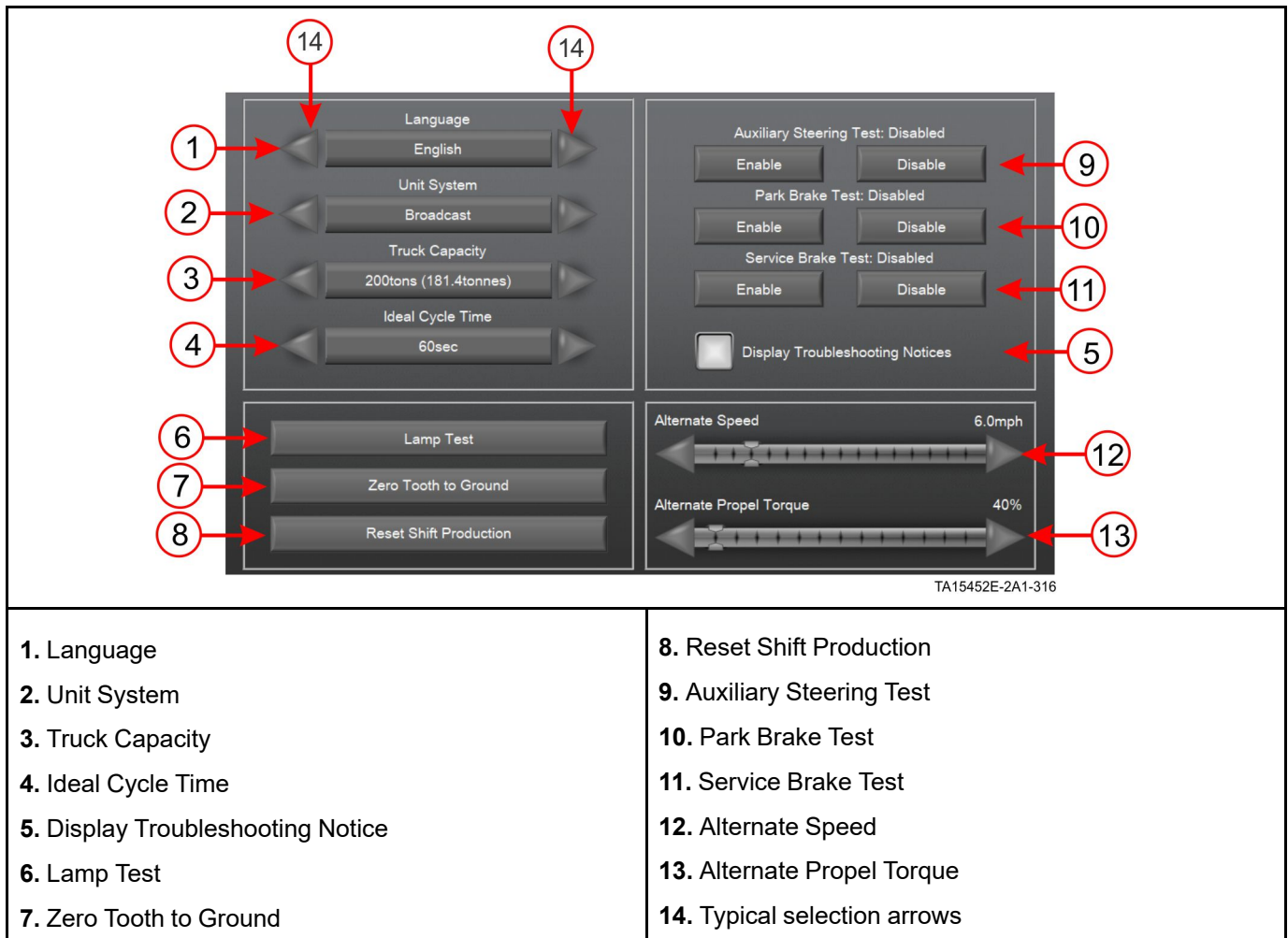


User Preferences Screen

The User Preferences Screen allows the user to change LINCS-II screens are displayed, test machine functions and adjust the Alternate Speed and Torque settings.

Items 1- 4, 12 & 13 have arrows at each end of the selector that are used to change the selection.

Figure 27: User Preferences Screen



For numbers in parenthesis, refer to illustration “User Preferences screen”.

Language (1)

- Touch the arrows to select the Language used for displaying information on the LINCS-II screens.

Unit System (2)

- Touch the arrows to select the Unit System used for displaying values (Metric, Imperial, or Broadcast).
- Broadcast units are a mixture of unit systems that is preferred by the factory.

Truck Capacity (3)

- Touch the arrows to decrease or increase the Truck Capacity as displayed on the Main Operator Screen.

Ideal Cycle Time (4)

- Touch the arrows to change the Ideal Cycle Time which is used as the center value of the Loading Cycle Timer displayed on the Main Operator Screen.
- Touch the arrows to decrease or increase the time value.

Display Troubleshooting Notices (5)

- Touch the box to place a checkmark and select Display Troubleshooting Notices.
- This activates notices not normally displayed such as when the machine stops moving because it has reached a limit.



Lamp Test (6)

- Touching the Lamp Test button turns on the dash Red Alarm light, Yellow Warning lights, and the Cab Audible Alarm.
- The screen button is momentary so the lights and alarm stay on as long as the button is touched.

Zero Tooth to Ground (7)

- Touch the Zero Tooth to Ground button to set the bucket-to-ground angle to zero (0.0°).
- Typically, the bucket is set flat on the ground before setting the angle.
- Set the bucket to the desired angle and press the button to set the angle.

Reset Shift Production (8)

- Touch the Reset Shift Production button to reset the shift production to zeros on the Main Operator screen.

Auxiliary Steering Test (9)

- Touch the Auxiliary Steering Test Enable button to engage the Auxiliary Steering System test mode.
- When left or right steering is commanded, the electric motors that power the steering hydraulics will turn on.
- The motors only operate while the Left Joystick is being used to steer left or right.
- Touch the Disable button to return the Auxiliary Steering System to normal operation.

Park Brake Test Enable and Disable (10)

- Touch the Park Brake Test Enable button to allow the wheel motors to torque with the Park Brake applied.
- Touch the Park Brake Test Disable button to return the traction system to normal operation.

Service Brake Test Enable and Disable (11)

- Touch the Service Brake Test Enable button to allow the wheel motors to torque with the Service Brake applied.
- Touch the Service Brake Test Disable button to return the traction system to normal operation.

Alternate Speed (12)

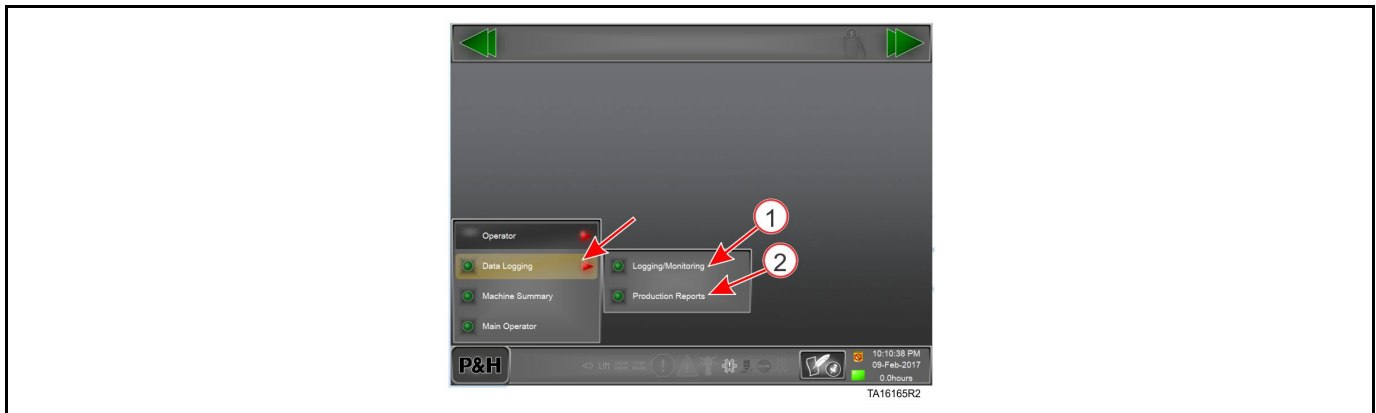
- Touch the arrows to set the machine Alternate Speed.
- The Alternate Speed is the speed limit used when the Alternate Speed function is engaged.
- Use the overhead control console “Alternate Machine Speed” button to engage the Alternate Speed function

Alternate Propel Torque (14)

- Touch the arrows to set the machine Alternate Propel Torque percent.
- The Alternate Propel Torque is the wheel motor torque percent limit used when the Alternate Torque function is engaged.
- Use the overhead control console “Alternate Propel Torque” button to engage the Alternate Torque function.
- Alternate Torque is used to help prevent the wheels from slipping when operating on a slick surface.
- This feature only reduces propel torque. Full braking torque is unchanged.

Data Logging Menu

Provides access to the Logging/Monitoring and Production Reports screens.



1. Logging/Monitoring

The Logging/Monitoring menu selection provides access to the Charting Screen and the Event Logging Screen.

2. Production Reports

The Production Reports menu selection provides access to the production reports such as Loads, Cycle Times, Loader Activity, etc.

Channel Selection Screen

The Channel Selection Screen provides a means to select data channels for viewing on charts.



NOTICE

Most red arrows are seen at operator level; however, some are shown only at Factory rep level for some channels.

1. Touch a scroll button to move the group list.
2. Drag the scroll button to scan the group list.
3. Touch a group name to expand the group and show the channels.
4. Touch the group name again to collapse the list.
5. Drag the group name to the right side of the screen to select all the channels in the group.
6. Drag a single channel name to select just one channel.
 - To remove a channel from the selection list, drag the name out of the selected channels box.

NOTICE

The selected channel list can be rearranged by dragging the channel name to a new location.

Channel Types

1. Calculated (derived from other data) shown as a calculator.
2. Input (Analog, Digital, or CAN) shown by a green “in” arrow.
3. Touch the Channel Selection Screen button to display this screen.
4. Touch the Channel Charting Screen button to display the selected channels in a chart or plot format.
5. Touch the Event Logging Screen button to display a list of event records.
6. Touch the Remove All Channels button to clear the list of selected channels.
7. Touch the Filtering Button to select the amount of noise filtering to be applied to the channel values on the Channel Selection Screen.
 - Selecting “Rabbit” gives light filtering that removes a minimal amount of noise.
 - Selecting “Turtle” gives heavy filtering so the values are more stable.

Logging/Monitoring

Charting Screen

The Charting Screen provides a way to view channel data in a plot or strip chart form. Multiple channels can be displayed showing data “live” (as it occurs) or “history” (from previous time).

Live Data



1. Channel Name

The Channel Name is displayed at the top left of a trace.

2. Channel Value

The Channel Value is displayed at the top right of a trace. For live data, the number shows the most recent data. For history data, the number shows the value of the channel measurement based on the position of the orange or blue cursor, or on the selected channel type as described in item #14 below. The vertical scale of the charts is automatically set to fit the selected data.

3. Time Zoom Scroll Bar

The amount of time shown on the display can be changed by dragging the zoom slider button. Drag the button left to zoom out and display more time. Drag the button right to display less time. The amount of data shown in the display will be the data stored in a download. Only 6.97 days is available. By default, the amount of time in the display is 60 seconds.

4. Selection List Scroll Bar

The list of selected channels can exceed the number that is displayed on the screen. Drag the scroll button to sweep through the entire list of selected channels. Touch the arrows at the ends of the scroll bar to move the channel traces one row at a time.

5. Live/History Data Button

Touch the Live/History Data Button to change the display between live (real-time) data and history (recorded) data. Live data is shown as soon as it happens. As time progresses, the trace will advance so that the most recent data is always shown. History data shows a selection of past time.

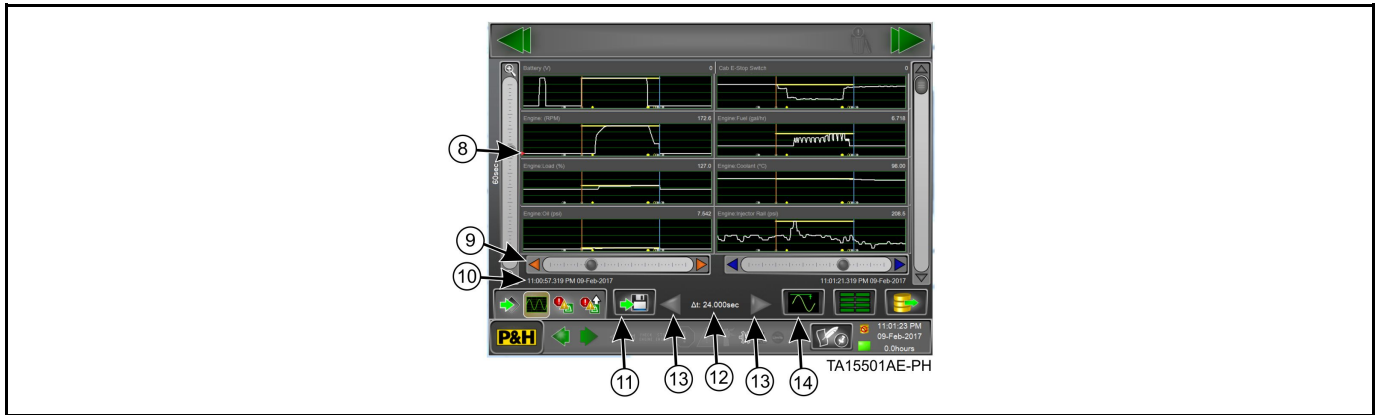
6. Chart Layout Buttons

The charts can be displayed in a variety of layouts. A single channel can fill the entire view area (1x1) or as many as 16 channels can be displayed at the same time (4x4).

7. Channel Plot

The channel is displayed as a curve plot that varies in height proportionally to the data value. The channels are shown in the same order as listed on the Channel Selection Screen.

History Data



8. Event Markers

Events are indicated at the bottom of a trace. The event type is indicated by the color of the marker (i.e. Red – Alarm, Yellow – Warning). A circle indicates when the event was set (i.e. when the Alarm occurred). A solid dot indicates that the event cleared.

9. Cursor Position Bars

The Cursor Position Bars allow adjustment of the two cursors. The left bar is used for the orange cursor and the right bar is used for the blue cursor. Touch the arrows to adjust the cursors in small steps. Drag the cursor button to pan the time setting.

10. Cursor Timestamps

The Timestamps show the time and date of the two cursors.

11. Download Button

Touch the Download Log Button to display the Download Dialog. (See DOWNLOAD DIALOG.)

12. The Cursor Delta Time (Δt)

The Delta Time is the amount of time between the two cursors.

13. Data Selection Buttons

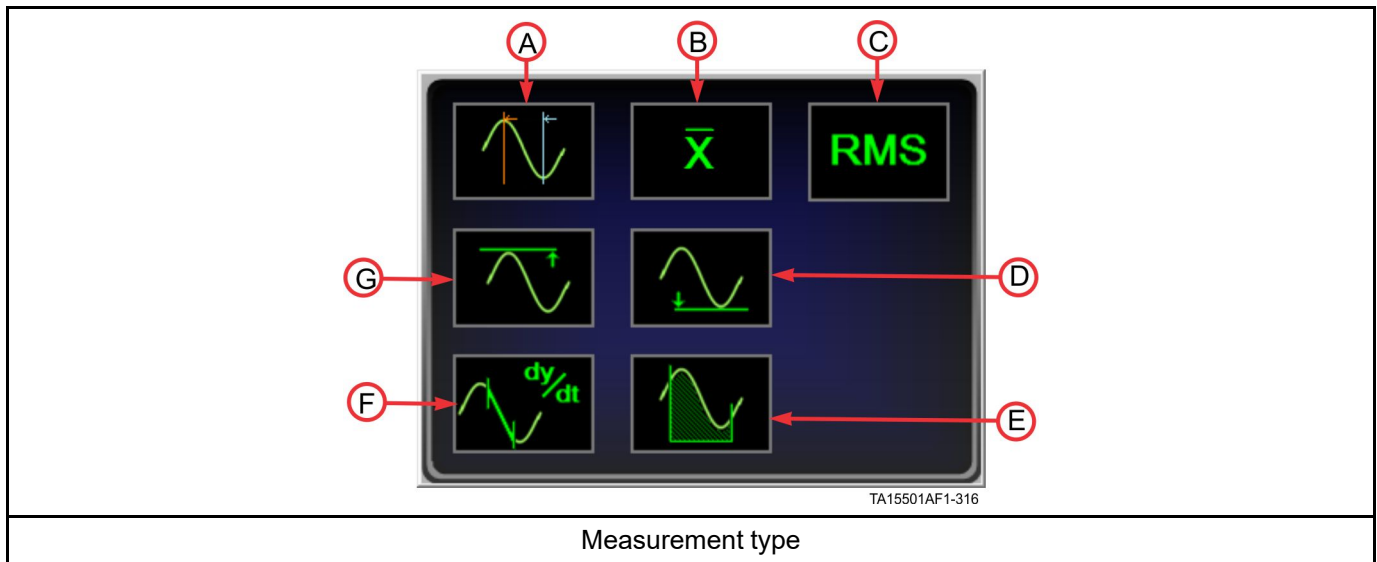
When the user is viewing history data, they can change the displayed section of data. Touching the left arrow moves the selection to show data earlier in time. Touching the right arrow shows data later in time.

NOTICE

The time selection can also be changed by dragging a trace to the left or the right.

14. Measurement Type Button

Touch the Measurement Type Button to select the type of measurement used for the history data. The value of the measurement is shown as the channel value and by a yellow line on the chart.



A. Cursor 1 is the value of the data at the point where the orange cursor crosses the plot. **Cursor 2** is the value of the data at the point where the blue cursor crosses the plot.

B. Average is the average of the values between the two cursors.

C. RMS is the root-mean-squared value of the data between the two cursors.

D. Minimum is the valley value of the data between the two cursors.

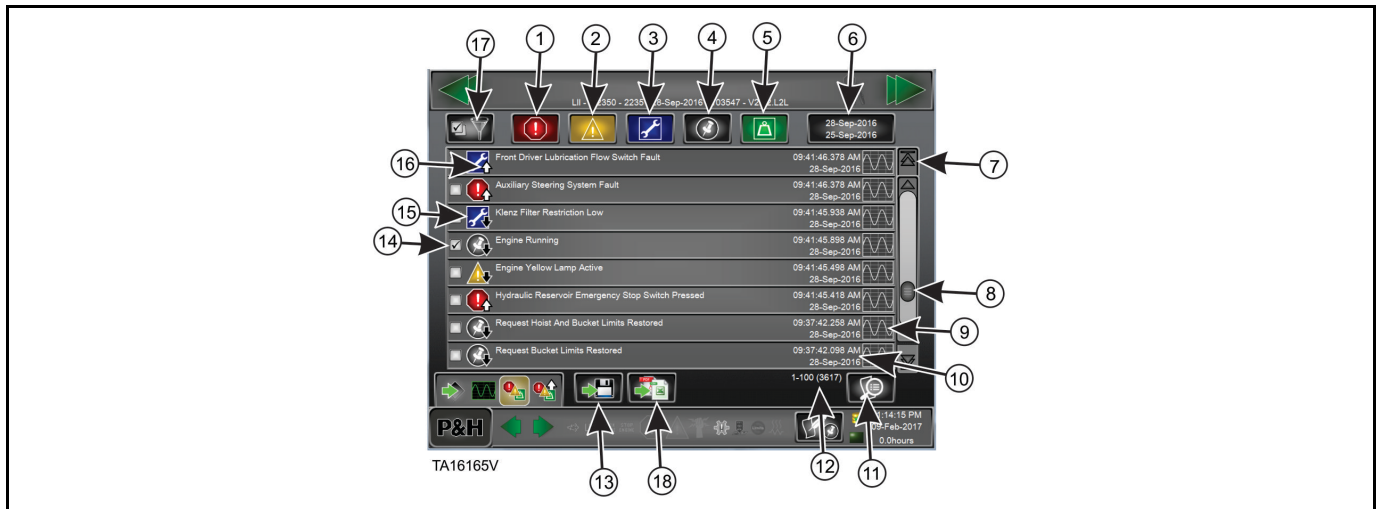
E. Area Under Plot is the sum of all the data values between the two cursors times the time (the integral). It could be used to determine the total fuel used in a load cycle by measuring Engine: Fuel Rate.

F. dy/dt is the slope of a line between the two data points that are marked by the two cursors. The slope is a measure of the change in amplitude of the data divided by the time between the two points.

G. Maximum is peak value of the data between the two cursors.

Event Logging Screen (Detailed)

Event logging provides a method for viewing events such as Alarms, Warnings, and Alerts.



1. Select Alarms Button

Touch the Alarms Button to show Alarms in the list. The button will be bright red when Alarms are displayed and faded grey when alarms are not included. The five Select buttons can be applied separately or together.

2. Select Warnings Button

Touch the Warnings Button to show Warnings in the list. The button will be bright yellow when Warnings are displayed and faded grey when they are not included.

3. Select Alerts Button

Touch the Alerts Button to show Alerts in the list. The button will be bright blue when Alerts are displayed and faded grey when they are not included.

4. Select Events Button

Touch the Events Button to show Events in the list. The button will be bright grey when Events are displayed and faded when they are not included.

5. Select Production Data Button

Touch the Production Data Button to show Production Data in the list. The button will be bright green when Production Data is displayed and faded grey when not.

6. Date Range Button

Touch the Date Range Button to change the date range used for the event list. The range is selectable by day, month, and year.

7. Page Button

The Page Buttons allow the user to navigate through sections of 100 events at a time. Touch the bottom Page Button to display the next page of older events, going back in time. Touch the top Page Button return to the next page of more recent events.

8. Scroll Buttons

Use the Scroll Buttons to navigate the event list.

9. Chart Select Button

Touch the Chart Select Button to select the event and navigate to the Charting Screen. The selected event will be centered in the chart. Events that do not have associated charting data are shown with a grey Chart Select Button.

10. Date and Time Stamp

The Date and Time Stamp show when the event happens. If multiple events have the same time stamp, they are logged in the order they occurred.

11. Detailed/Summary View Button

Touch the Detailed/Summary View Button to switch between the detailed and summary views. The Detailed View shows the occurrence each event with the Date and Time Stamp.

12. Event Group (Total Events) Maximum of 2000

The Event Group is the event numbers that are currently available with the scroll buttons. The Total Events (in parentheses) is the total events available for viewing.

13. Download Button

Touch the Download Log Button to display the Download Dialog. (See DOWNLOAD DIALOG.)

14. Event Select Box

Touch the Event Select Box to select event types for focused viewing. The event list becomes reduced to only the selected events when the Filter Button is touched.

15. Set Event Indicator

A white up arrow on the event type image shows that this is a Set Event. The Set Event time is when the event occurred.

16. Cleared Event Indicator

A black down arrow on the event type image shows that this is a Cleared Event. The Cleared Event occurs when the triggering condition is resolved. For example, this happens when a fault is corrected.

17. Filter Button

Touch the Filter Button to limit the list of events to the event types that have been selected. All other events are filtered out of the list.



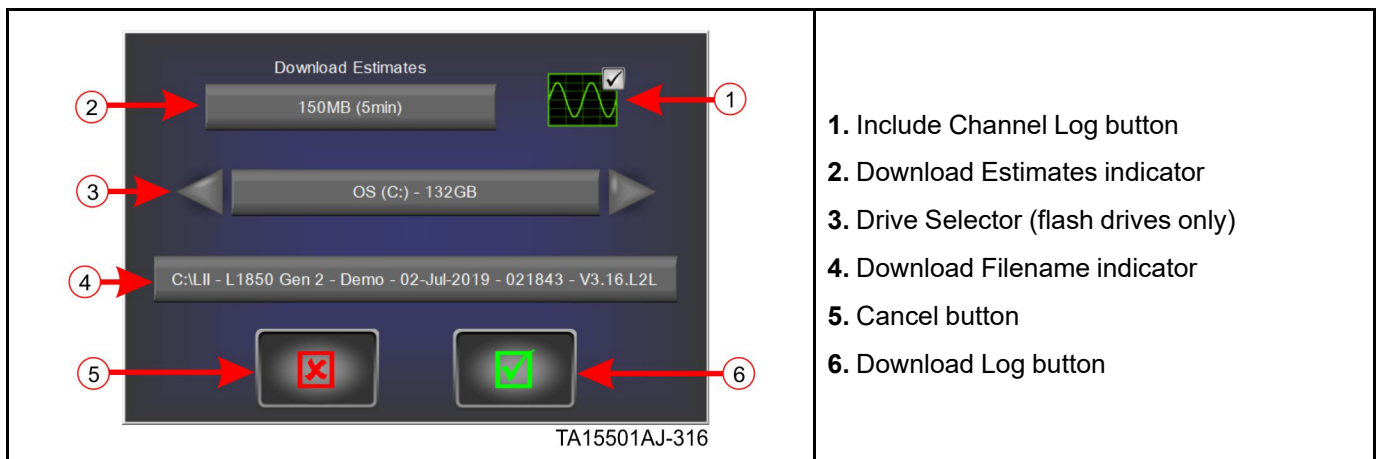
Event Logging Screen (Summary)

The Summary View shows a summary that gives the total occurrences of each event type in the history log. The numbers indicate only the number of events that occurred within the selected Date Range. The Summary View is sorted with the most frequent event listed at the top.



Download Dialog

History logs can be downloaded (copied) to a USB memory device (flash drive only) plugged into the USB port in the cab. The log will contain a copy of all the events currently recorded by LINC3-II. The log can optionally contain a section of channel data recorded.



1. Include Channel Log button

Touch the Include Channel Log button to include the channel data in the log. The time span of the channel data will be the time previously viewed on the Channel Charting screen. A zoomed-in chart (less time) will result in a smaller log file.

2. Download Estimates indicator

This displays the approximate size of the download and the approximate time it will take to send the file to the USB device.

3. Drive Selector (flash drives only)

Touch the Drive Selection arrows to pick the target USB device. LINC3-II automatically recognizes USB devices when they are plugged into the USB port in the cab. The bar shows the USB device's name and the amount of empty space.

4. Download Filename indicator

The path and filename are automatically provided.

5. Cancel button

Touch the Cancel button to close the dialog box and cancel the download.

6. Download Log button

Touch the Download Log button to start the download. A progress bar will appear on the screen. Do not disturb the USB memory device while the download is in process.

NOTICE

When the progress bar disappears, the USB device can be removed.

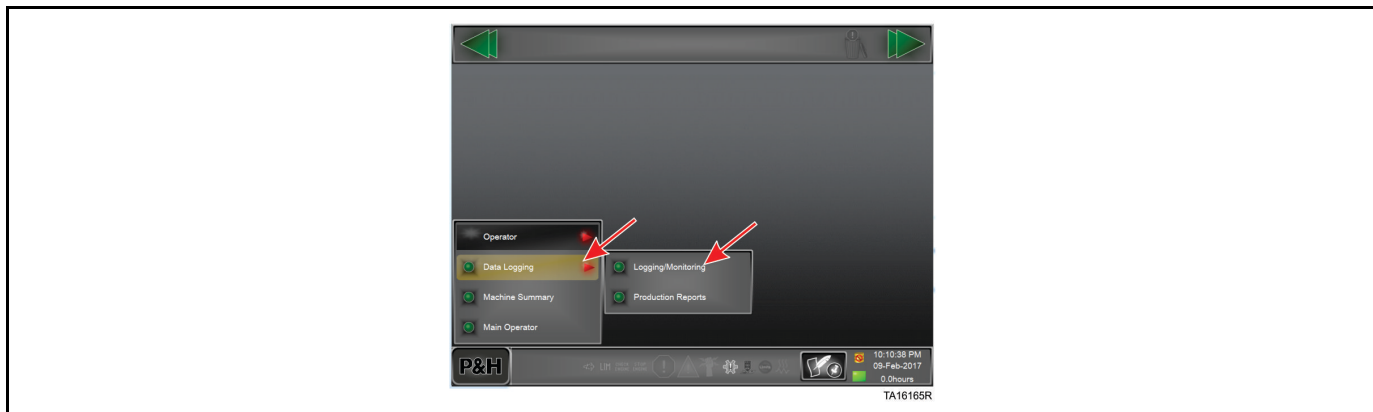
Download Procedure

Insert a USB flash drive into the USB port in the cab. The USB port will either be located under the dash on the left hand side above the service brake panel, or it will be located on the front of the dash on the left hand side.

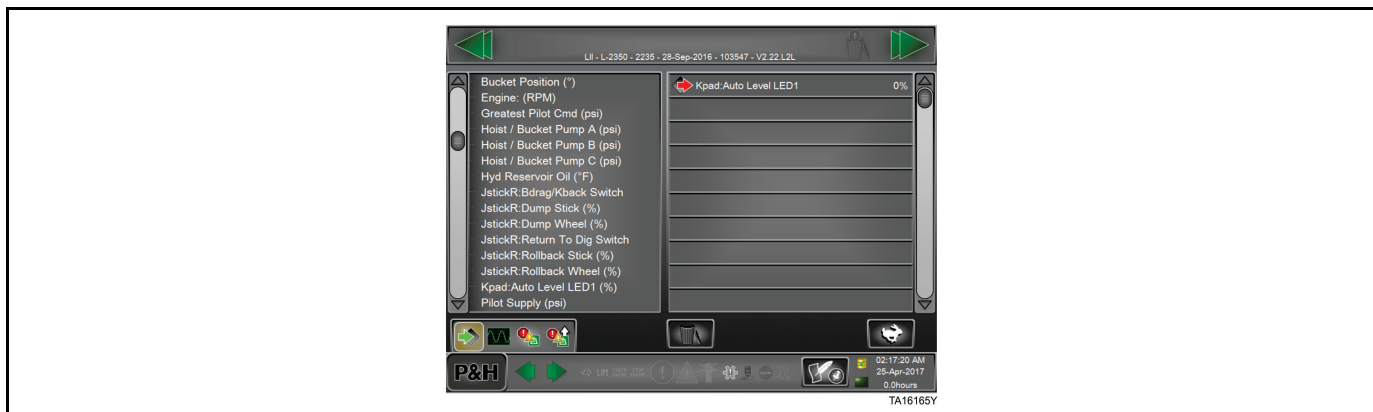
Step 1: Determine if channel data is required. If no channel data is required, go to “Log File Downloads”.

Step 2: Navigate to the Data Logging menu.

Step 3: Select Logging/Monitoring.



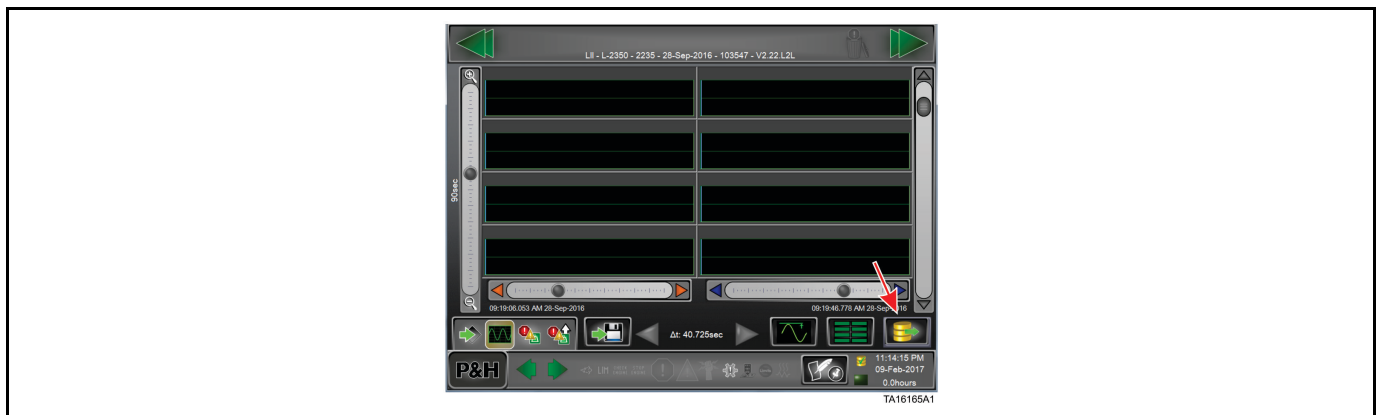
Step 4: Select at least one channel and drag it to the Channel Selection screen on the right side of the screen.



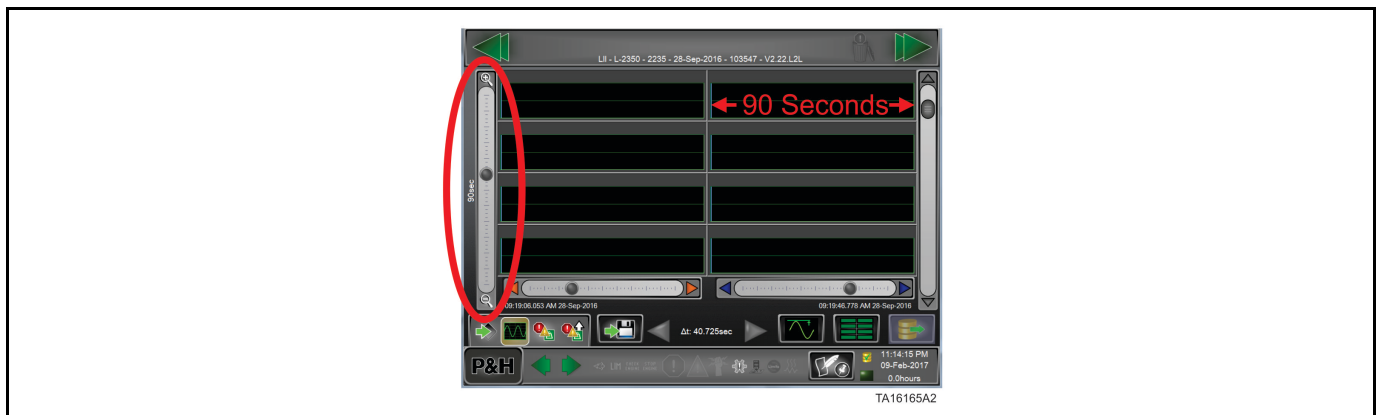
Step 5: Touch the Channel Charting screen button to display the selected channel(s) in a chart or plot format.



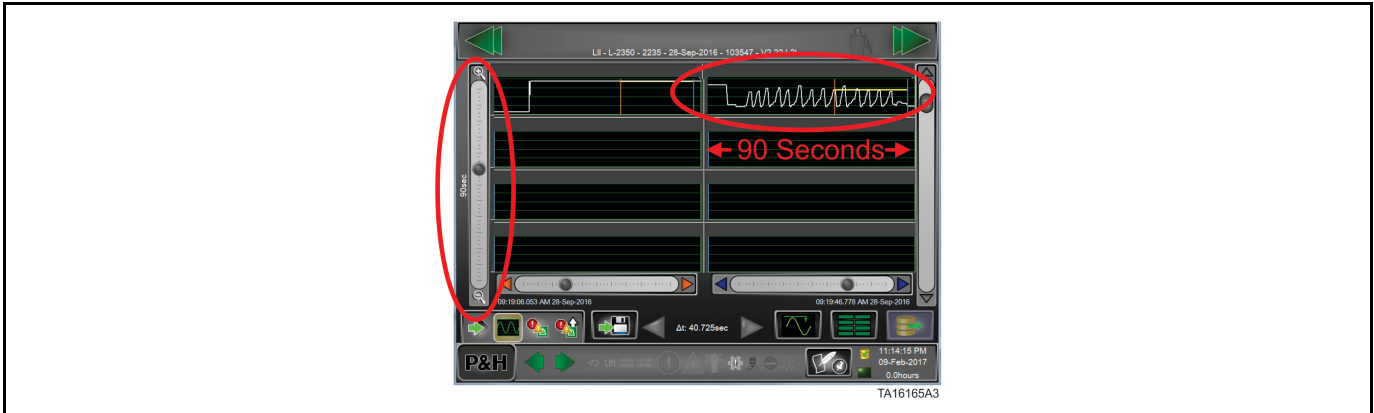
Step 6: Touch the Live/History Data button to display history (recorded) data.



Step 7: Adjust the Time Zoom scroll bar to the required time setting. Only data on the screen will be downloaded. Example; if the Time Zoom is set at 60 seconds, the channel data downloaded will only be 60 seconds.



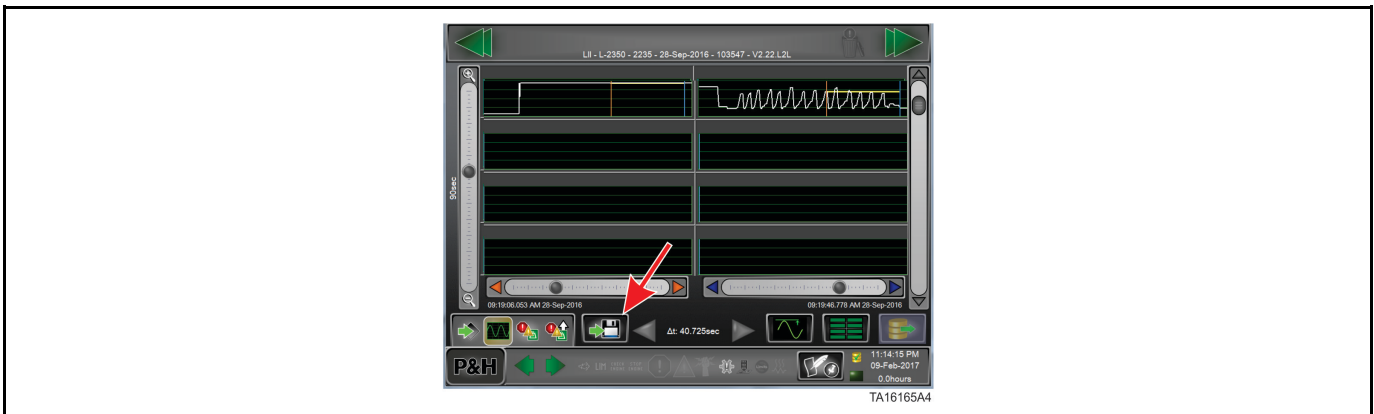
Step 8: Locate the data that is desired to be downloaded. To locate the data, scroll the charts until the desired chart information is displayed. If an exact time and date of the data is known, watch the cursor time and date change as the chart is scrolled.



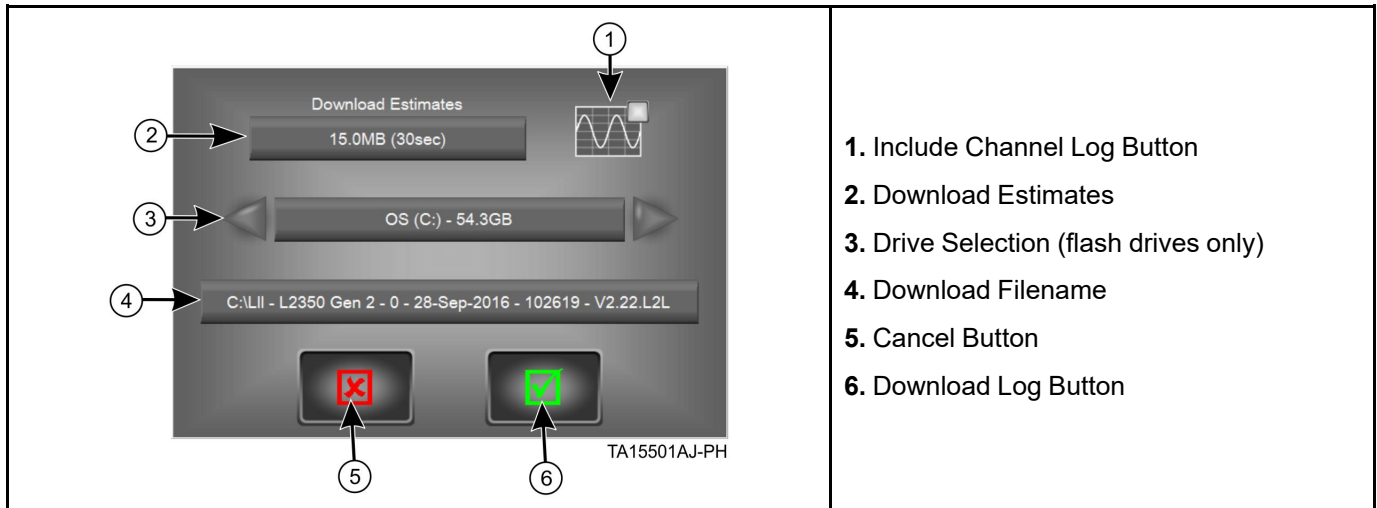
NOTICE

In the example above, the time zoom is set at 15 minutes, the channel data downloaded will be the 15 minutes shown on the screen.

Step 9: Touch the Download button.



Step 10: Once the Download Dialog box is open, touch the box to include channel data. A check mark (Item #1) will appear if channel data will be included.

