OPERATOR'S MANUAL

BN075477 Rev D (FEBRUARY 2024)

E# ADT'S & HAULERS
SMALL TRUCKS PIN 3.4 AND 3.5

Original Instruction

B18E 6X4 ADT
B18E 6X6 ADT
B20E 6X6 ADT
B20E LGP 6X6 ADT
2304E HAULER
B25E 6X4 ADT
B25E 6X6 ADT
B30E 6X6 ADT
B30E 6X6 ADT TIER 4i
B30EN 6X6 ADT
2806E HAULER

DISCLAIMER:

Due to **BELL EQUIPMENT'S** policy of continuous product improvement, the information contained in this manual was correct up to the time of printing (issue date of manual). Any changes after this date will only be included in the next update of this manual.

The illustrations in this manual are pictorial and not necessarily true representations of components. Photographs and illustrations may show optional equipment.

EC Declaration Of Conformity

BELL EQUIPMENT GROUP SERVICES (PTY) LTD.
Reg No. 2019/311068/07
A member of the worldwide Bell Equipment Group
13-19 Carbonode Cell Road, Alton
Richards Bay, 3900, South Africa

P/Bag X20046, Empangeni, 3880, South Africa
E: Linda.Joubert@bellequipment.com
T: +27(0)35 907 9720
W: www.bellequipment.com

EC Declaration of Conformity_B20E_Pin3.4 Rev1

CE

EC DECLARATION OF CONFORMITY
ORIGINAL

We hereby certify that the machinery stipulated below complies with all the relevant provisions of the Machinery Directive and the National Laws and Regulations adopting this Directive.

Machine description and function: Articulated Dump Truck – Earth Moving Machinery
Model: B20E
PIN designations:

1	**B20E** • **AEBA620EXX34XXXXX** • **B93A620EXX34XXXXX**

***PLEASE NOTE:** "X" Represents variable letters and numbers unique to each machine.

Manufacturer Address 1
Bell Equipment Company S A (Pty) Ltd
13-19 Carbonode Cell Road,
Alton Richards Bay,
South Africa

Manufacturer Address 2
German Assembly Plant (Eisenach)
Industriestrasse 8,
99820 Hörselberg-Hainich
Eisenach, Germany

Technical Documentation held at Address 1 by
Linda Joubert
Compliance Officer

Technical Documentation held at Address 2 by
Steffen Zitter
Factory Manager

Also conforms with the following EU directives/Regulations:

1. Physical Agent (Noise) Directive (2000/14/EC) (Amended by 2005/88/EC):
   - The conformity has been evaluated following the annex VI (procedure 2) of the directive 2000/14/EC and 2005/88/EC.
   - Notified body - ECO S.p.A. Via Mengolina, 33 - 48018 Faenza (RA) - ITALY.
   - Installed net power: 170 kW at 1800 rpm
   - Sound power level Measured LwA = 104 dB(A)
   - Sound power level Guaranteed LwA = 106 dB(A)
2. Electromagnetic Compatibility (2014/30/EU)- In accordance with EN ISO 13766-1:2018 (Harmonised Standard)
3. Engine Emissions Regulation ((EU) 2016/1628)
4. Machinery Directive 2006/42/EC- In accordance with Harmonised standards: EN474-1:2006+A6:2019
   EN474-6:2006+A1:2009

The appropriate internal measures have been taken to ensure that series-production units conform at all times to the requirements of the EU Directives and relevant standards. The signatory is empowered to represent and act on behalf of the company management.

.....	.....	.....
Linda Joubert	Leon Goosen	Stephen Jones
Compliance Officer	Group CEO	Director: Product Portfolio & Marketing

Date: 2022-09-16
Signed at: Bell Equipment Group Services (Pty) Ltd
13-19 Carbonode Cell Road, Alton
Richards Bay, South Africa

Directors: L Goosen (Chairman), D Chinnappen, A Goordeen, KJ van Haght, SR Jones, AW Mayer, D Morris, JJ van Wyngaardt
Company Secretary: D McIlrath

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EC Declaration of Conformity_B20E_Pin3.5 Rev0

CE

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Machine description and function: Articulated Dump Truck – Earth Moving Machinery
Model: B20E
PIN designations:

1	**B20E** • **AEBA620EXX35**XXXXX • **B93A620EXX35**XXXXX

***PLEASE NOTE:** "X" Represents variable letters and numbers unique to each machine.

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Compliance Officer

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Stephan Giese
Technical Plant Manager

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…….	……	……
Linda Joubert	Leon Goosen	Stephen Jones
Compliance Officer	Group CEO	Director: Product Portfolio & Marketing

Date: 2023-07-11
Signed at: Bell Equipment Group Services (Pty) Ltd
13-19 Carbonode Cell Road, Alton
Richards Bay, South Africa

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EC Declaration of Conformity_B25E_B30E_Pin3.4 Rev2

CE

EC DECLARATION OF CONFORMITY
ORIGINAL

We hereby certify that the machinery stipulated below complies with all the relevant provisions of the Machinery Directive and the National Laws and Regulations adopting this Directive.

Machine description and function: Articulated Dump Truck – Earth Moving Machinery
Model/s: B25E, B30E 4x4, B30E 6x6, B30EN
PIN designations:

B25E
- **AEBA625E**XX**34**XXXXX
- **B93A625E**XX**34**XXXXX

B30E 4x4
- **AEBA632E**XX**34**XXXXX
- **B93A632E**XX**34**XXXXX

B30E 6x6
- **AEBA631E**XX**34**XXXXX
- **B93A631E**XX**34**XXXXX

B30EN
- **AEBA629E**XX**34**XXXXX
- **B93A629E**XX**34**XXXXX

***PLEASE NOTE:** "X" Represents variable letters and numbers unique to each machine.

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   - Notified body - ECO S.p.A. Via Mengolina, 33 - 48018 Faenza (RA) - ITALY.
   - Installed net power: B25E= 210 kW at 1800 rpm; B30E = 260kW at 1800rpm
   - Sound power level Measured LwA = 106 dB(A)
   - Sound power level Guaranteed LwA = 108 dB(A)
2. Electromagnetic Compatibility (2014/30/EU)- In accordance with EN ISO 13766-1:2018 (Harmonised Standard)
3. Engine Emissions Regulation ((EU) 2016/1628)
4. Machinery Directive 2006/42/EC- In accordance with Harmonised standards: EN474-1:2006+A6:2019
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The appropriate internal measures have been taken to ensure that series-production units conform at all times to the requirements of the EU Directives and relevant standards. The signatory is empowered to represent and act on behalf of the company management.

Linda Joubert	Leon Goosen	Stephen Jones
Compliance Officer	Group CEO	Director: Product Portfolio & Marketing

Date: 2023-03-16
Signed at: Bell Equipment Group Services (Pty) Ltd
13-19 Carbonode Cell Road, Alton
Richards Bay, South Africa

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EC Declaration of Conformity_B25E_B30E_Pin3.5 Rev0

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- **B93A625E**XX**35**XXXXX

B30E 4x4
- **AEBA632E**XX**35**XXXXX
- **B93A632E**XX**35**XXXXX

B30E 6x6
- **AEBA631E**XX**35**XXXXX
- **B93A631E**XX**35**XXXXX

B30EN
- **AEBA629E**XX**35**XXXXX
- **B93A629E**XX**35**XXXXX

***PLEASE NOTE:** "X" Represents variable letters and numbers unique to each machine.

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Linda Joubert	Leon Goosen	Stephen Jones
Compliance Officer	Group CEO	Director: Product Portfolio & Marketing

Date: 2023-07-11
Signed at: Bell Equipment Group Services (Pty) Ltd
13-19 Carbonode Cell Road, Alton
Richards Bay, South Africa

Location Of Operations

Please visit www.bellequipment.com for the latest **BELL EQUIPMENT** operations listing.

SOUTH AFRICA, RICHARDS BAY (HEAD OFFICE)	
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EMPANGENI	+ 27(0) 35 907 2500
GEORGE	+ 27(0) 44 878 0930
JETPARK	+ 27(0) 11 928 9846
KIMBERLEY	+ 27(0) 53 841 0710
KURUMAN	+ 27(0) 53 712 3072
MIDDELBURG	+ 27(0) 13 246 8900/1
MTHATHA	+ 27(0) 47 531 4905/5045
NELSPRUIT	+ 27(0) 13 755 2110
NEWCASTLE	+ 27 (0) 34 375 6190/1
PIET RETIEF	+ 27(0) 17 826 1523
PIETERMARITZBURG	+ 27(0) 33 386 9319
PORT ELIZABETH	+ 27(0) 41 486 3775
RUSTENBURG	+ 27(0) 14 592 1160
TZANEEN	+ 27(0) 15 307 1129/1180
UMHLALI	+ 27(0) 32 947 0696
VRYHEID	+ 27(0) 34 981 5541
WOLMARANSSTAD	+ 27(0) 53 712 3033

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NAMIBIA (WINDHOEK)	+ 264 (0) 61 226 021/2/3
NAMIBIA (ORANJEMUND)	+ 264 (0) 63 239432/3
SWAZILAND	+ 268 2518 7496/7

AFRICAN SERVICE CENTRES	
ZAMBIA (KITWE & MAZUBUKA))	+ 260 962 249 900
ZAMBIA (SOLWEZI)	+ 260 (0) 218 821 439
ZIMBABWE	+ 263 4 447374/9

BELL EQUIPMENT INTERNATIONAL

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Bulletins

Record the relevant information from the Service Bulletins into this manual as follows:

1. Ensure the manual number reflected in the bulletin is the same as the manual number on the front page or in the footer of this manual
2. Carry out the instructions as detailed in the bulletin
3. Record the required information below
4. File the bulletins in numerical order in a suitable binder

REF NO.	SUBJECT	INSERTED BY	DATE

REF NO.	SUBJECT	INSERTED BY	DATE

Feedback Form

Should you, as user of this manual, have any suggestion for improving the manual, or you find any errors or omissions, then we would like to know.

Please complete a copy of this form and hand it in to your **BELL EQUIPMENT** Product Support Representative or post it directly to the **BELL EQUIPMENT** head office at the following address:

Technical Documentation Department
Bell Equipment Company SA (Pty) Ltd
Private Bag X20046
EMPANGENI
3880

Comments, suggestions or queries (please state page number):

Please circle YES or NO below:

Does the manual meet your needs?	YES	NO
Did you find the information accurate?	YES	NO
Did you find the information easy to read?	YES	NO
Did you find the information easy to retrieve?	YES	NO

OVERALL, how would you rate the quality of this manual?

Poor		**Fair**		**Good**		**Very Good**		**Excellent**	
1	2	3	4	5	6	7	8	9	10

Machine model: _____

PIN: _____

Your name: _____ Job title: _____

Company name: _____

Address: _____ Tel: _____

_____ Fax: _____

_____ Email: _____

Thank you for your co-operation.

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TABLE OF CONTENTS

INTRODUCTION

♦ INTRODUCTION

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Foreword

WARNING

All specifications in this manual apply to a standard machine as supplied by the factory and any modifications done to the machine will result in different specifications and we as OEM cannot take responsibility for this.

Read this manual carefully for it has been produced to assist you in the correct operation, maintenance and care of your **BELL EQUIPMENT** machine. Failure to do so could result in personal injury or equipment damage.

This manual should be considered a permanent part of your machine and should remain with the machine when you sell it.

Be sure all operators of this machine understand every safety message.

Replace operator's manual and safety labels immediately if missing or damaged.

For Your Safety

WARNING

Do not operate the machine unless you have read the operator's manual and fully understand how to operate the machine properly.

The safe operation of your **BELL EQUIPMENT** machine is very important to prevent any personal injury and/or damage. This manual must be read and fully understood before operating or carrying out any maintenance or tests on your **BELL EQUIPMENT** machine.

The following symbols and words are used throughout this manual:

This is the safety alert symbol. When you see this symbol on your machine or in this manual, follow the safety message to avoid personal injury or death.

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury. These symbols are red in colour.

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury. These symbols are orange in colour.

CAUTION indicates a hazard with a low level of risk which, if not avoided, will result in minor or moderate injury. These symbols are yellow in colour.

NOTE highlights information of special interest.

DANGERS, WARNINGS and **CAUTIONS** must be read, fully understood and followed, before carrying out the action or maintenance procedure concerned.

DANGERS, WARNINGS and **CAUTIONS** are always placed before any action or maintenance procedure where personal injury and/or damage to the machine could occur if that action, test or maintenance procedure is not carried out correctly.

WARNING

Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects and other reproductive harm.

INTRODUCTION

Machine Identification

Write product identification numbers (PIN) in the Machine Numbers section of this manual. Accurately record all the numbers to help in tracing the machine should it be stolen. Your dealer also needs these numbers when you order parts. File the identification numbers in a secure place away from the machine.

Warranty

Warranty is provided as part of **BELL EQUIPMENT'S** support program for customers who operate and maintain their equipment as described in this manual. The warranty is explained on the warranty certificate which you should have received from your dealer.

Should the equipment be abused, or modified to change its performance beyond the original factory specifications, the warranty will become void and field improvements may be denied.

Disclaimer

This manual has been produced by the Technical Documentation Department of **BELL EQUIPMENT**. Every effort has been made to ensure that the information in this manual was correct at the time of publication. **BELL EQUIPMENT** has a policy of continuous product development, improvement and design. **BELL EQUIPMENT** reserves the right to change, amend and update the design of its product at any time without prior notice. With this policy, changes may have occurred that are not included in this manual.

Whilst every endeavour has been made to provide accurate and reliable information, **BELL EQUIPMENT** specifically disclaims any actual or implied warranty and under no circumstances shall be liable for any loss, damage or injury to person or property suffered, whether direct, or indirect or consequential, arising from the use of this manual.

In particular and without detracting from the above, the disclaimer also applies in the event of any specification, warning, or representation contained in this manual being inadequate, inaccurate, or unintentionally misleading.

Contact Details

Please do not hesitate to contact your **BELL EQUIPMENT** Product Support Representative whenever you have a query on your **BELL EQUIPMENT** product or this manual.

The contact details of the **BELL EQUIPMENT** operations can be obtained from the following sources:

- The Location Of Operations, page VII in this manual.
- The **BELL EQUIPMENT** website at www.bellequipment.com
- The **BELL EQUIPMENT** head office (Richards Bay – South Africa) by phoning +27 (0) 35 907 9111 or emailing sales@bellequipment.com

Dealer Stamp

SAFETY

♦ CERTIFICATIONS AND STANDARDS
♦ SAFETY AND OPERATOR CONVENIENCES
♦ GENERAL SAFETY PRECAUTIONS
♦ OPERATING SAFETY PRECAUTIONS
♦ MAINTENANCE SAFETY PRECAUTIONS
♦ SAFETY SIGNS
♦ TYRE INFORMATION

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Unauthorized Machine Modifications

WARNING

All specifications in this manual apply to a standard machine as supplied by the factory.

Any modifications done to the machine such as greedy boards, etc. will result in different specifications and we as OEM cannot take responsibility for this.

WARNING

All specifications in this manual apply to a standard machine as supplied by the factory, all machines fitted with rear view mirrors, cab top peak mirror and rear camera are compliant to ISO 5006.

Any modifications done to the machine may result in the non compliance of ISO 5006 & 14401, unless retesting is conducted.

Roll Over and Falling Objects Protective Structure (ROPS/ FOPS)

The Roll Over Protective Structure has been certified to meet specified test requirements according to ISO 3471. The Falling Objects Protective Structure has been certified to meet specified test requirements according to ISO 3449, Level II.

Unauthorised Modifications of Machine Cab (ROPS and FOPS)

WARNING

A damaged ROPS or FOPS must be replaced, not reused.

Do not perform or undertake any unauthorised modification or alteration to the machine Cab (ROPS and FOPS) such as: welding on extinguisher brackets, CB aerial brackets, fire suppression systems etc. Unauthorised modifications will affect the structural limits of the Cab (ROPS and FOPS) and will void the certification (and increase the risk of an adverse safety incident).

Any planned modification or change must be reviewed in advance by the **BELL EQUIPMENT** Engineering Department to determine if the modification or change can be made within the limits of the certifying tests. It is important that each person in your organisation, including management, be made fully aware of these rules involving the machine Cab (ROPS and FOPS). Whenever anyone sees unauthorised modification or change to a machine's Cab (ROPS and FOPS) both the customer and manufacturer must be notified in writing. The protection offered by ROPS and FOPS will be impaired if they are subjected to structural damage, is involved in an overturn incident, or is altered in any way and as such Machine Cab's (ROPS and FOPS) must be replaced, not reused.

Loosening or Removal of ROPS and FOPS

Make sure that all parts are installed correctly if the cab (ROPS or FOPS) is loosened or removed for any reason.

Once the mounting bolt and nut assembly has been removed or loosened, check for any damage and condition of threads and replaced with new parts as specified in the parts manual if required. Tighten the mounting bolts to the correct torque specification as specified in the parts manual. Failure to comply could compromise product safety and increase the risk to safety.

Material Safety Data Sheet (MSDS)

The Federal Occupational, Safety and Health Administration (OSHA) Standard 29 CFR 1910.1200 and in some cases, State and Local Right-to-Know laws, may require that specific MSDS be available to the employees prior to operating this equipment. This may include information on substances contained in this equipment such as antifreeze, engine oil, battery acid, hydraulic fluid and Freon (if equipped with an air conditioner).

To ensure a prompt response, please be sure to include your return address and ZIP (postal) code, along with the model, serial number and/or VIN number of your machine.

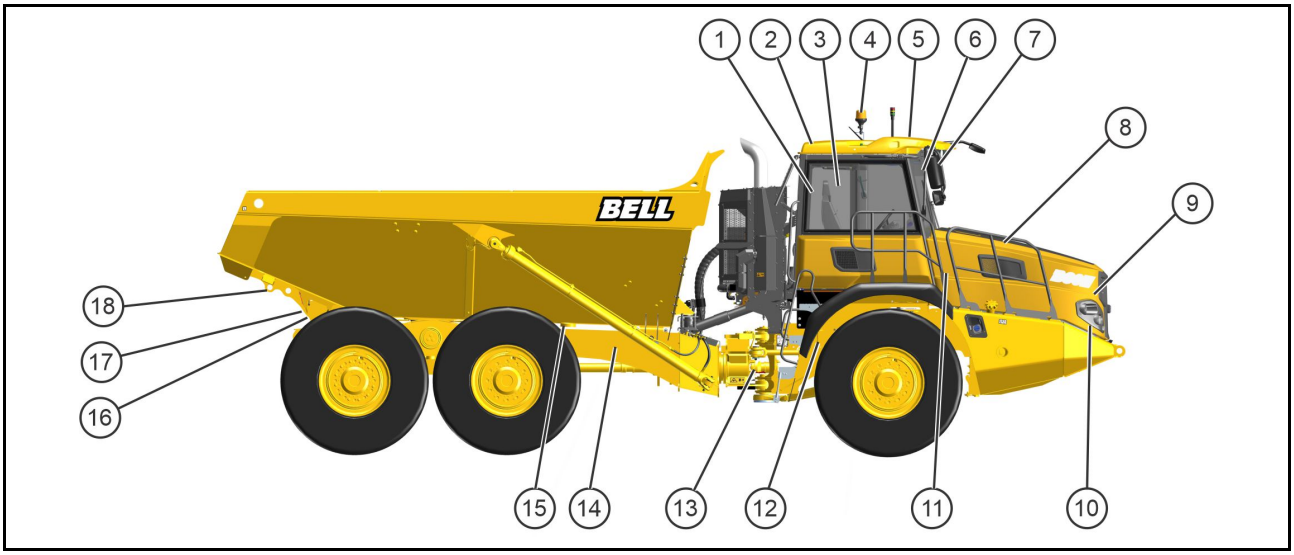
Noise Emission Levels

The sound pressure and sound power was tested according to ISO 6395.

Safety Regulations

It is the obligation of the operator to know and apply any safety regulation in the country where the machine is operated and apply this manual.

Safety Features



1. **Cab with Heater/Defroster**
   The ventilation system circulates both outside and inside air through filters for a clean working environment. Built in defroster vents direct air flow for effective window de-fogging/de-icing.
2. **ROPS/FOPS Cab Protection**
   The Roll Over Protective Structure has been certified to meet specified test requirements according to ISO 3471 and ISO 13459. The Falling Objects Structure has been certified to meet specified test requirements according to ISO 3449.
3. **Seat Belt Retractors**
4. **Beacon Lights**
5. **Horn**
6. **Large Windshield Wiper With Washer**
7. **Mirrors**
8. **Bypass Start Protection**
9. **Engine Fan Guard**
10. **Halogen Lights and Turn Signals**
11. **Exhaust Brake and Transmission Retarder** (If Equipped)
12. **Secondary Steering**
    Ground driven, continuously in operation. Secondary steering indicator light will light when activated.
13. **Articulation Locking Bar** (On Left Hand Side of the Machine)
14. **Independent Parking Brake**
15. **Dump Body Service Lock (Bin Pole)** (B30E 4x4 Only)
16. **Backup Alarm**
17. **Stop/Back Lights. Highly Visible Lights**
18. **Over Centre Bin-Up Lock** (Not B30E 4x4)

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General Safety

Be sure all operators of this machine understand every safety message. Replace operator's manual and safety decals immediately if missing or damaged.

Accidents and injuries must be reported immediately. Site management must also be informed of any "narrow escapes" and areas and situations which may present an accident risk.

If possible, after an accident, the machine must be left in position.

Do not do anything to the machine that may hamper an investigation into the accident.

Follow the instructions given by site management and familiarise yourself with the job site and your surroundings before operating the machine.

Know and observe all safety rules that may apply to your work situation and your job site.

Never drive the machine with the doors open.

Keep bystanders away from the machine and in sight at all times. Use barricades or a person nominated as the spotter to keep vehicles and pedestrians away.

Use the spotter if moving the machine in congested or restricted vision areas. Always keep the spotter in sight and co-ordinate hand signals before starting the machine.

Lower bin during work interruptions, apply park brake and be careful not to accidentally actuate controls when co-workers are present.

Keep bystanders away from a raised bin.

Should the machine malfunction for any reason, bring the machine to a complete stop, apply the park brake, select neutral gear and switch machine Off. Install the "Do Not Operate" tag in the machine and report the malfunction to the site management and/or service personal.

Should the service brake malfunction for some reason, conduct the emergency braking procedure to bring the machine to a complete stop. (Refer to "Operating Instructions" for procedure.)

Operator Qualifications

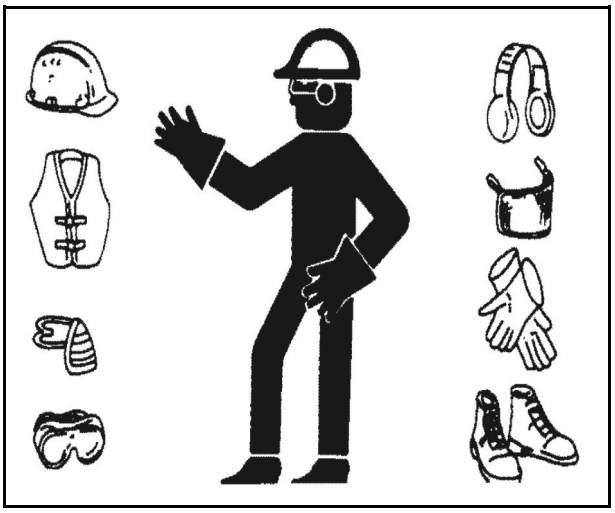
Operators must be trained and supervised by a training instructor before operating the machine.

The operator must read and understand the Operator's manual to familiarize him/her self with the safety and controls of the machine.

The operator will need to also familiarize him/her self with the machine risk assessment.

Qualified operators must familiarise themselves with the work site and surroundings before operating the machine. Test all controls and machine functions in an open area before starting work.

Wear Protective Equipment



Wear a hard hat, protective glasses and other protective equipment as required by the job conditions. Do not wear loose clothing or jewellery that can get caught on controls or other parts of the machine.

When you drive connecting pins in or out, guard against injury from flying pieces of debris by wearing goggles or protective glasses.

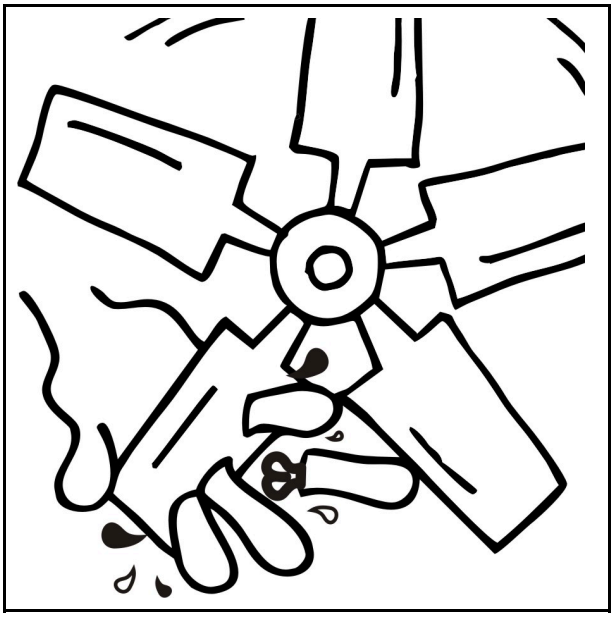
Always wear protective goggles or safety glasses and other protective equipment before striking hardened parts.

Hammering hardened metal parts such as pins and bucket teeth may dislodge chips at high velocity. Use a soft hammer or a brass bar between hammer and object to prevent chipping.

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs.

Wear gloves when handling wire rope cable.

Stay Clear Of Moving Parts

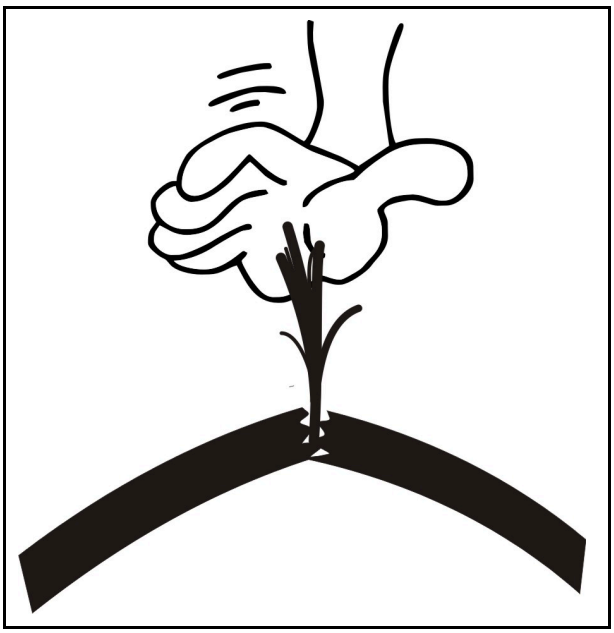


Entanglements in moving parts can cause serious injury.

Stop the engine and park the machine safely and lock-out before examining, adjusting or maintaining any part of the machine with moving parts.

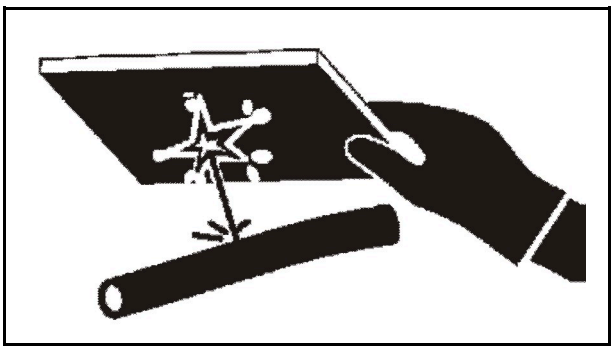
Keep guards and shields in place. Replace any guard or shield that has been removed for access as soon as service or repair is complete.

Avoid High Pressure Fluids



Discharge the pressure before disconnecting any hydraulic or other lines. Tighten all connections before applying pressure.

The pressure discharge on pressurised vessels must be performed by Service Personnel only.



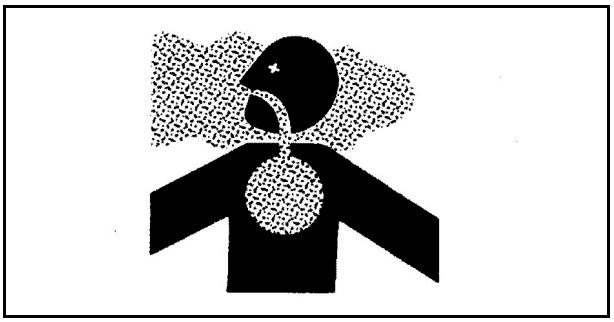
Escaping fluid under pressure can penetrate the skin causing serious injury.

Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks.

If any fluid is injected into the skin it must be surgically removed within a few hours by a doctor who is familiar with this type of injury or gangrene may result.

Ensure that leaking hydraulic hoses are replaced immediately and clean up any fluid spills.

Beware Of Toxic Fumes



Prevent inhalation of engine exhaust fumes, which can cause sickness or death.

Operate only in well ventilated areas. Avoid hazardous fumes by first removing paint on painted surfaces before welding.

Wear an approved respirator when sanding or grinding painted surfaces.

If a solvent or paint stripper is used, wash surface with soap and water. Remove solvent or paint containers before welding and allow at least 15 minutes before welding or heating.

Measures to Prevent Fires

WARNING

Do not point the high pressure jet at personnel.

CAUTION

If a high pressure jet is used for cleaning, take great care as the insulation of electrical leads can become damaged even at a moderately high pressure and temperature.

CAUTION

Switch OFF the battery isolator switch and disconnect the batteries, when welding on the machine.

Find out which type of fire extinguisher to use, where it is kept and how to use it.

Any fire fighting equipment stored on the machine must be maintained in working order.

At the slightest sign of fire, and if the situation allows, take the following steps:

1. Move the machine away from the danger area.
2. Shut down the engine and leave the cab.
3. Start putting out the fire and notify the fire brigade if required.

Do not smoke or have a naked flame near a machine when filling with fuel or when the fuel system has been opened.

Diesel fuel oil is flammable and should not be used for cleaning, use an approved solvent.

Remember that certain solvents can cause skin rashes and are usually flammable. Do not inhale solvent vapour.

Store flammable starting aids in a cool, well ventilated location. Remember that such aids (starting gas) must not be used in connection with preheating of the induction manifold.

Keep the work place clean. Oil and/or water on the floor makes it slippery.

Oil and/or water in close proximity to electrical equipment or electrically powered tools are dangerous and any spills should be cleaned up immediately.

Oily clothes are a serious fire hazard.

Check daily that the machine and equipment are free from dirt and oil. In this way the risk of fire is reduced and it is easier to detect faulty or loose components.

Check if the electric leads have been damaged by chafing which could lead to a short circuit and fire.

Check that there is no damage to hydraulic and brake hoses caused by chafing.

Welding and grinding may only be done on the machine when it is placed in a clean area where there are no fuel tanks, hydraulic pipes or similar lying around. Take extra care when welding and grinding near flammable objects. A fire extinguisher should be kept handy.

Clean Trash From Machine

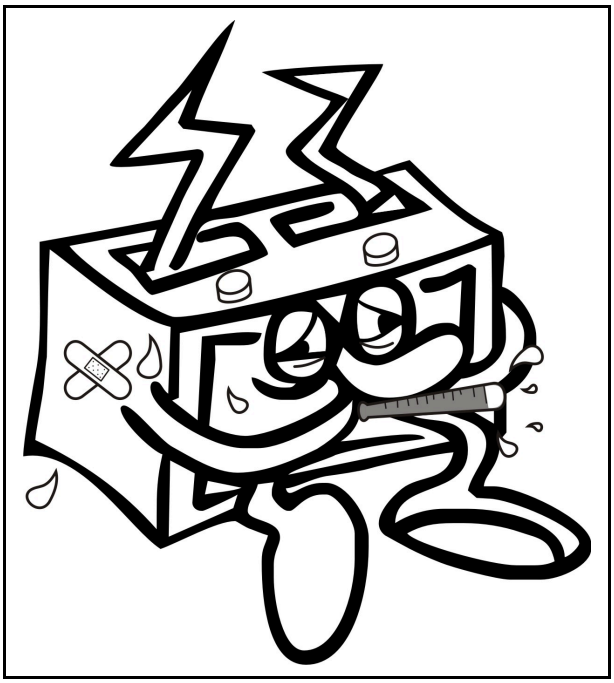
Keep engine compartment, radiator, batteries, hydraulic lines, exhaust components, fuel tank and operator’s station clean and free of debris.

Clean any oil spills or fuel spills on machine surfaces.

Temperature in engine compartment may go up immediately after engine is stopped. BE ON GUARD FOR FIRES DURING THIS PERIOD.

Open access door(s) to cool the engine faster, and clean engine compartment.

Prevent Battery Explosions And Acid Burns



The standard battery supplied with the machine is a sealed type that does not need maintenance.

Keep sparks and flames away from the batteries.

Keep batteries clean and check that all cables are properly secured and insulated.

If a non-sealed battery is subsequently installed, keep sparks and flames away from the batteries. Use a flashlight to check the battery electrolyte level. Use a voltmeter to check battery charge. Never place a metal object across the posts.

Always remove the grounded (Negative -) battery clamp first and replace it last.

Do not smoke in areas where batteries are being charged.

Do not attempt to charge a frozen battery. If the battery temperature is below 16°C (60°F) there is a danger it may explode while charging.

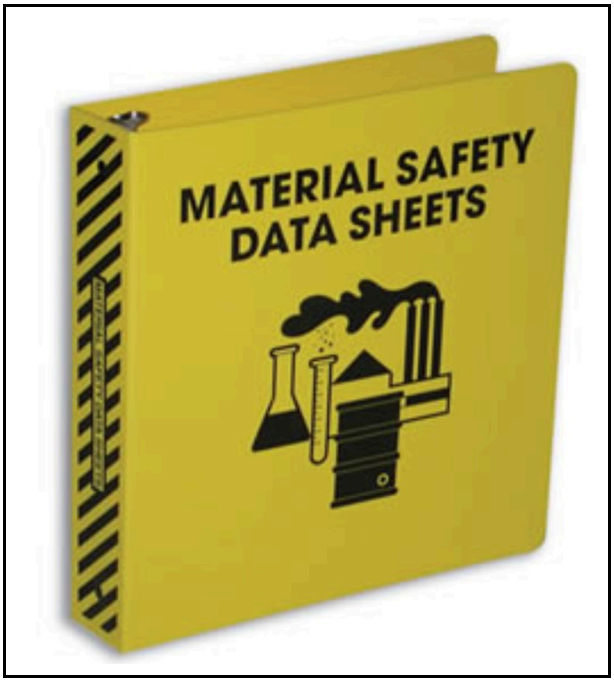
Sulphuric acid in battery electrolyte is poisonous and is strong enough to burn skin, eat holes in clothing and cause blindness if splashed into the eyes.

Avoid the hazard by:

- Filling the batteries in a well ventilated area.
- Wearing eye protection and rubber gloves.
- Avoid breathing fumes when electrolyte is added.
- Avoid spilling or dripping electrolyte.

Handling Chemical Products And Flammable Fluids Safely

Exposure to hazardous chemicals can cause serious injury. Under certain conditions, lubricants, coolants, paints and adhesives used with this machine may be hazardous.



If uncertain about safe handling or use of these chemical products, contact your authorised dealer for a **Material Safety Data Sheet (MSDS)**. The MSDS describes physical and health hazards, safe use procedures and emergency response techniques for chemical substances. Follow MSDS recommendations to handle chemical products safely.

Refer to **Health and Safety Information on Lubricants and Fluids** at the end of this section for further information.

Handle fuel with care, as it is highly flammable. Do not smoke or go near an open flame or sparks while refuelling. Always stop the engine before refuelling the machine and fill the fuel tank outdoors.

Keep all fuels and lubricants in properly marked containers and away from all unauthorised persons. Do not smoke in the storage areas.

Store oily rags and other flammable material in a protective container, in a cool, safe area, away from fire hazards. Never store oily rags or flammable materials inside a machine compartment.

Do not weld or flame cut pipes or tubes that have contained flammable fluids. Clean them thoroughly with non flammable solvent before welding or flame cutting them.

Starting fluid is highly flammable. Keep all sparks and flames away when using it. To prevent accidental discharge when storing the pressurised can, keep the cap on the can and store it in a cool protected place. Do not burn or puncture a starting fluid container.

Clean Machine Regularly

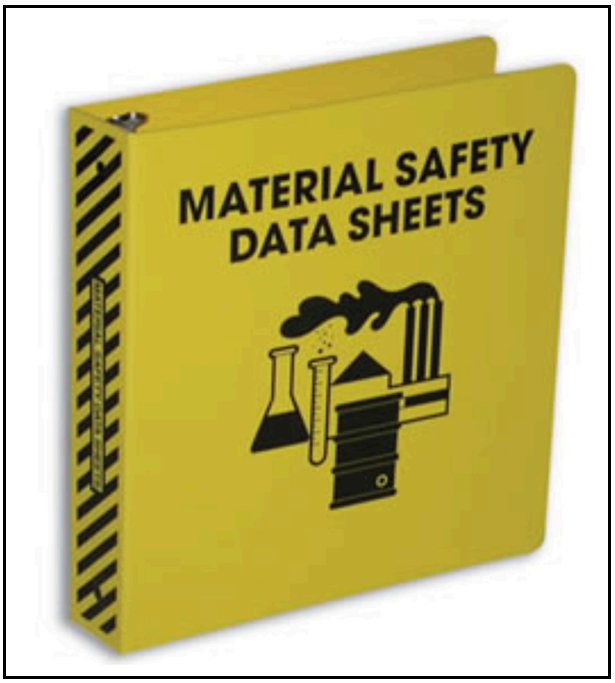
Wait until the engine has cooled before removing trash from areas such as the engine, radiator, batteries, hydraulic lines, fuel tank and operators cab. Remove any grease, oil or debris build-up. Keep the machine, especially the walkways and steps, free of foreign material, such as debris, oil, tools and other items which are not part of the machine.

Ensure that service personnel replace hydraulic hoses immediately if they show signs of leaking . Clean up any oil spills. Regularly examine electrical wiring and connectors for damage.

Keep a fire extinguisher available, on or near the machine and know how to use it properly.

The build-up of combustible material on and around high heat areas must be removed on a regular basis and the machine cleaned to prevent build-up and ignition of material. Critical areas are the areas around the exhaust, turbo charger, between the cab and the transmission cooler/exhaust silencer and the area on top of the horizontal heat shield leading into the silencer heat shield. It may require that from time to time the heat shields have to be removed by service personnel to clean this areas properly.

Health And Safety Information On Lubricants, Fluids And Gases



The Material Safety Data Sheet (MSDS) is a document containing data regarding the properties of a particular substance. An important component of product management and work place safety.

It is intended to provide workers and emergency personnel with procedures for handling or working with that particular substance in a safe manner, and includes information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill handling procedures.

Fluids and Lubricants

CAUTION

If uncertain about safe handling or use of any lubricant, fluid or other chemical products, contact your authorised dealer for a Material Safety Data Sheet (MSDS). The MSDS describes in detail the physical and health hazards, safe use procedures and emergency response techniques for chemical substances.

BELL Hydraulic Oil

BELL Semi Synthetic Engine Oil 10W40

BELL Syn ATF Ultra

BELL Gear Oil Limited Slip 80W90

BELL Super Gear Oil

The MSDS classifies the above products as having no significant hazard.

Eyes — Cause no more than minor irritation. Flush eyes for 15 minutes with fresh water. Avoid by wearing safety goggles when splashing may occur.

Skin — Cause no more than minor irritation. Avoid by washing thoroughly with soap and water after contact and by wearing gloves and protective clothing.

Ingestion — If swallowed, give water or milk and DO NOT induce vomiting.

Inhalation — Move the person to fresh air. Avoid by using the product only in a well ventilated area. If any effects continue, refer to a doctor.

Fire Hazard — Products may be combustible at high temperatures or if pressurised.

Waste Disposal (environment protection) — Prevent the product from contaminating soil and from entering drainage, sewer systems and all bodies of water.

BELL Multi Purpose Grease

BELL Wheel Bearing Grease

BELL High Temperature Grease

WARNING

Handle grease in pressure equipment care fully.
Accidental injection can cause serious tissue damage.
See a doctor as soon as possible.

Eyes — Cause no more than minor irritation. Flush eyes for 15 minutes with fresh water. Avoid by wearing safety goggles when splashing may occur.

Skin — Cause no more than minor irritation. Avoid by washing thoroughly with soap and water after contact and by wearing gloves and protective clothing.

Ingestion — If swallowed, give water or milk and DO NOT induce vomiting.

Inhalation — Move the person to fresh air. Avoid by using the product only in a well ventilated area. If any effects continue, refer to a doctor.

Fire Hazard — Products may be combustible at high temperatures or if pressurised.

Waste Disposal (environment protection) — Prevent the product from contaminating soil and from entering drainage, sewer systems and all bodies of water.

Extended Life Coolant

WARNING

This product is harmful or fatal if swallowed.
It can enter lungs and cause damage.

Ingestion — May be toxic.

Eyes and Skin — Irritation, redness, tearing or burning sensation. Avoid by washing thoroughly with soap and water after contact and by wearing safety goggles and protective clothing when splashing may occur.

Inhalation — Not volatile at ambient temperatures, spraying or heating in an enclosed space may cause irritation.

BELL EQUIPMENT do not assume any liability for consequences of the use of this information since it may be applied under conditions beyond our control or knowledge. It is also possible that additional data could be made available after this MSDS is issued.

If any effects continue, refer to a doctor.

Gas Hazards on Site

WARNING

The machine user/owner must conduct a gas test on the work site that the machine is working on.

A gas test must be conducted on the work site, to determine if there are any gas hazards that may be present on the site.

If there are gas supply lines present on or close to the work site, the owner of the site should obtain the relevant MSDS's.

Safety Precautions for Exhaust Aftertreatment System (EU Stage 5)

During automatic and manual regeneration of the Diesel Particulate Filter (DPF) the catalyst and exhaust stack surface temperature will get extremely hot (possibly 500°C). Any cloths or flammable materials left on the exhaust system can ignite if it comes into contact with the exhaust system or parts of the engine that heat up. There is a risk of fire. Carry out regular checks to make sure that there are no flammable foreign materials in the engine compartment or on the exhaust system.

During automatic and manual regeneration, extremely hot exhaust gases escape from the exhaust stack. Manual regeneration must not be performed under roof or under trees, where there is risk of the exhaust gasses igniting any flammable material above the machine.

Dispose Of Waste Properly

Improper disposal of waste can threaten the environment. Fuel, oils, coolants, filters and batteries used with this machine may be harmful if not disposed of properly.

Never pour waste onto the ground, down a drain or into any water source.

Air conditioning refrigerants can damage the atmosphere. Government regulations may require using a certified service centre to recover and recycle used refrigerants.

If uncertain about the safe disposal of waste, contact your local environmental centre or your dealer for more information.

Prepare For Emergencies

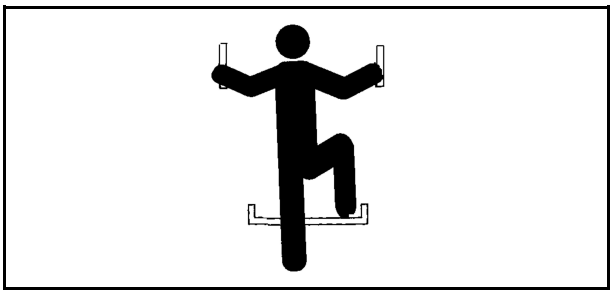
GENERAL SAFETY PRECAUTIONS

Keep a first aid kit and fire extinguishers handy and know how to use them.

Inspect and have your extinguisher serviced as recommended on its instruction plate. When an extinguisher is discharged, no matter for how long, it must be re-charged. Keep record of inspections on the tag supplied with the extinguisher.

Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.

Mounting And Dismounting Machine



Always use the handrails and steps provided to get on and off the machine. Use both hands and always face the machine.

Maintain three-point contact when climbing on/off the machine or moving around on the machine exterior. (Three-point contact is both hands and a foot, or both feet and a hand).

Never get on or off a moving machine.

Never jump off the machine.

Use a hand line to pull equipment up onto the platform, do not climb on or off the machine carrying tools or supplies.

Use extra care when mud, snow, or moisture present slippery conditions.

Keep steps clean and free of grease, oil and foreign objects.

Never use machine controls as hand-holds.

Inspect all access systems (steps, handrails, hand-holds), including slip-resistant surfaces, for signs of wear or damage. Repair/replace as necessary.

Start From Operator Seat Only

Avoid unexpected machine movement. Start the engine only while sitting in the operator seat. Ensure all the controls and working tools are in proper position for a parked machine.

Never attempt to start the engine from the ground. Do not attempt to start the engine by shorting across the starter solenoid terminals.

Use Seat Belt

Use the seat belt at all times to minimise the possibility of injury in an accident.

The seat belt must not be altered or modified in any way. Such changes can render the belt ineffective and unsafe.

The seat belt is designed and intended for the seat's occupant to be of adult build and for one occupant on the seat only.

The seat belt with associated parts must be inspected at regular intervals (Refer to the *Recommended Service Guide*). Replace the entire seat belt immediately if it is worn, has loose stitching, if the buckles are damaged or the seat belt roller does not work.

Replace the seat belt if the machine has been involved in an accident where the belt has been subjected to high strain or load.

Only clean with warm water, not soap or cleaners. Let the belt dry while it is fully extended before rolling it in.

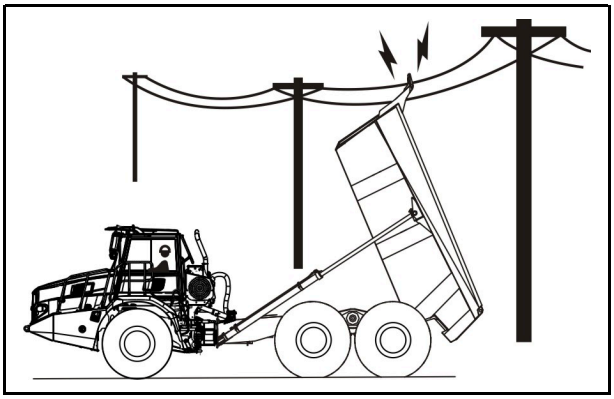
The trainer seat is also equipped with a seat belt, and must be used at all times should there be a passenger or trainer travelling in the machine.

Leaving Machine

Before leaving the machine, ensure that the park brake is applied, the transmission is in neutral, the engine is switched off at the SSM. Lock the cab door and the fuel cap. Turn the battery isolator switch to the OFF position if the machine is to be left for an extended period.

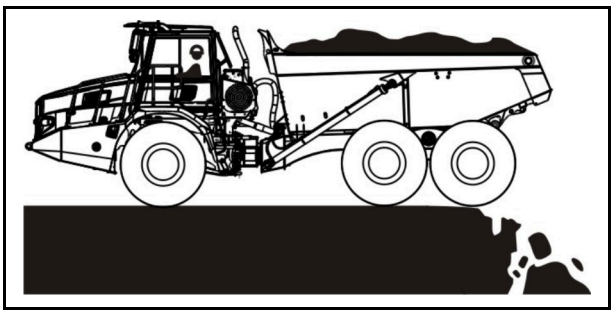
Avoid Work Site Hazards

Avoid Overhead Power Line



Never move any part of the machine within 3 m (10 ft) plus twice the line insulator length, as serious injury or death may result.

Operate Only on Solid Footing

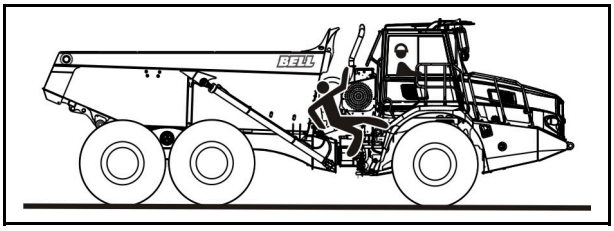


Operate only on solid footing with strength sufficient to support machine. Be alert working near embankments, excavations and with bin raised. Avoid working on surfaces that could collapse under machine.

Use caution when backing up to berms before dumping load.

Avoid operating near structures or objects that could fall onto the machine. Clear away debris that could move unexpectedly if run over.

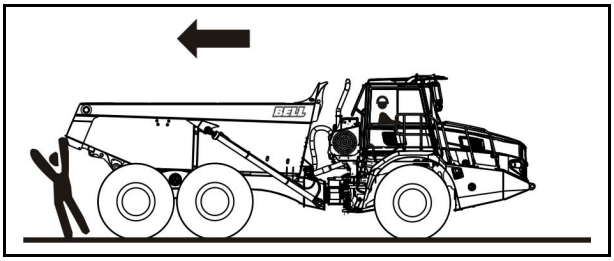
Keep Riders Off Machine



Do not allow unauthorised personnel on the machine.

Riders may fall from the machine, be caught in moving parts or be struck by objects. Riders will also impair the operator's view and his control of the machine.

Avoid Reversing Accidents



Before moving the machine ensure that no person is in the path of the machine. Where conditions permit, raise bin for better visibility to the rear. Use reverse camera if fitted.

Use a spotter when reversing if view is obstructed and/or in close quarters. Keep spotter in view at all times. Use prearranged hand signals to communicate.

Avoid Machine Tipping Accidents

Use seat belt at all times.

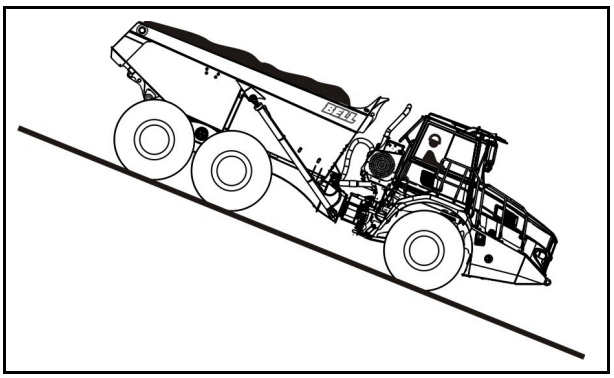
Do not jump out of the cab if the machine tips over. It would be unlikely, that you would jump clear of the machine which could result in the machine crushing you.

Use extra care when bin is raised. Machine stability is greatly reduced when bin is raised. Drive slowly, avoid sharp turns and uneven ground.

Know the capacity of the machine. Do not overload.

Before operating machine after any accident, carefully inspect all hydraulic and electrical lines.

Operating On Slopes



Avoid side slope travel whenever possible.

Check service brakes frequently when operating on slopes.

The maximum slope values are calculated with the exhaust brake and exhaust valve brake fully functional, the transmission retarder set to maximum and the transmission locked in a specified gear. The continuous slope values are with the exhaust brake and exhaust valve brake fully functional.

The operator must refer to the ' speed down slope' decal on the windscreen (or in this manual) for the gear selection and speed values. The operator must also be familiar with the gradient value charts in the Operating Instructions Chapter in this manual.

Knowledge of the site is important, especially the altitude of the site and the maximum percentage slope likely to be encountered and also the continuous slope at the site. Take note that the values indicated on the gradient decal are for operation at sea level.

Also take into account the ground conditions at the site when deciding upon gear selection.

Due to an ADT's versatility, it can be used in a wide variety of applications. Many of these applications present hazards related to machine stability when operated in soft and/or slippery conditions and/or on slopes. For this reason a risk assessment must be performed on the use of the machine per application. The risk assessment must be done in accordance with the local governing and/or ISO legislation. Whilst precautions have been taken to optimise the performance and stability of the vehicle, the risk assessment must identify and prioritise all additional actions to be taken to treat, tolerate or transfer the risks

In addition, there are precautions the operator can take during the operation of the machine in slippery/ wet conditions and/or while operating on slopes. These precautions include (although the list is not exhaustive):

- When operating on slopes, the operator should take special care of sliding and/or rolling hazards. These hazards are dependent on site and operating conditions. When operator is unsure of potential hazards, a risk assessment must be done.
- The differential locks should be engaged when operating at a downhill or operating on ice or slippery conditions. This will ensure maximum vehicle traction is achieved.
- It is important that the diff locks are engaged prior to entering an area where there is poor traction.
- Make full use of the retarder before applying service brakes.

Travelling On Public Roads

Machines which operate or travel on or near public roads, with or without payload must ensure that the machine complies with the local legislation requirements and must be allowed to do so. Make sure proper lighting, markings, beacon light and other requirements are in place so the machine is visible to other drivers. (Refer to your local **BELL EQUIPMENT** Product Support Representative for assistance).

Inspect And Maintain ROPS

A damaged roll-over protective structure (ROPS / Machine Cab) should be replaced, not reused.

If the ROPS / Machine Cab was loosened or removed for any reason, inspect it carefully before operating the machine again.

To Maintain the ROPS / Machine Cab:

OPERATING SAFETY PRECAUTIONS

Report missing hardware to service personnel immediately.

Check isolation mounts for damage, looseness or wear. Check ROPS / Machine Cab for cracks or physical damage, report any problems to service personnel.

Human Vibration

Factors Effecting Drive Exposure to Whole Body Vibration

Driver exposure to vibrations can be influenced significantly by the driver and operator. It depends on the following factors:

Driver	Driving style
	Operation
	Training

Construction Site	Driving Route
	Ground
	Material

Machine	Machine Type
	Equipment
	Seat
	Suspension / Damping System
	Condition / maintenance

To a great extent, the driver determines the current exposure to vibrations himself since he can choose factors such as speed, operating mode and driving route. In addition, driver exposure to vibrations is influenced by machine type, equipment, maintenance condition and seat type.

The daily driver exposure to vibrations depends on vibration values as well as duration of exposure.

The BELL machine was tested under typical work site conditions, and the hand-arm vibration does not exceed 2.5m/s² and the whole body vibration does not exceed 0.5m/s².

Provisions Aimed at Reducing Exposure to Vibrations

- Correct use of machines.
- High-quality seat and its correct adjustment.
- Machine maintenance to OEM (Original Equipment Manufacturer) requirements.
- Correct operation of the machine.
- Appropriate driving speed.
- Good ground conditions.
- Use of additional suspension/damping systems.
- It is highly recommended to follow the safety instructions provided by the machine manufacturer. Only use appropriate machines, equipment and additional devices for the task at hand.
- In case of re-fitting the driver seat, only use seats complying with ISO 7096. All original seats are provided in accordance with ISO 7096. As the seat has to be individually adjusted for every driver, it is recommended to consider the following aspects regarding seating comfort (Refer to Operator Seat overview under the Operating Components section) :

  - Height and weight adjustment.

  - Ideal damping adjustment.

  - Correct inclination adjustment.

  - Use of additional options such as lumbar support.
- Carry out regular maintenance checks of your machines, particularly of tyre pressure, chain tension, brakes, steering and mechanical linkages.
- Avoid jerky operation of machine and working equipment. Avoid jerky steering, braking and accelerating.
- Adapt the driving speed to the road conditions.

  - Adapt your driving speed to longer distances.

  - Decelerate if you drive on rough terrain.

  - Drive around obstacles and avoid driving on extremely rough terrain.
- Try to maintain a good condition of the terrain the machine works and drives on.

  - Remove big stones and obstacles.

  - Avoid and fill up holes.

  - Keep appropriate machines for ground improvement.

  - Allow enough time for such measures.
- Use additional systems such as comfortable suspension for machines with a prolonged vibration exposure. If no additional system is available, avoid accumulation of vibration exposure by reducing speed.

Legal Requirements

- The EU Directive 2002/44/EC defines the daily driver exposure to vibrations with two limit values:

- Action value 2.5 m/s²
- Limit value 0.5 m/s²

NOTE

Some EU member states may have stricter limit values.

- Once the exposure action values are exceeded, the operator of construction machinery shall implement the following measures:

  - Establish technical and organisational measures intended to reduce to a minimum the exposure to mechanical vibration.

  - Provide adequate information and training to instruct drivers to use work equipment correctly and safely in order to reduce their exposure to mechanical vibration to a minimum.

  - Adopt provisions to ensure the appropriate health surveillance of drivers.

- If the exposure limit value is exceeded, the operator of construction machinery shall implement the following measures:

  - Take immediate action to reduce exposure below the exposure limit value.

  - If necessary, reduce working hours.

The assessment of the daily level of exposure to vibration is based on the calculation of vibration values and duration of exposure in different operating cycles. The results can either be displayed in m/s² or in a system of points.

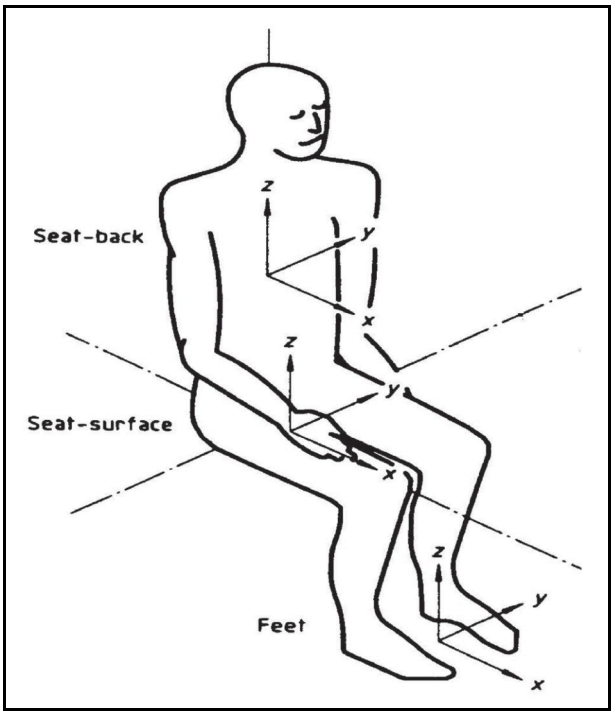
The following pages describe a simple system of points to determine and assess the daily exposure of a driver to vibrations without any measurement or calculations.

Determination And Assessment of Daily Exposure to Vibrations

Since the daily driver exposure to vibration depends on the vibration values as well as on the duration of exposure, both factors need to be determined.

Determination of the vibration values of different operating cycles

The driver vibration values in different operating cycles are determined using the chart. The chart contains average vibration values of construction machines and their typical application areas. The vibration values are given for the three main directions x, y and z.



The operating conditions for the machinery are divided into three stages:

Light, Normal and Hard operating conditions. The x, y and z axis need to be assigned to the same condition. The exposure of machinery and drivers can be divided into the following categories:

Light conditions (L)
Experienced driver, level road surface, loose material ...
Normal conditions (N)
Proficient driver, level road surface ...
Hard conditions (H)
Inexperienced driver, rough use of machinery ...

Vibration Values for Different Construction Vehicles

Machine type	Typical operating cycle	Vibration values in m/s² at operating conditions Light, Normal and Hard								
		x-axis			y-axis			z-axis		
		L	N	H	L	N	H	L	N	H
Articulated Dump Truck	Loading process	0.12	0.29	0.46	0.18	0.41	0.64	0.08	0.24	0.24
	Unloading (tipping)	0.24	0.49	0.74	0.09	0.42	0.75	0.12	0.30	0.48
	Driving with load	0.43	0.64	0.85	0.60	0.89	1.18	0.46	0.67	0.88
	Driving without load	0.56	0.82	1.08	0.76	1.02	1.28	0.53	0.81	1.09

Table 1

Source: ISO /TR 25398 Earth-moving machinery - Guidelines for assessment of exposure to whole-body vibration of ride-on machines

Determination of the Duration of Driver Exposure to Vibration

The daily driver exposure to vibration can either be estimated or measured, using the duration of the individual operating cycles the driver carries out during the day. To define the individual operating cycles, use table 1 and 2

Note: *If the drivers are asked about the duration of their exposure to vibration, times are usually overestimated since they tend to include vibration-free periods such as engine idling or waiting periods.*

CAUTION

Vibration-free periods do not constitute an exposure to vibrations and therefore may not be included in the calculations.

Simplified determination and assessment of daily driver exposure to vibration

The aim of this method is to determine and assess the daily driver exposure to vibration using a system of points in which the measured values are replaced by a number of points. The number of points resulting from the individual operating cycles completed during a day is added up to a total value.

According to the directive ISO/ TR25398, the values can be expressed as follows:

Action value (0.5 m/s²) 100 total points

Limit value (1.15 m/s²) 529 total points

The total number of achieved points is assigned to a certain colour indicating the operator's need for action (also see the practical examples in chapter 5).

Some EU member states may have stricter limit values. A lower limit value also results in a lower number of total points, which means that the red zone is reached sooner. It is up to you to mark the respective colour codes according to your valid limit values using the following chart:

Limit Value in m/s²	1.1-5	1.1-0	14.-05	1.0-0	0.9-5	0.9-0	0.8-5	0.8-0
Total Points	529	484	441	400	361	324	289	256

OPERATING SAFETY PRECAUTIONS

Equivalent vibration value in m/s^2	Exposure Duration									
	0.1 hr 6 min	0.2 hr 12 min	0.5 hr 30 min	1 hr 60 min	2 hr 120 min	3 hr 180 min	4 hr 240 min	5 hr 300 min	6 hr 360 min	8 hr 480 min
0.20	0	0	1	2	4	6	8	10	12	16
0.25	0	1	2	3	6	9	13	16	19	25
0.30	0	1	2	5	9	14	18	23	27	36
0.35	1	1	3	6	12	18	25	31	37	49
0.40	1	2	4	8	16	24	32	40	48	64
0.45	1	2	5	10	20	30	41	51	61	81
0.50	1	3	6	13	25	38	50	63	75	100
0.55	2	3	8	15	30	45	61	76	91	121
0.60	2	4	9	18	36	54	72	90	108	144
0.65	2	4	11	21	42	63	85	106	127	169
0.70	2	5	12	25	49	74	98	123	147	196
0.75	3	6	14	28	56	84	113	141	169	225
0.80	3	6	16	32	64	96	128	160	192	256
0.85	4	7	18	36	72	108	145	181	217	289
0.90	4	8	20	41	81	122	162	203	243	324
0.95	5	9	23	45	90	135	181	226	271	361
1.00	5	10	25	50	100	150	200	250	300	400
1.05	6	11	28	55	110	165	221	276	331	441
1.10	6	12	30	61	121	182	242	303	363	484
1.15	7	13	33	66	132	198	265	331	397	529
1.20	7	14	36	72	144	216	288	360	432	576
1.25	8	16	39	78	156	234	313	391	469	625
1.30	8	17	42	85	169	254	338	423	507	676
1.35	9	18	46	91	182	273	365	456	547	729
1.40	10	20	49	98	196	294	392	490	588	784
1.45	11	21	53	105	210	315	421	526	631	841
1.50	11	23	56	113	225	338	450	563	675	900
1.55	12	24	60	120	240	360	481	601	721	961
1.60	13	26	64	128	256	384	512	640	768	1024
1.65	14	27	68	136	272	408	545	681	817	1089
1.70	14	29	72	145	289	434	578	723	867	1156
1.75	15	31	77	153	306	459	613	766	919	1225
1.80	16	32	81	162	324	486	648	810	972	1296
1.85	17	34	86	171	342	513	685	856	1027	1369
1.90	18	36	90	181	361	542	722	903	1083	1444
1.95	19	38	95	190	380	570	761	951	1141	1521
2.00	20	40	100	200	400	600	800	1000	1200	1600
2.05	21	42	105	210	420	630	841	1051	1261	1681
2.10	22	44	110	221	441	662	882	1103	1323	1764
2.15	23	46	116	231	462	693	925	1156	1387	1849
2.20	24	48	121	242	484	726	968	1210	1452	1936
2.25	25	51	127	253	506	759	1013	1266	1519	2025
2.30	26	53	132	265	529	794	1058	1323	1587	2116
2.35	28	55	138	276	552	828	1105	1381	1657	2209
2.40	29	58	144	288	576	864	1152	1440	1728	2304
2.45	30	60	150	300	600	900	1201	1501	1801	2401
2.50	31	63	156	313	625	937	1250	1563	1875	2500

Determination and assessment of daily driver exposure by total number of points.

1. Determine the type of machine and the corresponding operating cycles the driver completes during the day.
2. Estimate or measure the duration of exposure for the individual operating cycles. Vibration-free periods may not be counted.
3. Determine whether your driver is exposed to light, normal or hard operating conditions.
4. Determine the vibration values of the individual operating cycles for the x-, y- and z-axis using table 1.
5. Determine the number of points of the individual operating cycles for the x-, y- and z-axis using table 2. In case of intermediate values, the vibration values should be rounded up.
6. Add up the points for x, y and z-axis.
7. The highest point sum of the three axes constitutes the total number of points.
8. Compare the total number of points to the action value and the limit value valid in the respective EU member state.
9. Determine the need for action of the operator of the construction vehicle.

Machine Operating Cycle	Duration of exposure in hours	x-axis in m/s²	No. of points	y-axis in m/s²	No. of points	z-axis in m/s²	No. of points
		Sum Total x-axis		Sum Total y-axis		Sum Total z-axis	
Total number of points (highest point sum of x-, y- and z-axis)							

Practical Examples

Example 1

Articulated Dump Truck (ADT)

Operating conditions:

- Very good working conditions.
- Level surface.
- Very experienced driver.
- Typical operating cycle 1: Driving with load = 2 hours.
- Typical operating cycle 2: Unloading = 0.1 hour.
- Typical operating cycle 3: Driving without load = 1 hour.
- Typical operating cycle 4: Loading = 0.2 hour.

Result: Light conditions (L)

Use the vibration values stated for x-, y- and z-axis under light conditions.

Machine Operating Cycle	Duration of exposure in hours	x-axis in m/s²	No. of points	y-axis in m/s²	No. of points	z-axis in m/s²	No. of points
ADT(Driving with Load)	2	0.43 rounded up to **0.45**	20	0.60	36	0.46 rounded up to **0.50**	25
ADT (Unloading)	0.1	0.24 rounded up to **0.25**	0	0.09 rounded up to **0.10**	0	0.12 rounded up to **0.15**	0
ADT (Driving without load)	1	0.56 rounded up to **0.60**	18	0.76 rounded up to **0.80**	32	0.53 rounded up to **0.55**	15
ADT (Loading process)	0.2	0.12 rounded up to **0.15**	0	0.18 rounded up to **0.20**	0	0.08 rounded up to **0.10**	0
		Sum Total x-axis	38	**Sum Total y-axis**	68	**Sum Total z-axis**	40
Total number of points (highest point sum of x-, y- and z-axis)		68					

The action value of the vibration exposure is not exceeded.

- If the result is near the action value, appropriate action shall be taken to reduce vibration exposure.
- Adequate information and training shall be provided to instruct drivers how to reduce their exposure to mechanical vibration.

Example 2

Articulated Dump Truck (ADT)

Operating conditions:

- Average working conditions.
- Uneven road surface.
- Inexperienced driver.
- Typical operating cycle 1: Driving with load = 3 hours.
- Typical operating cycle 2: Unloading = 0.2 hour.
- Typical operating cycle 3: Driving without load = 1 hour
- Typical operating cycle 4: Loading = 0.2 hour

Result: Light conditions (L)

Use the vibration values stated for x-, y- and z-axis under light conditions.

Machine Operating Cycle	Duration of exposure in hours	x-axis in m/s²	No. of points	y-axis in m/s²	No. of points	z-axis in m/s²	No. of points
ADT(Driving with Load)	3	0.85	108	1.18 rounded up to **1.20**	216	0.88 rounded up to **0.90**	122
ADT (Unloading)	0.2	0.74 rounded up to **0.75**	6	0.75	6	0.48 rounded up to **0.50**	3
ADT (Driving without load)	1	1.08 rounded up to **1.10**	85	1.28 rounded up to **1.30**	85	1.09 rounded up to **1.10**	61
ADT (Loading process)	0.2	0.46 rounded up to **0.50**	4	0.64 rounded up to **0.65**	4	0.24 rounded up to **0.25**	1
		Sum Total x-axis	178	**Sum Total y-axis**	311	**Sum Total z-axis**	187
Total number of points (highest point sum of x-, y- and z-axis)		311					

Assessment of a total point sum between 101 and limit value:

The action value of the vibration exposure is exceeded.

The limit value is not exceeded.

- The employer shall establish and implement a programme intended to reduce the vibration exposure.
- Provisions shall be made to ensure the appropriate health surveillance of drivers.

Comfort Ride

BELL EQUIPMENT offers an optional BELL designed Comfort Ride system, that helps to reduce the effects of vehicle vibration on the operator, and serves to improve operational cycle times.

The Comfort Ride suspension is available for the B25E and B30E range of **BELL EQUIPMENT** ADT's. The system consists of an independent front and rear suspension systems.

The front system incorporates a fully automated height control system that manages ride heights in accordance to payload, ensuring maximum suspension travel is available at all times. To further improve the requirements for comfort and improved dynamics stability at high speeds, the system will autonomously modify its spring rate to suit the operational conditions, taking into consideration payload, speed and articulation angle.

The rear system incorporates a unique walking beam design that uses a dual stage sandwich block on the middle and rear axles. This solution functions by altering the spring stiffness characteristic between laden and unladen operation, to ensure the optimal spring rate is always active. This simple mechanical solution has proven to be durable and maintenance free, while being effective in reducing vehicle bounce and vibration.

On site tests have shown that the new system will allow the operator to increase his shift duration by as much as 34% using the RMS (Root Mean Square) WBV (Whole Body Vibration) calculations during unladen operation of the vehicle. Unladen operation is deemed to cause the greatest vibration inputs.

Information Sources

ISO/TR 25398 Mechanical vibrations – Guideline for the assessment of whole-body vibration of earth moving machinery for seated operators using harmonized data measured by international institutes, organizations and manufacturers.

The vibration exposure data stated in this guideline is based on average real measurement results of whole-body vibrations related to practical operating cycles of different machine types and manufacturers.

For more detailed information do not hesitate to contact your nearest **BELL EQUIPMENT** branch or dealer.

Prepare For Maintenance And Service

WARNING

If the following steps are not observed it could result in injury or death.

If work must be done on a warm machine, beware of hot fluids and components.

Warn others of maintenance or service work.

Before starting to work on the machine, wash it thoroughly and park the machine on a level surface.

Engage the park brake.

Stop the engine.

Use access systems provided to access maintenance areas on machine.

Attach the “Do Not Operate” tag in full view of anyone entering the operator's station.

Allow the machine to cool down.

Discharge all pressure in the relevant pneumatic, hydraulic and fuel systems gradually before any lines, fittings or related items are disconnected or removed.

Before working under the machine ensure that the machine and attachments are securely supported.

The use of appropriate wheel chocks are recommended to prevent movement of the machine during maintenance.

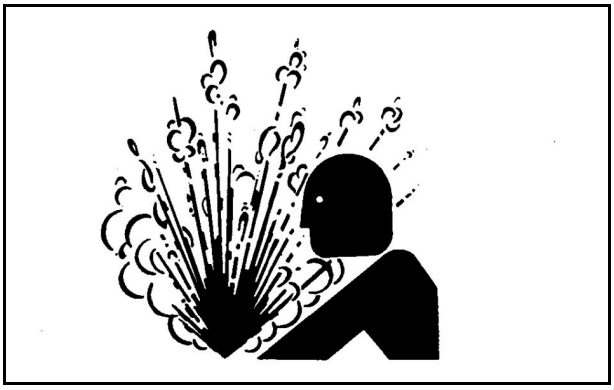
Do not support the machine with a single jack or other devices that may slip out of position.

Understand maintenance procedures before beginning any maintenance.

Keep the maintenance and service area clean and dry.

The operator should assist the service personnel whenever the engine must be running during service or repair.

Inspect Cooling System



Explosive release of fluids from the pressurised cooling system can cause serious burns.

Shut off the engine and only remove the filler cap when the engine is cool enough to touch with bare hands.

Slowly loosen the cap to the first stop, to relieve the pressure before removing it completely.

Make Welding Repairs

Disable electrical power before welding.

- Turn off battery isolator switch (or disconnect positive battery cable).
- Separate harness connectors to engine, alternator and vehicle microprocessors if necessary.

Avoid welding near fluid lines or vessels. Do not let heat go beyond work area near fluid lines.

Remove paint properly. Wear eye protection and protective equipment when welding. Do not inhale dust or fumes.

Avoid welding or heating near pressurised fluid lines. Flammable spray may result and cause severe burns if pressurised lines fail as a result of heating. Prevent heat going beyond the immediate work area towards any nearby pressurised lines.

Use a qualified welding technician for structural repairs.

Ensure that there is good ventilation in the welding area.

Do not earth through any assembly incorporating bearings or gears because this could cause these items to fail.

In cases where the repair has to be done close to a bearing or gear assembly, ensure that the earth point is close to where the repair is being done and that the current does not have to pass through bearings or gears.

Filter and Filter Elements

This machine should be operated in a well-ventilated area.

The design intent of the Heating, Ventilation and Air Conditioning (HVAC) system on this machine is not to filter toxic gases.

Only use a **BELL EQUIPMENT** approved ventilation filter element.

Maintenance Safety Precautions for Exhaust Aftertreatment System (EU Stage 5)

During regeneration of the Diesel Particulate Filter (DPF) the catalyst and exhaust stack surface temperature will get extremely hot (possibly 500°C). Any cloths or flammable materials left on the exhaust system can ignite if it comes into contact with the exhaust system or parts of the engine that heat up. There is a risk of fire. After carrying out maintenance work, make sure that no extraneous flammable material is left on the exhaust system or in the engine compartment.

Changing the Diesel Particulate Filter (DPF)

Direct contact or inhalation of soot particles is hazardous to health. There is a risk of injury. Have the diesel particle filter replaced by a qualified Bell Service Technician, requires special skills. The diesel particle filter is replaced as part of scheduled maintenance.

Accumulator Maintenance

Maintenance shall only be carried out by suitably skilled personnel, using instructions in accordance with ISO 12100 : 2010 - 1&2.

Overhaul or re-certification for continued safe use of gas loaded accumulators shall be carried out only by skilled personnel.

Brake Test

Brake functionality check – Wheel Brake and Park Brake test rpm

The brake functionality check is to verify that you have residual braking capacity prior to conducting actual performance tests. This check assists in enduring that the machine has adequate circuit functionality, acceptable brake torque and basic functioning of the overall system.

The machine must be parked on a level surface with the service brakes fully applied, first gear must be engaged and the park brake released. The engine must then be brought up to the stall rpm values indicated in the table below.

Wheel brake and park brake test rpm		
Machine	**Wheel Brake test RPM**	**Park Brake test RPM**
B18E	1965	1965
B20E	1965	1965
2304E	1500	1965
B25E	1500	1500
2806E	1350	1965
B30E WDB	1500	1500

If the machine does not move, this means the brakes are functioning. It is now safe to proceed to the static or dynamic brake performance testing as determined by the customer's risk assessment.

Storage For Flexible Hoses

Store hoses in a dark, dry environment away from electrical equipment below 33°C with sealed end caps.

Replacing Hoses

Damaged hoses and fittings should be replaced and not repaired.

Replacement of high pressure hoses should only be carried out by qualified personnel.

Only original parts must be used when replacing components/parts.

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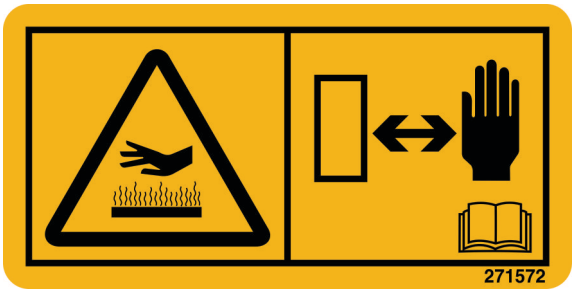
Safety Decals

There are several safety decals on your **BELL EQUIPMENT** machine. Their exact location and description of the hazard are reviewed in this section. Please take the time to familiarise yourself with these.

Keep the decals clean by using a soft cloth, water, and soap. Do not use solvent, gasoline, etc. You must replace a decal if it is damaged, missing or cannot be read. If a decal is on a part that is replaced, ensure a new decal is installed on the replacement part. Contact your **BELL EQUIPMENT** Representative for new decals.

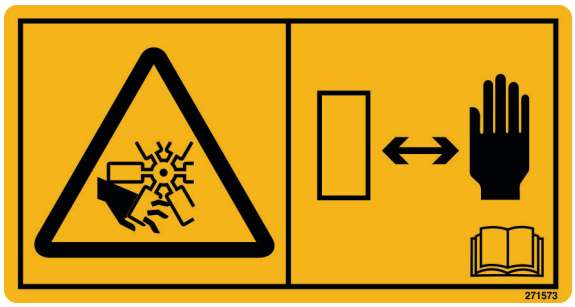
There are other decals on your machine, such as the **BELL** identification decal, but only the decals of special relevance to the safety of the operator are shown here. Refer to the Parts Manual for additional decals.

The Do Not Operate tag is located inside the parts manual (PM) pack wallet.



The Hot Surface decal is located on the engine, on the exhaust heat shield, on the back of the catalyst frame and on the cooler box. (All machines)

This decal is situated near hot surfaces to warn the operator not to touch such surfaces, as it may result in burn injuries.



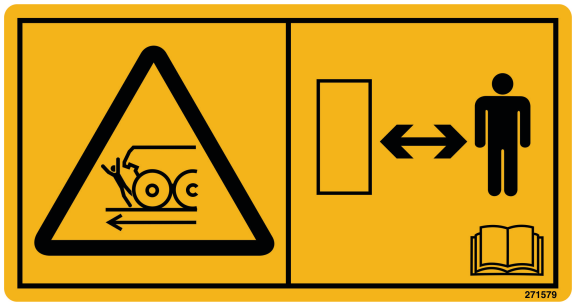
The Fan Warning decal is situated at the engine fan cowling and is used to warn the operator to keep clear of the rotating fan blades, as it may result in serious injury.

The Articulation Crush decal is located on each side of the articulation area. (All machines).

It denotes a crushing injury, that may occur in the articulation area of the machine. Stay clear of the articulation area to avoid serious injury.

SAFETY SIGNS

Attach the articulation locking bar before performing service on the machine or during transportation.

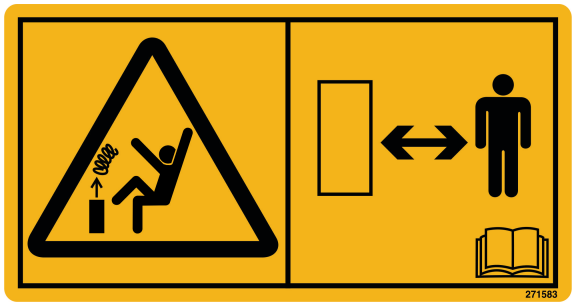


The Visibility Warning decal is located at the rear of the machine as well as on the back of the bin. (All machines)

Purpose of the decal is to warn people, not to stand behind the machine as the operator of the machine may reverse onto them which may result in serious injury or death.

The Propshaft Guard decal is located on the propshaft guard. (All machines)

The purpose of the decal is to warn all personnel not to remove the propshaft guard, as it may result in serious injury should they come into contact with the rotating propshaft.



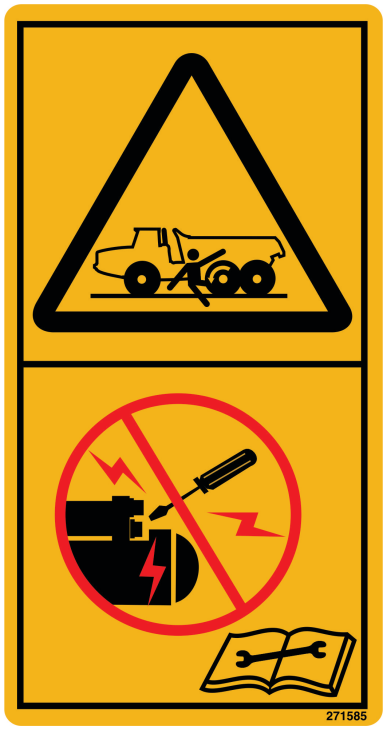
The Spring Pressure decal is located on the inside of the right rear chassis beam. (All machines)

Purpose of the decal is to warn all personnel, to be aware that the braking system is under pressure.

The Crush Support decal is located on the left and right of the rear chassis at the bin pole (where applicable) as well as on the fire wall of the cab facing the cab stay. (All machines)

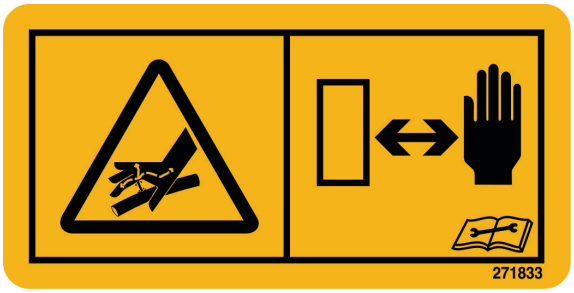
Purpose of the decal is to warn all personnel, that should any work or maintenance be conducted on the machine in this area, they should ensure that the machine transmission is set to neutral, the bin / cab is emptied and the bin support pole (where applicable) / cab stay is installed, to avoid accidental injury or death.

(The bin pole / cab stay is dimensioned for an empty bin / cab)



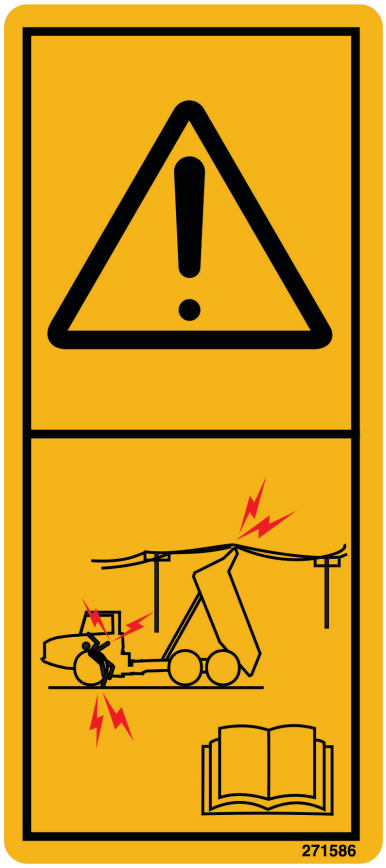
The Starter Motor decal is located on the electrical routing plate on the RHS chassis. (All machines)

Purpose of the decal is to warn all personnel to avoid serious injury from electrical and mechanical hazards. The machine must be started from inside the cab.



The High Pressure decal is located at the nose box of the machine, on the tip cylinders, as well as adjacent to the brake accumulators and suspension struts. (All machines)

Purpose of the decal is to warn all personnel, that all hoses and components are under high pressure and that any escaping fluid or gas may cause injury.



The Overhead Power Lines decal is located on the rear window inside the cab. (All machines)

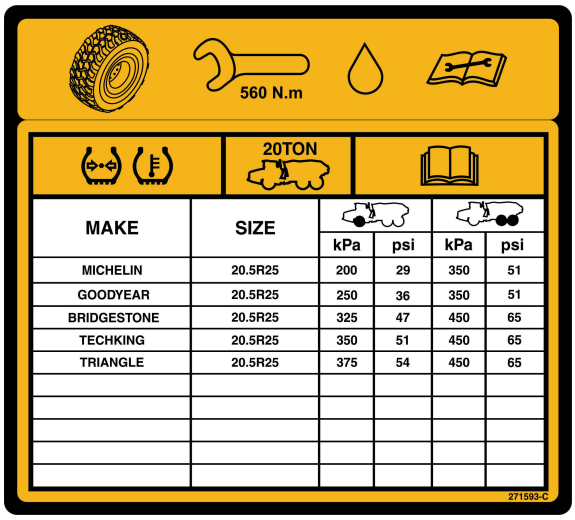
Purpose of the decal is to warn the operator never to move any part of the machine or load closer than 3m (10FT) plus twice the insulator length to an electric line to avoid serious injury .

This decal is located at the rear of the machine on the bin. (Where applicable)

Purpose of the decal is to show the operator that the lock out tag should be used and to warn all personnel, that should any work or maintenance be conducted on the machine in this area, they should ensure that the machine transmission is set to neutral, the bin is emptied and the bin support pole and / or bin up-lock is installed, to avoid accidental injury or death.

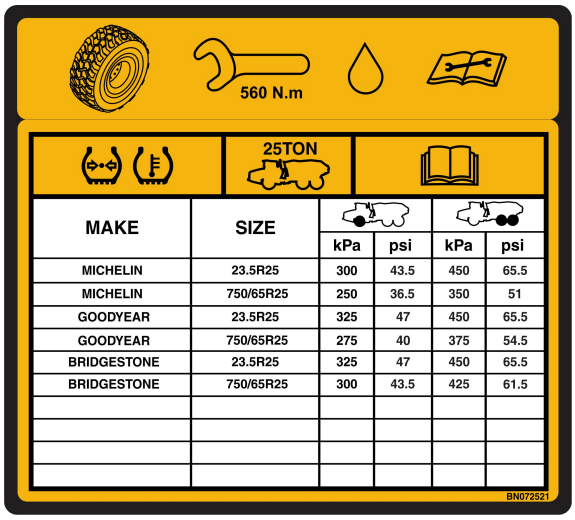
(The bin up-lock is dimensioned for an empty bin)

SAFETY SIGNS



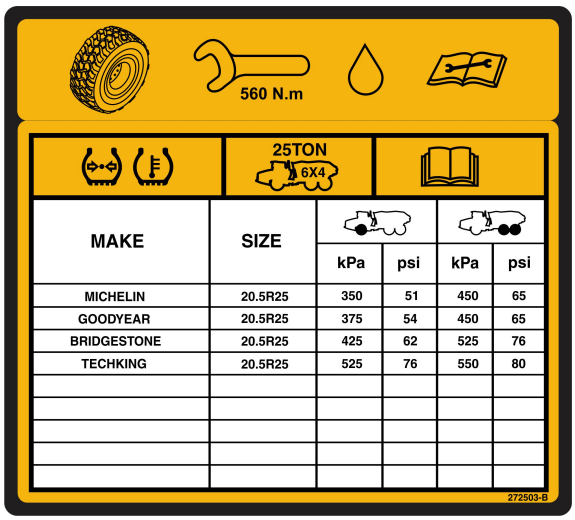
This decal is located on the hydraulic tank of the B18 and 20E.

Refer to the Tyre Information section for more details.



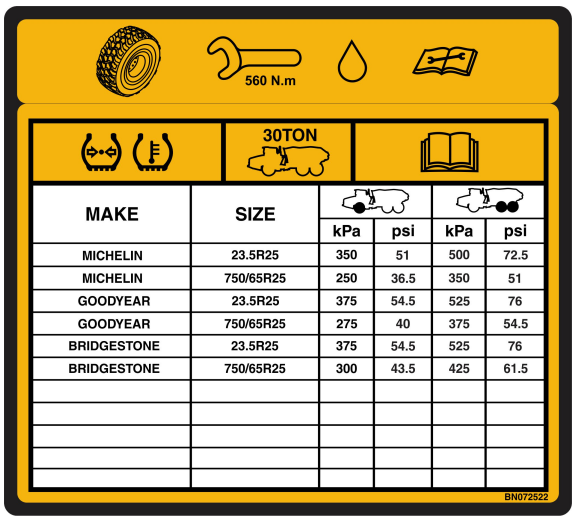
This decal is located on the hydraulic tank of the B25E 6X6.

Refer to the Tyre Information section for more details.



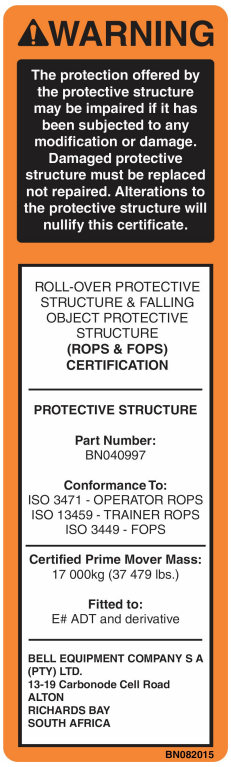
This decal is located on the hydraulic tank of the B25E 6X4.

Refer to the Tyre Information section for more details.

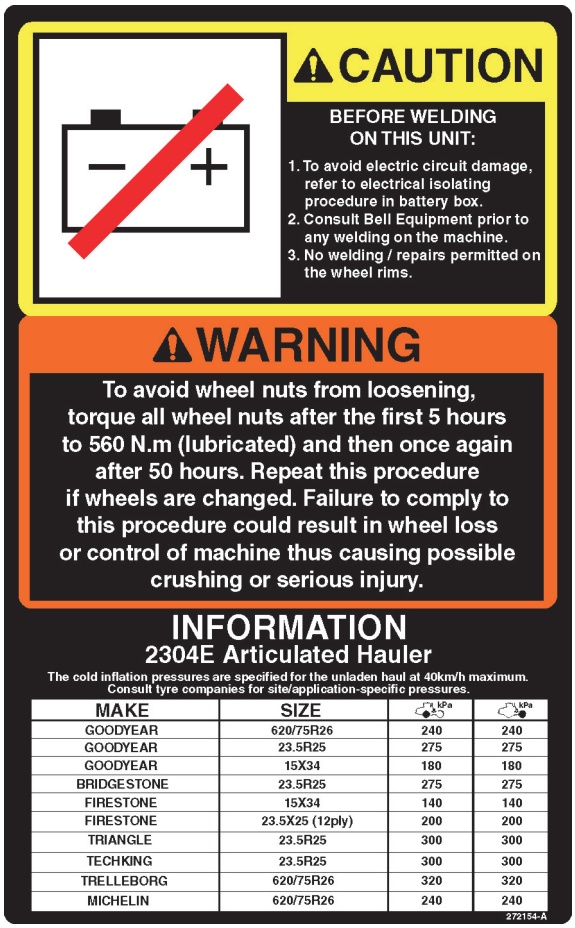


This decal is located on the hydraulic tank of the B30E.

Refer to the Tyre Information section for more details.



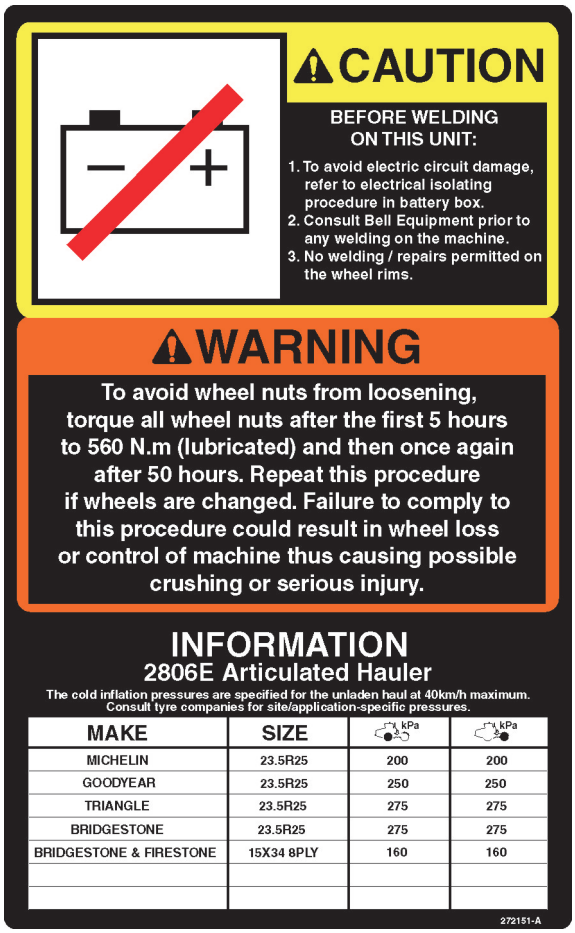
This decal is located on the LHS rear pillar inside the cab of the B18E, B20E, B25E and B30E.



This decal is located on the hydraulic tank of the 2304E.

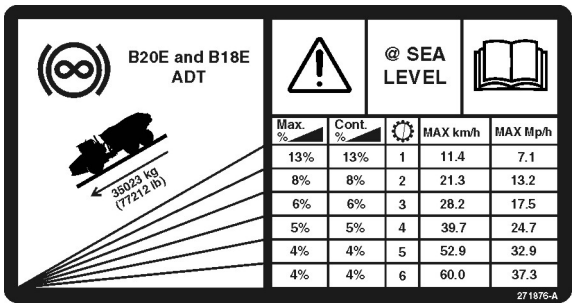
Refer to the Tyre Information section for more details.

SAFETY SIGNS



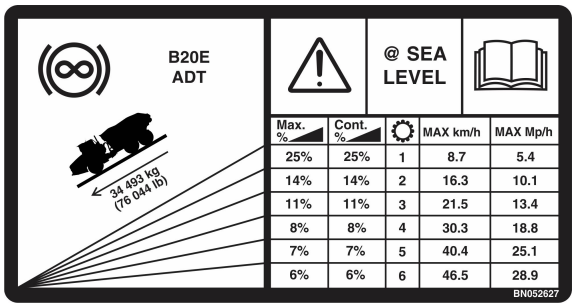
This decal is located on the hydraulic tank of the 2806E.

Refer to the Tyre Information section for more details.



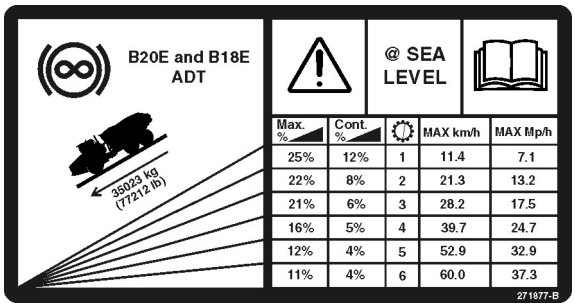
Max. %	Cont. %		MAX km/h	MAX Mp/h
13%	13%	1	11.4	7.1
8%	8%	2	21.3	13.2
6%	6%	3	28.2	17.5
5%	5%	4	39.7	24.7
4%	4%	5	52.9	32.9
4%	4%	6	60.0	37.3

This decal is located on the interior windscreen of the B18/20E (With non- retarder transmission). This decal applies to the 20 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



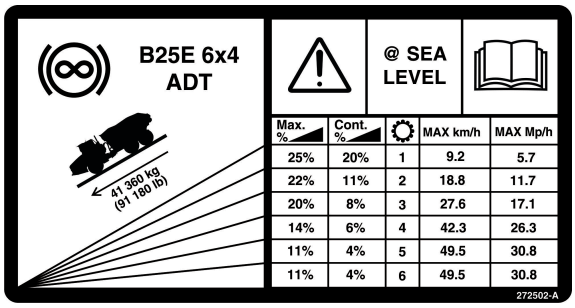
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	25%	1	8.7	5.4
14%	14%	2	16.3	10.1
11%	11%	3	21.5	13.4
8%	8%	4	30.3	18.8
7%	7%	5	40.4	25.1
6%	6%	6	46.5	28.9

This decal is located on the interior windscreen of the B20E LGP (Low Ground Pressure) (Non retarder). This decal applies to the 20 Ton LGP ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



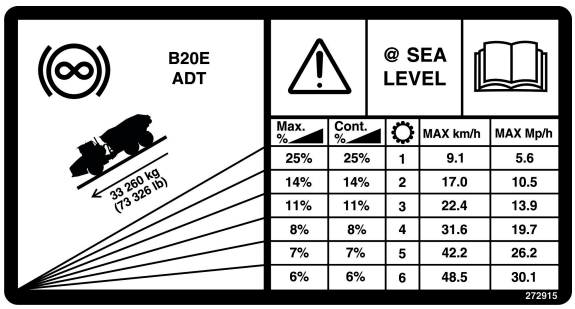
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	12%	1	11.4	7.1
22%	8%	2	21.3	13.2
21%	6%	3	28.2	17.5
16%	5%	4	39.7	24.7
12%	4%	5	52.9	32.9
11%	4%	6	60.0	37.3

This decal is located on the interior windscreen of the B18/20E (With retarder transmission). This decal applies to the 20 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



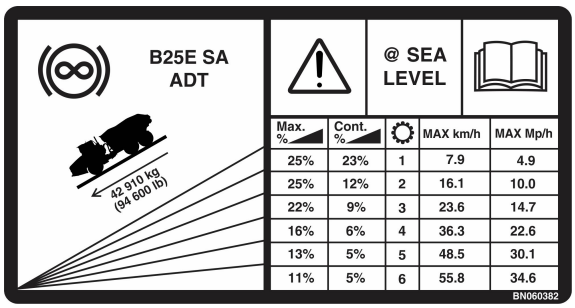
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	20%	1	9.2	5.7
22%	11%	2	18.8	11.7
20%	8%	3	27.6	17.1
14%	6%	4	42.3	26.3
11%	4%	5	49.5	30.8
11%	4%	6	49.5	30.8

This decal is located on the interior windscreen of the B25E 6X4 (S.A Models Only). This decal applies to the 25 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	25%	1	9.1	5.6
14%	14%	2	17.0	10.5
11%	11%	3	22.4	13.9
8%	8%	4	31.6	19.7
7%	7%	5	42.2	26.2
6%	6%	6	48.5	30.1

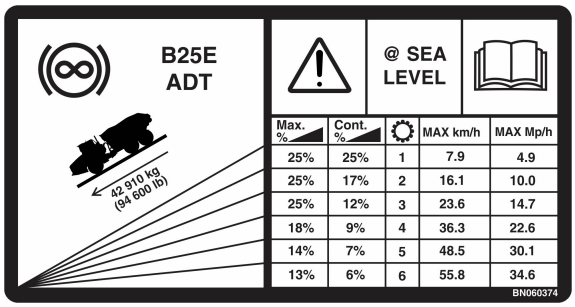
This decal is located on the interior windscreen of the B20E LGP (Low Ground Pressure) (With retarder option). This decal applies to the 20 Ton LGP ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	23%	1	7.9	4.9
25%	12%	2	16.1	10.0
22%	9%	3	23.6	14.7
16%	6%	4	36.3	22.6
13%	5%	5	48.5	30.1
11%	5%	6	55.8	34.6

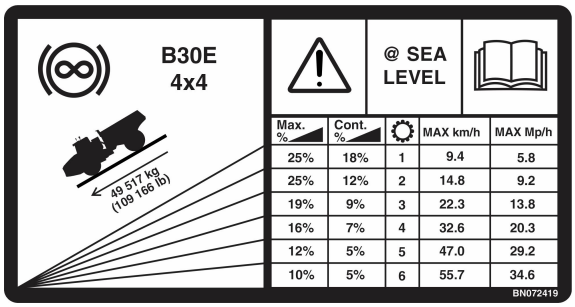
This decal is located on the interior windscreen of the B25E 6X6 (S.A Models Only) (Stage 2). This decal applies to the 25 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)

SAFETY SIGNS



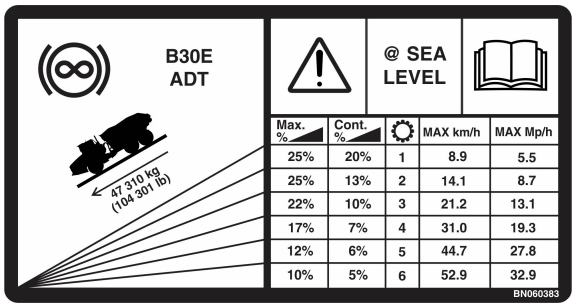
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	25%	1	7.9	4.9
25%	17%	2	16.1	10.0
25%	12%	3	23.6	14.7
18%	9%	4	36.3	22.6
14%	7%	5	48.5	30.1
13%	6%	6	55.8	34.6

This decal is located on the interior windscreen of the B25E (Euro Models Only) (Stage 4). This decal applies to the 25 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



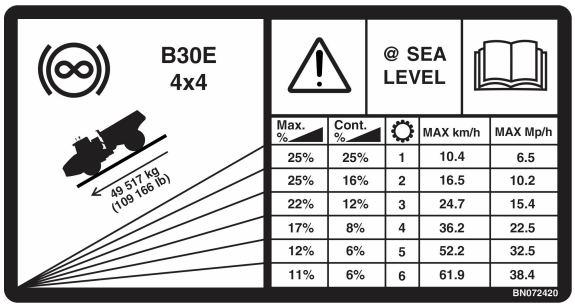
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	18%	1	9.4	5.8
25%	12%	2	14.8	9.2
19%	9%	3	22.3	13.8
16%	7%	4	32.6	20.3
12%	5%	5	47.0	29.2
10%	5%	6	55.7	34.6

This decal is located on the interior windscreen of the B30E 4X4 (S.A Models Only). This decal applies to the 30 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



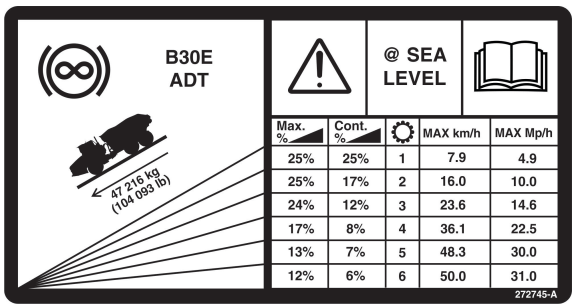
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	20%	1	8.9	5.5
25%	13%	2	14.1	8.7
22%	10%	3	21.2	13.1
17%	7%	4	31.0	19.3
12%	6%	5	44.7	27.8
10%	5%	6	52.9	32.9

This decal is located on the interior windscreen of the B30E 6X6 (S.A Models Only). This decal applies to the 30 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



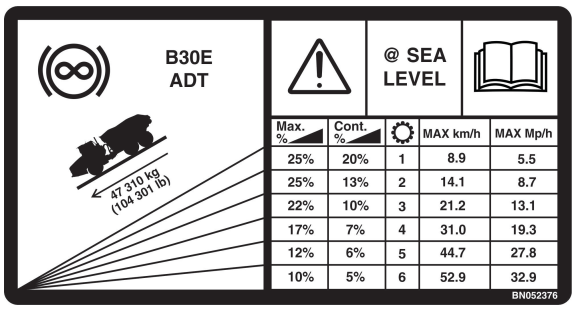
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	25%	1	10.4	6.5
25%	16%	2	16.5	10.2
22%	12%	3	24.7	15.4
17%	8%	4	36.2	22.5
12%	6%	5	52.2	32.5
11%	6%	6	61.9	38.4

This decal is located on the interior windscreen of the B30E 4X4 (Euro Models Only). This decal applies to the 30 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



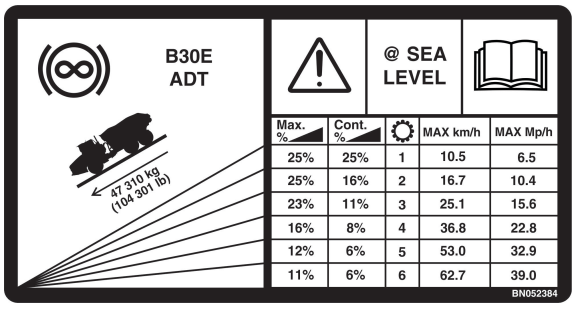
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	25%	1	7.9	4.9
25%	17%	2	16.0	10.0
24%	12%	3	23.6	14.6
17%	8%	4	36.1	22.5
13%	7%	5	48.3	30.0
12%	6%	6	50.0	31.0

This decal is located on the interior windscreen of the B30E (Euro Models Only) (Stage 4). This decal applies to the 30 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



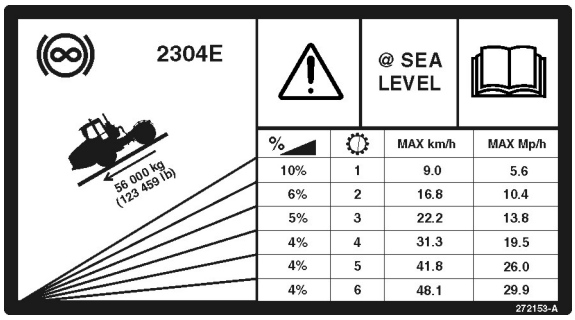
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	20%	1	8.9	5.5
25%	13%	2	14.1	8.7
22%	10%	3	21.2	13.1
17%	7%	4	31.0	19.3
12%	6%	5	44.7	27.8
10%	5%	6	52.9	32.9

This decal is located on the interior windscreen of the B30E (Stage 2). This decal applies to the 30 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



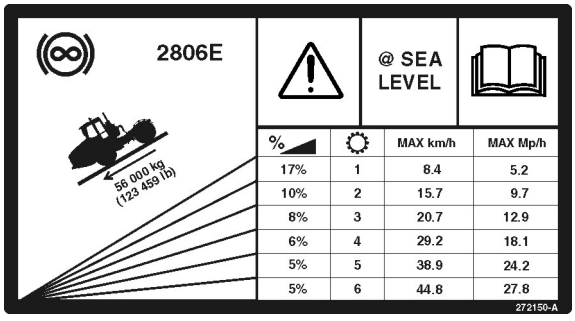
Max. %	Cont. %		MAX km/h	MAX Mp/h
25%	25%	1	10.5	6.5
25%	16%	2	16.7	10.4
23%	11%	3	25.1	15.6
16%	8%	4	36.8	22.8
12%	6%	5	53.0	32.9
11%	6%	6	62.7	39.0

This decal is located on the interior windscreen of the B30E (Stage 4 & 5). This decal applies to the 30 Ton ADT's descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



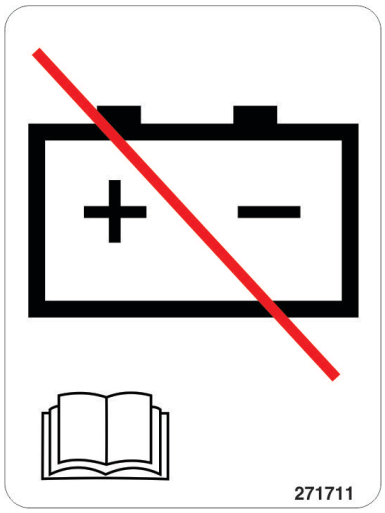
%		MAX km/h	MAX Mp/h
10%	1	9.0	5.6
6%	2	16.8	10.4
5%	3	22.2	13.8
4%	4	31.3	19.5
4%	5	41.8	26.0
4%	6	48.1	29.9

This decal is located on the interior windscreen of the 2304E. This decal applies to the 230 hp Hauler descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)



%		MAX km/h	MAX Mp/h
17%	1	8.4	5.2
10%	2	15.7	9.7
8%	3	20.7	12.9
6%	4	29.2	18.1
5%	5	38.9	24.2
5%	6	44.8	27.8

This decal is located on the interior windscreen of the 2806E. This decal applies to the 280 hp Hauler descending a slope with fully laden gross vehicle mass at sea level. (Refer to section Operating Techniques - Down Hill Operation and Gradient Values at Altitude for more details)

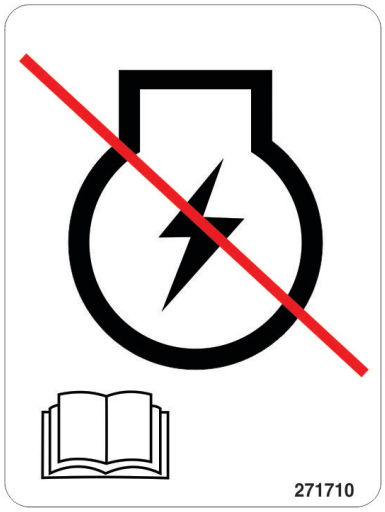


NOTE

The Battery Lock Out decal is only used on machines that have a Battery Isolation Switch fitted.

This decal is located on the Machine Isolator Cover.

The decal identifies the Battery Isolation Switch.



NOTE

The Engine Lock Out decal is only used on machines that have an Engine Isolation Switch fitted.

This decal is located on the Machine Isolator Cover.

The decal identifies the Engine Isolation Switch.

SAFETY SIGNS

The Do Not Step decal is located inside the bonnet on the engine. (All machines)

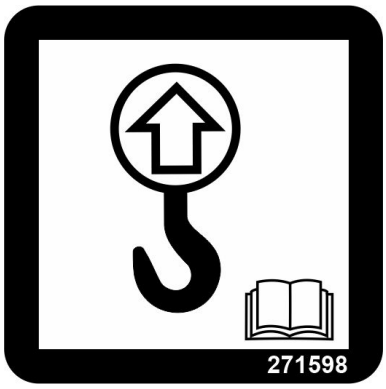
Purpose of the decal is to warn all personnel, not to step on surfaces that have this decal, as it may cause damage to the machine.

The RPM decal is located inside the cab on the windscreen. (All machines)

Maximum engine speed allowed.

The Refrigerant decal is located in the centre of the panel next to the driver's seat, on the right side of the cab. (All machines)

Refer to Service Instructions for more details.



The Lifting Point decal is located at each of the two rear and two front lifting points. (All machines)

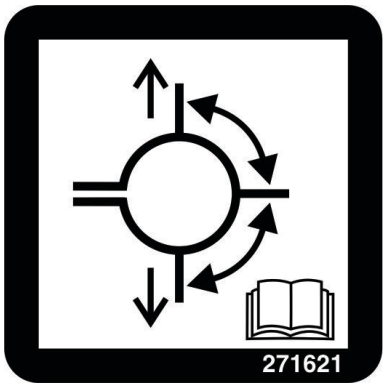
Refer to Machine Lifting section for more details.

The Tie Down Point decals are located at each of the six tie-down points on the chassis.

Refer to Machine Tie Down section for more details.

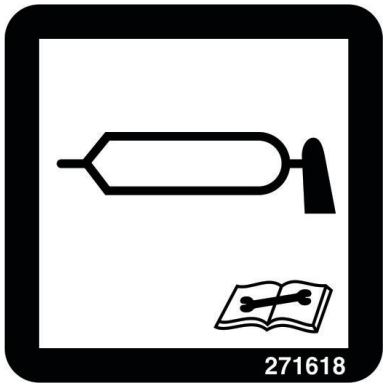
The Towing decals are located near the front and rear tow points.

Refer to Machine towing section for more details.



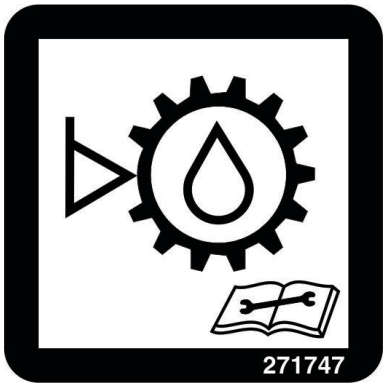
The Cab Lift Pump Lever decal is located on the cab lift pump.

This decal illustrates to the operator, in which direction to set the cab lift pump for upward / downward movement.



The Grease Point decal is located near the bonnet hinge on both sides of the front bumper.

Refer to Service Manual for greasing procedure of bonnet.

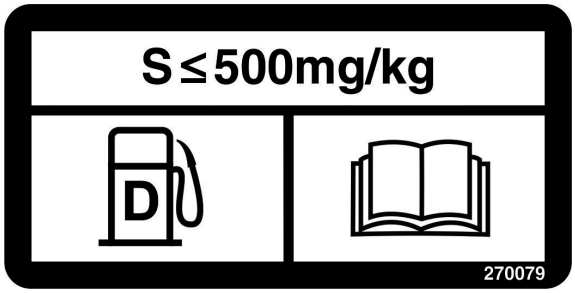


This decal is located on the transfer case, next to the sight glass. (All machines)

Check Transfer Box Oil Level.

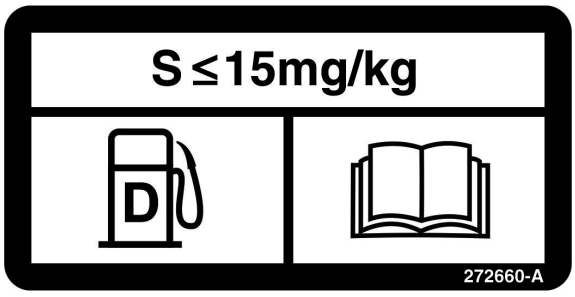
This decal is located on top of the reverse drive transfer case. (Machines with reverse drive choice)

Auto transmission fluid only.



The LSF (Low Sulphur Fuel) decal is located on the diesel tank. (SA machines only)

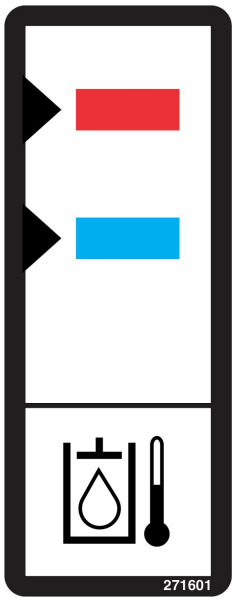
The purpose of this decal is to ensure the operator fills the machine with the correct grade and quality diesel.