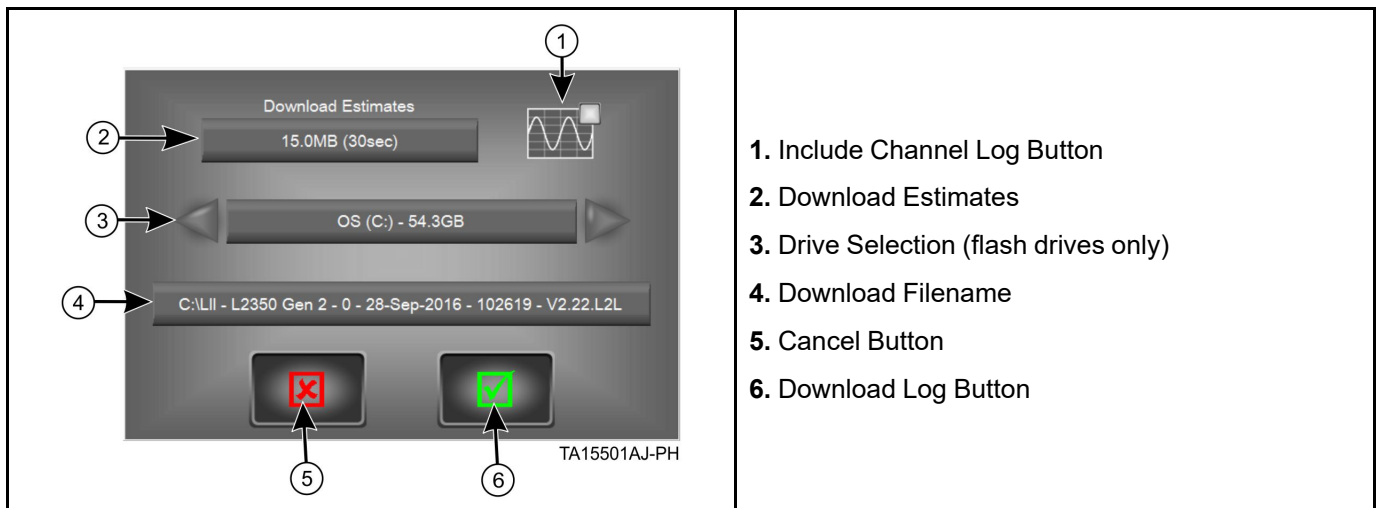


1. Include Channel Log Button
2. Download Estimates
3. Drive Selection (flash drives only)
4. Download Filename
5. Cancel Button
6. Download Log Button

NOTICE

IF NO channels have been previously chosen (steps 4 thru 8), and the download dialog box is opened and the box is checked to have channel data included, the download WILL NOT have any data associated with it. If this download file is opened, the date on the channel data will read the year 1903 or 1904.

Step 11: Select the destination drive letter (Item #3). The file name is automatically generated and cannot be changed prior to the download. After the download is done, the file name may be changed following standard file renaming perimeters (Item #4).



1. Include Channel Log Button
2. Download Estimates
3. Drive Selection (flash drives only)
4. Download Filename
5. Cancel Button
6. Download Log Button

Step 12: Select the green check mark to start the download (Item #6).

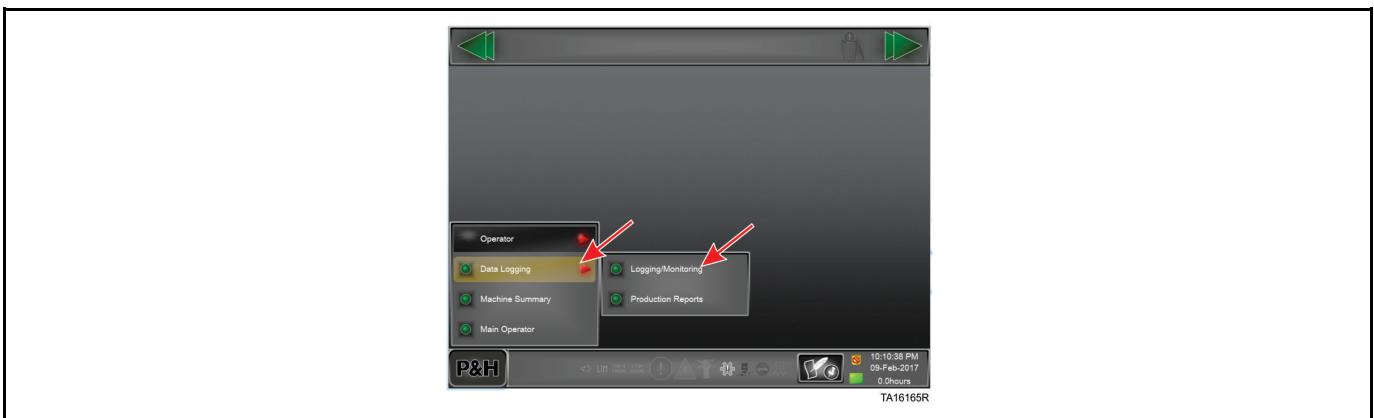
NOTICE

If the selected time zoom setting is at maximum (4 hours) and the download has channel data selected, the download may take up to an hour to complete. An estimated file size and download time is automatically generated (Item #2).

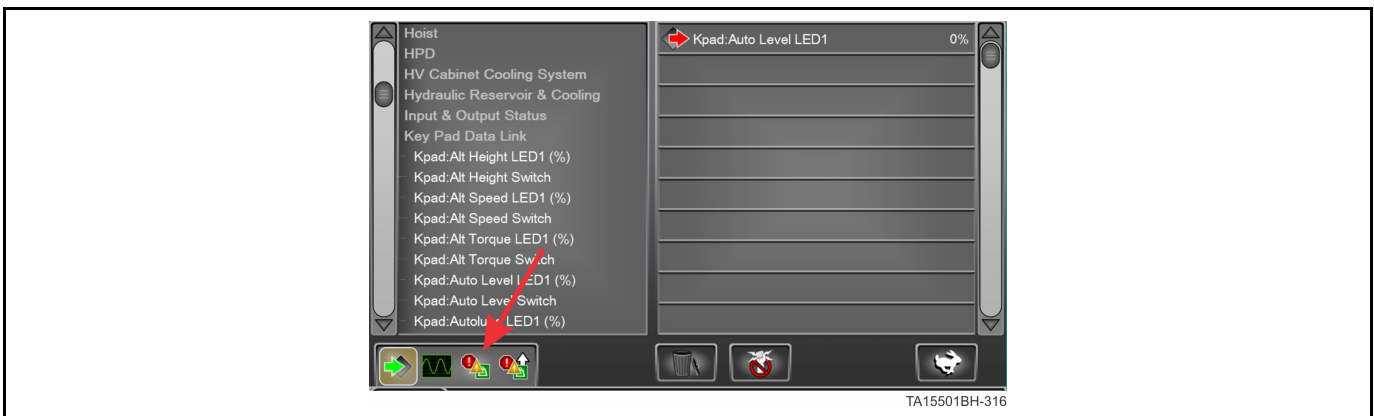
Event Log File Downloads

Step 1: Navigate to the Data Logging menu.

Step 2: Select Logging/Monitoring



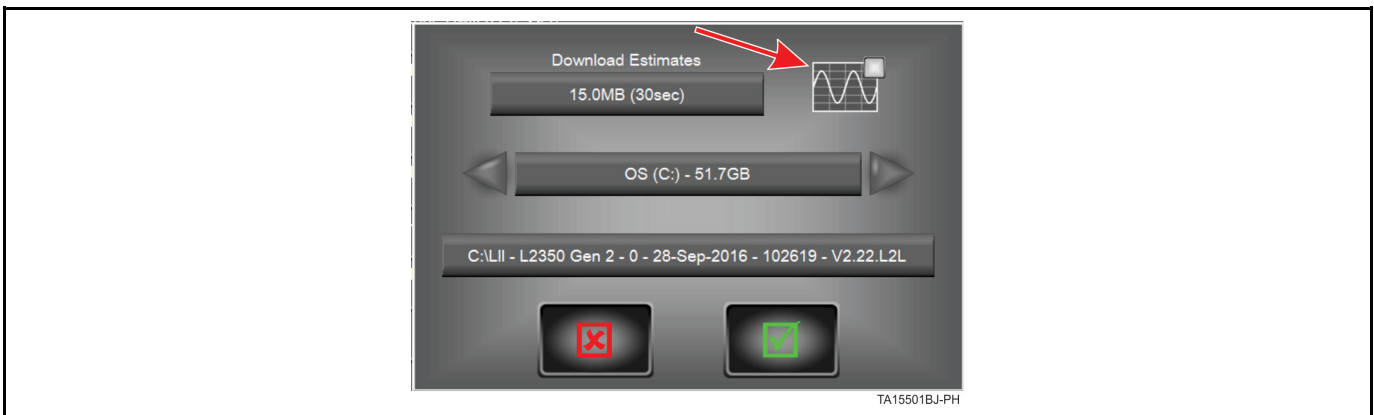
Step 3: Touch the Event Logging screen button.



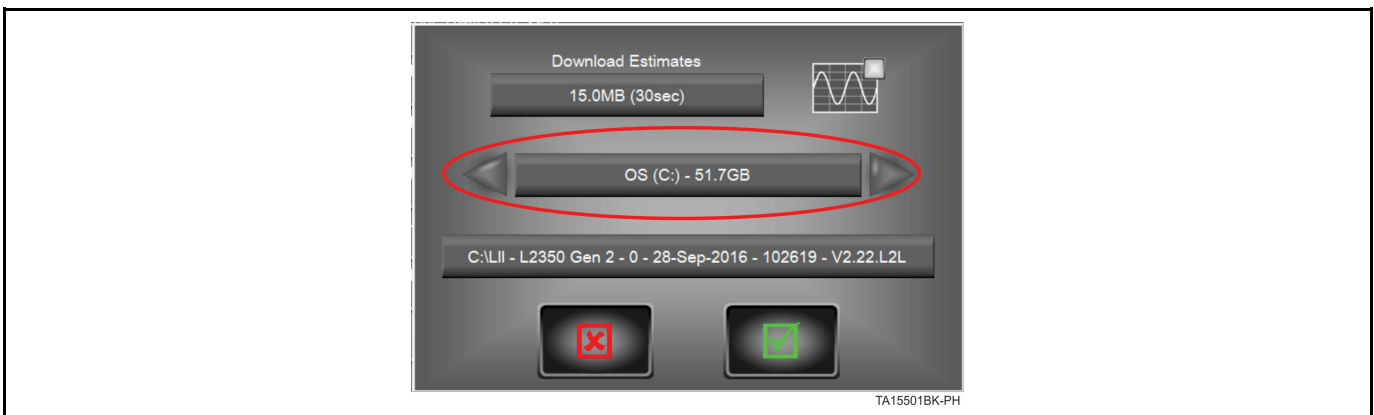
Step 4: Touch the Download button.



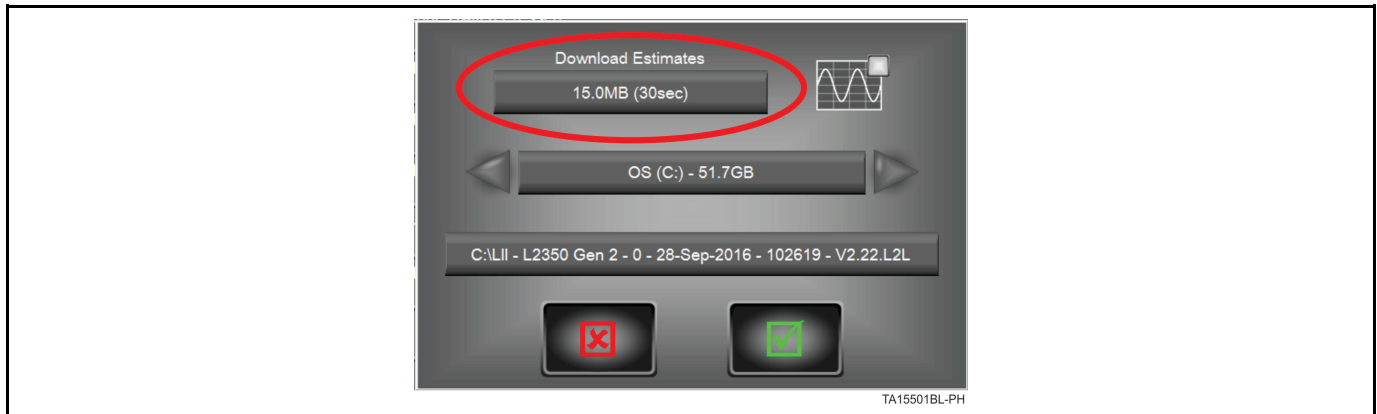
Step 5: Verify that the Chart Data button is grayed out with no check mark.



Step 6: Select the destination drive letter.



Step 7: Select the green check mark to start the down load.

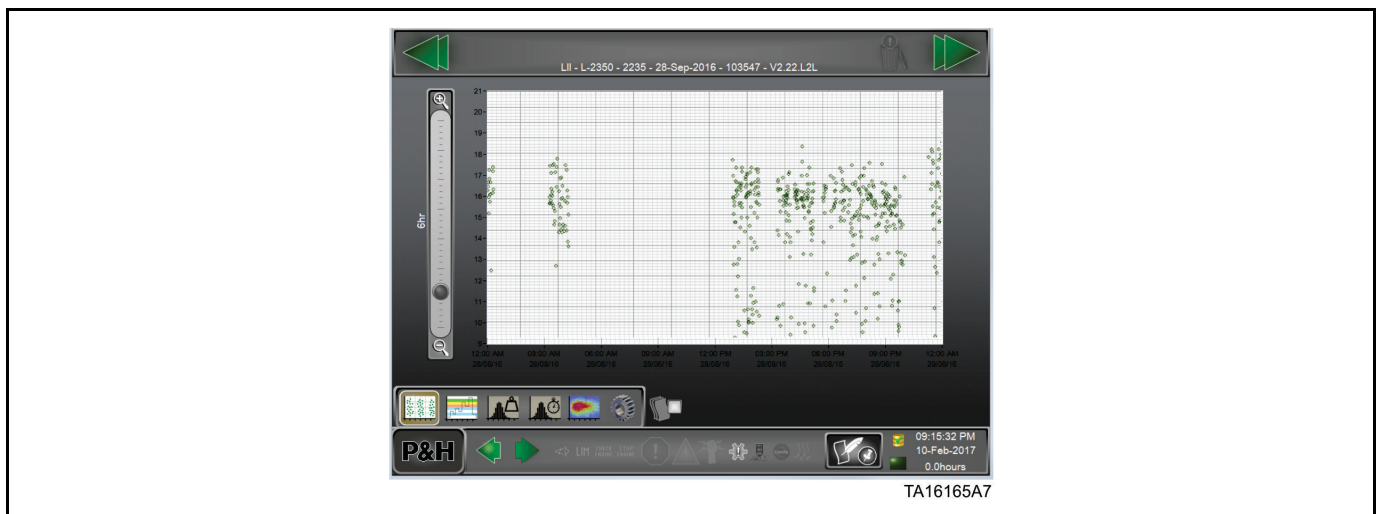


Step 8: Because no channel data is being downloaded, the download should complete in under 10 minutes.

Production Reports

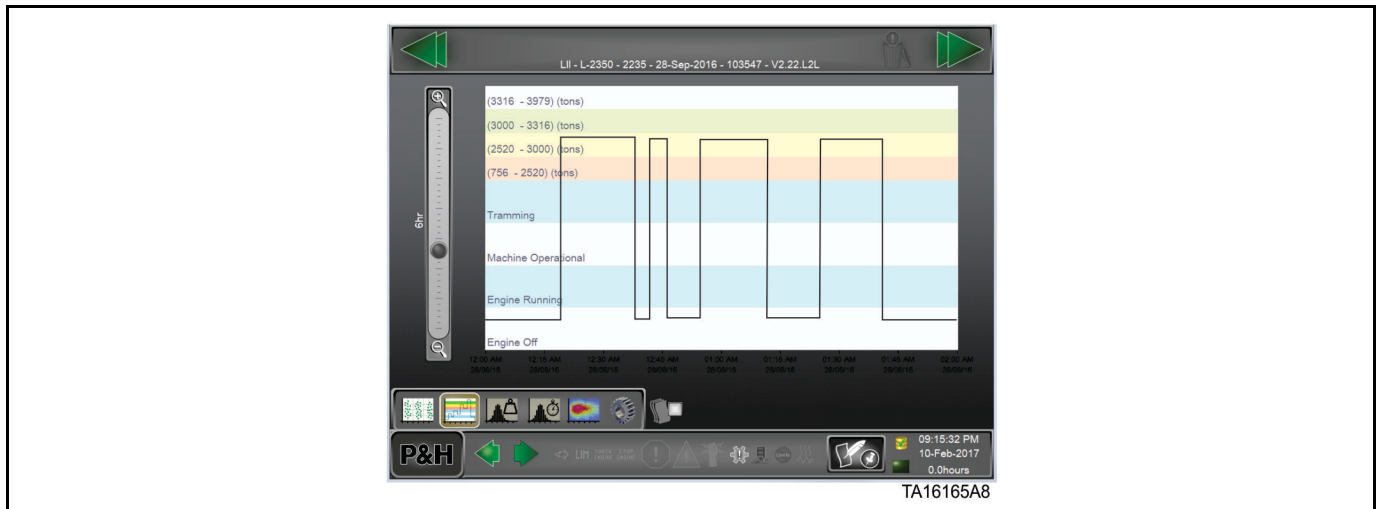
Loads

The Loads report shows the value and time of each load. The left scroll bar selects the time width of the display window. The bottom scroll bar selects the window position in time.



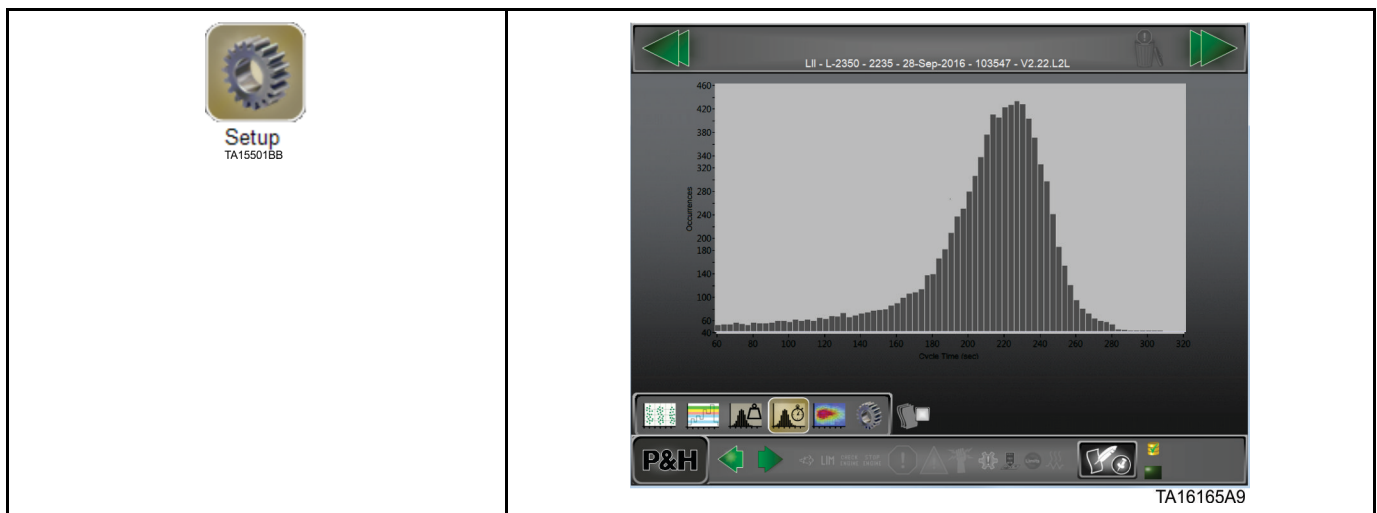
Profile

The Profile report provides a summary of loader activity. The left scroll bar selects the time width of the display window. The bottom scroll bar selects the window position in time.



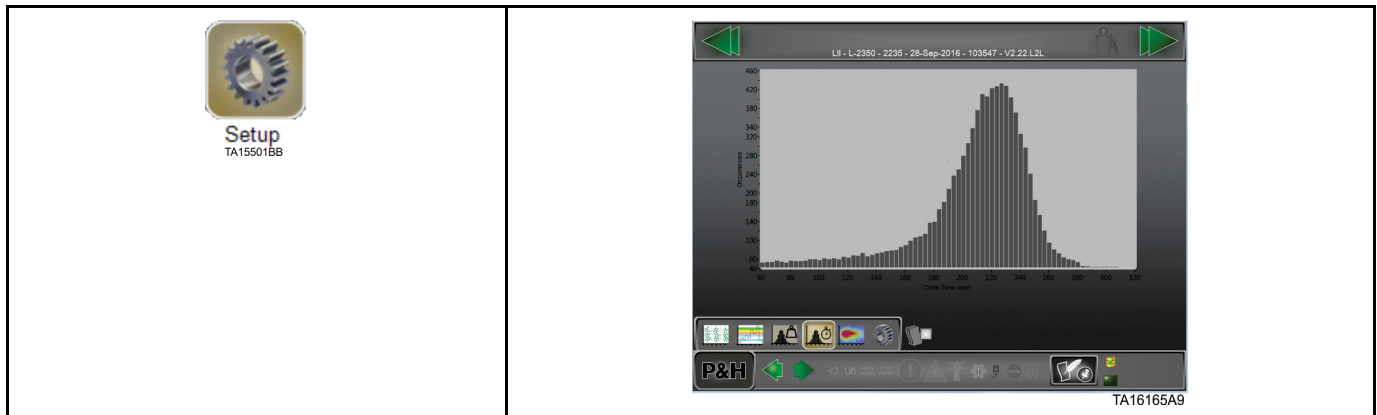
Tons Per Load

The Tons Per Load report provides a bar chart that shows the number of loads by the load weight value. The data range is selected by touching the Setup Button.



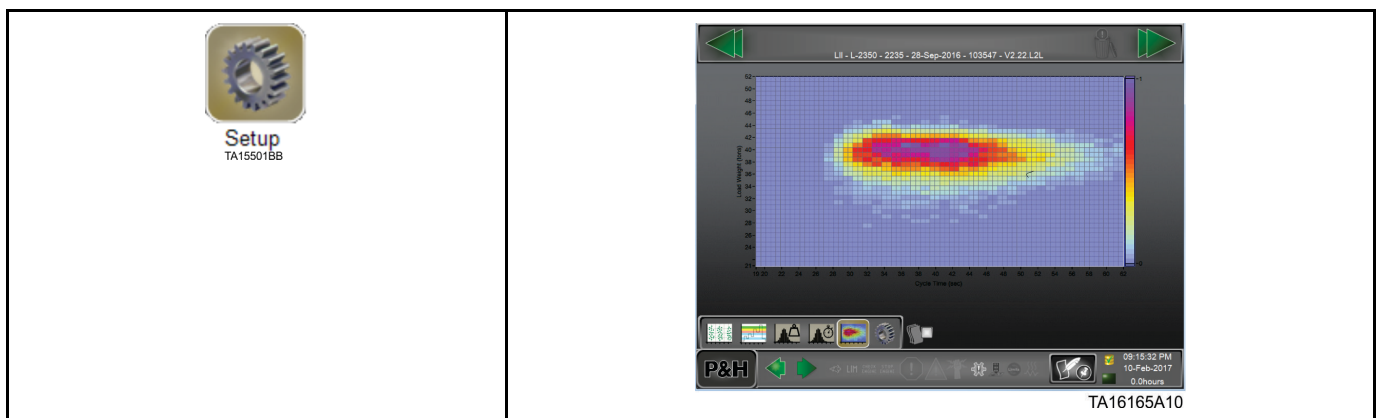
Cycle Times

The Cycle Times report provides a bar chart that shows the number of cycles by the cycle time value. The data range is selected by touching the Setup Button.



Cycle Time/Load Sweet Spot

The Cycle Time/Load Sweet Spot report provides a 3D bar chart that combines the load and cycle time values. The color chart indicates the number of occurrences for each combination. The data range is selected by touching the Setup Button.



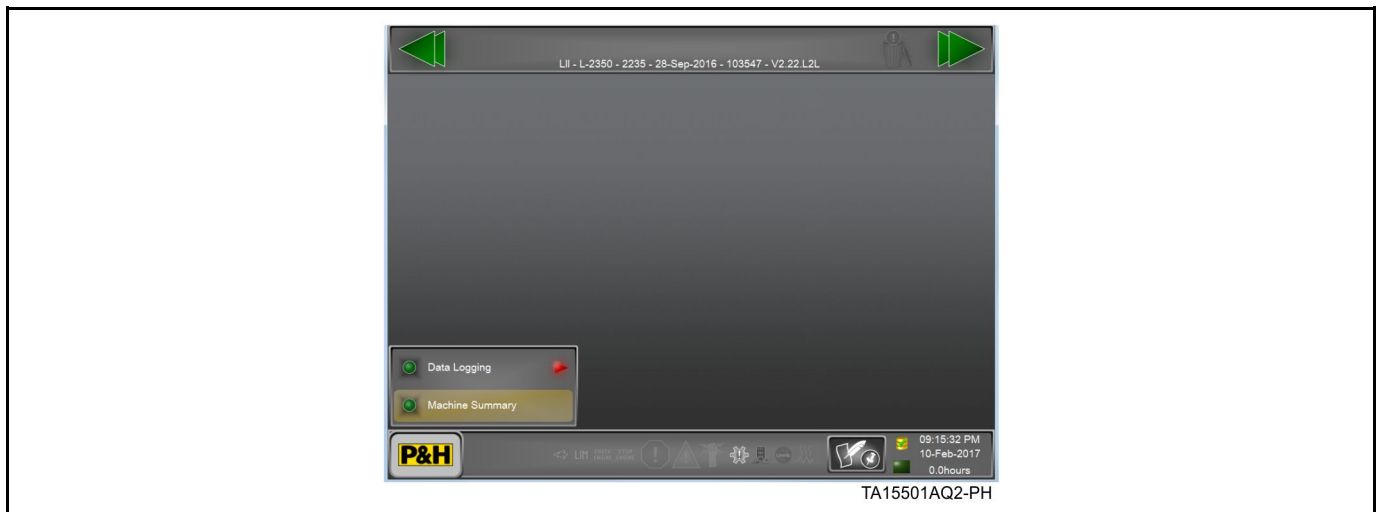
Production Reports Setup

The Production Reports Setup screen allows filtering of the production data to remove spurious values. For example, the Load Weight Minimum can be set to a value that allows the reports to ignore weights recorded when the loader is cleaning up the work site. The Date Range for the reports can be selected by touching the Date Range Button.



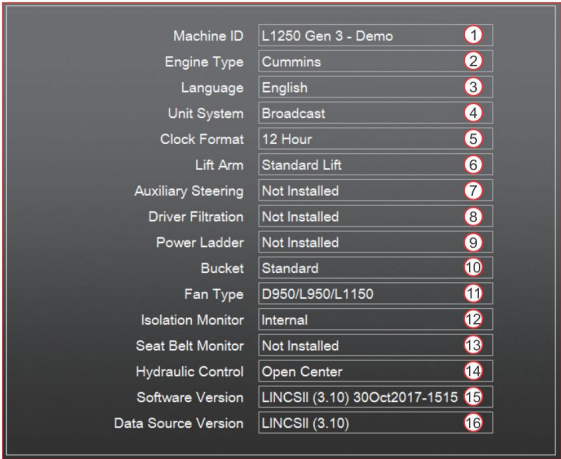
Machine Summary

Touch Machine Summary to display a list of general information about the machine. This list includes the Machine Serial Number and the installed options.



Machine Summary Screen

The Machine Summary Screen gives a list of machine settings and options. This screen is for information only. The list contains the following:

	
TA16165B3	
<ol style="list-style-type: none"> 1. Machine id (L-1150 - 2001) 2. Engine type (Cummins, Detroit, etc.) 3. Language (English, Spanish, etc.) 4. Unit system (Imperial, Metric, or Broadcast) 5. Clock format (12 hour or 24 hour) 6. Lift arm (Standard Lift or High Lift) 7. Auxiliary steering (Installed or Not Installed) 8. Driver filtration (Installed or Not Installed) 	<ol style="list-style-type: none"> 9. Power ladder 10. Bucket (Standard or Clamshell) 11. Fan type 12. Isolation monitor (External or Internal) 13. Seat belt monitor 14. Software version (LINCS II Software Version) 15. Data source version (Data version)

Clean Screen

The LINCS-II screen is a touch screen and must be periodically cleaned.

- Clean Screen prevents LINCS-II from responding to a display touch so that the screen can be cleaned.
- Clean Screen should be selected before attempting to physically wipe the screen.
- Once Clean Screen has been selected, a countdown displays showing the number of seconds remaining before the screen returns to normal operation.

The Acknowledge Button on the Left Joystick cancels the countdown.

Figure 28: Clean screen



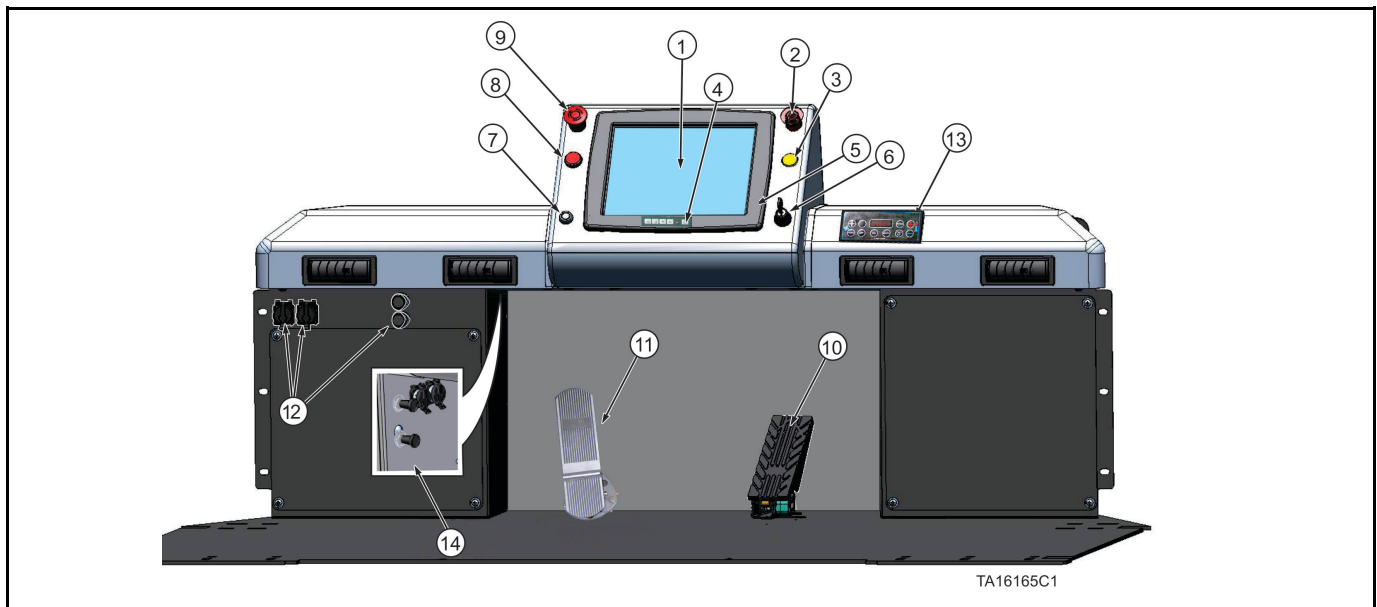
CAUTION

Damage to the display is possible if it is wetted during operation. NEVER wet clean the screen Turn the display off to clean with a wet process.

Cleaning Procedure

Clean the screen with a clean, dry, soft cloth. If this does not clean the screen adequately, use water or a mild glass cleaner. Do not use a cleaner that contains ammonia. Apply the cleaner to a clean soft cloth and not to the screen. Never use an abrasive cleaner or cloth.

Figure 29: Cab control console



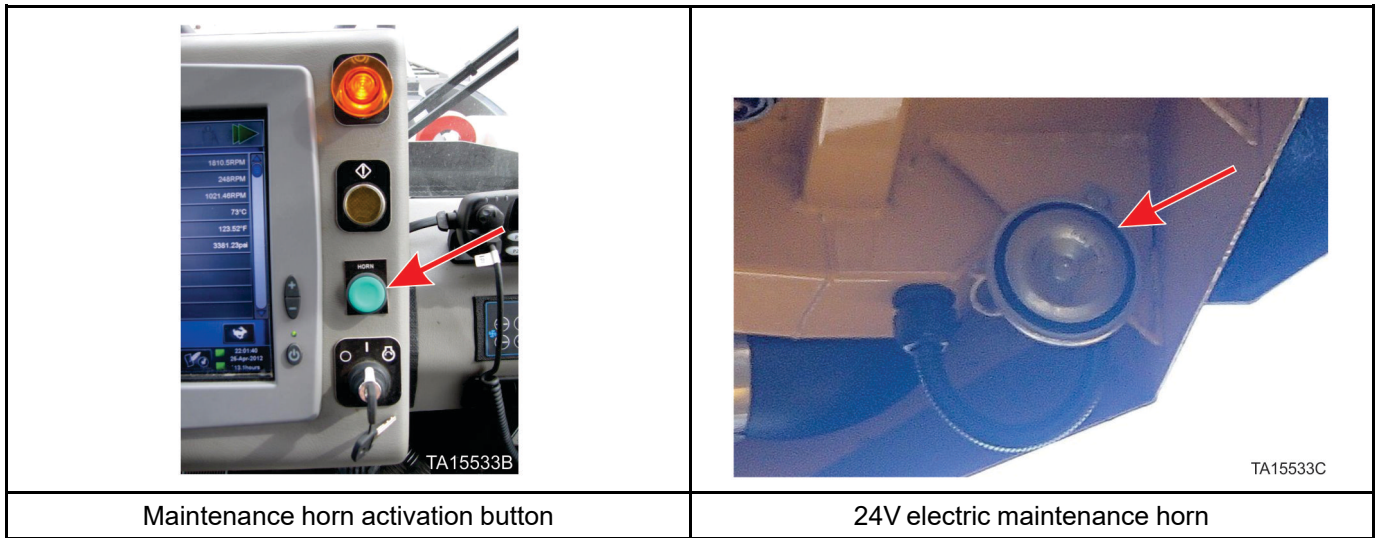
TA16165C1

- | | |
|---|--|
| <ul style="list-style-type: none"> 1. LINCS II Touch Screen 2. Park Brake Switch 3. Yellow Warning Light 4. Monitor Display Dimmer/Reset Switches 5. NOT USED 6. Key Switch/Crank Switch 7. User Access Key Reader | <ul style="list-style-type: none"> 8. Red Alarm Light 9. Cab Emergency Stop Switch 10. Speed Control Pedal 11. Service Brake 12. 12V Power-Ports, USB and Ethernet Terminals 13. Cab Environmental Controls 14. Port Location (some models) |
|---|--|

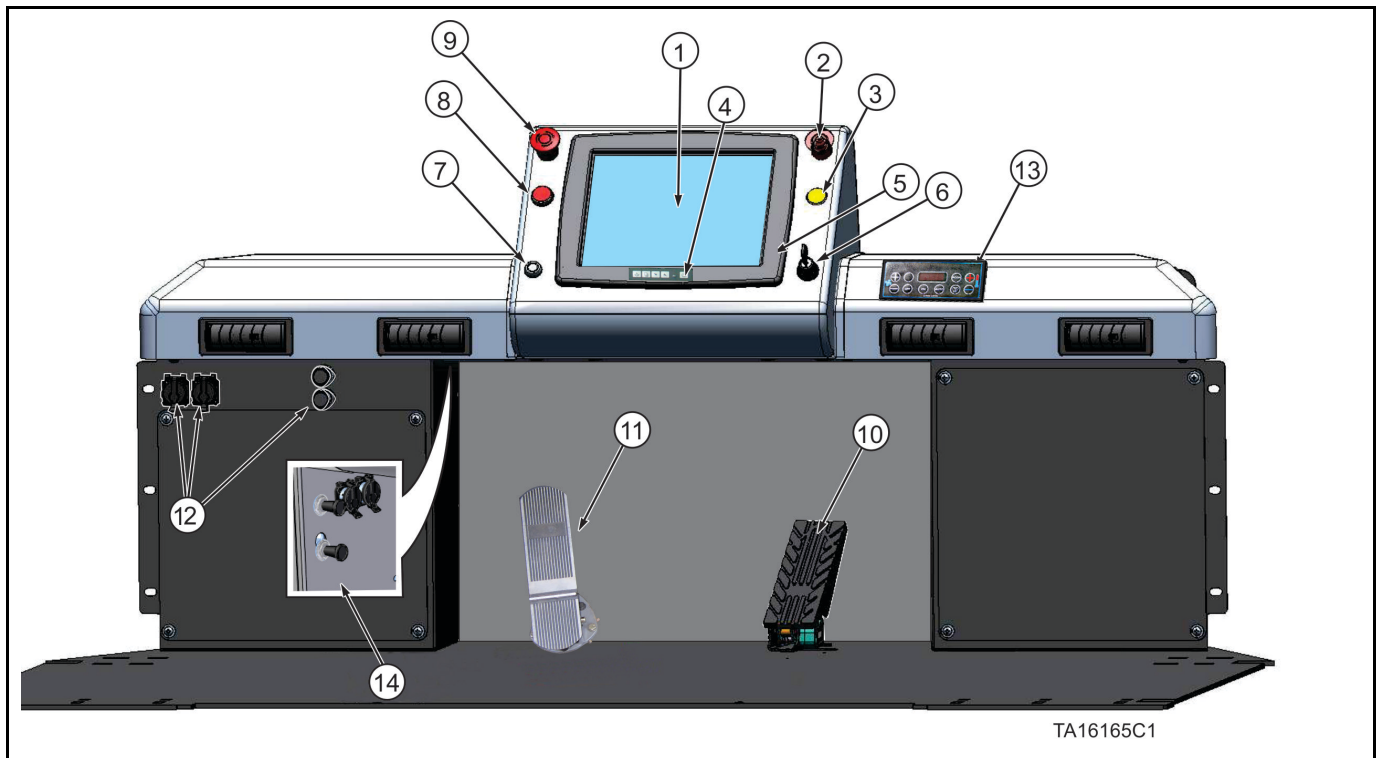
24V Maintenance Horn

Some machines may be equipped with a 24V electric maintenance horn that is not as loud as the air horn. The activation button is located above the key switch, on the operator console. It is typically used in a maintenance area. The horn is typically located under the cab, but may be located in the light bar mounting bracket on top of the Falling Object Protection Structure (FOPS).

Figure 30: 24V maintenance horn



Cab Control Console



- | | |
|--|---|
| <ul style="list-style-type: none"> 1. LINCS II Touch Screen 2. Park Brake Switch 3. Yellow Warning Light 4. Monitor power switch 5. NOT USED 6. Key Switch/Crank Switch 7. User Access Key Reader 8. Red Alarm Light | <ul style="list-style-type: none"> 9. Cab Emergency Stop Switch 10. Speed Control Pedal 11. Service Brake 12. 12V Power-Ports, USB and Ethernet Terminals 13. Cab Environmental Controls 14. Port Location (earlier models) |
|--|---|

Park Brake Switch

(#2 on Illustration “Cab control console”)



Park Brake Switch

The park brake switch is a push-pull type switch that has a built-in light that illuminates continuously when the brakes are set (also see NOTICE below). The park brakes are spring/air operated.

Pushing the park brake switch IN sets the park brakes by releasing air pressure from the brake actuator, and also inhibits propel.

- LINC II will not allow the engine to crank unless the park brake switch is pressed IN.

Pulling the park brake switch OUT releases the park brakes by increasing air pressure to the brake actuator, and also enables propel.

- Hydraulics will not function unless the park brake switch is positioned OUT.

NOTICE

The park brake switch light illuminates off and on (flashes) if either of the following conditions occurs: If the park brake switch is pulled OUT, with the ladder in the up position, but air pressure is not enough to release the brakes, the light flashes until sufficient air pressure to release the brakes is achieved. If the park brake switch is pulled OUT, with the ladder in the DOWN position, a notice is posted on the touch screen, and the park brake switch flashes. Tractive power is inhibited until the ladder is raised to the full UP and LOCKED position. The park brake switch must be set again and re-released before the park brakes release.



WARNING

Crush hazards exist from leaving the cab without setting the park brakes, which could result in unplanned and uncontrolled movement of the machine. The operator should never leave the cab with the park brake released. Set the park brake before leaving the cab. Leaving the cab without setting the park brake could cause a crush hazard from unexpected machine movement, resulting in property damage, serious injury or death.



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 dynamic braking, then use the service brake if necessary 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 personal injury.

Yellow Warning Light

(#3 on Illustration “Cab control console”)



TA16219Y

The Yellow Warning light, Yellow Warning light and audible alarm indicate a problem that may not require immediate shut down of the engine but **MUST BE INVESTIGATED** and addressed immediately.

Not Used

(#4 on Illustration “Cab control console”)

(#5) NOT USED

Key Switch/Crank Switch

(#6 on Illustration “Cab control console”)



The Key Switch/Crank Switch has three positions: OFF, ON and START.

The ON position turns on the electrical power to the instrument panel circuits, LINCOS II computer system and electronic engine ECM, allowing fuel flow to the injectors.

The START position is a momentary position.

To start the engine:

- Set the park brakes.
- Move the directional switch to the center (neutral) position,
- Wait for the LINCOS II system to boot up and the Park Brake switch light to illuminate.
- Turn the Key Switch/Crank Switch clockwise, to START. Once the engine starts release the switch. The switch returns to the ON position.

NOTICE

Cummins engines will NOT start immediately when the Key Switch/Crank Switch is turned to the START position.

To stop the engine under normal conditions:

- Stop the motion of the machine.
- Lower the bucket/blade to ground level (for safety reasons).
- Set the park brakes.
- Select LO engine idle.
- Turn the Key Switch/Crank Switch to the OFF position.
- Turning the Key Switch/Crank Switch to the OFF position activates the idle timer if needed.