The ULSF (Ultra Low Sulphur Fuel) decal is located on the diesel tank. (European/US machines only)

The purpose of this decal is to ensure the operator fills the machine with the correct grade and quality diesel.

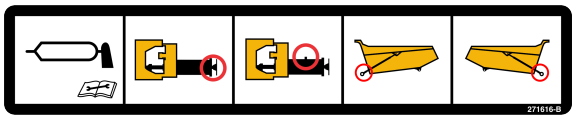
SAFETY SIGNS



The WDB (Wet Disk Brake) Hydraulic Oil Level decals are located next to hydraulic level gauges.

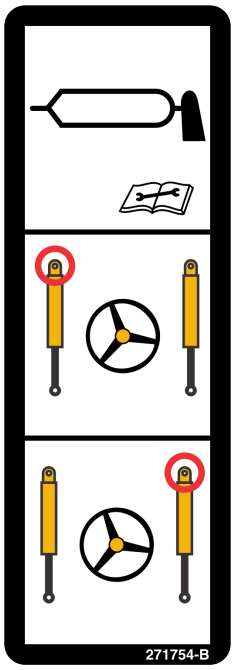
This decal is located on the Hydraulic tank on all B18E, B20E, B25E & B30E machines.

Refer to Service Manual for inspection procedure.



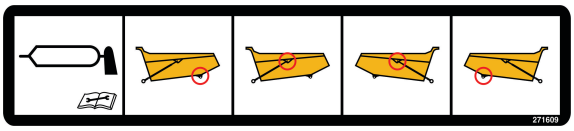
This decal is located at the grease bank which supplies grease to the oscillation joint. (Found on machines that are NOT fitted with an auto greasing system)

Refer to Service Manual for greasing procedure.



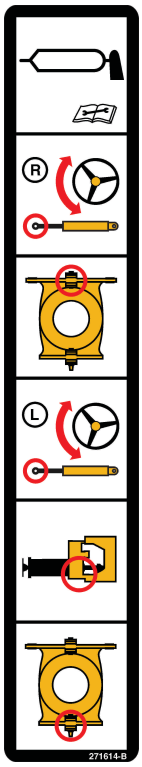
This decal is located below the catalyst/ silencer at the grease bank which supplies grease to the steering cylinder pivot point. (Found on machines that are NOT fitted with an auto greasing system)

Refer to the Service Manual for greasing procedure.



This decal is located at the grease bank which supplies grease to the bin pivots. (Found on machines that are NOT fitted with an auto greasing system)

Refer to Service Manual for greasing procedure.



This decal is located at the grease bank which supplies grease to the articulation area. (Found on machines that are NOT fitted with an auto greasing system)

Refer to Service Manual for greasing procedure.

The Emergency Exit decal is located on the RHS window of the cab. (All machines)

This decal illustrates to the operator, the direction of the emergency exit.

This decal is located on the cap of the engine coolant bottle. (All machines)

This decal illustrates to the operator that he should beware of certain dangers/ hazards when opening the coolant cap.

The Reflective Tape (Red) decal is located at the rear of all machines.

The Reflector Tape (Red) decal is located on the cab stay.

This decal is located on the emergency stop.

SAFETY SIGNS

The AdBlue Only decal is located next to the AdBlue / DEF filler cap. (European machines only).

The purpose of the decal is to help the operator distinguish between the AdBlue / DEF tank and Diesel tank.

Blu@dvantage™

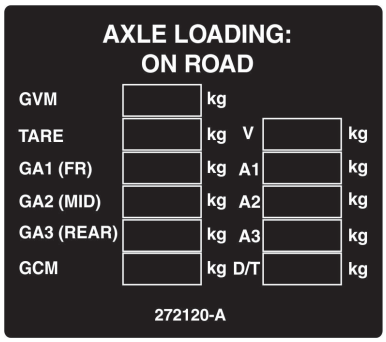
The Blue Advantage decal is located inside the cab on the LHS window (European machines only).

Fleetm@tic®

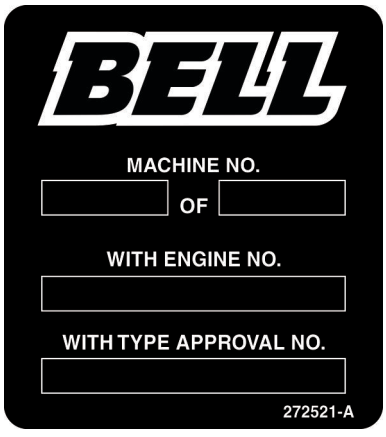
The Fleetmatic decal is located inside the cab on the LHS window (If machine is equipped with Fleetmatic).

The Powercore Filters decal is located on the Power Core Air Cleaner. This decal has details about changing the filter elements and their parts numbers. (Refer to the Service manual for detailed description on how to change the filter elements).

The PDI/Quality decal is located inside the truck on the rear window. All information regarding the final inspection off the machine before it is delivered, can be found on this decal.



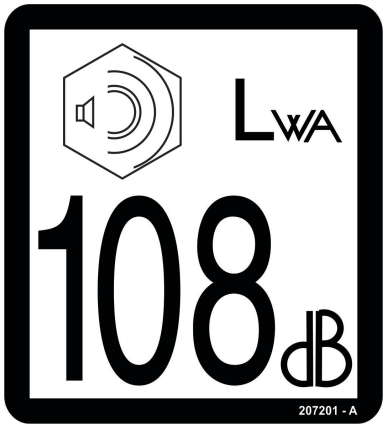
Located inside the cab.



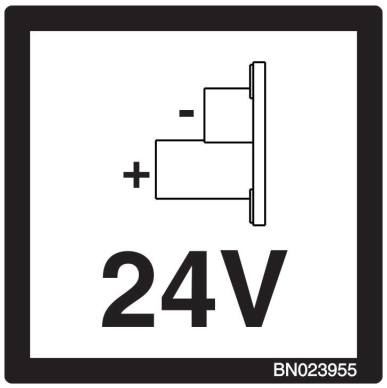
Located inside the cab on the rear pillar above the cab Spec Plate. (This will only be fitted to machines where engines are fitted, that do not comply to Stage 4/5)

Sound Pressure - Located on the bottom left inner wall of the cab for B18E & B20E.

Sound Pressure - Located inside the cab on the RH C-Pillar for B25E & B30E.

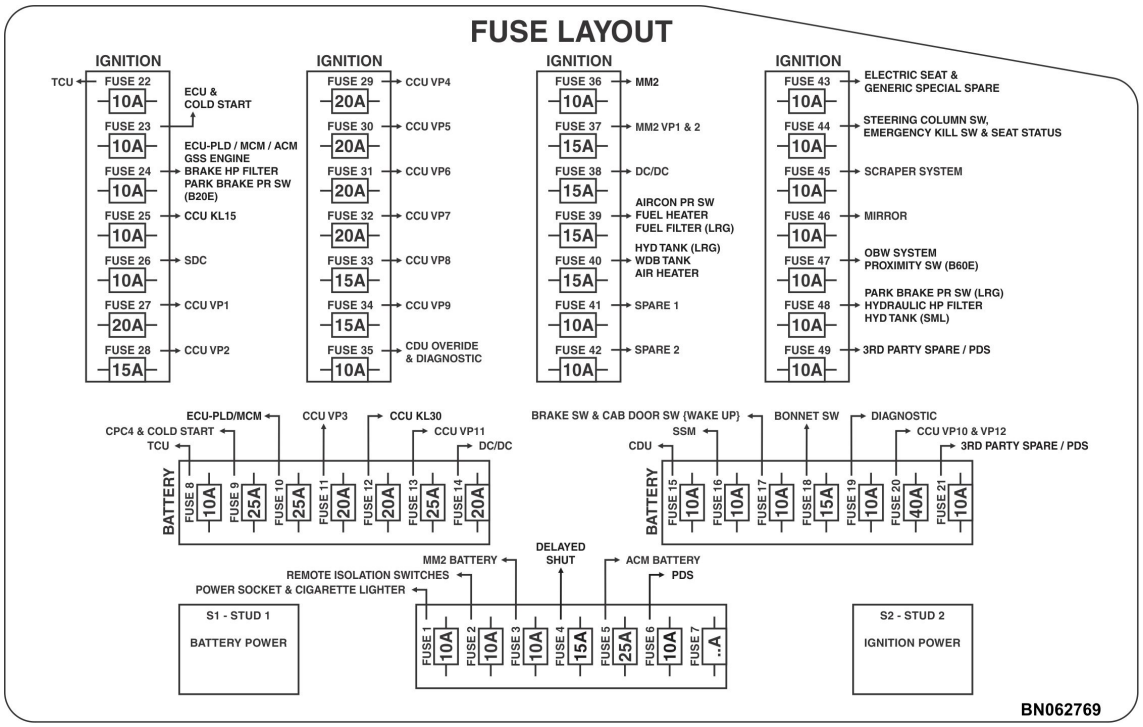


Sound Level decal (Located on the outside of the cab, on the RHS) (B25E & B30E).

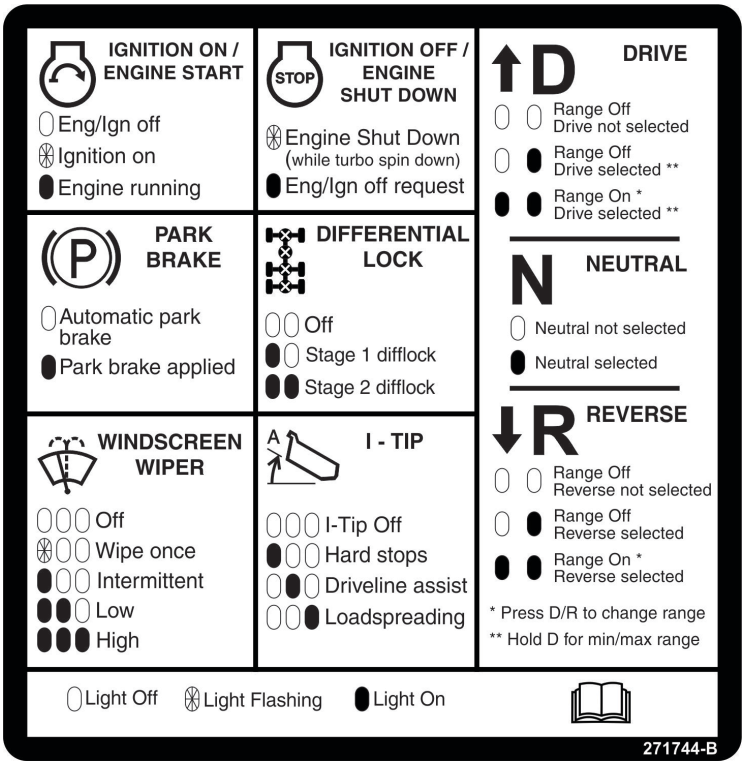


This decal is located next to the jump start point that is situated behind the cab lift pump.

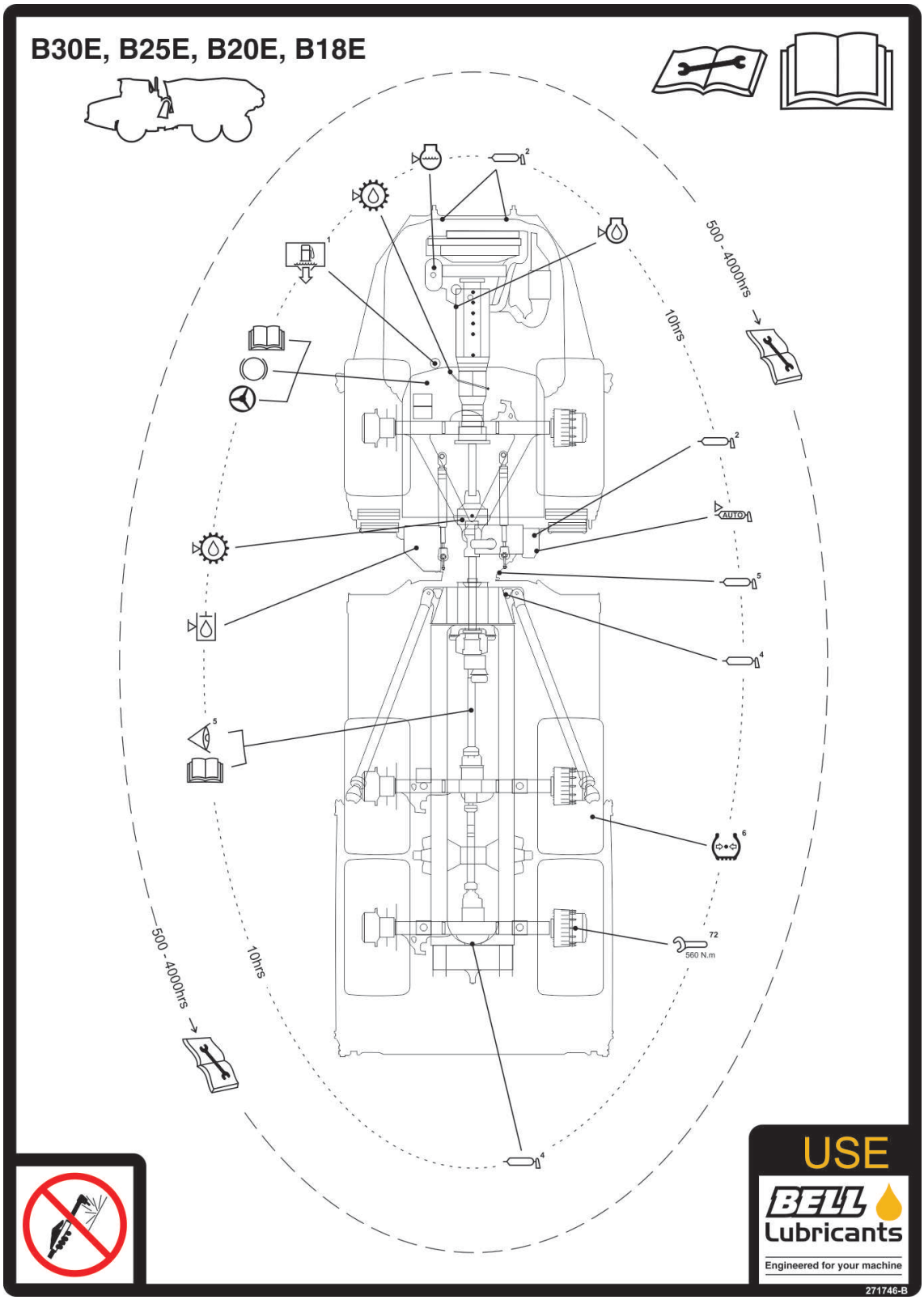
SAFETY SIGNS



This decal is located inside the fuse panel lid, inside the cab.

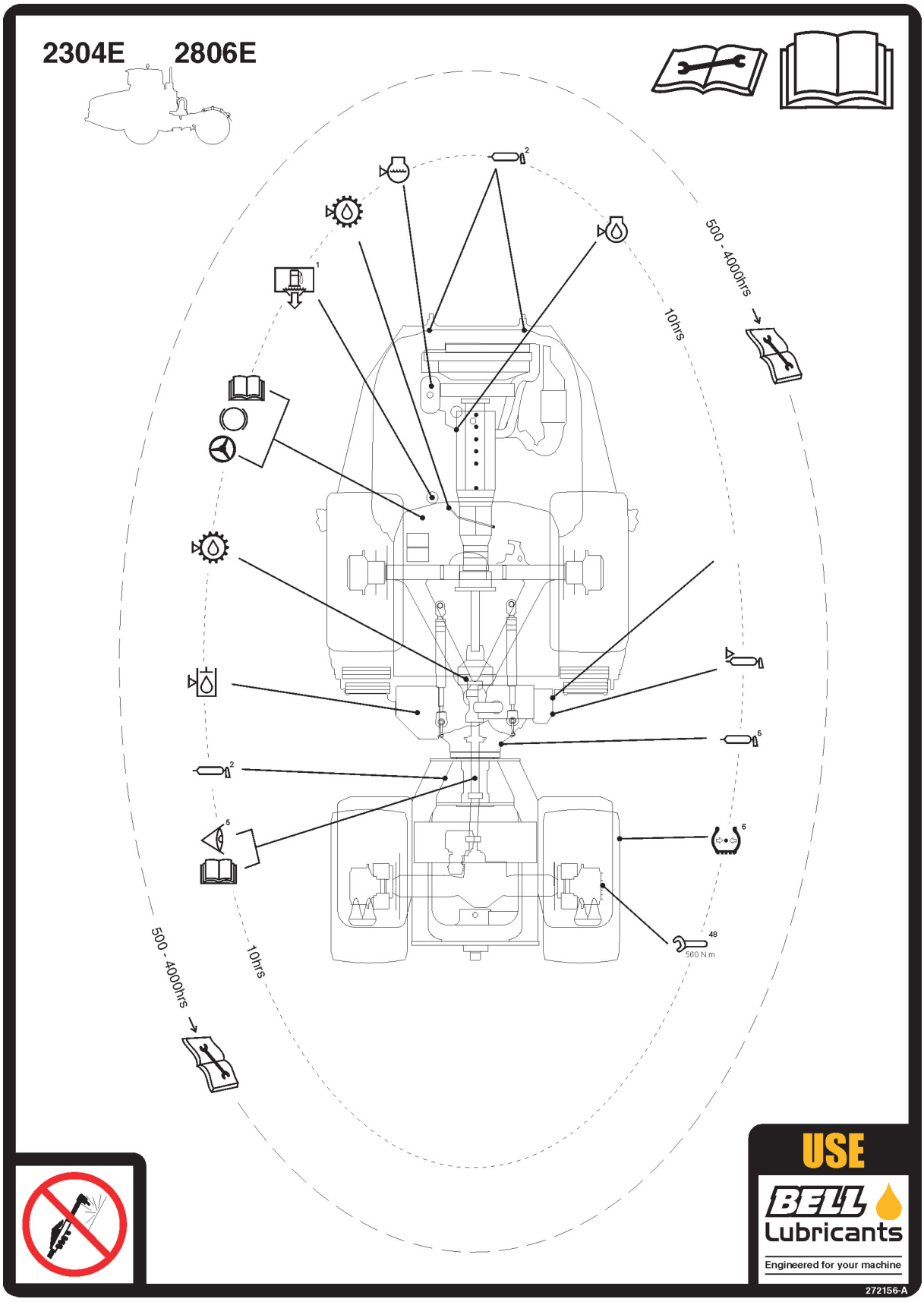


The SSM (Sealed Switch Module) decal is located inside the cab on the RHS window adjacent to the SSM.



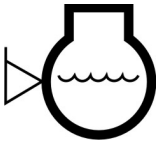
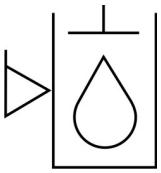
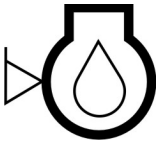
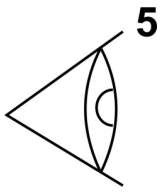
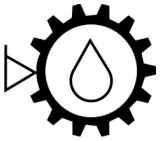
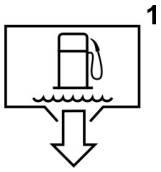
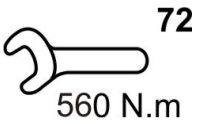
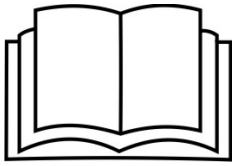
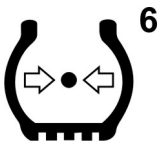
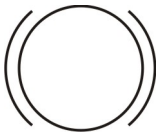
This Daily Inspection decal is located on the Hydraulic Tank of the B18E, B20E, B25E & B30E.

SAFETY SIGNS

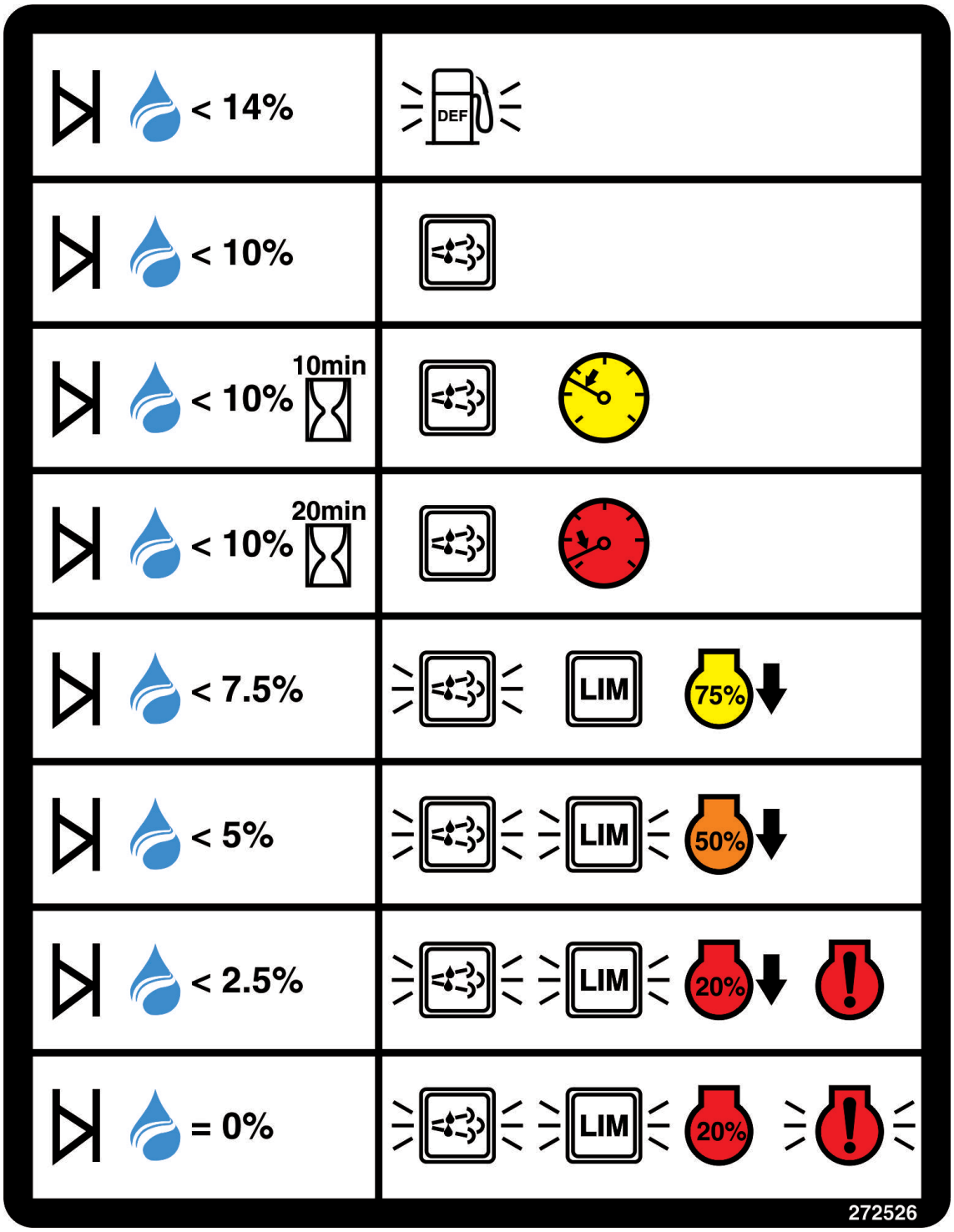


This Daily Inspection decal is located on the Hydraulic Tank of the 2304E and 2806E Hauler.

RSG Decal Symbols

	Check Engine Coolant Level		Check Hydraulic Oil Level
	Check Engine Oil Level		Visual checks to be carried out around machine.
	Check Transmission Oil Level Check Drop Box Oil Level		Greasing Point
	Drain water from fuel/ water separator fitted to Fuel System		Wheel Rim Wet Torque Setting
	Refer to Operators Manual		Check Tyre Pressure
	Emergency Steering Test - refer to operator's manual		Check Auto Greaser Level
	Emergency Steering Test - refer to operator's manual		Contact Bell Equipment, prior to conducting any welding on the machine. To avoid electric circuit damage, while welding is carried out on the machine, ensure that the battery terminals are removed. NO welding / repairs permitted on wheel rims.
	Use Bell Lubricants Only		

SAFETY SIGNS

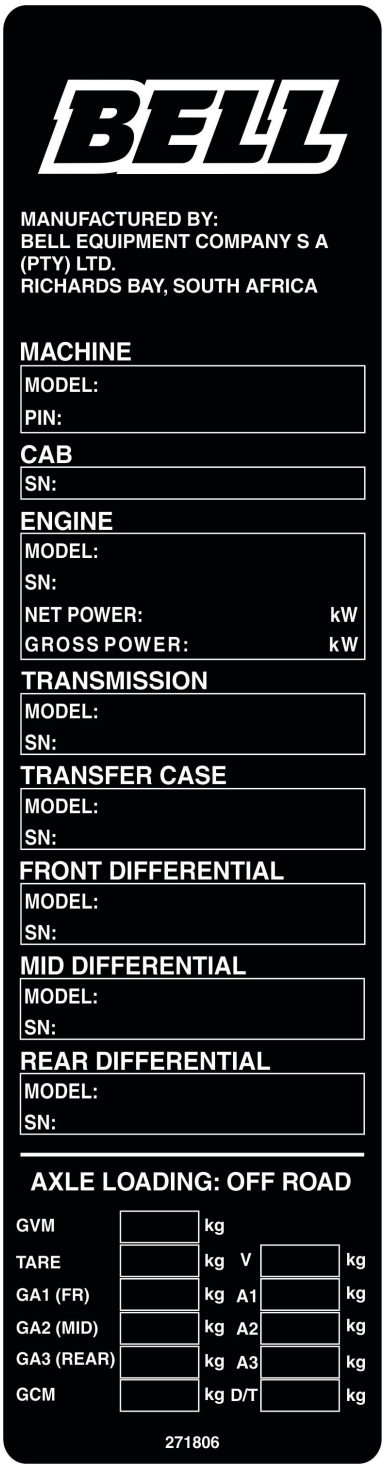


The DEF Level Warning decal is found on all machines equipped with a SCR / DEF system. It is located inside the cab, at the bottom RHS of the windscreen.

It describes the different inducement levels the truck would experience as the AdBlue/ DEF level decreases below the specified threshold. For a detailed explanation of each inducement level please refer to the table below.

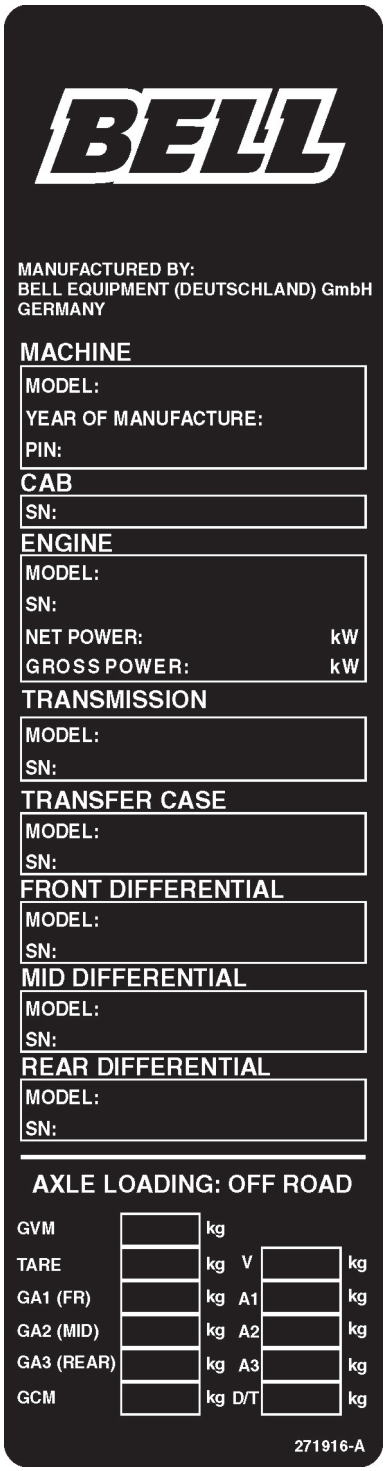
Stage	System Reaction / Response
1	Stage 1 is triggered when the AdBlue/ DEF level in the tank has reached < 14%, the AdBlue/ DEF Low Level warning light will flash on the CDU within the fault warning panel and stay ON untill the level of AdBlue/ DEF is replenished to above 14%.
2	When the AdBlue/ DEF level in the tank has reached < 10%, the AdBlue/ DEF warning light will illuminate on the CDU within the Fault warning Panel. A countdown timer of 10 minutes will appear in the interactive display screen.
3	The AdBlue/ DEF warning light will still be illuminated on the CDU. Stage 3 is triggered once the timer has reached zero, at which time the travel speed of the machine is limited to 15km/h (9.32 m/h) for a duration of 20min. When stage three is triggered a new count down timer will start for a further 20 minutes.
4	The AdBlue/ DEF warning light will still be illuminated on the CDU. Stage 4 is triggered once the 20 minute countdown is over, at this stage the travel speed of the truck is further reduced to 10 km/h (6.21 m/h).
5	When the AdBlue/ DEF level in the tank has reached < 7.5% the AdBlue/ DEF warning light will begin to flash on the CDU. The Torque Limiter warning light will also illuminate on the CDU within the fault warning panel. The engine torque will be limited to 75%.
6	When the AdBlue/ DEF level in the tank has reached < 5% the AdBlue/ DEF & Torque Limiter warning lights will be flashing on the CDU. The engine torque will be limited to 50%.
7	When the AdBlue/ DEF level in the tank has reached < 2.5% the AdBlue/ DEF & Torque Limiter warning lights will still be flashing on the CDU. The Engine Fault warning light will also illuminate in the CDU within the fault warning panel. (Refer to the "Operating Component" section under "Warning Lights" for a description of actions to be taken). The engine torque will be limited to 20%.
8	When the AdBlue/ DEF level in the tank has reached < 0% the AdBlue/ DEF & Torque Limiter warning lights will still be flashing on the CDU. The Engine Fault warning light will begin to flash. (Refer to the "Operating Component" section under "Warning Lights" for a description of actions to be taken). The engine torque will be limited to 20%. The machine engine speed will be restricted to Idle and will cut accelerator pedal function.

SAFETY SIGNS

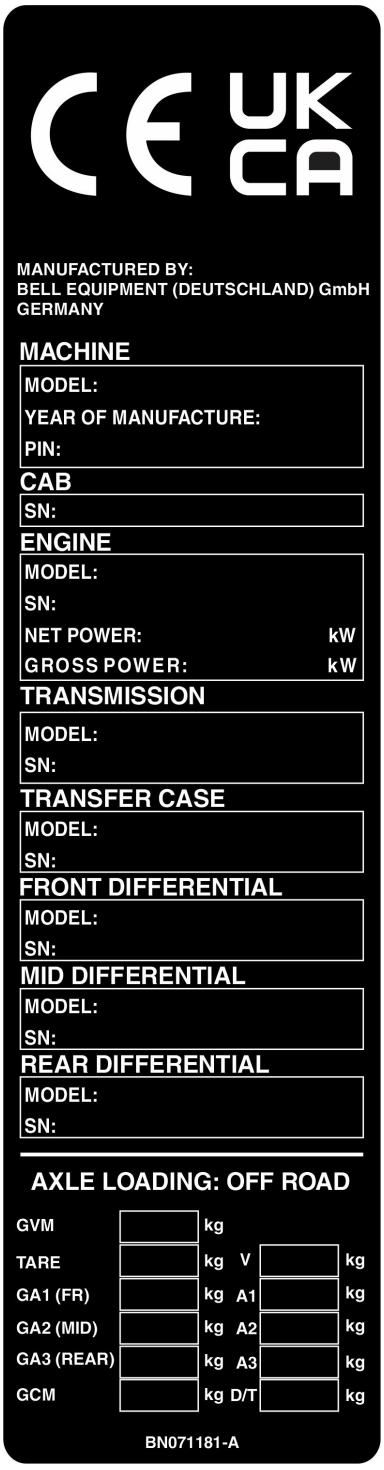


The BELL Serial Plate decal is located inside the cab on the LHS rear pillar. (South African Bell Assembled machines Only)

The iT4 Serial Plate decal is added beneath the previous serial plate when a South African Bell Assembled machine is exported. (US/Euro machines only)



The BELL Serial Plate decal is located inside the cab on the LHS rear pillar. (Bell Germany assembled machine - Non CE marked machines)



The BELL Serial Plate decal, for Euro machines, is located inside the cab on the LHS rear pillar (Bell Germany assembled machine - CE marked machines).

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Tyres and Rims

Unless otherwise specified, the standard tyres and rims fitted to **BELL EQUIPMENT** machines are approved for use at the specified machine tyre loads (half of the axle loads) at the machine's maximum speed, at the cold tyre inflation pressures specified by each tyre supplier. Site specific investigations are required to ensure that the machines operate within the capabilities of the machines and tyres.

Rims are designed with inherent safety factors against safety critical failure with reasonable use. However, due to overloading and vehicle abuse, the working life of such a rim may be significantly shortened. It is a **BELL EQUIPMENT** recommendation that rims be scrutinised and inspected at least every 2 years by the responsible wheel manufacturer and recertified as fit for use. This inspection should at least include cleaning, sandblasting, ultrasonic or magnetic particle inspection for cracks, repair if required, and stamping for recertification.

By implementing these measures the owner will benefit from extended rim working lives and improved safety within the operational site and for operators alike. It is recommended that a visual rim inspection be done not less than at every tyre change.

Tyre Pressure - General

Air under pressure, in the correct quantity, enables a tyre to carry the load in approved conditions. The quantity of air necessary for optimal functioning of a tyre is determined by the tyre inflation pressure.

These tyre pressures are specially calculated for **BELL EQUIPMENT** machines to provide maximum tyre life and should be used in all normal operating conditions. It is important to note that design axle loads are used to calculate the Cold Inflation Pressures appearing on the Tyre Pressure Decals.

Additionally, some tyre companies have allowed for extreme conditions and have recommended higher pressures to protect the tyres from excessive deflection. As a result of these factors, optimum performance and safe operation can only be ensured by determining inflation pressure from operational and site specific data. For instance, actual axle loads, haul conditions and ambient operating temperature. Both over- and under-inflation of a tyre can result in decreased tyre tread life.

NOTE

Pressure amendments to allow for overloads are not permitted, as it will not only result in excessive vibration during the unladen state of the machine, but also overload load-carrying components which could result in premature failure.

Tyres of different manufacturers should never be combined on the same machine. Tyres of different types and/or from different manufacturers have different dimensions and constructions which, when mixed on a machine, will have a negative impact on the drive train, as well as the safety of the machine, as the handling and stability will be affected.

Tyre Inflation Pressure, Hot vs. Cold

The pressures specified on the tyre pressure decals are Cold Inflation Pressures. These pressures are typically used when new machines start on a job site and/or new wheels are fitted to machines and/or after long periods without operating the machine. In this case the tyre temperature will be the same as the ambient temperature. The load/pressure tyre tables in the tyre companies' data books are usually based on a reference ambient temperature of 18° C and indicate Cold Inflation Pressures. Here 'ambient' refers to environment at the place and time of tyre inflation, not the work site. These tables may be used without adjustment between 0° C and 25°C. However, if ambient temperature varies significantly, adjusted cold inflation pressures must be used.

As a general rule of thumb, for ambient (at place of inflation) temperatures exceeding 25°C, the following applies:

- from (25 to 29° C) increase the Cold Inflation Pressure by 4%
- from (30 to 34° C) increase the Cold Inflation Pressure by 6%
- from (35 to 39° C) increase the Cold Inflation Pressure by 8%
- from (40 to 45° C) increase the Cold Inflation Pressure by 10%

The adjusted Cold Inflation Pressure is a one-time change based on the recommended inflation pressure for the machine/site and the temperature at the time the pressure is being checked or adjusted. This adjustment is required to ensure that the tyre **does not become under-inflated should**

the ambient operating temperature drop below the temperature at which the tyre pressures were set. Once the machine starts operating, the pressure will increase due to heat build-up inside the tyre. The increasing pressure on an operational machine should be monitored until stabilised, at which time the pressure is noted as the Hot Inflation Pressure. Future pressure checks and adjustments should be done according to the Hot Inflation Pressure with the tyre at operating temperature.

⚠ WARNING

BELL Equipment has done everything in its power to source tyres suited for the machine application. Customers and Operators are reminded that BELL Equipment cannot control the applications in which BELL machines are being applied. Inspection and maintenance of tyres needs to be conducted continuously by trained tyre professionals. Failure to do so may result in unexpected tyre failure which poses serious risk to the operators and bystanders.

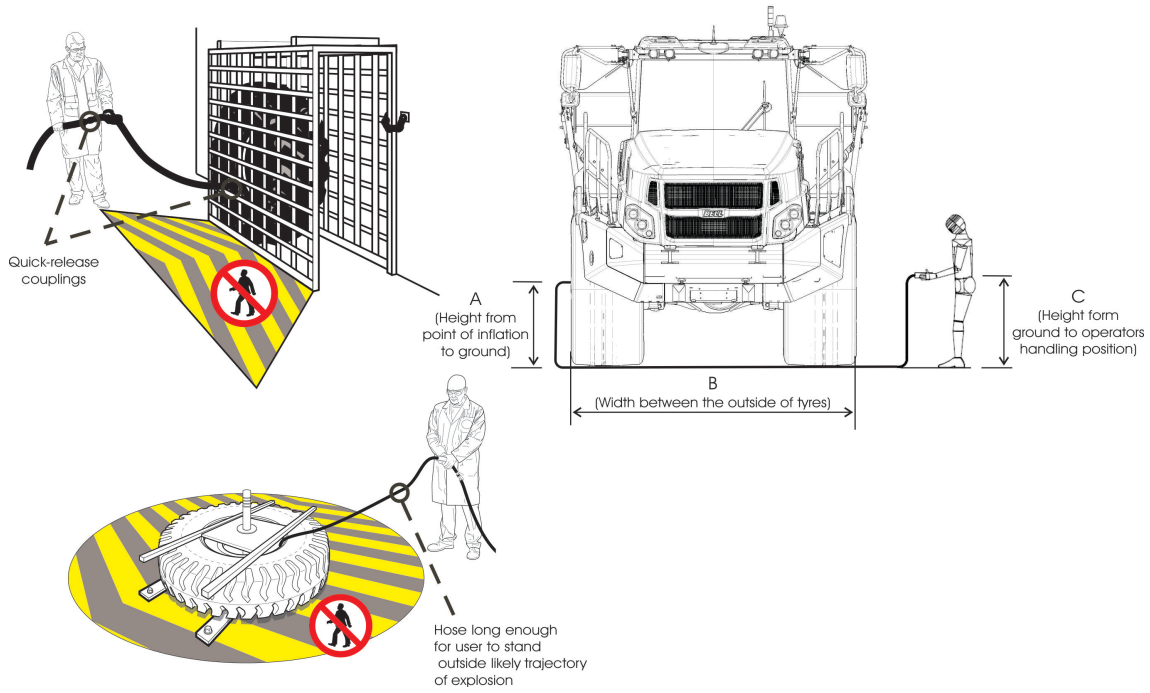
BELL Equipment strongly recommends that respective tyre companies are approached to establish safe working parameters of each machine & tyre combination prior to operation on any site

⚠ WARNING

Welding or modifying rims is strictly prohibited. Rims are manufactured in a controlled environment and any welding or other modifications to factory issued rims will immediately render the rims unsafe. Overheating of a tyre caused by application of an external heat source, internal heat source, for instance excessive use of brakes, or operating conditions will cause a steep rise in internal tyre pressure. This could result in tyre explosion which could propel projectiles in excess of 500m (1640ft) from the machine, posing a serious risk to anyone or anything in the affected area. If tyre overheating is suspected or noticed, do not approach the tyre until such time that the tyre has cooled down sufficiently. Never deflate overheated tyres. When inflating tyres, stand behind the tread and use a self attaching chuck with extension hose. Use a safety cage on loose wheel-sets if available. Do not stand over the tyre.

DO use a clip-on chuck to connect the airline with a quick-release coupling at the operator's end, this allows tyre deflation from a safe position if problems occur.	**DON'T** use valve connectors that require the operator to hold them in place.
DO use airline hoses long enough to allow the operator to stay outside the likely explosion trajectory during inflation.	**DON'T** exceed the manufacturer's recommended tyre pressure for the size and rating of the tyre.
DO use enough bead lubricant when seating the tyre. Consider removing the valve core or using a 'beadblaster' if seating is difficult.	**DON'T** use 'unrestricted' airlines without a gauge or pressure control device.
DO remove the airline after use to prevent air seepage and possible over inflation.	**DON'T** allow the control valve to be jammed open which could allow the operator to leave the inflating tyre unattended.

Recommended Operator Position During Tyre Inflation



Schrader MAST AIR gauge with 6mm input and output hose

Schrader Gauge Instructions

1. Measurement Scale: 0.7 to 12bar (10 to 170psi)
2. Recommendations and first time operation:
   - Use only filtered oil and water free compressed air.
   - Maximum pressure of air source: 15bar.
   - Do not use inflating or checking pressure of hydroflated tyres or those containing corrosives.
   - Attach a hose (7 mm interior diameter and exceeding the total length of A+B+C) to the air- intake neck (fitted with an R987-2 coupler).
   - Insert a flexible intermediate connector:

     – Ref. R153-1 on the air-intake neck for connection to a quick-acting coupler. Ref. 39066-67 for a 1/4 inch thread connection.
3. Check regularly to see that the hose and the seal on the quick-acting coupler are airtight.
   - Fit the connector to the valve mouth.
   - Press the + button for inflation.
   - Press the - button for deflation.

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MACHINE INFORMATION

♦ MACHINE NUMBERS
♦ MACHINE SPECIFICATIONS
♦ MACHINE DIMENSIONS

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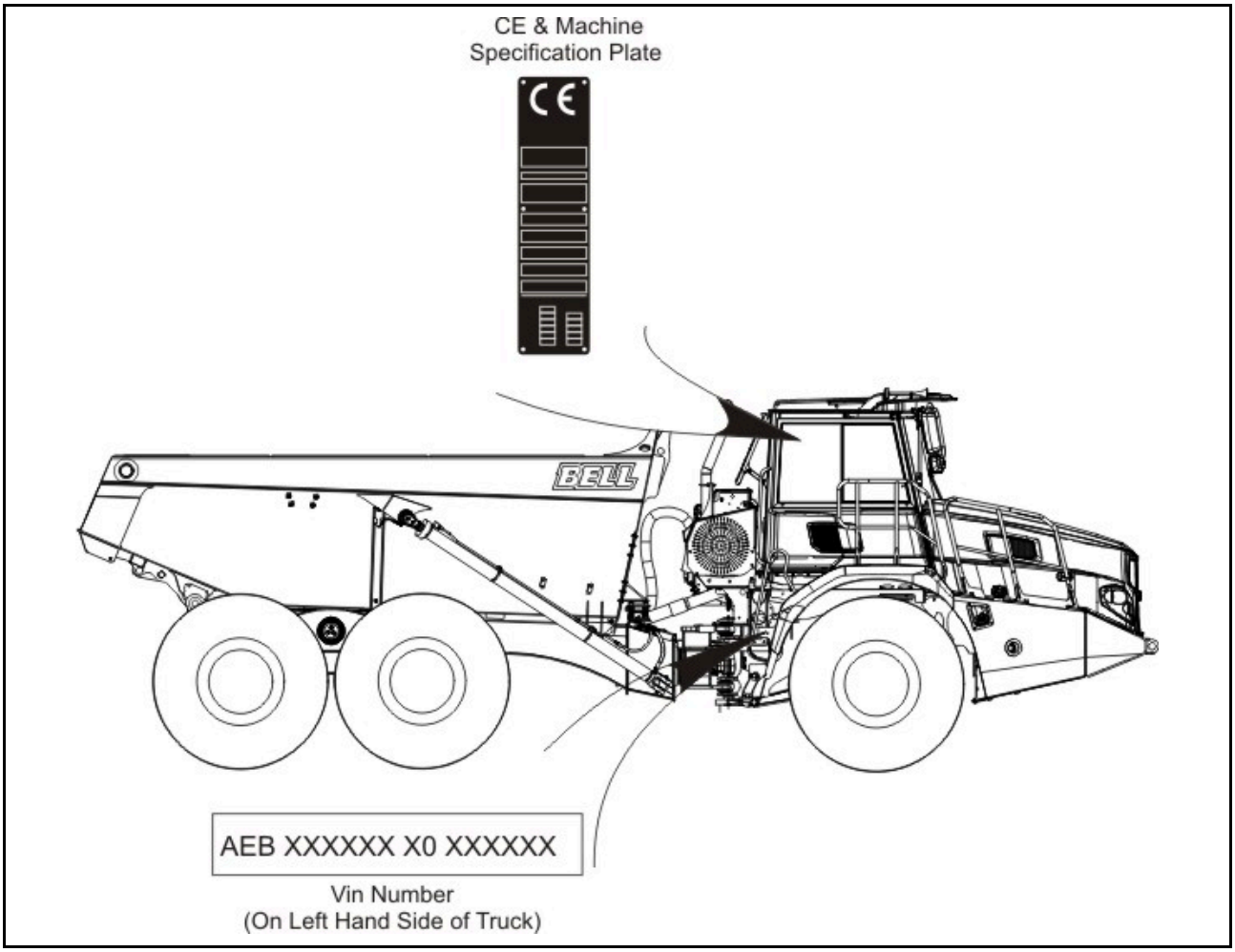
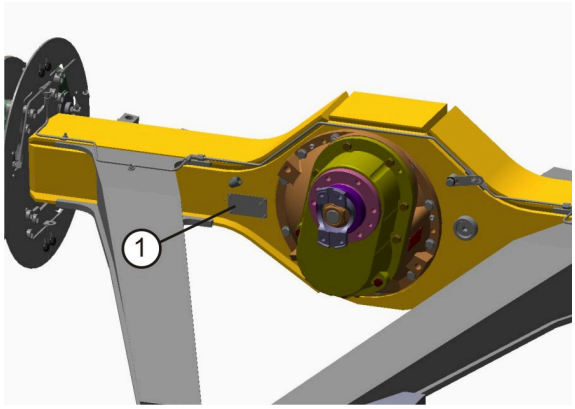
Product Identification Number (PIN) Vehicle Identification Number (VIN)

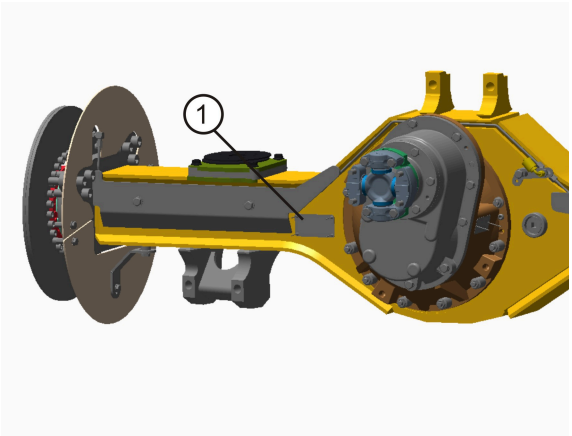


Front Axle Serial Number (ADT's & Haulers)



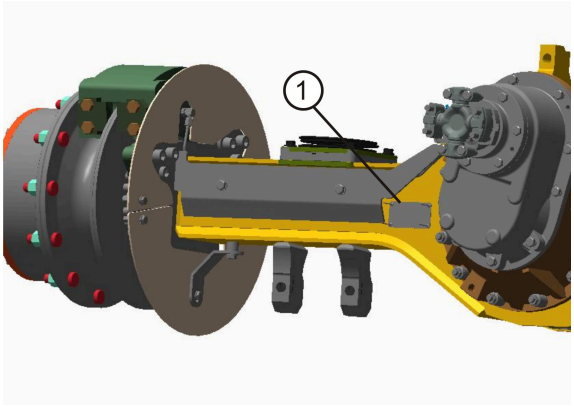
Front Axle Serial Number (1).

Middle Axle Serial Number (ADT's Only)



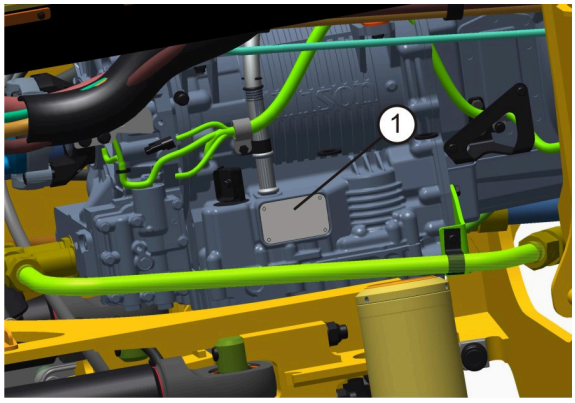
Middle Axle Serial Number (1).

Rear Axle Serial Number (ADT'S & Haulers)



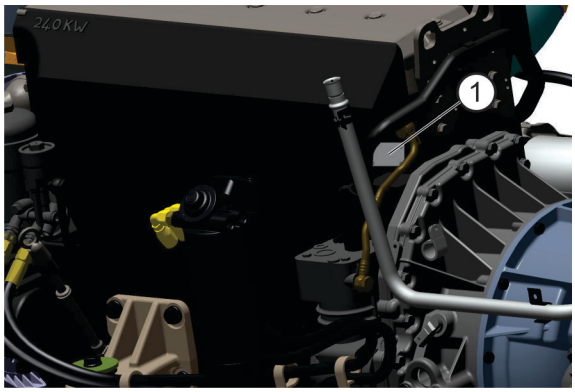
Rear Axle Serial Number (1).

Transmission Serial Number



Transmission Serial Number (1).

Engine Serial Number



Engine Serial Number (1).

Intended Use Of Machine

The intended use of this machine is the bulk handling and transport of material.

Machine Operation Temperature Range

The intended safe operating temperature range of a standard machine is -20 ˚C to 45 ˚C. The machine can be operated down to -40 ˚C but fitment of specialised equipment (arctic kit) may be necessary. Consult your local **BELL EQUIPMENT** dealer concerning this.

Consult the tyre manufacturer when operating ambient temperatures are expected to fall outside the intended safe operating temperature range of -40°C to 45°C.

Fuel Specification

ENGINE WITHOUT AN EXHAUST AFTER-TREATMENT SYSTEM (Non-Regulated / De-Tiered)

This diesel engine is designed to operate with commercially available diesel fuels complying to:

- The European Standard (DIN) EN 590 with a sulphur content of less than 0.05% sulphur by weight (500 ppm).
- All other relevant National / International Standards for diesel fuel.

Selection and use of the correct fuel is essential for good engine performance and increase engine life and fuel economy. It is also important that the fuel is not contaminated e.g. with dust or water since any contamination may cause irreversible damage to the engine.

All manufacturer warranties will be rendered void by using improper or incorrect fuel.

FAME (Fatty Acid Methyl Esters)/Biodiesel as an alternative to diesel fuel

This diesel engine is designed to operate with FAME/Biodiesel fuel complying to:

- The European Standard (DIN) EN 14214.
- A FAME additive content of up to 7% added to diesel fuel (DIN EN 590), ready mixed from recognisable fuel suppliers.

Any use of pure vegetable/animal oil as an alternative to diesel fuel or FAME is strictly prohibited.

FAME is a highly effective solvent and should therefore not be brought into contact with paint work, etc.

ENGINE WITH AN EXHAUST AFTER-TREATMENT SYSTEM (SCR) (Stage 3B/TIER 4 Interm)

This diesel engine is designed to operate with commercially available diesel fuels complying to:

- The European Standard (DIN) EN 590 with a sulphur content of less than 0.005% sulphur by weight (50 ppm).
- All other relevant National /International Standards for diesel fuel.

This engine is designed to operate with exhaust after-treatment fluid (AdBlue), any engine that operates without exhaust after-treatment fluid and is not deregulated as per the Bell STS modification & programming, will render all manufacturing warranties void, including any systems or structures that are in contact with the exhaust system ie, catalyst, exhaust pipes and ducting, bin heating mechanism and bin.

The following fuel types are not permitted:

- sulphurous fuel with a sulphur content greater than 0.005% by weight (50 ppm)
- marine diesel fuel
- aviation turbine fuel
- heating oils
- FAME (Fatty Acid Methyl Ester)/Biodiesel fuels

These fuel types cause irreversible damage to the engine and the exhaust gas after-treatment system, as well as also significantly reducing the expected service life of all components.

FAME/Biodiesel fuel are not permitted on engines with an exhaust after-treatment system as these fuels increases the NOx levels in the exhaust gasses, counter acting the exhaust after-treatment system.

ENGINE WITH AN EXHAUST AFTER-TREATMENT SYSTEM (SCR) AND AN EXHAUST GAS RECIRCULATION (EGR) SYSTEM (Stage 4/ TIER 4)

This diesel engine is designed to operate with commercially available diesel fuels complying to:

- EN590 as of 2010, et seq. (max. 0.001% sulphur by weight) (10 ppm).
- ASTM D975 (max. 0.0015% sulphur by weight) (15 ppm).

Selection and use of the correct fuel is essential for good engine performance and increase engine life and fuel economy. It is also important that the fuel is not contaminated e.g. with dust or water since any contamination may cause irreversible damage to the engine.

All manufacturer warranties are likely to be rendered void by using improper or incorrect fuel. The use of improper or incorrect fuel is illegal in regulated countries and the use of such a fuel is punishable by civil penalties.

The following fuel types are not permitted:

- sulphurous fuel with a sulphur content greater than 0.005% by weight (50 ppm)
- marine diesel fuel

- aviation turbine fuel
- heating oils
- FAME (Fatty Acid Methyl Ester)/Biodiesel fuels

These fuel types cause irreversible damage to the engine and the exhaust gas after-treatment system, as well as also significantly reducing the expected service life of all components.

FAME/Biodiesel fuel are not permitted on engines with an exhaust after-treatment system as these fuels increases the NOx levels in the exhaust gasses, counter acting the exhaust after-treatment system.

Hauler Data Plate

Hauler Data Plate and Mass (kg) information	
GVM	21 200
Tare	13 920
FR.	10 600
RR	10 600
GCM (2806E) - (with Un-braked Trailer)	22 000
GCM (2304E) - (with Un-braked Trailer)	26 000
GCM - (with braked Trailer)	56 000

Hauler Tyre Choices & Specifications

2806E Hauler Tyre Choices & Specifications

Tyre	Other	Tyre Recommended pressure (cold) at Max. Speed 40km/h	Max Load (kg)	Max. Load Front axle (kg)	Max. Load per Rear axle (kg)	Max GVM (kg)
Dual 15 x 34	Firestone / Bridgestone	160	2650	10600	10600	21200
23.5R25	Good Year	250	5600	11200	11200	22400
23.5R25	Michelin	200	5650	11300	11300	22600
23.5R25	Triangle	275	5600	11200	11200	22400
23.5R25	Bridgestone	275	5600	11200	11200	22400
23.1	Trelleborg	320	5300	10600	10600	21200

Wheels

Tyre size B18E, B20E & B25E 6X4 ADT	20.5R25
Tyre size 2304E/2806E Hauler	23.5x25
Tyre size B25E, B30E & B30EN ADT and 2304E/2806E Hauler	23.5R25
Tyre size B25/30E (Optional) High Flotation tyre	750/65R25
Tyre size 2304E Hauler	620/75R26
Tyre size 2304E & 2806E Hauler	15x34 Dual Tyres

Axles

Machine	Front	Middle	Rear
B18E & B20E ADT	14R8SA	14R8SB	N/A
2304E Hauler	16K10JA	N/A	16K10JA
B25E 6X4 ADT	14R13SA	14R13SC	N/A
B25E ADT	14R8SA	14R8SB	14R8SA
2806E Hauler	16K10JA	N/A	16K10JA
B30E & B30EN - WDB	16D8JA	16D8JB	16D8JA

Suspension System

Front (B18E, B20E, B25E, B30E & B30EN)	
Type	Semi-independent axle movement, leading A-frame supported on Hydro-pneumatic suspension struts.
Rear (B18E, B20E, B25E, B30E& B30EN)	
Type	Pivoting walking beams to equalise load distribution, connected to the axles via laminated rubber blocks. (4 supporting links per axle)

MACHINE SPECIFICATIONS

Transmission

ADT / Hauler	Model
2304E	Allison 3000 ORS P
B18E & B20E	Allison 3000 ORS P
B18E	Allison 3000 ORS PR
2806E	Allison 3200 ORS P
B25E	Allison 3500 ORS PR
B30E & B30EN	Allison 3400 ORS PR

Engine

Engine – Daimler OM 924 LA EURO 3	
Model	OM 924 LA EURO 3
Configuration	4 In Line
Aspiration	Turbo charged
Injection type	Direct
Idle speed	830 rpm
Oil pressure	0,5 bar @ idle
Engine – Daimler OM 906 LA Stage 2	
Model	OM 906 LA Stage 2
Configuration	6 In Line
Aspiration	Turbo charged
Injection type	Direct
Idle speed	680 rpm
Oil pressure	0,5 bar @ idle
Engine – Daimler OM 926 LA Stage 2	
Model	OM 926 LA Stage 2
Configuration	6 In Line
Aspiration	Turbo charged
Injection type	Direct
Idle speed	680 rpm
Oil pressure	0,5 bar @ idle
Engine – Daimler OM 934 LA Stage 5 & Tier 4 final	
Model	OM 934 LA Stage 4
Configuration	4 In Line
Aspiration	Turbo charged
Injection type	Direct
Idle speed	830 rpm
Oil pressure	0,5 bar @ idle
Engine – Daimler OM 936 LA Stage 5 & Tier 4 final	
Model	OM 936 LA Stage 4 & Tier 4 final
Configuration	6 In Line
Aspiration	Turbo charged
Injection type	Direct
Idle speed	680 rpm
Oil pressure	0,5 bar @ idle
B18E, B20E & 2304E (OM 924 LA EURO 3)	
Max NetPower	163 kW (214 HP) @ 2200 rpm
Torque	810 Nm (597 lb.ft) @ 1200 – 1600 rpm
B20E Low Ground Pressure (OM 934 LA Stage 5 & Tier 4 final)	
Max Net Power	170 kW (228 HP) @ 1800 rpm
Torque	900 Nm (664 lb.ft) @ 1200 – 1600 rpm
B25E & 2806E (OM 906 LA Stage 2)	
Max Net Power	205 kW (275 HP) @ 2200 rpm
Torque	1100 Nm (811 lb.ft) @ 1200 – 1600 rpm
B25E (OM 936 LA Stage 5 & Tier 4 final)	
Max Net Power	210 kW (281 HP) @ 1800 rpm
Torque	1200 Nm (885 lb.ft) @ 1200 – 1600 rpm
B30E & B30EN (OM 936 LA Stage 5 & Tier 4 final)	
Max Net Power	260 kW (353 HP) @ 1800 rpm
Torque	1450 Nm (1069 lb. ft) @ 1200 - 1600 rpm

Travel Speeds

B18E 6X4 & B20E 6X4 ADT	
1st Forward	10 km/hr (6 mph)
2nd Forward	21 km/hr (13 mph)
3rd Forward	27 km/hr (17 mph)
4th Forward	38 km/hr (24 mph)
5th Forward	50 km/hr (31 mph)
6th Forward	50 km/hr (31 mph)
Reverse	7km/hr (4 mph)
2304E Hauler	
1st Forward	9 km/hr (5.4 mph)
2nd Forward	16 km/hr (10.1 mph)
3rd Forward	21 km/hr (13.3 mph)
4th Forward	30 km/hr (18.7 mph)

5th Forward	40 km/hr (25 mph)
6th Forward	46 km/hr (28.8 mph)
Reverse	7 km/hr (4 mph)
2806E Hauler	
1st Forward	8 km/hr (5 mph)
2nd Forward	15 km/hr (9.4 mph)
3rd Forward	20 km/hr (12.4 mph)
4th Forward	28 km/hr (17.5 mph)
5th Forward	38 km/hr (23.3 mph)
6th Forward	43 km/hr (26.8 mph)
Reverse	7 km/hr (4 mph)
B25E ADT	
1st Forward	7 km/h (4 mph)
2nd Forward	15 km/h (9 mph)
3rd Forward	23 km/h (14 mph)
4th Forward	35 km/h (21 mph)
5th Forward	47 km/h (29 mph)
6th Forward	50 km/h (31 mph)
Reverse	7 km/h (4 mph)
B30E & B30EN ADT	
1st Forward	8 km/h (5 mph)
2nd Forward	14 km/h (8.8 mph)
3rd Forward	19 km/h (12.2 mph)
4th Forward	29 km/h (17.9 mph)
5th Forward	41 km/h (25.5 mph)
6th Forward	48 km/h (29.8 mph)
Reverse	5.7 km/h (3.6 mph)

Transfer Case

2304E Hauler	Kessler W3872
2806E Hauler	Kessler W3862
B18E 6X4 & B20E 6X4 ADT	Kessler W3894
B25E, B30E & B30EN ADT	Kessler W3248

Steering System

Type	Articulated with two double-acting, hydraulic cylinders
B18E, B20E & 2304E Hauler	
Turns (Lock to Lock)	4.9
Turns (Centre to Lock)	2.4
B25E, B30E, B30EN & 2806E Hauler	
Turns (Lock to Lock)	4
Turns (Centre to Lock)	2

Brakes

Service Brakes B18E, B20E & B25E	
Type	Dual circuit, hydraulic actuated dry disc brakes on all six wheels.
Caliper type	Self-adjusting
Service Brakes B20E (EURO), B30E & B30EN (Bell wet disc brakes)	
Type	Dual circuit, oil immersed multi disc brakes on front and middle axles. Hydraulic actuated.
Park Brake B18E, B20E, B25E, B30E & B30EN	
Model	DX195
Type	Spring applied, air released, self-adjusting, mechanical callipers on drive-line mounted dry disc.

Electrical System

CDU (Colour Display Unit)	
CCU2 & OEU	
Voltage	24 V
Battery type	2 X 12 V, AGM
Battery capacity	Cold Crank Amps (CCA) (BCI 0°F): 900amps, 75 Ah each
Starter motor capacity for OM 906/926 LA engine	4 kW
Starter motor capacity for OM 924 engine	6.7 kW
Alternator voltage rating	28.3 V
Alternator amperage rating for OM 906/926 LA engine	80 A
Alternator amperage rating for OM 924 LA EURO 3 engine	100 A
Power ratings (bulbs)	
Headlight	24 V 70/75 W
Front park light	24 V 4 W
Front indicator light	24 V 21 W

Number plate light (B20E Only)	24 V 5 W
Stop/tail light	24 V diode light unit
Rear indicator light	24 V diode light unit
Reverse light	24 V 75 W
Interior light	24 V 10W

Rear View Camera (Option on ADT's Only)

Specifications	
Image	Interline transfer type CCD
Picture Elements	NTSC: 270,000 Pixels PAL: 320,000 pixels
Image Size	1/3 Inch
Lens	Focal Length 2,75 mm
Synchronisation	Internal
Horizontal resolution	330TV Lines
Required illumination	0.1 Lux minimum
Signal to noise ratio	Min. 47 dB (at AGC off)
Power Supply	12 VDC
Power Consumption	≥2.4 W
Current Consumption	≥300 mA
Operating Temperature	-30˚C to +50˚C (-22˚F to +122˚F)
Weight	0.4 Kg
Dimensions	69 (W) X 43 (H) X 61 (D) mm / 2.7 (W) X 1.7 (H) X 2.4 (D) inch
Illumination Distance	5 Meters
Vibration Rating	20 G
Shock Rating	100 G

Frame and Body

Cab	
Type	FOPS (ISO 3449) / ROPS (ISO 3471)
Principal Chassis Components	
Type	Front Chassis, Rear Chassis, Male Oscillation Joint.
Materials	
Type	Structural steel and high strength steel

Front Chassis Construction - ADT & Hauler	
Type	Dual box-type longitudinal beams and several non-boxed transverse members
Rear Chassis Construction - ADT	
Type	Dual box-type longitudinal beams, two boxed transverse members and one transverse tubular member
Rear Chassis Construction - Hauler	
Type	Non boxed sheet monocoque structure
Bin	
Type	Manufactured from high tensile wear and impact resistant alloy steels
Retrieval Points (in conformance with ISO 10532) - ADT	
Type	Two points on front chassis and a single point on rear chassis
Retrieval Points (in conformance with ISO 10532) - Hauler	
Type	Two points on front chassis and rear tow pin
Tie-down Points (in conformance with ISO/DIS 15818) - ADT	
Type	Two points on front chassis, two points on front of the rear chassis and a single point at the rear of the rear chassis.
Tie-down Points (in conformance with ISO/DIS 15818) - Hauler	
Type	Two points on front chassis (in conformance with ISO/DIS15818), two points at the front of the rear chassis and rear tow pin.
Lifting Points (in conformance with ISO/DIS 15818)	
Type	Two points on front chassis and two points on bin.

B18E & B20E	
Rated payload	18 000 kg (35 683 lb.)
Capacity struck	9 m³ (14.4 yd.³)
Capacity heaped (SAE 2:1)	11 m³ (14.4 yd.³)
Capacity heaped (SAE 1:1)	13 m³ (14.4 yd.³)
B25E & B30EN	
Rated payload	24000 kg (52911 lb)
Capacity struck	12 m³ (15.7 yd.³)
Capacity heaped (SAE 2:1)	15 m³ (19.6 yd.³)
Capacity heaped (SAE 1:1)	18 m³ (23.5 yd.³)
B30E	
Rated payload	28000 kg (61729 lb)
Capacity struck	13.5 m³ (17.7 yd.³)
Capacity heaped (SAE 2:1)	17 m³ (22.2 yd.³)
Capacity heaped (SAE 2:1)	21 m³ (27.5 yd.³)

Tip Cylinders - ADT's Only	
Tip cylinders	2 X single stage, double acting
Tipping angle max. (Can be limited to any lower angle, programmable on CDU)	70°
B18E & B20E	
Bin raise time	10 seconds
Bin lowering time	6 seconds
B25E, B30E & B30EN	
Bin raise time	14 seconds
Bin lowering time	7.5 seconds

Mass

B18E 6X4	
Total mass, empty	15 289 kg to 16 091 kg
Total mass, fully laden (Gross weight)	33 288 kg to 34 090 kg
B20E 6X4	
Total mass, empty	15 127 kg to 15 624 kg
Total mass, fully laden (Gross weight)	33 449 kg to 33 946 kg
B20E 6X6 LGP	
Total mass, empty	16 494 kg to 17 906 kg
Total mass, fully laden (Gross weight)	34 494 kg to 35 906 kg
B25E	
Total mass, empty	19 037 kg to 21 146 kg (depending on specification)
Total mass, fully laden	43 037 kg to 45 146 kg (depending on specification
B30E	
Total mass, empty	20 879 kg to 22 885 kg (depending on specification)
Total mass, fully laden	48 879 kg to 50 885 kg (depending on specification)
B2304E Unladen	
Front Axle	8075 kg (depending on specification)
Rear Axle	4710 kg (depending on specification)
B2304E with 15000Kg load transfer to ball hitch	
Front Axle	9845.28 kg (depending on specification)
Rear Axle	17939.72 kg (depending on specification)
B2806E Unladen	
Front Axle	9879 kg (depending on specification)
Rear Axle	4710 kg (depending on specification)
B2806E with 20000Kg load transfer to ball hitch	
Front Axle	12239.37 kg (depending on specification)
Rear Axle	22349.63 kg (depending on specification)

Hydraulic System

Main Hydraulic System	
Pump Type	**Load sensing**
Model	Rexroth A10VO72

Emergency Steering System	
Pump Type	**Load sensing**
Model - Depending on region	Rexroth ALA10VWO28
	Parker P1028

Pneumatic System

B18E, B20E, 2304E, B25E, B30E, B30EN & 2806E	
Reservoir capacity	20 litres (5.28 USGAL)

Noise Emission

The Guaranteed External Sound Power Level, as measured according to ISO 6395.

Standard	
B25E, B30E, B30EN & 2806E	Lwa 108 dB
Blu@dvantage	
B25E, B30E, B30EN & 2806E	Lwa 108 dB
B20E Stage 4	Lwa 106 dB

The Guaranteed Internal Sound Pressure Level at operator's position, as measured according to ISO 6396.

Standard	
B18E, B20E & 2304E	LpA 76 dB

B25E, B30E & 2806E	LpA 74 dB
Blu@dvantage	
B18E, B20E & 2304E	LpA 76 dB
B25E, B30E & 2806E	LpA 74 dB

Service Capacities

See the section under Lubricant Specifications for details of fluids to be used in the different components.

Engine (OM 924 LA) B18E, B20E & 2304E	
Engine oil (in oil pan)	15 litres (3.96 USGAL)
Engine oil (Service fill including filter)	16 litres (4.23 USGAL)
Engine (OM 934 LA Stage 4) B20E LGP	
Engine oil (in oil pan)	17 litres (4.49 USGAL)
Engine oil (Service fill including filter)	19.5 litres (5.15 USGAL)
Engine (OM 906 LA) B25E, B30E, B30EN & 2806E	
Engine oil (in oil pan)	28 litres (7.40 USGAL)
Engine oil (Service fill including filter)	29 litres (7.66 USGAL)
Engine (OM 936 LA Stage 4 & Tier 4 final) B25E, B30E	
Engine oil (in oil pan)	25 litres (6.60 USGAL)
Engine oil (Service fill including filter)	29.5 litres (7.79 USGAL)
Engine Coolant	
Engine coolant (initial and service fills)	28 litres (7.40 USGAL)
Transmission (Allison)	
Transmission fluid (initial fill)	40 litres (10.57USGAL)
Transmission fluid (service fill)	34 litres (8.98 USGAL)
Transfer case (W1400)	
Transfer Case (initial and service fills)	9 litres (2.4 USGAL)
Hydraulic Reservoir	
B18E, B20E, B25E, B30E, B30EN, 2304E & 2806E	
Hydraulic reservoir	78 litres (20.6 USGAL)
Hydraulic reservoir (service fill)	135 litres (35.7 USGAL)
Axles	
B18E, B20E & 2304E	
Axle oil per axle	27 litres (7.1 USGAL)
Axle oil (service fill)	27 litres (7.1 USGAL)
Final drive oil (per final drive)	4 litres (1.05 USGAL)
B25E & 2806E	
Axle oil per axle	30 litres (7.9 USGAL)
Axle oil (service fill)	30 litres (7.9 USGAL)
Final drive oil (per final drive)	4 litres (1.05 USGAL)
B30E & B30EN - WDB (Wet Disc Brake)	
Axle oil per axle	36 litres (9.51 USGAL)
Axle oil (service fill)	36 litres (9.51 USGAL)
Final drive oil (per final drive)	4 litres (1.05 USGAL)
Cab tilt system	
Cab tilt system	0.80 litres (0.2 USGAL)
Windscreen washer bottle	6 litres (1.59 USGAL)
Fuel tank	
B18E	200 litres (52.83 USGAL)
B20E & 2304E	200 litres (52.83 USGAL)
B25E, B30E, B30EN & 2806E	379 litres (100.1 USGAL)
B25E, B30E & B30EN Blu@vantage	302 litres(79.78 USGAL)
Adblue® / DEF Tank	
B25E, B30E, B30EN & 2806E	40 litres (10.57 USGAL)

Lubricant Specifications

Engine Oil Specification	
Approved	MB 228.5
Approved - Essential when using Diesel Fuel that has a Sulphur content of < that 50 ppm	MB 228.51
Operating Ambient Temp.	**Viscosity**
-20°C (-4°F) to 50°C (122°F)	SAE 10W-40 Bell Lubricant – BN005545
-15°C (5°F) to 50°C (122°F)	SAE 15W-40
Engine Coolant Specification	
Approved	MB325.5 Bell Lubricant - BN005611
Approved	MB325.5 (Neat Concentrate) Bell Lubricant -
Approved	MB326.5 (Premixed Coolant) 50/50 Bell Lubricant - BN033240
Transmission Oil Specification	
Approved	Allison TES-295

Operating Ambient Temp.	Viscosity
-20°C (-4°F) to 50°C (122°F)	SAE 70W-80 Bell Lubricant – BN005548
Transfer Case Oil Specification	
Meet	API GL-5
Approved	ZF TE-ML 05F
Operating Ambient Temp.	**Viscosity**
-20°C (-4°F) to 50°C (122°F)	SAE 80W-90 (GL5) SAE 20W-40 (05F) Bell Lubricant – BN005574 (GL-5) 910378 (05F)
Hydraulic Oil Specification	
Must Meet	Vickers M-2950-S DIN 51 524-3, HVLP
Operating Ambient Temp.	**Viscosity**
10°C (50°F) to 45°C (113°F)	ISO VG68 Bell Lubricant – BN005597
0°C (32°F) to 40°C (104°F)	ISO VG46 Bell Lubricant – BN005602
-10°C (14°F) to 30°C (86°F)	ISO VG32 Bell Lubricant – BN005605
-20°C (-4°F) to 45°C (113°F)	ATF Bell Lubricant – BN005556
Axles (Dry Disc Brake) Oil Requirements & Specification	
Approved	ZF TE-ML 05C
Operating Ambient Temp.	**Viscosity**
-20°C (-4°F) to 35°C (95°F)	80W-90 Bell Lubricant – BN005574
20°C (68°F) to 50°C (122°F)	85W-140 Bell Lubricant – BN005587
Axles (Wet Disc Brake) Oil Requirements & Specification	
Approved	API GL-5, 80W-90 Oil with LS additive
Operating Ambient Temp.	**Viscosity**
-20°C (-4°F) to 50°C (122°F)	Bell Lubricant – BN061186
Wet Disc Brake Oil Requirements & Specification	
Approved	Dexron III
Operating Ambient Temp.	**Viscosity**
-20°C (-4°F) to 50°C (122°F)	Bell Lubricant – BN038209
Grease Requirements	
Lithium Complex EP grease	
Operating Ambient Temp.	**Viscosity**
-10°C (14°F) to 50°C (122°F)	NLGI 2 Bell Lubricant – BN005567
-20°C (-4°F) to 30°C (86°F)	NLGI 1
Diesel Fuel Requirements	
Diesel Fuel	< 50ppm for Stage 3B/Tier 4 intrim machines
Ultra Low Sulfur Diesel Fuel	≤ 15ppm for Stage 4 and 5 machines

Default End Of Line Enable Options

VIN Security ON	By default last 4 digit of the VIN number allows machine access.
Service Warning ON	Will have a popup every 5 minutes from 50 hours before the service is due. The service warning pops up anyway on start up but does not persist as it would with this option enabled.
Unsafe Tip ON	With an unsafe tip limit of 15% - above + 15% roll on the rear chassis, tipping is not permitted.
Auto Horn ON	Hoot twice before start up, once when engaging forward, twice when engaging reverse.
Auto Park Brake ON	Park brake will apply automatically if neutral is pressed below 500 rpm output shaft speed and park brake releases automatically on torque.
Turbo Spin Down ON	
Idle Shut Down ON	After 10 minutes.
Load Angle Compensation ON	Above +-5 % incline, the OBW weight is frozen.

Selective Catalytic Reduction (SCR)

Introduction

Selective Catalytic Reduction is an emissions technology designed to help bring diesel machine engines into compliance with new EPA regulations.

AdBlue® / DEF, a water solution of urea, is injected into the exhaust stream to convert nitrogen oxide (NOx) into harmless nitrogen and water vapour.

SCR is a straightforward NOx after treatment system with the following advantages:

- Very little maintenance required.
- Reliable, proven approach. SCR is already proven in high volume vehicle production.

SCR System

The **BELL EQUIPMENT** SCR system consists of an AdBlue® / DEF tank, injector, sensors and wiring harness, and a catalyst. The system operates automatically—all the driver has to do is monitor an indicator on the dash and top up the AdBlue® / DEF tank when necessary. Warnings for low AdBlue® / DEF levels similar to those for other fluids, like diesel, are included, and must be adhered to, to prevent engine power de-rating.

The range of the AdBlue® / DEF tank depends upon the job the machine is doing, but should be around 1:2 = One tank of AdBlue® / DEF, to two tanks of diesel.

BELL EQUIPMENT machines fitted with the SCR system, require no change to service and maintenance intervals. A small AdBlue® / DEF filter on the pump module can be changed in minutes. No catalyst maintenance is required.

AdBlue® / DEF Storage

AdBlue® / DEF is nontoxic, nonhazardous and nonflammable. It is non-polluting and meets strict international standards for purity and composition. AdBlue® / DEF poses no serious risk to drivers or equipment when handled properly.

AdBlue® / DEF degrades over time depending on temperature and exposure to sunlight. If stored at recommended temperatures (not exceeding 25°C) shelf life will be two years.

AdBlue® / DEF is available throughout Europe at all major truck stops, dealers and distributors.

AdBlue® / DEF is packaged as follows:

- Retail Outlets (Stations)
- Home Depot (> 3000L)
- IBC’s (Intermediate Bulk Containers) (1000L)
- Drum’s (208L)
- Cans (5L / 10L / 18L)

Stage 5 DPF Operation (Europe)

The exhaust gas flows from the engine to the diesel oxidation catalytic converter, and the **Diesel Particulate Filter (DPF)**. After the diesel particulate filter, the AdBlue metering equipment injects AdBlue directly into the exhaust gas flow. It then travels through the SCR catalytic converter and the ammonia slip converter, after which the cleaned exhaust gas is issued to the atmosphere via the exhaust stack pipe.

For the EU Stage 5 engine and aftertreatment installations in the **BELL EQUIPMENT** ADT’s, the diesel oxidation catalytic convertor and the diesel particulate filters are new systems, compared to the afterrteatment of the EU Stage 4 / EPA Tier 4F installations.

Diesel Oxidation Catalytic Converter

The exhaust gas coming from the engine flows through the diesel oxidation catalytic converter (DOC). It converts the carbon monoxide (CO) and hydrocarbon (CH) in the exhaust gas into less harmful carbon dioxide (CO_2) and water (H_2O). It oxidizes a part of the nitric oxide (NO) to form nitrogen dioxide (NO_2) that is required for the subsequent reactions at the diesel particulate filter and SCR catalytic converter.

An optimal conversion of the pollutants takes place above an exhaust gas temperature of approximately 250°C.

Diesel Particulate Filter

The exhaust pre-cleaned by the diesel oxidation catalytic converter (DOC) flows through the filter element in the diesel particulate filter (DPF). The soot particles that arise during the combustion process in the engine are retained in the porous honeycomb structure of the filter element. The diesel particulate filter (DPF) is so efficient that approximately 90% of the particulate mass and roughly 95% of the total number of particles are retained.

By evaluating the signals of the pressure sensors and temperatures sensors mounted at the inlet and outlet of the EATU, the aftertreatment control module (ACM) can determine the current load condition of the diesel particulate filter (DPF) and initiate regeneration measures via the motor control module (MCM).

Passive regeneration takes place during operation and is imperceptible to the driver.

Nitrogen dioxide oxidizes the soot particles in the filter element. The optimal temperature range for the reaction between the nitrogen dioxide (NO_2) and soot is between 250°C and 350°C.

If a certain load state is reached at which passive regeneration no longer suffices, active regeneration is automatically initiated.

For active regeneration, diesel is directed to the exhaust flow from the engine via the diesel fuel metering unit. The ensuing reaction in the EATU generates a great deal of heat, causing the stored soot to be burnt to ashes. The exhaust gas temperatures are higher during the active regeneration, and the operator is notified of this, by notification light which will be displayed on the bottom section of the display unit in the cab.

Active regeneration can be suppressed by the driver to prevent higher exhaust gas temperatures. Via the messages on the main display unit in the cab, the operator is prompted to start a manual regeneration.

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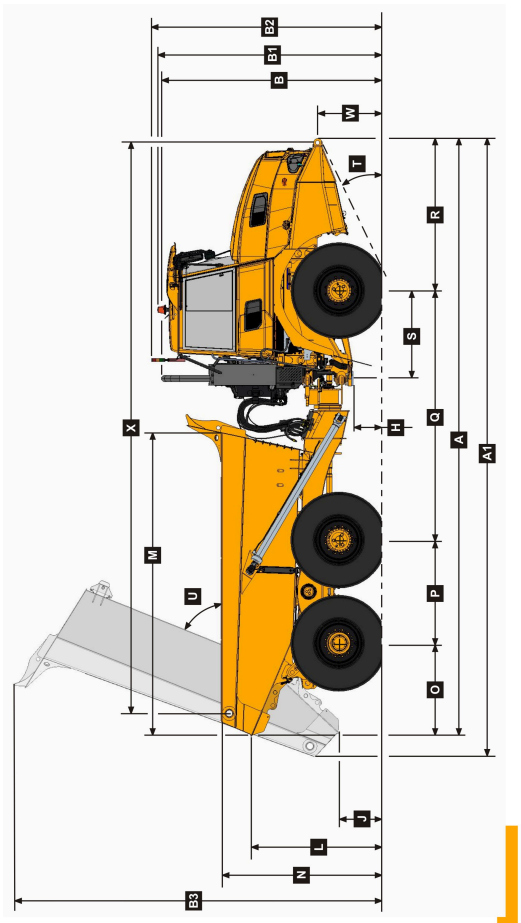
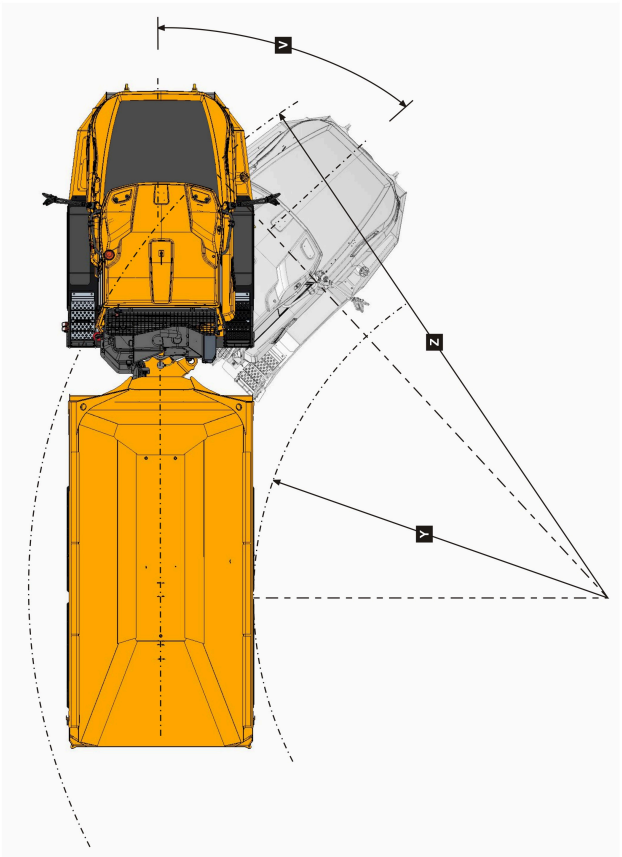
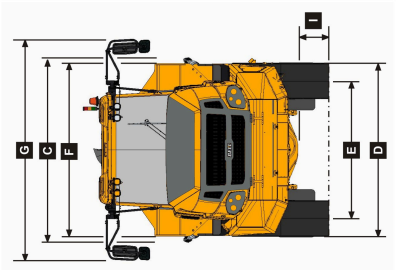
B18E 6x4 ADT





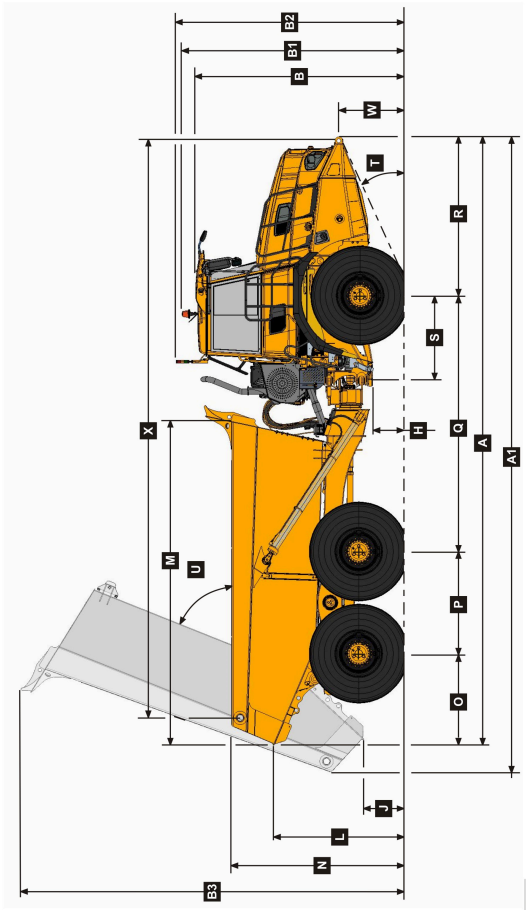


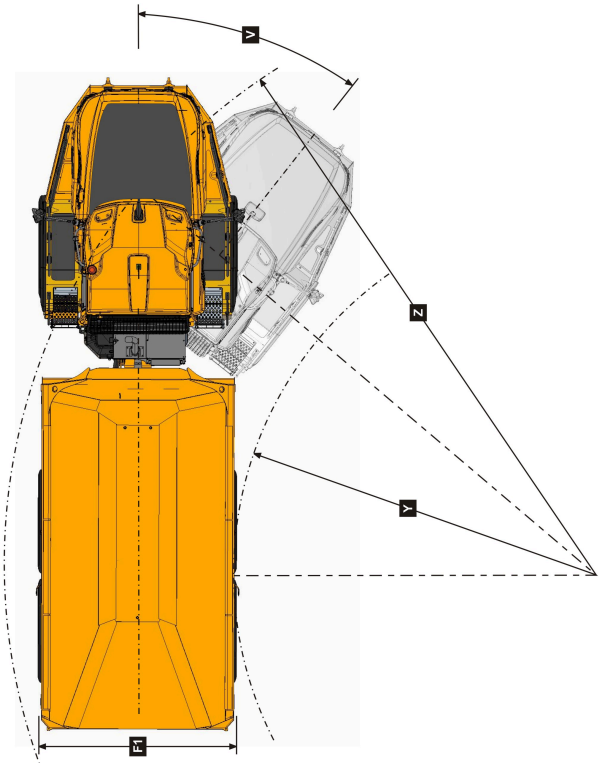
Machine Dimensions

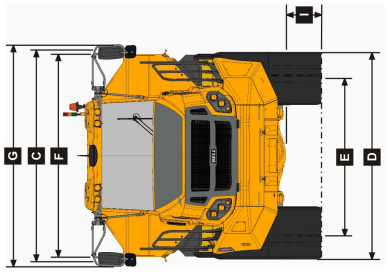
A	Length - Transport Position	9271	mm
A1	Length - Bin Fully Tipped	9560	mm
B	Height - Transport Position	3454	mm
B1	Height - Rotating Beacon	3595	mm
B2	Height - Load Light	3689	mm
B3	Bin Height - Fully Tipped	5734	mm
C	Width over Mudguards	2568	mm
D	Width over Tyres - 20.5R25	2550	mm
E	Tyre Track Width - 20.5R25	2022	mm
F	Width over Bin	2540	mm
G	Width over Mirrors - Operating Position	3260	mm
H	Ground Clearance - Artic	479	mm
I	Ground Clearance - Front Axle	444	mm
J	Ground Clearance - Bin Fully Tipped	670	mm
K	Ground Clearance - Under Run Bar	N/A	
L	Bin Lip Height - Transport Position	2060	mm
M	Bin Length	4709	mm
N	Load over Height	2533	mm
O	Rear Axle Centre to Bin Rear	1449	mm
P	Mid Axle Centre to Rear Axle Centre	1600	mm
Q	Mid Axle Centre to Front Axle Centre	3865	mm
R	Front Axle Centre to Machine Front	2357	mm
S	Front Axle Centre to Artic Centre	1361	mm
T	Approach Angle	26	°
U	Maximum Bin Tip Angle	70	°
V	Maximum Articulation Angle	45	°
W	Front Tie Down Height	1028	mm
X	Machine Lifting Centres	8845	mm
Y	Inner Turning Circle Radius - 20.5R25	3954	mm
Z	Outer Turning Circle Radius - 20.5R25	7309	mm

MACHINE DIMENSIONS

B20E 6x4 ADT



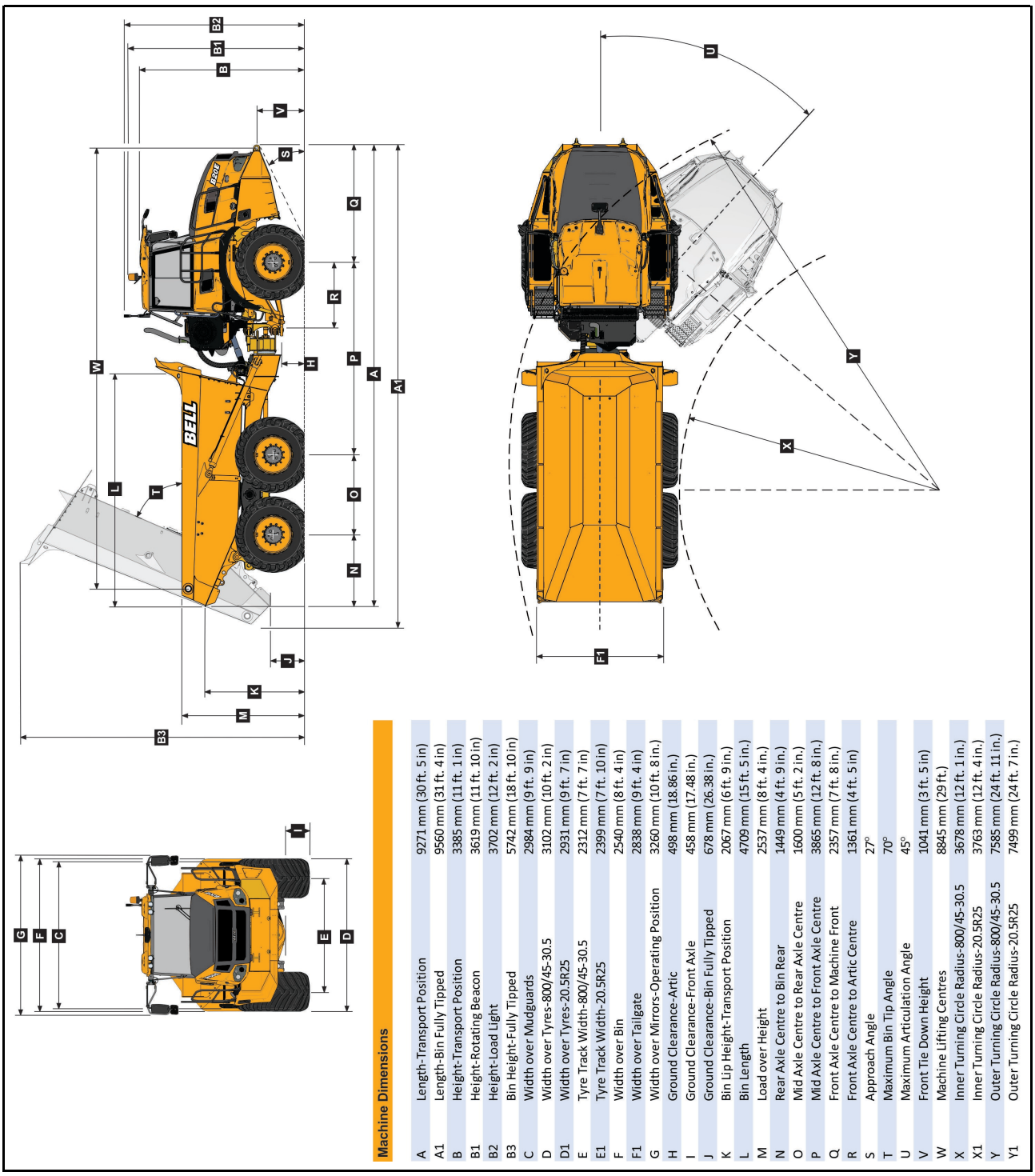




Machine Dimensions

A	Length - Transport Position	9953	mm (32 ft. 7 in.)
A1	Length - Bin Fully Tipped	10311	mm (33 ft. 9 in.)
B	Height - Transport Position	3426	mm (11 ft. 2 in.)
B1	Height - Rotating Beacon	3661	mm (12 ft.)
B2	Height - Load Light	3747	mm (12 ft. 3 in.)
B3	Bin Height - Fully Tipped	6255	mm (20 ft. 6 in.)
C	Width over Mudguards	2985	mm (9 ft. 9 in.)
D	Width over Tyres - 23.5R25	2940	mm (9 ft. 7 in.)
D1	Width over Tyres - 750/65 R25	2998	mm (9 ft. 10 in.)
E	Tyre Track Width - 23.5R25	2356	mm (7 ft. 8 in.)
E1	Tyre Track Width - 750/65 R25	2260	mm (7 ft. 4 in.)
F	Width over Bin	2700	mm (8 ft. 10 in.)
F1	Width over Tailgate	2998	mm (9 ft. 10 in.)
G	Width over Mirrors - Operating Position	3260	mm (10 ft. 8 in.)
H	Ground Clearance - Artic	537	mm (21.14 in.)
I	Ground Clearance - Front Axle	488	mm (19.21 in.)
J	Ground Clearance - Bin Fully Tipped	670	mm (26.38 in.)
K	Ground Clearance - Under Run Bar	N/A	
L	Bin Lip Height - Transport Position	2176	mm (7 ft. 1 in.)
M	Bin Length	5272	mm (17 ft. 3 in.)
N	Load over Height	2763	mm (9 ft.)
O	Rear Axle Centre to Bin Rear	1500	mm (4 ft. 11 in.)
P	Mid Axle Centre to Rear Axle Centre	1670	mm (5 ft. 5 in.)
Q	Mid Axle Centre to Front Axle Centre	4181	mm (13 ft. 8 in.)
R	Front Axle Centre to Machine Front	2602	mm (8 ft. 6 in.)
S	Front Axle Centre to Artic Centre	1362	mm (4 ft. 5 in.)
T	Approach Angle	25	°
U	Maximum Bin Tip Angle	70	°
V	Maximum Articulation Angle	45	°
W	Front Tie Down Height	1075	mm (3 ft. 6 in.)
X	Machine Lifting Centres	9477	mm (31 ft. 1 in.)
Y	Inner Turning Circle Radius - 23.5R25	4110	mm (13 ft. 5 in.)
Y1	Inner Turning Circle Radius - 750/65 R25	4081	mm (13 ft. 4 in.)
Z	Outer Turning Circle Radius - 23.5R25	8000	mm (26 ft. 2 in.)
Z1	Outer Turning Circle Radius - 750/65 R25	8029	mm (26 ft. 4 in.)

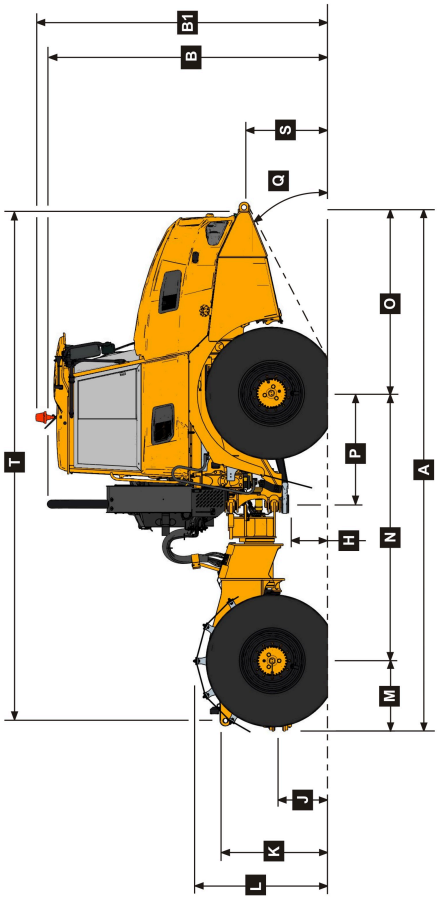
B20E LGP ADT (Low Ground Pressure)

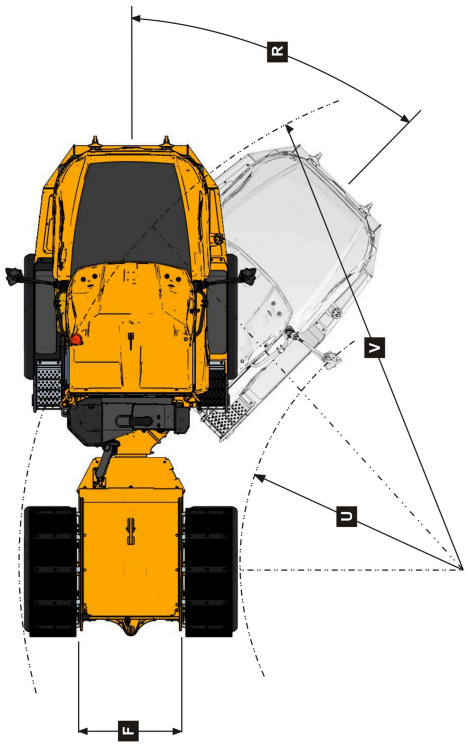


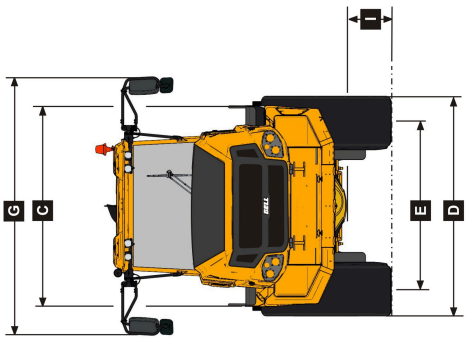
Machine Dimensions		
A	Length-Transport Position	9271 mm (30 ft. 5 in)
A1	Length-Bin Fully Tipped	9560 mm (31 ft. 4 in)
B	Height-Transport Position	3385 mm (11 ft. 1 in)
B1	Height-Rotating Beacon	3619 mm (11 ft. 10 in)
B2	Height-Load Light	3702 mm (12 ft. 2 in)
B3	Bin Height-Fully Tipped	5742 mm (18 ft. 10 in)
C	Width over Mudguards	2984 mm (9 ft. 9 in)
D	Width over Tyres-800/45-30.5	3102 mm (10 ft. 2 in)
D1	Width over Tyres-20.5R25	2931 mm (9 ft. 7 in)
E	Tyre Track Width-800/45-30.5	2312 mm (7 ft. 7 in)
E1	Tyre Track Width-20.5R25	2399 mm (7 ft. 10 in)
F	Width over Bin	2540 mm (8 ft. 4 in)
F1	Width over Tailgate	2838 mm (9 ft. 4 in)
G	Width over Mirrors-Operating Position	3260 mm (10 ft. 8 in.)
H	Ground Clearance-Artic	498 mm (18.86 in.)
I	Ground Clearance-Front Axle	458 mm (17.48 in.)
J	Ground Clearance-Bin Fully Tipped	678 mm (26.38 in.)
K	Bin Lip Height-Transport Position	2067 mm (6 ft. 9 in.)
L	Bin Length	4709 mm (15 ft. 5 in.)
M	Load over Height	2537 mm (8 ft. 4 in.)
N	Rear Axle Centre to Bin Rear	1449 mm (4 ft. 9 in.)
O	Mid Axle Centre to Rear Axle Centre	1600 mm (5 ft. 2 in.)
P	Mid Axle Centre to Front Axle Centre	3865 mm (12 ft. 8 in.)
Q	Front Axle Centre to Machine Front	2357 mm (7 ft. 8 in.)
R	Front Axle Centre to Artic Centre	1361 mm (4 ft. 5 in)
S	Approach Angle	27°
T	Maximum Bin Tip Angle	70°
U	Maximum Articulation Angle	45°
V	Front Tie Down Height	1041 mm (3 ft. 5 in)
W	Machine Lifting Centres	8845 mm (29 ft.)
X	Inner Turning Circle Radius-800/45-30.5	3678 mm (12 ft. 1 in.)
X1	Inner Turning Circle Radius-20.5R25	3763 mm (12 ft. 4 in.)
Y	Outer Turning Circle Radius-800/45-30.5	7585 mm (24 ft. 11 in.)
Y1	Outer Turning Circle Radius-20.5R25	7499 mm (24 ft. 7 in.)

MACHINE DIMENSIONS

2304E

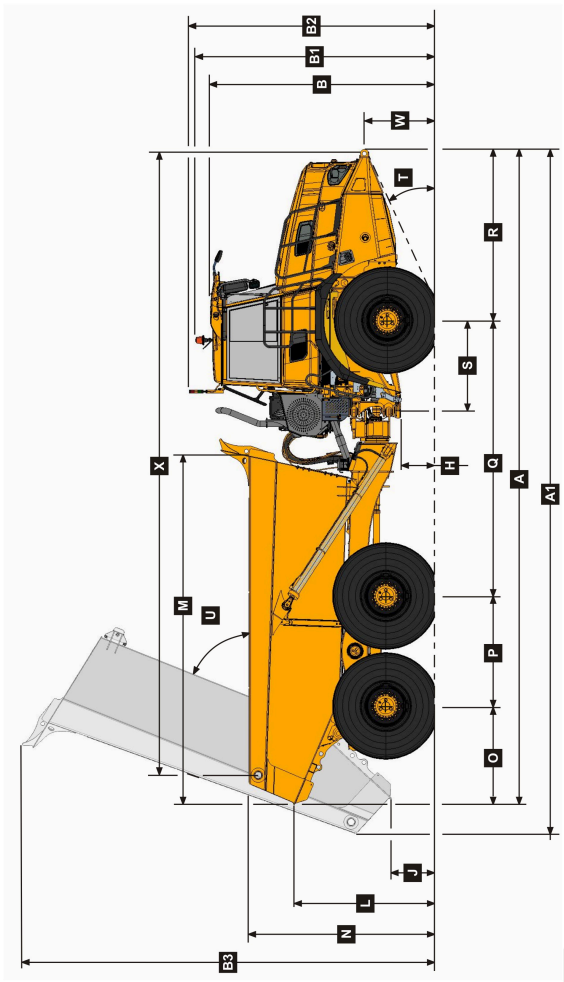


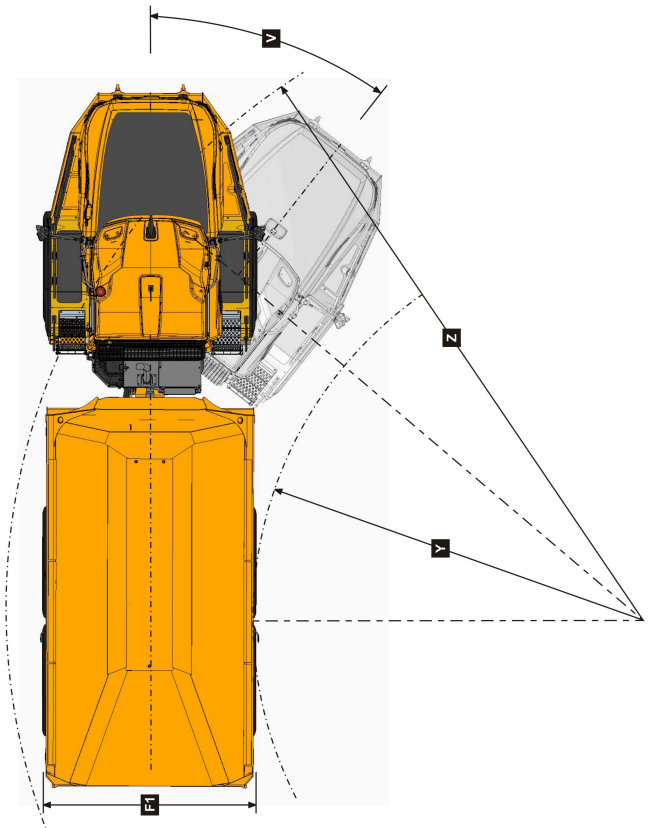


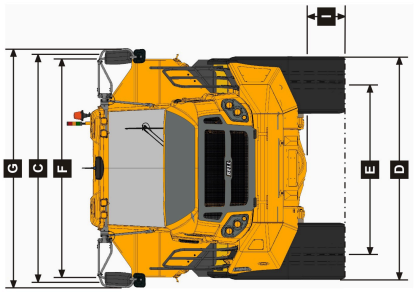


Machine Dimensions		
A	Length - Transport Position	6520 mm
B	Height - Transport Position	3509 mm
B1	Height - Rotating Beacon	3650 mm
C	Width over Mudguards	2632 mm
D	Width over Tyres - 23.5R25	2752 mm
D1	Width over Tyres - Dual 15x34	3371 mm
E	Tyre Track Width - 23.5R25	2137 mm
E1	Tyre Track Width - Dual 15x34	2402 mm
F	Width over Rear Chassis	1310 mm
G	Width over Mirrors - Operating Position	3260 mm
H	Ground Clearance - Artic	537 mm
I	Ground Clearance - Front Axle	499 mm
J	Hitch Center Height	672 mm
K	Rear Chassis Height	1397 mm
L	Rear Mudguard Height	1724 mm
M	Rear Axle Center to Machine Rear	868 mm
N	Rear Axle Center to Front Axle Center	3295 mm
O	Front Axle Center to Machine Front	2357 mm
P	Front Axle Center to Artic Center	1362 mm
Q	Approach Angle	27 °
R	Maximum Articulation Angle	45 °
S	Front Tie Down Height	1084 mm
T	Machine Lifting Centers	6325 mm
U	Inner Turning Circle Radius-23.5R25	2483 mm
U1	Inner Turning Circle Radius-Dual 15x34	2174 mm
V	Outer Turning Circle Radius-23.5R25	5472 mm
V1	Outer Turning Circle Radius	5781 mm

B25E ADT





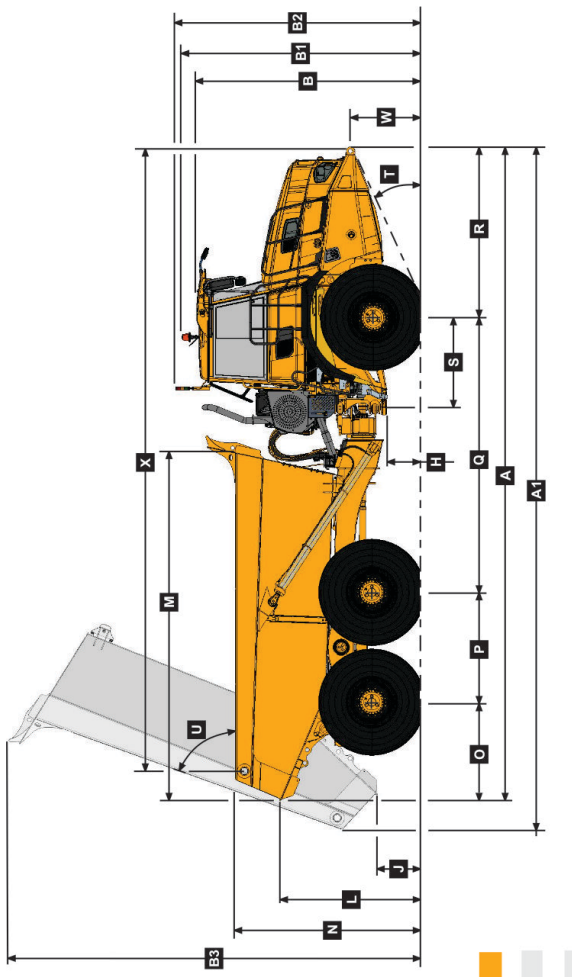


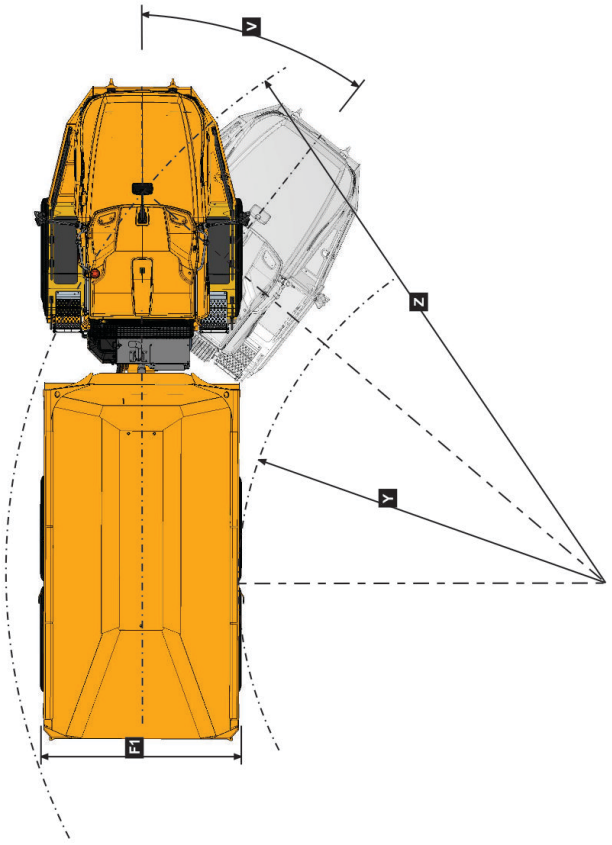
Machine Dimensions

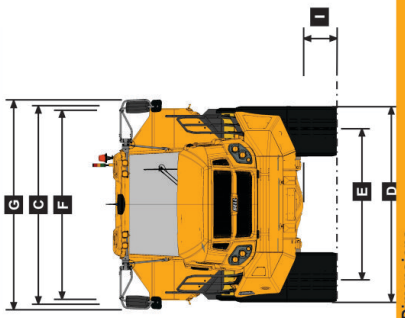
A	Length - Transport Position	9953	mm (32 ft. 7 in.)
A1	Length - Bin Fully Tipped	10311	mm (33 ft. 9 in.)
B	Height - Transport Position	3426	mm (11 ft. 2 in.)
B1	Height - Rotating Beacon	3661	mm (12 ft.)
B2	Height - Load Light	3747	mm (12 ft. 3 in.)
B3	Bin Height - Fully Tipped	6255	mm (20 ft. 6 in.)
C	Width over Mudguards	2985	mm (9 ft. 9 in.)
D	Width over Tyres - 23.5R25	2940	mm (9 ft. 7 in.)
E	Tyre Track Width - 23.5R25	2356	mm (7 ft. 8 in.)
F	Width over Bin	2700	mm (8 ft. 10 in.)
F1	Width over Tailgate	2998	mm (9 ft. 10 in.)
G	Width over Mirrors - Operating Position	3260	mm (10 ft. 8 in.)
H	Ground Clearance - Artic	537	mm (21.14 in.)
I	Ground Clearance - Front Axle	488	mm (19.21 in.)
J	Ground Clearance - Bin Fully Tipped	670	mm (26.38 in.)
K	Ground Clearance - Under Run Bar	N/A	
L	Bin Lip Height - Transport Position	2176	mm (7 ft. 1 in.)
M	Bin Length	5272	mm (17 ft. 3 in.)
N	Load over Height	2763	mm (9 ft.)
O	Rear Axle Centre to Bin Rear	1500	mm (4 ft. 11 in.)
P	Mid Axle Centre to Rear Axle Centre	1670	mm (5 ft. 5 in.)
Q	Mid Axle Centre to Front Axle Centre	4181	mm (13 ft. 8 in.)
R	Front Axle Centre to Machine Front	2602	mm (8 ft. 6 in.)
S	Front Axle Centre to Artic Centre	1362	mm (4 ft. 5 in.)
T	Approach Angle	25	°
U	Maximum Bin Tip Angle	70	°
V	Maximum Articulation Angle	45	°
W	Front Tie Down Height	1075	mm (3 ft. 6 in.)
X	Machine Lifting Centres	9477	mm (31 ft. 1 in.)
Y	Inner Turning Circle Radius - 23.5R25	4110	mm (13 ft. 5 in.)
Z	Outer Turning Circle Radius - 23.5R25	8000	mm (26 ft. 2 in.)