- The idle timer allows the engine to run at low throttle for up to a TOTAL of five minutes, to cool the turbochargers.

NOTICE

If the machine has already been running at low throttle for the five previous minutes prior to turning the Crank switch OFF, the engine will shut down immediately. The engine must run a total of five minutes at low throttle before the engine will stop.

- The LINCOS II computer system remains booted up.
- When the idle timer is activated, the touch screen provides an indication that the idle timer is operating.
- After five minutes, the engine fuel flow to the injectors stops, which stops the engine.
- The LINCOS II computer system remains booted up for an additional 15 seconds. During this 15-second interval, the Key Switch/Crank Switch can be switched back to the ON position and the LINCOS II computer system remains booted up. This function saves waiting the normal boot-up time to complete service work, data transmission, etc.
- If the Key Switch/Crank Switch is not switched back to the ON position during the 15-second interval, the LINCOS II computer system switches off and the power to the instrument panel is cut.

User Access Key and Reader

(#7 on Illustration “Cab control console”)



The User Access Key Reader is an access port which allows the LINCOS system to read an identification pendant (User Access Key). The User Access Key provides the LINCOS II system the ability to identify “access level” when it is touched to the reader. The level of LINCOS II access, personnel identity, and other information which affects the menu selection is programmed into the LINCOS II system. The system defaults to “operator” level upon startup (without use of the User Access Key).

Red Alarm Light

(#8 on Illustration “Cab control console”)

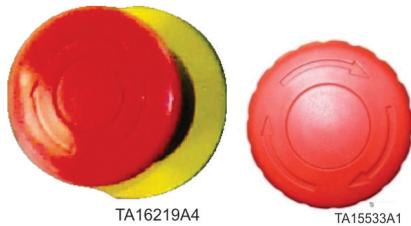


If a Red Alarm screen appears on the touch screen, the red indicator light illuminates and an audible alarm sounds when a monitored component falls outside normal operating parameters.

The alarm screen includes a brief text message to alert the operator to the nature of the problem. The operator can silence the audible alarm and remove the text message from the screen by pressing the acknowledge switch on the left joystick. The alarm screen will no longer appear but the light will continue to illuminate.

Cab Emergency Stop Switch

(#9 on Illustration “Cab control console”)



The Emergency Stop Switch mounted inside the cab, is a palm operated (push-in, pull-out), pushbutton type emergency stop switch. The Cab Emergency Stop Switch removes control from the computer, which kills the engine, disables the drive system, and shuts off the generator. When the switch is pressed, the park brakes will immediately set. When pushed, the switch locks. To unlock it, twist the switch knob in the direction of the arrows shown on its top. Ground-level emergency stop switches are also provided. Refer to Section 01-02 in the Service Manual for additional information and other locations.



CAUTION

Struck by hazard exists if using the emergency stop switch inside the cab to shut down the machine. This will immediately set the brakes and stop the machine suddenly, possibly causing the operator to be thrown unexpectedly and rapidly against the seat belt or harness. Use the emergency stop switch only in an emergency situation. Use the dynamic braking and then the service brake to stop the machine during normal operation. Using the emergency stop switch to stop the machine can cause the operator to be thrown forward rapidly against the seat belt or harness, resulting in injury.

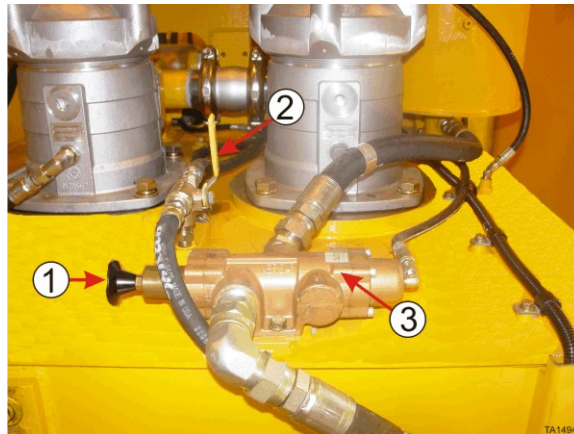
CAUTION

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.

NOTICE

When the emergency shutdown circuit is actuated, the hydraulic reservoir automatic air release valve (Hydraulic reservoir air release valves) is tripped, releasing pressure in the hydraulic reservoir. This valve must be manually reset by pushing the reset button IN to the closed position.

Figure 31: Hydraulic reservoir air release valves



1) Reset Button, 2) Manual Relief Valve, 3) Automatic Air Release Valve (mounted on top of hydraulic reservoir)

Speed Control Pedal



TA13746E

The pedal on the right side is the speed control pedal. The speed control pedal controls speed of the machine. The speed is proportional to the distance that the speed control is depressed. Conversely, as the speed control is released, the speed of the machine decreases and dynamic braking occurs, which brings the machine to a complete stop on flat ground. If stopping on a grade, the machine may have a tendency to creep. Should this occur, depress the Service Brake pedal with the left foot, and the machine will come to a complete stop.

NOTICE

The speed control pedal does not have to be released to change direction of travel (FORWARD or REVERSE). Refer to "Directional Control Switch".

Service Brake Pedal



TA13746D

The left pedal controls the service brake.

Depressing the pedal activates the disc brakes on all four wheels.

The primary service brake function should be for EMERGENCY STOPS. However, when required, the brakes could be used to prevent machine movement or to hold the machine on a grade.

NOTICE

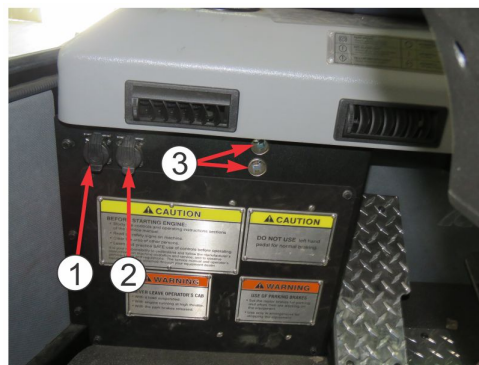
The service brake should NOT be routinely used to stop the machine during normal operation. The machine should be stopped by releasing the speed control pedal and utilizing the dynamic braking system. Use of the service brake to routinely stop the machine during material handling operations will result in accelerated wear of the disc pads and rotors.

12V Power-Ports, USB and Ethernet Terminals

(#12 & #14 on Illustration “Cab control console”)

Two 12V Power-Ports, are provided for connecting laptop computers used to troubleshoot various machine component systems or other auxiliary equipment. A USB Port and an Ethernet Port are provided to connect to and communicate with various computer controlled systems. Refer to “12V POWER-PORTS, USB AND ETHERNET CONNECTIONS” for locations.

Figure 32: 12V power-ports, USB and Ethernet connections



TA15514

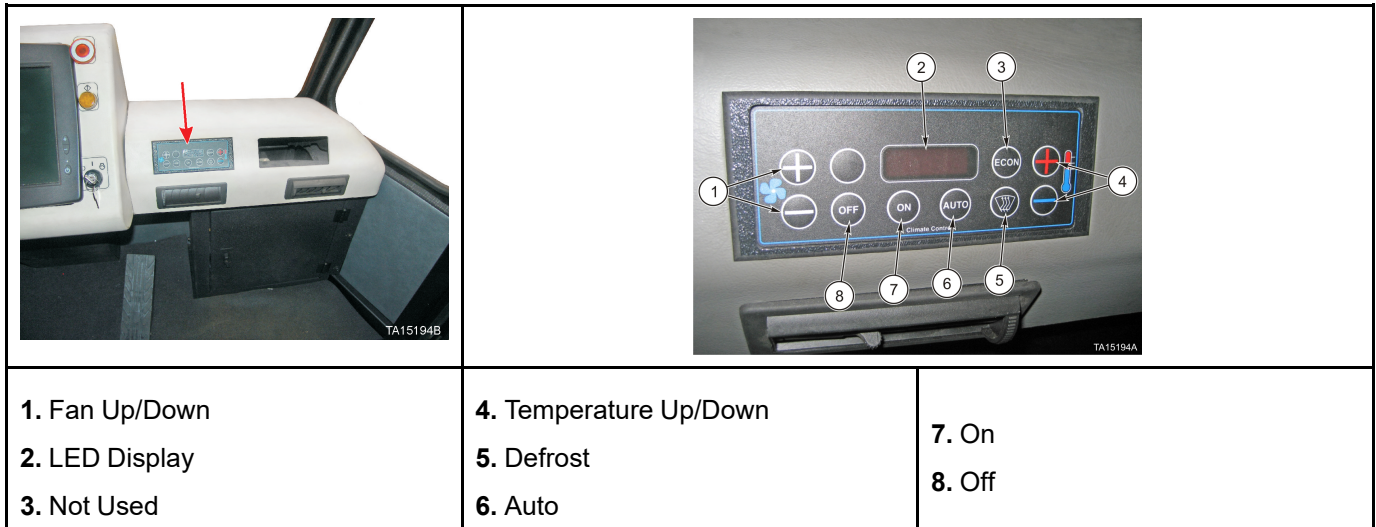
1) Ethernet Connection, 2) USB Connection, 3) Power-Ports

Climate Control Switches

(#13 on Illustration “Cab control console”)

Numbers in parentheses refer to “Climate control switches”. Refer to Vendor Literature for more information.

Figure 33: Climate control switches



FAN UP/DOWN (1) – Overrides the automatic fan speed control feature. Increments fan speed up or down in eleven (11) steps. The digital display indicates the fan speed setting as a percentage or “HI” when maximum fan speed is reached or “LO” when minimum fan speed is reached then returns to normal display five (5) seconds after either key is depressed. The set point fan speed is maintained until it is changed or if the AUTO key is depressed.

LED DISPLAY (2) – Displays error codes and other pertinent information.

NOT USED (3)

TEMPERATURE UP/DOWN (4) – Increments the set point temperature up or down. The system will control the electronic water valve and/or the A/C compressor clutch to hold the cab temperature as closely as possible to the set point temperature.

DEF (5) (Defrost icon) – Energizes the A/C system to allow for rapid de-humidification of the cab. The A/C will be enabled even if the set point temperature requires heat. A panel indicator light indicates when this mode is active.

AUTO (6) – Places the system in a fully automatic temperature control mode including fan speed. A panel indicator light indicates when this mode is active. The system will adjust the blower fan speed to the lowest setting necessary to maintain the cab temperature at the displayed set point temperature.

ON/OFF (7) (8) – Powers vehicle HVAC control system on or off. The LED numeric display is illuminated when the unit is turned on. The display will show the current set point temperature.

Special Key Functions

To display diagnostics, depress the ON key three (3) times. The digital display will then display any active fault codes. See Troubleshooting section of the vendor literature for fault code explanations.

To change the display from Fahrenheit to Celsius or back, depress the TEMPERATURE UP/DOWN (+, -) keys simultaneously.

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Overhead Keypad

Figure 34: Overhead keypad

<ol style="list-style-type: none"> 1. Alternate Height Switch 2. return to Dig /Bucket Auto Level Switch 3. Drive Enable Switch 4. Hazard Switch 5. Throttle Switch 6. Front Windshield Wiper Switch 7. Rear Window Wiper Switch 8. Front Windshield Washer Switch 	<ol style="list-style-type: none"> 9. Rear Window Washer Switch 10. Not Used 11. Alternate Speed Switch 12. Auto Lube Switch 13. Auxiliary Torque Switch 14. Cruise Switch 15. Beacon Switch 16. Light Switch
--	---

Alternate Height Switch (1)



(Refer to illustration “Overhead keypad”)

The Alternate Height Switch is a two position momentary pushbutton switch. A rotary transducer is provided on the loader that can be preset to stop the flow of hydraulic fluid to the bucket cylinders when the bucket reaches the predetermined height. The switch is set to stop the bucket at the same height during each lifting cycle when the loader is being used to load a fleet of vehicles of uniform height.

- When the switch is pressed, the alternate height limit function is enabled and the bucket will stop at the selected height each time. The LED will illuminate.
- To set the alternate height limit, hoist the bucket to the desired position and press and hold the Bucket Height Switch for a minimum of 2 seconds. If the lift arms are above 25° the height will be recorded in the loader's computer and the lift arms will automatically stop at this height whether using the hoist detent switch or joystick to perform hoisting operations.
- The lift arms can be raised to full height without resetting the alternate height limit by returning the right joystick to the neutral (center) position and then pulling back on the joystick. If the alternate height limit function is enabled while the lift arms are below 25°, the last programmed limit when hoisting, whether using the joystick or the hoist detent switch, becomes the alternate height limit.
- When the adjustable height limit function is enabled, after dumping the bucket, the operator must push the joystick forward or press the Return to Dig switch to lower and geometrically level the bucket.
- Pressing the switch a second time will turn OFF the adjustable height limit function and the LED will go OFF. When the adjustable height limit function is turned OFF, the preset limit switch is bypassed, and the bucket will rise to the maximum height attainable after the hoist joystick control is moved to the full back position or the hoist detent switch is pressed. The Alternate Height Switch should also be turned OFF when a fleet of vehicles of varying heights is loaded.

NOTICE

If the bucket is loaded to 120% of rated capacity hoisting action is inhibited, the yellow light illuminates, the audible alarm sounds, and the text screen indicating bucket overload appears on the computer monitor. The audible alarm can be silenced and the text message removed from the screen by touching a key on the touch screen keypad. However, the yellow light continues to illuminate.

Return to Dig/Auto Level Switch (2)



TA16219I

(Refer to illustration “Overhead keypad”)

The Auto Level Switch is a two-position momentary pushbutton switch. This switch enables or disables the auto-leveling feature of the bucket.

- When the switch is pressed, the auto-leveling feature is enabled. The left LED will illuminate.
- Pressing the switch a second time disables the auto-level feature and the LED goes out.
- If the auto-leveling feature is switched from disabled to enabled, and the button is pressed and held for a minimum of 2 seconds, while the lift arms are below 0°, the current angle of the bucket is recorded as the bucket angle to which to auto level.

Drive System Enable/Disable Switch (3)



TA16219J

(Located on “Overhead keypad”)

- Enables and disables the drive system.
- Drive may be enabled at low throttle for moving in out of the shop area.
- All four LEDs illuminate when the drive system is enabled.

Hazard Switch (4)



TA16219K

(Refer to illustration “Overhead keypad”)

The Hazard Switch is a two position momentary pushbutton switch.

- When the switch is pressed the yellow hazard lights on the front and rear of the loader are turned ON and will flash.
- The LED will illuminate.
- When the switch is pressed a second time the hazard lights are turned OFF and the LED will go out.

Engine Speed Switch (5)



TA16219L

(Located on “Overhead keypad”)

The Throttle Switch is a four-position momentary pushbutton switch.

- The Engine Speed Switch has three LED lights at the top of the switch.
- If the machine is equipped with a Cummins engine, when the engine is started the left LED will flash until the operating temperature has reached a point where the Cummins electronic control module will allow control of all engine functions by the LINCS II computer system. It will then stay on without flashing.
- If the machine is equipped with a Detroit Diesel engine the left LED will flash until the LINCS II computer system is in control of the engine functions and it will then stay on without flashing.
- When the LINCS II computer system gains control, the engine will run at LO speed position (800 RPM).
- When the switch is pressed one time the engine will go to HI speed. The left and right LEDs will illuminate without flashing. The center LED will go out.
- When the switch is pressed a second time the engine will go to L2 speed (1100 RPM) and both the center and left LEDs will illuminate without flashing.
- When the switch is pressed a fourth time the engine returns to LO speed (800 RPM) and only the left LED will illuminate.
- Operate the loader only in HI speed when performing material handling operations.

Front Windshield Wiper Switch (6)



TA16219M

(Refer to illustration “Overhead keypad”)

The Front Windshield Wiper Switch is a four position momentary pushbutton switch.

- When the switch is pressed the front windshield wiper will come on with intermittent or delayed operation. The left LED will illuminate.
- When the switch is pressed a second time, the front windshield wiper will come on at SLOW speed. The center LED will illuminate and the left LED will go out.
- When the switch is pressed a third time, the front windshield wiper will come on at HI speed. The right LED will illuminate and the center and left LEDs will go out.
- When the switch is pressed a fourth time, the front windshield wiper is turned OFF and all LEDs are turned OFF.

Rear Window Wiper Switch (7)



TA16219N

(Refer to illustration “Overhead keypad”)

The Rear Window Wiper Switch is a four position momentary pushbutton switch.

- When the switch is pressed the rear window wiper will come on at LOW speed. The left LED will illuminate.
- When the switch is pressed a second time, the rear window wiper will come on a MEDIUM speed. The center LED will illuminate and the left LED will go out.
- When the switch is pressed a third time, the rear window wiper will come on at HI speed. The right LED will illuminate and the center and left LEDs will go out.
- When the switch is pressed a fourth time, the rear window wiper is turned OFF and all LEDs are turned OFF.

Windshield and Rear Window Washer Switches (8 & 9)

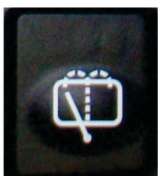


TA16219o

(Refer to illustration “Overhead keypad”)

The Windshield and Rear Window Washer Switches are two position momentary switches.

- When the switch is pressed, the washer sprays a jet of window cleaning solvent on either the windshield or rear window (as selected) and the applicable wiper will come on to clean the glass.
- When the switch is released it returns to the OFF position. The solvent spray will stop and the wiper will stop.



TA16219P

Not Used (10)



TA16219Q

(Refer to illustration “Overhead keypad”)

Some buttons are not assigned a function on some machine models. They do not have an icon.

Alternate Speed Switch (11)



TA16219R

(Refer to illustration “Overhead keypad”)

The Alternate Speed Switch is a two position momentary switch.

- When the Alternate Speed Switch is pressed once, the loader’s top speed is limited to a preset speed limit. The LED light will illuminate.
- Refer to “USER PREFERENCES” screen settings in Section “ELECTRICAL SYSTEMS”, VEHICLE CONTROL SYSTEM (LINCS) in the Service Manual.
- When the switch is pressed a second time, the Alternate Speed function is turned OFF and the loader’s top speed is returned to normal. The LED light will go out.

Auto Lube Switch (12)



(Refer to illustration “Overhead keypad”)

The AUTO LUBE Switch is a two-position momentary switch that starts the automatic lubrication pump. The engine must be running for the AUTO LUBE Switch to operate.

Drive disabled:

- Pressing the AUTO LUBE Switch activates the lubrication pump. The LED illuminates.
- Releasing the switch turns the lubrication pump OFF. LED goes OFF.

Drive enabled:

- Pressing the AUTO LUBE Switch activates the lubrication pump. The pump cycles through the set cycle time. The LED illuminates until the pump turns OFF.
- Should there be a problem with the lubrication system, either a Yellow Warning Light or a Red Alarm Light, and an audible alarm comes on and a message appears on the computer screen.

NOTICE

Two other switches labeled Lubrication Cycle are also provided. One is located in the Isolation and Control Switch Box mounted at the left rear of the machine. The other is mounted inside the front frame, above the auto lube pump. These switches perform the same function as the Lube Switch on the Overhead Switch Panel.

CAUTION

Always ensure the automatic lubrication system is operating properly during operation of the machine. Check auto lube operation frequently during operation. Never, under any circumstances, operate the machine with the automatic lubrication system inoperable. Serious component damage will occur.

Auxiliary Torque Switch (13)



TA16219T

(Refer to illustration “Overhead keypad”)

- The Auxiliary Torque Switch is a pushbutton switch and has one LED.
- The switch is programmable with the LINCS II computer system.
- Refer to “USER PREFERENCES” screen settings in Section “ELECTRICAL SYSTEMS”, VEHICLE CONTROL SYSTEM (LINCS) in the Service Manual.

Cruise Switch (14)



TA16219U

(Refer to illustration “Overhead keypad”)

The Cruise Switch is a three state momentary pushbutton switch and has two LEDs.

- Cruise control allows the machine to travel at the speed commanded by the speed control pedal at time cruise control is activated. Cruise control speed can be increased or decreased by pushing the joystick forward to increase or pulling the joystick back to decrease speed. The following actions will disable cruise (once it is set).
 - Pressing the Cruise Control switch again.
 - Actuating the Service brakes.
 - Actuating the Park brake.
 - Placing the Direction switch to Reverse or Neutral.
 - Depressing the Speed control pedal.
 - Machine speed <1 mph.

Beacon Light Switch (15)



TA16219V

(Refer to illustration “Overhead keypad”)

The Beacon Light Switch is a two-position momentary pushbutton switch that operates the flashing beacon mounted on top of the operator’s cab.

- When the switch is pressed once, the beacon light is turned ON.
- When the switch is pressed a second time, the beacon light is turned OFF.

NOTICE

Turn the beacon light on *ANYTIME* the loader is operating.

Pole Work Lights Switch (16)

Cab Light Bar Lights Switch (16)

Rear Cowl Lights Switch (16)



TA16219W

(Refer to illustration “Overhead keypad”)

The Lights Switch is a four-position momentary pushbutton switch.

The machine is equipped with 24-VDC, 35-watt, lights that are mounted on each side of the cab, on the light bar (Cab Light Bar Lights), on poles below the light bar (Work Lights) and on each side of the rear of the machine, above the radiator (Rear Cowl Lights-facing the rear of the machine). The lights are provided for nighttime material handling operations and for travel.

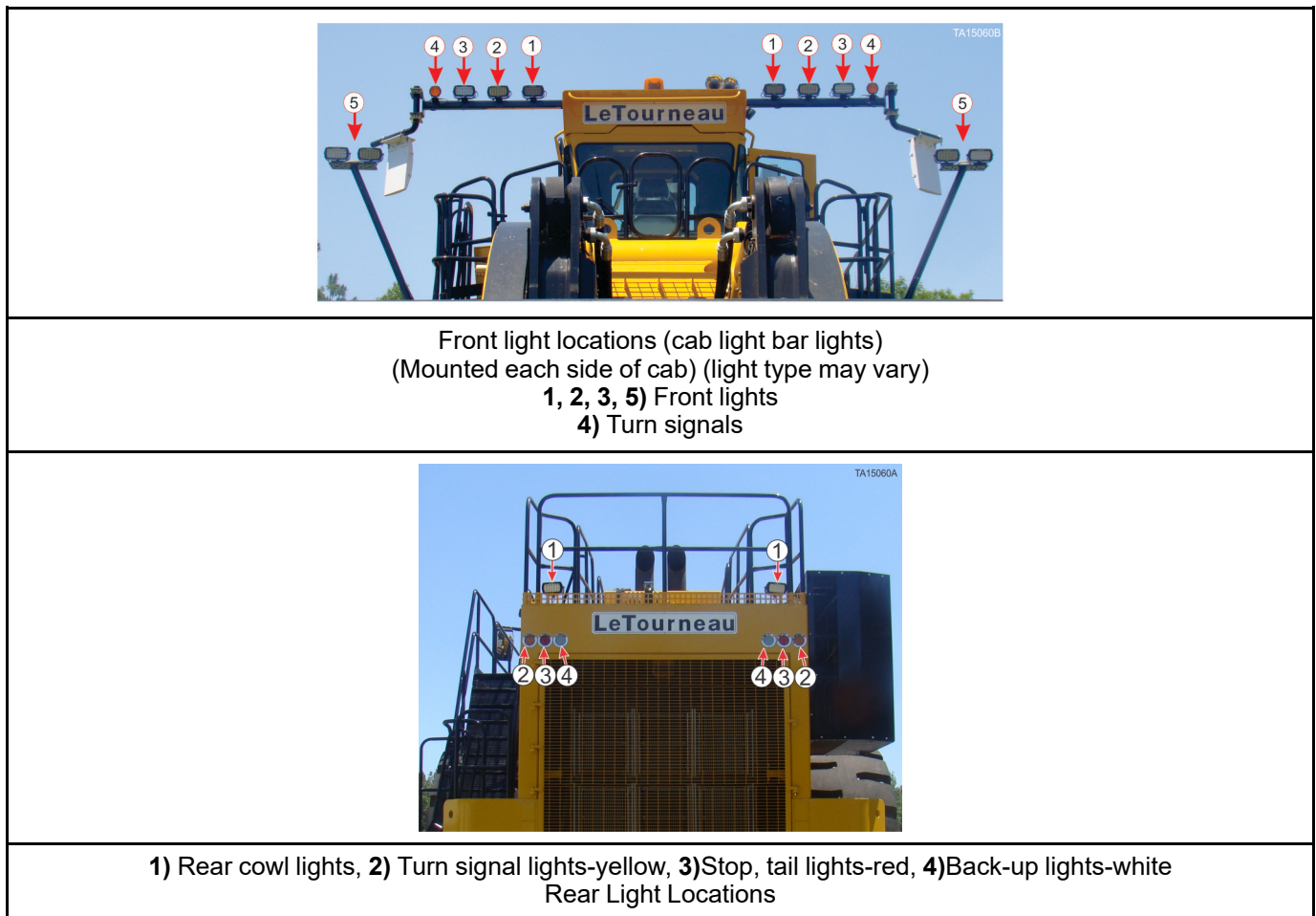
Each press of the button, within 2 seconds, turns ON or OFF a different set of lights as described below.

Times Button is Pressed within 2 seconds*	Pole work lights and (1ST LED on switch)	Cab light bar lights and (2ND LED on switch)	Rear cowl lights and (3RD LED on switch)
	Lights and indicator LED illuminated		
1	YES	YES	YES
2	YES	NO	YES
3	YES	NO	NO
4	NO	NO	NO
*Pressing the button <u>after</u> 2 seconds turns all lights OFF.			
Figure 13. Light switch operation			

NOTICE

Turning ON any of these lights also changes the screens being displayed on the touch screen. The screens slightly change color to accommodate for the expected lower ambient light encountered in a darker environment. The red and yellow lights on the console dim also.

Figure 35: Front and rear light locations



 **WARNING**

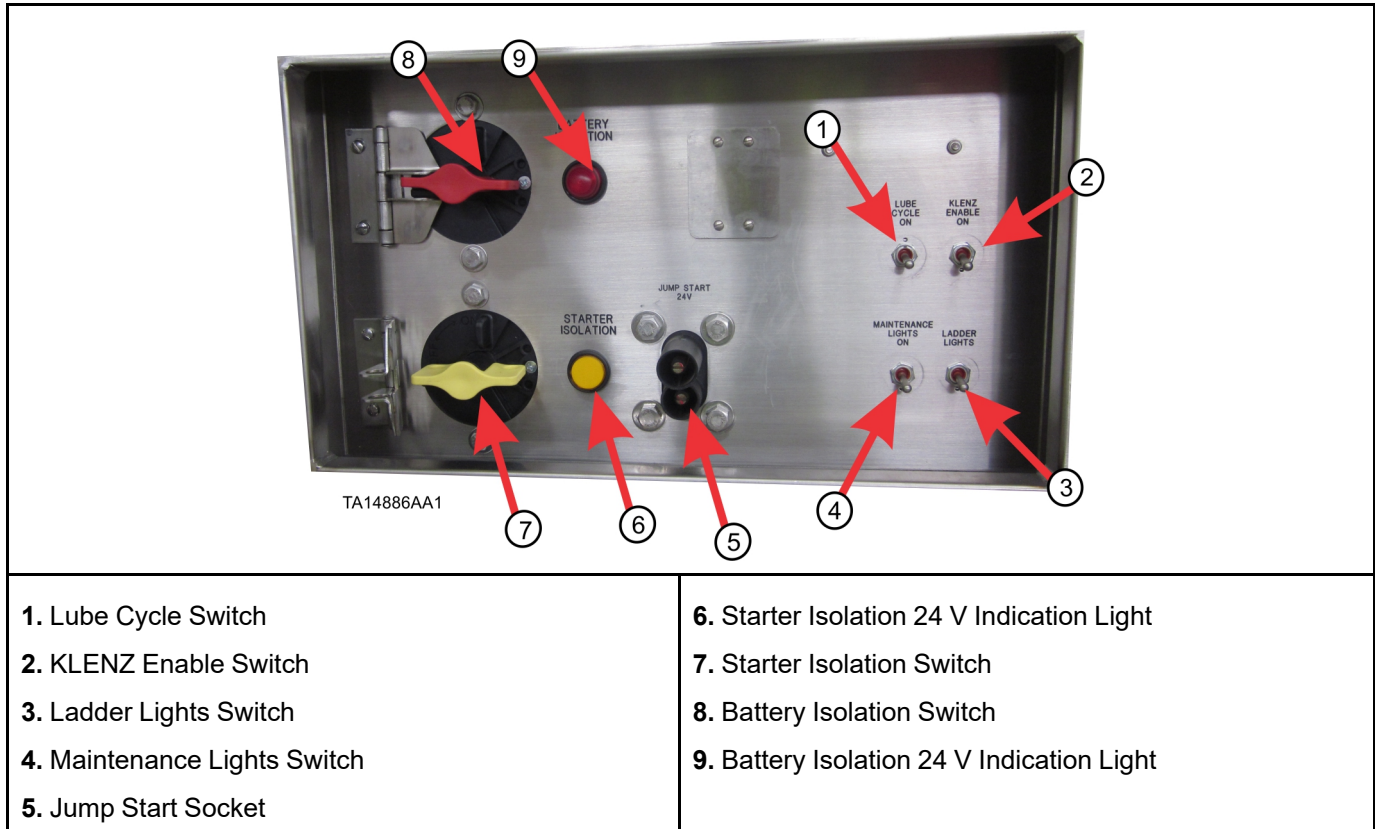
Electrical shock and crush hazards exist if lights are serviced while the machine electrical system is energized or not locked out and unexpected machine movement occurs. Always de-energize and lock out the machine electrical system before servicing the lights. Electrical shock is possible, resulting in serious injury or death. If the machine is started up while the lights are being serviced, a crush hazard is possible from unexpected machine movement, resulting in serious injury or death.

Service Switches

Isolation and Control Switches Assembly

The Isolation and Service Switches Assembly, located on the left side, at the rear of the machine, contains components useful to maintain safety during machine maintenance.

Figure 36: Isolation and control switches assembly



Auto Lube Switch

Because the automatic lubrication system is hydraulically powered, the engine must be running for the AUTO LUBE Switch to actuate the AUTO LUBE pump motor. When the drive is not enabled and any AUTO LUBE Switch is pressed to the ON position, the automatic lubrication system will run as long as the button is held down. When the drive is enabled and any AUTO LUBE Switch is pressed to the ON position, the automatic lubrication system will cycle once. The switch on the keypad on the overhead panel has a built in led that illuminates during any AUTO LUBE system cycle/actuation (manual or timed).

There are three AUTO LUBE Switches. They are located:

- Inside the Isolation and Control Switch Box on the left rear of the machine.
- On the overhead keypad in the operator's cab.
- Inside the front frame, above the grease reservoir on the frame wall.

Figure 37: Auto lube switch locations (1 of 2)

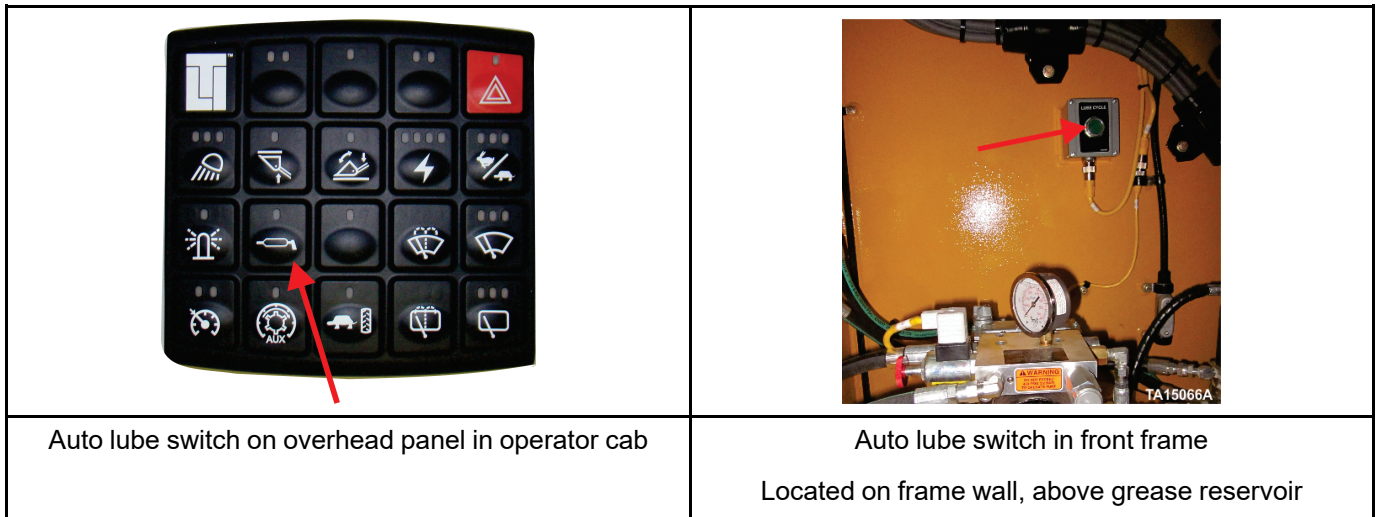
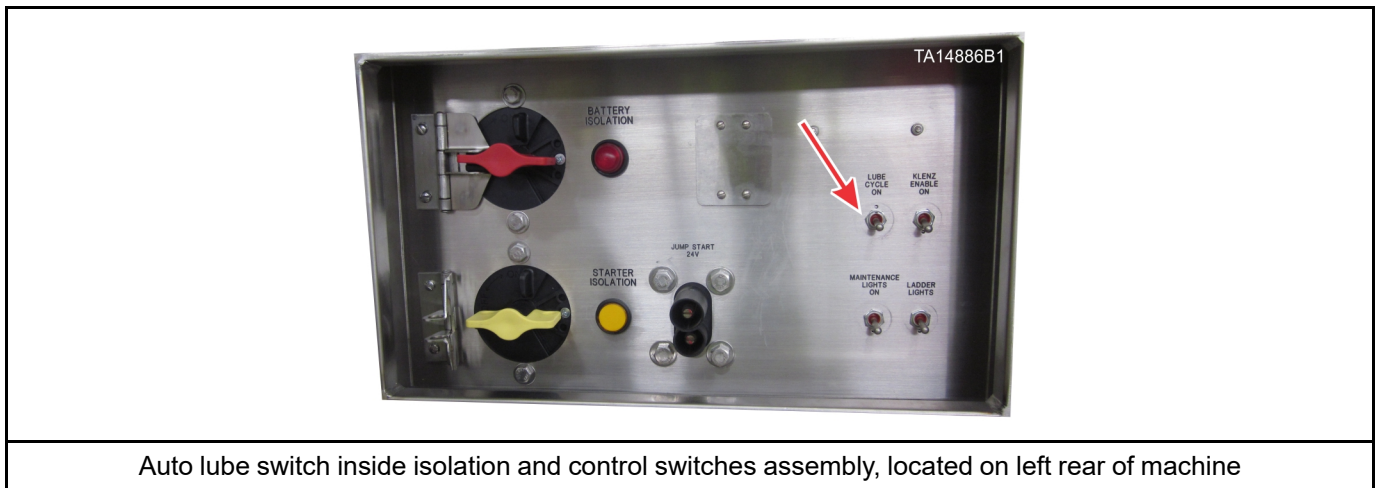


Figure 38: Auto lube switch locations (2 of 2)



KLENZ™ Enable Switch

Figure 39: KLENZ enable switch



The KLENZ™ Enable Switch, located inside the Isolation and Control Switches Assembly, is a two-position maintained toggle switch. The Switch turns OFF the purge cycle of the Komatsu Cartridge Filtration System (KLENZ™ system). Unless turned OFF, the purge cycle continues until there is no longer adequate pressure in the air system. When the purge occurs, the system emits a loud “boom” and dirt is blown from the hopper. The noise can be startling and dirt blowing from the hopper can present a hazard to persons climbing the ladder adjacent to the KLENZ™ system or standing under the hopper.



WARNING

Hearing damage or eye injury hazard exists if the KLENZ™ Enable Switch is not turned to the OFF position before performing any service work to the machine. Bleed air pressure to zero psig before performing any service or repair work to the KLENZ™ system or other components powered by the compressed air system. Failure to bleed the air pressure to zero in the compressed air system can cause hearing damage or eye injury from a sonic blast within the KLENZ system resulting in serious injury.

NOTICE

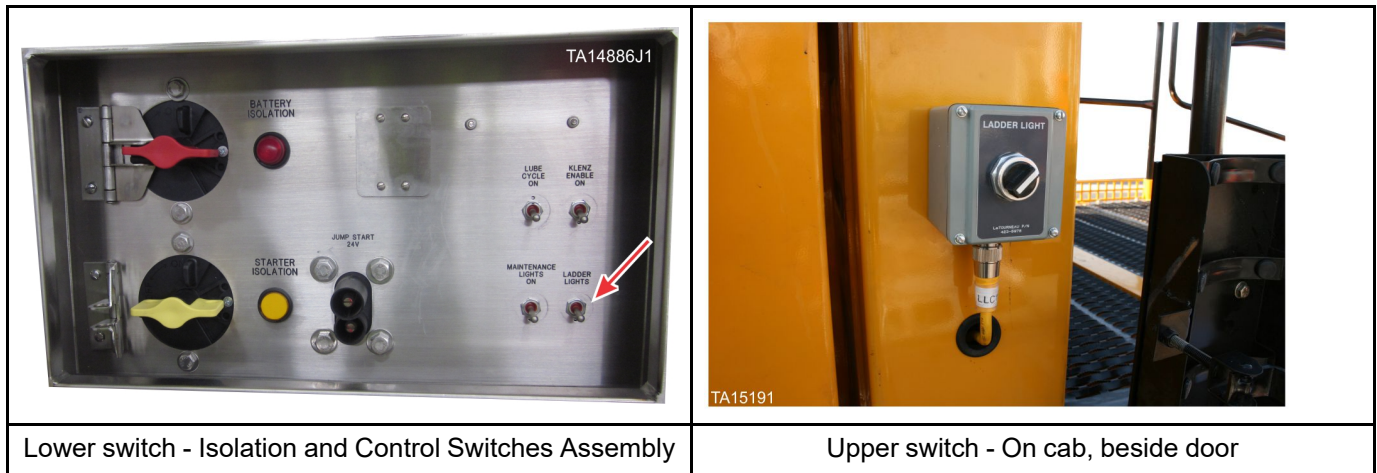
When the KLENZ™ Enable Switch is turned OFF, a notice screen, with a text message appears on the LINC II touch screen in the operator’s cab. BE SURE to turn the KLENZ™ Enable Switch to the ON position and close the manual air release valve before returning the machine to service.

Ladder Lights Switch

(Refer to illustration “Isolation and Control Switches Assembly”).

The machine is equipped with 24-VDC lights for illuminating the access ladder, staircase and work service areas. The ladder and staircase lights are mounted on top of the rear frame and on top of the operator’s cab. Two, 2-position switches are provided to turn the lights on and off. The upper switch is mounted behind the cab. The lower switch is located on the Control Switch Box. The switches are labeled “Ladder Lights”.

Figure 40: Ladder light switches



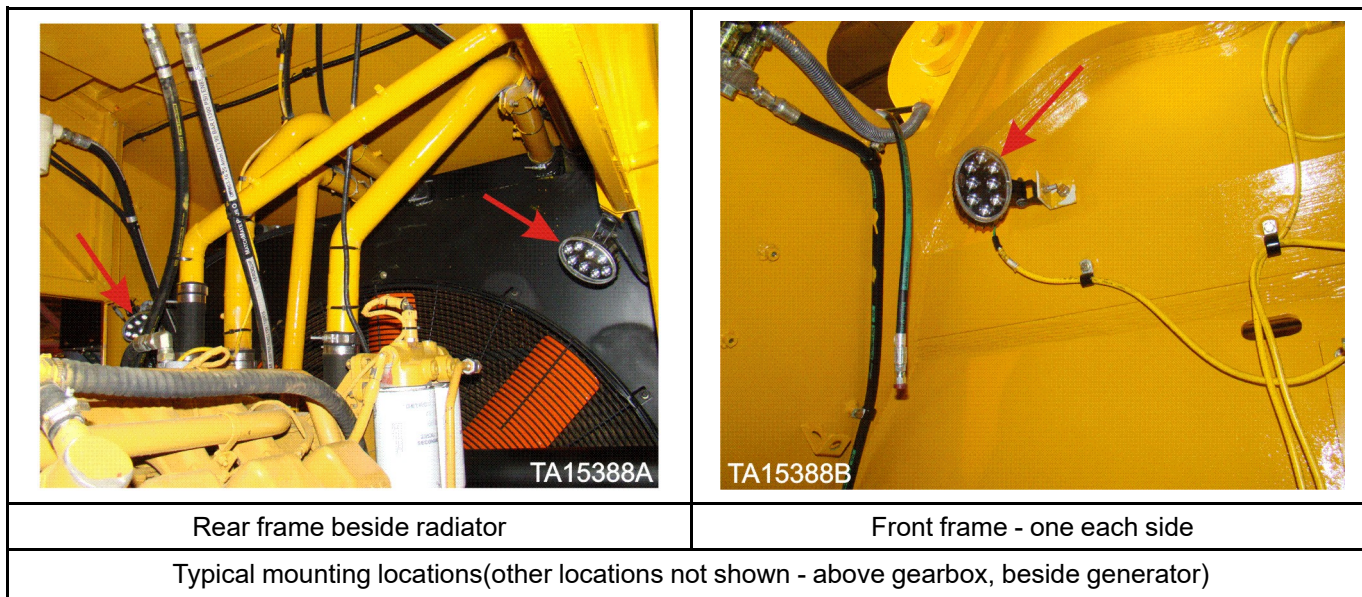
Maintenance Lights Switch

Figure 41: Maintenance lights switch



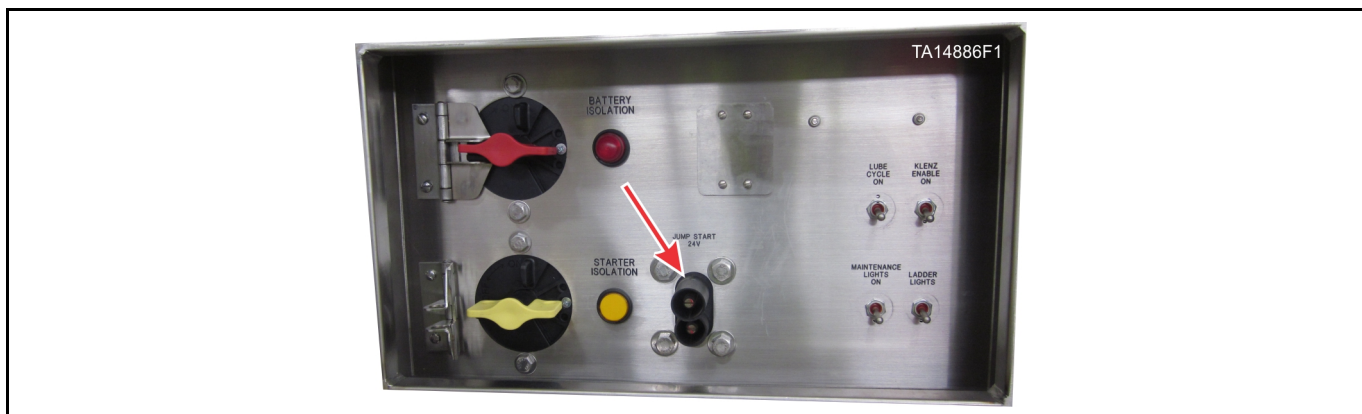
The Maintenance Lights Switch, located inside the Isolation and Control Switches Assembly box, is a two-position maintained toggle switch that controls the 24V DC service maintenance lights mounted on each side of the radiator, mid-engine, near the generator and in the front frame. The Key Switch/Crank Switch on the operator's console does not have to be in the ON position to operate the lights, but the Battery Isolation Switch must be in the ON position.