MACHINE DIMENSIONS

B25E 6X4 ADT

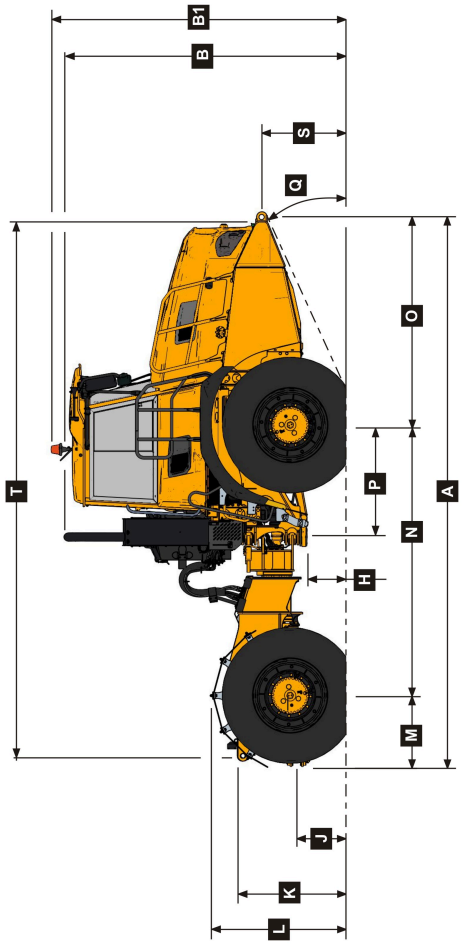


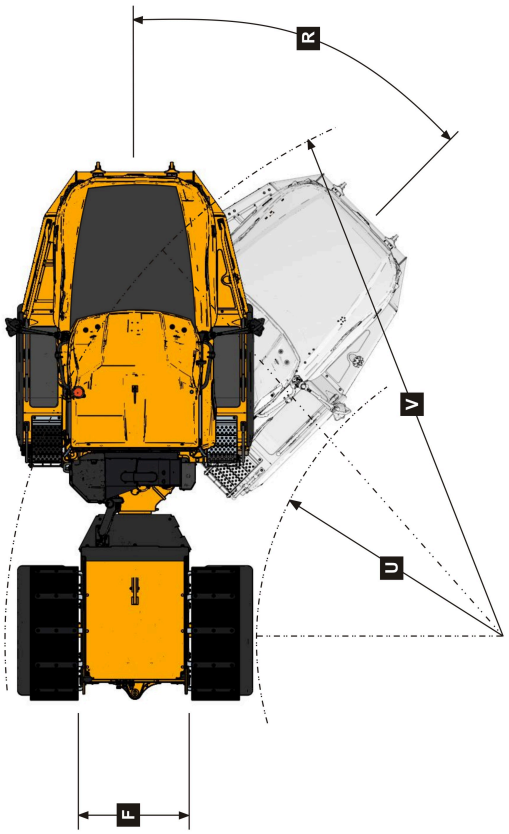


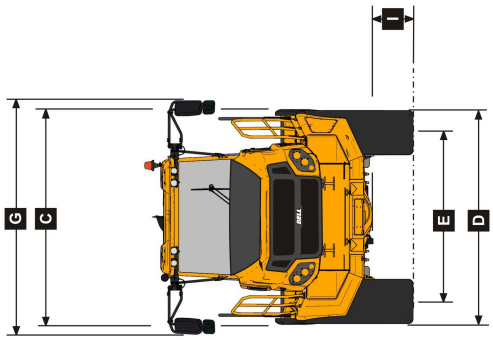


Machine Dimensions		
A	Length - Transport Position	9953 mm
A1	Length - Bin Fully Tipped	10395 mm
B	Height - Transport Position	3426 mm
B1	Height - Rotating Beacon	3661 mm
B2	Height - Load Light	3747 mm
B3	Bin Height - Fully Tipped	6307 mm
C	Width over Mudguards	2985 mm
D	Width over Tyres - 23.5R25	2940 mm
D1	Width over Tyres - 750/65 R25	2998 mm
E	Tyre Track Width - 23.5R25	2356 mm
E1	Tyre Track Width - 750/65 R25	2260 mm
F	Width over Bin	2968 mm
F1	Width over Tailgate	3268 mm
G	Width over Mirrors - Operating Position	3260 mm
H	Ground Clearance - Artic	537 mm
I	Ground Clearance - Front Axle	488 mm
J	Ground Clearance - Bin Fully Tipped	670 mm
K	Ground Clearance - Under Run Bar	N/A
L	Bin Lip Height - Transport Position	2176 mm
M	Bin Length	5294 mm
N	Load over Height	2864 mm
O	Rear Axle Centre to Bin Rear	1500 mm
P	Mid Axle Centre to Rear Axle Centre	1670 mm
Q	Mid Axle Centre to Front Axle Centre	4181 mm
R	Front Axle Centre to Machine Front	2602 mm
S	Front Axle Centre to Artic Centre	1362 mm
T	Approach Angle	25 °
U	Maximum Bin Tip Angle	70 °
V	Maximum Articulation Angle	45 °
W	Front Tie Down Height	1075 mm
X	Machine Lifting Centres	9443 mm
Y	Inner Turning Circle Radius - 23.5R25	4110 mm
Y1	Inner Turning Circle Radius - 750/65 R25	4081 mm
Z	Outer Turning Circle Radius - 23.5R25	8000 mm
Z1	Outer Turning Circle Radius - 750/65 R25	8029 mm

2806E





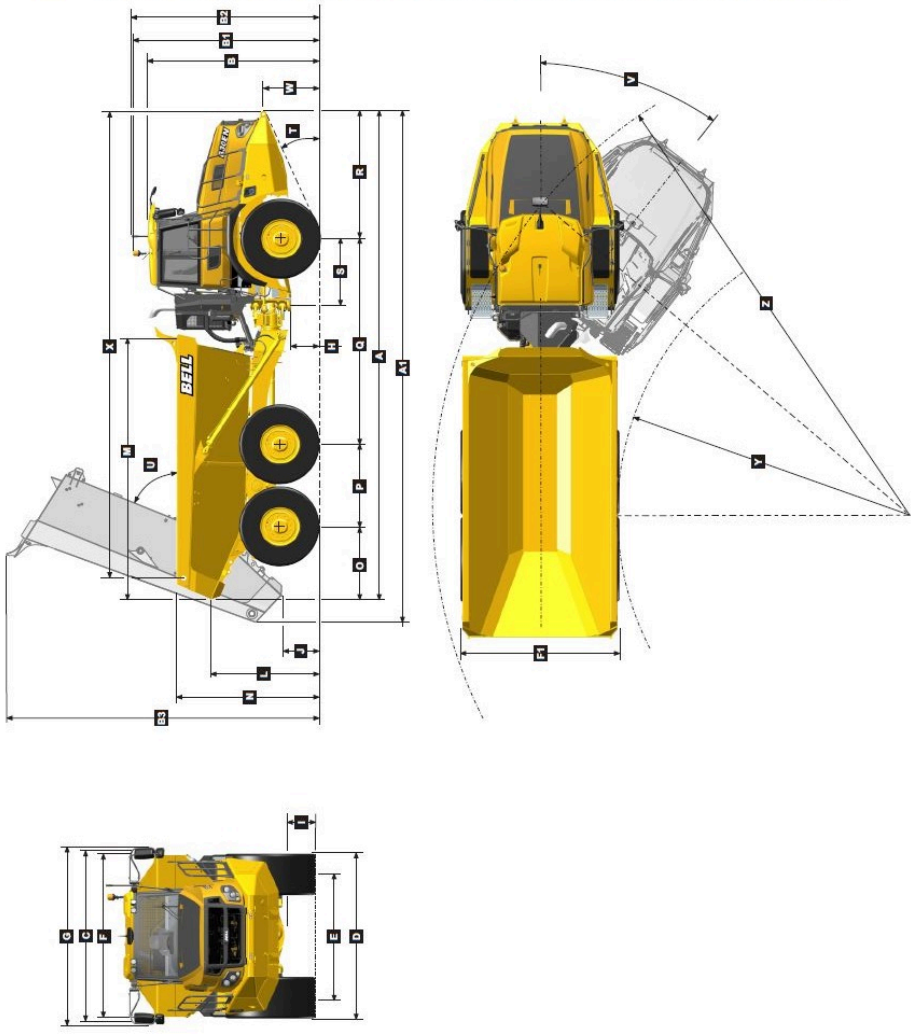


Machine Dimensions			
A	Length - Transport Position	6765	mm
B	Height - Transport Position	3494	mm
B1	Height - Rotating Beacon	3650	mm
C	Width over Mudguards	2985	mm
D	Width over Tyres - 23.5R25	2957	mm
D1	Width over Tyres - Dual 15x34	3772	mm
E	Tyre Track Width - 23.5R25	2342	mm
E1	Tyre Track Width - Dual 15x34	2701	mm
F	Width over Rear Chassis	1310	mm
G	Width over Mirrors - Operating Position	3260	mm
H	Ground Clearance - Artic	537	mm
I	Ground Clearance - Front Axle	488	mm
J	Hitch Center Height	672	mm
K	Rear Chassis Height	1397	mm
L	Rear Mudguard Height	1724	mm
M	Rear Axle Center to Machine Rear	868	mm
N	Rear Axle Center to Front Axle Center	3295	mm
O	Front Axle Center to Machine Front	2602	mm
P	Front Axle Center to Artic Center	1362	mm
Q	Approach Angle	25	°
R	Maximum Articulation Angle	45	°
S	Front Tie Down Height	1084	mm
T	Machine Lifting Centers	6570	mm
U	Inner Turning Circle Radius-23.5R25	2381	mm
U1	Inner Turning Circle Radius-Dual 15x34	1973	mm
V	Outer Turning Circle Radius-23.5R25	5574	mm
V1	Outer Turning Circle Radius-Dual 15x34	5982	mm

MACHINE DIMENSIONS

B30EN

Machine Dimensions			
A	Length-Transport Position w/o Tailgate	9953 mm	(32 ft. 7 in.)
A	Length-Transport Position with Tailgate	10035 mm	(32 ft. 11 in.)
A1	Length-Bin Fully Tipped	10467 mm	(34 ft. 4 in.)
B	Height-Transport Position S5	3426 mm	(11 ft. 3 in.)
B1	Height-Rotating Beacon	3723 mm	(12 ft. 3 in.)
B2	Height-Load Light	3748 mm	(12 ft. 4 in.)
B3	Bin Height-Fully Tipped	6258 mm	(20 ft. 6 in.)
C	Width over Mudguards	2985 mm	(9 ft. 9 in.)
D	Width over Tyres-23.5R25	2940 mm	(9 ft. 7 in)
D1	Width over Tyres-750/65 R25	2998 mm	(9 ft. 10 in.)
E	Tyre Track Width-23.5R25	2356 mm	(7 ft. 8 in.)
E1	Tyre Track Width-750/65 R25	2260 mm	(7 ft. 4 in.)
F	Width over Bin	2700 mm	(8 ft. 10 in.)
F1	Width over Tailgate	2998 mm	(9 ft. 10 in.)
G	Width over Mirrors-Operating Position	3260 mm	(10 ft. 8 in.)
H	Ground Clearance-Artic	537 mm	(21.14 in.)
I	Ground Clearance-Front Axle	488 mm	(19.21 in.)
J	Ground Clearance-Bin Fully Tipped	675 mm	(26.57 in.)
L	Bin Lip Height-Transport Position	2176 mm	(7 ft. 1 in)
M	Bin Length	5316 mm	(17 ft. 5 in)
N	Load over Height	2953 mm	(9 ft. 8 in)
O	Rear Axle Centre to Bin Rear	1500 mm	(4 ft. 11 in)
P	Mid Axle Centre to Rear Axle Centre	1670 mm	(5 ft. 5 in)
Q	Mid Axle Centre to Front Axle Centre	4181 mm	(13 ft. 8 in)
R	Front Axle Centre to Machine Front	2602 mm	(8 ft. 6 in)
S	Front Axle Centre to Artic Centre	1362 mm	(4 ft. 5 in)
T	Approach Angle	25°	
U	Maximum Bin Tip Angle	70°	
V	Maximum Articulation Angle	45°	
W	Front Tie Down Height	1075 mm	(3 ft. 6 in)
X	Machine Lifting Centres	9477 mm	(30 ft. 1 in)
Y	Inner Turning Circle Radius-23.5R25	4110 mm	(13 ft. 5 in)
Y1	Inner Turning Circle Radius-750/65 R25	4081 mm	(13 ft. 4 in)
Z	Outer Turning Circle Radius-23.5R25	8000 mm	(26 ft. 2 in)
Z1	Outer Turning Circle Radius-750/65 R25	8029 mm	(26 ft. 4 in)



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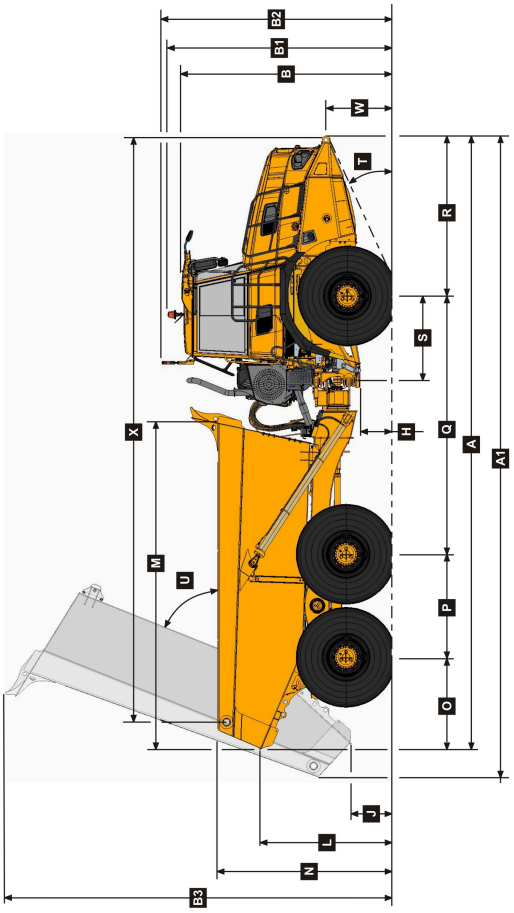

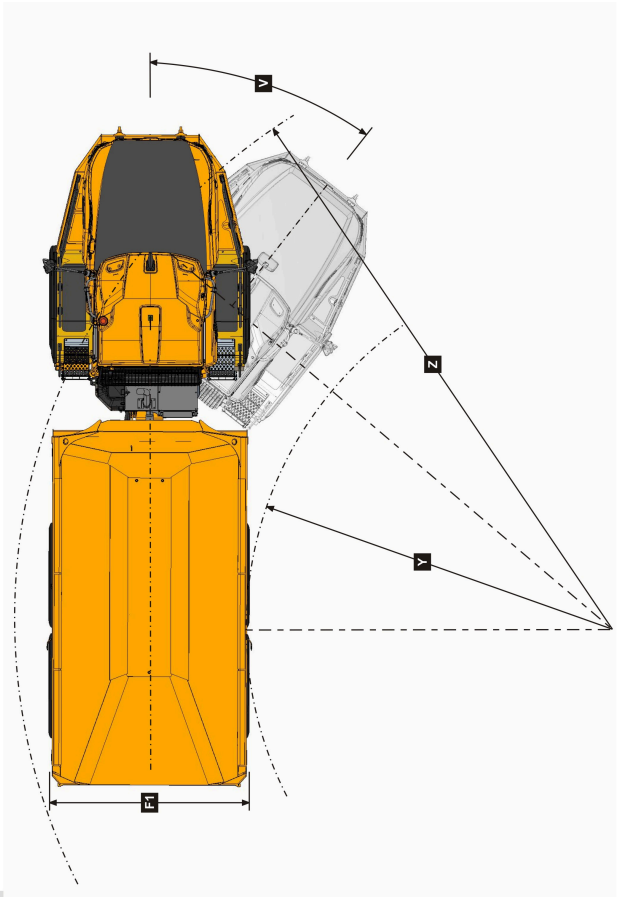

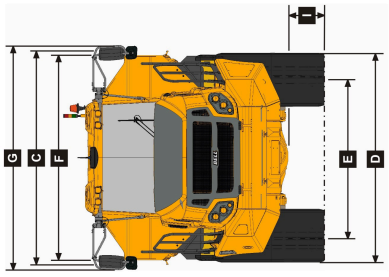

Machine Dimensions

A	Length - Transport Position	9953 mm	(32 ft. 7 in.)
A1	Length - Bin Fully Tipped	10395 mm	(34 ft. 1 in.)
B	Height - Transport Position	3426 mm	(11 ft. 2 in.)
B1	Height - Rotating Beacon	3661 mm	(12 ft.)
B2	Height - Load Light	3747 mm	(12 ft. 3 in.)
B3	Bin Height - Fully Tipped	6307 mm	(20 ft. 8 in.)
C	Width over Mudguards	2985 mm	(9 ft. 9 in.)
D	Width over Tyres - 23.5R25	2940 mm	(9 ft. 7 in.)
D1	Width over Tyres - 750/65 R25	2998 mm	(9 ft. 10 in.)
E	Tyre Track Width - 23.5R25	2356 mm	(7 ft. 8 in.)
E1	Tyre Track Width - 750/65 R25	2260 mm	(7 ft. 4 in.)
F	Width over Bin	2968 mm	(9 ft. 8 in.)
F1	Width over Tailgate	3268 mm	(10 ft. 8 in.)
G	Width over Mirrors - Operating Position	3260 mm	(10 ft. 8 in.)
H	Ground Clearance - Artic	537 mm	(21.14 in.)
I	Ground Clearance - Front Axle	488 mm	(19.21 in.)
J	Ground Clearance - Bin Fully Tipped	670 mm	(26.38 in.)
K	Ground Clearance - Under Run Bar	N/A	
L	Bin Lip Height - Transport Position	2176 mm	(7 ft. 1 in.)
M	Bin Length	5294 mm	(17 ft. 4 in.)
N	Load over Height	2864 mm	(9 ft. 4 in.)
O	Rear Axle Centre to Bin Rear	1500 mm	(4 ft. 11 in.)
P	Mid Axle Centre to Rear Axle Centre	1670 mm	(5 ft. 5 in.)
Q	Mid Axle Centre to Front Axle Centre	4181 mm	(13 ft. 8 in.)
R	Front Axle Centre to Machine Front	2602 mm	(8 ft. 6 in.)
S	Front Axle Centre to Artic Centre	1362 mm	(4 ft. 5 in.)
T	Approach Angle	25 °	
U	Maximum Bin Tip Angle	70 °	
V	Maximum Articulation Angle	45 °	
W	Front Tie Down Height	1075 mm	(3 ft. 6 in.)
X	Machine Lifting Centres	9443 mm	(30 ft. 11 in
Y	Inner Turning Circle Radius - 23.5R25	4110 mm	(13 ft. 5 in.)
Y1	Inner Turning Circle Radius - 750/65 R25	4081 mm	(13 ft. 4 in.)
Z	Outer Turning Circle Radius - 23.5R25	8000 mm	(26 ft. 2 in.)
Z1	Outer Turning Circle Radius - 750/65 R25	8029 mm	(26 ft. 4 in.)

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OPERATION

♦ OPERATING COMPONENTS
♦ OPERATING INSTRUCTIONS

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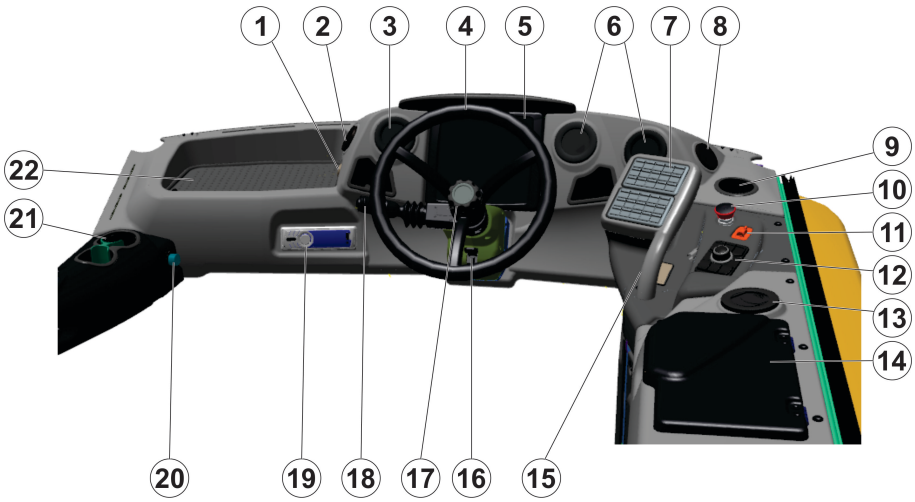
Internal Components

Operator Station



1	USB Power Socket	12	Sealed Display Controller (SDC)
2	Air Vent	13	Air Vent
3	Air Vent	14	Cooler Box
4	Steering	15	Bonnet Switch
5	Colour Display Unit (CDU)	16	Steering Wheel Telescopic Adjustment
6	Air Vent	17	Steering Wheel Adjustment Lever
7	Sealed Switch Module (SSM)	18	Steering Column Switch
8	Air Vent	19	Radio/CD Player (Optional)
9	Cup Holder	20	Cigarette Lighter Socket
10	Emergency Stop Button	21	Cup Holder
11	Rear-view Mirrors Adjustment Switch (Optional)	22	Fuse/Relay and Diagnostic Socket Compartment

Steering Wheel

WARNING

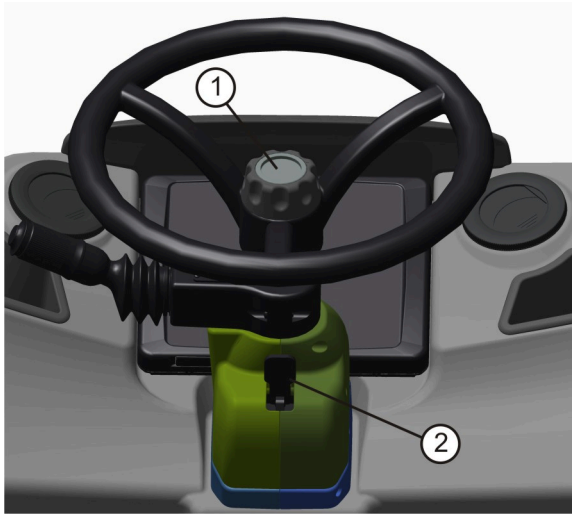
If there is an engine or main pump failure, the ground driven emergency steering system will enable the operator to steer the machine to a safe stop.

In this event the machine must be stopped as quickly as possible.

There is no self-centralising action on the steering. The machine must be returned to the straight ahead position by turning the steering wheel.

The steering wheel can be adjusted to ensure maximum operator comfort.

Adjusting Steering Wheel



Telescopic Adjustment

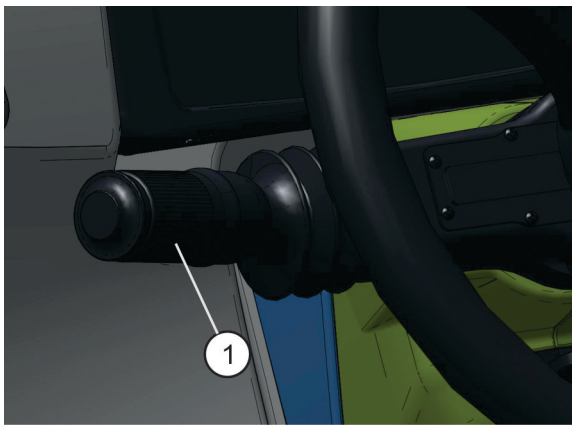
1. Unlock the steering wheel by rotating the knob (1) anti-clockwise.
2. Adjust the steering wheel in/out for operator comfort.
3. Lock the steering wheel into place by rotating the knob (1) clockwise until it is secure.
4. Do not tighten the knob excessively.

Tilt Adjustment

Push Lever (2) and adjust the tilt of the steering column by pushing or pulling the steering wheel.

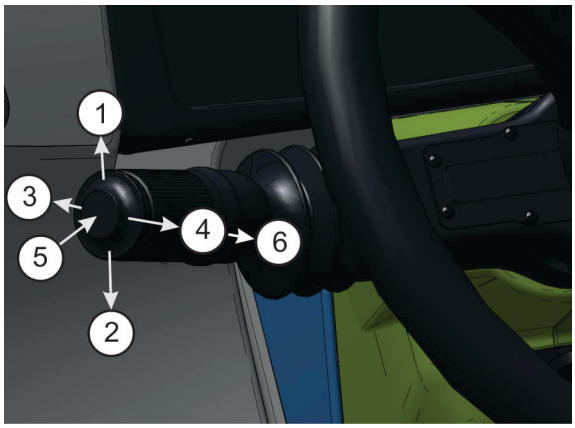
After the desired setting is achieved, release lever (2).

Steering Column Switch



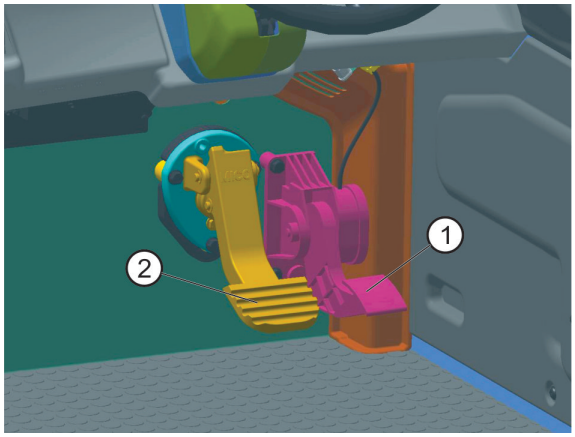
The steering column switch is a self canceling switch (1) (after turning, the switch automatically returns to its neutral position) and is located on the left of the steering column.

The operation of the switch is as follows:



1. To indicate a right turn, move the switch upwards (1).
2. To indicate a left turn, move the switch downwards (2).
3. For high beam headlights, move the switch towards the dash (3).
4. To dip the headlights, move the switch away from the dash (4).
5. To operate the horn push the end (5) of the switch.
6. To flash the headlights, pull switch backwards to position (6) and release.

Accelerator And Brake Pedals



The accelerator pedal (1) and the brake pedal (2) are located on the cab firewall near the floor.

Both pedals are progressive and spring loaded to an up, disengaged, neutral position.

Auto Greasing Control (Optional)

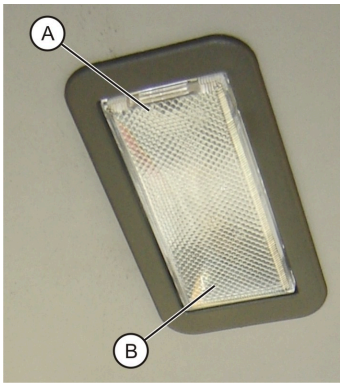
The automatic greasing system is controlled via the on-board display and SDC Unit.

CAUTION

Do not change the settings, report to service personnel if you think a greasing cycle should be changed.
Report to service personnel immediately if the low level or error light illuminates.

The control enables selection of light, medium or heavy duty greasing cycles, warns of a low level of grease in the reservoir and warns of errors in the system.

Interior Light

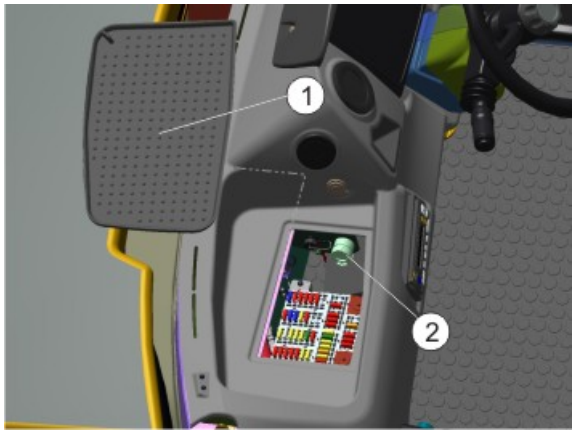


The interior light in the cab is located in the roof panel and is switched **ON** or **OFF** by pushing the light at **A** or **B**.

USB Power Socket

The USB Power Socket (1) is located on the left side in the front dash and has 2 x 1 Amp outputs.

Diagnostic Socket



CAUTION

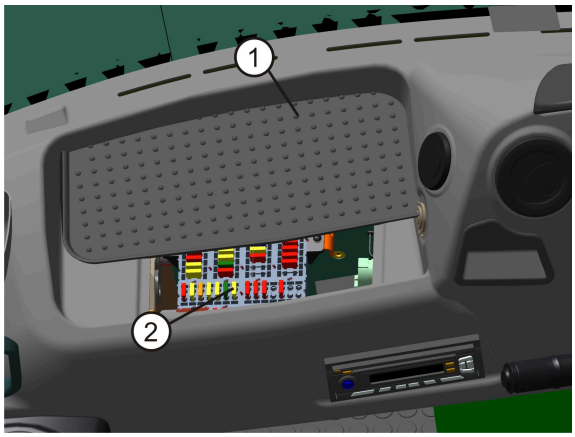
The diagnostic socket is to be used only by trained personnel.
The operator must ensure that the cover is secure and undamaged.

A diagnostics socket (2) is installed in the dash for connecting a diagnostics tool for fault finding.

To gain access to the diagnostic socket, the cover (1) must be removed.

Fuses, Diodes and Relays

The following picture shows the cover on the left of the dashboard removed to show the fuses, diodes and relays.



To gain access to the fuses, diodes and relays (2), the cover (1) must be removed first.

There is an identification decal underneath the cover (1). Refer to the decals section in the "Safety Signs" section for fuses, diodes and relays layout.

Operator Seat

WARNING

Before operating the machine, the operator should adjust the seat for his/her own height and weight. Improper adjustment of the seat, could compromise the ride comfort and operator's ability to control the machine.

In order to optimize the seat's vibration damping capabilities, the seat height should be adjusted to the mid-point of total vertical suspension travel range.

WARNING

This seat may be equipped with a seat heater or ventilation system. There is a possibility that some people may suffer heat-induced burns or excessive cooling when using the system. Do not use either of these systems if you have a diminished ability to sense temperature, a reduced ability to feel pain, or have sensitive skin.

When using the seat heater or ventilation system, do not place anything on the seat that insulates against heat or cooling, such as a blanket, cushion, or similar item. This may cause the seat heater or ventilation system to overheat which may cause a heat-induced burn or may damage the seat.

1	Horizontal Adjustment
2	Air Dump Valve
3	Shock Absorber Adjustment
4	Height Adjustment
5	Lumbar Support (LS)
6	Back Rest Adjustment
7	Tilt Adjustment
8	Seat Cushion Length Adjustment
9	Horizontal Suspension
10	Seat Heating (Optional - Standard to Euro Models/ Not in standard S.A. models)
11	Armrest
12	3 - Point Seat Belt (B25/30E only)
13	Mesh Feature on Rear of Seat

The operator’s seat is fully adjustable to suit the operator.

Horizontal Adjustment

To adjust position of seat forward or backward, pull lever (1) firmly while sliding the seat horizontally

forward/backward. Release lever when desired position is reached.

Air Dump Valve

Gently press button in at top once seated, before exiting press button down.

This improves entry & exit clearance.

Shock Absorber Adjustment

By adjusting the Shock Absorber, the suspension characteristics of the seat can be optimally adapted to every road and every driver.

Lever (3) Up: Minimum damping force.

Lever (3) Down: Maximum damping force.

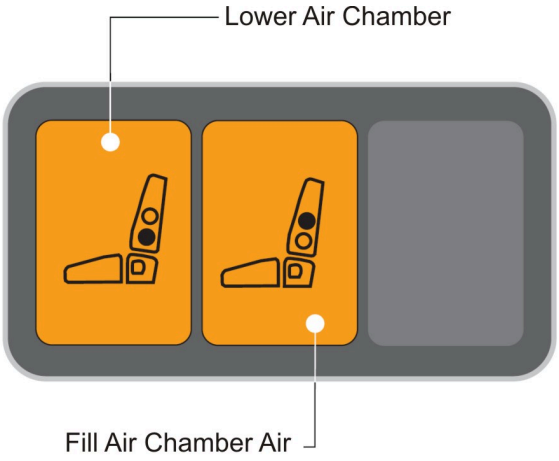
A good initial value is in the middle.

Height Adjustment

The required level of vertical adjustment can be reached by pulling or pushing handle (4) till the desired position is reached.

The height adjustment should ideally be done when the operator is already seated and the machine idling in neutral.

Lumbar Support (LS)



Press button to match the shape of the backrest individually to the body contours.

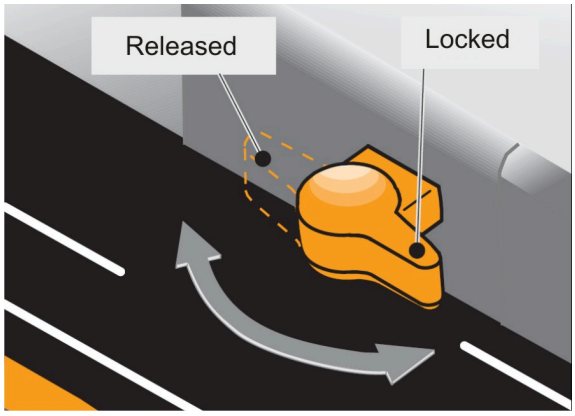
Back Rest Adjustment

The back rest is spring loaded and will automatically tilt forward when the locking mechanism is released.

Pull Handle (6) upwards to disengage the locking mechanism while adjusting the back rest forwards or backwards to obtain the correct angle.

Release the handle (6) to lock in position.

Horizontal Suspension

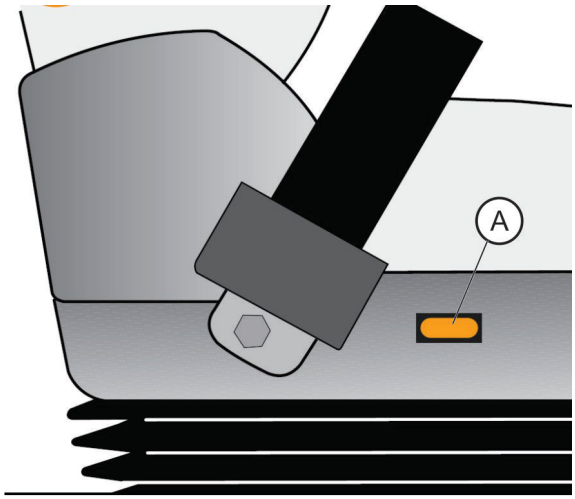


Move lever to the Right : Horizontal suspension released.

Move lever to the Left: Horizontal suspension Locked. It will allow the seat to float horizontally a small amount to improve comfort.

Seat Heating

Seat heating is standard to all Euro models but optional for standard S.A. models.



Thermostatic controlled heating for the seat cushion and backrest.

The heating can be switched (A) on/off respectively by the switch.

Armrest

The armrests (11) can be tilted up if required and the height individually adjusted.

The angular position of the armrests can be adjusted by turning the adjusting wheel situated underneath each armrest. The armrests can also be tilted vertically to allow easier access to the seat.

Seat Belt

WARNING

Always wear a seat belt when travelling or operating the machine. In an accident it may save your life.
Check the condition of the seat belt and mounting hardware before operating the machine.

A self-adjustable 3 - point seat belt is an integral part of the seat and is designed to fit firmly across the front of the torso.

Seat belt and mounting hardware must be inspected before operating the machine. If belt or mounting hardware is worn, replace complete seat belt assembly.

It is recommended that the seat belt be replaced at least every three years, regardless of its condition.

Fastening

Pull the seat belt out and push the buckle (1) into the fixed clasp (2) until it clicks into position.

Ensure that the connection is secure and that the belt fits tightly across the pelvis and that the strap of the belt is not twisted.

Releasing

Press down the red push button (3) on the fixed clasp. The seat belt is spring-loaded to return to its retracted stowage position.

Trainer Seat

The trainer seat is located on the left side of the operator's seat.

The seat is not adjustable and is equipped with a seat belt.

The seat belt for the trainer is fastened, released and adjusted in the same way as the operator's seat belt.

To set-up the trainer seat, lift the front end of the seat in the upward direction till it is locked in place.

To stow the seat away when not in use:

- While in the open position,
- Place one hand at the front end of the seat and lift up, while placing your other hand at the rear end of the seat, pushing in a downward to forward motion.
- Once the seats begins to swivel in the anti-clockwise direction, release the seat.

Heating, Ventilation and Air Conditioning

Refer to the Sealed Switch Module (SSM) section for detailed HVAC operation.

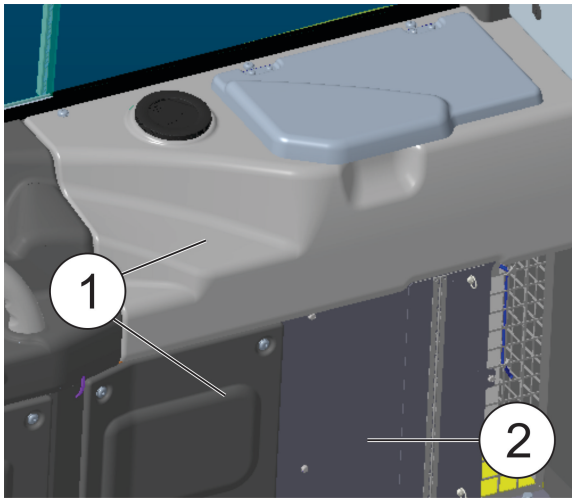
Air Conditioner

WARNING

The Air Conditioning system delivers filtered air into the cab, it does NOT filter toxic gases.
Only BELL EQUIPMENT approved filter elements must be used in the air conditioning system.

CAUTION

ONLY service personnel may remove the side panel.

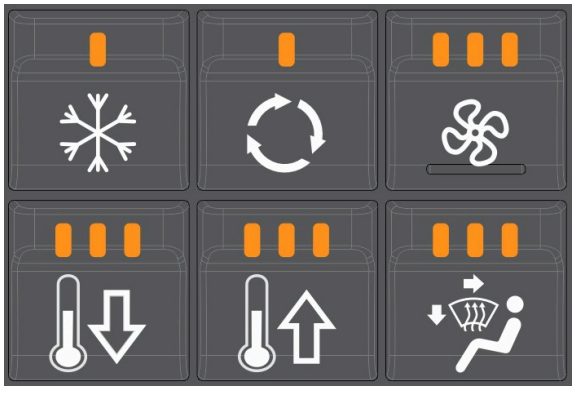


The air conditioner and the filter housing (2) are located inside the right side panel (1) in the cab.

The air conditioner condenser is located in front of the coolant pack.

The HVAC system is equipped with an air re-circulation function. This function provides maximum heating or cooling capacity during the initial machine start-up.

Fresh Air Supply

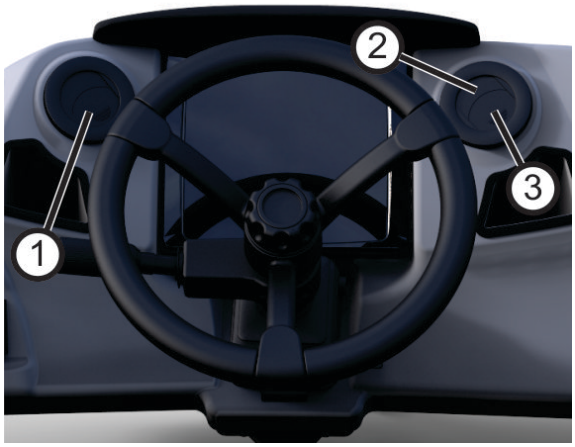


1. Set blower fan speed switch to **HIGH**.
2. Set air direction switch to position 3 (Middle and Feet).
3. Switch air recirculation switch **OFF**.

NOTE

Refer to the Sealed Switch Module (SSM) section for detailed HVAC operation.

Vents



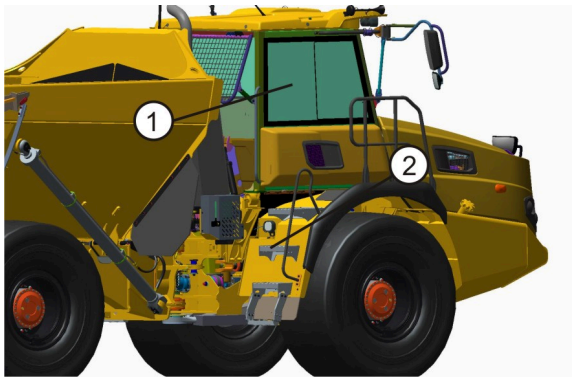
There are six climate control vents (1) installed in the cab.

The vents are opened and closed manually. The vents can be rotated to direct the flow of the air.

To open the vents, push on the full visible fin (2) and to close, push on the small fin (3).

Emergency Exit

The emergency exit is the right side window of the cab.



In an emergency exit the truck cab by climbing out through the right hand side sliding window (1), walk along the handrails and down the steps (2) which are mounted on the mudguard.

Optional fitment of window punches are available for all E# Trucks. It is a requirement in some industries that the emergency exit window be able to be opened form outside as well, thus the option to install window punches is available, which allow for the shattering of the exiting window from outside.

Emergency Stop Button

CAUTION

This button must only be used in an emergency.

In an emergency, the red button on the right of the SSM can be depressed, this will bring the machine to an aggressive stop.

This will disable the accelerator pedal, will apply full engine brake, full transmission retarder and full park brake ON.

The transmission will be switched to Neutral and the engine will not be switched off and will run at idle speed.

The CDU will display an “Emergency Stop” message.

Bonnet Opening/Closing Switch

CAUTION

BEFORE opening the bonnet, snow, mud or any other deposits must be removed from the top of the bonnet.

WARNING

Risk of crushing - Unintended and unexpected closure of the bonnet may result in serious injury.

BEFORE closing the bonnet, ensure there are no personnel in or around the bonnet area and all tools are removed.

Press and hold the top of the bonnet switch to lift the bonnet .

To lower the bonnet, press and hold the bottom of the bonnet switch.

NOTE

There is an automatic cut-off time for lifting and lowering the bonnet.

The bonnet actuator has a thermal protection switch which will prevent the bonnet from opening if the temperature inside the bonnet is too high. If this occurs, wait 2 minutes and retry.

Mirror Adjustment Switches

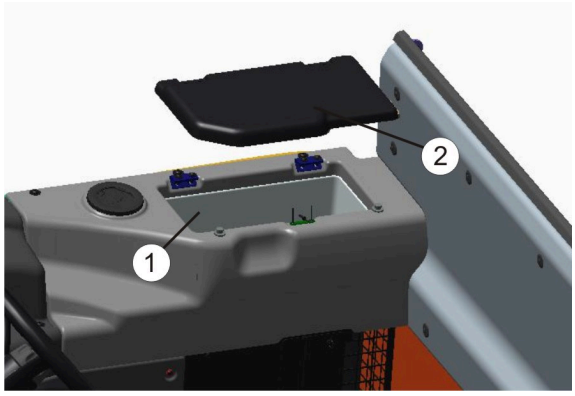
Mirror Adjustment Switch installed only if Electric Mirrors option is selected.

Use the mirror selector switch (1) to select the mirror you would like to adjust, either left or right.

Use the directional switch (2) to move the selected mirror in the direction desired.

Move the mirror selector switch (1) to the centre position when done to prevent accidental mirror movement if switch (2) is bumped.

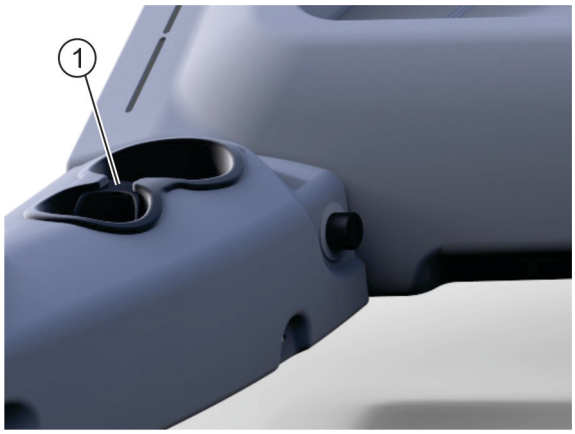
Cooler Box



The cooler box (1) is located on the right side of the cab under the hinged lid (2).

Is is useful to keep food and refreshments cool.

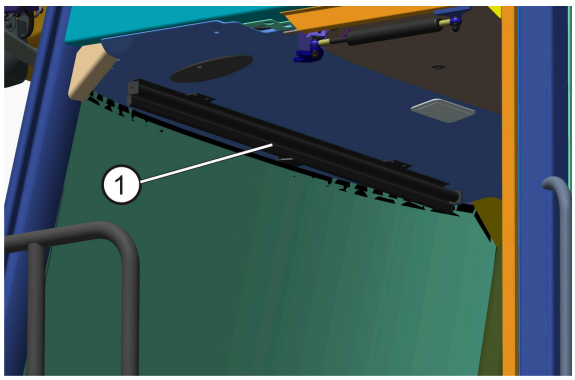
Drinks Holder



A drinks holder is also installed to hold a cup or glass and is located on the left side.

The central rubber divider (1) is removable depending on the size of the container used.

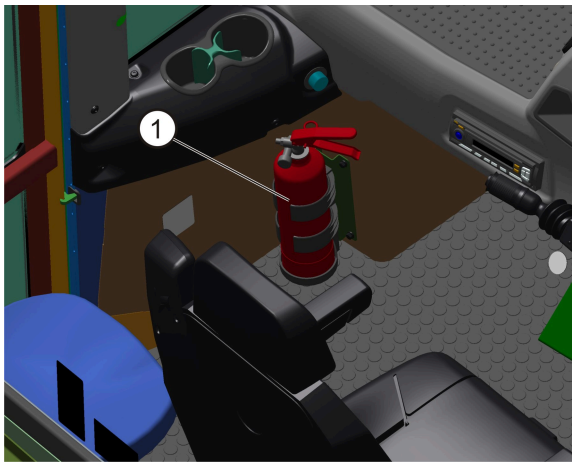
Sun Visor (Roller Blinds)



The sun visor is located on the head liner of the roof and folds down when pulled.

The operator can adjust it to the best position for shielding his eyes in bright sunlight.

Fire Extinguisher

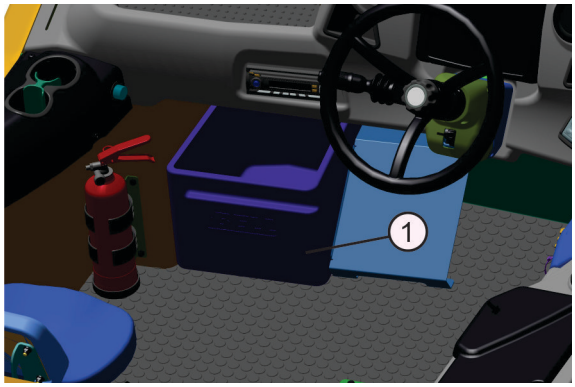


All machines are fitted with a fire extinguisher (1).

Ensure that you read and understand the direction of use, on the side of the fire extinguisher, about how to safely use the fire extinguisher.

Check the expiry date published on the extinguisher and service or replace as required.

Utility Box



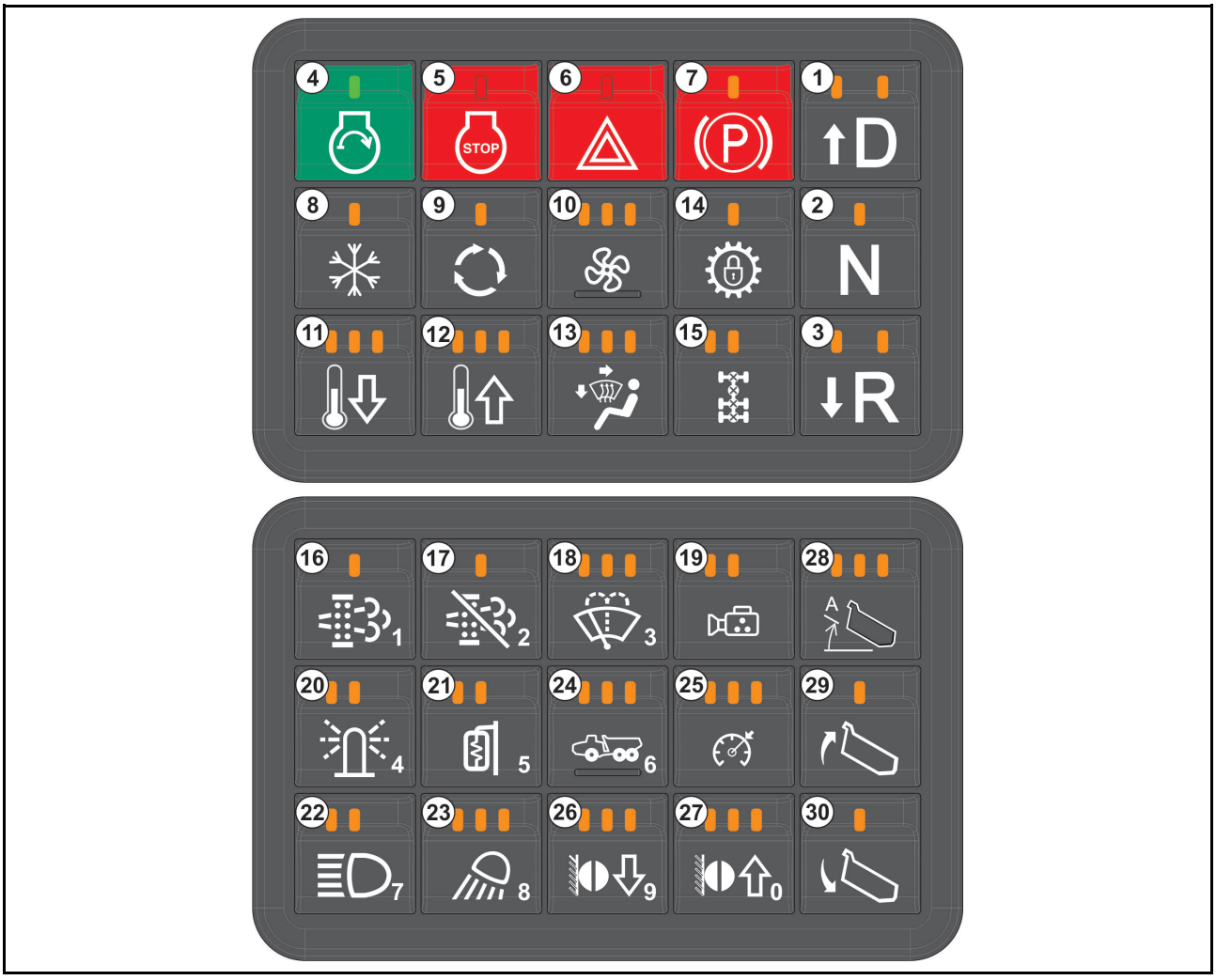
The utility box (1) is located inside the cab on the left, under the dash panel below the fuse box.

It is removable from the cab, though it might require a firm tug to release, and has a drain hole at the bottom.

The utility box is used for miscellaneous storage inside the cab, which could include clothing, lunch boxes, basic tools, etc.

Sealed Switch Module (SSM)

When a button is activated a signal light will come on. On some buttons a corresponding message will be displayed via the on-board display screen.



1. Drive Selection Button
2. Neutral Selection Button
3. Reverse Drive Selection Button
4. Ignition On/Engine Start Button
5. Ignition Off/Engine Stop Button
6. Hazard Button
7. Park Brake Button
8. Air Conditioning On/Off Button
9. Air Recirculation Button
10. Blower Fan Speed Button
11. Semi-Climate Control (HVAC) (Decrease Temperature) Button
12. Semi-Climate Control (HVAC) (Increase Temperature) Button
13. Air Flow Direction Button
14. Gear Hold Button
15. Interaxle Diff Lock Button (CTD fitted to B35E - B50E ADT models)
16. Manual Regeneration Button
17. Disable Regeneration Button
18. Front Windscreen Wiper Control Button
19. Reverse Camera Button
20. Beacon Light Button
21. Electric Mirror Defrost Button
22. Head Lights Button

23. Working Lights Button
24. Machine Pre-sets Button
25. Speed Limit Button
26. Retarder/Speed Control (decrease) Button
27. Retarder/Speed Control (increase) Button
28. “i-Tip” Button
29. Bin-Up Switch
30. Bin-Down Switch

NOTE

Machines leaving the factory will have a default security code assigned to them. This will be the last four digits of the VIN number.

The numbers at the bottom of some of the switches are used for numerical inputs required by some menus.

All buttons are push buttons with LEDs incorporated.

Security Code And Driver Identity

NOTE

The machine has an option whereby a Security Access Code can be activated. If this option is enabled a code number must be entered before the operator can start the machine. Machines leaving the factory will have a default security code assigned to them. This will be the last four digits of the VIN number. The code number is entered using the numbers on some of the switches on the SSM. The security access feature can be configured on the CDU by **BELL Equipment** service personnel.

There are three levels of security available in this software via the SSM, Level 1 — No Code, Level 2 — Security Code (Initial Default) and Level 3 — Full Driver Identity.

Level 1 — No Code

If ‘Enable Security’ is de-selected under the ‘Machine Config’ ‘Enable Options’ menu (in service mode) then there will be no code required to start the engine when the Ignition On button is pressed on the SSM.

Level 2 — Security Code

If ‘Enable Security’ is selected under the ‘Machine Config’ ‘Enable Options’ menu (in service mode) and the ‘Security Code’-‘Driver Mask’ (in service mode) is set to “00000000” OR “99999999” then a 4-digit pin code will be required to start the engine when the Ignition On button is pressed on the SSM.

If “9999” or “0000” (invalid code) is entered into ALL of the ‘Access Code 1’ to ‘Access Code 20’ parameters in the ‘Menu’ ‘Security Code’ menu then the 4-digit pin code required will be the last four digits of the Vehicle’s VIN number (THIS WILL BE THE DEFAULT LEVEL OF SECURITY ON TRUCKS LEAVING THE FACTORY). Alternatively, if there are any valid codes entered into the Access Code 1 ’to ‘Access Code 20’ parameters then one of these will be required to be entered before the operator can start the engine. These codes can only be changed in Service Mode.

Any Memory Module logs or Fleetmatic messages will include the detail of which access code was used to log into the machine. This also applies to Level 3 - Full Driver Identity.

Level 3 — Full Driver Identity

PC software is available to create a ‘Driver Mask’ using information provided by the owner / site manager. This mask can be used to create 250 8-digit codes that should be linked to operator names by the owner / site manager, the relevant 8-digit code should be given to the relevant machine operator.

This ‘Code’ should be entered into the ‘Driver Mask’ parameter under the ‘Menu’ - ‘Security Code’ (service mode) menu if this level of security is required (default is ‘00000000’).

If this Driver Mask is entered into the machine then any one of the 250 8-digit codes allocated to that mask as mentioned above will unlock the machine to be able to start the engine.

Features of this 8-digit code include:

- This 8-digit code includes a user selectable expiry date per code. If the code has expired, the machine will not start.
- A new number with a new expiry date can be generated at any time (to cater for new employees) without having to go to the machine and change the ‘Driver Mask’.
- It is not possible to remove a code before its expiry date (in the event of an employee being

dismissed, caution should be taken until the code is changed)

- Should security be compromised on one or more codes, then the 'Driver Mask' will have to be changed on all relevant machines.

Drive/Neutral/Reverse Buttons

Drive/Reverse

Select "D" or "R".

Press "Park Brake" button to release the park brake (LED and the CDU park brake indicators will go off). Drive off.

Neutral

If "N" is pressed and the machine's speed is less than 7kmph then the Park Brake will be automatically applied.

The Park Brake will be released after "D" or "R" is selected. To manually change the maximum gear that can be attained, press the ⇧ or ⇩ arrows (also "D" and "R") when the transmission is in Drive mode and the left LED above the "D" is on.

The maximum current gear is displayed in the middle of the CDU, by two numbers. The RHS number is the highest gear that can be attained. The LHS number is the current gear. The ⇧ or ⇩ arrows control the LHS numbers.

A direction change is only allowed at speeds below 5kmph.

NOTE

Starting the machine or selecting Drive or Reverse, will sound the horn. Twice for starting and reverse and once for drive. This option can be turned on via the CDU.

If the system has speed limit control active then the range will be automatically adjusted to match the desired speed according to the following logic:

- For each gear, calculate the engine speed at 1 400 rpm. The maximum allowed speed for the immediately lower gear will then be this speed.

Example: If the system reads the machine is travelling at 9km/h with an engine speed of 1400 rpm in 2nd gear, then it will set the 1st gear maximum speed to 9km/h. Then, any speed limitation from 0-9km/h will set the transmission range to 1st only.

If the Neutral button is pressed and the engine speed is less than 275 rpm, the park brake will be applied even if neutral has not been attained (to achieve immediate park brake on neutral select).

To initially engage a gear, first apply service brakes, engage the gear and then turn **OFF** the park brake.

Ignition On/Engine Start Button

If the "Ignition On/Engine Start" button is pressed the electrical supply to the vehicle will be turned on. The LED will start flashing.

To start the engine you will need to input a security code via the numerical pad on the SSM. This function is set as default from the factory, but can be turned off in service mode via the CDU.

If the button is pressed while the LED is flashing, then the engine will crank automatically. The automatic engine crank will turn off after 5 seconds if the engine has not started. This is due to built in Starter Protection.

Ignition Off/Engine Stop Button

If this button is pressed while the ignition is on, then the electrical supply to the vehicle will be turned off. If this button is pressed while the engine is turning, then the machine will go into shut down mode. The LED will flash while in shutdown mode.

This includes placing the transmission into neutral, applying the park brake and going into "Turbo Spin-Down" mode. The duration for the "Turbo Spin-Down" varies from 5-120 seconds. This time is based on how hard the engine has been working.

A quick press and release of this button while the machine is at high speed, will bring the machine to a graceful stop.

Pressing and holding the button will cut the engine immediately in an emergency shutdown.

Pressing and holding the button while driving at high speed will bring the machine to a sudden stop.

NOTE

Do not interrupt the shut down process as this will harm the engine.

Hazard Button

A short press of this button will cause the left and right indicator lights to flash.

The LED will flash and a warning sound will beep.

This button works whether or not the ignition power is on or off, however if the ignition is off then the CDU lights and warning alarm will be off.

Pressing and holding the button will turn off the warning beep.

Park Brake Button

WARNING

Under normal circumstances the operator must not leave the machine unattended with the engine running.

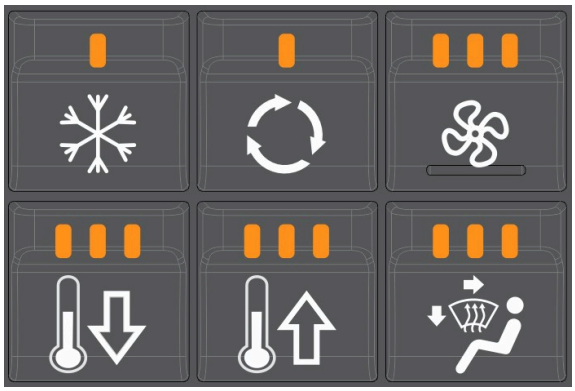
If the circumstances are such that the operator must leave the engine running, the operator must not leave the machine until he has: Selected and ensured that the transmission is in Neutral, applied the park brake and ensured that it is properly engaged, chocked the wheels and taken all other steps necessary to prevent the machine from moving.

A short press of this button will cause the park brake to be applied / released manually.

Note that the exception to this is that the machine is programmed to keep the automatic park brake applied if the machine is still in neutral. This is for safety to prevent uncontrolled movement.

In this case the park brake light will change from red to green and the word "auto" will appear under the symbol. It will be released automatically when the machine is put in drive and the operator puts their foot on the accelerator pedal.

HVAC Button



Air Conditioner Button

A short press and release will allow you to cycle to the option you require.

- LED OFF - Air conditioning OFF
- LED ON - Air conditioning ON

Air Recirculating Button

This button allows you to choose to close the recirculation flap. A short press and release will allow you to cycle to the option you require.

- LED OFF - Air recirculation OFF. Fresh air will enter cabin.
- LED ON - Air recirculation ON.

Blower Fan Speed Button

Short press and release will allow you to cycle to the speed you require.

The LEDs will turn on as the speed increases:

- 0 x LED - Fan **OFF**. Air conditioner will also be OFF
- 1 x LED - **LOW** fan speed.
- 2 x LEDs - **MEDIUM** fan speed.
- 3 x LEDs - **HIGH** fan speed.

Lights come on to indicate incremental increase in fan speed. If pressed and held it will turn the fan off.

Semi-Climate Control Temperature Buttons

These buttons increase or decrease the temperature inside the cab when the air conditioner is ON.

To increase the air temperature inside the cab, press the ⇧(Up) arrow button and to decrease the air temperature, press the⇩(Down) arrow button.

The desired temperature will be shown on the CDU while the button is being pressed. The LEDs above the arrows will also light up as the buttons are pressed.

The amount of the LED's above the switches indicate the temperature setting;

One = Cold,

Three/Four = Medium

Six = Hot.

Air Direction Button

This button controls the direction of the air… Short press and releases will allow you to cycle through the various different directional options.

The CDU will display the directional option chosen.

The LEDs on the switch also change depending on the option chosen.

Gear Hold Button

This function is used to ascend and descend steep inclines. The function can also be used in very sticky conditions when a change in gear may cause the vehicle to lose traction and momentum.

LED **ON**: Gear hold is ON.

LED **OFF**: Gear hold is OFF.

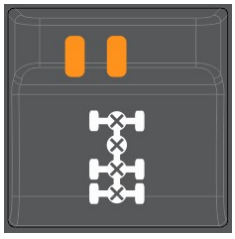
When the button is OFF the transmission is in normal automatic mode.

When the "Gear Hold" button is ON the transmission will hold the gear that it is in at the time of the button being activated. Normal down shifting will occur, but the transmission will not shift to a higher gear until the function is turned OFF.

Differential Lock Button

CAUTION

Do not engage the Inter Axle Differential Lock while the machine is travelling on tar or graded surfaces. This will cause damage to the differential.



A short press and release of the "Differential Lock" button, when all LEDs are off, will cause the Inter Axle Differential Lock (IDL) to be applied and the left LED to illuminate.

Another quick press and release of the button when the left LED is illuminated will cause the IDL to be turned off.

A long press and release of the "Differential Lock" button, when all LEDs are off, will cause the IDL and Controlled Traction Differential Lock (CTD) to be applied and both the LEDs to illuminate. After 30 seconds the CTD will be deactivated and the right light will go off.

The CTD is only fitted to the B35E - B50E ADT models. IDL and CTD will only engage at speeds less than 1 kmph. The CDU will show the status of the IDL and CTD.

Manual Regeneration Button

This is used to request manual regeneration. If the machine requires manual regeneration, this button can be pressed. The CDU will display the Manual Regeneration screen and start the process.

Disable Regeneration Button

If the Disable Regeneration Button is pressed, the system will not start with active regeneration, but the soot levels will continue to build up. It basically toggles the “Inhibit DPF Regeneration” switches currently selectable via the CDU menu.

Front Windscreen Wiper Control Button

A quick press and release of the button will cause the wiper to wipe once and the left LED to flash for 5 seconds.

Another quick press and release of the button while the LED is flashing, will take the wiper into intermittent wiper mode and the left LED will illuminate. Intermittent mode / speed can be configured on the CDU.

A quick press and release of the button while the wiper is in intermittent wiper mode will take the wiper into low speed wiper mode, and the two left LEDs will illuminate.

A quick press and release of the button while the wiper is in low speed mode will take the wiper into high speed mode and all 3 LEDs will be on.

A quick press and release of the button while the wiper is in high speed mode will turn the wiper and all LEDs off.

Holding down the wiper button will cause the washer to activate. It will wash and wipe for the duration of press.

Reverse Camera Button

If the Reverse Camera Button is activated, the CDU will display the main reverse camera screen. *(The second LED is reserved for future functionality.)*

Light Buttons

Beacon Light Button

The Beacon Light Button is used to turn the flashing beacon lights **ON** or **OFF**.

The switch has two positions:

- LED **OFF**: Beacon light function turned OFF.
- LED **ON**: Beacon light function turned ON.

(The second LED is reserved for future functionality.)

Electric Mirror Heating Button

NOTE

Only on machines with electric mirrors.

The Mirror Heating button is used to demist / defrost the electric mirrors in cold and frosty environments.

- LED **OFF**: Heating function turned OFF.
- LED **ON**: Heating function turned ON.

Do not leave this function on unnecessarily.

(The second LED is reserved for future functionality.)

Head Light Button

This button is used to turn the head lights and rear lights on or off. Please note that the ignition switch must be ON for the headlights to operate.

- LEDs **OFF**: The lights are turned OFF.
- One LED **ON**: Park and Tail Lights ON.
- Two LEDs **ON**: Headlights and Tail Lights ON.

The Headlight Dip and Bright functions are controlled from the steering column switch.

Working Lights Button

The Working Lights button is used to operate the working lights on the machine.

The light switch positions are:

- **1st** LED **ON** = Front Working Lights ON
- **1st and 2nd** LED **ON** = Front Working Lights and Artic Light ON
- **2nd** LED **ON** = Artic Light ON

(The third LED is reserved for future functionality.)

Machine Presets Button

Future option. If pressed the CDU will display "Option not supported".

Speed Limit Button

The Speed Limit button allows the operator to set the maximum speed for the machine, thus allowing him to have accelerator pedal completely depressed without having to worry about controlling the speed or worrying about foot movement from bumpy roads.

The speed control function mimics an operator by reducing accelerator and applying the retarder. The speed limit can be increased or decreased using the retarder up or down button.

- **1st** LED : Production Speed Limit 1

- **2nd** LED : Production Speed Limit 2

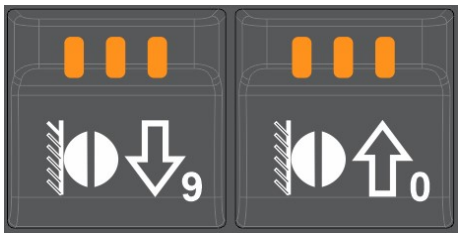
For operator safety it is advised that the speed control values be set while the machine is stationary.

(The third LED is reserved for future functionality.)

Retarder Buttons

NOTE

The retarder function can only function when the exhaust brake is functioning (in lock-up).



Engaging the transmission retarder helps to control the speed of the machine especially when descending. It is also a factor in reducing fuel consumption and minimising brake wear. Bell recommends maximum retardation to suit site conditions.

Retardation

The retarder comes on automatically when your foot is lifted from the accelerator pedal.

To set the retarder aggressiveness press the ⇧ or ⇩ arrows.

Engaging the retarder helps to control the speed of the machine especially during descent. It also is a factor in reducing fuel consumption and minimising brake wear.

The retarder settings are:

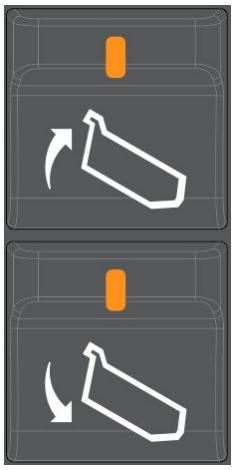
- 0 x LED ON = 15% Retardation (Minimum)
- 1 x LED ON = 25% Retardation
- 2 x LEDs ON = 35% Retardation
- 3 x LEDs ON = 45% Retardation
- 4 x LEDs ON = 60% Retardation
- 5 x LEDs ON = 75% Retardation
- 6 x LEDs ON = 100% Retardation (Maximum)

Downhill Speed Control

The retarder will automatically activate at the pre-set level as soon as the operator takes their foot off the accelerator pedal.

However if the machine goes faster than the speed it was doing when the operator took their foot off the accelerator, the retardation will automatically be increased to prevent the machine from running away. This feature can be turned off.

Bin Up/Down Buttons



To raise the bin: Press the "Bin Up" (upper button). The LED will go ON.

To lower the bin: Press the "Bin Down" (lower button). The LED will go ON.

A long press of the "Bin Up" or "Bin Down" will manually raise or lower the bin. Releasing the button will stop the bin movement.

If the "Drive-Line Assist" feature is active then the bin latch and release (Latch-Up) feature will be active. This means that a short press and release of the "Bin Up" button will cause the bin to be raised until it stops. It can be interrupted by an additional press.

If the "Bin Down" button is pressed and released while the bin is being raised (whilst in bin up latch mode) then the bin will lower to its rest position.

The bin down latch and release (Latch-Down) feature is always active. A short press and release of the "Bin Down" will cause it to lower to the bottom stop position. It can be interrupted by another press.

WARNING

If the “Bin Up” is pressed while the bin is lowering and:

- the Latch-Up mode is enabled, then the bin will be raised to the top stop.

- the Latch-Up mode is disabled, then the bin will stop moving.

Refer to the “i-Tip” button for more info on these and other features.

NOTE

The machine has been fitted with a solid state inclinometer. It can prevent tipping at various angles. This feature will have to be selected by the site engineer. If the bin is raised, the gear and speed of the machine will be limited.

i-Tip Button

The CDU as well as the LEDs will show the option being chosen, as this button is cycled.

Drive-Line Assist

This function makes the operators life easier and improves cycle times by automating many of the functions when tipping.

When the desired loction is reached for tippng to start and Driveline Assist is turned on, simply come to a halt and press the "Bin Up" button. The machine will automatically select neutral, apply the park brake and take the machine to the correct engine rev rate to raise the bin quickly and efficiently.

When the tipping has finished, simply select drive ("D") and apply pressure to the accelerator and press the "Bin Down" button. The machine will automatically release the park brake, start lowering the bin and proceed forward, controlling the speed at the required maximum rate until the bin is fully down.

Soft Stops

When you are not carrying sticky material in your dump body select Soft Stops. This softens the end stroke of the dump body lift cylinders and thus reduces wear & tear. Soft stops are the default setting.

Hard Stops

When you are carrying sticky material in your dump body select Hard Stops. This makes sure that the lift cylinders stop abruptly, while moving up at maximum power, ensuring that sticky material ejected.

Load Spreading

This function is only active if it is first enabled via the CDU (in Dealer mode). The spread rates are varied by controlling the machine and bin tip speed.

To cancel any of the i-Tip functions press the button until all the LEDs are off.

- **No LED’s On**
  Drive line Assist OFF and Hard Stops OFF (Manual tipping)
- **Left LED On**
  Drive line Assist OFF and Hard Stops ON
- **Left and Centre LED On**
  Drive line Assist ON and Hard Stops ON
- **Right LED On**
  Auto Load Spreading ON
- **Centre LED On**
  Drive line Assist ON and Hard Stops OFF

Load Spreading Selection

To activate the Load Spreading option the operator must hold in the SSM "i-Tip" switch. The Load Spreading option must be enabled on the CDU for this to work, if it is not enabled then holding in the "i-Tip" switch will result in a “Request Denied” pop-up on the CDU.

Select "Load Spreading" from *Machine Configuration / Productivity / Material Descriptions / Production* option choice.

The 3rd LED on the "i-Tip" switch will illuminate when the Load Spreading option is active.

The operator must select the load spreading rate as a value between 0 and 100 (with 100% being the

thickest spread) on the CDU 'Machine Config' - 'Prod Options' - 'Spread Rate'.

When the Load Spreading option is active then the Spread Limit, speed limit will automatically be active. The standard gear limitation with bin angle will not be functional if the Auto Load Spreading Function is active (when the Bin Up button is held down).

To de-activate the Load Spreading option the operator should either hold in the SSM "i-Tip" button or give it a short press. The 3rd LED will de-activate.

When the Load Spreading option is active and the operator is ready to spread the load then he should press the accelerator to 100% and hold the bin up button continuously. The machine will be limited to the spreading speed and the bin will lift at the pre-set rate.

These machine and bin-up speed limits are based on the load spreading rate value that the operator entered into the CDU. The load spreading rate is as follows:

- At 0%, to achieve the thinnest spread (approximately 0.1 m thick*), the vehicle speed will be set to 20 km/h.
- At 100%, to achieve the thickest spread (approximately 1 m thick*), the vehicle speed will be set to 7 km/h.

* Dependent upon the type of material being spread.

Bin Restriction and Load Selection

In the 'Machine Config' - 'Prod Options' - 'e-Bin' menu on the CDU, these features can be enabled or disabled.

If the Bin Restriction feature is enabled the bin will not raise above the bin angle value selected.

Dumping Prevention Safety Tip

The bin tip limitation is based on the inclinometer roll value and will inhibit activation based on rear chassis lateral roll angle.

The roll percentage warning limit can be selected via the CDU in service mode, this limit can be between 5% and 20% (default 10%).

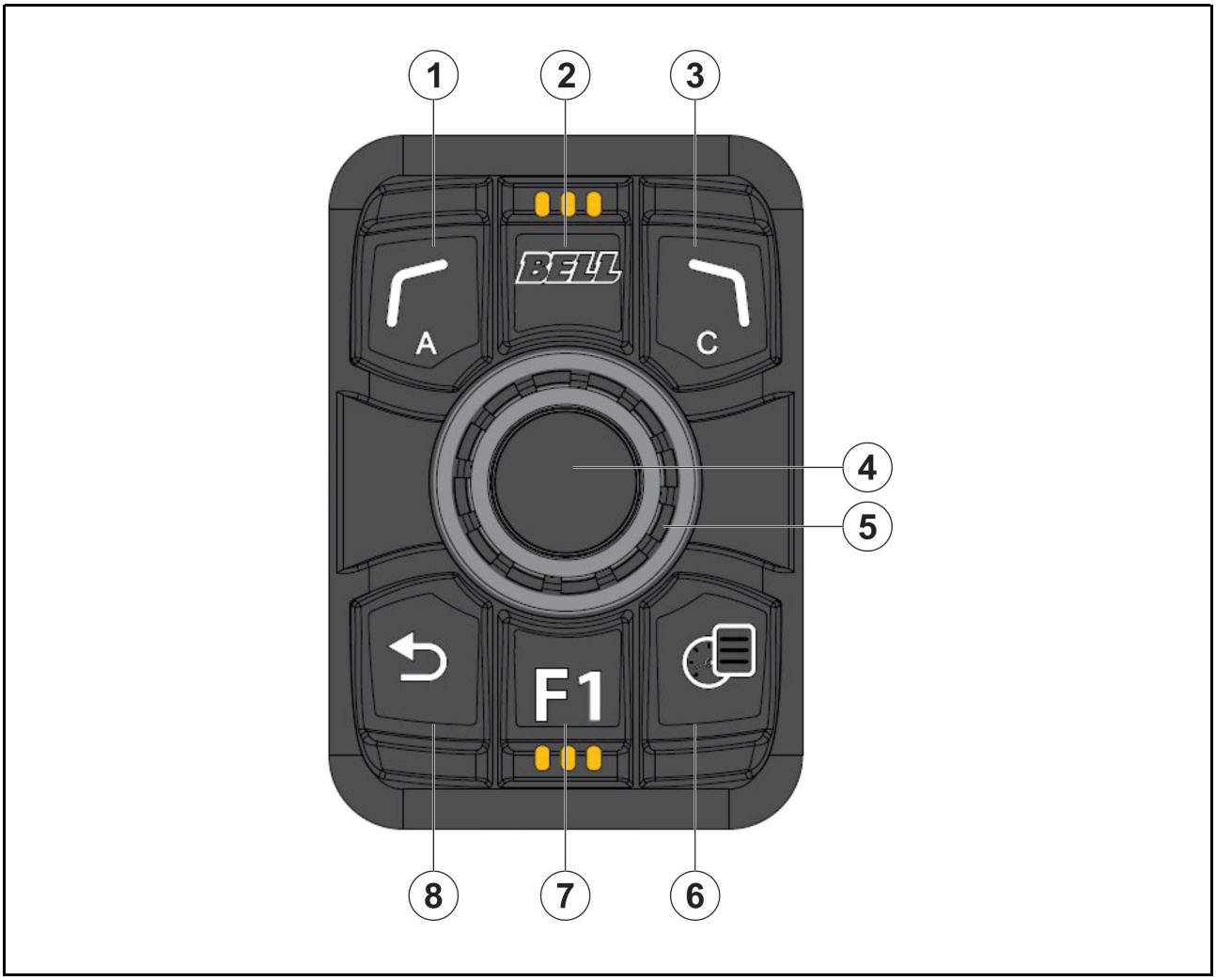
If the engine is running and the ground speed is less than 5 km/h then the following will happen:

1. If the roll percentage is above the unsafe limit -2% (min 4%) (either side of the machine) then the CDU screen will change to the machine roll screen.
2. If the roll percentage is above the unsafe limit then the machine roll screen will be displayed with a warning symbol.
3. If the roll percentage is above the unsafe limit and the bin limit on roll enabled option is selected then the following will happen:

- The bin-up solenoid will be disabled.
- An "Unsafe to Tip" pop-up will be displayed on the CDU if bin-up is requested.
- If drive-line assist is selected and bin-up is requested then the engine rpm will not be raised but Neutral and Park Brake will still be applied (as these will be expected by the operator).

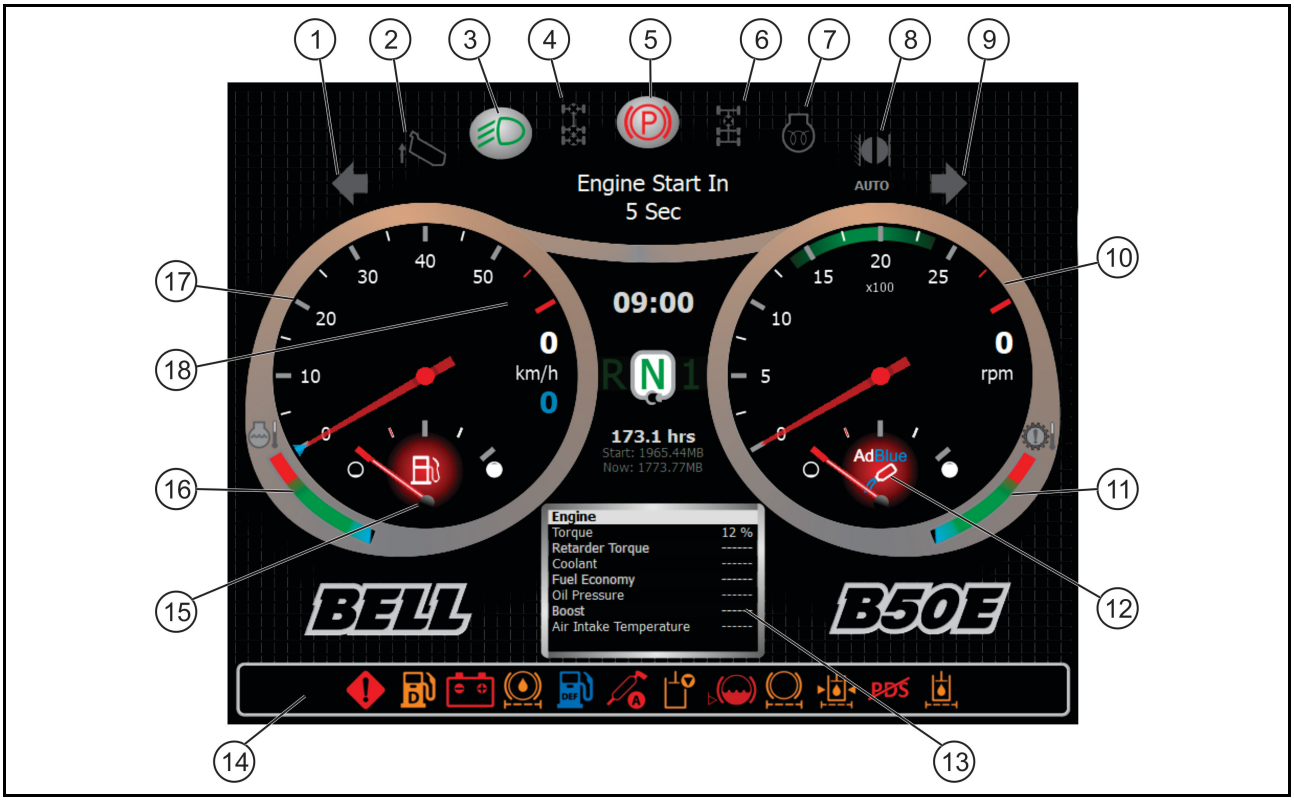
Sealed Display Controller (SDC)

The Sealed Display Controller (SDC) allows the operator or service personal to interact through different menus and options of the Machine, displayed by the CDU.



1	**Left Button** It is used to scroll down between pages on the different menus.	**5**	**Rotary Knob** This is used to increase or decrease values. It is also used to scroll through different sub-menus.
2	**Bell Button** This toggles the screen between the Diagnostics and Machine Configuration screen. Press and hold in Machine ID page for software update. Press and hold in main drive screen for factory/service mode.	**6**	**Menu Button** This toggles between the main menu and the main drive screen.
3	**Right Button** It is used to scroll up between pages on the different menus.	**7**	**F1 Button** Reserved for future use.
4	**Select Button** A single press of the Rotary Knob will select what is highlighted.	**8**	**Back Button** This button will navigate you to the previous menu/page.

Warning/Indicator Lights



NOTE

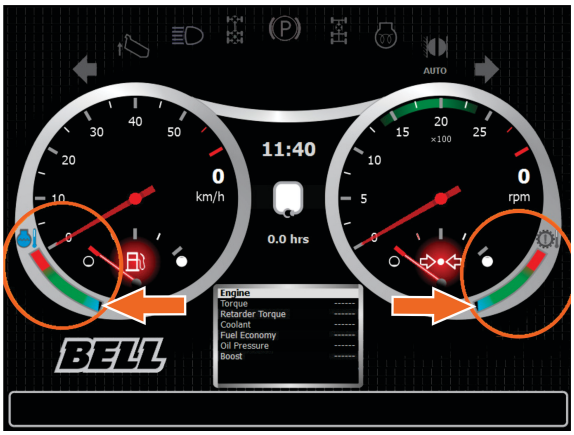
All warning lights on the CDU (Colour Display Unit) are illuminated for about 2 seconds when the ignition is switched on. This is done as a screen check procedure and the operator should ensure that the screen is operating correctly.

1	Left Turn Indicator Light	12	Pneumatic Pressure Level DEF / AdBlue® Level in Tank (Blu@dvantage Models)
2	Bin Raised Warning Light		
3	High Beam Indicator Light	13	Interactive Display Screen (IDS) The selection between various information screens can be done using the SDC.
4	Controlled Traction Differential Lock Light		
5	Park Brake Warning Light	14	Fault Warning Panel A text description for any warning light will be displayed in the IDS (13).
6	Inter Axle Differential Lock Light		
7	Cold Start Warning Light	15	Fuel Level in Tank
8	Retarder Light	16	Engine Coolant Temperature Gauge
9	Right Turn Indicator Light	17	Machine Travel Speed
10	Engine Speed (Rev Counter)	18	Speed Limit Indicator (Blue Triangle)
11	Transmission Oil Temperature Gauge		

Temperature Warning Level Gauges

There are two Temperature Warning Level Gauges, one on the right and one on the left of the CDU, as illustrated in the following figure.

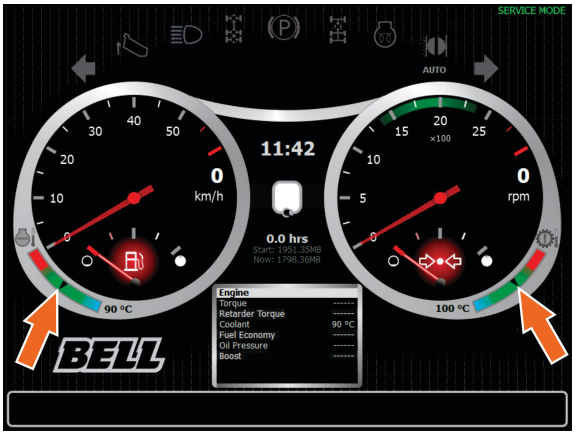
The gauge on the left of the CDU indicates the Engine Coolant temperature and the right gauge indicates the Transmission Oil temperature.



Gauges indicating the engine coolant and transmission oil temperature.

The Engine Coolant and Transmission Oil temperatures are displayed by the needle position in the gauge as illustrated in the following figure.

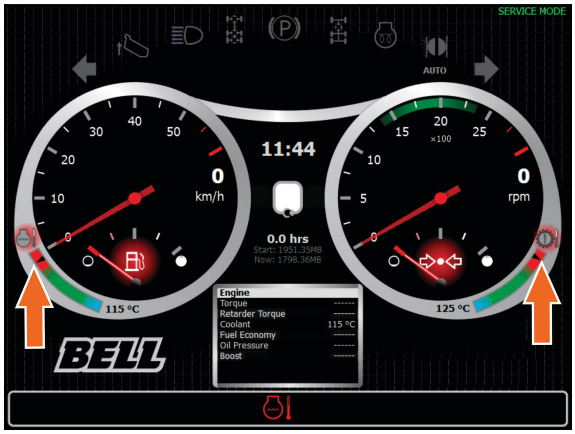
While in Service, Dealer or Factory mode, the temperature of the Engine Coolant and Transmission Oil will be displayed next to the gauge as seen in the following two figures.



Engine Coolant and Transmission Oil Optimum Temperature.

If the Engine Coolant temperature exceeds a critical value, the needle will move into the red portion of the gauge, the Engine Coolant Temperature symbol above the gauge will illuminate red and a red Engine Coolant Temperature Warning symbol will be displayed at the bottom of the CDU, as illustrated in the following figure, along with an alarm sounding.

Similarly, if the Transmission Oil Temperature exceeds a critical value, the needle will move into the red portion of the gauge and the Transmission Oil Temperature symbol above the gauge will illuminate red, as illustrated in the following figure, along with an alarm sounding.



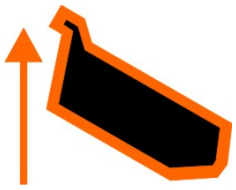
Engine Coolant and Transmission Oil Critical Temperature.

Left Turn Indicator Light

The left turn indicator light (1) will flash when the steering column switch is moved to indicate a left turn.

If the hazard switch is **ON** both direction indicators flash with the steering column switch in the **OFF** position. When the steering column switch is moved to the left turn position, the left hand side indicator lights will flash while the right hand side indicator lights will be **ON** continuously.

Bin Raised Warning Light



WARNING

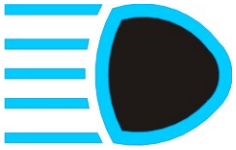
As a safety precaution it is recommended that the operator not drive the machine when the bin raised. The warning light (2) is illuminated as this may cause serious damage to the machine and/or injury to personnel.

Refer to the "i-Tip" Switch in this section for special instructions regarding driving the machine while the bin is raised. The bin raised warning light will illuminate when the bin is raised.

NOTE

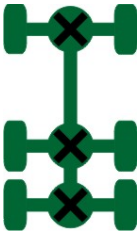
Gear restriction will occur while the bin is up.

High Beam Indicator Light



The high beam indicator light (3) illuminates when the high beam mode on the headlights is selected on the steering column switch

Control Traction Diff Lock Light



NOTE: Not Applicable to B18–30E.

Park Brake Warning Light

The park brake warning light illuminates when the park brake is applied and extinguishes when it is released.

Inter-Axle Diff Lock Light (ADTs Only)

CAUTION

Do not operate the machine on hard surfaces with the inter-axle differential lock engaged.

Damage to the drive train may result if this caution is not observed.

The inter-axle differential lock light (6) illuminates when the longitudinal differential lock is engaged.

To engage inter-axle differential lock, the IDL switch must be activated and the accelerator must be released briefly.

The machine can be moving at any speed.

Cold Start Warning Light

CAUTION

Do not start the engine until the cold start warning light (1) extinguishes.

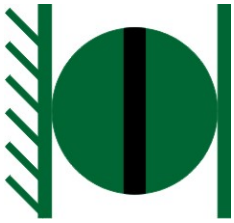
Damage to the engine could occur if this caution is ignored.

The cold start function is automatic.

When the ignition is switched on and the engine coolant temperature is below 15°C (59°F), the warning light illuminates.

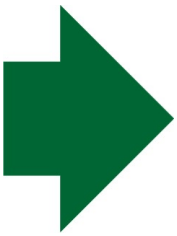
When it is safe to start the engine, the cold start warning light extinguishes.

Retarder Light



The retarder light (8) is activated when either the transmission retarder or engine retarder (Exhaust brake and/or Exhaust valve brake (EVB)) is activated.

Right Turn Indicator Light



The right turn indicator light (9) will flash when the steering column switch is moved to indicate a right turn.

If the hazard switch is **ON** both direction indicators flash with the steering column switch in the **OFF** position. When the steering column switch is moved to the right turn position, the right hand side indicator lights will flash while the left hand side indicator lights will be **ON** continuously.

Stop Engine Light

CAUTION

Continued operation of the machine with the Stop Engine Light activated will cause serious damage to the engine or transmission.

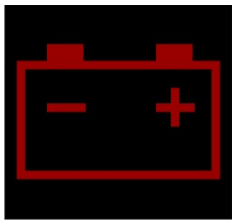
This indicator light indicates a serious malfunction in the engine system.

The engine's operating safety is at risk

- The machine must be stopped as soon as it is safe to do, when this light is active.
- Consult a qualified **BELL EQUIPMENT** approved specialist workshop.

A warning buzzer also sounds when the Stop Engine Light is active and the engine is running.

Battery Charge Warning Light



CAUTION

If the battery charge warning light illuminates, the fault must be rectified or the batteries will be discharged.

The warning light illuminates if the alternator is not charging the batteries or if the engine is not running and the ignition switch is ON.

The normal operating voltage is between 25.5V and 29.5V while the engine is running.

The balance between the two batteries is also monitored and if a difference of greater than 1.2V occurs, the battery light is illuminated.

This must be rectified immediately, or damage to both batteries will occur.

Check Engine Light

If a fault to the engine occurs the Check Engine Light will illuminate.

- Stop the machine as soon as it is safe.
- Check the fault codes and take the required action to rectify the fault.

This indicator light indicates an prohibited operating condition.

It indicates that one of the following systems is malfunctioning:

- Engine
- Engine Cooling
- Fuel Injection System
- Engine Management
- Exhaust Gas Aftertreatment
- Diesel Particulate Filter

If other indicator lights activate or flash, their combination must be taken into account when the cause is investigated.

Have the system checked at a qualified **BELL EQUIPMENT** approved specialist workshop.

Engine Air Filter Indicator Light

The Engine Air Filter Indicator Light illuminates when the air element is blocked and needs to be replaced.

Engine Over Speed Warning Light

CAUTION

If the engine over speed warning light illuminates, the engine speed must be reduced immediately, using the service brake as this over speed condition can cause serious damage to the engine and transmission.

When the engine speed reach 2 900 rpm, the EVB and transmission retarder will be activated.

As soon as the engine speed reaches 3 000 rpm, the engine over speed warning light illuminates and the buzzer sounds.

Low Engine Coolant Level Warning Light

CAUTION

If the Low Engine Coolant Level Warning Light activates, the machine must be stopped and the engine shut down immediately.

Engine damage may result if this caution is ignored.

When the engine coolant level is below the specified minimum, the low engine coolant level indicator will be shown on the Display.

Engine coolant should be added as soon as the Low Engine Coolant Level warning is displayed.

The Engine coolant tank is full when the coolant has reached the outlet.

Engine Oil Level Warning Light

CAUTION

If the Red Engine Oil Level Warning Light illuminates, the machine must be stopped and the engine shut down immediately.

Engine damage may result if this caution is ignored.

NOTE

The dipstick serves only to check whether there is oil in the engine.

The Engine Oil Level is measured before the engine is switched on. If the Engine Oil Level is out of safe operating levels, a warning symbol will be displayed as illustrated within the following table.

The colour of the warning symbol is dependent on the severity of the oil level; an amber symbol is used to illustrate the oil levels exceeding correct operating conditions while a red symbol along with a buzzer will be activated when the oil level is critically out of correct operating conditions.

Warning Symbol	 (Red) (Amber) (Red)	 (Amber) (Amber)	 (Amber) (Amber)	 (Red) (Amber) (Red)
Alarm Sound	Yes	No	No	Yes
Warning Description	**Engine Oil Level Critically Low**	**Engine Oil Level Low**	**Engine Oil Level High**	**Engine Oil Level Critically High**
Engine	**Oil deficit (litres)**		**Oil surplus (litres)**	
OM906LA Stage_2	6+	4 to 6	2 to 8	8+
OM926LA Stage_2	6+	4 to 6	2 to 8	8+
OM924LA EURO_3	6+	4 to 6	2 to 8	8+
OM501LA Stage_3A	6+	4 to 6	2 to 8	8+
OM926LA Stage_3B/Tier 4i	6+	4 to 6	2 to 8	8+
OM936LA Stage_4	6+	4 to 6	2 to 8	8+
OM471LA All	14+	5.5 to 14	2 to 8	3+
OM473LA All	14+	7 to 14	2 to 8	3+
OM934LA All	6+	4 to 6	2 to 8	8+

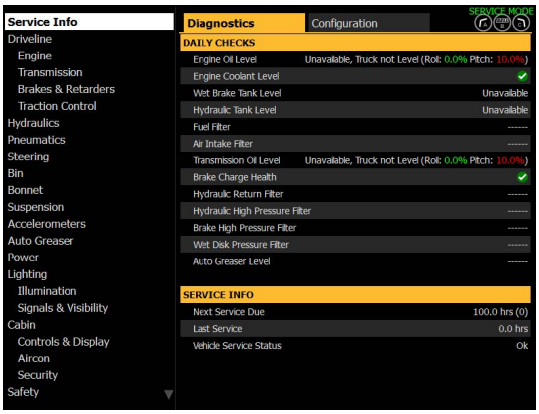
Conditions required for measuring the Engine Oil Level

1. The Engine must be off.

   There is a five minute delay before the Engine Oil Level will be displayed after the engine has been shut off or before it is started again.

2. The machine must be level.

   If the machine is not level, a message under the "Daily Checks" list will illustrate that the Engine Oil level reading is "Unavailable, Truck not level" as illustrated in following figure. The text illustrating the roll and pitch will be green when the conditions are acceptable and red when they are not acceptable.



Daily Checks Menu with a Pitch of 10%.

Action required

The status of the Engine Oil Level will be indicated by the correlating warning symbol. The arrow on the left of the symbol shows the status of the Engine Oil Level, i.e. if the Engine Oil Level is low, the arrow will be displayed on the bottom of the symbol and vice versa.

The exact quantity of oil required to be added or removed is displayed next to the engine oil level reading in the "Daily Checks Menu", when in Service, Dealer or Factory Mode, as illustrated in the following figure. (This option is not available for Stage III (B) and older)

Daily Checks Menu illustrating the Engine Oil required.

Hydraulic Oil Level Warning Light

CAUTION

If the Red Hydraulic Oil Level Warning Light illuminates, the machine must be stopped as soon as it is safe to do so. If the oil level is critical the engine should be shut down immediately.

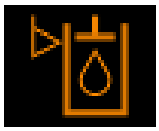
Machine damage may result if this caution is ignored.

Warnings were added to indicate when the oil levels in the Hydraulic tank on the machines are not within correct operating conditions. The warning level senders take into account the following parameters when measuring the oil level on the machine to ensure accurate readings:

1. The machine's pitch and roll measurements to compensate for oil movement due to not being level.
2. The temperature of the oil as measured by a temperature sender positioned close to the level sender.
3. The depth of the oil as measured by a level sender.

If any of these parameters is incorrect, the oil level measurement will also be incorrect.

Explanations for the Hydraulic Oil warnings are located in the following table. Additionally an “X” symbol will be displayed next to the Hydraulic tank level located in the "Daily Checks" menu when the level is not within correct operating conditions.

Warning Condition	Symbol on CDU	Alarm Sound	Cause
Hydraulic Oil Level High	 (Amber)	No	There is a surplus of 30 or more litres of oil in the Hydraulic tank.
Hydraulic Oil Level Low	 (Amber)	No	There is a deficit of 20 to 40 litres of oil in the Hydraulic tank.
Hydraulic Oil Level Critically Low	 (Red)	Yes	There is a deficit of 40 or more litres of oil in the Hydraulic tank.

NOTE

Lifting the bin will disable the hydraulic oil level warning.

Corrective Actions

The status of the Hydraulic tank oil level will be displayed by the correlating warning symbol. The arrow on the left of the symbol shows the status of the oil level, i.e. if the oil level is low the arrow will be displayed on the bottom of the symbol and vice versa.

The exact quantity of oil required to be added or removed is displayed next to the hydraulic tank oil level reading in the "Daily Checks Menu", when in Service, Dealer or Factory Mode, as illustrated in the following figure.

Daily Checks Menu illustrating the quantity of oil required in the WDB and Hydraulic tank.

Diagnostics

When diagnosing a faulty oil level measurement, it is imperative that the first thing to do is to check that all 3 of these level measurements is correct. To do this, it is important to diagnose the oil level when the machine is in the following state:

1. The machine is parked on a dead level.
2. The engine is not running.

Diagnosing the Pitch and Roll Measurements

Once the machine is on dead level ground and you go to the wet disk brake or hydraulic level diagnostics in service mode, then the pitch and roll displayed with the measurement must each be very close to 0%. If it is not, then either the ground is not as level as it seems, or the accelerometers need to be zeroed. Make sure that the pitch and roll as reported on the CDU is as close to 0% as possible while parked on level ground with the engine not running. Do not proceed with diagnosing the system until this has been achieved.

Diagnosing the Hydraulic Tank or Wet Disk Tank Oil Temperature

Each oil has its own tank temperature. The temperature is used to compensate for the oil expansion and contraction as it heats and cools. If the machine is cold and has been standing for several hours, then both tank temperatures should be close to ambient.

1. Unplug the wet tank temperature sender and make sure that wet tank temperature on the CDU shows an error. Plug it back in.
2. Unplug the hydraulic tank temperature sender and make sure that hydraulic tank temperature on the CDU shows an error. Plug it back in.

Once these 2 points are covered, you will know that the tank temperature senders are plugged in the correct place and responding to being unplugged. If you have a means of verifying the temperature of each tank (with an infrared heat gun or something similar), do so and compare with the temperature values on the CDU. If they are very different, then the sensor or harness needs to be repaired.

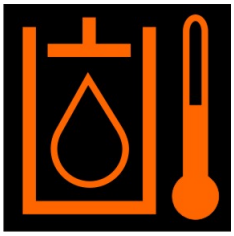
Diagnosing the Hydraulic Tank or Wet Disk Tank Oil Level Sender

The first step in diagnosing the oil level senders is to make sure the harness has been plugged in correctly:

1. Unplug the wet tank level sender (the level sender closest to the bonnet) and make sure that wet tank level on the CDU shows an error. The volt reading will be between 4500 - 5000 mV. Plug it back in.
2. Unplug the hydraulic tank level sender (the level sender closest to the cab) and make sure that hydraulic tank level on the CDU shows an error. The volt reading will be between 4500 - 5000 mV. Plug it back in.

Once these 2 points are covered, you will know that the tank level senders are plugged in the correct place and responding to being unplugged.

High Hydraulic Fluid Temperature Warning Light



CAUTION

If the high hydraulic fluid temperature warning light activates, the machine must be stopped immediately.

The high hydraulic fluid temperature warning light activates when the hydraulic fluid temperature exceeds 95°C/100°C (203°F/212°F)

If overheating occurs stop the machine, engage neutral and allow the engine to run at 1 500 rpm. until the hydraulic temperature returns to normal temperature and the warning light de-activates.

Check the fluid levels.

The main warning light and the warning buzzer are also activated with the high hydraulic fluid temperature warning light.

Transmission Oil Level Warning Light

Transmission Oil Level Warnings were created for Allison Transmissions found in the E# machines. These warnings are illustrated and explained in the following table.

CAUTION

If the Red Transmission Oil Level Warning Light illuminates, the machine must be stopped and the engine shut down immediately.

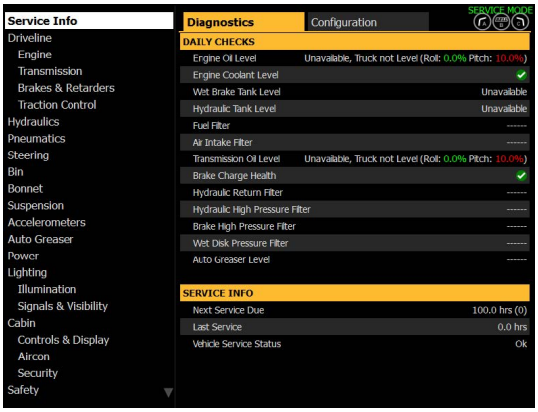
Transmission damage may result if this caution is ignored.

Warning Condition	Symbol on CDU	Alarm Sound	Cause
Oil Level Critically Low	 (Red)	Yes	The oil level is four litres or more below the required level.
Oil Level Low	 (Amber)	No	The oil level is three litres to four below the required level.
Oil Level High	 (Amber)	No	The oil level is two to three litres above the required level.
Oil Level Critically High	 (Red)	Yes	The oil level is three or more litres above the required level.

Conditions required for measuring the Transmission Oil Level.

1. The machine must be level.

   If the machine is not level, a message under the “Daily Checks Menu” will indicate that the Transmission Oil level reading is “Unavailable, Truck not level” as illustrated in the following figure. The text indicating the roll and pitch will be green when the conditions are acceptable and red when they are not acceptable.



Daily Checks Menu with a Pitch of 10%.

2. The Engine must be running.

   After starting the engine, the transmission oil level reading will take 120 seconds to populate. While the transmission oil level reading is being populated, the transmission oil level reading

under the “Daily Checks Menu” will display “Busy Measuring.”

3. The machine must be stationary.

   If the machine is moving, the transmission oil level reading under “Daily Checks Menu” will display, “Unavailable, Machine moving.”

4. The machine must be in neutral.

   If the machine is not in neutral, the transmission oil level reading under “Daily Checks Menu” will display, “Unavailable, Requires Neutral.”

5. The Transmission Oil Temperature must be above 40°C.

   If the transmission oil temperature is below 40° C, the transmission oil level reading under “Daily Checks” will display, “Unavailable, Oil too Cold” along with the current temperature of the transmission oil.

6. The Engine Speed should not be too high or low.

   If the engine speed is outside of the set parameters, a message displaying, “Unavailable, Engine Speed Too High” or “Unavailable, Engine Speed Too Low” will be displayed.

Corrective actions

The status of the transmission oil level will be indicated by the arrow on the left of the transmission oil level warning symbol. If the transmission oil level is low the arrow will be displayed on the bottom of the symbol and vice versa. The exact quantity of oil required to be added or removed is illustrated next to the transmission oil level reading in the “Daily Checks Menu,” when in Service, Dealer or Factory Mode, as illustrated in following figure.

Transmission Oil Level indicating the required quantity of oil to be added.

Transmission Fault Warning Light

CAUTION

If the transmission fault warning light illuminates, the machine must be stopped immediately using only the service brake and NOT the gear shift control.

CAUTION

For some problems, diagnostic codes may be registered without the ECU activating the DNS warning light.

Whenever there is a transmission related concern, consult BELL EQUIPMENT Product Support.

The electronic control system is programmed to inform the operator of a problem with the transmission system and automatically take action to protect the operator, machine and transmission.

When the Transmission Control Unit (**TCU**) detects a “Do Not Shift” (**DNS**) condition, the **ECU** restricts shifting, turns on the **DNS** warning light and registers a diagnostic code.

Wet Disk Brake Oil Level Warning Light

CAUTION

If the Wet Disk Brake Oil Level Warning Light illuminates, the machine must be stopped and the engine shut down immediately.

Warnings were added to indicate when the oil levels in the Wet Disk Brake tank on the machines are not within correct operating conditions. The warning level senders take into account the following parameters when measuring the oil level on the machine to ensure accurate readings:

1. The machine's pitch and roll measurements to compensate for oil movement due to not being level.
2. The temperature of the oil as measured by a temperature sender positioned close to the level sender.
3. The depth of the oil as measured by a level sender.

If any of these parameters is incorrect, the oil level measurement will also be incorrect.

Explanations for the Wet Disk Brake Oil warnings are located in the following table. Additionally an “X” symbol will be displayed next to the Wet Disk Brake tank level located in the "Daily Checks" menu when the level is not within correct operating conditions.

Warning Condition	Symbol on CDU	Alarm Sound	Cause
Wet Disk Brake Oil Level High	 (Amber)	No	There is a surplus of 20 or more litres of oil in the WDB tank.
Wet Disk Brake Oil Level Low	 (Amber)	No	There is a deficit of 20 to 40 litres of oil in the WDB tank.
Wet Disk Brake Oil Level Critically Low	 (Red)	Yes	There is a deficit of 40 or more litres of oil in the WDB tank.

Corrective Actions

The status of the wet disk brake tank oil level will be displayed by the correlating warning symbol. The arrow on the left of the symbol shows the status of the oil level, i.e. if the oil level is low the arrow will be displayed on the bottom of the symbol and vice versa.

The exact quantity of oil required to be added or removed is displayed next to the hydraulic or wet brake tank oil level reading in the "Daily Checks Menu", when in Service, Dealer or Factory Mode, as illustrated in the following figure.

Daily Checks Menu illustrating the quantity of oil required in the WDB and hydraulic tank.

Diagnostics

When diagnosing a faulty oil level measurement, it is imperative that the first thing to do is to check that all 3 of these level measurements is correct. To do this, it is important to diagnose the oil level when the machine is in the following state:

1. The machine is parked on a dead level.
2. The engine is not running.

Diagnosing the Pitch and Roll Measurements

Once the machine is on dead level ground and you go to the wet disk brake or hydraulic level diagnostics in service mode, then the pitch and roll displayed with the measurement must each be very close to 0%. If it is not, then either the ground is not as level as it seems, or the accelerometers need to be zeroed. Make sure that the pitch and roll as reported on the CDU is as close to 0% as possible while parked on level ground with the engine not running. Do not proceed with diagnosing the system until this has been achieved.

Diagnosing the Hydraulic Tank or Wet Disk Tank Oil Temperature

Each oil has its own tank temperature. The temperature is used to compensate for the oil expansion and contraction as it heats and cools. If the machine is cold and has been standing for several hours, then both tank temperatures should be close to ambient.

1. Unplug the wet tank temperature sender and make sure that wet tank temperature on the CDU shows an error. Plug it back in.
2. Unplug the hydraulic tank temperature sender and make sure that hydraulic tank temperature on the CDU shows an error. Plug it back in.

Once these 2 points are covered, you will know that the tank temperature senders are plugged in the correct place and responding to being unplugged. If you have a means of verifying the temperature of each tank (with an infrared heat gun or something similar), do so and compare with the temperature values on the CDU. If they are very different, then the sensor or harness needs to be repaired.

Diagnosing the Hydraulic Tank or Wet Disk Tank Oil Level Sender

The first step in diagnosing the oil level senders is to make sure the harness has been plugged in correctly:

1. Unplug the wet tank level sender (the level sender closest to the bonnet) and make sure that wet tank level on the CDU shows an error. The volt reading will be between 4500 - 5000 mV. Plug it back in.
2. Unplug the hydraulic tank level sender (the level sender closest to the cab) and make sure that hydraulic tank level on the CDU shows an error. The volt reading will be between 4500 - 5000 mV. Plug it back in.

Once these 2 points are covered, you will know that the tank level senders are plugged in the correct place and responding to being unplugged.

Wet Disk Brake Temperature Warning Light

The brake temperature warning light will illuminate if the wet disc brakes oil temperature is too high.

Brake Pressure Warning Light

WARNING

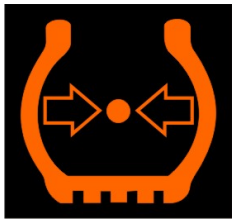
If the brake system pressure is low, the brake pressure warning light activates and the machine must be stopped immediately.

Machine damage and/or personal injury, perhaps fatal, may result if this warning is ignored.

The light activates if the brake system's hydraulic pressure drops below 123 bar (1 784 psi).

The main warning light and the warning buzzer are also activated with the brake system low pressure warning light.

Tyre Pressure Indicator Light (If Equipped)



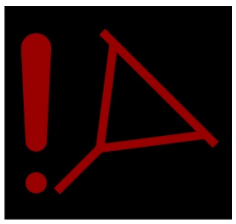
The tyre pressure indicator light will be activated when the pressure in one or more Tyres drops below the minimum specification.

If there is a moderate pressure problem (first level threshold of 15% exceeded), the tyre pressure indicator light will flash.

If there is a sudden loss of pressure (second level threshold of 20% exceeded), the tyre pressure indicator light will illuminate and the buzzer will sound.

A fault code will be generated and displayed in the active fault code menu on the CDU. Refer also to CDU-Daily Checks screen.

Emergency Steering Warning Light



WARNING

If the emergency steering warning light activates, the machine must be steered to safety as soon as possible and then stopped.

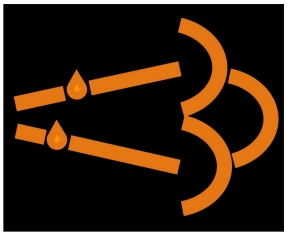
The emergency steering warning light activates if there is an engine or main hydraulic pump failure and the emergency steering is activated.

The main warning light and the warning buzzer are also activated with the emergency steering warning light.

Torque Limiter Active (LIM)

Torque Limiter Active (LIM) warning light will illuminate when Engine Torque output of the machine is being limited. (Refer to the DEF & LIM Warning Light Trigger & Detection) Table on the next page.

DEF (Diesel Exhaust Fluid) - AdBlue Warning



The AdBlue warning light will illuminate when the level of AdBlue in the tank has reached low level or the quality of the AdBlue is inferior. (Refer to the table in "DEF & LIM Warning Light Trigger & Detection" section)

AdBlue / DEF Low Level Warning Light

AdBlue / DEF Low Level Warning light will illuminate and flash when the AdBlue/ DEF level in the tank is < 14%.

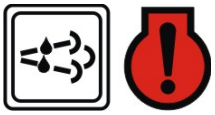
DEF & LIM Trigger & Detection

Emission related warnings and failures lead to indicator signals and torque reduction of the engine. Inducement is a mandatory process required if NOx emissions exceed a certain threshold.