Figure 42: Maintenance lights (maintenance work lights)



Jump Start Socket

Figure 43: Jump start socket



The battery jump start socket is located inside the Isolation and Control Switches Assembly box. It is possible to damage the electronic controls of the machine and engine if jumper cables are connected improperly or arcing occurs. Therefore, Komatsu recommends that the machine only be jump started or used to jumpstart another vehicle with the optional jumpstart socket.

⚠ WARNING

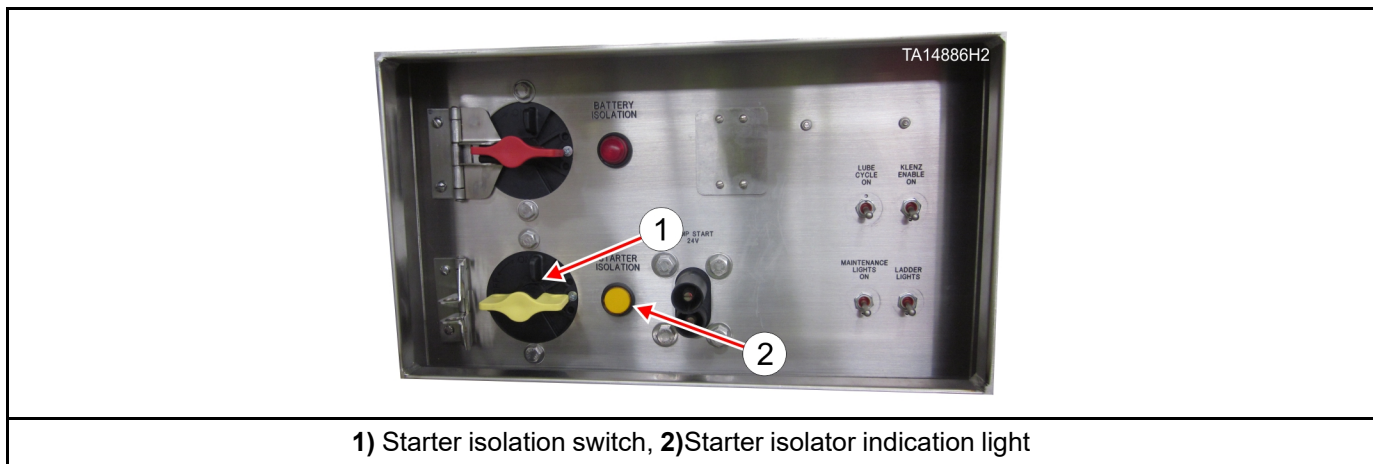
Battery posts, terminals and related accessories contain lead and lead components, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Do not handle lead components without proper personal protective equipment (PPE).

Starter Isolator Indication Light and Starter Isolation Switch

For maintenance where 24 volts is required (for 24 volt circuit testing or for repairs at night) the YELLOW Starter Isolation Switch can be turned to the OFF position. When the YELLOW Starter Isolation Switch is turned OFF, there will be 24 volt power available for all machine functions, except engine cranking. The switch can be locked in the OFF position if desired. When the Starter Isolation Switch is turned to the ON position, the engine cranking function is enabled.

The YELLOW light is illuminated when the engine cranking function is enabled.

Figure 44: Starter isolator indication light and starter isolation switch

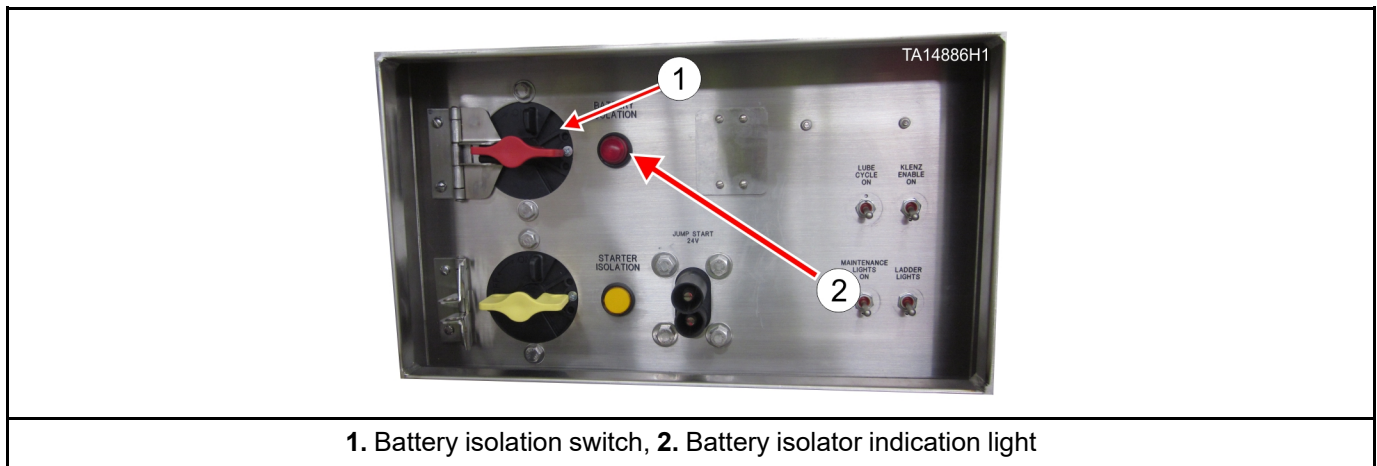


Battery Isolation Switch and Battery Isolator Indication Light

If necessary to leave the machine unattended or if necessary to eliminate all electrical energy sources, turn the RED Battery Isolation Switch to the OFF position. This switch can be locked in the OFF position if desired. When the Battery Isolation Switch is turned to the ON position, the 24V system is enabled.

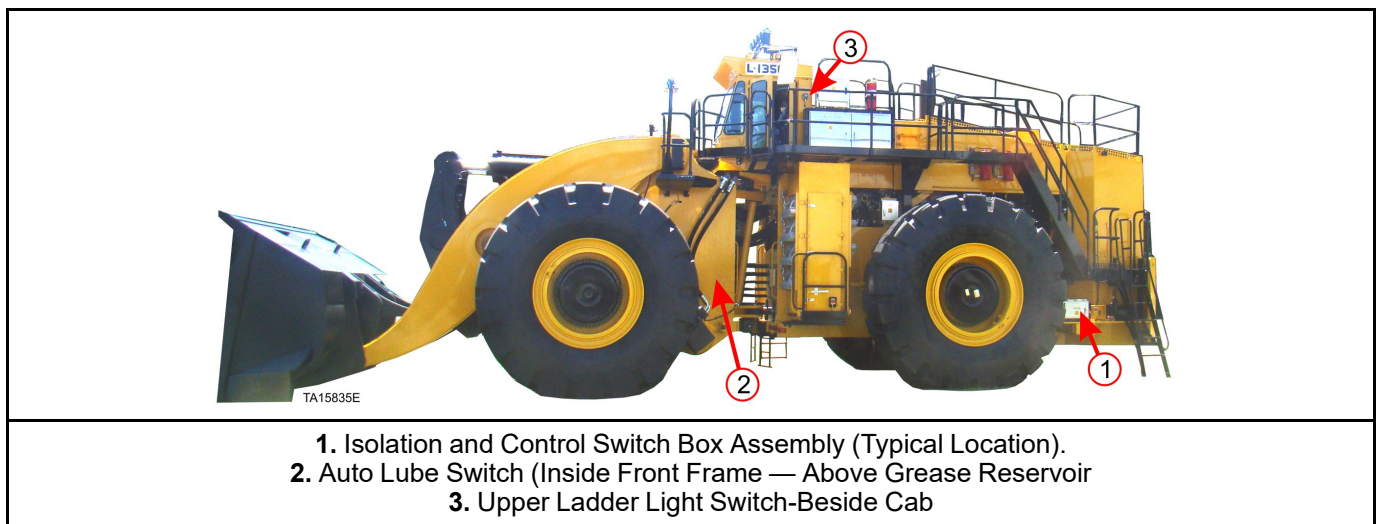
The RED light is illuminated when the Battery Isolation switch is in the ON position, (24V battery power is enabled). The machine engine cannot be started unless the 24V system is enabled.

Figure 45: Battery isolator indication light and battery isolation switch



1. Battery isolation switch, 2. Battery isolator indication light

Figure 46: Service switch locations



1. Isolation and Control Switch Box Assembly (Typical Location).
 2. Auto Lube Switch (Inside Front Frame — Above Grease Reservoir)
 3. Upper Ladder Light Switch-Beside Cab

Central Service System (Optional)

(Refer to illustration “Central Service System (optional)”)

The optional central service system is housed inside a protective box and mounted at the left rear of the machine. The central service system provides quick-coupling connections for refilling the fuel reservoir, engine crankcase, hydraulic reservoir, and engine coolant. Different quick couplers are provided for each component to ensure accuracy in filling.

NOTICE

When using the Central Service system, be sure to relieve pressure in the hydraulic reservoir and in the radiator by opening the manual air release valve provided for each component before attaching a hose to the quick couplings (refer to illustration “Hydraulic reservoir air release valve”). Be sure to allow sufficient time for each reservoir to de-pressurize. The filling process will be slow and the reservoir relief valves will open if pressure is not relieved before filling begins.

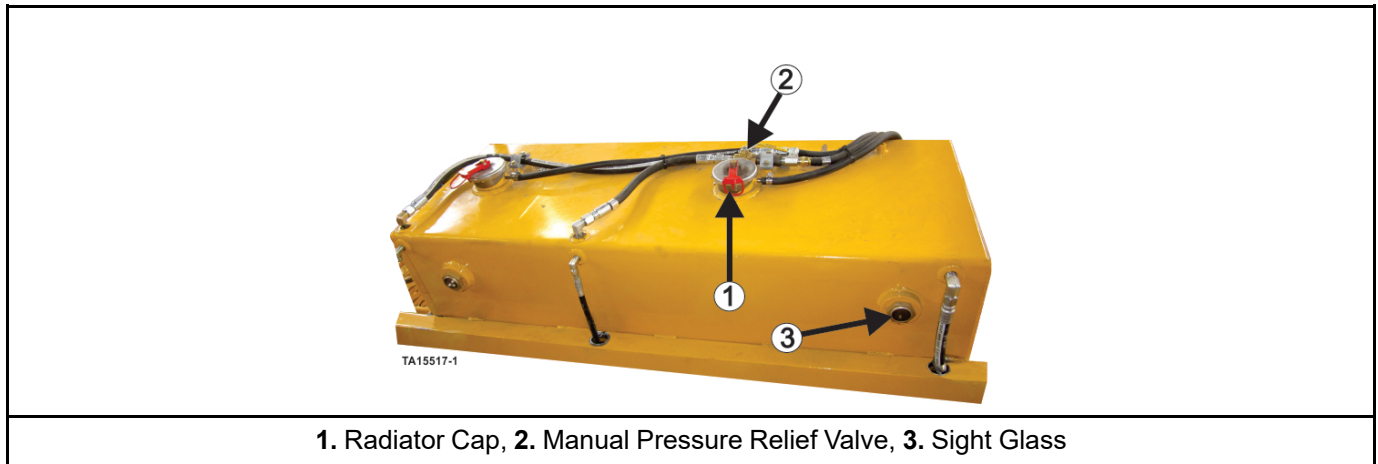
Figure 47: Central service system (optional)



Figure 48: Hydraulic reservoir air release valves

<p>(mounted on top of hydraulic reservoir)</p> <p>1. Reset button</p> <p>2. Manual relief valve (handle in open position, reservoir de-pressurized).</p> <p>3. Automatic air release valve</p>	<p>Right side view of # 2 at left - handle in closed position (reservoir pressurized)</p>

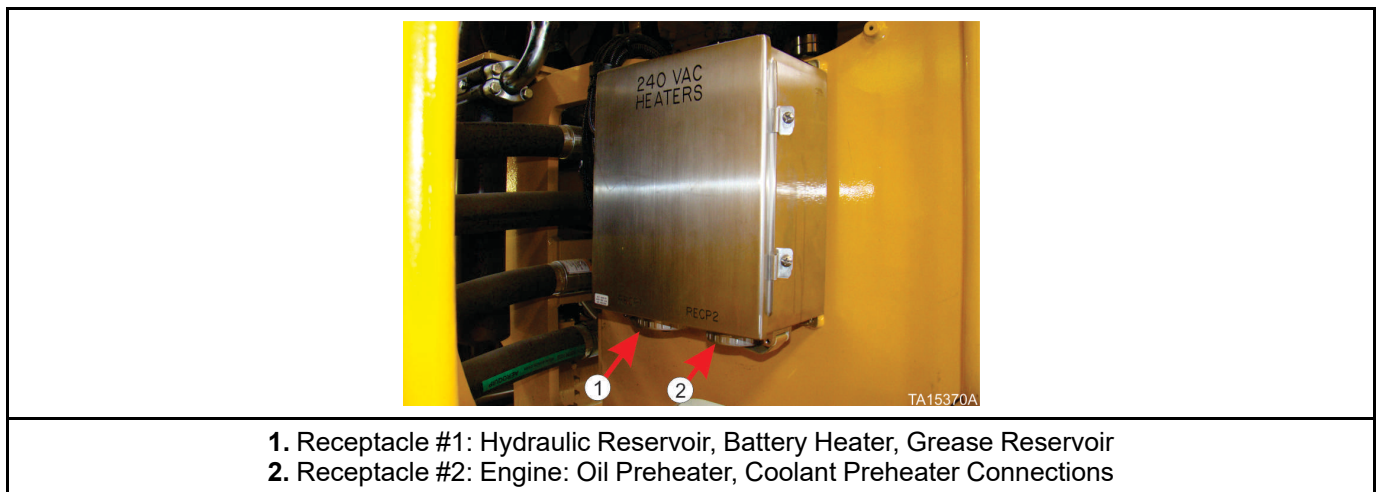
Figure 49: Radiator reservoir cap and manual de-pressurizing valve



Component Heater Connections (Optional)

220-volt receptacles component heater connections, located on the rear frame, inside the pivot area, on the left side of the machine, are optionally provided for connecting the optional hydraulic reservoir, battery, grease reservoir, and engine coolant and oil heaters. Connections are accessible from ground level.

Figure 50: Component heater connections



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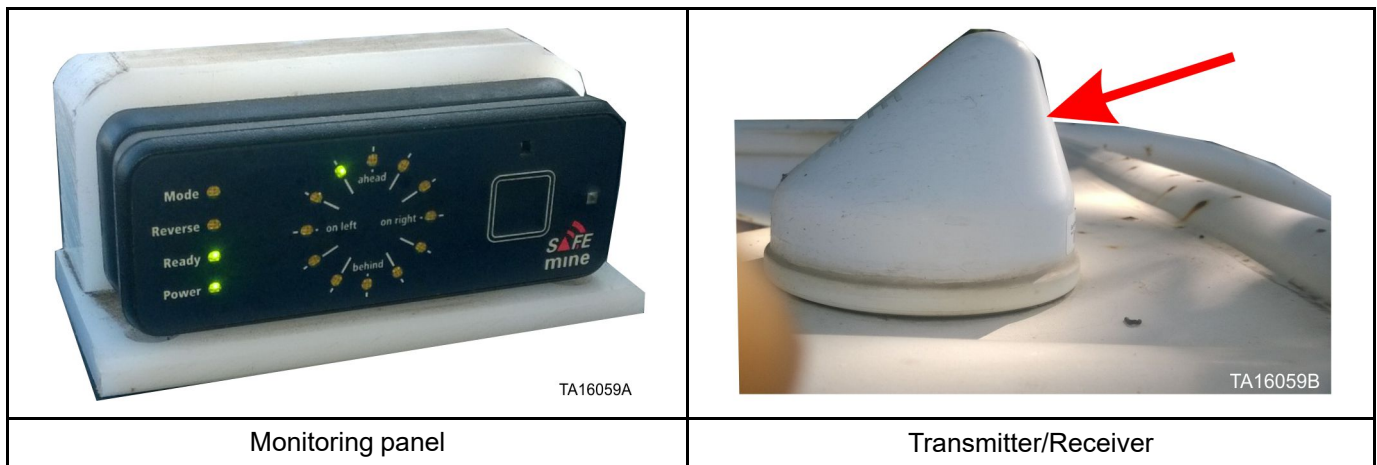
Proximity Detection System

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.

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 51: Typical proximity detection system components



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Machine Mechanical Operating Concerns

The operator should be continually aware of the indicator lights, gauges, audible alarm and monitor screen messages. He/she should also be alert to any unusual noises, vibrations, smoke, fluid leaks or odors that might signal problems with the loader or become a potential fire hazard. Prompt and correct action by the operator in the event of trouble is often required to prevent costly repairs and downtime. It is also essential for the operator to correctly operate the machine to prevent damage to various components. We especially draw your attention to “Overspeed Prevention Recommendations” located within this section.

NOTICE

When operating in cold climates, the oil pressure indications will be higher after starting, during engine warm-up, and when HI throttle is selected. It will take longer for the oil to warm-up and for the oil pressure to reach normal operating temperature.

Computer Monitor

(Refer to “Cab control console”)

The Komatsu on-board control system monitors various functions of the loader for problems and provides diagnostic data for maintenance personnel. Two lights – red and yellow – are provided to alert the operator of problems with engine, electrical, hydraulic, pneumatic, and electronic systems. An audible alarm accompanies the red and yellow lights.

The machine is equipped with either a Detroit Diesel or Cummins engine. The Detroit Diesel or Cummins (as applicable) diagnostic and warning system is integrated into the overall machine alarm and monitoring system functions. The red and yellow lights will activate upon receiving appropriate messages from the engine’s diagnostics.

- The Red Alarm light indicates a serious problem that requires shutdown of the machine. Operation should not be resumed until the problem has been corrected. An engine problem that causes the Red Alarm light to glow will inhibit propel and the machine comes to a complete stop. A message will appear on the touch screen. The machine must be stopped and the engine must be shut down immediately by using the normal engine shutdown procedure (key switch).
- The yellow warning light indicates that a problem may not require immediate shutdown of the engine but **MUST BE INVESTIGATED** and addressed. In the event an engine related problem results in the yellow light glowing, a message will appear on the touch screen. The engine should be operated to transport the machine to the maintenance area for diagnosis of the problem only.
- An audible alarm is activated when the red or yellow lights illuminate.
- When a yellow warning light illuminates, a warning message appears on the touch screen to advise the operator of the nature of the warning which activated the light. The operator can remove the message from the screen and silence the audible alarm by pressing the Acknowledge Switch on the left joystick. The warning message leaves the screen but will remain in the system (in the log file) for access by repair technicians. The light will continue to glow until the warning condition is corrected.
- When a red alarm light illuminates, an alarm message appears on the touch screen to advise the operator of the nature of the alarm which activated the light. The operator can remove the message from the screen and silence the audible alarm by pressing the Acknowledge Switch on the left joystick. However a red alarm causes an engine shutdown timer to activate, if the park brake is set, the engine is immediately shutdown. If the machine is moving, a countdown timer indicates the amount of seconds before the park brake is automatically set and the engine is shutdown. The alarm message is stored in the system for access by repair technicians. The light will continue to glow until either the LINCOS system is rebooted or the red alarm is cleared by a service level technician.

Auxiliary Steering System (Optional)

The auxiliary steering system employs the use of two 24-VDC, 9-horsepower motor-driven pumps with the machine's four batteries as the 24-VDC power source. The optional auxiliary steering system automatically activates if the hydraulic steering system pressure drops below 30 psi during normal machine operation. When the Auxiliary Steering system is activated, the LINC'S II computer system activates the Red Alarm light, an audible alarm sounds, and a Red Alarm message appears on the touch screen. As with all Red Alarms, the machine comes to a stop, propel is inhibited, a Red Alarm light illuminates and the audible alarm sounds. The machine comes to an abrupt stop. Should this occur, SHUT THE ENGINE DOWN as soon as safely possible, by using the normal engine shutdown (key switch) procedure.



WARNING

Crush hazards exist from uncontrolled machine movement if the auxiliary steering system fails. Auxiliary steering is ONLY a backup system. If something occurs in the normal steering system, auxiliary steering should only be used to steer the machine to a stopped position. It should NEVER be used in material handling operations. Loss of steering could cause a crush hazard by uncontrolled machine movement resulting in serious injury or loss of life.

Diesel Engine Operational Concerns

NORMAL ENGINE SHUTDOWN: It is critically important to allow the engine to run at the low throttle setting for five minutes before shutting down the engine. When a turbocharged engine is stopped immediately, the turbochargers continue to turn without an oil supply to the bearings. Allowing the engine to run at low throttle for five minutes also cools the bearings and seals in the turbochargers. If the engine is stopped suddenly, the turbocharger temperature may rise as much as 100°F (38°C) over normal safe operating temperature. The results of the extreme heat may be seized bearings or loose oil seals.

An automatic idle timer is programmed into the LINC'S II Computer System. The engine must run at low throttle for five minutes before the computer system shuts it down (except in certain alarm conditions). When the Key Switch/Crank Switch is turned to the OFF position to stop the engine, the computer system checks the previous low throttle time prior to turning off the key, then adds enough time to the timer to total five minutes before turning off the engine. The LINC'S II Computer System will remain booted up. After a total of five minutes at low throttle, the engine will stop but the LINC'S II Computer System will remain booted up for an additional 15 seconds. If the Key Switch/Crank Switch is turned back to the ON position during this 15-second interval, the LINC'S II Computer System will remain booted up until the Key Switch/Crank is once again turned to the OFF position. It is NOT recommended to stop the engine immediately after it has been run at hi throttle as damage to engine components is possible.

EMERGENCY ENGINE SHUTDOWN: Never use the emergency shutdown system except in an emergency. Using the emergency shutdown system can cause serious damage to the engine components such as the turbochargers. If the emergency shutdown system is activated, a qualified and experienced technician should check the engine before the machine is returned to service.

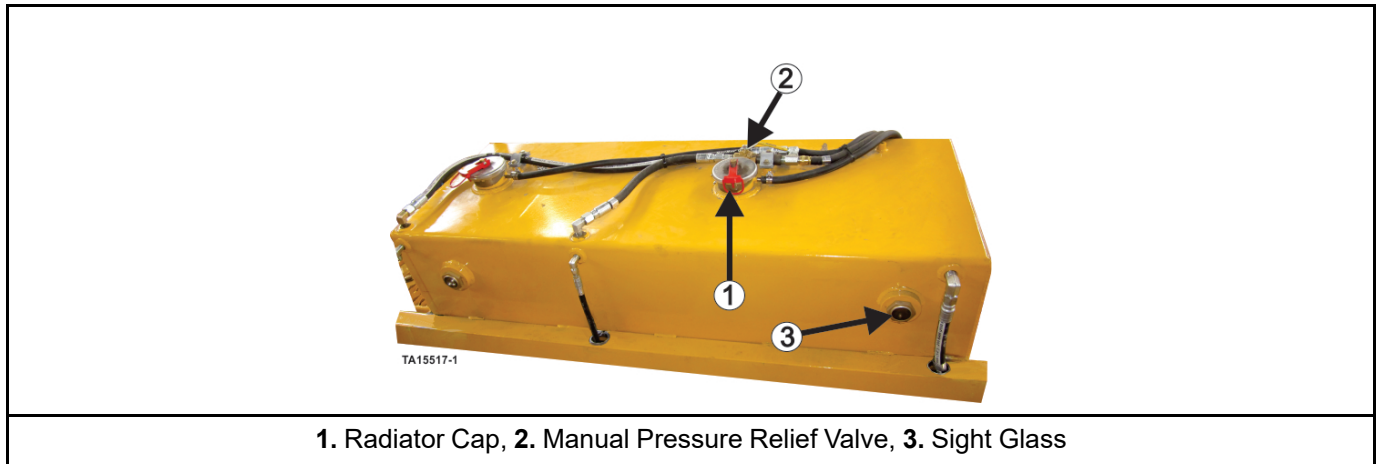


CAUTION



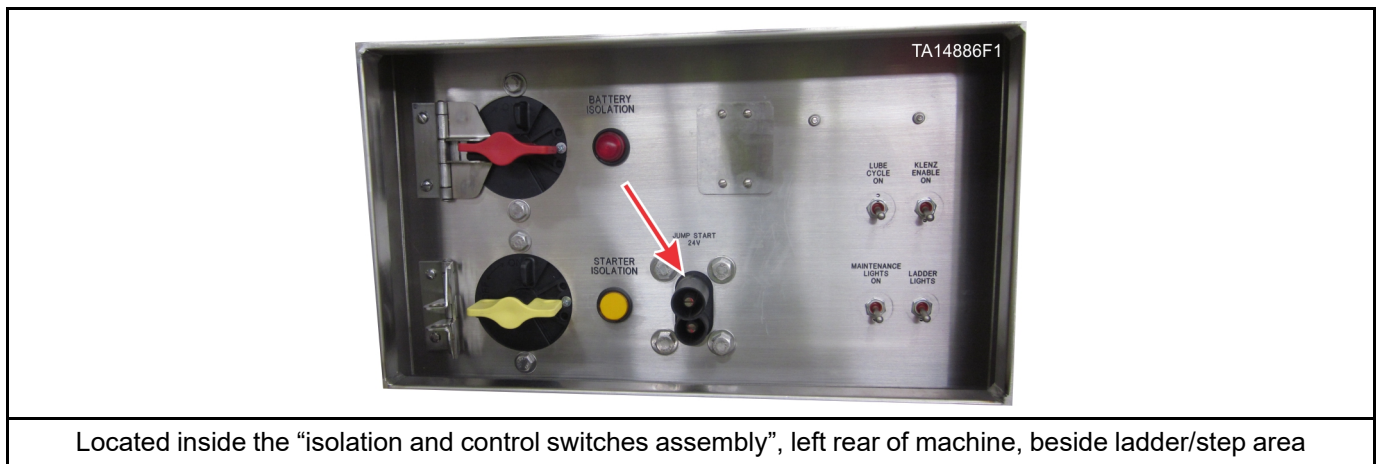
Burn hazard exists from hot fluids or steam when removing the radiator cap if it is not allowed to cool down before opening. Allow the engine cooling system to cool before removing the radiator cap. Do not remove radiator cap while pressure remains in the system. Hot fluids escaping can cause serious burns.

Figure 52: Radiator cap



EMERGENCY JUMP STARTING: It is possible to damage the solid-state electronic controls of the machine and engine if jumper cables are connected improperly or arcing occurs. The possibility of serious personal injury is also possible. Therefore, Komatsu recommends that the machine is only jump started with the jumpstart connections.

Figure 53: Jump start socket



AVOID UNNECESSARY ENGINE IDLING: During long engine idling periods, the engine coolant temperature will fall below the normal operating range. The incomplete combustion of fuel in a cold engine, causes crankcase dilution, formation of lacquer or gummy deposits on the valves, pistons, and rings, and causes rapid accumulation of sludge in the engine.

ENGINE PROBLEMS - EARLY WARNING SIGNS: Most engine problems give an early warning. Look and listen for changes in performance, sound or engine appearance that can indicate service or engine repair is needed. Some changes to look for are as follows:

- Engine misfires
- Unusual engine noises
- Excessive vibration
- Excessive smoke

- Fuel, oil or coolant leaks
- Sudden changes in engine operating temperature or pressure
- Loss of power
- An increase in the rate of fuel consumption
- An increase in the rate of oil consumption

CAUTION

Damage to the engine electronic control system is possible when welding on the machine. To prevent damage to the engine electronic control system, disconnect the following BEFORE welding: battery power and ground cables and the power connector at the engine Electronic Control Module (ECM). Failure to isolate the engine electronic control system from high current (possible occurrence as a result of welding) can result in severe ECM damage.

Hydraulic System Monitoring and Operational Concerns

If a warning light and its accompanying text message indicate a problem with the hydraulic system, perform the following procedure:



WARNING

Crush hazards exist when using the Manual Bleed Valve Assembly to relieve pressure from the hoist and bucket circuits if personnel are in the area of the bucket or lift arms. Always depressurize the hydraulic hoist and bucket circuit when working on the hoist and bucket hydraulic circuit. Operating the manual bleed valve may cause the lift arms and bucket to descend rapidly. All personnel shall stand clear of the lift arms and bucket areas before the Manual Bleed Valve Assembly is used to relieve hoist and bucket circuit pressure. Before performing any procedure on any hydraulic component within the hoist and bucket circuit, the valves shall be used to relieve residual system pressure from the hoist and bucket circuits. The Hoist and Bucket Hydraulic Circuit Manual Bleed Valve Assembly shall not be operated when the engine is running. Failure to clear the bucket and lift arm areas of personnel prior to operating the valve assembly can cause a crush hazard resulting in serious injury or death.

- Stop the machine.
- Lower the bucket to the ground.
- Select low throttle.
- Set the park brakes.
- Turn the Key Switch/Crank Switch to the OFF position.
- Press and hold the Acknowledge Switch for 2 seconds to bypass the idle timer.

NOTICE

Normal shutdown procedures require that the engine be run in LO throttle for five minutes or more. But in the case of an emergency, turn the Key Switch/Crank Switch to the OFF position immediately. Running the engine for five minutes helps prevent cavitation in the hydraulic pumps.

- Get out of the machine and check the hydraulic reservoir sight gauge.

- If the hydraulic oil sight gauge shows that the quantity of hydraulic oil is at a safe level, call for a maintenance check on the hydraulic oil cooling system.
- If the hydraulic level is low and the reservoir must be filled, observe the following warning.



CAUTION

Burns and struck-by hazards are present if pressure is not relieved before removing the hydraulic fluid reservoir filler cap. Hot oil could be present and could be unexpectedly expelled from the system when opening the reservoir filler cap if the reservoir is not depressurized. Burns from hot oil is possible. Air pressure in the reservoir could cause uncontrolled movement of the cap if it is removed without depressurizing the reservoir. Always release air pressure in the hydraulic reservoir before servicing or repairing anything requiring removal of the reservoir filler cap. Release of the reservoir air pressure is done by turning the manual air release valve to the OPEN position. The air pressure in the reservoir will be released, and at the same time, the valve will lock in the air pressure in the rest of the system. After servicing, repairing or inspecting the hydraulic oil reservoir, make certain to turn the manual air release valve (refer to “Hydraulic reservoir air release valves”) to the CLOSED position to pressurize the reservoir. Failure to release the air pressure from the hydraulic reservoir before removing the filler cap could cause burns or struck-by hazards resulting in injury.

NOTICE

Whenever there is a hydraulic leak (such as a leaking O-ring or hose) release the air pressure from the hydraulic reservoir to prevent further loss of hydraulic fluid.

NOTICE

When the emergency stop or fire suppression systems are actuated, the automatic air release valve (refer to “Hydraulic reservoir air release valves”), 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.

Grade Stability



WARNING

Crush hazards exist if exceeding the parameters shown in figure “Allowable Grade Parameters”. This could result in machine rollover/tip-over. Do not exceed the parameters shown in “Allowable Grade Parameters” shown below. Machine rollover/tip-over can cause crush hazards which could result in equipment damage, serious injury or death.

Komatsu equipment is designed to operate safely when all operating parameters are maintained. DO NOT exceed the following Allowable % Grade parameters when operating the machine.

Empty Bucket in Carry Position

Machine Position	Travel Speed Limit	Allowable % Grade
Fully Articulated / Slope Side to Side	Creep (less than 1 mph)	10%

No Articulation / Slope Side to Side	2.5 mph	14%
No Articulation / Fore and Aft	2.5 mph	20%

Empty Bucket in Raised Position

Table 1: Allowable grade parameters

Machine Position	Travel Speed Limit	Allowable % Grade
Fully Articulated / Slope Side to Side	Creep (less than 1 mph)	10%
No Articulation / Slope Side to Side	2.5 mph	10%
No Articulation / Fore and Aft	2.5 mph	20%

Overspeed Prevention Grade/Speed Chart Examples

1. Observe actual grade conditions as compared to the grade/speed chart for both loaded and unloaded conditions. The grade/speed chart is located inside the cab (refer to “Typical grade/speed chart”).
2. Reduce speed PRIOR to descending a grade.
3. As a general rule: descend a grade no faster than what the machine will ascend the same grade with the same load.
4. Promptly apply service brakes to slow the machine if an overspeed situation occurs.



WARNING

Multiple hazards exist if operating the machine on less than four wheel motors, or with any of the converter panels disabled. Operation of the machine on less than four wheel motors, or with any of the converter panels disabled, will result in a reduction in electric (dynamic) braking and could possibly lead to an overspeed on grades and/or longer stopping distances when using dynamic braking. Failure to properly employ the service brake under these conditions could lead to the loss of machine control which poses an impact hazard to nearby personnel that may result in death or serious personal injury, as well as substantial equipment damage.



WARNING

Multiple hazards exist if operating the machine with less than four service brakes. The machine should only be operated with less than four service brakes in order to move the machine away from a dangerous situation. Do not tram the machine or operate the machine in production with less than four service brakes. The service brakes must be maintained and working properly (e.g., disks in spec, pads in spec, gaps in spec, pressures in spec, no leaks, etc.). Failure to properly inspect and maintain all four service brakes may compromise braking capability leading to the loss of machine control which poses an impact hazard to nearby personnel that may result in death or serious personal injury, as well as substantial equipment damage.

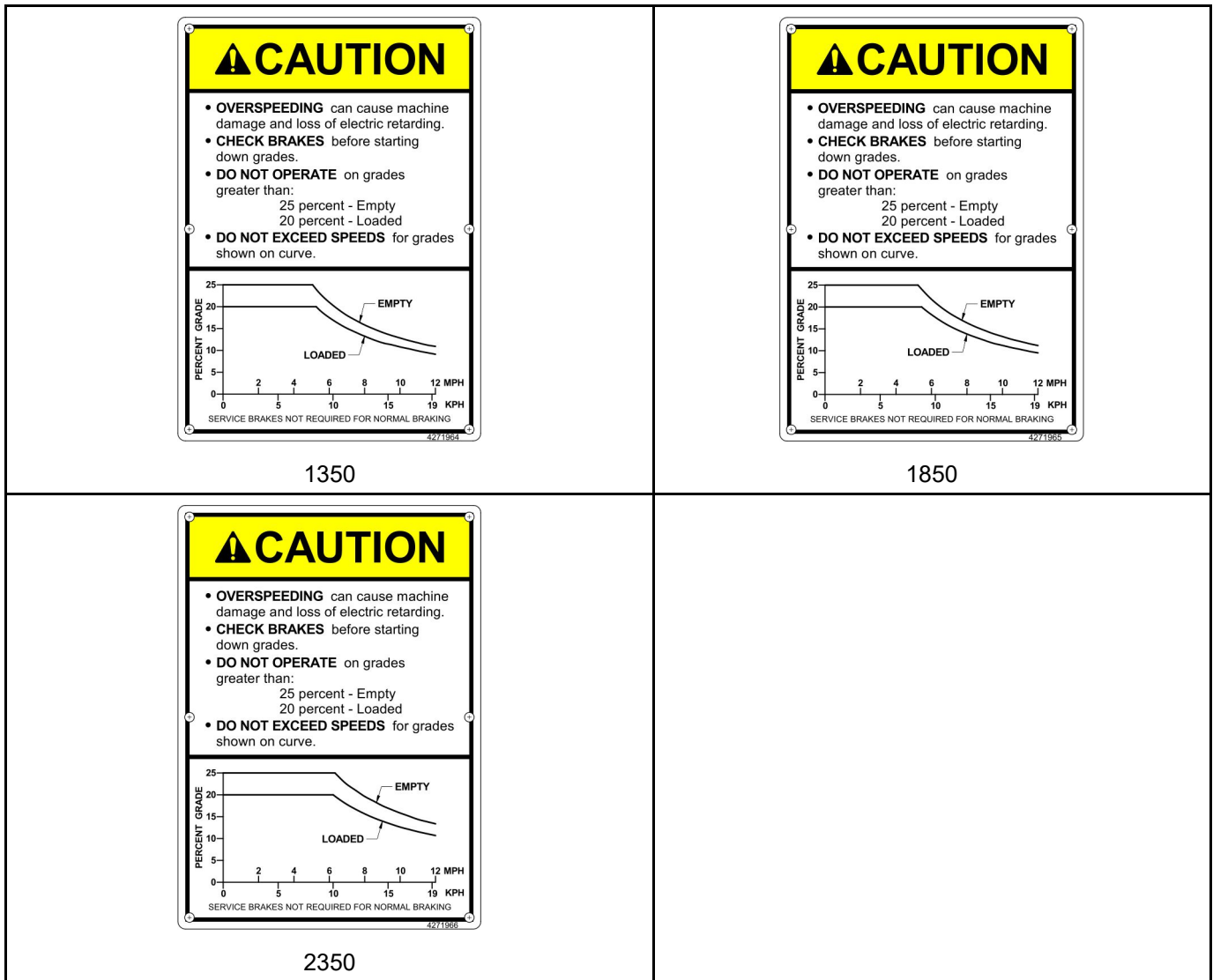
⚠ WARNING

Multiple hazards exist if failing to appropriately reduce the machine’s speed while descending a grade with disabled converter panels and/or disabled motor. Failure to appropriately reduce the machine’s speed while descending a grade with disabled converter panels and/or disabled motors can create the risk of a machine runaway leading to the loss of machine control which poses an impact hazard to nearby personnel that may result in death or serious personal injury, as well as substantial equipment damage.

NOTICE

Due to variations in drive components, example grade/speed charts are shown below. Refer to the grade/speed chart mounted in the operator’s cab for specific information.

Figure 54: Typical grade/speed chart



Walk-Around Inspection

It is essential for the operator to perform a walk-around inspection of the machine daily or pre-shift before operating the machine in material handling operations. Anyone performing inspections or service to the machine should read and understand the instructions in this Service Manual and the engine manufacturer’s owner’s manual (available on engine manufacturer's website) before attempting to inspect or service the machine.

⚠ WARNING

Electrical shock and crush hazards from uncontrolled machine movement exist if the appropriate safety procedures have not been followed and all electrical connections are not de-energized to prevent electrical shock or uncontrolled movement of the machine. Always follow all local required safety procedures and procedures in this manual before working on or starting the machine. Failure to follow procedures can cause electrical shock or uncontrolled machine movement resulting in serious injury or death.

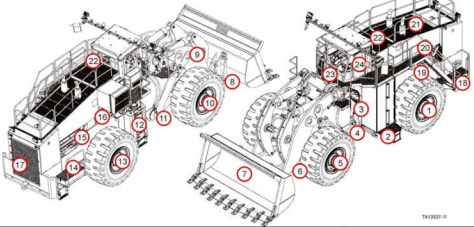
Guidelines for performing the walk-around inspection are provided in the Section 02. The OPERATOR’S DAILY OR PRE-SHIFT WALK-AROUND portion of the schedules should be used in the inspection of the machine. An example check list is shown below. All scheduled lubrication and cleaning should be incorporated into the walk-around inspection.

NOTICE

Service personnel should pay special attention to SAFETY IN MAINTENANCE OPERATIONS, located in Section 02 and “Service Switches”, located in this section. All instructions provided in these articles should be followed, as applicable.

Figure 55: Example walkaround checklist

TA15478



TA15478-01

Chart Position	ITEM TO CHECK/INSPECT	NOTES
1	Left rear planetary drive and wheel/tire: Loose bolts cover leaks tire damage wheel damage cooling duct.	
2	Platform and converter cabinet: Dirt debris secure.	
3	Left pivot area: steering cylinders remote air system drain valves stop pad component heater connections Inside rear frame: Leaks <u>gearbox oil level</u> mounts secure loose bolts. Inside front frame: Leaks hoses cooling ducts wiring. Under front frame and rear frame: Leaks	
4	Left hoist cylinder: Ball caps grease lines fresh grease leaks	
5	Left front planetary drive and wheel/tire: Loose bolts cover leaks tire damage wheel damage	
6	Lift arms (lower): Visible cracks grease lines fresh grease Left side, bellcrank, area and rear of bucket: Bucket pins intact stop pads Bellcrank pivot bolts grease lines fresh grease	
7	Bucket: Visible cracks damage teeth lip coverage system parts.	
8	Right side, bellcrank area, and rear of bucket: Bucket pins intact stop pads Bellcrank pivot bolts grease lines fresh grease. Front Axle: Access covers vents	
8/9	Lift arms (lower): Grease lines fresh grease visible cracks.	
10	Right front planetary drive and wheel/tire: Loose bolts cover leaks tire damage wheel damage	
11	Right hoist cylinder: Ball caps grease lines fresh grease leaks steering positioned.	
12	Hydraulic reservoir: ladder <u>fluid level</u> relief cap valves	
13	Right rear planetary drive and wheel/tire: Loose bolts cover leaks tire damage wheel damage	
14	Right rear of machine: Battery box aux oil cooler.	
15/16	Engine compartment (right side): Coolant leaks hoses radiator drive belts leaks wiring fan grill hood grating guards <u>engine oil level</u> cooling air duct mufflers fire suppression system bottles nozzles hoses fire hazards engine air intake tubes hump hoses brackets air compressor air dryer.	
17	Rear of machine: Radiator and hydraulic oil cooler core braking grids lights backup alarm.	
18	Left rear of machine: Fuel reservoir cap central service system cover leaks	
19	Rear ladder/stairway: ladder steps clean/secure <u>radiator coolant level</u>	
20	Engine compartment (left side): coolant leaks hoses radiator drive belts fuel leaks engine oil leaks <u>engine oil level</u> wiring fan grill hood grating guards fire suppression system bottles nozzles hoses fire hazards engine air intake tubes supports brackets hoses hump hoses air filter restriction gauges	
21	Top of tow unit: Exhaust pipes clamps grating handrails.	
22/23	Front and rear cab area/top of rear frame: ladders guardrails catwalks lights bucket position transducer hoist position transducer AC cover windows wiper blades window washer reservoir mirrors.	
23	Lift arms (upper): Grease lines fresh grease stop pads visual cracks	
24	Cab interior: Door latch hinges weather stripping interior lights windshield wipers exterior lighting mirrors adjusted seat belt instructional labels air leaks	
24	Operational tests: Unsecured items engine starts LUNCS display screen alarms/warnings environmental controls speed control pedal (footpad) dynamic/park/service brakes over travel sluggish unusual noises direction select switch backup alarm left/right steering hoist and bucket joysticks	

Braking

There are three systems used to slow down or stop the machine: Dynamic, Service, and Park. Dynamic braking is the primary system for slowing down or stopping the machine.

Dynamic Brake

The service brakes and park brakes are back up systems for the dynamic braking system, which is the machine's primary braking system. Dynamic braking utilizes electrical and mechanical systems to achieve slowing down or stopping the machine.

NOTICE

Refer to "Operating the Machine (Non-Material Handling Operations)" for procedure to test the Dynamic Brake function.

Service Brake

Depressing the Service brake pedal activates the air-release service brakes. The primary function of the service brakes is to hold the machine while on grades or when in close proximity to material hauling vehicles or for emergency stops. The service brakes are NOT intended to routinely stop the machine during material handling operations. Use of the service brakes to routinely stop the machine during material handling operations will result in rapid wear of the disc pads and rotors.

NOTICE

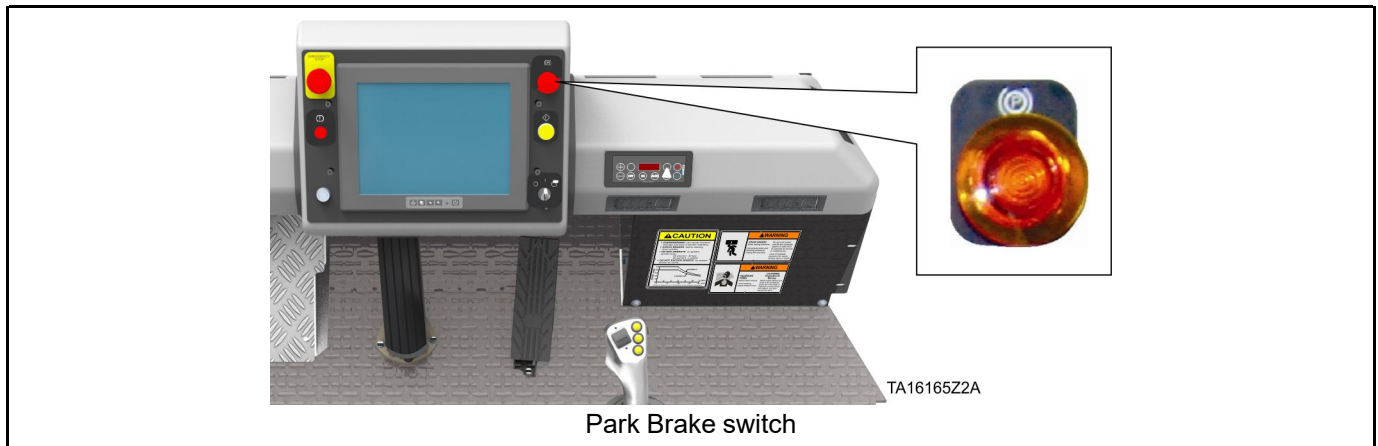
It is natural for operators to equate stopping the machine with stopping a highway vehicle, which requires depressing the brake pedal to stop. Therefore, it is essential to train operators in the function and capability of the machine's dynamic braking system to avoid accelerated wear of the disc pads and rotors.

NOTICE

Refer to "Operating the Machine (Non-Material Handling Operations)" for procedure to test the Service Brake.

Park Brake

The function of the park brake is to hold the machine while parked. The park brake is applied with the console-mounted switch. When the park brake or service brake is set, propel is inhibited.



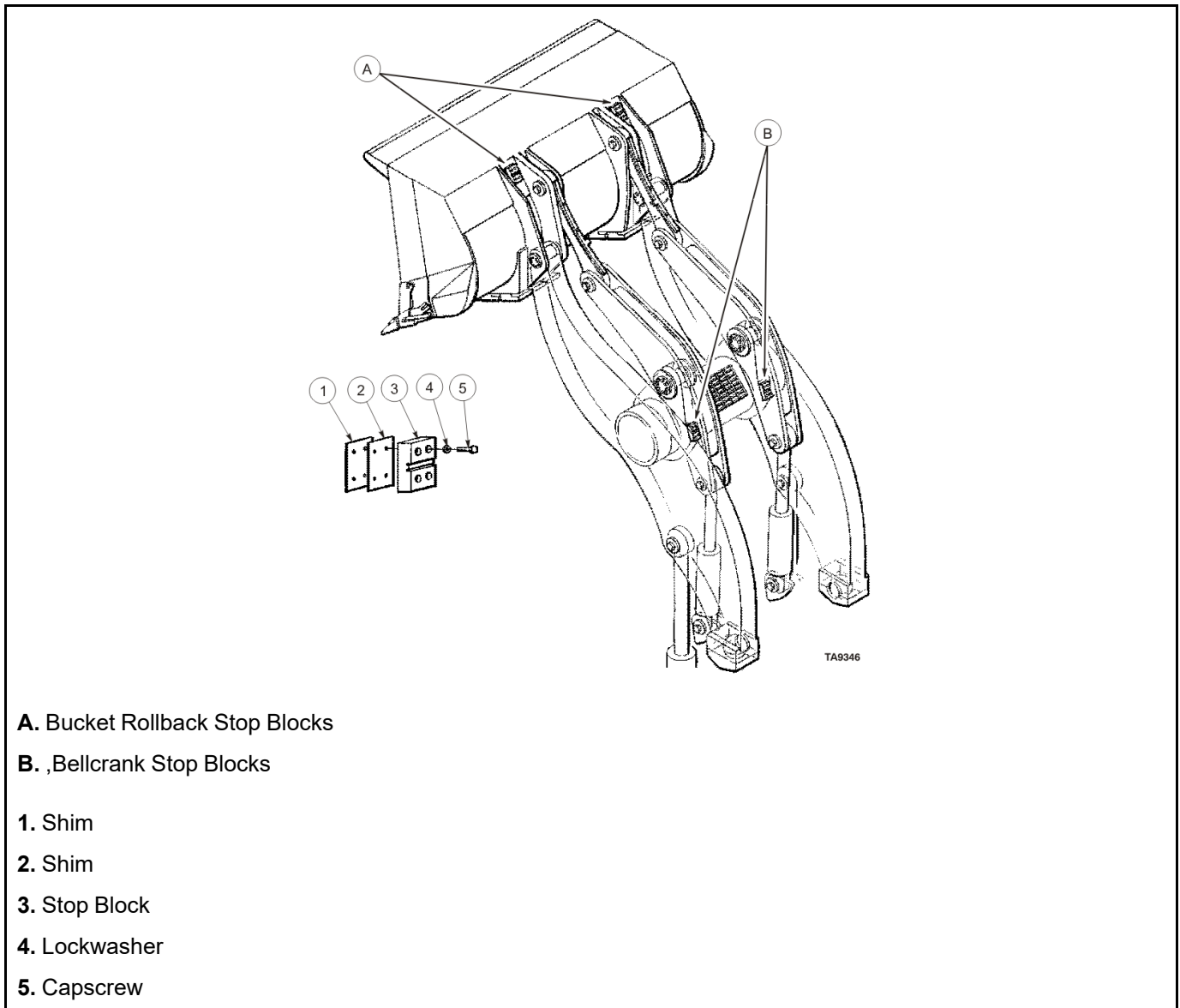
NOTICE

Refer to "Operating the Machine (Non-Material Handling Operations)" for procedure to test the Park Brake.

Bucket Rollback Stop Blocks and Bell Crank Stop Blocks

It is essential that the operator visually inspect the bucket rollback stop blocks and bell crank stop blocks as part of the daily walk-around inspection. If the stop blocks are damaged, missing or excessively worn, they must be replaced immediately or damage to the lift arms and other components could occur (refer to "Bucket rollback and bell crank stop block inspection" and bucket rollback and bell crank stop block replacement procedures, located in Section 3, MECHANICAL, STRUCTURAL, of the Service Manual).

Figure 56: Bucket rollback and bell crank stop block inspection



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Basic Machine Operating Instructions Non-Material Handling Operations

The following instructions are for the basic operations of the controls and engine start up and shut down (non-material handling operation). It is ESSENTIAL for operators of the loader to read and understand all instructions contained in this Service Manual pertaining to machine operation and safety before operating the loader. We especially draw the reader's attention to the information contained in Section 1. The engine manufacturer's owner's manual(s) (available on the manufacturer's website) should also be reviewed for any special instructions pertaining to operation and maintenance of the engine. These instructions cover various options that may or may not be found on your machine.

If there are ANY questions after reading the instructions contained in this Service Manual and the engine manufacturer's owner manual, call a Komatsu Service Center or the engine manufacturer's local authorized service center to have the problems resolved BEFORE operating the machine.



WARNING

Crush hazards exist if uncontrolled machine movement occurs. Before starting the engine, ensure the machine is in a place that is safe for operations. The machine should be on a level area, and all personnel and equipment must be clear of the area. After the starting procedures and observations have been made, and it is determined the loader is safe to operate, it can be moved. Starting the machine in an area that is not safe to operate could cause a crush hazard resulting in serious injury or death.



WARNING

Crush hazard exists if non-essential personnel are not alerted to stay clear of machine during operational/energized inspections. Crush and electrical hazards exist during operational maintenance procedures. Failure to alert personnel of machine movement can cause crush hazards which result in serious injury or death.

NOTICE

Use of the machine in material handling operations is covered within this section entitled "Basic Machine Operating Instructions Material Handling Operations".

- *ANYONE performing inspections or service procedures to the machine should be familiar with ALL appropriate instructions and procedures.*

Pre-Starting Procedures

Perform the following procedures before starting the engine (refer to "Cab control console"):

CAUTION

Equipment damage is possible if the machine is moved after starting the engine. BE SURE the frame lock has been removed and secured before starting the engine. Moving the machine with the frame lock in the locked position could cause serious machine damage.

- Step 1:** Adjust the operator's seat to a comfortable position to safely operate the controls. Make sure that the seat is adjusted so that your right foot reaches the speed control pedal, whereby you can FULLY RELEASE the pedal as well as press the pedal down.
- Step 2:** Fasten and adjust the seat belt.
- Step 3:** Place the directional switch in the neutral (center) position. The switch must be in the neutral position to start the engine.
- Step 4:** Check that the park brake is in the park (PRESSED IN) position.
- Step 5:** Place the Throttle Switch in the LOW position.
- Step 6:** Turn the Key Switch/Crank Switch to the ON position. If no faults are present which would inhibit the start function, the engine is ready to be started. If a problem exists which will inhibit the start function, a message indicating the nature of the problem appears on the screen (if it is booted up).
- Step 7:** Ensure the Battery Isolation and Starter Isolation switches are in the "ON" position. The switches cannot be locked in the "ON" position, they CAN be locked in the "OFF" position. In the "ON" position the red and yellow indicator lights will be illuminated, indicating the machine engine can be started.

Starting the Engine

After the above measures are taken, the engine is ready to start.



WARNING

Entanglement in the drive shaft or engine belts, burns if working on the engine exhaust or around hydraulic fluid or engine fluid, cuts/dismemberment if working on the radiator fan, electrical shock if working on the electrical system, skin injection from hydraulic fluid if working on high pressure side of hydraulic system, hearing loss from sonic sounds if working inside KLENZ system and other hazards exist. ALWAYS sound the horn for 2-3 seconds prior to starting the engine to alert personnel on the machine or in close proximity to it that the engine is about to start. Allow at least 30 seconds for them to clear the area before starting the engine. Check wing mirrors and all sides of machine from a seated position. If the horn is inoperable (see the following NOTICE), and if allowed by local rules and regulations, dismount the machine, and walk around it to be sure no one is on the machine or in close proximity to it before starting the engine. Always follow all local startup procedures before starting the machine. Failure to allow ample time for personnel to leave the area before starting the engine could cause entanglement, burns, cuts/dismemberment, electrical shock, hearing loss, skin injection, and other hazards resulting in serious injury or death.



WARNING

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.

NOTICE

Compressed air system pressure powers the pneumatic horn and releases the park brake. Air pressure may, on occasion, bleed off after the loader has been parked for a set amount of time. This will result in the horn being inoperable until the engine is started, which provides compressed air system pressure. If blowing the horn is required by local rules and regulations, before starting the machine, the air system can be manually charged by an external source.

Diesel Engine Exhaust



WARNING

Inhalation hazard exists when working around engine exhaust. Always have adequate 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.

Starting Detroit Diesel Equipped Machines

Turn the Key Switch/Crank Switch firmly to the START position. If the engine fails to start within 20 seconds, release the Key Switch/Crank Switch and allow the starting motor to cool at least two minutes before trying to start again. If the engine fails to start after four attempts, an inspection should be made to determine the cause. Refer to the **CAUTION** below.

Starting Cummins Engine-Equipped Machines

CAUTION

Starter damage is possible. To prevent serious damage to the starter, if the engine does not start, DO NOT turn the Key Switch/Crank Switch to the START position again while the starter motor is still running.

Observe the oil pressure gauge immediately after starting the engine. If there is no oil pressure indicated within 10 to 15 seconds, stop the engine and check the lubricating system.

NOTICE

Cummins engines utilize a pre-lube system, which builds up the engine oil pressure prior to starting the engine. The Key Switch/Crank Switch must be held in the START position while the pre-lube system is in operation. Cummins engines WILL NOT start immediately when the Key Switch/Crank Switch is turned to the START position.

Turn the Key Switch/Crank Switch firmly to the START position. This will energize a pre-lube motor. When the oil pressure reaches 4 psi, the pre-lube motor turns off and the normal start circuit will function.

If the engine fails to start within 20 seconds, release the Key Switch/Crank Switch and allow the starting motor to cool at least two minutes before trying to start again. If the engine fails to start after four attempts, an inspection should be made to determine the cause.

After Starting the Engine

Step 1: Run the engine at the low throttle position with no load for approximately five minutes, allowing it to warm up before applying a load.

NOTICE

During cold weather starts, the engine should be warmed up at least 10 minutes or until the engine temperature gauge indicates at least +120°F (49°C). Normal operating engine coolant temperature is +160°F to +190°F (71°C to 88°C).

Step 2: Check all instruments and indicator lights. For operation of the motor and machine, the following must be true:

- Alarm/Warning lights should be off.
- The water temperature gauge should read at least +120°F (49°C).
- The oil pressure gauge should read at least 15 psi.
- The air pressure gauge should read at least 110 psi.

Step 3: Select hi throttle and recheck instruments and indicator lights.

NOTICE

During cold weather it may take more than 30 minutes operation for the hydraulic oil to reach its normal operating temperature of 140°F to 160°F (60°C to 71°C).



WARNING

Crush hazards exist in machine pivot area and area between the front and rear tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.

Step 4: Select hi throttle and recheck instruments and indicator lights.

Operating the Machine (Non-Material Handling Operations)

After the starting procedures and observations above have been made, and it is determined the loader is safe to operate, it can be moved.

Test the Hoist and Bucket Functions



WARNING

Crush hazards exist if uncontrolled machine movement occurs. Do not test the functionality of the hoist/bucket, steering, or brakes, unless the machine is in a place that is safe for operations. The machine should be on a level area, and all personnel and equipment must be clear of the area. After the starting procedures and observations have been made, and it is determined the loader is safe to operate, it can be moved. Crush hazard is possible from uncontrolled machine movement and could result in serious injury or death.

NOTICE

The following instructions cover the basics of only moving and shutting down the machine. Use of the machine in material handling operations is covered in detail in “Basic Machine Operating Instructions Material Handling Operations”, located within this section.

Step 1: Pull the hoist control joystick back to raise the bucket off the ground.

Step 2: When the bucket rises to about three (3) feet high, return the hoist control joystick back to the center position to stop movement of the lift arms.

Step 3: Use the bucket control switch (roller switch) on the hoist joystick or move the hoist joystick to the left to roll back the bucket. Release the bucket control switch (roller switch) or move the joystick back to center when the bucket reaches the full rollback position.

NOTICE

It is recommended that the bucket be three to four feet off the ground and rolled back when the machine is traveling. Bucket angle can be verified by checking the bucket angle gauge on the screen, (refer to illustration "Cab control console").

Test the Steering Function

Step 1: Release the park brakes by pulling the parking brake control **OUT**.

NOTICE

The park brakes cannot be released until compressed air system pressure has reached about 110 psi on the air pressure gauge.

Step 2: Move the directional control switch to the desired position.

Step 3: SLOWLY press the speed control pedal and steer the loader slightly left and right to make sure the steering system is operating normally.

NOTICE

The speed of the machine is proportional to the amount the speed control pedal is depressed.

Test the Dynamic Brake Function

Step 1: Immediately after traveling 10 to 15 feet, release the speed control pedal to determine that dynamic braking is occurring. The machine should come to a complete stop on level ground.

Test the Park Brake

The machine will be running and moved during this test. All personnel other than the operator must be removed from the area during this test.

NOTICE

This test procedure is used for machines using LINCS II™ 3.16 or higher.



WARNING

Crush hazards exist if uncontrolled machine movement occurs. Before starting the engine, ensure the machine is in a place that is safe for operations. The machine should be on a level area, and all personnel and equipment must be clear of the area. After the starting procedures and observations have been made, and it is determined the loader is safe to operate, it can be moved. Starting the machine in an area that is not safe to operate could cause a crush hazard resulting in serious injury or death.

	<div style="background-color: #0056b3; color: white; text-align: center; padding: 5px; font-weight: bold; font-size: 1.2em;">NOTICE</div> <p>Two buttons on the overhead keypad are used during this procedure.</p> <p>3. Drive Enable Switch</p> <p>5. Throttle Switch</p>
--	---

Step 1: Ensure the Park Brake switch is engaged. (light is illuminated)

<p style="text-align: center;">Park Brake switch</p>	<p>The park brake switch is a push-pull type switch that has a built-in light that illuminates continuously when the brakes are set (also see NOTICE below). The park brakes are spring/air operated.</p> <p>Pushing the park brake switch IN sets the park brakes by releasing air pressure from the brake actuator, and also inhibits propel.</p> <p>Pulling the park brake switch OUT releases the park brakes by increasing air pressure to the brake actuator, and also enables propel.</p>
--	--

Step 2: Start the machine using local startup rules, regulations, and procedures.

Step 3: Place the machine in high throttle.



(Located on “Overhead keypad”)

The Throttle Switch is a four-position momentary pushbutton switch.

- The Engine Speed Switch has three LED lights at the top of the switch.
- If the machine is equipped with a Cummins engine, when the engine is started the left LED will flash until the operating temperature has reached a point where the Cummins electronic control module will allow control of all engine functions by the LINC S II computer system. It will then stay on without flashing.
- If the machine is equipped with a Detroit Diesel engine the left LED will flash until the LINC S II computer system is in control of the engine functions and it will then stay on without flashing.
- When the LINC S II computer system gains control, the engine will run at LO speed position (800 RPM).
- When the switch is pressed one time the engine will go to HI speed. The left and right LEDs will illuminate without flashing. The center LED will go out.
- When the switch is pressed a second time the engine will go to L2 speed (1100 RPM) and both the center and left LEDs will illuminate without flashing.
- When the switch is pressed a fourth time the engine returns to LO speed (800 RPM) and only the left LED will illuminate.
- Operate the loader only in HI speed when performing material handling operations.

NOTICE

Drive system should be enabled (four lights indicated on the lighting bolt button on the key pad)

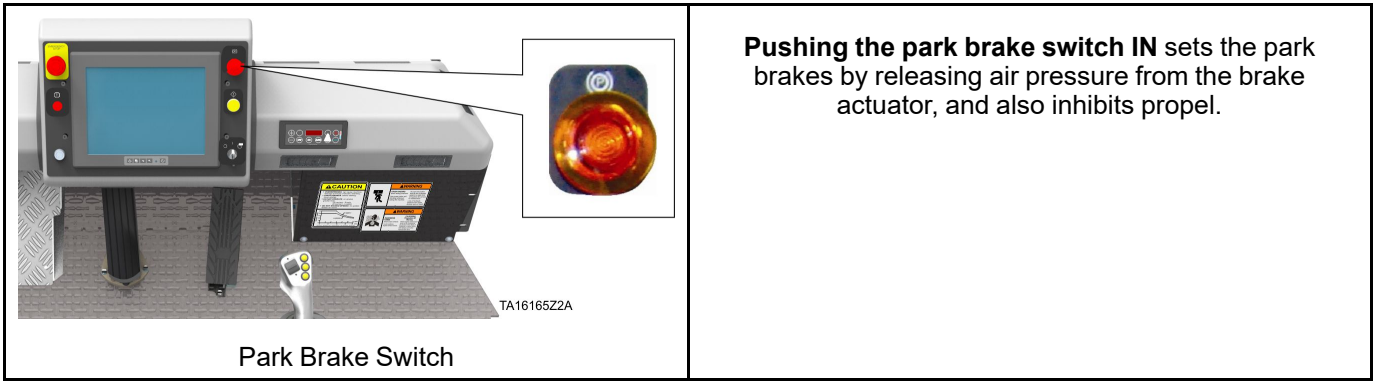


(Located on “Overhead keypad”)

- Enables and disables the drive system.
- Drive may be enabled at low throttle for moving in out of the shop area.
- All four LEDs illuminate when the drive system is enabled.

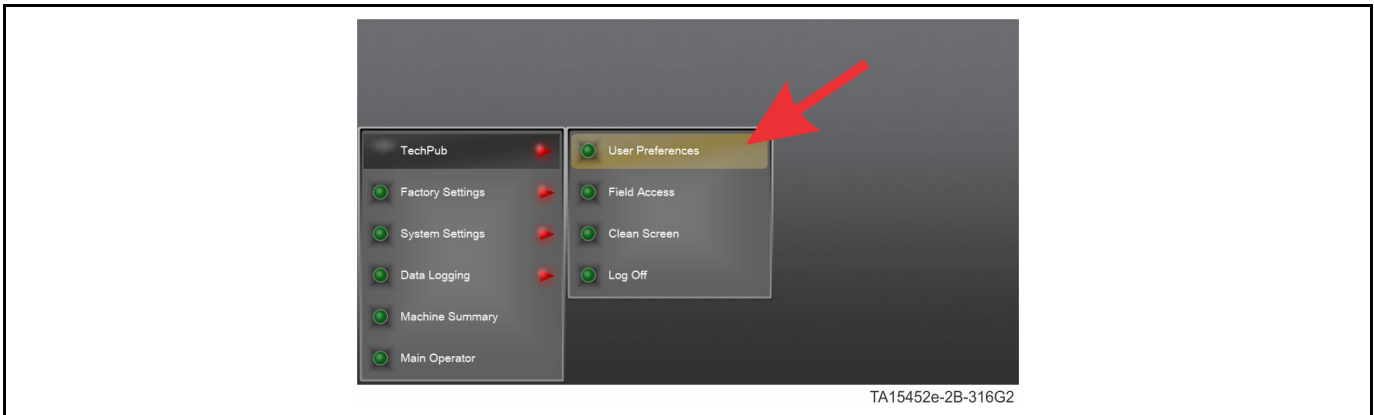
NOTICE

Leave the Park Brake switch applied (button pushed in, Park Brake light illuminated).

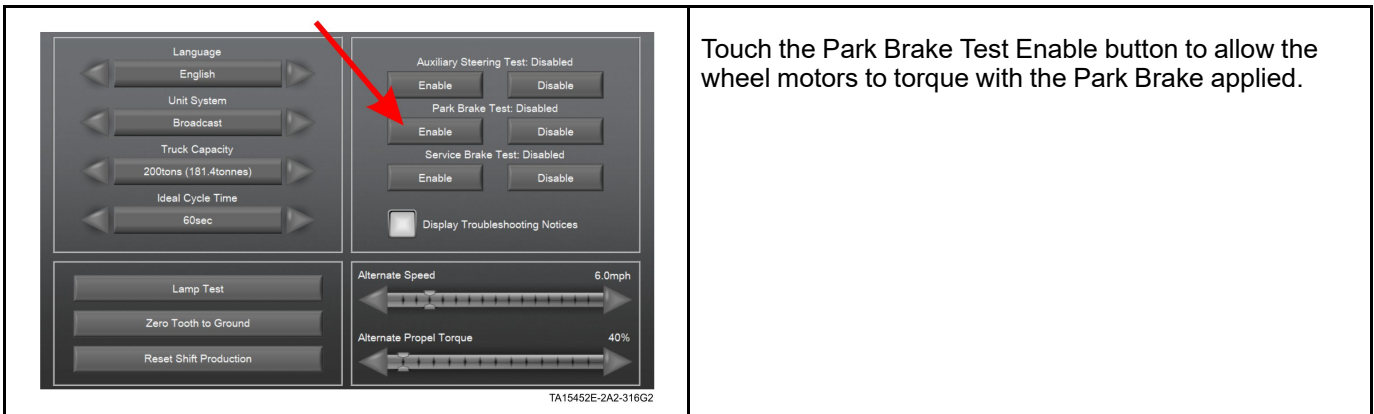


Step 4: Navigate in LINC3 to the Operator “User Preferences” screen.

- Menu>Operator>User Preferences

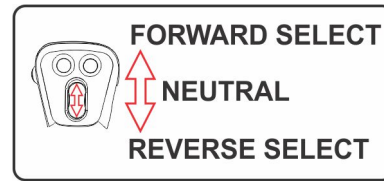


Step 5: Touch the Park Brake Test enable button.



Step 6: Place the direction selector switch in the Forward position.

The directional control switch is a three-position maintained rocker-type switch mounted on the steering joystick control. It is used to select forward, neutral, or reverse direction of machine movement.

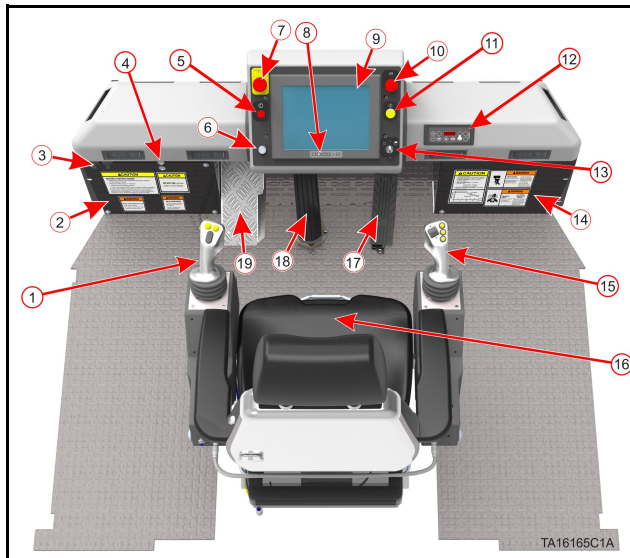


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NOTICE

The test is cancelled if the user selects Neutral, or Reverse.

Step 7: Slowly depress the speed control pedal completely.



17. Speed control pedal



- The machine should not move.

NOTICE

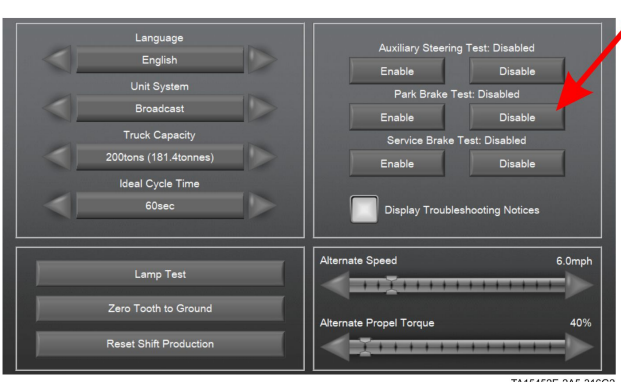
A small amount of movement may be noticed if the brake pads or brake rotor are new and have not been worn in or burnished.

- If machine movement is detected, immediately release the speed control pedal and shut down the machine.
 - Movement indicates a possible failure in the Park Brake system.
 - A full inspection of all the park brake components should be performed.

NOTICE

The test is cancelled if the user selects Neutral, selects Reverse, or exceeds low machine speed (>0.5 mph >0.8kmh).

Step 8: Touch the Park Brake Test Disable button.



The screenshot shows a control panel with several sections. On the left, there are settings for Language (English), Unit System (Broadcast), Truck Capacity (200tons (181.4tonnes)), and Ideal Cycle Time (60sec). Below these are buttons for Lamp Test, Zero Tooth to Ground, and Reset Shift Production. On the right, there are three test status sections: Auxiliary Steering Test: Disabled, Park Brake Test: Disabled, and Service Brake Test: Disabled. Each section has 'Enable' and 'Disable' buttons. A red arrow points to the 'Disable' button for the Park Brake Test. Below these sections is a checkbox for 'Display Troubleshooting Notices'. At the bottom right, there are two sliders: 'Alternate Speed' set to 6.0mph and 'Alternate Propel Torque' set to 40%. The model number TA15452E-2A5-316G2 is visible at the bottom center of the screenshot.

Touch the Park Brake Test Disable button to return the traction system to normal operation.

Step 9: Apply the Park brake switch (light is illuminated).

Step 10: Release the Service brake pedal.

Step 11: Return the machine to normal operating condition once the machine has successfully passed the brake test.

Test the Service Brake

This procedure should be performed on flat, level ground in an area that is safe to operate.

NOTICE

This test procedure is used for machines using LINCS II™ 3.16 or higher.



WARNING

Crush hazards exist if uncontrolled machine movement occurs. Before starting the engine, ensure the machine is in a place that is safe for operations. The machine should be on a level area, and all personnel and equipment must be clear of the area. After the starting procedures and observations have been made, and it is determined the loader is safe to operate, it can be moved. Starting the machine in an area that is not safe to operate could cause a crush hazard resulting in serious injury or death.

NOTICE

Two switches on the overhead keypad are used during this procedure.

- 3. Drive Enable Switch
- 5. Throttle Switch

NOTICE

Always depress and release the speed control pedal slowly and smoothly. Abrupt movement of the speed control pedal will result in a sudden response from the loader’s drive motors. Sudden and complete release of the speed control pedal will apply full dynamic braking.

When the loader is on a grade, it will not come to a full stop until the Service Brake pedal is applied.

NOTICE

The service brake pedal should NOT routinely be used to stop the loader during normal operation. The loader should be stopped by releasing the speed control pedal and utilizing the dynamic braking system. Use of the service brakes to routinely stop the loader during material handling operations will result in accelerated wear of the disc pads and rotors.

However, when required, service brakes could be used to prevent movement of the loader while in close proximity to a transport vehicle or to hold the loader on a grade.

Step 1: Ensure the Park Brake switch is engaged. (light is illuminated)

Park Brake switch

The park brake switch is a push-pull type switch that has a built-in light that illuminates continuously when the brakes are set (also see NOTICE below). The park brakes are spring/air operated.

Pushing the park brake switch IN sets the park brakes by releasing air pressure from the brake actuator, and also inhibits propel.

Pulling the park brake switch OUT releases the park brakes by increasing air pressure to the brake actuator, and also enables propel.

Step 2: Start the machine using local startup rules, regulations, and procedures.

Step 3: Place the machine in high throttle.



TA16219L

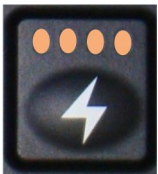
(Located on “Overhead keypad”)

The Throttle Switch is a four-position momentary pushbutton switch.

- The Engine Speed Switch has three LED lights at the top of the switch.
- If the machine is equipped with a Cummins engine, when the engine is started the left LED will flash until the operating temperature has reached a point where the Cummins electronic control module will allow control of all engine functions by the LINC S II computer system. It will then stay on without flashing.
- If the machine is equipped with a Detroit Diesel engine the left LED will flash until the LINC S II computer system is in control of the engine functions and it will then stay on without flashing.
- When the LINC S II computer system gains control, the engine will run at LO speed position (800 RPM).
- When the switch is pressed one time the engine will go to HI speed. The left and right LEDs will illuminate without flashing. The center LED will go out.
- When the switch is pressed a second time the engine will go to L2 speed (1100 RPM) and both the center and left LEDs will illuminate without flashing.
- When the switch is pressed a fourth time the engine returns to LO speed (800 RPM) and only the left LED will illuminate.
- Operate the loader only in HI speed when performing material handling operations.

NOTICE

Drive system should be enabled (four lights indicated on the Drive Enable (has lightning bolt) button on the keypad)



TA16219J

(Located on “Overhead keypad”)

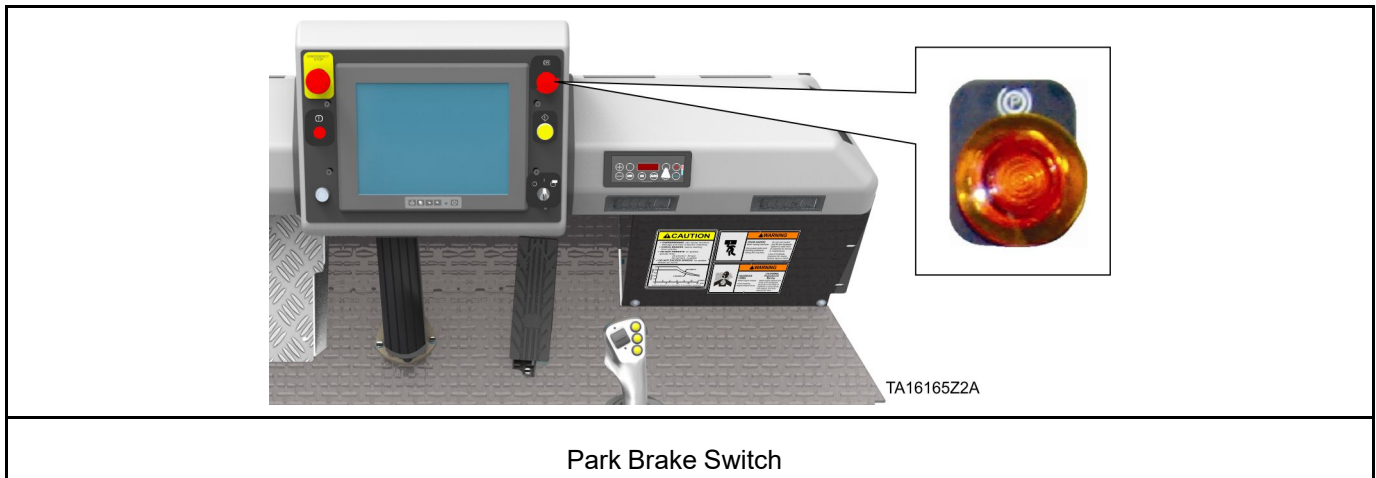
- Enables and disables the drive system.
- Drive may be enabled at low throttle for moving in out of the shop area.
- All four LEDs illuminate when the drive system is enabled.

Step 4: Navigate in LINC'S to the Operator “User Preferences” screen.

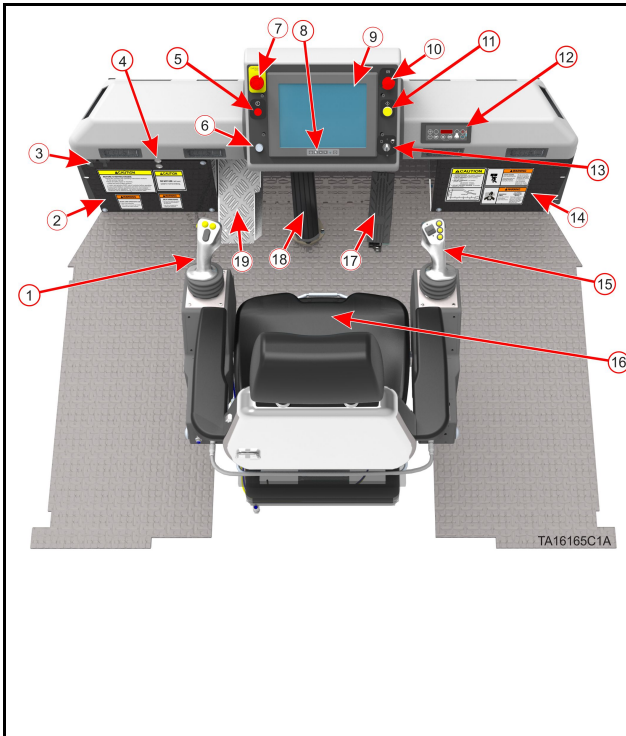
- Menu>Operator>User Preferences



Step 5: Release the Park Brake by pulling the Park Brake switch out (light is not illuminated).



Step 6: Fully depress the Service Brake pedal.



18. Service brake pedal



TA13746D

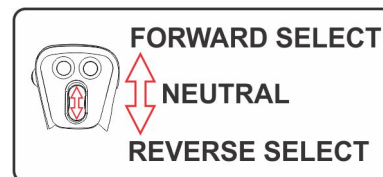
The left pedal controls the service brake.

Depressing the pedal activates the disc brakes on all four wheels.

The primary service brake function should be for EMERGENCY STOPS. However, when required, the brakes could be used to prevent machine movement or to hold the machine on a grade.

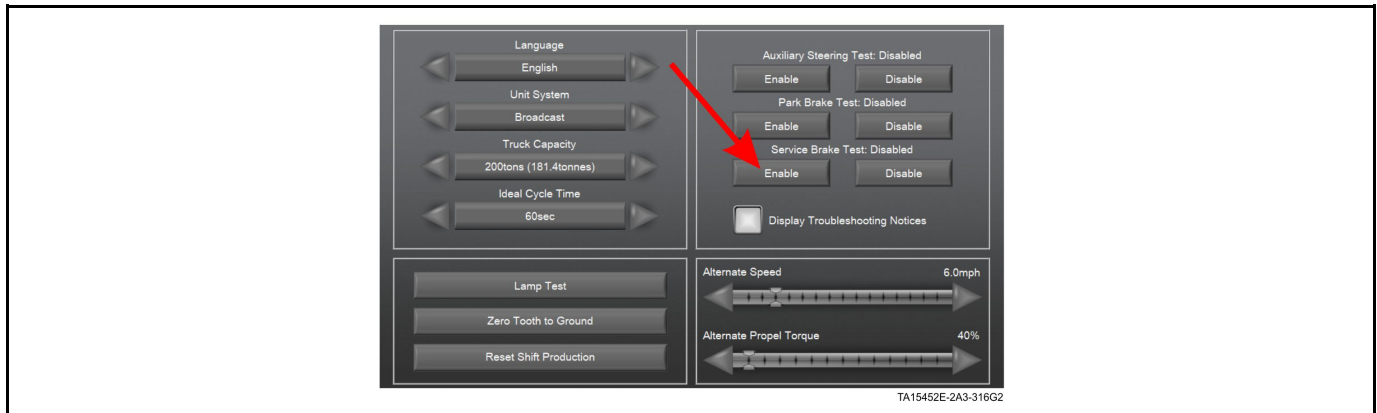
Step 7: Place the direction selector switch in the Forward position.