Events which effect NOx emissions are therefore primary factors for an inducement strategy:

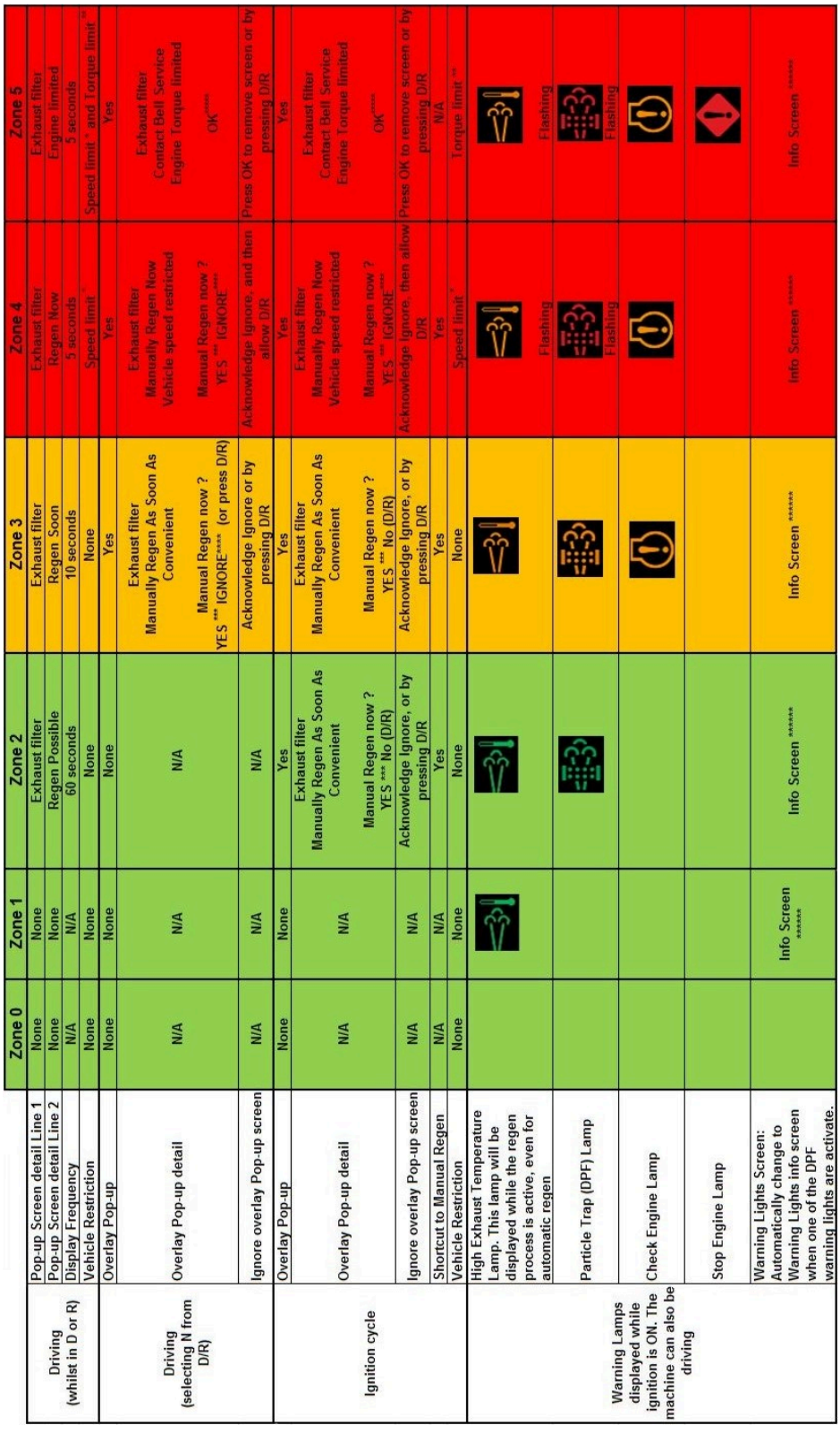
- DEF Tank Level
- DEF Quality
- NOx Monitoring System
- Dosing Interruption or Tampering

Certain values are monitored and if the appointed thresholds are violated, the inducement takes place. These results in a reduced maximum engine torque/speed and besides this, several different indicator lamps are activated to inform the driver about the changed vehicle status. The different indication lamps are provided as followed:

Tampering & Incorrect AdBlue / DEF Quality	Symbol Displayed on CDU	System Reaction / Response
Trigger: Detection • Disconnect Tank Level Sensor • Disconnect AdBlue Dosing Line or Valve • Blocked AdBlue Dosing Line or Valve • Disconnect AdBlue Dosing Pump • Disconnect SCR Wiring Harness • Disconnect NOx Sensor • Disconnect AdBlue Temperature Sensor • Disconnect Exhaust Temperature Sensor		AdBlue Warning ON
60 Min after trigger		AdBlue Warning - Flashing Engine Warning Light - ON **LIM Warning - ON**
150 Min after trigger		AdBlue Warning - Flashing Engine Warning Light - ON At torque > 50% - LIM Warn - ON At torque < 50% - **LIM Warning - Flashing**

230min after trigger		DEF Lamp flashing LIM Lamp flashing AWL solid Stop Engine Lamp solid Maximum available engine torque is reduced to 20% of peak torque and maximum speed is reduced idle speed
240min after trigger		DEF Lamp flashing LIM Lamp flashing AWL solid Stop Engine Lamp flashing Maximum available engine torque is reduced to 20% of peak torque and maximum speed is reduced idle speed

Stage V DPF (Diesel Particulate Filter) Zone Restrictions, Info and Actions



		Zone 0	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Driving (whilst in D or R)	Pop-up Screen detail Line 1	None	None	Exhaust filter	Exhaust filter	Exhaust filter	Exhaust filter
	Pop-up Screen detail Line 2	None	None	Regen Possible	Regen Soon	Regen Now	Engine limited
	Display Frequency	N/A	N/A	60 seconds	10 seconds	5 seconds	5 seconds
	Vehicle Restriction	None	None	None	None	Speed limit *	Speed limit * and Torque limit **
Driving (selecting N from D/R)	Overlay Pop-up	None	None	None	Yes	Yes	Yes
	Overlay Pop-up detail	N/A	N/A	N/A	Exhaust filter Manually Regen As Soon As Convenient Manual Regen now ? YES *** IGNORE**** (or press D/R)	Exhaust filter Manually Regen Now Vehicle speed restricted Manual Regen now ? YES *** IGNORE****	Exhaust filter Contact Bell Service Engine Torque limited OK****
	Ignore overlay Pop-up screen	N/A	N/A	N/A	Acknowledge Ignore or by pressing D/R	Acknowledge Ignore, and then allow D/R	Press OK to remove screen or by pressing D/R
Ignition cycle	Overlay Pop-up	None	None	Yes	Yes	Yes	Yes
	Overlay Pop-up detail	N/A	N/A	Exhaust filter Manually Regen As Soon As Convenient Manual Regen now ? YES *** No (D/R)	Exhaust filter Manually Regen As Soon As Convenient Manual Regen now ? YES *** No (D/R)	Exhaust filter Manually Regen Now Vehicle speed restricted Manual Regen now ? YES *** IGNORE****	Exhaust filter Contact Bell Service Engine Torque limited OK****
	Ignore overlay Pop-up screen	N/A	N/A	Acknowledge Ignore, or by pressing D/R	Acknowledge Ignore, or by pressing D/R	Acknowledge Ignore, then allow D/R	Press OK to remove screen or by pressing D/R
	Shortcut to Manual Regen	N/A	N/A	Yes	Yes	Yes	N/A
	Vehicle Restriction	None	None	None	None	Speed limit *	Torque limit **
Warning Lamps displayed while ignition is ON. The machine can also be driving	High Exhaust Temperature Lamp. This lamp will be displayed while the regen process is active, even for automatic regen					Flashing	Flashing
	Particle Trap (DPF) Lamp					Flashing	Flashing
	Check Engine Lamp						
	Stop Engine Lamp						
	Warning Lights Screen: Automatically change to Warning Lights info screen when one of the DPF warning lights are activate.		Info Screen ******	Info Screen *******	Info Screen *******	Info Screen ******	Info Screen ******

Speed limit *	Enable Option (Factory Mode), default on	Speed limit value settable from 5 km/h, 10 km/h or 15 km/h, (Factory Mode) Factory Default 15 km/h
Torque limit **	Daimler limit - not settable	
YES ***	Selecting YES (SDC press centre knob) sets vehicle up for Manual Regen Process and commences Normal Manual Regen process	
IGNORE****	Allows D/R (within restrictions), records IGNORE selected by operator	
OK*****	Allows D/R selected by operator	
Info Screen ******	Once the screen is displayed, the operator can then select an alternative screen. If one of the DPF lights activate again, it will jump back to the Warning Lights screen	

Manual Active (High Idle) Regeneration

INTRODUCTION

Bell Equipment Machines with Tier4/Stage V engines are fitted with an aftertreatment system to satisfy emissions regulations. The aftertreatment system is part of the engine and is controlled by the engine ECUs. To avoid premature replacement of the Diesel Particulate Filter (DPF), which is part of the aftertreatment system, the accumulated soot in the filter is converted to ash by means of a process called regeneration.

There are three different types of regeneration:

- Automatic Passive regeneration (physical/ chemical process)
- Automatic Active regeneration (while driving)
- Manual Active regeneration when at a standstill (High Idle Regeneration)

Passive and Active Automatic regenerations are automatically initiated by the engine, while Manual Active is initiated by an operator either via a diagnostic tool provided by the engine manufacturers or via the Color Display Unit (CDU).

While the machine is in operation, soot gathers on the filter depending on machine load and driving cycles. The soot load on the filter will determine which regeneration process should take place. This soot load is indicated in zones from zero to five. Zero means very little soot load and five means very high soot load. **Manual Active Regeneration** is usually possible from Zone 2 up to Zone 4. If the DPF soot load reaches Zone 5, **Manual Active Regeneration** can only be performed via the diagnostic tool, provided the DPF is not already overloaded.

There is process called HC Burn-off which is also requested by the engine in relation to the aftertreatment system and it's activated by initiating Manual Active Regeneration. HC Burn-off is required in the event of unburnt fuel (HC) accumulating in the aftertreatment system due to excessive idling conditions. If no measures are taken to clean this un-burnt fuel, there is risk of spontaneous combustion and will cause the exhaust aftertreatment system to overheat.

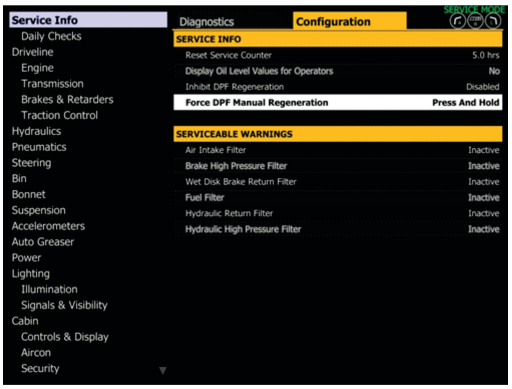
To avoid such a conditions, the CDU will notify the operator to do a Manual Active Regeneration if the soot level reaches Zone two or if a HC Burn-off is required and will continue to notify/warn until a Manual Regeneration process is initiated by the operator.

The following procedure describes how the CDU notifies/warns the operator and how the operator can manually initiate the Active Regeneration or HC Burn-off process when requested by the engine.

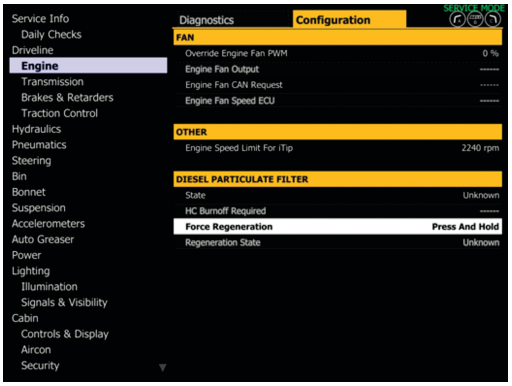
STARTING MANUAL REGENERATION PROCESS

On the CDU, there are two ways to initiate the Manual Active Regeneration Process.

1. Activating from the Menu's without any prompts. This requires the CDU to be in Service mode or above. There are two places in the Menus, where this option is available.
   - Service Info → Configuration → Force DPF Manual Regeneration



   - Engine → Configuration → Force Regeneration.



2. Activating from the Drive screen after a prompt/ notification. This method is available in all modes. When the soot levels are in Zone 2 and above the prompt or notify the operator to start the manual active regeneration process.
   - The prompts happen on ignition ON or when there is gear change to neutral when stationery.

- The notifications happen when the machine is moving and in gear other than neutral.

The prompts will allow the operator to select to start the manual active regeneration process or defer it for later. The notifications will appear when moving but will not give the operator the option to start the manual active regeneration until they are stationery.

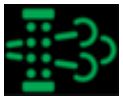
Prompts and notifications depend on the state of the machine whether its moving or stationery.

In addition to prompts and notifications, the engine will also bring up DPF warning lights warning the operator to initiate manual active regeneration when the soot zone is two and above.

PROMPTS AND WARNING LIGHTS

Next are different prompts and warning lights shown on the drive screen depending on the soot zone and when HC burn-off is required.

Zone 2 Drive Screen Prompt



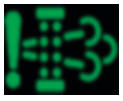
Zone 2 Soot High Warning Light

Zone 3 Drive Screen Prompt

Zone 3 Soot Very High Warning Light

Zone 4 Drive Screen Prompt

Zone 4 Soot Load Critical Warning Light



Zone 4 Vehicle Speed Restricted Warning Light

NOTE

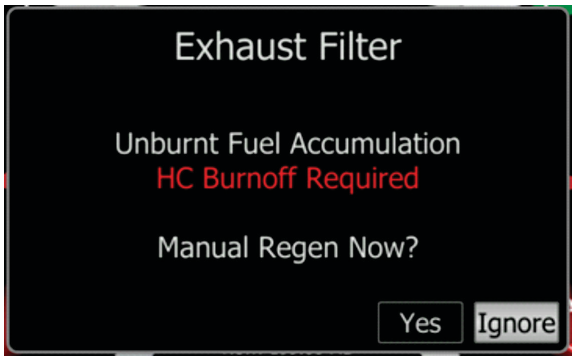
The vehicle speed is limited to a maximum of 10km/h, hence the “Vehicle Speed Restricted” message on the prompt.

Zone 5 Drive Screen Prompt

Zone 5 Soot Load Too High Warning Light

NOTE

In Zone 5 the engine will limit the torque and manual active regeneration will not be possible without enabling it from the diagnostic tool supplied by the engine manufacturers. The machine should be parked immediately and should only be operated when the soot load has been cleared or the DPF filter has been replaced.



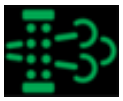
HC Burn-Off Required Drive Screen Prompt

Pops up when the engine requests a manual active regeneration process to be initiated, so it can perform HC burn-off.

NOTIFICATIONS AND WARNING LIGHTS

Next periodic notifications that are displayed to the operator while the machine is moving and not stationery.

Zone 2 Drive Screen Notification



Zone 2 Soot High Warning Light

Zone 3 Drive Screen Notification

Zone 3 Soot Very High Warning Light

Zone 4 Drive Screen Notification

Zone 5 Soot Load Too High Warning Light

Zone 5 Drive Screen Notification

Zone 5 Soot Load Too High Warning Light

MANUAL ACTIVE REGENERATION PROCESS SCREEN

When the active regeneration process is either started from the menu or from the drive screen prompt, the CDU will bring up the manual active regeneration screen. This particular screen inform the operator on the state of active regeneration screen as well as errors if any.

From the CDU's perspective, the manual active regeneration process consists of four stages:

1. Checking active regeneration prerequisites.
2. Requesting the engine to start the actual active regeneration process.
3. Notifying the state of the actual active regeneration process to the operator in terms of time remaining if the engine supports it, while the regeneration process is underway.
4. Reporting whether the process was successfully completed or there was a problem.

On this screen, they will be a message displayed on how to cancel the process altogether using the SDC.

Additional information will be shown at the bottom to show the state of machine such as the fuel and Adblue remaining, battery state, machine hours, aftertreatment system temperatures and the engine RPM.

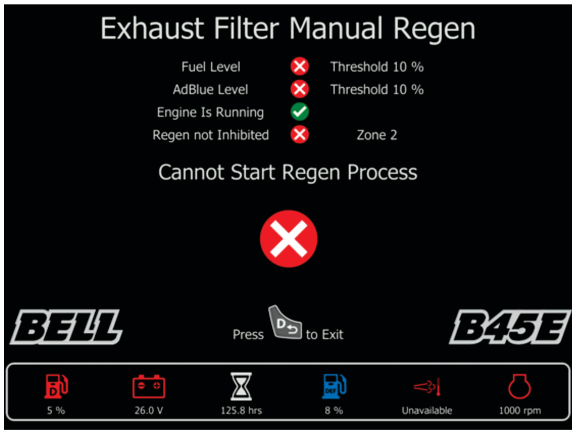
The operator will not be able to go back to the drive screen until the active regeneration is completed or cancelled. In Service Mode, the operator can navigate to the menus.

Checking Active Regeneration Prerequisites

Immediately after starting manual active regeneration, the CDU will check the following prerequisites if they are in the required states before requesting a manual active regeneration from the engine.

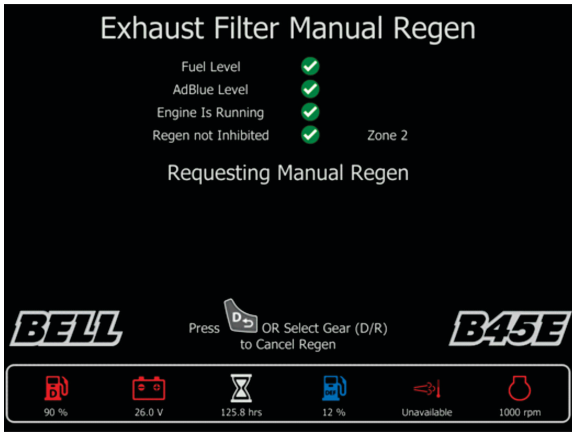
- Fuel Level. (The fuel level should be 10% and above.)
- AdBlue Level. (The AdBlue level should be 10% and above.)
- Engine should be running.
- Engine should not be indicating that active regeneration is inhibited. There are approximately 14 reasons why active regeneration can be inhibited by the engine and these can be found in the menus under the Engine → Diagnostics menu. They should all be in the OFF state for the engine to accept the CDU request to start manual active regeneration process.

Next is an example of a screen where the CDU will not request manual active regeneration from the engine. The process will not continue, and the operator is asked to press the D button on the SDC to go back to the drive screen.

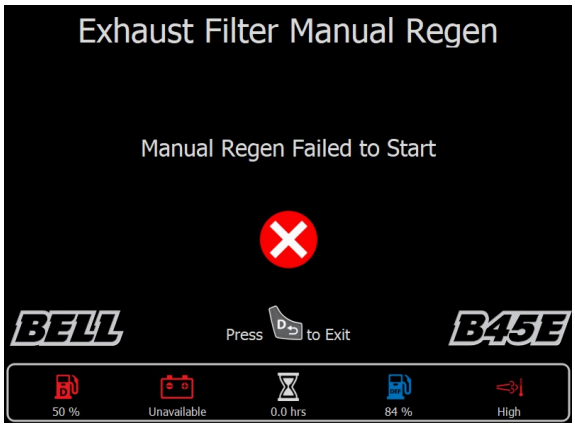


Requesting Manual Active Regeneration from the Engine

The Manual Active Regeneration process is controlled by the engine controllers and the CDU has no control of the process except for requesting and cancelling. If all the prerequisites are in the required states, the CDU will request the manual active regeneration to start. The CDU will indicate that it is requesting the process to start as shown by the next image.

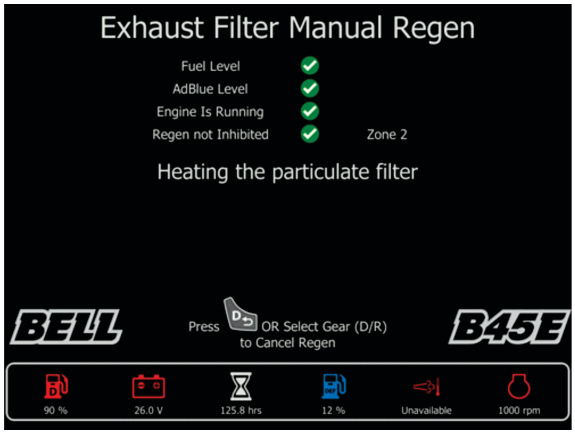


If the process fails to start or the engine controllers do not respond within 10 seconds the CDU will indicate that the process failed to start. The operator will be asked to press D button to go back to the drive screen.

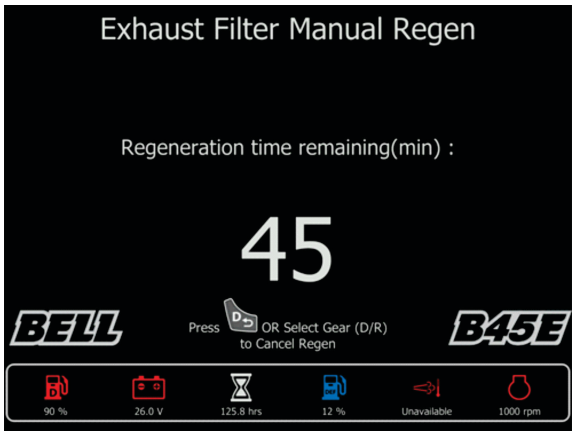


Manual Active Regeneration Process Activated

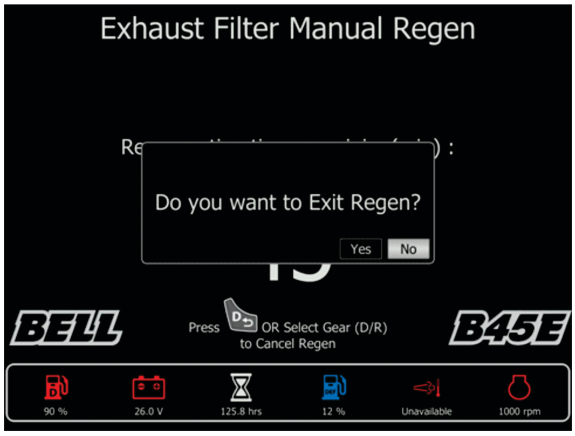
If the request is successful, the engine will start the active regeneration process by heating the filter to get it to the require temperature. The process of removing the soot will start when the required temperature has been reached. The CDU will show the heating stage if the engine supports the messages indicating the heating stage, otherwise it will skip this stage.



When the filter has reached the required temperature, the engine will start cleaning the filter. Some engines will indicate how long the process takes and some do not. The process usually takes between 30 to 45 minutes. For engines which indicate the CDU will display the time remaining as follows.

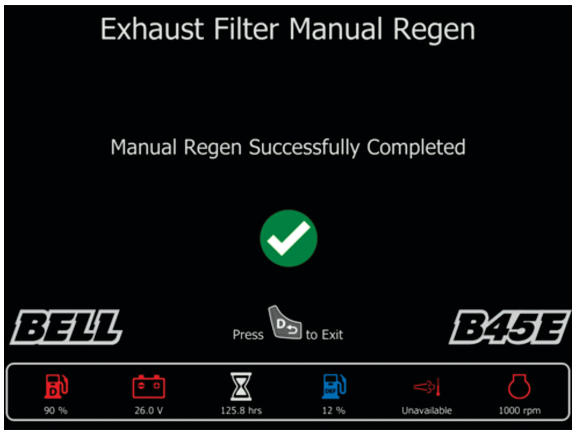


The operator can cancel the process by pressing the D button on the SDC as indicated on the screen. If the D button is pressed to cancel the process, a dialog prompt is brought up to confirm the cancellation. The operator can use the SDC scrolling function to select YES or NO. The current choice is indicated by a grey background on the YES or NO buttons. The operator can confirm their choice by pressing the SDC center button.



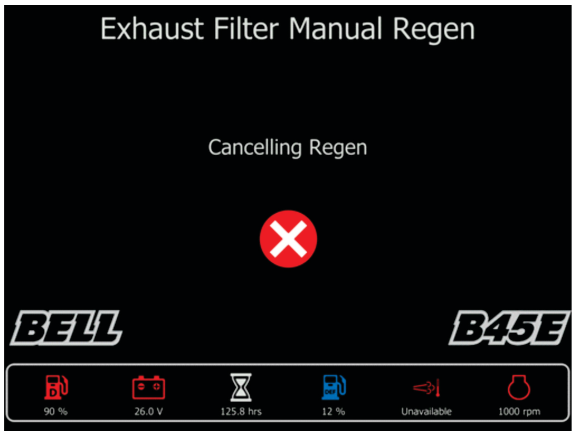
Manual Active Regeneration Process Completed

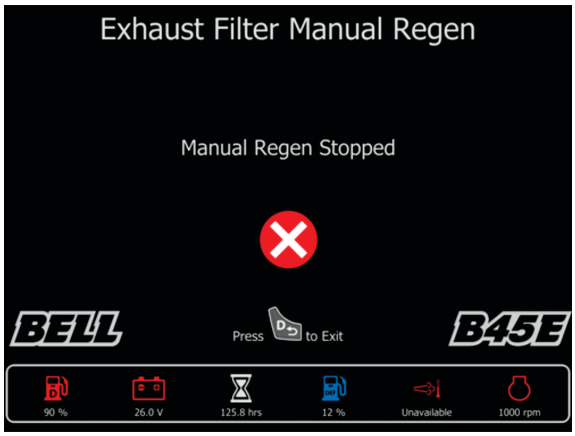
The process can be completed successfully, or it can fail depending on several reasons. If there were no errors and the filter was cleaned successfully, the CDU will show a successfully completed message. Refer to next.



If the operator cancels the process, the CDU will request cancelling the process and will wait for the engine to confirm that the process is cancelled.

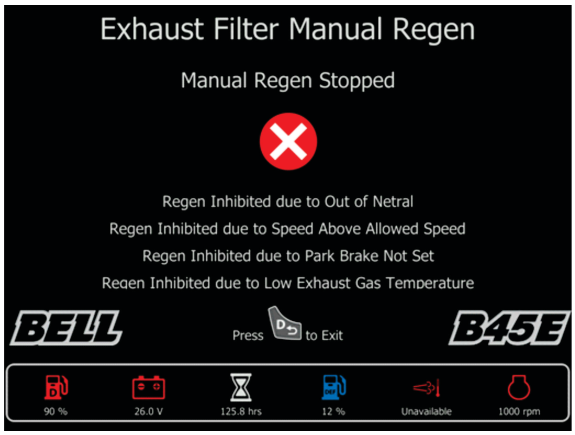
The following images illustrate the sequence.



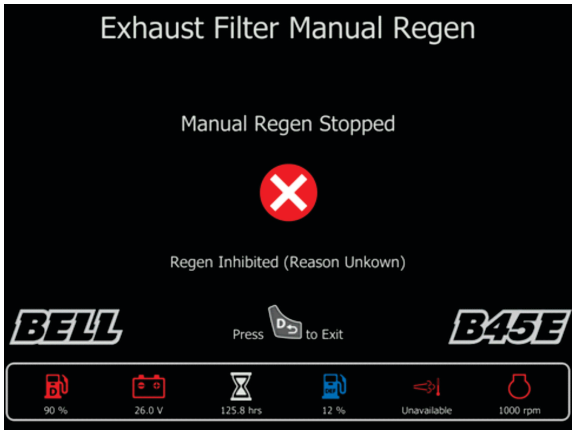


The engine can also indicate with reasons if the process does not successfully complete. The top four reasons are shown on the manual active regeneration screen and the rest can be viewed in the menu for completeness.

Next is an example of something going wrong and the engine gives a reason why.



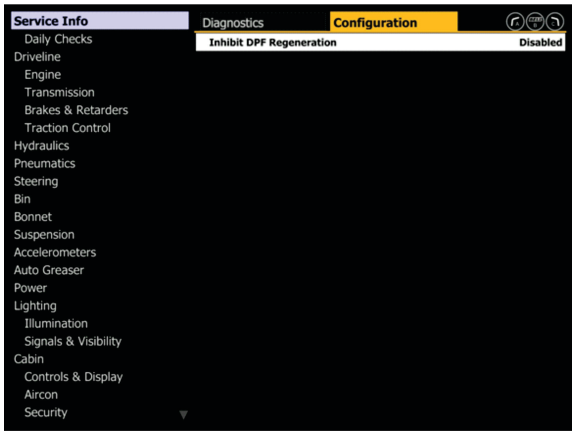
If the engine does not specify the reason why the regeneration is not completed successfully, the CDU will indicate that the reason as unknown.



DISABLING THE REGENERATION PROCESSES

All three different regeneration processes can be disabled from the menu, but this should only be done under special conditions because it will lead to soot build up if it is left disabled for too long.

Following is where the regeneration process can be disabled in the menu.



The operator will be warned that the engine cannot perform any of the three regeneration processes by an Amber Warning Light as shown below.

The Warning Light indicates that the engine cannot perform passive, automatic and manual active regeneration.

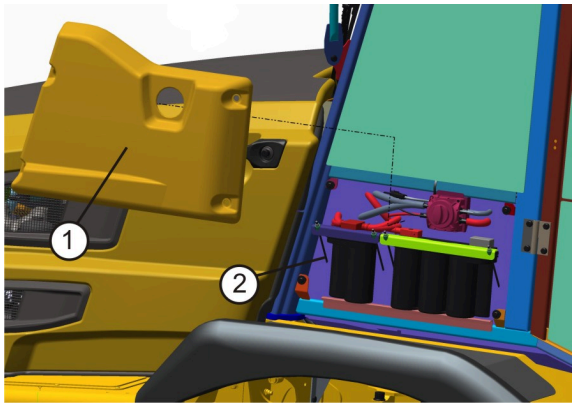
External Components

Battery Box

CAUTION

Always switch OFF the battery isolator switch when the engine is shut down and the machine is left unattended. If the switch is left ON for long periods while the engine is shut down, the batteries may become discharged.

Always switch OFF the battery isolator switch before any maintenance or repair is performed on the machine's electrical system or any welding work is performed.

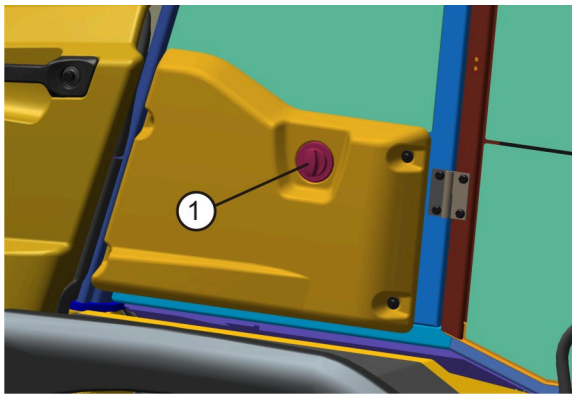


Battery Box Cover (1)

Battery Box (2)

The battery box is located on the front, left of the operator's cab.

The main components located in the battery box are the two batteries, circuit breakers and the battery isolator switch.



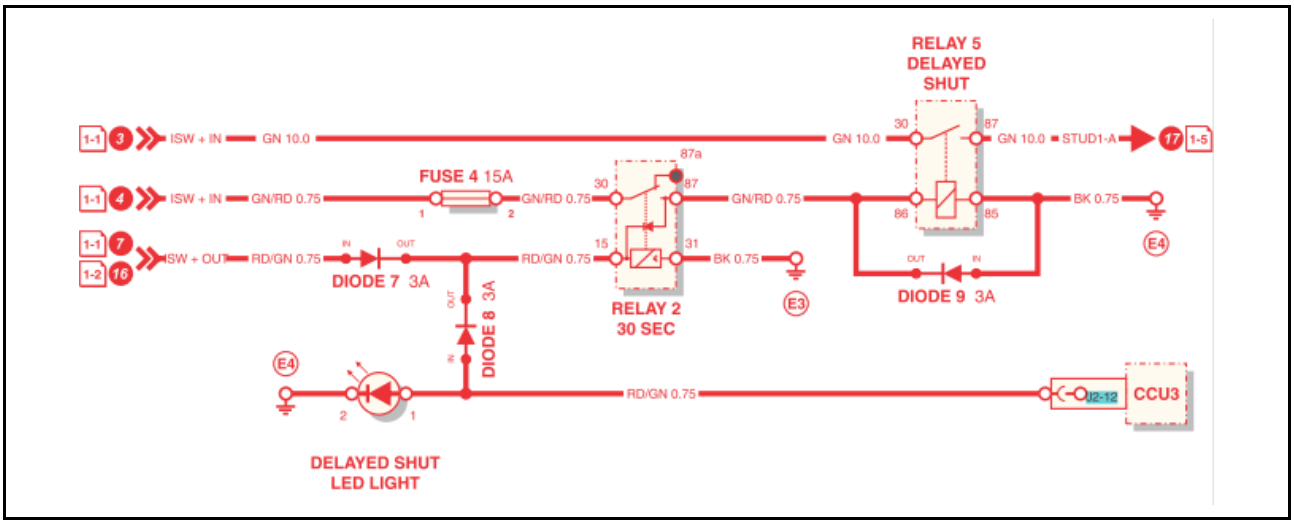
NOTE

Switch is shown in "OFF" position.

The battery isolator switch (1) is used to isolate the electrical power from the batteries to the machine.

The battery isolator switch has two positions, **OFF** and **ON**, the switch position is clearly marked on the switch's face plate.

Delay Shut Isolator



The CCU has an output which is able to delay the isolation of the battery power. It does this by providing a voltage in parallel with the isolator switch output which keeps the 30-second relay energised.

If the isolator is switched OFF and the CCU is not supplying this delayed shut signal, then the 30 second relay will provide 30 seconds of battery power after the isolator has been switched off.

However, if the CCU powers the delay shut output after the isolator has been switched off, then the machine can be provided with battery power indefinitely (until the CCU removes the delay shut voltage).

Delay Shut Sources

There are several machine functions which require battery to be supplied after ignition has been switched off. Therefore, even if the isolator is switched off, battery power still needs to be supplied to various machine functions.

This is achieved by energising the CCU delay shut output for as long as battery is needed. This is to allow for a proper shutdown of these machine functions. Here is a table of the functions:

Truck Function	Description	Battery Time after Ignition Off
CDU	The display needs time to shut down properly to prevent storage corruption.	Approximately 3 minutes
SCR Purge	The SCR system needs to be properly purged after ignition off to prevent component damage.	60 seconds
CPC4 / MCM	These controllers need time to shut down correctly to prevent EOL corruption.	2 minutes
ACM	The ACM will report (via CAN message Proprietary B 0x0A, Post Run On Time signal) how long the battery should be maintained to shut down the after treatment system properly.	Variable

The delayed shut will be active for at most 5 minutes, even if one of the machine functions calls for a longer duration. This is to make sure that one of the machine functions does not call for an infinite duration (like the ACM) which will cause the batteries to run flat.

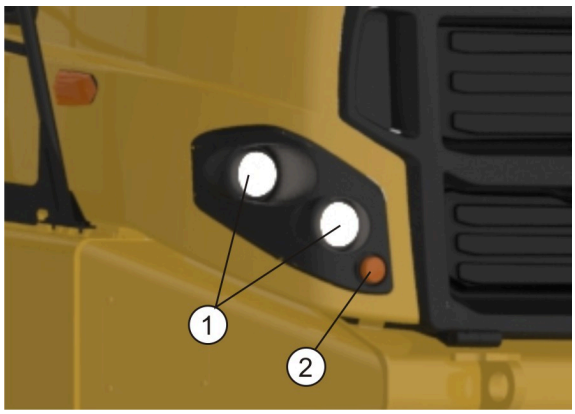
Summary

When the battery isolator switch is in the ON position, the electrical system is connected to the main batteries. When the battery isolator switch is in the OFF position, the following will be applicable:

1. When the LED is ON, then 24V are supplied to all the controllers on the machine. However, the starter is disconnected from the main battery.
2. The LED will remain ON for a maximum duration of 5 minutes.
3. Once the LED turns OFF, there is a fix period of 30 seconds before all power is disconnected from the controllers.

Lights

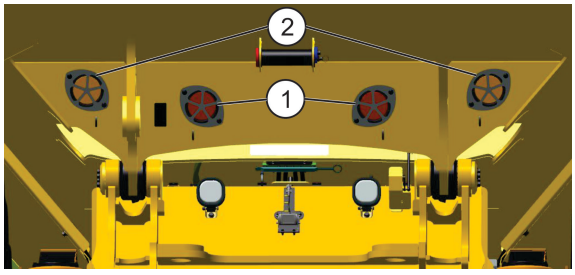
Front Lights



The front of the machine is equipped with two front light units, headlights (1) and indicators (2).

The headlights are operated from the lights switch on the SSM and the steering column switch.

Rear Lights (ADT Shown)



The rear of the machine is equipped with stop/tail/ indicator lights (1) and flashing beacon lights (2).

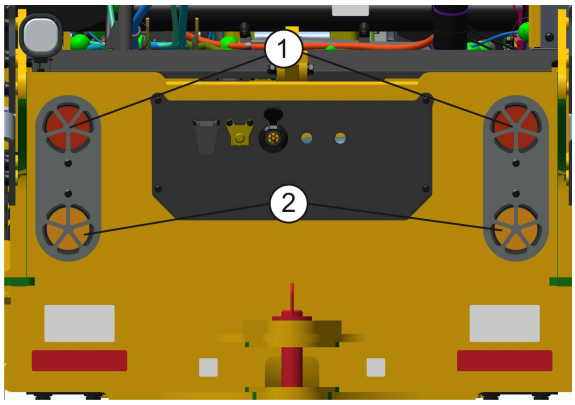
The stop light illuminates when the brake pedal is depressed or when the engine retarder or transmission retarder is activated.

The park lights operate from the lights switch on the SSM.

The indicator light operates from the steering column switch.

The flashing beacon lights are switched on from the rotating and flashing beacon light switch on the SSM.

Rear Lights (2806E Shown)



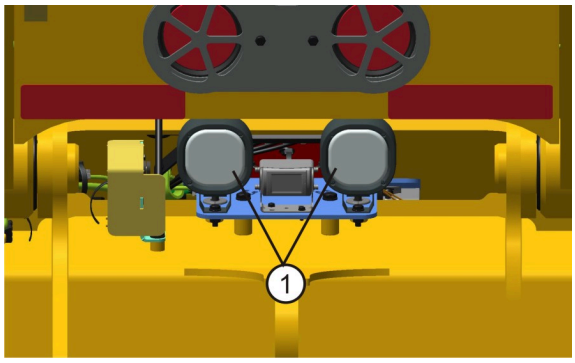
The rear of the machine is equipped with stop/tail lights (1) and indicator lights (2).

The stop light illuminates when the brake pedal is depressed or when the engine retarder or transmission retarder is activated.

The park lights operate from the lights switch on the SSM.

The indicator light operates from the steering column switch.

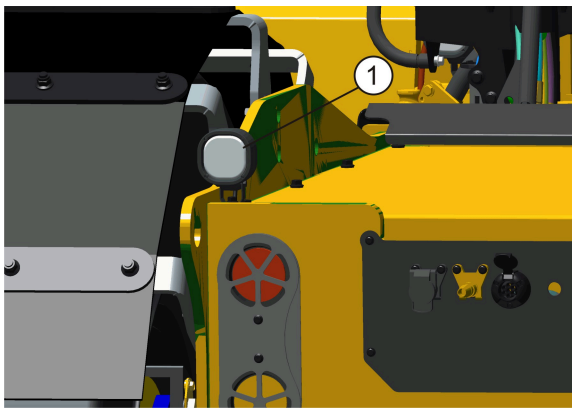
Reverse Lights (B30E ADT Shown)



The machine is equipped with two flood lights (1) as reverse lights.

The reverse lights illuminate and a warning buzzer sounds when the reverse gear is selected.

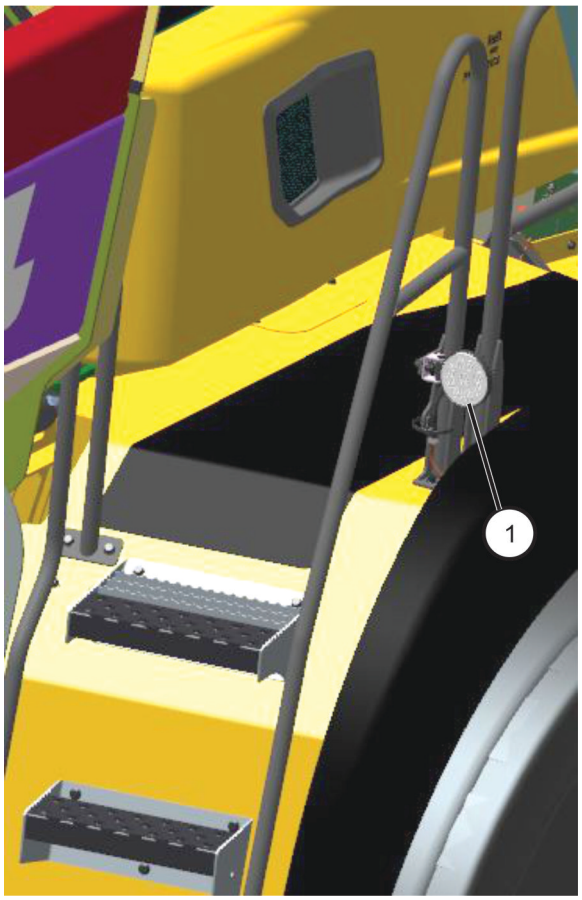
Reverse Lights (2806E Hauler Shown)



The machine is equipped with one flood lights (1) as reverse lights.

The reverse lights illuminate and a warning buzzer sounds when the reverse gear is selected.

Articulation Reverse Light (Option)

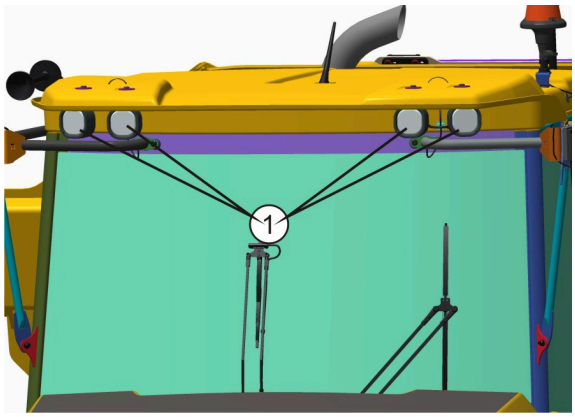


The articulation reverse lights (1), only lights up when reverse gear is selected.

The articulation reverse lights will also stay ON for 2 minutes after the machine is switched off. This is programmed into the CDU in order to brighten the machine access route to allow the operator to exit the machine safety.

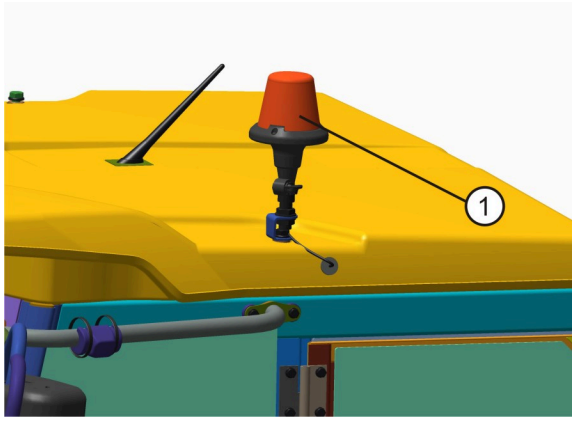
The lights are situated above the steps, on the handrail on the left and right of the machine.

Front Working Lights (Optional)



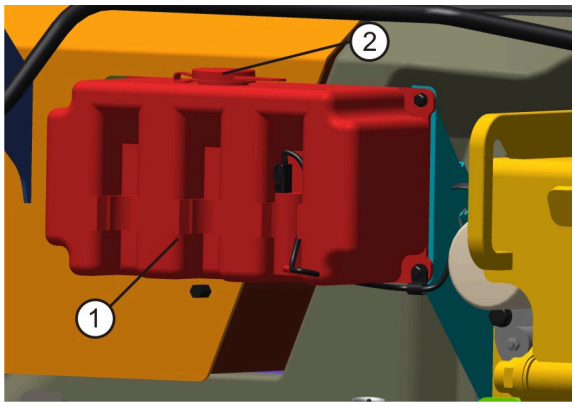
The front working lights are switched **ON** with a switch on the SSM.

Rotating Beacon Light



The rotating beacon light is mounted on the left hand side of the cab roof and is switched **ON** from the switch on the SSM.

Windscreen Washer Water Reservoir

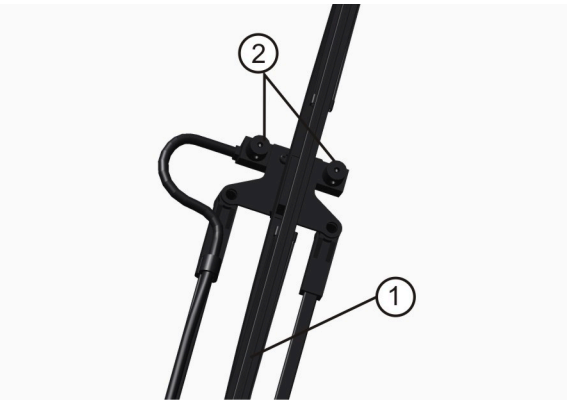


The windscreen washer reservoir is located at the left side of the cab under the bonnet.

To refill the water bottle:

1. Open bonnet.
2. Remove the filler cap (2) and fill the bottle (1) with a window cleaning solution.
3. Ensure that the cap (2) is replaced securely.
4. Check electrical connection and fluid delivery hose for wear/damage and operation.

Windscreen Wiper and Washer Nozzle



The machine is fitted with a dual windscreen wipers (1) which is equipped with a washer nozzle (2).

The wiper/washer switch is located on the SSM and activates the windscreen wiper motor and/or washer.

Bonnet Opening and Closing

The Bonnet is opened and closed using the bonnet switch located inside the cab. See "Bonnet Switch" for more details.

Tilting and Lowering Cab

WARNING

The cab support is dimensioned to support an EMPTY cab.

The machine's cab is hinged so that it may be tilted for access to the hydraulics and transmission systems below.

Tilting Cab Up

WARNING

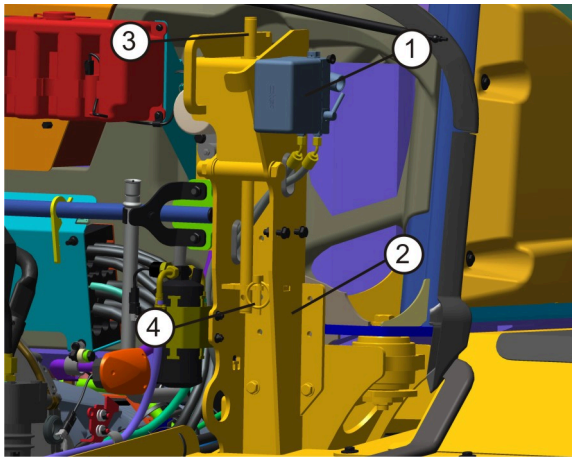
Ensure that the cab is empty.

WARNING

Never re-use cab mounting bolts. Always replace bolts after loosening.

WARNING

Do not work under the raised cab unless the cab rests onto the Cab Locking Plate.



1. Park the machine on level ground with bin lowered and park brake on.
2. Shut down the engine and turn off the battery isolator switch.
3. Close the cab door and open the bonnet.
4. Ensure that the right hand side mirror is in the normal operating position, and the left hand mirror is folded towards the rear
5. Unscrew and remove the left hand side cab mounting bolts.
6. Discard the mounting bolts.

NOTE

The cab tilt pump is located on the cab stay structure on the left side of the engine compartment.

7. Place directional valve lever in “Cab Raise” position.
8. Insert the tilt pump lever (Stored inside the cab stay structure) into the cab tilt pump and start pumping to tilt the cab, observe and ensure that the cab starts rising from the left hand side of the truck.
9. The cab foot will start to push the cab locking plate away, continue tiling the cab until the cab locking plate has fallen underneath the cab foot support landing.
10. Place the tilt pump lever into “Cab Lower" position and lower the cab onto the cab locking plate.
11. Store the pump lever into the storage place provide in the cab stay structure and lock it using the lock pin (4) to prevent accidental disengaging of the cab lock or use a lock-out device to ensure that others cannot lower the cab during under-cab maintenance.

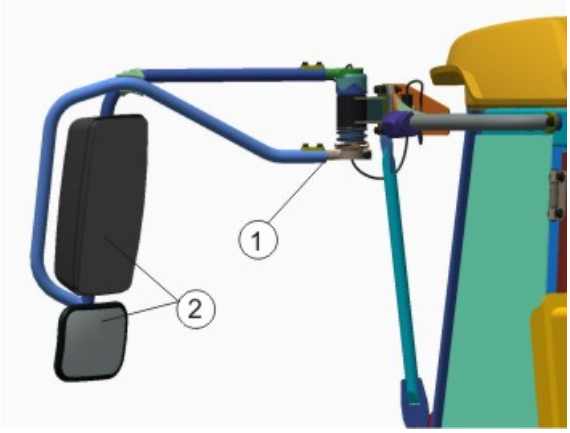
Lowering Cab

WARNING

Ensure both mountings are locked into position.
Always check the condition of the mounting bolts and nuts and replace if thread has degraded.

1. Ensure that the cab area is free of obstructions.
2. Turn the directional valve to the “Cab Raise” position.
3. Ensure that the cab door is closed.
4. Pump the cab upwards until the cab locking plate is free to rotate from underneath the cab structure. Ensure that the Cab Locking Plate is pulled completely forward, clearing the cab tilt path.
5. While holding the Cab Locking Plate forward, slowly rotate the cab pump lever to the “lowering position" Cab Down. Release the cab locking plate once the cab structure has passed the cab locking plate and continue lowering.
6. Once you have lowered the cab, store the pump lever in position.
7. Ensure directional valve handle is in “Cab Lower” position.
8. Install and torque locking bolts to 410Nm. (Replace the left-hand side cab mount bolts every 1000 hours, or when visual inspection indicates that the thread has degraded.)
9. Ensure that the cab mount nut retainers are centralised after fastening of the cab bolts. This is important so as to eliminate noise entering the cab.

Electrical Mirror Brackets (Deluxe Cab Option)



The electric mirrors (2) are set with a switch on the dashboard. There is also a defrost function for the mirrors operated from a switch on the SSM.

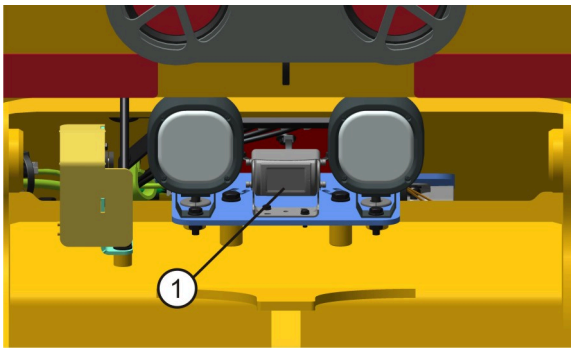
The bracket (1) must be swivelled out to the front or back of the cab when access to the bonnet area is required.

Swing the bracket (1) back after work has been done.

Reverse Warning Buzzer

When reverse gear is selected, the reverse lights illuminate and a warning buzzer sounds at the rear of the machine.

Rear-view Camera (Option On ADT's)



If the rear-view camera (1) is installed on the machine, the camera is mounted between the two reverse lights at the rear of the truck.

The intended use of the camera is to aid the operator with reversing of the machine, the operator would be able to spot small object or persons behind the machine that are not visible in the rear view mirrors.

The camera is automatically switch on when the reverse gear is selected, and will display in the interactive display screen.

There is an option to open the camera view on the full CDU display screen, using the SDC.

Should the camera malfunction during operation, please report to service personnel.

Features

- High resolution 1/3” CCD camera.
- Infa-red LED assisted low light performance enhancement.
- Rugged lightweight die cast aluminum body.
- Waterproof design.
- Adjustable mounting angle.
- Operates in a wide temperature range.
- 2006/28/EC
- ISO 20653: 2006 (IP Testing)

Wheel Chocks

Wheel chocks can be mounted on the side of the bin at the front of the machine.

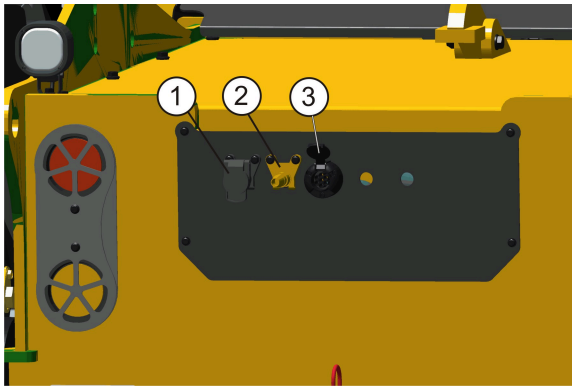
Wheel chocks are placed behind the machine's wheels to prevent accidental movement. Chocks are placed for safety in addition to the park brakes be used.

How to use/ install the wheel chocks.

- Apply the vehicle park brake.
- Position wheel chocks snugly against the center of the tire.
- If the vehicle is on a flat surface, chock on both sides of the tire, and use two sets of chocks.
- The above measure is especially helpful if the vehicle will be undergoing engine work or is being loaded or unloaded with the engine running.

Trailer/Auxiliary Equipment Connectors (Haulers Only)

The following connectors are available at the rear of the machine:



The pneumatic female connector (1) is used for the trailer park brake and is activated when the hauler park brake is activated.

The pneumatic male connector (2) is used for the trailer brakes (trailer service brakes).

Electrical connector (3) used to control and send signals to the trailer lights.

Articulation Safety Bar

Engaging the Articulation Safety Bar

NOTE

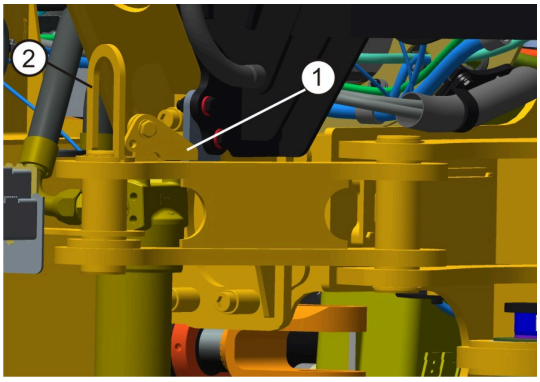
Two people are needed to engage the articulation safety bar. One person is required to operate the steering system from the cab in order to align the holes in the safety bar and the male oscillation joint, while the second person installs the locking pin in order to engage the safety bar.

WARNING

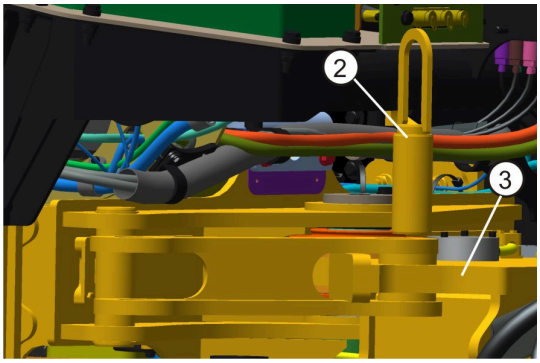
Engaging the articulation safety bar requires a person to work within the articulation pinch zone of the machine.

Ensure that any person operating the machine steering is fully aware of the movements of the person within the pinch zone and that they are able to communicate with one another.

1. Park the machine in the straight ahead position.



2. Hinge up the locking pin retaining device (1) so that the locking pin may be removed.
3. Remove the locking pin (2) from the articulation safety bar stowage bracket.



4. Swing the articulation safety bar out and line up the holes in it with the hole in the male oscillation joint (3). It may be necessary to adjust the articulation angle slightly by rotating the steering wheel in order to allow the holes to align.
5. Fit the locking pin (2) through the holes and allow the retaining device to drop and secure the locking pin in position.
6. Shut the engine down and apply the park brake.
7. Attach a **DO NOT OPERATE** warning in full view of anyone entering the operator station.
8. A lock-out device may be attached to the locking pin retaining device (1) in order to prevent removal of the locking pin.

Disengaging the Articulation Safety Bar

1. Remove any lock-out device from the locking pin retaining device.
2. Lift the locking pin retaining device and withdraw the locking pin.
3. Swing the articulation safety bar back into the stowage position.
4. Lift the locking pin retaining device and fit the locking pin in the stowage position.

Engaging the Bin Prop (Where Applicable)

WARNING

When the bin is raised to perform any maintenance task, the bin prop must be engaged.

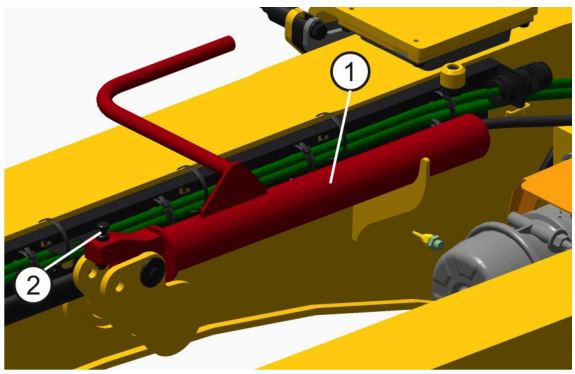
The bin prop is dimensioned for an empty bin, thus the bin must be empty before engaging the bin prop. Ensure that the transmission is in neutral before engaging the bin prop.

WARNING

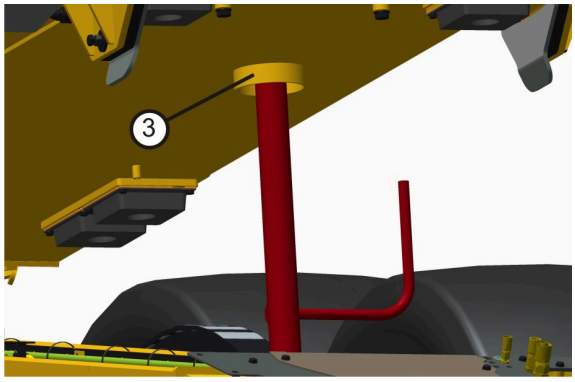
The support device is dimensioned for an unladen dumper body or unladen dumper body substitute and/ or empty operator's cab *ONLY.*

NOTE

An operator is required to control bin motion from inside the cab.



1. Raise the bin high enough to allow the bin prop (1) to be rotated up until it comes to rest against the travel stop (2).
2. Lower the bin down towards the bin prop. Limit the engine speed as the bin comes close to the point of engagement with the bin prop in order to limit the force applied to the bin prop and reduce the bin travel speed to set it down gently onto the bin prop.