The directional control switch is a three-position maintained rocker-type switch mounted on the steering joystick control. It is used to select forward, neutral, or reverse direction of machine movement.



LA6518V

Step 8: Touch the Service Brake Test enable button to allow the wheel motors torque with the Service brake applied.



Step 9: Slowly depress the speed control pedal completely.

- The machine should not move.

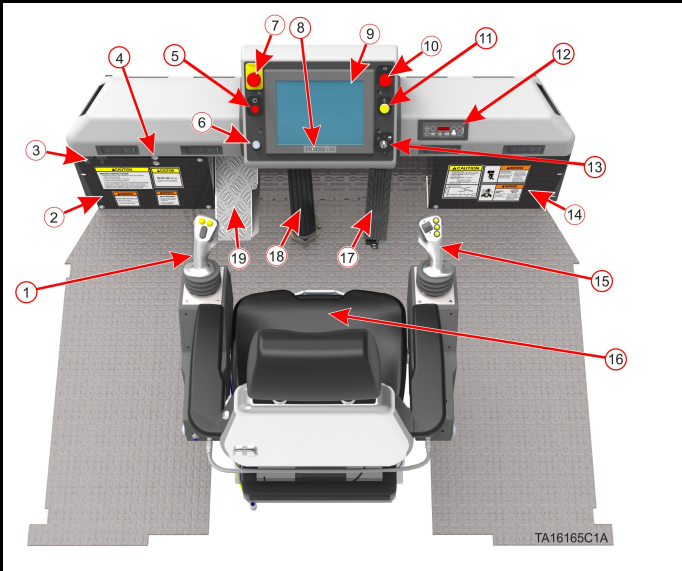

NOTICE

A small amount of movement may be noticed if the brake pads or brake rotor are new and have not been worn in or burnished.

- If machine movement is detected, immediately release the speed control pedal and shut down the machine.
 - Movement indicates a possible failure in the Service Brake system.
 - A full inspection of all the park brake components should be performed.

NOTICE

The test is cancelled if the user selects Neutral, selects Reverse, or exceeds low machine speed (>0.5 mph >0.8 kmh).

	<p>17. Speed control pedal</p>  <p>TA13746E</p> <p>The pedal on the right side is the speed control pedal. The speed control pedal controls speed of the machine. The speed is proportional to the distance that the speed control is depressed. Conversely, as the speed control is released, the speed of the machine decreases and dynamic braking occurs, which brings the machine to a complete stop on flat ground. If stopping on a grade, the machine may have a tendency to creep. Should this occur, depress the Service Brake pedal with the left foot, and the machine will come to a complete stop.</p>
<h2>NOTICE</h2> <p><i>The speed control pedal is used during this procedure.</i></p>	

Step 10: Slowly release the Speed Control pedal.

Step 11: Touch the Service Brake Test Disable button to return the traction system to normal operation.



Step 12: Apply the Park brake switch (light is illuminated).

Step 13: Release the Service brake pedal.

Step 14: Return the machine to normal operating condition once the machine has successfully passed the brake test.

Changing Directions (Forward and Reverse)

The machine's direction, FORWARD or REVERSE, can be selected without releasing the speed control pedal. Once the directional control switch is moved to the opposite direction, the machine's control system automatically applies dynamic braking, slows the machine to a complete stop and then changes the machine's direction. While this change of direction is being processed by the control system, the speed control pedal can remain fully depressed. This will ensure cycle times are maximized and there is no wasted time selecting direction.

Normal Shutdown Procedures

After operation of the machine, or if the machine will be left unattended, the following procedures should be followed for normal shutdown:

Step 1: Move the machine to the desired flat, level location.

Step 2: Position the bucket, level on the ground.

Step 3: Place machine at LO Throttle.

Step 4: Move the directional control switch to the neutral (center) position.

Step 5: Push the parking brake switch IN to engage the park brake.

Step 6: Turn the key switch/crank switch to the OFF position.

- If the engine has been running for a set amount of time, turning the Key Switch/Crank Switch to the OFF position activates the idle timer.
- The idle timer allows the engine to run at low throttle for five minutes to cool various components including the engine turbochargers.
- The LINCS II Computer System remains booted up during the idle timer shutdown process.

- When the idle timer is activated, the touch screen provides a screen indicating the idle timer is operating.

NOTICE

The idle timer can be bypassed by pressing and holding the acknowledge button for 2 seconds during the idle timer process. This will immediately shut down the engine and LINCS II Computer System. Bypassing the idle timer can cause damage to the turbochargers. Shutting the engine down immediately should only be done in emergency situations.

- After five minutes, the engine fuel flow to the injectors is stopped, which stops the engine.
- The LINCS II Computer System remains booted up for an additional 15 seconds. During this 15-second interval, the Key Switch/Crank Switch can be switched back to the ON position and the LINCS II Computer System will remain booted up.
- This function saves waiting the normal boot-up time to complete service work, data transmission, etc.
- If the Key Switch/Crank Switch is not switched back to the ON position during the 15-second interval, the LINCS II Computer System switches off and the touch screen turns off.
- If the Key Switch/Crank Switch is turned back to the ON position to keep the LINCS II Computer System booted up, turning it back to the OFF position immediately boots the computer system down.

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

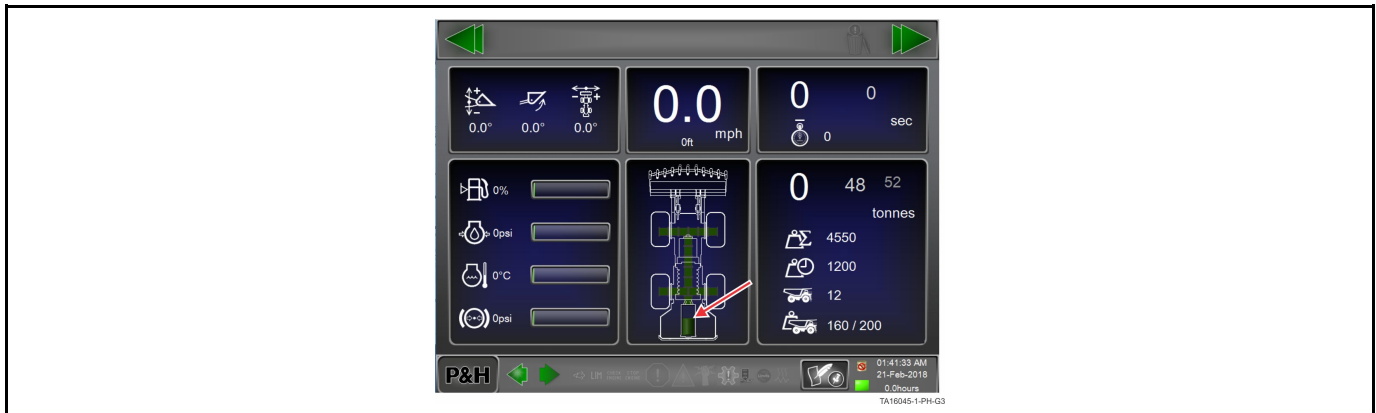
The engine does not have to be running to determine ESD RPM. The LINCS system must be booted up and the operator screen must be ON.



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.

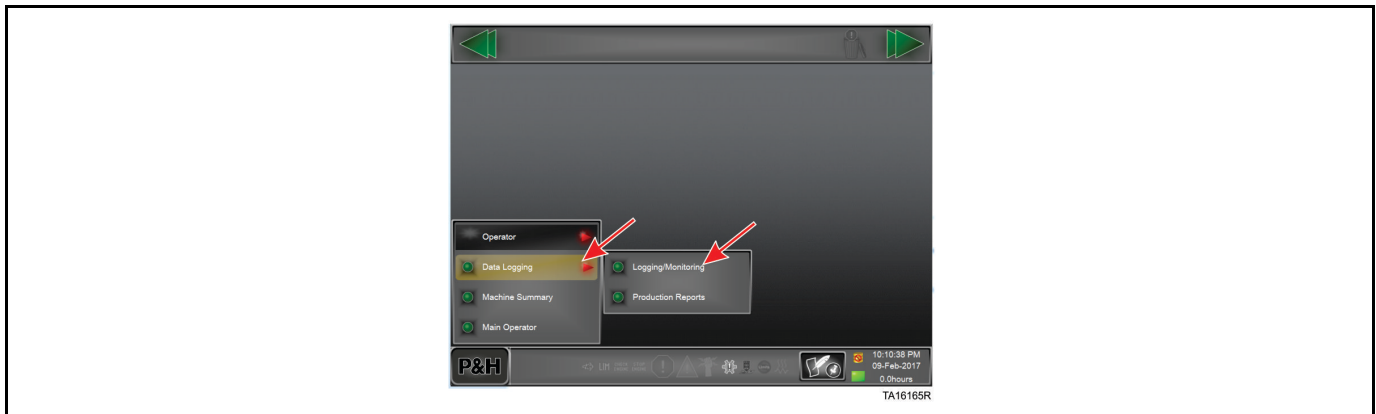
Figure 57: Operator Screen — KESS at 60%



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.

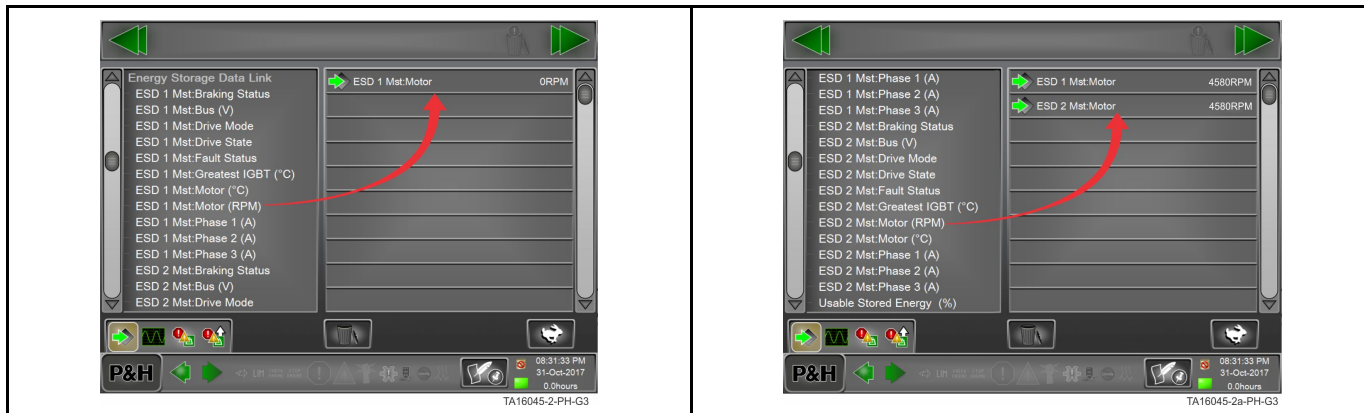
- a. Select LINCS II Main Menu button.
- b. Select Data Logging.
- c. Select Logging/Monitoring.



d. Select Drive Commands and Responses.

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

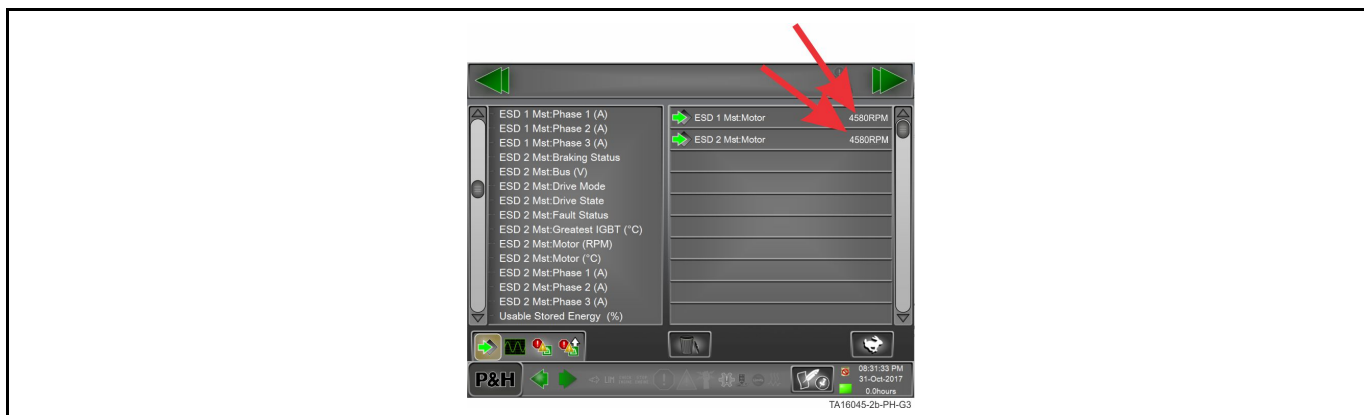
Figure 58: ESD Motor Channel Select



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 59: ESD RPM reading



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.



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 60: Operator Screen — KESS at 60%



Step 1: Ensure Park Brake is SET.



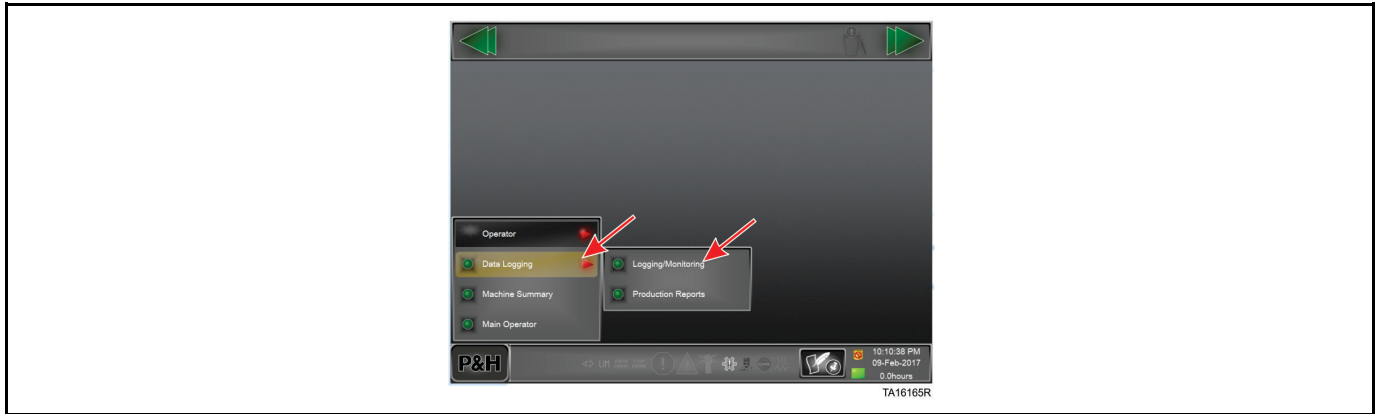
TA16219L

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.

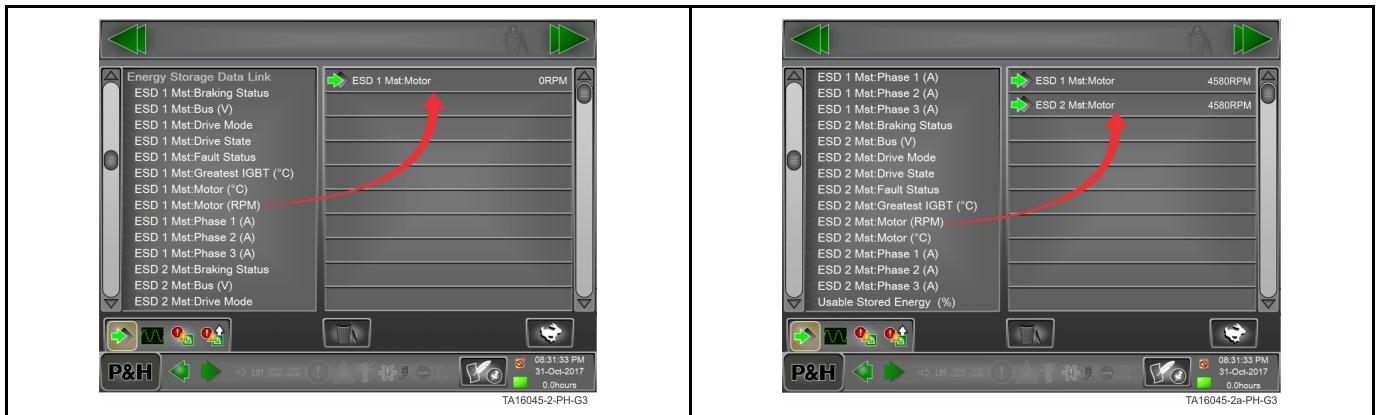
c. Select Logging/Monitoring.



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.

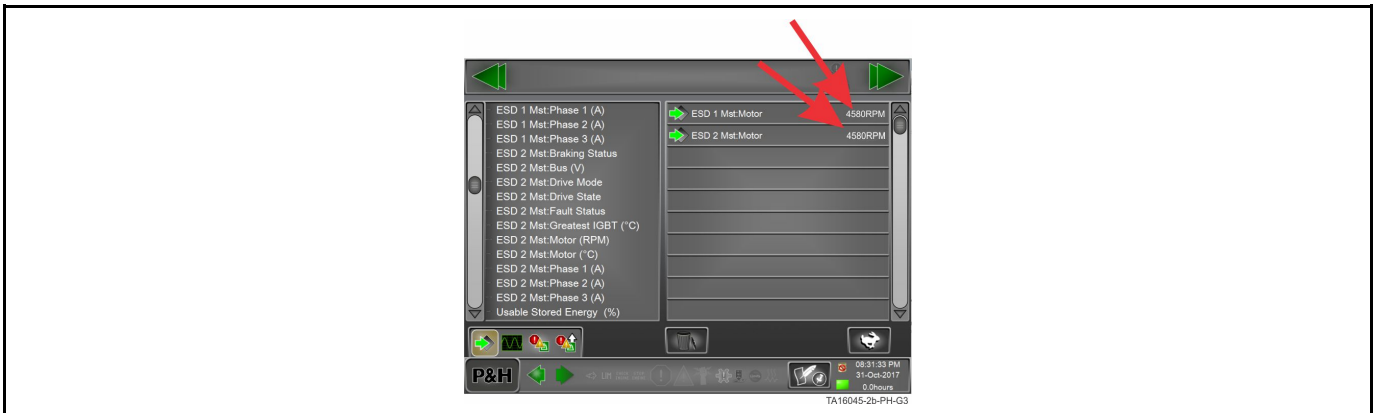
Figure 61: ESD Motor Channel Select



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 62: ESD RPM reading



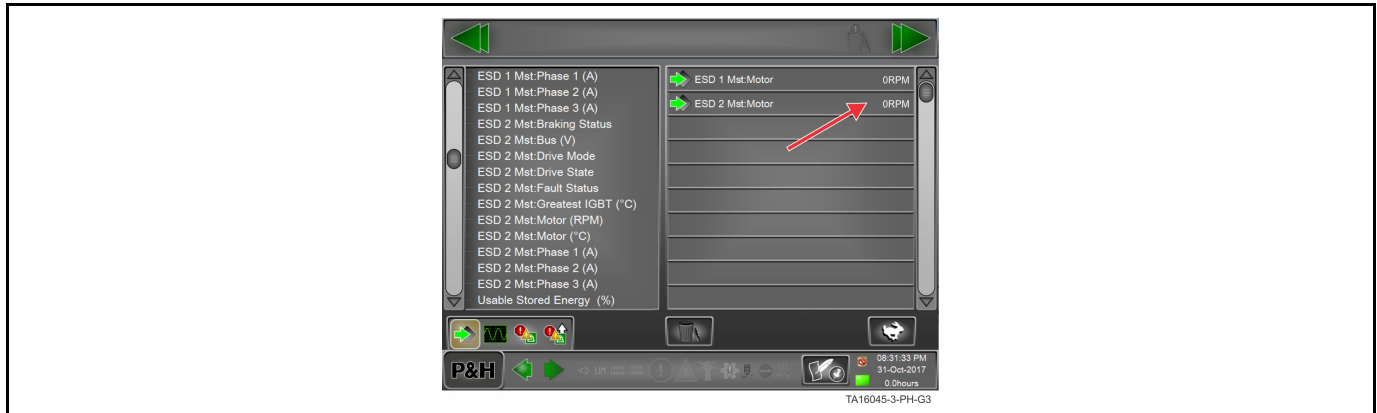
Step 5: Press the Drive Enable switch.
It does not have to be held down.

Figure 63: Drive Enable Switch



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

Figure 64: ESD Motor RPM



Emergency Shutdown

The operator's cab is equipped with an emergency stop button for use in emergency situations. Emergency stop switches are also located at ground level on each side of the loader. These switches should NEVER be used for routine shutdown of the engine as damage to components could occur. They should only be used in emergency situations. Following their use, a complete inspection of the engine must be made by a qualified technician to ensure no damage has occurred. When the emergency shut down system is actuated, air pressure in the hydraulic reservoir is automatically released by the automatic air release valve, located on top of the hydraulic reservoir. This valve must be manually reset by pushing the button on the switch IN to the closed position.

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Basic Machine Operating Instructions Material Handling Operations

General Material Handling Operations and Precautions

The following instructions are for operating the loader in basic material handling operations. These instructions are provided as a guide to safe and productive operations. Operating the loader under different job situations may require additional measures than are described herein.

NOTICE

All lift capacities and machine operating characteristics are based on the criteria of the machine being level, on firm supporting ground. When the machine is operated in conditions that deviate from these criteria (e.g. on soft or uneven ground, on slope or when subject to slide loads), these conditions shall be considered by the operator and the operator shall operate the machine in a manner consistent with safe operation. The operator shall consider all operating conditions before operating the machine.



WARNING

Special hazards may exist. Before operating the equipment, it must be determined if special hazards exist in the operating area, such as toxic gasses, or ground (underfoot) conditions, that require special precautions or measures to eliminate or reduce the hazard. If special hazards exist (e.g. lines: gas, electricity) in the ground: close overhead electric lines: below ground in enclosed areas: contaminated areas: other special conditions: local rules and regulations shall be followed. Serious injury or death is possible.

Before the loader is operated, the operator(s) should have a good understanding and demonstrated ability of the following:

1. All controls, warning and indicator lights, gauges, touch screen, and any special instructions concerning engine start-up, operation and shutdown as provided in this manual and the engine manufacturer's owners manual.
2. Basic operation of the loader with regards to maneuvering, traveling, starting and stopping, changing directions (forward/reverse) and hoist and bucket functions as described in "Basic Machine Operating Instructions Non-Material Handling Operations", located within this section.
3. Operation of the loader to ensure mechanical components are operated and monitored in a manner that will provide safe and cost effective material handling operations as described in "MECHANICAL OPERATING CONCERNS", located within this section of the manual.
4. The safety instructions contained within this Manual and knowledge of company safety policy in regards to operating the loader in material handling operations.
5. Knowledge of the job site and terrain to ensure safe machine operation to avoid damage to the loader or vehicles being loaded.

It is **ESSENTIAL** to observe the following operating practices and precautions to prevent damage to the loader and vehicles being loaded:

Know the material to be loaded. Overloading the bucket can damage the lift arms, main frame, and hydraulic equipment.

- NEVER try to raise an overloaded bucket to additional height by bouncing it.
- NEVER let any part of the loader touch any part of the truck or hopper being loaded.
- NEVER use the loader as a dozer; it is not designed as a dozer.

- NEVER jack the loader up by using the bucket and lift arms.
- When traveling pit-to-pit, shop-to-pit, pit-to-shop, etc., the loader bucket should be carried three (3) to four (4) feet off the ground in a full rollback position.

CAUTION

Equipment damage is possible. Do not corner load the bucket. Damage to the lift arms could occur. In all bucket-loading cycles, approach the face or stockpile with the bucket square and the loader straight (not articulated). The bucket should always be loaded close to the ground.

CAUTION

Equipment damage is possible. As the loader bucket enters or exits the pile, do not spin or bounce the tires. Spinning the tires could cause serious damage to the drivers and traction motors.

CAUTION

Equipment damage is possible. NEVER enter the pile at full speed. This can cause serious damage to the traction motors, drivers, lift arms and bucket. Enter the pile slowly.

Loader Operation

Safety in Operation

The safe operation of Komatsu equipment is always the number one priority. The operator must be familiar with machine controls and comfortable operating the machine. A competent operator is an operator who has received proper training and can safely **AND** efficiently operate the machine. All operators must be able to focus on the task to be completed. The operator must be familiar with all emergency features and procedures of the Komatsu machines. Safety is a behavior, not an excuse.

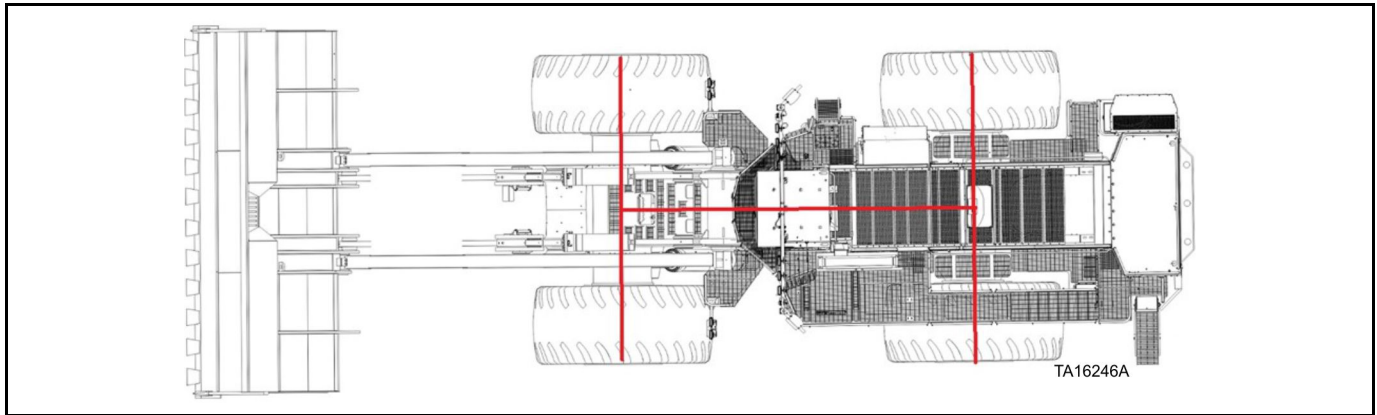
Reviewing Loader History

In years past, it was common practice to spot steering wheel equipped trucks at 45 degree angles. The idea was to fill the bucket, then turn the steering wheel a turn and a half to the right while backing up. An operator would travel in reverse a turn and a half of the front left wheel. This would put the loader some distance from the truck, but it was in a safe place to let go of the steering wheel, change directions, and proceed to the truck to dump the bucket.

With Komatsu advanced dual joystick design, this is no longer an issue because the operator never loses contact with any of the machine controls, which benefits the operator by greatly decreasing the amount of travel to and from the dig face to the truck.

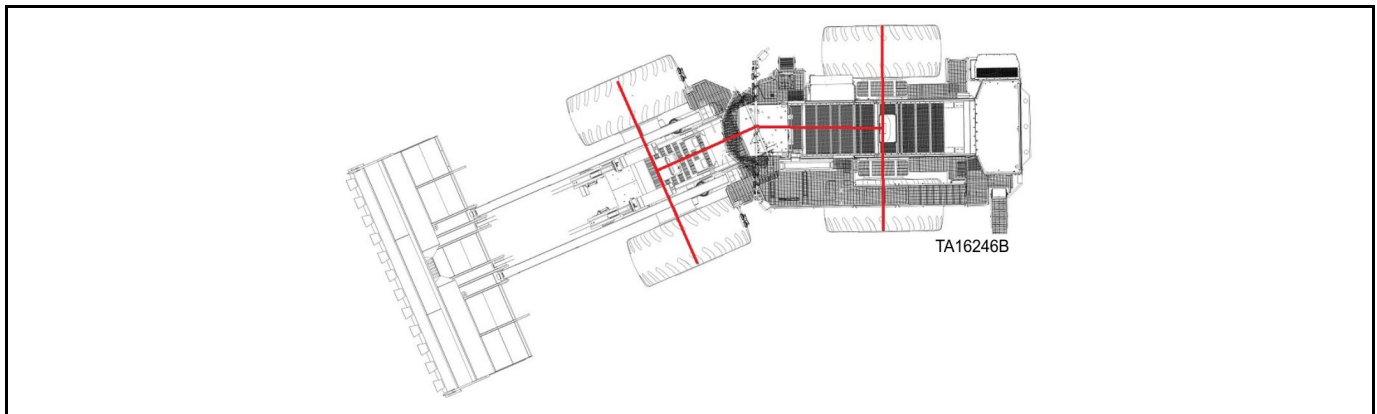
Mechanical Lock

Mechanical loaders do this in an attempt to keep the machine as straight as possible. Due to drivelines and transmissions, all 4 tires are connected.



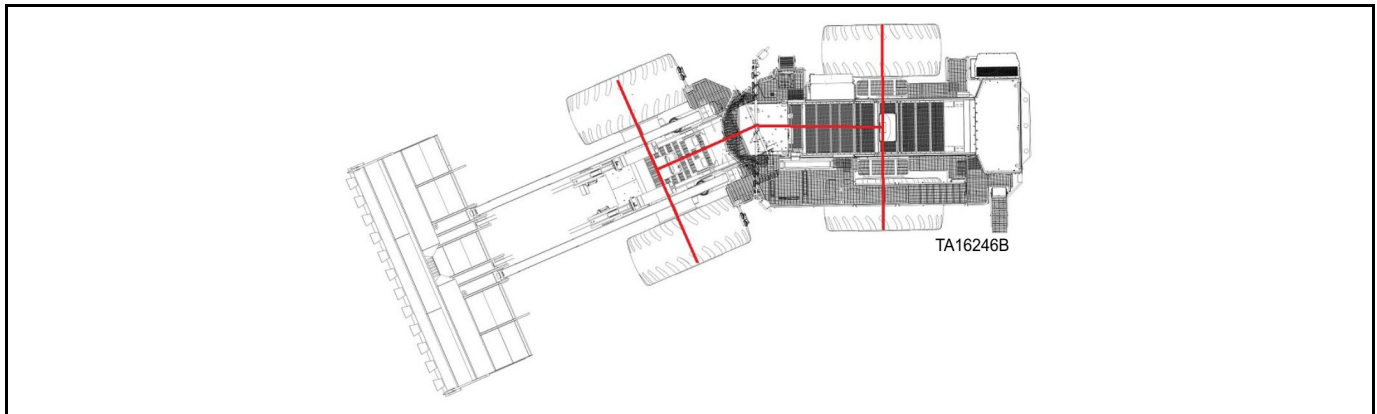
Mechanical Bind Articulating

When a mechanical loader is articulated, the inside two tires turn less than the outside two tires.



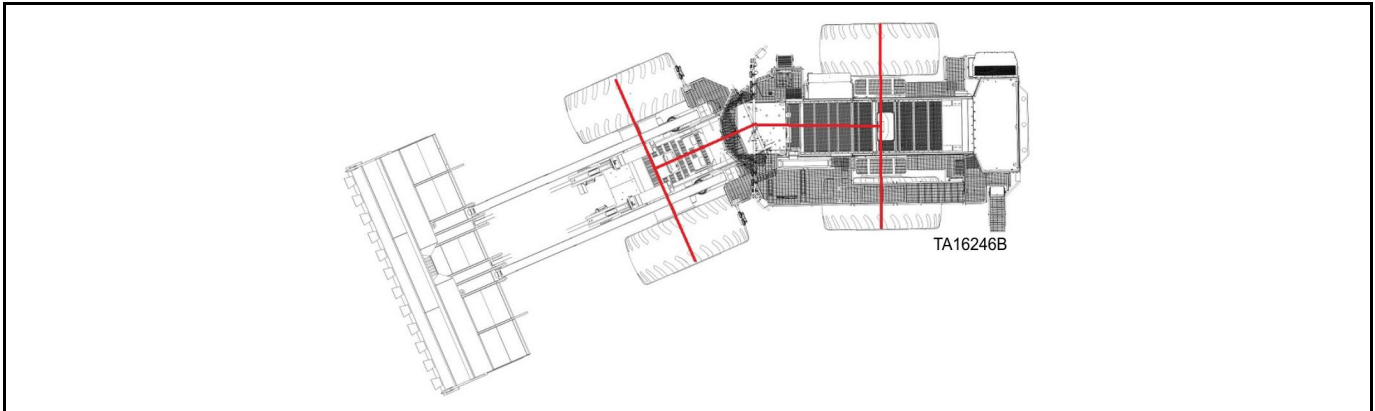
Mechanical Disadvantage

An articulated mechanical loader can lead to tire scrubbing, torque converter damage, transmission damage, and so forth.



Electric Advantage

Electric drive loaders have 4 wheel independent drive, thus eliminating many mechanical concerns.



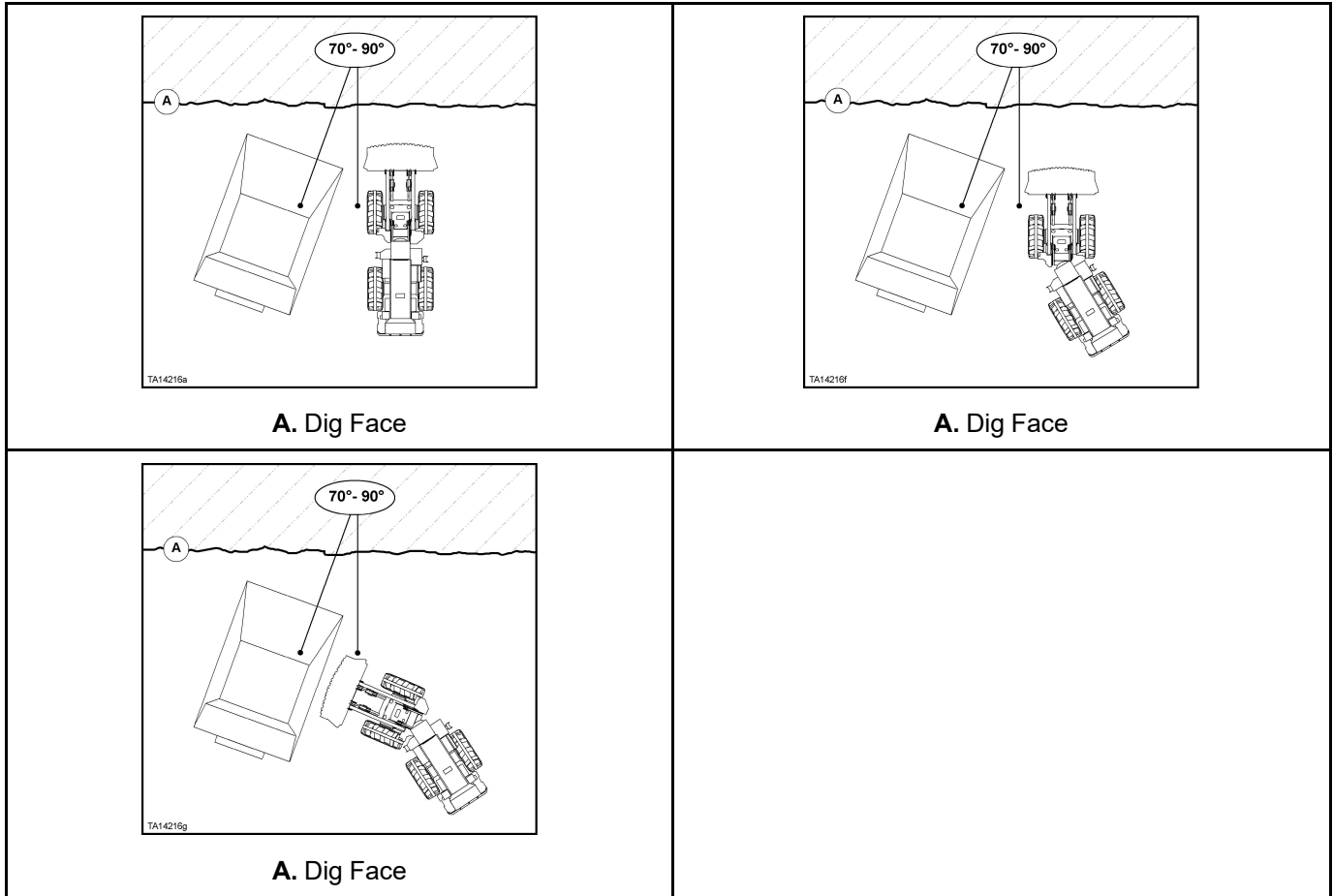
Electric Drive, Making Efficiencies

Because of the electric drive, Komatsu electric drive surface loaders can articulate without those mechanical concerns. Therefore, eliminating the need to continue spotting trucks at 45 degrees. By eliminating 45 degree truck spotting, the distance traveled from the dig face to the truck, and back to the dig face can be reduced. This decreases cycle times dramatically, reduces wear on the machine, and allows the machine to work on a much smaller footprint.

Placing Trucks

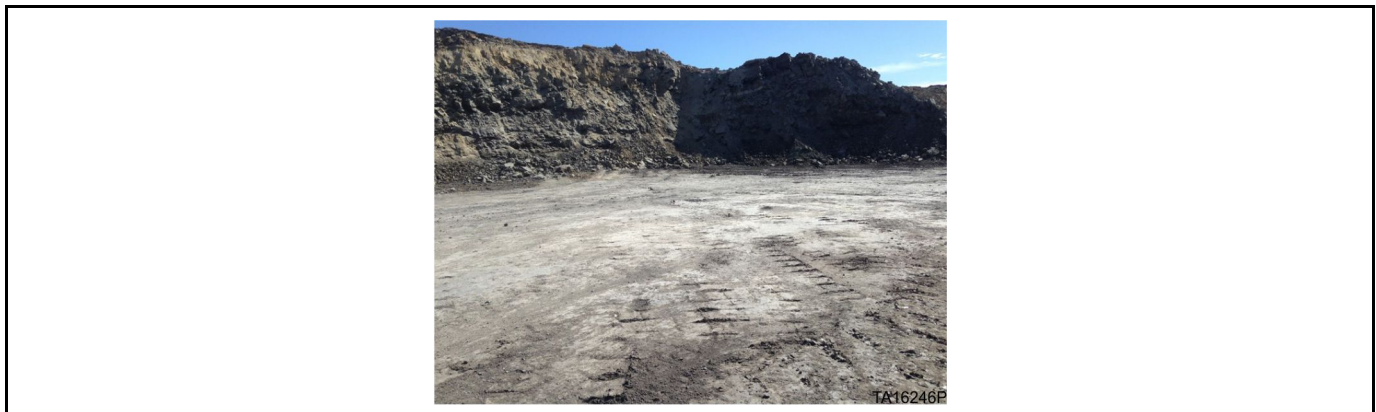
Ideally, trucks should be spotted at 70 to 90 degrees to the dig face. This will ensure the loader doesn't dig behind the truck and promotes keeping the machine straight while digging.

Figure 65: Square work line truck placement



Becoming Efficient

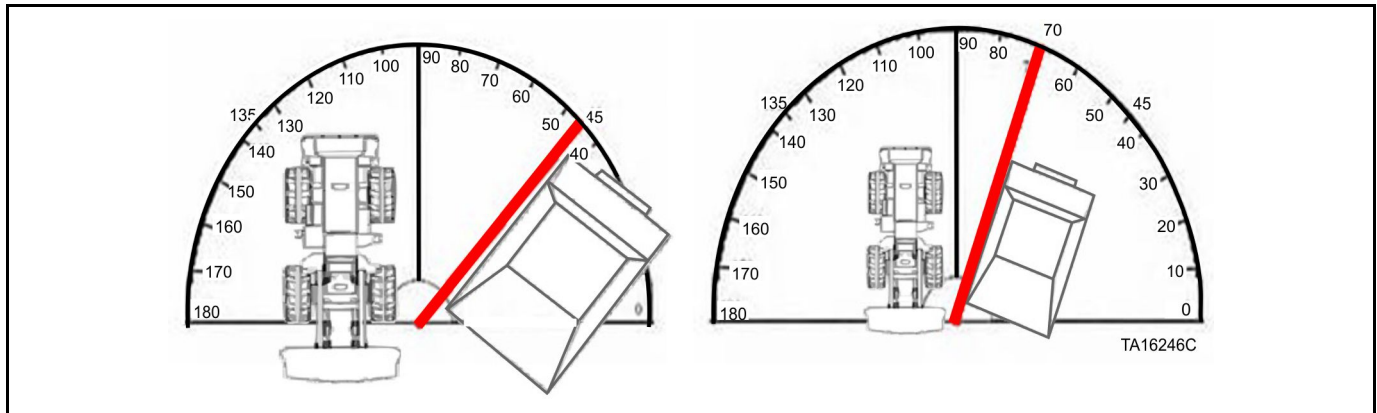
The whole idea is to become efficient. Consistent repeatability creates efficiency. Once an operator gets used to staying close to the truck, always working from right to left, and loading the left side of the truck, the truck transition times will improve dramatically as well.



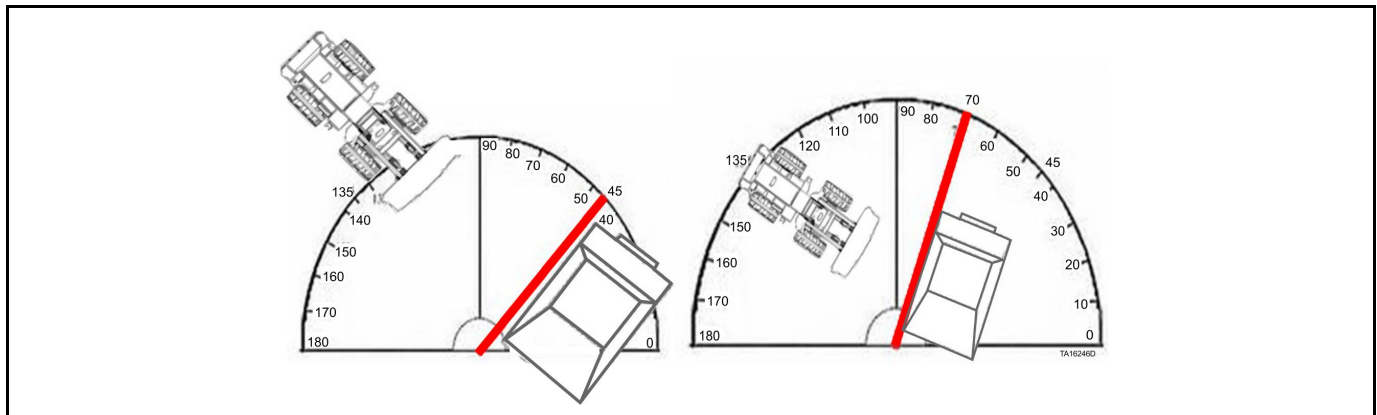
Creating Savings

Savings can occur by best practices when using the machine. Some savings can result because of the following.

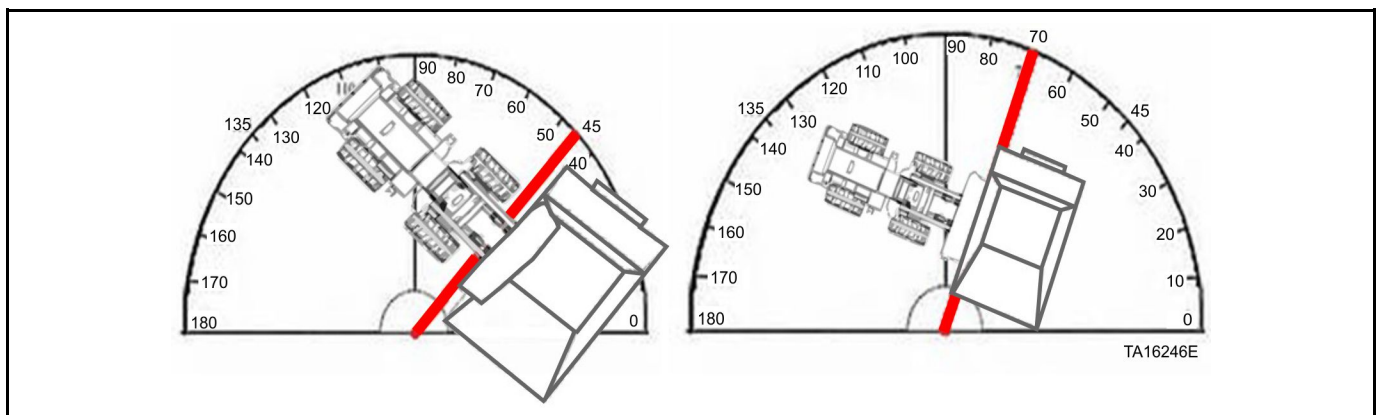
Changing the angle of truck spotting



Travel distance is greatly reduced.



Cycle time is reduced.

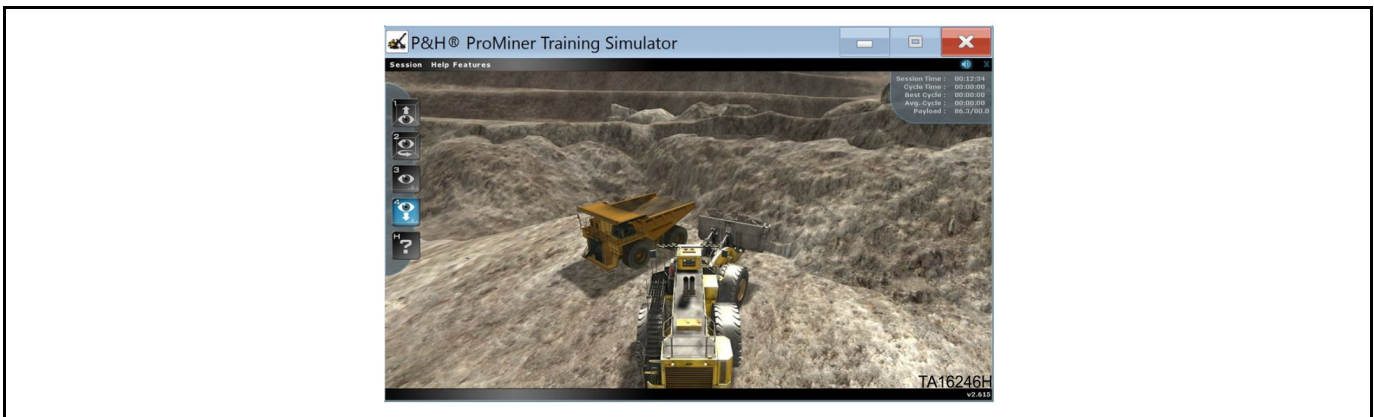


Improving Cycle Time

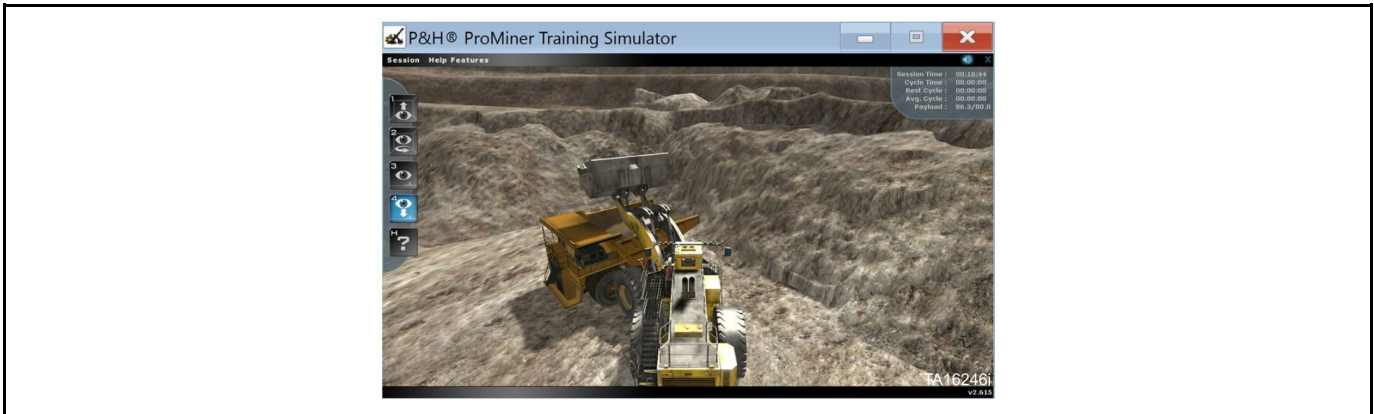
Get as close to the truck as comfortably possible.



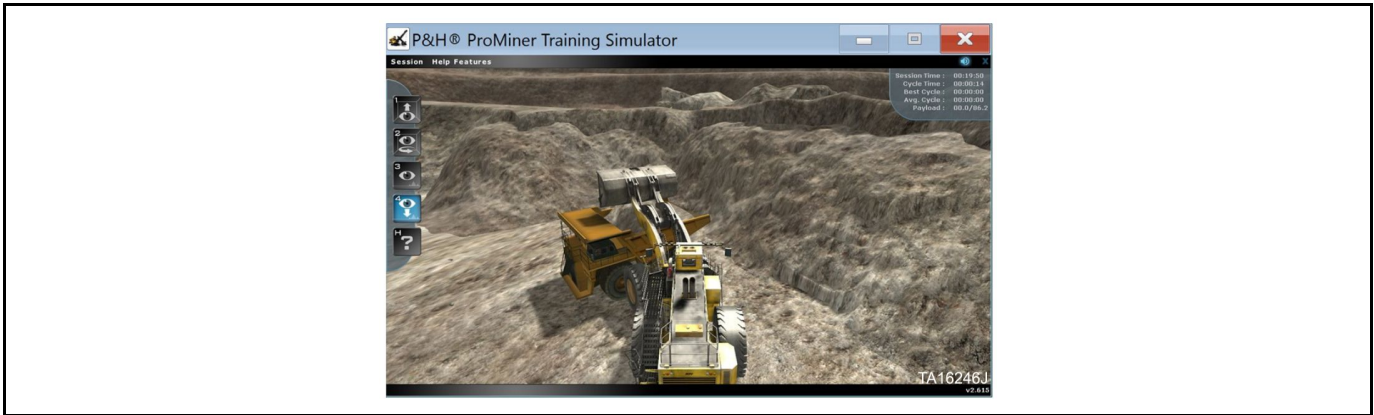
Keep the bucket as close to the truck as possible.



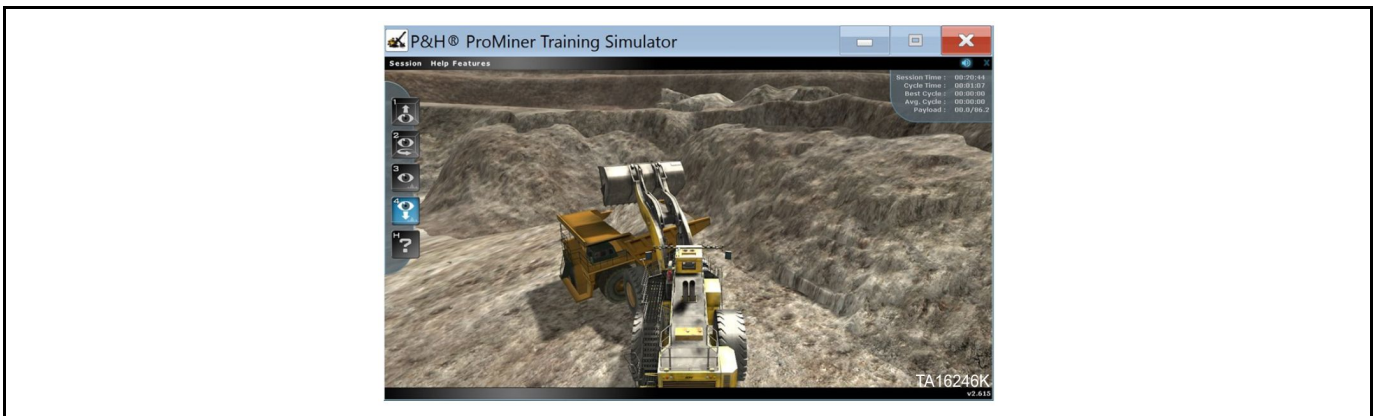
Articulate the machine fully to the left when dumping in the truck.



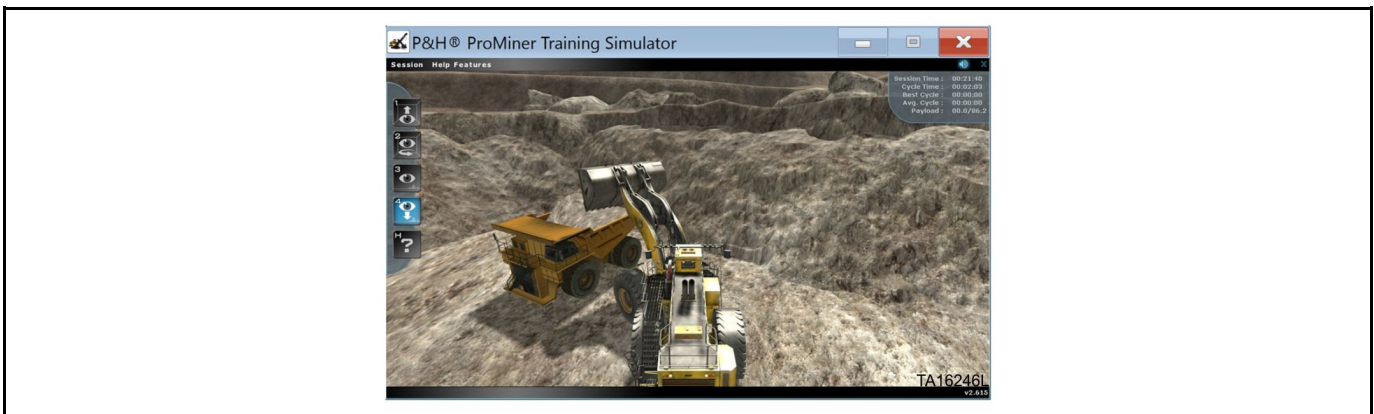
By staying articulated when leaving, the bucket will line up to dig.



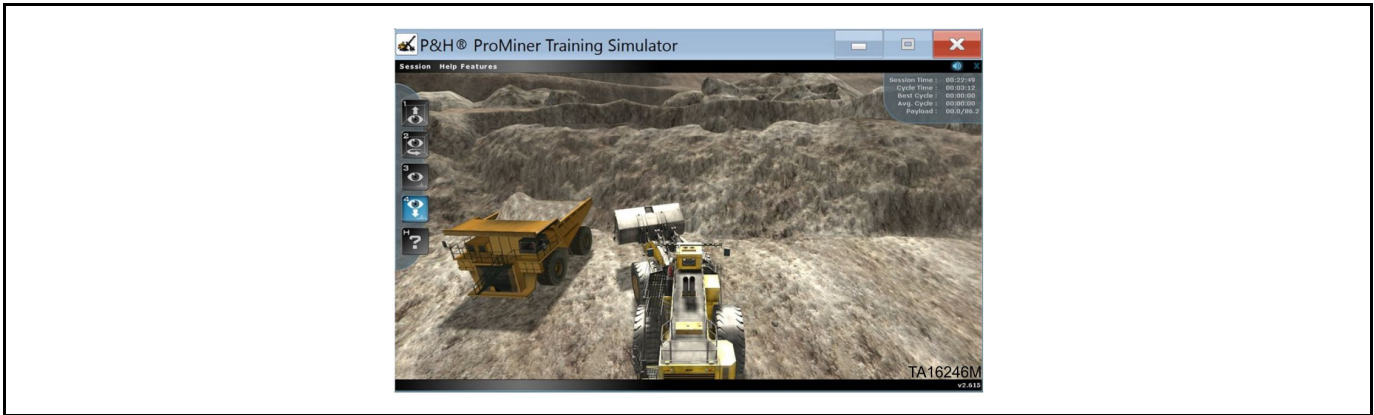
Ensure the teeth clear the bed.



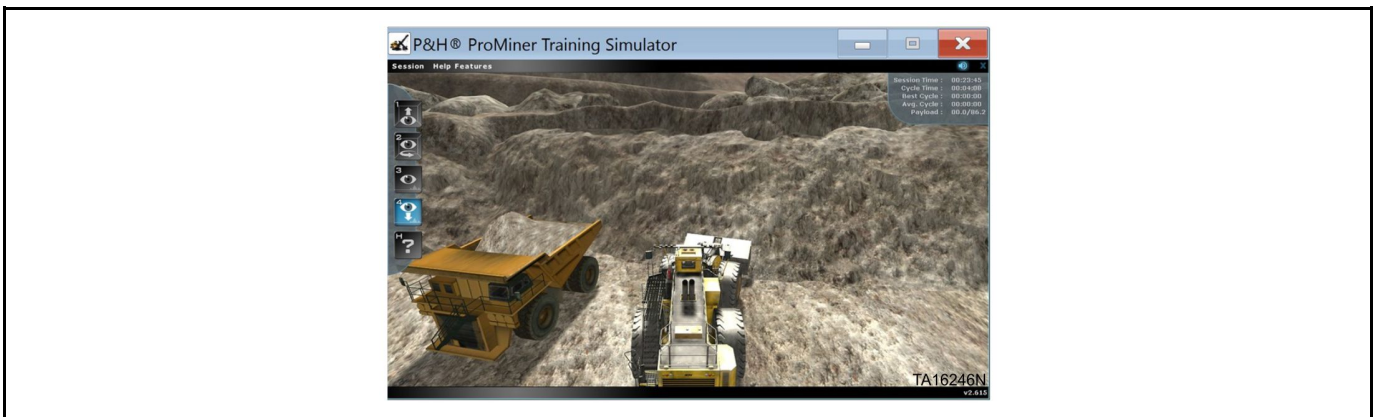
Stay articulated until the bucket is clear of the truck.



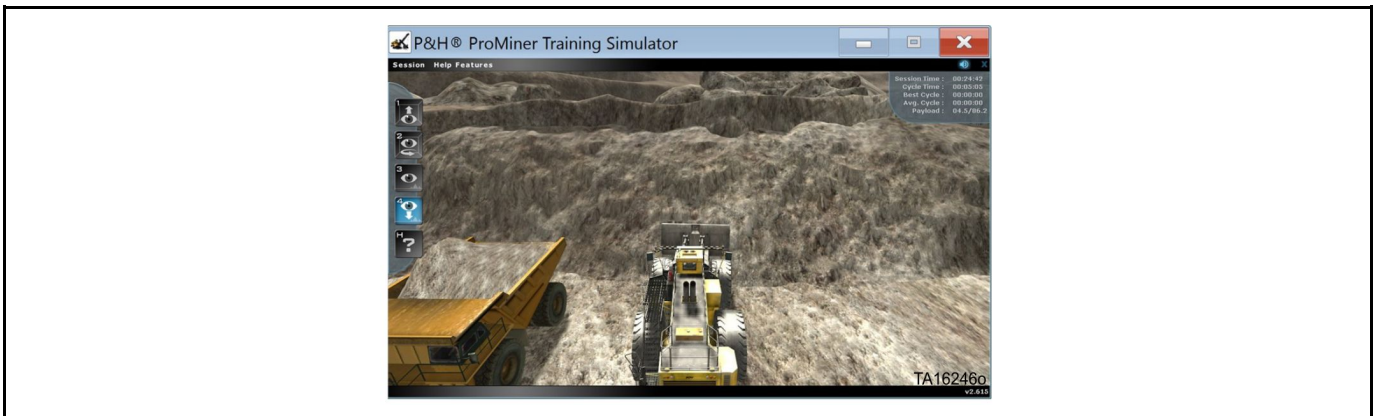
Use the “Float” button for faster return to dig.



Get square to the dig face and then straighten the machine.



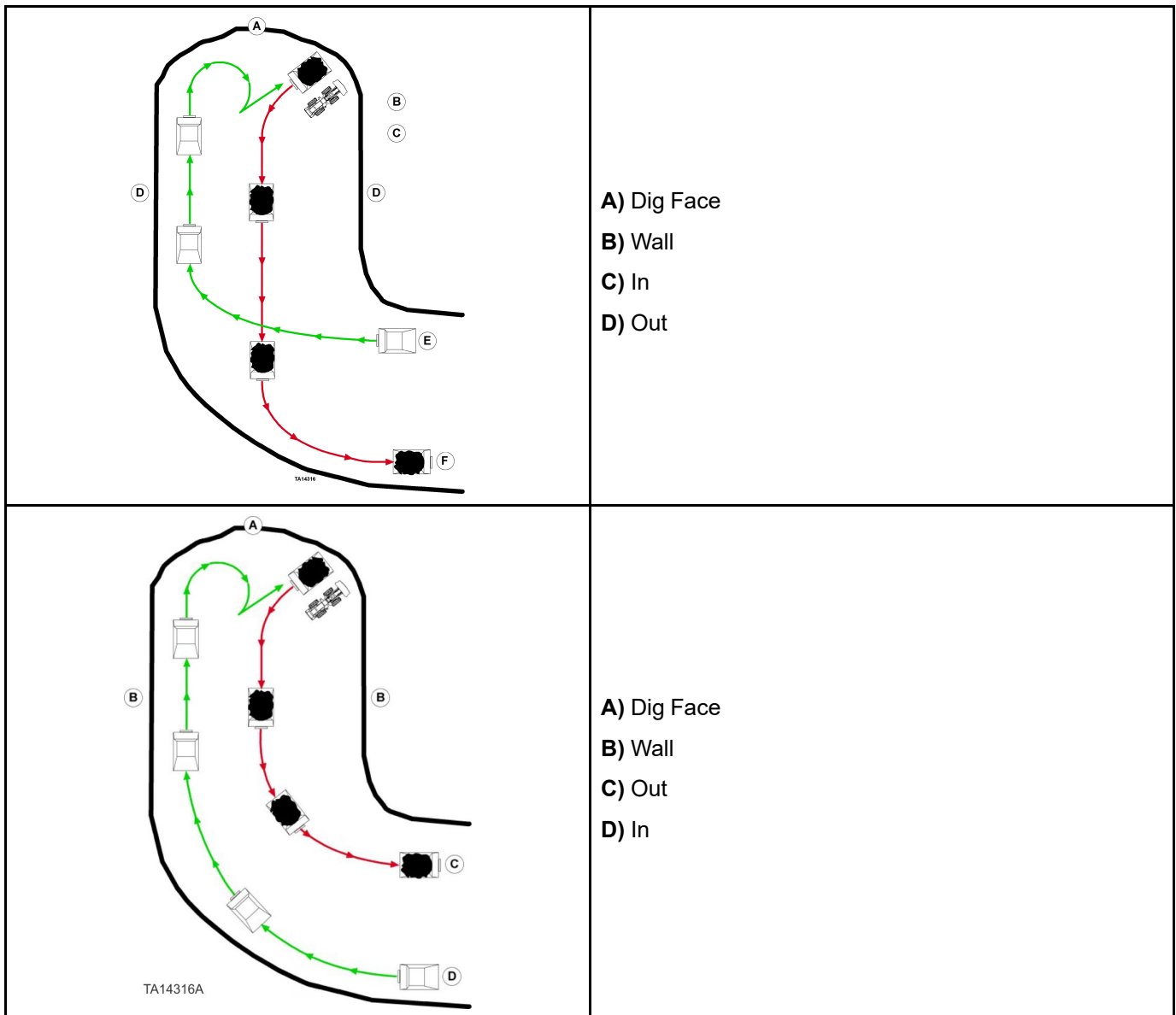
Fill bucket and repeat.



Controlling Traffic

Pit traffic should enter the loader's work area on the left side. However, there are special occasions where this is not always applicable. The loader operator should spot trucks on the loader's left side. By always loading to the left side of the loader, traffic has a set pattern and traffic flow remains optimum. When a loader operator continually switches from right-side loading to left-side loading, traffic becomes confused and disorientated and time delays will occur between trucks. Consistency is the key factor in controlling traffic. As the loaded truck leaves the loader, the next truck waiting to get loaded, should be backing under the loaders bucket just as the loader reaches his spotting target. Loader operators should **ALWAYS** be aware of environmental surroundings. Keeping an eye on the walls and slopes and applying caution where needed is absolutely necessary. Common sense should play a vital role in every operator's day to day job performance. Never put yourself or others into an unsafe situation.

Figure 66: Truck flow (left hand truck)

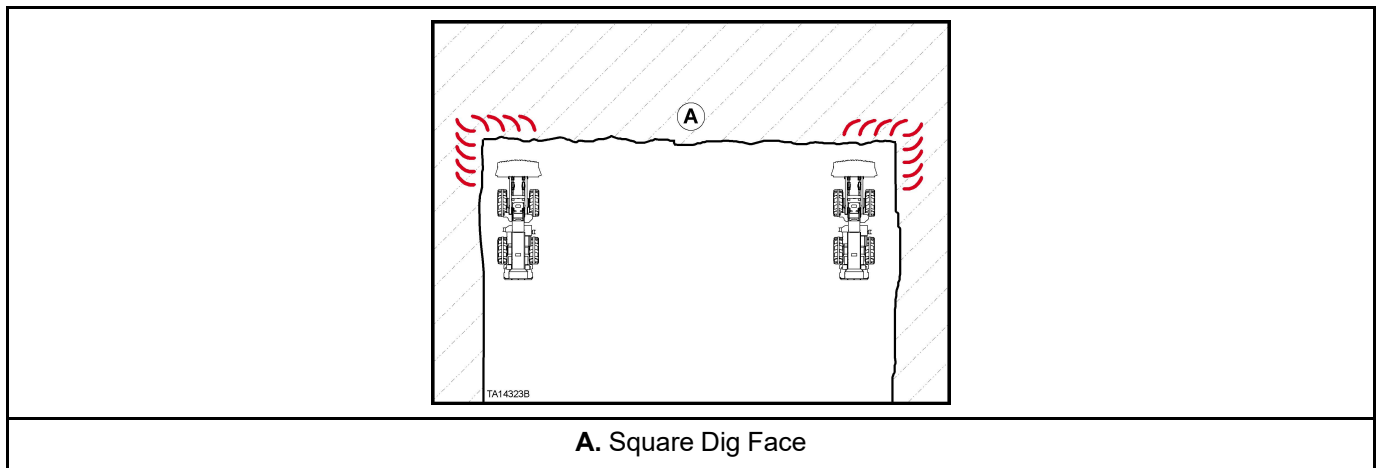


Digging Theories

There are many digging theories that have been utilized and institutionalized into protocol. The simple fact is, every operator will develop their own style for different scenarios. Too many variables are encountered throughout a day such that there is no perfect theory. However, some have advantages over others.

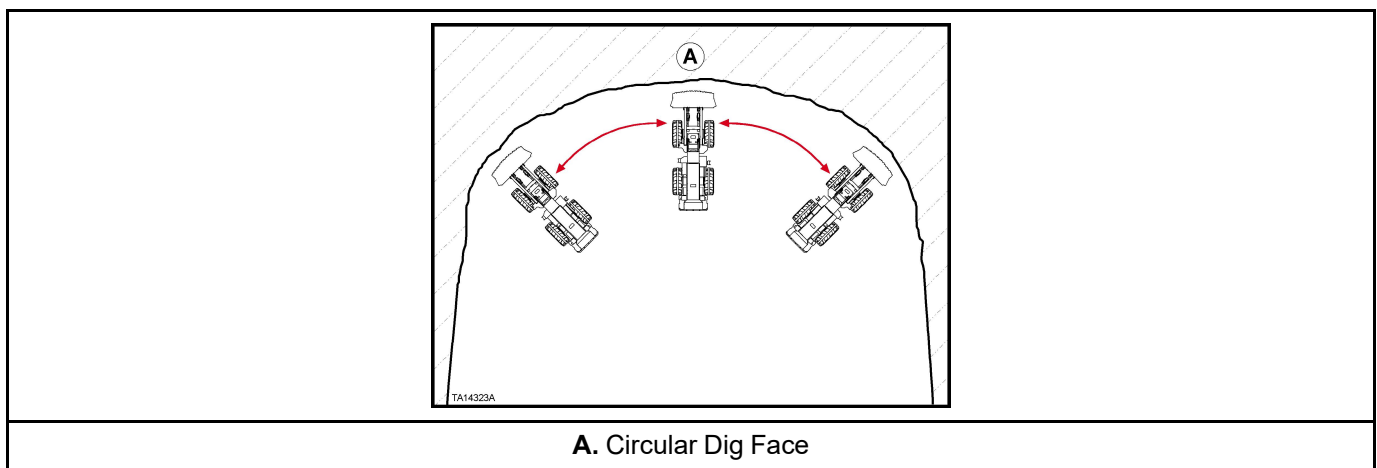
The most common is the practice of keeping a square dig face. One inherent problem with this theory is that while digging on the left side and right side, uneven stress to the lift arms is added due to the resistance of the dig face as well as the wall. This theory of digging also leads to off side loading of trucks and breaks any consistency or rhythm of the pit traffic. Straight dig faces are difficult to keep the corners. Loaders and trucks are forced to be parallel to high wall or dig face. It puts operators directly under the high wall or spoil pile that could have catastrophic results in the event of a wall collapse or slough.

Figure 67: Square dig face



Circular digging addresses these issues and allows the pit traffic to remain constant and keeps operators from paralleling high walls and spoil piles. Circular digging also allows machines to work in small work areas by spreading the dig face into a more user friendly arc.

Figure 68: Circular dig face

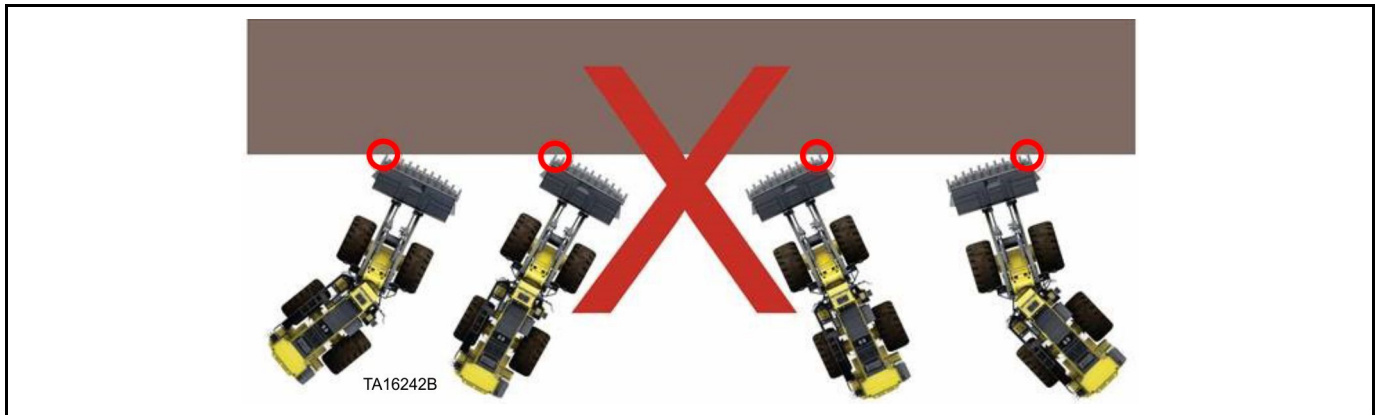


CAUTION

Equipment damage is possible if operating the machine too close to the bank or high wall. Do not operate the machine parallel, and close to the bank or high wall. Material can fall, damaging equipment. Always leave enough room between the bank or high wall and the machine to move to safety should material fall from the bank or high wall or if the bank or high wall collapses. Failure to leave enough room between the machine and the bank or high wall can cause crush hazards resulting equipment damage.

Do not corner dig with the bucket. Serious equipment damage is possible.

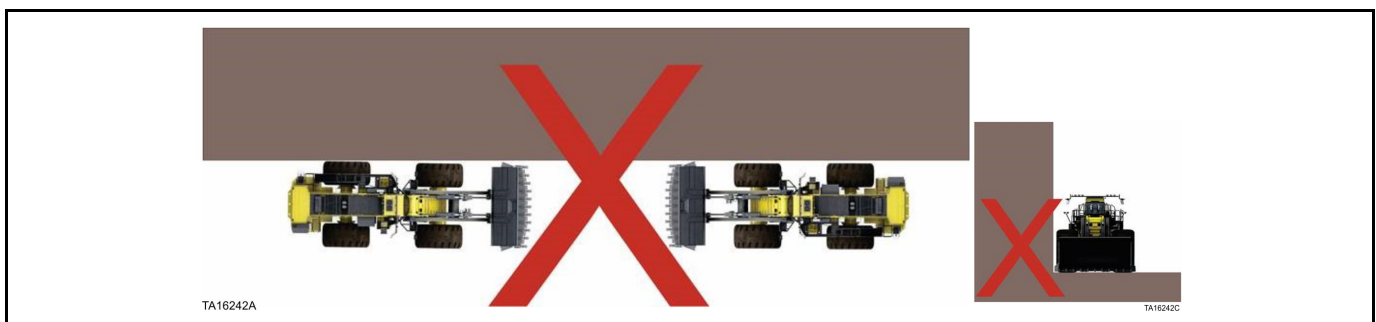
Figure 69: Do not corner dig



⚠ WARNING

Crush hazards exist if operating the machine too close to the bank or high wall. Do not operate the machine parallel, and close to the bank or high wall. Material can fall, crushing personnel. Always leave enough room between the bank or high wall and the machine to move to safety should material fall from the bank or high wall or if the bank or high wall collapses. Failure to leave enough room between the machine and the bank or high wall can cause crush hazards resulting in serious injury or death.

Figure 70: Do not operate close and sideways to the bank (or highwall)



Managing the Dig Face

What is the optimum dig face height? As high as can be safely work under. 20 feet (6 meters) was the standard for years. As the equipment gets bigger, so do the dig faces. 60 foot (18 meters) is not unheard of in some mines. If its full of very large, round boulders, it is better to error on the side of safety. Do not operate the machine so close to the dig face as to endanger the operator or to damage the machine with falling rocks or material.

Controlling the Dig Face

The idea is to stay at one location in the dig face to create an avalanche to feed the loader. Once that “rock slide” begins to fall, the dig face becomes active and does 50% of the work. This is the goal. Once it starts falling it is time to start moving one truck width to the left. Stay disciplined and leave that area that’s falling alone. It will help on the next round. Once the next area is falling, move to the left another truck width. Repeat across the dig face. When the end is reached, start back where the process was started and all that material that has been falling will act like a natural feeder.

Operation

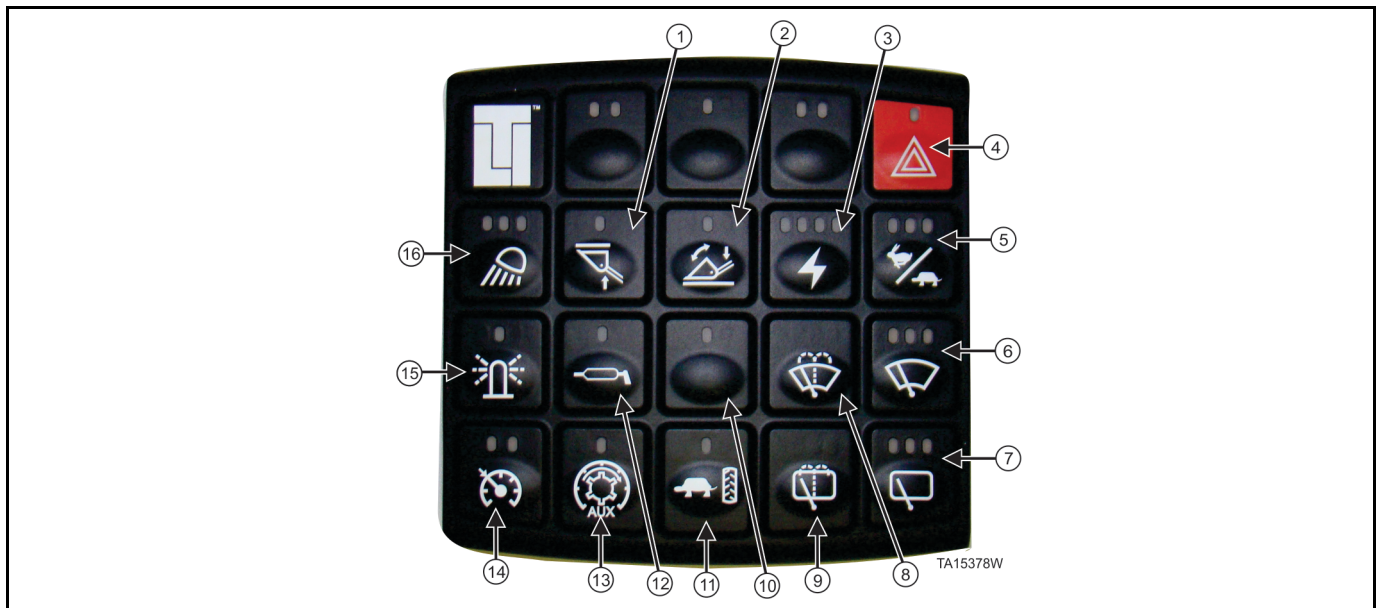
Loading trucks is essentially repeating six steps;

1. Digging (filling the bucket)
2. Hoisting the bucket
3. Traveling to Destination (Truck, Hopper, etc.)
4. Dumping the Bucket
5. Lowering the Bucket (Float)
6. Travel back to Dig Face

Operators new to Komatsu equipment should focus on completing each step flawlessly and then start to blend step one with step two, step two with step three and so on. Form and smoothness should be the goals as speed will follow. The Loader should never stop; thus becoming one flowing movement without jerkiness and bouncing.

Using the Bucket Auto Level

Figure 71: Use the bucket auto level on overhead keypad (Item#2)



1. Alternate Height Switch

2. Return to Dig /Bucket Auto Level Switch

3. Drive Enable Switch

4. Hazard Switch

5. Throttle Switch

6. Front Windshield Wiper Switch

7. Rear Window Wiper Switch

8. Front Windshield Washer Switch

9. Rear Window Washer Switch

10. Not Used

11. Alternate Speed Switch

12. Auto Lube Switch

13. Auxiliary Torque Switch

14. Cruise Switch

15. Beacon Switch

16. Light Switch

Bucket Auto Level



The Auto Level Switch is a two-position momentary pushbutton switch. This switch enables or disables the auto-leveling feature of the bucket.

- When the switch is pressed, the auto-leveling feature is enabled. The left LED will illuminate.

- Pressing the switch a second time disables the auto-level feature and the LED goes out.
- If the auto-leveling feature is switched from disabled to enabled, and the button is pressed and held for a minimum of 2 seconds, while the lift arms are below 0°, the current angle of the bucket is recorded as the bucket angle to which to auto level.

Sometimes the bucket auto level will be reset a few hundred times during a shift. Conditions are always changing.

- If the digging gets hard, change the bucket angle so the teeth are digging deeper.
- If holes are being dug, change the bucket angle so the teeth are not digging as deep.

Some operators like to let the bucket land close, then adjust it every single time manually. This can be cumbersome as the bucket will not hit the same exact spot every time. The floor will resemble that.

However, the machine will land in the same exact spot every time, and the floor will resemble that.

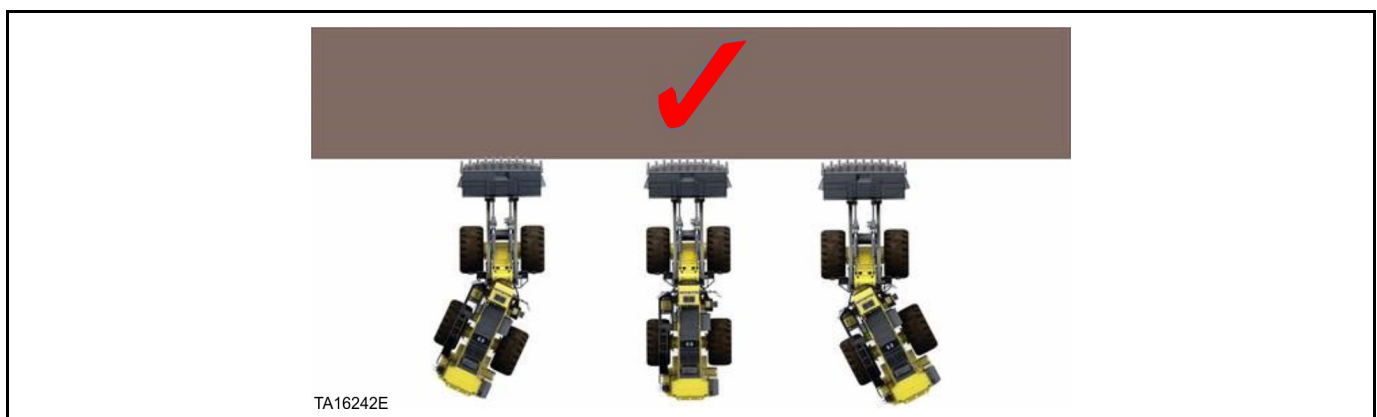
Digging

When digging, always engage the bucket straight with the bank. When approaching the bank, the bucket should be approximately 1" off the ground, and the loader ground speed should be about 4 MPH. As the bucket engages the bank, begin to curl and lift the bucket. This simultaneous action not only utilizes the hydraulic strength of the lift and curl cylinders, but also takes advantage of the forward motion of the loader. The bucket section of the hydraulic system has priority over the hoist so when the bucket is curled, the hoist will stop or slow noticeably. Use the speed control pedal to provide sufficient power for proper penetration, but DO NOT allow the tires to spin.

Steps to complete a cycle

1. Approach the dig face around 4 mph.
2. Bucket set to just grazing the floor with the teeth.
3. Slightly curl the bucket when propulsion into the face slows.
4. Then hoist while maintaining bucket contact by using the speed control pedal.
5. Once hoist slows, curl back a little more while maintaining bucket contact in the dig face.
6. Ideally, the machine will break out of the dig face with a full bucket when hoist is just above being directly in line with the cab.

Figure 72: Engage the bucket straight with the bank



The bucket should always be filled low in the bank. The bucket should be full, not over-full. The spill guard on the back of the bucket is to protect from spillage off the back of the bucket while in forward motion. If this area is already full, material has no place to go except over the back of the bucket, possibly damaging the machine or causing severe injury or death to the operator.

Figure 73: Bucket loading

<p>TA9321</p> <p>(A)</p>	<p>(B)</p>	<p>TA9321C</p>
<p>1. Heaped Material</p> <p>2. Spill Guard</p> <p>3. End Of Bucket Sheet</p>	<p>A. WRONG</p> <p>B. CORRECT</p>	<p>CORRECT</p>

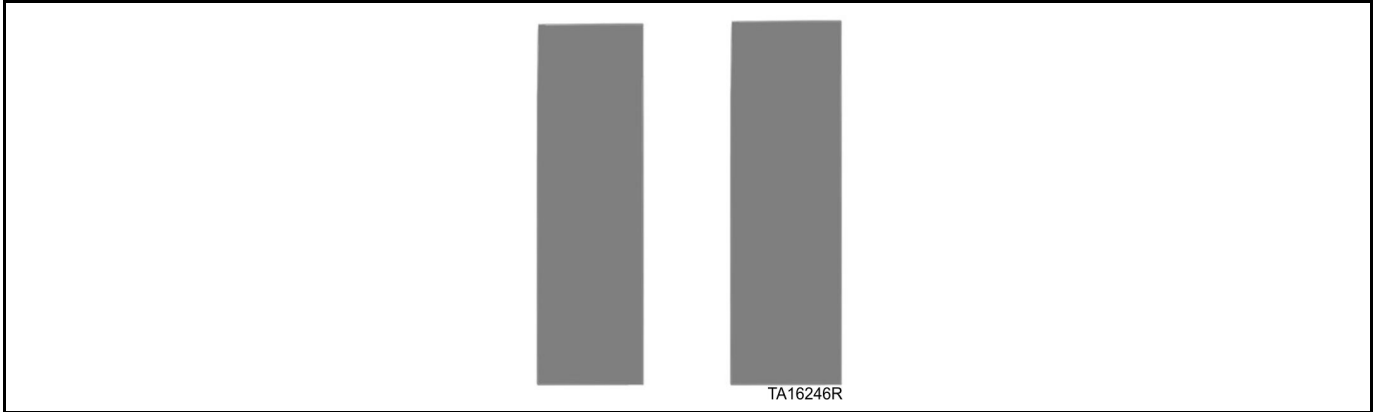
Recognizing the Signs of Bucket Position

When backing away from the dig face, look at the marks the teeth left in the floor. Marks on the floor indicate desirable and undesirable bucket and teeth position.



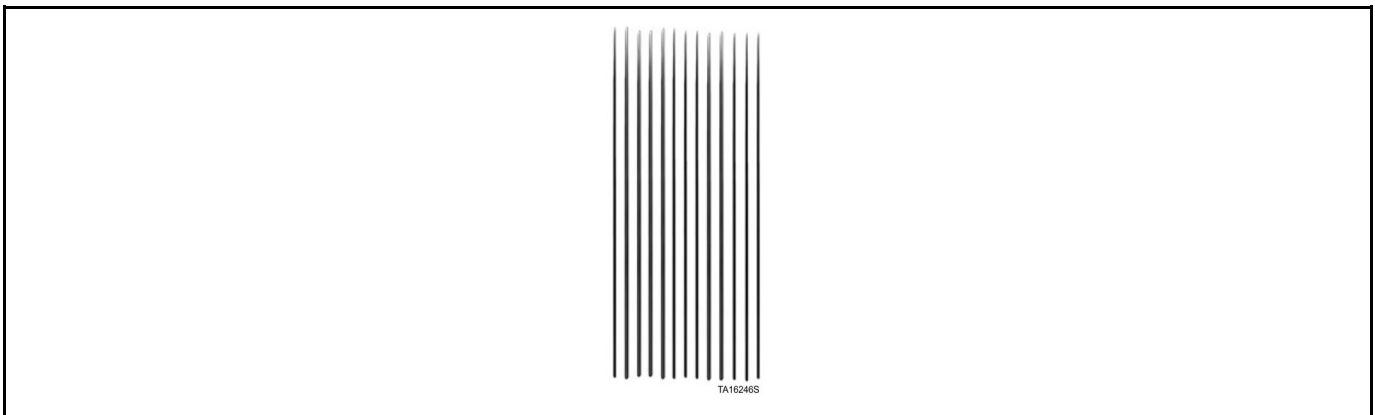
Bucket teeth too high

Heal plate marks are visible.



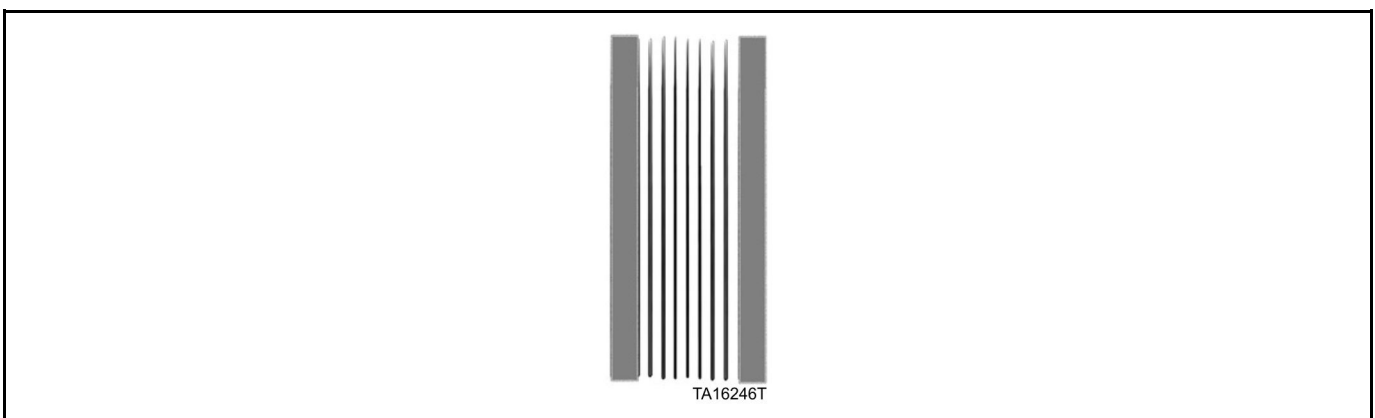
Bucket teeth too low

Deep ridges are visible.



Ideal

Slight ridges are visible, but the tires flatten them out



NOTICE

Every floor is different. Find the right combination for each application

Hoisting and Traveling to the Truck

These two “steps” occur simultaneously in efficient loader operation. Once the bucket is full, begin to back away from the loading face. As soon as the bucket is no longer engaged in the material, begin hoisting while continuing to back out. Once backed out far enough, the machine should be brought to a smooth stop, shifted to forward and forward motion resumed while the hoisting motion continues. Approach the truck slowly, making sure the bucket is high enough to prevent contact of any kind between the loader bucket or arms and the side rails on the truck. With the loader hoisting from the time the full bucket is obtained, the operator should be in place at the truck and ready to dump as the bucket reaches the proper height. This requires coordination and practice to achieve man and machine performing as one fluid movement.

Dumping the Bucket

Once the bucket is over the truck bed, begin to dump the load. Dump the first load into the truck slowly to prevent damage to the truck beds liners. This first bucket will act as bedding for the following buckets. Depending on the Loader to Truck match, it may be necessary to level the bucket before pulling away from the truck to ensure the bucket will not “rake” the bed rails of the truck. Do not allow any contact between the loader and the truck.

Lowering the Bucket and Traveling to the Dig Face

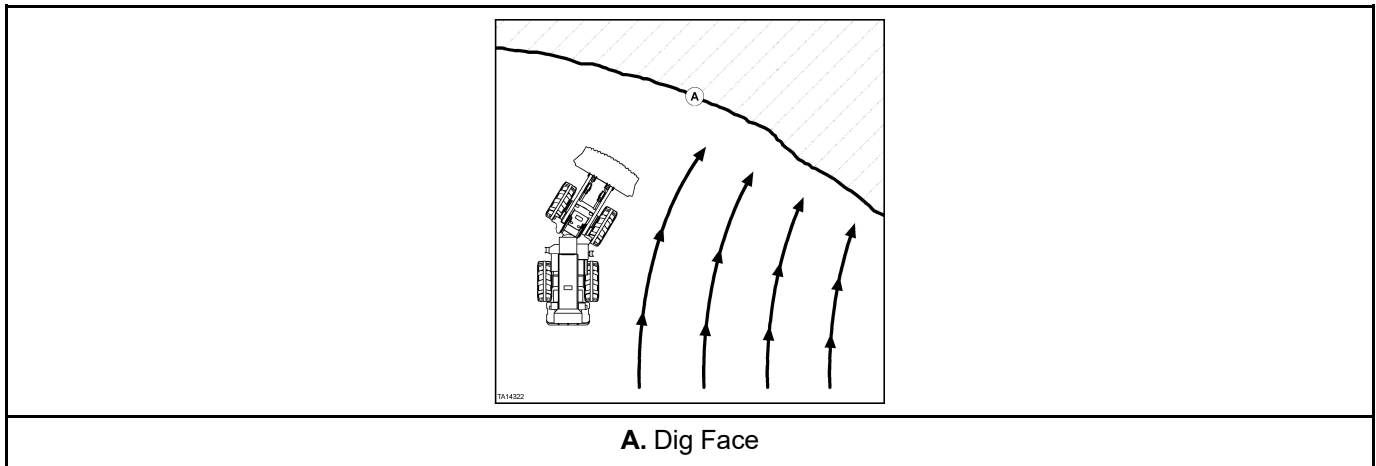
Once the loader has backed away from the truck, begin lowering the bucket by selecting “back to dig”. This allows the bucket to lower rapidly, but not in a free fall. The auto level feature will automatically level the bucket for the operator. When timed properly, the loader bucket should be close enough to the ground that hoist is ready to be applied. This takes practice and should not be expected with new operators. Note, if spillage occurs, take the time to clean it while preparing to get the next bucket. Do not run over spillage as tire damage will occur.

Pit Floor Maintenance

Experienced loader operators pride themselves on the floor they keep. It is easy to judge a loader operators’ skill simply by looking at the floor they keep.

A simple way to keep a floor on grade and free of debris is to start on one side of the work area and utilize a sweeping motion with the loader bucket. This will keep windrows to the outside of the arc. While the inside of the bucket will follow the grade of the previous pass, the outside edge of the bucket will cut and fill as needed. It may take several passes to fix a bad floor and with practice, can be accomplished while still loading trucks.

Figure 74: Pit floor maintenance



Maintaining Grade

<p>Session Session Time : 00:18:48 TA16246U</p> <p>A screenshot from a simulation showing a yellow wheel loader in a large, curved pit. The loader is positioned on the floor, and the walls of the pit are visible in the background. The simulation interface includes a 'Session' header, a 'Session Time' of 00:18:48, and a file identifier 'TA16246U'.</p>	<p>It is easier to keep grade at the dig face, not 10' or 20' away.</p>
<p>Session Session Time : 00:19:28 TA16246V</p> <p>A screenshot from a simulation showing a yellow wheel loader in a large, curved pit. The loader is positioned on the floor, and the walls of the pit are visible in the background. The simulation interface includes a 'Session' header, a 'Session Time' of 00:19:28, and a file identifier 'TA16246V'.</p>	<p>Don't be afraid to get aggressive.</p>

Responding to Bucket Overloads

- If a “yellow warning” overload occurs, proceed with caution and dump normally.
 - There is a misconception that getting an overload yellow warning is a bad thing. It is actually good, as it shows that the machine is being used to capacity.
- If a “red warning” critical overload occurs, simply take it back to the dig face and dump it out.
 - Red warning critical overloads happen, but not very often.

The operator should watch the hoisting of the day’s first bucket load when approaching the truck to be loaded. If the bucket stops before it reaches the normal top (refer to HOISTING THE LOAD, below) or stops before rising past the required dump height of the sides of the truck, the bucket is overloaded. Overloading is harmful to the loader.

NOTICE

If the bucket is loaded to 120% of rated capacity hoisting action is inhibited, the yellow light will illuminate, the audible alarm will sound and the text screen indicating bucket overload will appear on the touch screen. The audible alarm can be silenced and the text message removed from the screen by pressing the Acknowledge button. However, the yellow light will continue to illuminate.

If overloading occurs and the bucket stops, the operator must push the Hoist Joystick forward to lower the lift arms and use the Bucket Control Switch or move the Hoist Joystick to the right to dump the bucket.

On the next cycle, the operator must not load as much material into the bucket as was in the previous load. If this loaded bucket goes to the normal top without stopping, it is not critically overloaded. Properly loaded buckets (not overloaded) reflect good work practice by the operator and results in reliable machine performance.

The amount of material in the bucket can be monitored by checking the production data screen on the touch screen.

NOTICE

Should an overload cause the machine to tip forward while hoisting or transporting a load, DO NOT PANIC! Do not articulate the machine. Lower the bucket to the ground and the machine will stabilize.

All lift capacities are based on the criteria of the machine being level, on firm supporting ground. When the machine is operated in conditions that deviate from these criteria (e.g. on soft or uneven ground, on slope or when subject to slide loads), these conditions shall be taken into account by the operator.

The bucket for the loader is rated as follows.

NOTICE

These ratings are based on ISO standards.

DO NOT load material onto the spill guard as the bucket will be overloaded and this could damage the loader and result in injury to the operator. The bucket should be loaded only to the bottom of the spill guard. Refer to text titled “Digging” as described previously in this section.

Machine	Standard Lift Lbs.	High Lift Lbs.	Super High Lift
L-1350	90,000 lbs. (40,823 kgs.)	84,000 lbs. (38,102 kgs.)	N/A
L-1850	120,000 lbs. (54,431 kgs.)	110,000 lbs. (49,895 kgs.)	N/A
L-2350	160,000 lbs. (72,574 kgs.)	150,000 lbs. (68,039 kgs.)	120,000 lbs. (54,431 kgs.)

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Operator's Daily or Pre-Shift Walk-Around Inspection and Service

The "Operator's Walk-around" provides a list of items to be checked/inspected before every shift. This information is provided in a checklist form that can be filled for record keeping purposes. A condensed checklist is provided at the end of the document and can be used once the operator becomes familiar with all areas being checked.

NOTICE

The left or right side of the machine is determined as when sitting in the operator seat.

Walk-around inspection starts at the left rear planetary drive and progresses clockwise around the machine and progresses to the cab. Refer to illustration "Position Chart" for position locations. Numbers show the general location of referenced components. Walk-around inspection requires hardhat, safety glasses, a flashlight, and any other safety equipment required by your work location.

A checklist is provided at the end of this section for use in the operator walk around.

Safety Preparations for Operators Daily or Pre-shift Walk Around



WARNING

Crush hazards exist if the machine is started or moves while inspections are being conducted. Place bucket flat and level on the ground. Lock out the machine's starting capability before performing any inspection. Follow all lockout tag out rules, local rules, and local regulations to return the machine back to service. Failure to follow all lockout tag out rules, local rules, and local regulations for returning the machine back into operating condition could cause unexpected equipment component movement for personnel in the area, resulting in serious injury or death.



WARNING

Crush hazard exists if relieving hydraulic pressure from the hoist and bucket circuit. Before servicing or repairing anything pertaining to the hydraulic system, the pressure should always be relieved from the hoist and bucket hydraulic circuits. The area must be cleared of all personnel before relieving hydraulic pressure from the hoist and bucket circuit. Relieving pressure by using the "MANUAL BLEED VALVE ASSEMBLY" (Refer to Section 04 in the Service Manual), can cause the lift arms and bucket to descend rapidly. The machine must NOT be running when using the manual bleed valve assembly. Failure to clear the area of all personnel can cause a crush hazard that could result in serious injury or death.

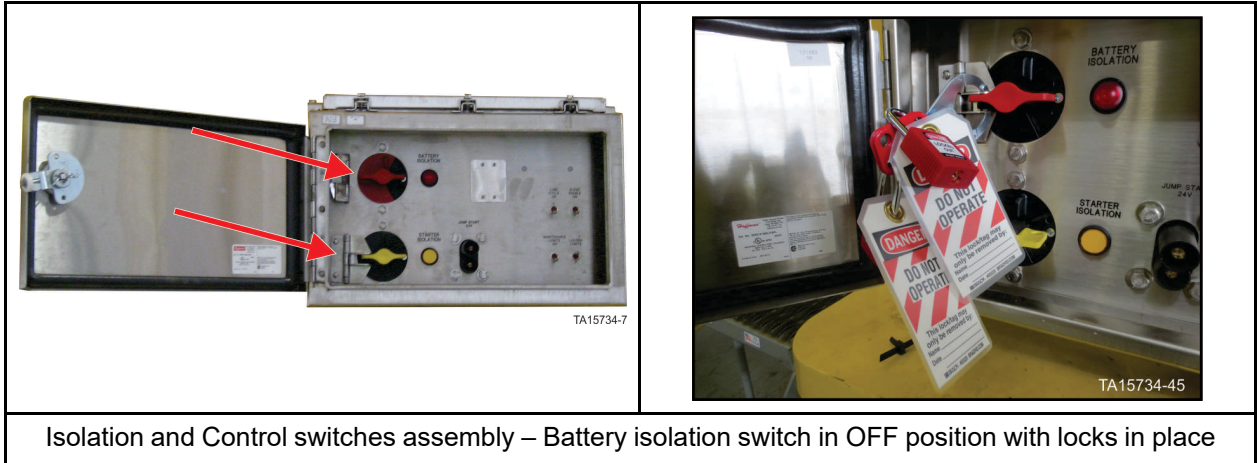


WARNING

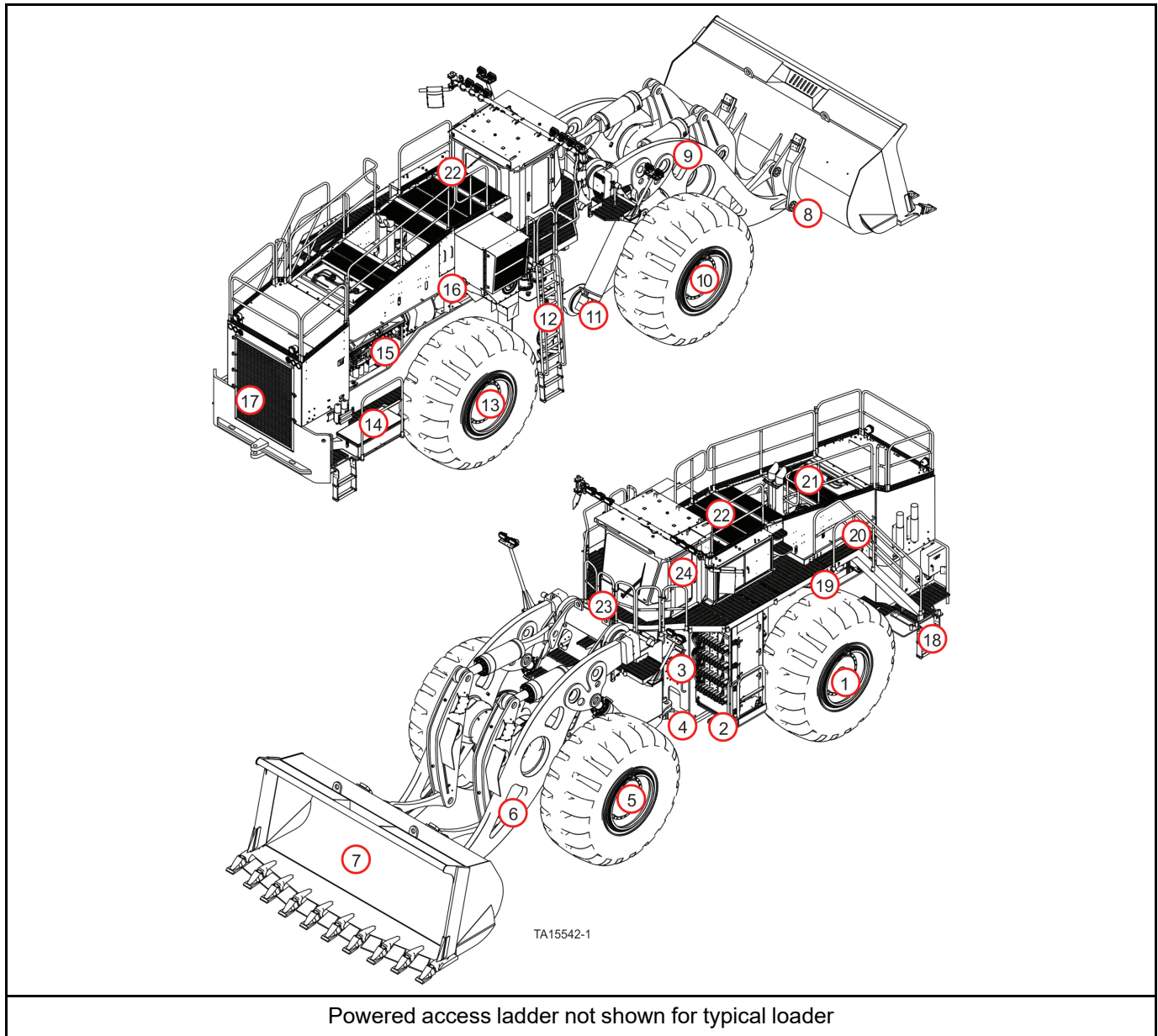
Electrical shock hazard exists when the generator is primed and operating and until 5 minutes after the machine is shut down. High voltage is present on the dynamic grids when the generator is primed and operating. Do not touch electrical connections or braking grids until at least 5 minutes after the machine is shut down and ignition key is off. Touching electrical connections or braking grids can cause electrical shock 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.
- Step 3:** Set the parking brakes.
- Step 4:** Shut off the engine.
- Step 5:** Turn on maintenance light switch located at left rear of machine in Control Switch Box Assembly.
- Step 6:** Lock out the machine's starting capability before performing any inspections.
- Step 7:** Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.



Position Chart for Operator Walkaround



Walk Around Checklist

Chart Position	Operator Daily or Pre-Shift Walk Around		Checked	Service Required
	Item to check/inspect			
1	Left rear planetary drive and wheel/tire.			
	a.	Planetary drive cover structure bolts loose or missing?		
	b.	Planetary drive oil leaks?		
	c.	Loose or missing wheel retaining bolts?		
	d.	Tire damage?		
	e.	Rim damage?		
	f.	Cooling duct to rear axle in place and secure?		
2	Platform and High Voltage cabinet.			
	a.	Platform clean and secure?		
	b.	Cabinet door latched and sealed?		
3	Safety Link properly retained?			
	Left pivot area, steering cylinders, and stop pad.			
	a.	Auto lube system functioning properly, a wet look of fresh grease at cylinder rod eyes?		
	b.	Steering filter leaks?		
	c.	Steering cylinder hydraulic leaks?		
	d.	Steering stop pad in good condition and secure?		
	e.	Use remote drain assembly to drain moisture from compressed air system reservoirs inside rear frame.		
	f.	Safety or instructional labels deteriorated, damaged, or missing?		
	Inside rear frame (enter at pivot area).			
	a.	Oil leaks?		
	b.	Hydraulic Pump Drive Gearbox oil level at specified level? (Check sight gauges on gearbox. If low, locate and repair leak and fill before commencing operation.)		
	c.	Hydraulic Pump Gearbox mounts secure?		
	d.	Any loose bolts?		
	e.	Any flammable liquid, material, or debris? If so, remove before operating machine.		
	Under front frame and rear frame.			
	a.	Any leaks noted - location - appearance of fluid?		

Chart Position	Operator Daily or Pre-Shift Walk Around	Checked	Service Required
	Item to check/inspect		
3	Inside front frame (enter at left pivot area): <div style="background-color: #0070C0; color: white; text-align: center; padding: 5px;">NOTICE</div> <i>Turn on Maintenance Lights with switch located at left rear of machine in the Control Switch Box Assembly.</i>		
	a. Oil leaks?		
	b. Grease lines broken, twisted, or kinked?		
	c. Hoses and wiring undamaged and secure?		
	d. Cooling ducts and hoses secure?		
	e. Safety or instructional labels deteriorated, damaged, or missing?		
	f. Any flammable liquid, material, or debris? If so, remove before operating machine.		
4	Left hoist cylinder		
	a. Ball cap retaining bolts loose or missing?		
	b. Grease line broken, twisted, or kinked?		
	c. Auto lube system functioning properly; a wet look of fresh grease at ball cap?		
	d. Hydraulic leaks?		
e. Safety or instructional labels deteriorated, damaged, or missing?			
5	Left front planetary drive and wheel/tire.		
	a. Planetary drive cover structure bolts loose or missing?		
	b. Planetary drive oil leaks?		
	c. Loose or missing wheel retaining bolts?		
	d. Tire damage		
	e. Rim damage		
f. Safety or instructional labels deteriorated, damaged, or missing?			
6	Left side Lift arms (lower)		
	a. Grease lines broken, twisted, or kinked?		
	b. Auto lube system functioning properly, a wet look of fresh grease at lube points?		
	c. Visible cracks in lift arms? DO NOT OPERATE MACHINE IF CRACKS ARE PRESENT!		

Chart Position	Operator Daily or Pre-Shift Walk Around		Checked	Service Required
	Item to check/inspect			
6	Left side, bellcrank, area and rear of bucket.			
	a.	Bucket retaining pins intact?		
	b.	Rollback and dump stop pads in good condition?		
	c.	Bellcrank pivot bolts loose or missing?		
	d.	Grease lines broken, twisted, or kinked?		
	e.	Auto lube system functioning properly — a wet look of fresh grease at pin bores?		
	f.	Safety or instructional labels deteriorated, damaged, or missing? (Check front axle).		
7	Bucket			
	a.	Visible Cracks?		
	b.	Damage?		
	c.	Missing, damaged or loose teeth, or lip coverage parts?		
8	Right side, bellcrank area, and rear of bucket.			
	a.	Bucket retaining pins intact?		
	b.	Rollback and dump stop pads in good condition?		
	c.	Bellcrank pivot bolts loose or missing?		
	d.	Grease lines broken, twisted or kinked?		
	e.	Auto lube system functioning properly, a wet look of fresh grease at pin bores?		
	f.	Safety or instructional labels deteriorated, damaged or missing?		
9	Right side Lift arms (lower)			
	a.	Grease lines broken, twisted, or kinked?		
	b.	Auto lube system functioning properly, a wet look of fresh grease at lube points?		
	c.	Visible cracks in lift arms? DO NOT OPERATE MACHINE IF CRACKS ARE PRESENT!		
10	Front Axle			
	a.	Front axle access cover in place and secure?		
	b.	Safety or instructional labels deteriorated, damaged, or missing?		

Chart Position	Operator Daily or Pre-Shift Walk Around	Checked	Service Required
	Item to check/inspect		
10	Right front planetary drive and wheel/tire.		
	a. Planetary drive cover structure bolts loose or missing?		
	b. Planetary drive oil leaks?		
	c. Loose or missing wheel retaining bolts?		
	d. Planetary drive to axle retaining bolts loose or missing?		
	e. Tire damage?		
	f. Rim damage?		
	g. Safety or instructional labels deteriorated, damaged, or missing?		
11	Right hoist cylinder.		
	a. Ball cap retaining bolts loose or missing?		
	b. Grease line broken, twisted, or kinked?		
	c. Auto lube system functioning properly, a wet look of fresh grease at ball cap?		
	d. Hydraulic leaks?		
	e. Steering position transducer intact?		
	f. Safety or instructional labels deteriorated, damaged, or missing?		
12	Hydraulic reservoir - climb ladder right side.		
	a. Ladder clean and secure?		
	b. Oil level in sight glass to spec level? (approximately ¾ full in sight glass)		
	c. Reservoir mounts intact?		
	d. Filler cap in place and tight?		
	e. Hydraulic leaks?		
	f. Manual air release valve in closed position?		
	g. Automatic air (release) valve button pushed IN to closed position?		
	h. Check KLENZ™ filtration system air intake for a buildup of coal dust or dirt.		
13	Right rear planetary drive and wheel/tire.		
	a. Planetary drive cover structure bolts loose or missing?		
	b. Planetary drive oil leaks?		
	c. Loose or missing wheel retaining bolts?		
	d. Tire damage?		
	e. Rim damage?		
	f. Safety or instructional labels deteriorated, damaged, or missing?		

Chart Position	Operator Daily or Pre-Shift Walk Around		Checked	Service Required
	Item to check/inspect			
14	Right rear of machine.			
	a.	Battery box intact?		
	b.	Check auxiliary oil cooler (If present) for cleanliness and for hydraulic leaks.		
15 / 16	Engine compartment (right side).			
	a.	Coolant leaks at engine, hoses, radiator?		
	b.	Drive belts in good condition? (If visible without pulling guards)		
	c.	Fuel leaks?		
	d.	Engine oil leaks?		
	e.	Wiring in good condition and secure?		
	f.	Fan, fan grill, and hood grating in good condition and secure?		
	g.	Guards in place and secure?		
	h.	Check engine oil level (if dipstick on this side).		
	i.	Cooling air duct to generator in place and secure?		
	j.	Mufflers in good shape and secure?		
	k.	Fire suppression system bottles, nozzles, and hoses in good condition? (optional)		
	l.	Anything that might present a fire hazard?		
	m.	Safety or instructional labels deteriorated, damaged, or missing?		
		Engine air intake tubes and supports:		
a.	Inspect for deterioration of rubber or metal.			
b.	Inspect brackets for tightness.			
c.	Hoses secure and against welded lip of tubing.			
17	Rear of machine.			
	a.	Radiator and hydraulic oil cooler core clean?		
	b.	Braking grids secure and clean? (DO NOT TOUCH until at least 5 minutes after machine is shut down).		
	c.	Rear lights and backup alarm in good condition/positioned correctly?		
18	Left rear of machine.			
	a.	Fuel reservoir cap secure?		
	b.	Central Service System in good condition and box cover closed? (optional)		
	c.	Powered access ladder in good condition (if present). Free of debris or slippery surfaces?		
	d.	Powered access ladder operating properly? (if present)		
	e.	Flexible step, clean and in good condition (if present)		

Chart Position	Operator Daily or Pre-Shift Walk Around		Checked	Service Required	
	Item to check/inspect				
19	Engine compartment (left side).				
	a.	Coolant leaks at engine, hoses, and radiator?			
	b.	Drive belts okay? (if visible - without pulling guards)			
	c.	Fuel leaks?			
	d.	Engine oil leaks?			
	e.	Wiring in good shape and secure?			
	f.	Fan, fan grill, and hood grating in good shape and secure?			
	g.	Guards in place and secure?			
	h.	Check engine oil level (if dipstick on this side).			
	i.	Fire suppression system bottles, nozzles, and hoses intact? (optional)			
	j.	Anything that might present a fire hazard?			
	k.	Safety or instructional labels deteriorated, damaged, or missing?			
	l.	Inspect engine air intake tubes and supports:	Deterioration of rubber or metal.		
			Brackets for tightness.		
			Hoses secure and against welded lip of tubing.		
m.	Check air filter restriction indicators. Replace engine air filters and safety elements immediately, if required.**Refer to footnote 1 at end of schedules.				
n.	Check converter coolant system pumps, connections, and hoses for leaks.				
o.	Engine exhaust wrap in good condition.				
20	Fire system secure and intact?				
21	Climb stairs left side of rear frame.				
	a.	Check radiator coolant level at sight glass. Check hoses for leaks.			
	b.	Check drive module coolant reservoir fluid level. Check hoses for leaks.			
	Top of rear frame.				
	a.	Exhaust pipes and clamps in good shape and secure?			
	b.	Grating and handrails in good shape and secure?			
c.	Check air filter restriction indicators. Replace engine air filters and safety elements immediately, if required.**Refer to footnote 2 at end of schedules.				

Chart Position	Operator Daily or Pre-Shift Walk Around		Checked	Service Required	
	Item to check/inspect				
22/23	Front and rear cab area/top of rear frame.				
	a.	Ladders, guardrails, and catwalks clean and secure?			
	b.	Lights in good condition?			
	c.	Bucket level transducer intact?			
	d.	Hoist position transducer intact?			
	e.	Air conditioner cover in place and secure?			
	f.	Clean the windows and note any cracks.			
	g.	Wiper blades in good condition?			
	h.	Windshield washer reservoir level full?			
	i.	Mirrors securely attached and not broken?			
23	Lift arms (upper) - visual inspection standing in front of cab.				
	a.	Grease lines broken, twisted, or kinked?			
	b.	Auto lube system functioning properly; a wet look of fresh grease at ball caps and pins?			
	c.	Dump stop pads in good condition and secure?			
	d.	Visual cracks in lift arms? Do NOT operate machine if cracks are present.			
24	Cab interior.				
	a.	Cab door latch, hinges and weather stripping in good shape and operating properly?			
	b.	Cab interior lights operating properly?			
	c.	Windshield wipers operating properly?			
	d.	Work lights operating properly?			
	e.	Mirrors adjusted properly.			
	f.	Seat and seatbelt:	Operating properly?		
			In good condition?		
			Seat attachment bolts tight?		
	g.	Safety or instructional labels deteriorated, damaged or missing.			
	h.	Radio operating properly. (optional)			
	i.	Customer installed communication devices operating properly.			
	j.	Perform any fire suppression system checks/maintenance as required by the specific system manufacturer (Refer to vendor reference material located in section 1-4 Controls and Operation).			


Chart Position	Operator Daily or Pre-Shift Walk Around	Checked	Service Required	
	Item to check/inspect			
24	Operational tests.			
	a. Any unsecured items in cab that might present a safety hazard (secure all such items before starting engine)?			
	b. Start engine per appropriate engine starting procedure and engine manufacturer owner's manual, if prior inspections indicate it is safe to do so. Blow horn for one to three seconds and wait at least 30 seconds before starting engine.			
	 WARNING			
	<p>Entanglement in the drive shaft or engine belts, burns if working on the engine exhaust or around hydraulic fluid or engine fluid, cuts/dismemberment if working on the radiator fan, electrical shock if working on the electrical system, skin injection from hydraulic fluid if working on high pressure side of hydraulic system, hearing loss from sonic sounds if working inside KLENZ system and other hazards exist. ALWAYS sound the horn for 2-3 seconds prior to starting the engine to alert personnel on the machine or in close proximity to it that the engine is about to start. Allow at least 30 seconds for them to clear the area before starting the engine. Check wing mirrors and all sides of machine from a seated position. If the horn is inoperable (see the following NOTICE), and if allowed by local rules and regulations, dismount the machine, and walk around it to be sure no one is on the machine or in close proximity to it before starting the engine. Always follow all local startup procedures before starting the machine. Failure to allow ample time for personnel to leave the area before starting the engine could cause entanglement, burns, cuts/dismemberment, electrical shock, hearing loss, skin injection, and other hazards resulting in serious injury or death.</p>			
	Operational tests (continued).			
	c. LINCSEII® display monitor operating properly?			
	d. No "alarm" or "warning" messages?			
	e. Heater/air conditioner operating properly?			
		Move machine, for a short distance, in forward and reverse directions. Operate all controls through slow speed operation.		
	f.	(1) Any limits out of adjustment? If problems noted, discontinue operation and correct before commencing material handling operations.		
		(2) Any binding, over travel, sluggish operation or unusual noises? If problems noted, discontinue operation and correct before commencing material handling operations.		
g.	Brakes operating properly?			
	Dynamic Braking			
	Service Brake			
	Park Brakes			

Chart Position	Operator Daily or Pre-Shift Walk Around		Checked	Service Required
	Item to check/inspect			
24 Cont'd	h.	Direction select switch (FNR) on left steering joystick operating properly.		
	i.	Foot pedals free of obstructions and operating properly?		
	j.	Backup alarm functioning properly?		
	k.	Steering operating properly?		
	l.	Hoist and bucket joystick operating properly?		
	Compressed Air system			
	a.	Repair air leaks and problems as soon as possible, as indicated by LINCAS alarms and messages.		

NOTICE

If mechanical or safety problems are noted which might cause damage to the machine or support vehicles, or cause personal injury, DO NOT operate the loader. Lockout the machine's starting capability, remove the key, and notify maintenance personnel of the problem(s).

Note 1: This location is based on machine model. Some models have engine air gauge restriction junction box located on top of Low Voltage Control Center (LVCC) at top of stairway.

Note 2: This location is based on machine model. Some models have engine air gauge restriction junction box located in front of the rear tire, left side.



WARNING

Crush hazards exist from unexpected equipment component movement. When inspection and service is complete, follow all lockout tag out rules, local rules, and local regulations to return the machine back to service. Failure to follow all lockout tag out rules, local rules, and local regulations for returning the machine back into operating condition could cause unexpected equipment component movement for personnel in the area, resulting in serious injury or death.

Walk Around Quick Reference Chart

Chart Position	Item to check/inspect	Notes
1	Left rear planetary drive and wheel/tire; loose bolts cover leaks tire damage wheel damage cooling duct.	

Operator's Daily or Pre-Shift Walk-Around Inspection Controls and Operations For Wheel Loaders— Gen3 and Service

Chart Position	Item to check/inspect	Notes
2	Platform and high voltage cabinet: dirt debris secure high voltage cabinet coolant connections.	
3	Left pivot area: steering cylinders remote air system drain valves stop pad.	
	Inside rear frame: leaks gearbox oil level mounts secure loose bolts fire hazard.	
	Inside front frame: leaks hoses cooling ducts wiring fire hazard.	
	Under front frame and rear frame: leaks fire hazard	
4	Left hoist cylinder: ball caps grease lines fresh grease leaks	
5	Left front planetary drive and wheel/tire: loose bolts cover leaks tire damage wheel damage	
6	Lift arms (lower): visible cracks grease lines fresh grease	
	Left side, Bellcrank, area and rear of bucket: bucket pins intact stop pads Bellcrank pivot bolts grease lines fresh grease	
7	Bucket: visible cracks damage teeth lip coverage system parts.	
8	Right side, bellcrank area, and rear of bucket: bucket pins intact stop pads Bellcrank pivot bolts grease lines fresh grease.	
	Front Axle: access covers vents	
8/9	Lift arms (lower): grease lines fresh grease visible cracks.	
10	Right front planetary drive and wheel/tire: loose bolts cover leaks tire damage wheel damage	
11	Right hoist cylinder: ball caps grease lines fresh grease leaks steering positioned.	
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Do's and Don'ts

This section contains some specific DOs and DON'Ts that apply to the operation of the loader. Compliance with the DOs and DON'Ts will be conducive to a longer operating life of the loader. Non-compliance could cause damage to the loader and also endanger the operator. These DOs and DON'Ts do not cover all possibilities but include those rules that are most frequently overlooked or violated.

Do's

DO - walk completely around the loader, making sure everything is clear, before starting to work.

DO - follow all local rules for starting the machine.

DO - warm up engine with Throttle Switch in the low position until the water temperature gauge indicates that the engine coolant is at least +120°F (49°C) before pushing the Throttle Switch to hi throttle. This will increase engine life (refer to engine manual).

DO - push the Throttle Switch to the low throttle, and let the engine run for several minutes before shutting down. This will equalize engine temperature and increase engine life (refer to engine manual).

DO - depress speed control pedal slowly and smoothly to increase traction and travel speed. Release speed control pedal slowly and smoothly to stop wheel spin, reduce traction, or stop the loader. Quick release will apply full dynamic braking.

DO - enter pile slowly with speed control pedal almost completely released. Push down on pedal a little at a time to maintain proper penetration into pile.

DO - use joystick controls slowly and smoothly to actuate bucket and hoist.

DO - release speed control pedal when digging in pile and hoist does not rise. Failure to rise indicates you have applied too much traction.

DO - use turn signals when appropriate.

DO - move steering joystick smoothly when articulating the machine (turning). Jerking the joystick causes the loader to jerk and spill its load.

DO - report any deficiencies or malfunctions to your foreman.

DO - watch out for other personnel and vehicles in the area.

DO - replace broken or lost bucket teeth immediately to prevent ruining the adapters.

DO - fill the fuel reservoir at the end of each shift. This will prevent condensation from contaminating the fuel. An adequate fuel supply will prevent possible engine damage caused by erratic engine rpm when running low on fuel.

DO - operate the loader from the operator's seat only.

DO - wear seat belt.

DO - avoid sudden stops with a load.

DO - have defects repaired immediately.

DO - make sure mirrors are properly adjusted and clean.

Don'ts

DON'T - use service brakes when changing direction or for normal stopping. All normal braking must be done by releasing the speed control pedal. The service brake may be used to hold the loader stationary, after stopping with the speed control pedal. Only in emergency should the service brakes be used to stop the loader.

DON'T - ram into pile. Ramming causes unnecessary shock to machine structures.

DON'T - use the bucket control switch from ROLLBACK to DUMP in an attempt to load the bucket. This accomplishes very little except unnecessary wear and tear.

DON'T - hit truck hubs with the tires or truck beds with the lift arms or bucket.

DON'T - store fuel in a galvanized reservoir. Fuel oil reacts with the zinc coating to form powdery flakes, which quickly clog fuel filters and strainers and damage fuel filters, strainers, fuel pumps and injectors.

DON'T - lift front wheels off the ground when lowering the bucket for parking. The park brakes lock the wheels.

DON'T - allow riders while operating the loader, unless the cab is equipped with a training seat (only a single rider allowed inside the cab with operator if so equipped).

DON'T - attempt to lift or transport loads in excess of rated capacity (refer to Section 01 of the Service Manual for information on capacity).

DON'T - walk, stand, or work under an elevated load or empty bucket.

DON'T - ever leave the loader cab with the engine running. Follow complete machine shutdown procedures before leaving the cab.

DON'T - leave the loader with the bucket elevated.

DON'T - transport a load with the bucket in a position that obstructs the operator's vision.

DON'T - operate the loader within 10 feet of live power lines.

DON'T - service the fuel reservoir while the engine is hot or running.

DON'T - smoke while servicing the fuel reservoir.

DON'T - remove the hydraulic reservoir cap without first bleeding the air pressure from the reservoir.

DON'T - remove the engine radiator cap without first bleeding the air pressure from the system.

DON'T - jack the machine up with the bucket and lift arms.

DON'T - use equipment near underground pipes, wires, or cables.

DON'T - lift or transport people.

Vendor Literature

**VL 15B – ANSUL Checkfire 210 Detection and Actuation System
Owners Guide**

VL 59A – AFEX Fire Suppression Systems

VL 97A – ANSUL Vehicle Fire Protection

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