3. Ensure that the bin prop is safely seated inside the locating ring (3) at the bottom of the bin.
4. A lock out device can be fitted to the bin prop to secure it in the engaged position.

WARNING

Always check to ensure that the bin prop is located securely within the locating ring on the bottom of the bin before allowing any personnel underneath the bin.

Disengaging the Bin Prop

1. Remove any lock out device that may have been fitted to the bin prop.
2. Raise the bin high enough to allow the bin prop to be hinged back down into the stowage position on the chassis.
3. Lower the bin down onto the chassis.

Bin Lifting

1. Ensure that all lifting equipment used is rated to support the loads that are generated when lifting the bin.
2. Use a four element sling and attach the individual elements to the bin lifting points as shown in Figure 1. Lifting equipment may ONLY be attached to the positions indicated. NEVER exceed the maximum rigging angles indicated in Table 1.
3. NEVER attach soft slings directly to the bin lifting positions.
4. Ensure that the centre of the lifting rigging is directly above the centre of gravity of the bin. Refer to Table 1 for the approximate longitudinal location of the bin centre of gravity (COG)
5. Lift the bin gradually while taking care to prevent jerking. Jerking during lifting will generate unnecessarily high loads in the lifting equipment and in the bin structure.
6. Move the lifted bin slowly in order to minimize swinging.
7. Lower the bin slowly and set it down gently in order to minimize the risk of damage to the bin guide mounting plates and bin pivot bosses.

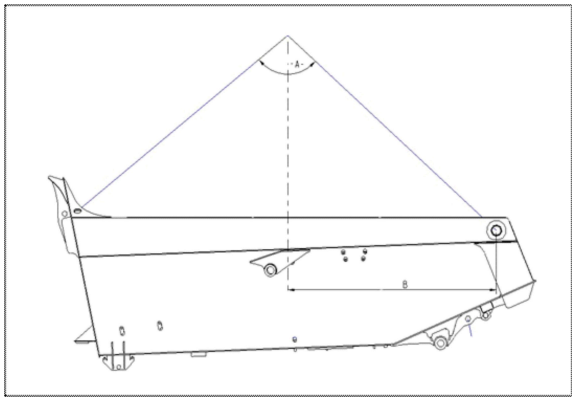


Figure 1

Machine								
B20E			B25E			B30E		
A	B (mm)	Approximate Bin Mass (kg)	A	B (mm)	Approximate Bin Mass (kg)	A	B (mm)	Approximate Bin Mass (kg)
<120°	2160	2500	<120°	2405	3300	<120°	2380	3750

A = Maximum included Angle of Chain

B = Distance from Rear Lifting Point to Bin Center of Gravity

Table 1: Bin Lifting Data

Activating the Over Centre Bin Lock (Where Applicable)

WARNING

Risk of crushing - An unlocked raised bin could fall down. Personnel standing under a falling bin could be seriously injured, including death.

Always lock the bin using the Over Centre Bin Lock, before conducting any maintenance or repair under the bin area.

Activating the over centre bin lock is a one man operation, and under no circumstances must the pin be placed in position whilst the bin is moving.

WARNING

The support device is dimensioned for an unladen dumper body or unladen dumper body substitute and/ or empty operator's cab *ONLY.*

1. The Over Centre Bin Lock is integrated into the tail section of the bin (Refer to figure 1).
2. Before activating the Over Centre Bin Lock, prepare the truck for maintenance. (Refer to chapter "Maintenance Safety Precautions" for the procedure)

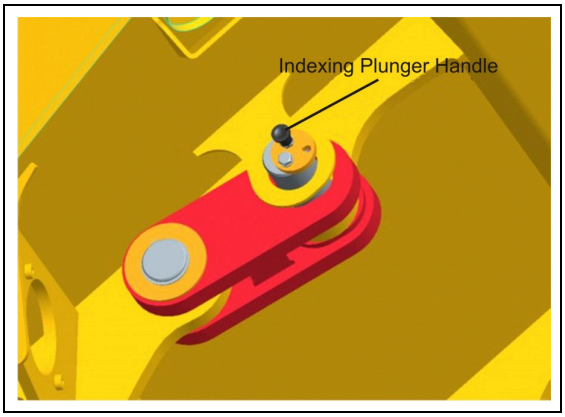


Figure 1: Over Centre Bin Lock Feature (Male Clevis)

3. Start the engine and tip the bin to the maximum tipping angle. The male clevis of the Over Centre Bin Lock will engage with the female clevis in the rear chassis.

NOTE

Ensure that there is no one in close proximity to the moving bin.

4. Once the bin has reached to maximum tip angle, switch the engine off and proceed to install the Over Centre Bin Lock.
5. While the engine is switched off, remove the pin from its stowage position. This is done by pulling on the indexing plunger handle and rotating the locking disc counter-clockwise so that the disc becomes concentric to the pin and the indexing plunger lands on the corresponding indexing hole in the pin (Refer to Figure 1). The pin can now be withdrawn.
6. Insert the locking pin through the holes in the chassis and the Over Centre Bin Lock (Refer to figure 2).
7. Should the holes not be aligned, repeat step 3 by adjusting the tip angle accordingly to align the holes and then proceed with steps 4 - 6.
8. Pull the indexing plunger handle and turn the locking disc clockwise to an eccentric position, thus preventing the pin from being removed. Allow the indexing plunger to engage in the appropriate hole in the pin.
9. A lock-out device can be inserted into the hole provided on the locking disc when the Over Centre Bin Lock is engaged. (Refer to "Lock-Out Point" in chapter "General Service Information" for the procedure.)

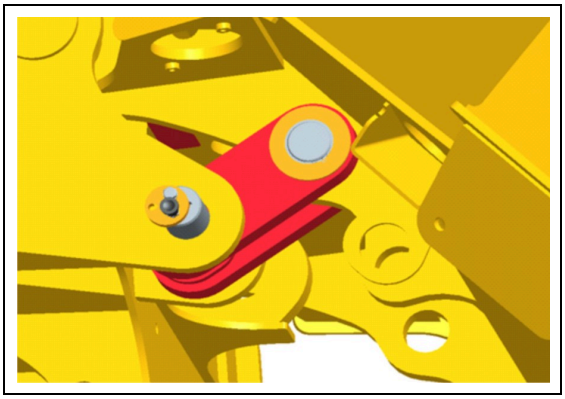


Figure 2: Over Centre Bin Lock in Activated Position

BIN NOT OPENING TO THE REQUIRED POSITION

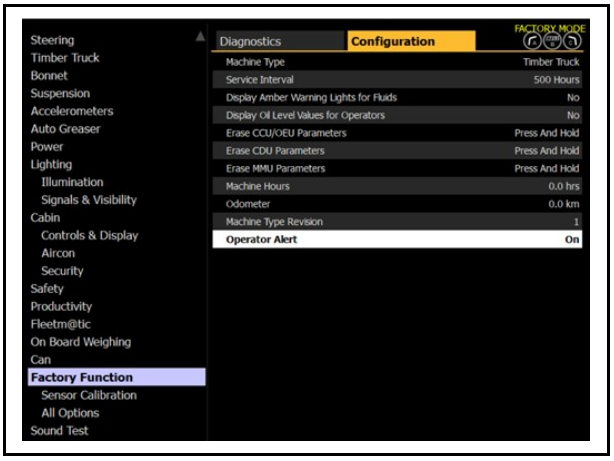
New Fault Codes

Source Module	SPN	FMI	Description
CCU/OEU	18143	7	BIN ANGLE sensor is being emulated due to its absence or failure
CCU/OEU	18143	9	ARTICULATION ANGLE sensor is being emulated due to its absence or failure
CCU/OEU	18143	13	BIN ANGLE and ARTICULATION ANGLE sensors are being emulated due to their absence or failure

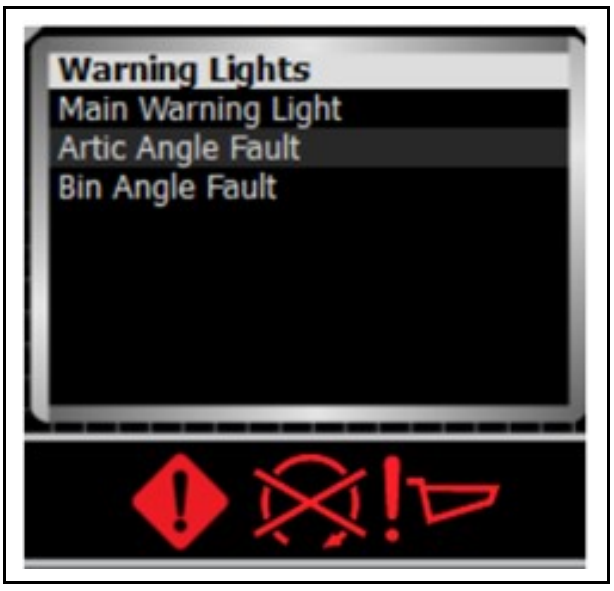
iTip is limited to 1300 rpm if an invalid bin angle sensor value is detected.

Operator Alert

Operator Alert is a new enabled option that goes together with the bin and artic angle sensors shortages. If this option is enabled and one of the fault codes mentioned above is active, then the main warning light will illuminate, the buzzer will sound and the appropriate sensor warning light will be illuminated. The option is enabled/disabled in the below menu on the CDU (Factory Mode):



The warning lights for the artic and bin angle sensor faults are as follows:

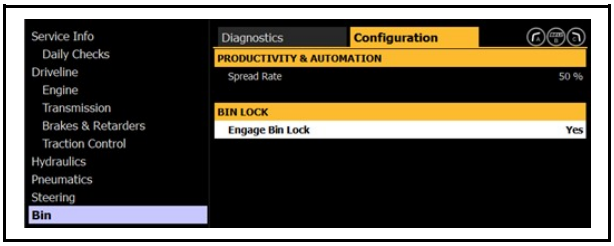


Bin Float Adjustment

There are machines which have high pressure filters where the software does not accurately emulate the bin angle and the bin is slamming on the chassis. To set up a higher bin float, there is a new menu that appears only if the bin angle sensor is missing. It is possible to then set up a new float value, up to 79% (Factory Mode):

Bin Lock

Without a bin angle sensor, it is often difficult to insert the bin lock when the bin is fully lifted because the bin angle emulation often doesn't allow the bin up solenoid to drive the bin against the end stops (due to minor inaccuracies in the calculation). A new menu item on the CDU allows operators to continue to push the bin against the end stops once activated. Once the operator leaves the menu, the bin lock option automatically clears. Below screen shot shows the CDU menu where the new enabled option can be found:



Removing the Over Centre Bin Lock

1. When the machine service is complete, start the engine and raise the bin to relieve pressure form the locking pin.
2. Switch the engine off and proceed to remove any lock-out device from the hole in the locking disc.
3. Remove the locking pin, following the same procedure with the indexing plunger and locking disc as that used when activating the lock.
4. Start the engine and lower the bin fully.

NOTE

Ensure that there is no one in close proximity to the moving bin.

5. Insert the locking pin in its stowage location.
6. Pull the indexing plunger handle and turn the locking disc clockwise to an eccentric position, thus preventing the pin from being removed. Allow the indexing plunger to engage in the appropriate hole in the pin.

Safety Instructions

WARNING

Do not operate the machine outside its design parameters.
It can cause serious damage to equipment and / or injury or death to the operator and / or bystanders.

WARNING

Read and understand all of the operator related chapters in this manual before performing any of the following procedures and obey all Warnings and Cautions contained in the sections.
Refer to the detailed procedures in the relevant chapter.

WARNING

The build-up of combustible material on and around high heat areas must be removed on a regular basis and the machine cleaned to prevent build-up and ignition of material. Critical areas are the areas around the exhaust, turbo charger, between the cab and the transmission cooler/exhaust silencer and the area on top of the horizontal heat shield leading into the silencer heat shield.
It may be required from time to time, for the heat shields to be removed by service personnel to clean these areas properly.

Before operating the machine the following safety instructions must be observed:

- Read and fully understand this manual, before you start operating the machine, it is important to learn and understand the information in the safety chapter of this manual.
- Never operate the machine while under the influence of alcohol, medication or any other drugs.
- Wear the required protective clothing for safe machine operation.
- When mounting or dismounting the machine always face the machine and use the hand rails and steps provided. Never jump off the machine.

  The operator must know the rules and safety aspects of the site. The operator must study the following rules and become aware of how to avoid serious injury and/or machine damage.
- It is the operator's duty to report all damage and wear which may endanger the operator or cause damage to the machine.
- Check daily for build-up of combustible material on and around high heat areas and remove such material immediately.
- Only trained personnel may operate the machine.
- Check that a **DO NOT OPERATE** tag is not attached to the steering wheel. If the tag is attached, do not operate the machine.
- Complete the Walk Round Check (refer to next instruction). If any defects are found, do not operate the machine. Attach the **DO NOT OPERATE** tag to the steering wheel and remove the machine key.
- Report all defects and problems encountered during the Walk Round Check to the service personnel.

On Site Safety

- Always check health and safety rules and restrictions before operating an ADT on site.
- Always check height, width and weight restrictions before operating on site.
- Check that the mirrors and camera are correctly positioned and clean for the best visibility. Check any blind spots, especially the crush area, before driving off.
- Adapt the machine speed to road conditions, load and visibility. Make sure you operate within the site speed limits.
- Find out what routes/roads you can and cannot use.
- To avoid the likelihood of turnover keep the ADT cab and body in a straight line, wherever possible, when tipping. Ensure the body is as horizontal as possible, if not adjust the position of the machine.
- Obey all site rules, ie, distance from edge, obey banksman, etc.
- Avoid steering hard stops (Full Lock) whenever possible.
- Do not drive machine with the bin in the UP/TIP position.
- Do not crowd machines working at the tipping site especially if several ADTs are tipping, hold back until safe and clear. Always keep a safe working distance from other machines especially on the haul road never "tailgate" (keep a distance of 5 metres) even when queuing or waiting to be loaded.

- Always give way to loaded vehicle.
- Never obstruct ramps.
- Never attempt to go under the bucket of a loader, observe the loading in a safe place.
- Whenever possible reverse park. This aids maintenance and reduces the likelihood of accidents.
- Trainers are only allowed on machines provided with a trainer seat and with the approval of site management.
- Always wear the seat belt when operating the machine.
- Check continuously that no personnel are near the machine.

Daily Walk Round Check Before Operating

The Daily Walk Round Check must always be carried out before operating the machine at the beginning of a work shift or after a change of operator during a shift.

The operator starts his check at the left of the machine and walks around the machine in a clockwise direction.

The machine must be parked in the straight ahead position on firm, level ground with the bin down and the park brake applied.

It is recommended that the machine is thoroughly washed before starting the Walk Round Check.

The following is a list of the tasks required in the Daily Walk Round Check. **For a more detailed description of the tasks refer to the Daily or 10 Hourly Service Checks in this Manual**.

The service decal located on the side of the cab lists the scheduled service needs (maintenance schedule) and is useful for locating the items.

WARNING

Refer to next chapter, Operating Instructions - Starting the Engine, for accessing the Daily Checks menu on the CDU and for details on warnings about any service which may be due.

1. Raise the bonnet and check the condition of the pivots and restraining straps.
2. Check the machine for oil leaks, especially in the vicinity of the transmission.
3. Check the condition and tension of the alternator belts.
4. Check for loose, frayed or corroded connections in the wiring harness.
5. Check the engine mountings and cab mountings are secure and the rubber elements are not damaged.
6. Ensure that all the hose connections are tight and inspect for leaks, cracks or chafing damage.
7. Check that the exhaust connections, exhaust brake valve and actuator are secure.
8. Check that the batteries are secure and clean and the connections are tight.
9. Check that the hydraulic oil cooler fins are not restricted.
10. Check the cooling pack for cleanliness and ensure there are no restrictions to the cooling function.
11. Check the security of the cooling pack assembly and inspect for leaks.
12. Inspect the air cleaner assembly for damage and security.
13. Check the engine oil level.
14. Check the engine coolant level.
15. Drain the fuel/water separator filter.
16. Inspect the suspension struts for leaks and sandwich blocks for damage.
17. Check that the steering cylinders are secure.
18. Check the transfer case oil level.
19. Ensure that the transfer case mountings are secure and undamaged.
20. Check the hydraulic fluid level.
21. Check the Adblue® / DEF level (SCR machines only).
22. Check the wet disk brake hydraulic fluid level. (B30E only)
23. Lubricate as required.
24. Check auto greaser reservoir level. (If equipped)
25. Check all lubrication points for proper lubrication.
26. Inspect the park brake disc pads linings.

27. Check the axles and components (trailing arms, stabiliser links and sandwich blocks) for leaks, damage and security.
28. Ensure that the drive shaft assemblies are secure.
29. Check the wheels, wheel nuts and components for damage and security.
30. Check the tyres for cuts and damage.
31. Check the tyre pressures (refer to the decal for pressures).
32. Check the fuel level.
33. Remove any combustible material on and around high heat areas.
34. Ensure that the windshield, side and rear windows and the rear view mirrors are clean, provide good visibility and are not damaged.
35. Ensure that the headlights and all exterior lights and reflectors are clean and undamaged.
36. Ensure that there are no obstructions around the machine before moving off.
37. Ensure that there are no obstructions in the cab, especially under and around the pedals and controls before moving off.
38. Ensure that the seat belt is in proper working order and fasten the seat belt before start-up.

Before Starting Engine

1. Ensure that the Daily or 10 Hourly Service Checks have been completed. Ad just the operator's seat for the best operator comfort and easy access to the machine controls.
2. Ensure the battery isolator switch is turned **ON**.
3. Fasten the seat belt and adjust the seat belt to fit firmly across the front of the pelvis.
4. Close the cab door.
5. Sound the horn to warn people in the area that the engine is about to start and the machine will be in use.

   NOTE

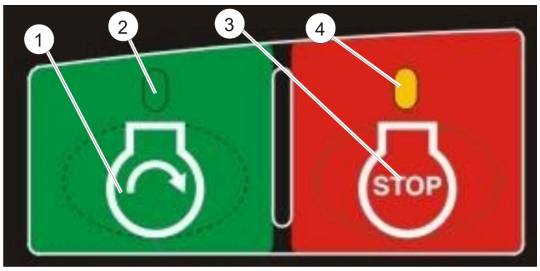
   If the automatic horn option is enabled, the horn will be activated automatically when the operator presses the engine start button. The horn will sound twice before the engine starts.

Starting Engine

1. Check / perform the procedures in Before Starting the Engine (previous instruction).

   NOTE

   The park brake was applied and the gear shift will be in the neutral position when the machine was shut down. The engine cannot be started unless the transmission is in Neutral.



WARNING

Do not start the machine by shorting across starter terminals. Never start the machine while standing on the ground.

Always start machine from operator's seat. Only start the engine and operate the machine in well ventilated areas.

CAUTION

Do not run the engine at high speed (rpm) or heavy loading until the engine oil, transmission fluid and hydraulic fluid have warmed up to normal operating temperatures.

CAUTION

DO NOT ignore any Service Due (or over due) messages. Report to Service Personnel immediately.

2. Press the Ignition On/Engine Start switch (1), the LED (2) above the switch will flash.
3. Enter your driver access code (Last 4 digits of the machine PIN number) using the numbers on the switches on the SSM. e.g. "4503" from PIN the PIN Number - "B93A336DC07204503"
4. The engine will crank and start automatically. If the Ignition On/Engine Start switch is pressed while the ignition LED is flashing and the security code has been accepted.

NOTE

If no driver access code has been programmed, the engine will crank as soon as the Ignition On/Engine Start switch is pressed while the ignition LED is flashing.

5. If the machine does not start then press the Ignition Off/Engine Stop switch (3) to stop cranking, if you hold down the Ignition On/ Engine Start switch then the engine will crank ONLY while you have the switch de pressed. The automatic engine crank will turn off after 15 seconds if the engine has not started.

NOTE

Engine will not start by towing or pushing.

If there is a service due within the next 50 machine hours, there will be a single "pop-up" message displayed on the CDU screen (on ignition-on), with a buzzer beep to alert the operator that a service is due. This "pop-up" will display the number of hours left until the service is due.

If the machine surpasses the service due machine hours, without the service being done (or the service done signal being re-set (by Service Personnel) then the ignition-on "pop-up" message will display "Service X hours Overdue".

Check Daily Service Information

A Daily Checks menu is accessible at the CDU to encourage thorough daily service checks.

Perform this check at the start of every shift after performing the Daily Walk Round Checks.

Shutting Down Engine

CAUTION

Never stop the engine from high idle. This will cause damage to the turbocharger and the engine. Do not shut the engine down with the ignition still ON using the battery isolator switch. This could cause error codes to be logged from electrical modules that need ignition sequence shut down before battery power is disconnected.

Allow 10 seconds delay from ignition OFF to battery disconnect switch OFF.

1. Having brought the machine to a stop, the manual parking brake should be applied followed by placing the transmissions in neutral (Please note that by applying the parking brake manually the indicator light on the button will light up and the parking brake warning light on the dash board will be highlighted in RED, indicating that the brake has been applied.
2. To stop the engine, press the Ignition Off/ Engine Stop switch. Keep the service brake pedal depressed until the engine shuts down.
3. The system will go into a "Turbo Spin-Down" mode and the engine will be turned off after a certain amount of time (the time depends upon machine usage, two minutes is the maximum time taken).
4. During this shut- down, time a count down timer will be shown on the CDU and the buzzer will beep once every second.

NOTE

In case of an emergency press and hold the Ignition Off/Engine Stop switch, this will shut down the engine and the ignition power. In this case an Emergency Shut Down. code will be logged continuously on the next ignition cycle until a full Turbo Spin Down has been counted.

NOTE

The Turbo Spin Down protects the engine components by allowing for proper lubrication and for all temperatures to stabilise before the engine shuts down.

NOTE

If the machine is stopped overnight ensure the battery isolator switch is turned to the **OFF** position.

NOTE

In the event of an engine stall the machine will automatically apply the park brake.

For the Tier 4 Final/Stage 4 machines please follow through with the following:

Once the "Turbo spin down" process is complete, the machine will automatically go into "AdBlue Purge" where the AdBlue fluid that is in the pipe lines is pumped back into the AdBlue tank.

While this takes place the instructions on the dashboard will show "Do not isolate the machine"

(this means **do not** turn off the battery isolator while this process takes place).

As with the turbo spin down procedure you will see a "count down timer" on the dashboard together with an alarm sound. Once this process has finished the machine's reverse alarm will automatically sound to indicate that this process has finished.

When the reverse alarm has finished sounding you must wait **thirty** (30) seconds before turning off the battery isolator to complete the machine shut down procedure.

Excessive Engine Idling

CAUTION

Avoid excessive engine idling. If the engine is allowed to idle excessively it can result in glazing of the pistons due to fuel dilution.

If the engine idles for longer than 20 minutes, a fault code will be logged.

If the engine idles for longer than 5 minutes the memory module will start logging the time and at the end of the shift a Fleetmatic message will be sent with the total idling time for that day.

The idle shut-down time can be configured by Technical Personnel.

Using Booster Batteries

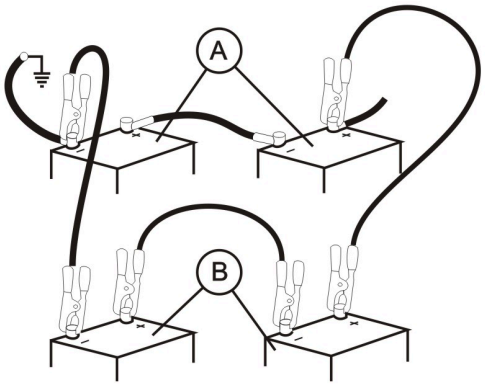
WARNING

Before boost starting, machine must be properly shut down and secured to prevent unexpected machine movement when engine starts.

CAUTION

An explosive gas is produced while batteries are in use or being charged.

Keep flames or sparks away from battery area. Make sure the batteries are charged in a well ventilated area.



The machine electrical system is a 24-Volt negative (-) ground system. Connect two 12-Volt booster batteries together in series as shown for 24-Volts.

NOTE

The batteries can only be boosted if the system voltage is above 22 Volts.

1. Switch battery disconnect switch to **OFF**
2. Connect one end of the positive cable to the positive terminal of the machine batteries (A) and the other end to the positive terminal of the booster batteries (B). En sure a good solid connection.
3. Connect one end of the negative cable to the negative terminal of the booster batteries (B) and the other end to the machine as far away from the batteries as possible, preferably to a machine earth point and not onto a painted section.
4. Verify that the booster batteries are connected in the correct order to prevent reverse battery polarity connection.
5. Switch battery isolator switch to **ON** and all other electrical loads such as lights, air conditioner, etc. **OFF** before starting the engine.
6. Start the engine.
7. Remove the cables. (Disconnect negative cable first from the machine and then from the negative terminal on the booster batteries. Only disconnect with engine idling).
8. Disconnect positive cable.

Avoid Jump Starting

WARNING

Jump starting could damage or destroy electronic control units.

Jump starting procedure is carried out at your own risk and is not recommended.

Maintain batteries & connections in good condition to avoid jump starting.

NOTE

The batteries can only be jump started if the system voltage is above 22 Volts.

Running-in Instructions

The machine's run-in period is the First 100 SMR of operation. The machine **MUST** be serviced at 100 SMR to ensure maximum machine service life.

The 100 SMR service **MUST ONLY** be done by **BELL EQUIPMENT** Service Personnel.

Driving

Driving Safety

- Check that all the gauges and indicators are operational. Ensure the readings are correct. (Refer to Operator's Controls) for the correct readings.
- Wait until there is sufficient air pressure {750kPa (109psi)} before driving the machine.
- Check that there are no personnel on or around the machine before driving the machine.
- Securely lock all doors and bins or any other moveable equipment that may cause a hazard during travelling.
- Check the steering and brake functions and confirm that the reverse alarm sounds when reverse is selected.
- Sound the horn before moving off. (Refer to Automatic Horn Option following in this section)
- Press the Park Brake Switch to apply park brake. The LED above the switch will flash until the switch is pressed again to release the park brake.
- The park brake will only release after a gear is selected or service brake is applied.
- The CDU Park Brake Applied Indicator will display the actual position of the park brake.
- Keep the service brakes applied while engaging/ disengaging the park brake.
- The park brake is automatically applied when the machine is switched off irrespective of whether the park brake switch is "ON" or "OFF".
- When the transmission is in neutral and the service brakes are not applied immediately, the park brake will automatically be applied.
- When the machine is started the park brake will still be applied and the switch must be switched off to release the park brake.
- When the ignition is turned off the park brake will automatically be applied.

Automatic Horn Option

If the automatic horn option is enabled, the horn will be activated automatically as follows:

- When the operator presses the engine start button (after entering his code), the horn will sound twice before the engine starts.
- When the operator presses the drive button, the horn will sound once as a forward gear is engaged.
- When the operator presses the reverse button, the horn will sound twice as the reverse gear is engaged.

Gear Shifting

CAUTION

Do not allow the machine to free wheel (coast in neutral) as this will cause damage to the transmission.

Do not continually select from 1st forward to 1st reverse as this will cause damage to the transmission.

The transmission has 6 forward gears and 1 reverse gear with automatic lock-up in all gears. The transmission can be operated as a fully automatic transmission. All automatic gear shifting will be controlled by the machine's electronic control unit.

The transmission control unit does not allow shifting from neutral to a gear when the engine speed is above 900 rpm. If **D** is selected while the engine speed is above 900 rpm. the shifter display will

blink. Select **N** again, let engine return to idle and re-select **D**.

Gear shifting in automatic is dependent upon engine speed and operating conditions (on site conditions).

Gear selection from Neutral is not possible if the park brake is not applied. (Park brake can only be released while in neutral when the service brakes are applied).

The engine torque is reduced to 0% by the software until neutral to gear engagement is completed.

NOTE

The following procedure must be used in gear shifting:

- Start the engine.
- Apply the service brake.

Forward Selection (Automatic)

- Select D on the gear selector.
- Release the park brake.
- Release the service brake and increase the engine speed.

As the machine speed increases, the transmission will select (sequentially) the next gear.

With drive **D** selected, the actual gear will be displayed on the CDU, if that option is selected.

Reverse Selection

- Select Reverse (R) on the gear selector.
- Release the park brake.
- Release the service brake and increase the engine speed.

Controlled Gear Range

For certain conditions only a limited range of gears may be required. To select the range of gears required, proceed as follows:

- Ensure that the park brake is applied.
- Start the engine.
- Apply the service brake.
- Select D on the gear selector.
- Move the gear selector to the highest gear required (3, 2 or 1).

To select normal driving gear range the control lever must be moved to the D position.

Down Shifting Or Reverse Inhibitor

Shifting from neutral **N** to drive **D** or reverse **R** is inhibited when engine speed is above 900 rpm.

Although there is no speed limitation on upshifting, there is on downshifting and shifts from neutral to drive or reverse. If a down shift or **N** to **D** or **R** is selected when engine speed is too high, the TCU will prevent the shift until neutral is selected or engine speed or road speed is reduced.

Accelerator Control

CAUTION

To avoid injury or property damage caused by sudden movement of the machine, do not make shift from neutral **N** to drive **D** or reverse **R** while pressing accelerator.

Shifting from neutral to drive or reverse is inhibited when engine speed is above 900rpm.

RR or **61** will flash in the display window if a shift is attempted above 900 rpm.

The position of the accelerator pedal influences the timing at which automatic shifting will occur at fast engine speeds.

A partially depressed accelerator pedal position will cause up shifts at slow engine speeds.

Slowing And Stopping

If the transmission is in neutral and the service brake is not applied, the park brake will automatically be applied.

During normal operation, machine must be stopped using the service brakes. If a machine is stopped for more than a few seconds, the park brake must be applied.

Retarders

Engine Retarder

The engine retarder system (Exhaust Brake & Engine Valve Brake) is fully automatic and will be activated when the accelerator pedal is fully released.

On down hill operation, if engine governed speed is exceeded, the transmission may up shift to the next higher gear. This will reduce braking. Apply service

brakes to prevent exceeding engine governed speed.

Down shifting to a lower gear increases the effectiveness of the engine braking.

When machine is fully loaded or slope is steep, it may be desirable to preselect a lower gear before reaching the slope.

When exhaust brake is engaged, the transmission automatically starts to down shift to a lower gear. The CDU will display the gear selected.

The digital display will indicate "2X" ("X" is the current gear and "2" is the gear it is aiming for) while this happens. When second gear is attained and machine has slowed, the exhaust brake will be disengaged and the digital display will return to the previous value shown.

When the machine has slowed down, the exhaust brake will be disengaged.

Exhaust Brake Protection

WARNING

If this message displays, report to Technical Personnel immediately.

If the CCU detects an exhaust brake failure, an exhaust brake protection pop-up message will be displayed on the CDU every 5 seconds.

Transmission Retarder (Not for B30E)

For increased safety, the transmission is used to assist the park brake.

If the park brake is applied then 100% transmission retardation is requested independent of the operator-selected retardation value.

The transmission retarder, as well as the engine retarder is automatically engaged when the accelerator pedal is released.

The retarder light on the CDU will light whenever the transmission retarder and exhaust valve brakes are activated.

The transmission retarder is applied when a retarder position is selected at the retarder switch and the accelerator pedal is fully released.

Retardation can be selected from a choice of 6 different retardation percentages.

15% retardation is applied when ever the service brake pedal is pressed, even if the switch is in the **OFF** position.

To resume driving, release service brake pedal. The transmission will automatically select the lowest gear.

Braking

The general rule for braking is that the retarder should be used before the service brakes in order to reduce the brake disc wear.

Service Brakes And Park Brake

During normal operation the machine must be stopped using the service brakes. When the machine is stopped and the transmission is set to Neutral with no service brake signal, the park brake will be automatically applied immediately.

Service Brakes

WARNING

The brakes may not function 100% when the hydraulic oil has not reached working temperature. Stopping distances will increase until working temperature has been reached.

Avoid using the service brake over extended periods. Excessive use of the service brakes will result in the brake assembly overheating which in extreme circumstances could result in a brake assembly failure.

Stopping the machine with the service brakes is done as follows:

1. Release the accelerator.

   When the accelerator is released the engine retarder as well as transmission retarder (if equipped) will be activated.

   It is recommended that the retarder brake function is used to slow the machine down and the service brakes used to stop the machine.

2. While driving the machine normally the brake pedal must be pressed.

The transmission will automatically select the lowest pull-off gear.

Park Brake (Normal Operation)

The park brake will be automatically applied, immediately, when the machine is stopped and the transmission placed in neutral, with no movement on the service brake pedal.

The park brake must only be applied when the machine is completely stationary.

When the machine is to be stopped for more than a few seconds the following must be done:

- Stop the machine using the service brake.
- Apply the park brake.
- Select Neutral **N**.
- Release the service brake.

Park Brake Protection

The park brake protection feature is to assist in pulling-off on an incline.

When the service brake pedal is not pressed and the truck is standing still (less than 1km/h) with the park brake on and the transmission is in gear then the engine torque is limited to 55%.

This limit is set at 55 % so that the park brake can be tested to function correctly without being able to drive through it. As soon as the park brake button on the SSM is released, 100% torque is available for pull away on steep inclines.

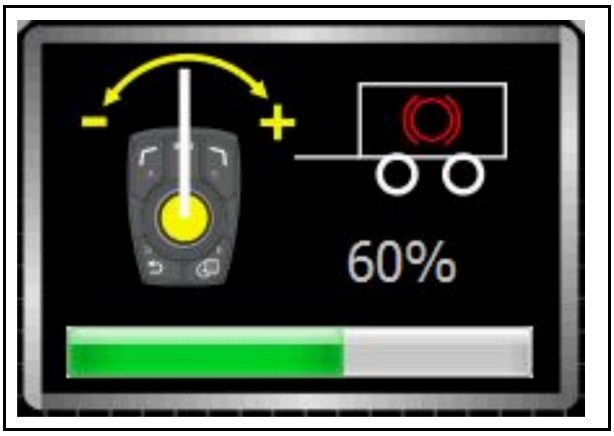
If the park brake is applied while driving (more than 1 km/h) then the engine torque is limited to 0% until the vehicle speed is below 1 km/h at which time 55% torque is allowed.

Trailer Brake (Haulers Only)

This option should only be switch ON if a trailer that is equipped with a braking system is coupled to the hauler.

The option is enabled in the machine config menu while in Dealer or Factory mode.

When the operator activates the service brake, the below screen will display on the CDU.



When the above screen is displayed on the CDU, the operator can adjust the percentage of braking required on the trailer depending on the haulage load.

Adjustments can be made by rotating the toggle device on the B-Drive to increase or decrease the percentage of braking required.

Emergency Braking

The park brake can be used (if possible in conjunction with the retarder) as an emergency brake if service and secondary brakes fail.

If the service brakes fail after the machine has been slowed down with the retarder, the machine can be stopped using the park brake. The following must be done:

The service brake system is designed such that the front and rear chassis brakes are applied via two separate brake control systems. If brake system failure occurs in one of the systems, the other system will still have sufficient retardation force to stop the machine. If both brake systems are defective use the park brake to stop the machine, as described above.

- Apply the park brake.
- When the machine has come to full stop, shut down the engine.
- Do not operate vehicle after emergency brake activation. Recover the vehicle to a work shop to be repaired.
- Replace the park brake pads and disc after emergency brake activation.
- Contact your **BELL EQUIPMENT** Product Support Representative.

Design and Function of Prop-Shaft System and Interaction with Park Brake

The function of the prop shaft is to transmit engine power to the axles and braking torque from the park brake to the rear axles. The prop shaft is an integral component to the functioning of the Park Brake System

Failure of Prop Shaft

In the event, that there is a failure of a prop shaft, apply service brake to bring the truck to a complete stop and keep engine running, with the service brake still applied.

Apply the inter axle Differential lock to fix the drive to the front axle.

Apply the park brake and call for assistance to chock the machine and conduct a risk assessment to ensure it is safe to release the service brake.

Operating With IDL (Inter Axle Diff Lock)

CAUTION

The differential lock must not be engaged when the machine is operating on tar or graded surfaces. This will cause damage to the differential.

The differential locks should be engaged when operating at a down hill or operating in ice or slippery conditions. This will ensure maximum vehicle traction is achieved.

The IDL is used to activate the inter axle differential lock in the transfer Case.

If the IDL switch is pressed while the left LED on the SSM switch is off, then the IDL will be applied and the left LED will illuminate.

If the IDL switch is pressed while the left LED is illuminated then the IDL will be switched Off.

The right LED on the SSM switch is for machines with CTD, which is not applicable to the B18- 30E.

The IDL Status light on the SSM switch on the CDU should flash if the request is active but feedback (from pressure switches) indicates that the function is not engaged.

It is recommended that the IDL lock is engaged when the machine is travelling over poor ground conditions.

IDL Protection

In the CCU the IDL output will only be turned ON while in automatic mode if the following parameters are met:

- The IDL SSM LED is **OFF**.
- The accelerator pedal position is less than 10%
- The output shaft speed (revs) is less than 60rpm.

ATC (Automatic Traction Control)

The ATC is set by default from factory.

If the IDL is switched ON then the ATC will switch OFF.

When there is spin-out on the wheels the machine will drop RPM and speed to allow the IDL to engage for a limited period of time.

Overspeed Ground Limitation

A speed limitation is implemented as increased protection against engine Overspeed conditions when using the gear hold function.

The engine speed relates to a specific ground speed for each gear, enabling the CCU to implement a specific ground speed limit when the gear range is reduced from 6 or when the gear hold is used to prevent the engine exceeding the engine speed limitation.

As the gear range is reduced or as a gear hold function is activated, the specific ground speed for that gear at which an engine Overspeed will occur is set as the Overspeed speed limitation.

This will prevent the retarder and engine brake Overspeed function, cycling each time the engine speed (rpm) drops when the gear is "punched through" by the transmission controller.

If the accelerator pedal is pressed and the pre-select 2nd output is active then there will be no speed limit active.

Hill assist

Hill Assist (or Roll Back Prevention) attempts to allow an operator to navigate steep inclines in a safer manner by reducing the possibility of the vehicle rolling down the hill in an unintended manner. To do this, the vehicle measures the incline of the slope and will do one of the following if the slope exceeds 18%.

Driving Forward up a Hill

If the output shaft speed falls below 100RPM and the operator puts his foot on the service brake, the park brake will automatically apply. This is to prevent the truck (especially laden) from rolling backwards down the slope against the torque converter. Once the operator puts his foot back on the accelerator pedal, the park brake will automatically release and the operator can continue to drive up the steep slope.

The park brake will also automatically release should the operator decide to rather reverse back down the hill.

Reversing up a Hill

If the output shaft speed falls below 100RPM and the operator puts his foot on the service brake, the park brake will automatically apply. This is to prevent the truck (especially laden) from rolling forwards down the slope against the torque converter. Once the operator puts his foot back on the accelerator pedal, the park brake will automatically release and the operator can continue to reverse up the steep slope.

The park brake will also automatically release should the operator decide to rather drive back down the hill.

Loading The Machine

The following procedure must be used to load the machine:

1. Position the machine in a straight ahead position.
2. Apply the park brake.
3. Select Neutral (N).

When the loading operator signals that the bin is fully loaded the following must be done:

4. Select Drive (D).
5. Release the park brake and drive off slowly.

Overloading Limp Mode

This option must be enabled by Technical Personnel and will prevent tipping and implements a 5 km/hr speed limitation limp mode on an overloaded machine.

When this option is enabled and the machine's payload exceeds its overload limit, the Overloading Limp Mode is activated and the machine is limited to 5 km/hr (which will activate a 1st gear limitation).

To de-activate the Overloading Limp Mode, the payload should be reduced to 5 metric tons below the machine's overload payload limit.

A "Limp Mode" pop-up message will be displayed momentarily on the CDU every 30 seconds, with a beep, if the Overloading Limp Mode is active.

Raising The Bin

It will not be possible to raise the bin if the machine is in 4th gear or higher. Only when the machine is in 3rd gear or below will it be possible to raise the bin. If the operator lifts the bin to between 5-15% and starts driving forward, the machine will be limited to 3rd gear. While in 3rd gear it will not be possible to raise the bin higher then 15%.

If the operator lifts the bin to between 15-50% and starts driving forward, the machine will be limited to 2nd gear and while in 2nd gear it will not be possible to raise the bin higher then 50%. If the operator lifts the bin to between 50-100%, and start driving forward, the machine will be limited to only 1st gear.

Reverse operation of the machine is not affected by the bin raised condition (as described above).

The engine exhaust brake is automatically applied and the exhaust brake warning indicator is illuminated during the above retardation period.

The display will show an amber bin up light and it will flash if the bin is up and in gear. If the bin is up and not in gear the display will show a green bin up light.

Reverse Bin Scrape Protection

NOTE

Bin scrape protection in reverse is built into the software. When the bin position is greater than 70% and the transmission is in reverse, the software will limit the engine torque to 20%. This will prevent the operator using the bin as a scraper when the machine is driven into the pile.

Lowering Bin

1. Position the machine in a straight ahead position.
2. Apply the park brake.
3. Select Neutral (N).
4. Increase the engine speed to approximately 1500 rpm.
5. Operate the bin-down switch.
6. Reduce engine speed as the bin reaches maximum travel.

CAUTION

Ensure that none of the load or other objects can prevent the tailgate closing fully during the bin lowering cycle.

WARNING

Ensure that there is no-one behind the machine before raising or lowering the bin.

NOTE

If the bin is not fully lowered (the bin raised warning indicator is illuminated), the machine has just been emptied and the bin is at 100%. The operator selects drive, and at the same time activates the bin-down switch, thus activating the detent. While the bin is between 100-50%, the machine is limited to only 1st gear. When the bin passes the 50% mark, the machine will allow shifting into 2nd gear and at the same time limits the machine to a maximum of 2nd gear while being between the points of 50-15%. As the bin passes the 15% mark, the machine will allow shifting into 3rd gear as the maximum. The machine will remain limited to a maximum of 3rd gear until the bin reaches 5%. At this point the detent becomes de-activated, and the bin float comes into effect. All limits are switched off, and the machine drives as normal.

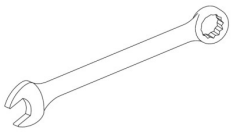
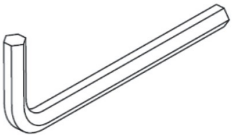
1. Select Drive (D).
2. Release the park brake and drive off slowly.

Bin Lowering Procedure After Engine/Pump Failure

WARNING

Ensure that there are no obstructions in the bin's path and that it is safe to lower the bin ensure that the cab stay is secured before working under the tilted cab. Do not make any adjustments while the machine is running.

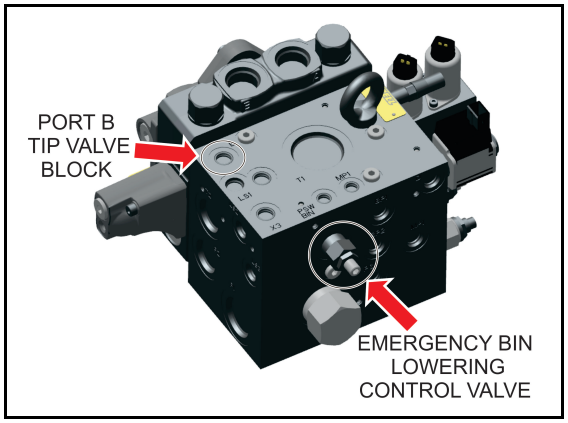
Tools and Equipment Required

Spanners	
	18mm Spanner (to loosen the cab bolts) 30mm Spanner
Allen Keys	
	5 mm
Hydraulic Hand Pump	

Procedure:

1. Inspect and examine the machine and the surrounding area where the machine has failed to determine if it is safe to commence with the emergency bin lowering. Ensure nothing will interfere with the bin movement when lowering the bin. Ensure all people are cleared from the machine and bin area.
2. Install the arctic lock if possible and place wheel chocks on two wheel sets either side of the machine. Also ensure the cab is not in the raised position when commencing with step 6 of this procedure.
3. If the bin is stuck in a position where the tip cylinders are not fully extended and the bin is not over centre on the bin pivots, steps 4 to 5 of this procedure could be left out and proceed with step 6. If the tip cylinders are full extended and the bin is over the centre of the pivot points, a hand pump will be required to assist with the lowering of the bin.
4. Use the 30mm spanners to loosen the cab bolts. Raise the cab and ensure the cab tilt lock is engaged.

5. Remove the plug on port B from the tip valve block (1/4” Allen Key). Connect the hose of the hand pump to port B. The hand pump will be used to jack the bin back over the center point of the bin pivots. The weight of the bin will then be used to lower the bin by controlling the emergency bin lowering control valve situated on the side of the tip valve block. Ensure to place the hand pump in a safe area next to the machine, clear from the rear chassis and bin of the machine.



CAUTION

Before continuing with step 6 of this procedure, ensure the cab is in the lowered position.

6. Use the 18mm spanner to loosen the lock nut of the emergency bin lowering control valve. This valve is situated on the side of the tip valve block. Access and controlling of this valve has been made possible without the need to raise the cab.

7. Use the 5mm Allen key and slowly turn the emergency bin lowering control valve counter clock wise to open the valve for the bin to come down. The more turns counter clock wise the faster the bin will lower. If a hand pump is connected to assist with the bin lowering, open the valve completely and give it two turns clock wise. This will ensure the valve is open and one can continue using the hand pump to jack the bin back over the bin pivot centre point.
Once over the bin pivot centre point, the weight of the bin will automatically start to take over and one can stop using the hand pump. To stop the bin from lowering again turn the valve clock wise until it has bottomed out. The bin lowering speed can be controlled using this bin lowering control valve. Continue with step 8 until the bin has been lowered to the full down position.

NOTE

One can only lower the bin and not lift the bin via this procedure.

8. Once the bin has been lowered as required, turn the emergency bin lowering valve clock wise until it has bottomed out to ensure this valve is closed.

9. Lock the valve with the lock nut.

10. If a hand pump was used to assist with the bin lowering. Lift the cab and engage the cab tilt lock. Disconnect the hand pump and replace the plug in port B on the tip valve block. Lower the cab and replace the cab bolts and fasten them.

NOTE

Illustration of the bin in the full tip position with the weight being over the centre point of the bin pivots. In scenarios where the bin is in the full tip position a hand pump is required to be connected to port B on the tip valve block to assist with the emergency bin lowering.

Steering

Normal Steering

WARNING

There is no self-centralising function on the machine steering. **After turning the steering, the machine must be straightened by turning the steering wheel to the straight ahead position.**

The machine’s normal steering system is operational when the engine is operating.

Emergency Steering

WARNING

If there is an engine or main pump failure, the ground driven emergency steering system will enable the operator to steer the machine to a safe stop.

In this event the machine must be stopped as quickly as possible.

There is no self-centralising function on the steering. The machine must be straightened by turning the steering wheel to the straight ahead position.

If the engine fails the machine must be steered to safety as soon as possible.

When the engine or main pump fails the emergency steering pump will become active.

The machine's emergency steering system is ground driven and will be operational until the machine is stationary.

When the emergency steering system is activated the emergency steering indicator on the centre instrument panel will flash together with the main warning light, and the buzzer will sound intermittently.

Testing Emergency Steering

Software version 2.10 and higher makes provision for an Emergency Steering test to be performed by the operator in order to verify the functionality of the emergency steering of the machine.

WARNING

This test must only be performed in a flat, open, demarcated area. The width of the demarcated area shall be at least twice the overall width of the test vehicle to enable the operator to test the steering to the left and right without moving out of the demarcated area. No other vehicles or pedestrians shall under any circumstances be allowed within the demarcated area or be parked within 2 metres of the demarcated area during testing.

Test Procedure

After doing the routine vehicle inspection, the operator may proceed with the test.

- Switch ignition ON and ensure that the CDU is in its default screen.
- From the CDU default screen press MENU and then NEXT to scroll to "4-Machine Config". Press SELECT.
- While in the "Machine Config" menu, scroll down to "6-Overrides" using the NEXT button, then press SELECT
- While in the "Overrides" sub-menu, scroll down to "2 - E/Steering test" using the NEXT button.

If not already started, the operator should at this stage start the machine.

With the engine running, press and hold the SELECT button for three beeps to enter Emergency Steering Confirmation.

Press SELECT for three beeps to confirm & enter Emergency Steering Test mode.

When the emergency steering test is active the message "Emergency Steering Test" flashes on the CDU and the buzzer sounds continuously.

While the test is active the following steps should be followed:

- Drive the machine to the desired speed (8 to 20 km/h) and then release the throttle.
- The transmission will default into Neutral and the engine will cut off, but if the ground speed is above 15 km/h, then the machine will slow down to below 15 km/h before the engine cuts off.
- The buzzer sounds with short, quick beeps notifying the operator that the engine has been cut.

At this point the operator must perform the steering test by turning to the left and right several times, making sure the machine is going in the intended direction.

When the machine slows to below 5 km/h the engine will re-start and the transmission revert back to forward gears

- To exit the test after the engine has been cut, press either the accelerator or brake pedal.
- Activating the park brake or emergency stop at any time during the test will terminate the test.
- As a safety precaution a speed limit of 25 km/h for this test has been built into the machine software.

Gear Selection

The transmission makes it unnecessary to select the right moment to up shift or down shift during changing travelling conditions.

However knowledge of the ranges and when to select them will make machine control and the operator's job easier.

The following is a brief summary of the range selections covered in this manual.

Reverse

Completely stop the machine before shifting from a forward gear to **R** or from **R** to a forward gear.

Neutral

Use N to start the machine and for periods of engine idle operation. N is selected by the TCU at start-up. Always select N before turning off the engine.

The shift from **N** to **D** or **R** is inhibited when the engine speed is above idle.

Drive

When **D** is selected with the On Board Weighing System, 2nd gear will be selected for pull-off if the truck is not loaded and 1st gear when the truck is loaded. As machine speed increases, the transmission will up-shift automatically through each gear. as the machine slows, the transmission will down-shift automatically. The monitor will display the highest range available.

Even though **D** is selected, it may not be attained due to active inhibit functions such as high throttle or engine idle speeds. Check for active diagnostic codes if **D** is not attained.

WARNING

If the operator just down-shifts or just uses the service brakes while going downhill, he may lose full control of the vehicle.

To help in keeping full control on down-hills, use a combination of down-shifting and braking.

Down-shifting to a lower gear increases engine braking and helps the operator maintain full control.

The transmission has a feature which prevents automatic up-shifting above the lower gear selected. However during downhill operation, if engine governed speed is exceeded in the lower gear, the transmission may shift to the next higher gear. This will reduce braking and may cause loss of control.

Apply service brakes to prevent exceeding engine governed speed in the lower gear selected.

Shift Control

Occasionally road conditions, load or traffic conditions will make it desirable to restrict automatic shifting to a lower gear. Lower gears provide greater engine breaking for going down grades (the lower the gear; the greater the braking effect).

Even though a lower gear was selected, the transmission may not down-shift until machine speed is reduced

The shift control utilises the (Up) and (Down) arrow buttons on the SSM to select individual forward gears. The CDU screen will display the operator's choice.

Even though a lower gear was selected, the transmission may not down-shift until machine speed is reduced .

Use 1st gear when pulling through mud and deep snow, when manoeuvring in tight spaces or while driving up/down grades.

1st gear provides the machine with maximum driving torque and maximum engine braking effect.

When selecting D from N and the bin is raised (bin raised warning indicator is illuminated), the transmission will limit gear selection to 1st gear. The CDU display will show "1".

As soon as the bin is fully lowered (bin raised warning indicator is extinguished), the transmission will automatically revert to normal gear selection.

Lowering The Bin

The machine has just been emptied and the bin is at 100%. The operator selects drive, and at the same time operates the bin-down switch thus activating the detent.

While the bin is between 100-50%, the machine is limited to only 1st gear. When the bin passes the 50% mark, the machine will allow shifting into 2nd gear and at the same time limits the truck to a maximum of 2nd gear while being between the points of 50-15%.

As the bin passes the 15% mark, the machine will allow shifting into 3rd gear as the maximum. The machine will remain limited to a maximum of 3rd gear until the bin reaches 5%. At this point the detent becomes de-activated, and the bin float comes into effect. All limits are switched off, and the machine drives as normal.

The CDU display will show "2" as long as retardation is in progress and will revert back to the original displayed value when:

- 2nd gear is attained and the machine has slowed down almost to a stop
- or when the operator applies the accelerator to cancel retardation.

  The engine exhaust brake is automatically applied and the exhaust brake warning indicator is illuminated during the above retardation period.

Range Hold

The range hold switch (on the SSM) allows the operator to manually hold the transmission in a gear of his choice to prevent shift cycling to improve cycle time in abnormal operating conditions.

The operator must watch gear position and engine rpm. When a lower gear is selected than the gears which the transmission is cycling between and engine speed. is increasing, the range hold switch must be applied.

When the switch is actuated, the gear which the transmission is in at the time, will be held.

No up-shifting will happen beyond this gear (except in over-speed conditions) but down-shifting is allowed.

The held gear is displayed on the CDU.

When the range hold switch is switched **OFF**, normal gear selection (up shifting) will continue and the CDU display will show the original value.

Gear Pre-Selection

Gear pre-selection means selecting a lower gear to match driving conditions which the operator encounters or expects to encounter.

Learning to take advantage of pre-selected shifts will give the operator better control on slick or icy surfaces and on downgrades.

Down-shifting to a lower gear increases engine braking.

The selection of a lower gear often prevents cycling between that gear and the next higher gear on a series of up-and-down gradients.

Make adjustments before you encounter an obstacle:

1. Select the correct gear and if necessary lock it before inclines and declines.
2. Select inter-axle diff locks and diff lock switches before going into soft ground conditions. It may also be advantageous to lock the transmission, as a gear change at the wrong time may get you bogged down.

Gear Hold Function

The Gear Hold switch is used to lock the transmission in a selected gear and prevent automatic gear shifting.

The Anti-Shift Cycle controlled by the CCU that holds the transmission in the lower gear for 12 seconds and engine at 2 120 rpm is overridden when this switch is activated.

The switch has two positions:

1. **OFF**; Normal position.
2. **ON**; Gear hold switched on.

When the switch is **OFF**, the transmission is in the normal automatic operating mode and the LED is **OFF**.

When the switch is **ON**, the transmission will hold the gear that it is in at the time of the switch being activated. Normal down shifting will occur, but the transmission will not up shifts to a higher gear until the switch is switched **OFF** (except in over speed conditions).

When the switch is activated, the CDU display screen will display the gear number that the transmission will be "held" in.

Transport Operation

When operating the machine in ideal conditions such as level graded surfaces, normal driving and gear selection must be used.

- The machine may be operated at maximum speed in accordance with the site and road regulations.
- Always adapt the machine speed to the road and traffic conditions.
- When driving through a bend do not drive too fast. The machine’s centre of gravity is changed which may cause the machine to tip or roll if the road is slippery or cambered the wrong way.
- The machine load must not be allowed to fall off the machine at any time.
- Do not use the inter-axle differential lock when operating on smooth graded surfaces.

- Due to the mass of the machine allow for long braking distances, especially on slippery roads.

Try to roll out ruts on the haul road do not follow the same route across the ground each time.

Operating on Slopes

WARNING

An ADT can be used in a wide variety of applications. Many of these applications present hazards related to machine stability when operated in soft and/or slippery conditions and/or on slopes. For this reason a risk assessment must be performed on the use of the machine per application. The risk assessment must be done in accordance with the local governing and/or ISO legislation. Whilst precautions have been taken to optimize the performance and stability of the vehicle, the risk assessment must identify and prioritise all additional actions to be taken to treat, tolerate or transfer the risks. When operating on slopes, the operator must pay special attention to sliding and/or rolling hazards. These hazards are dependent on site and operating conditions. When operator is unsure of potential hazards, a risk assessment must be done. The differential locks should be engaged when operating at a downhill or operating in ice or slippery conditions. This will ensure maximum vehicle traction is achieved Full use of the retarder shall be made before applying service brakes.

Uphill Operation

If the machine is operating in full automatic mode, transmission will select the correct gear for travelling uphill.

1. When operating on slippery roads the inter-axle differential lock must be applied to allow for even traction on all the driving wheels.
2. The engine speed must be kept constant at all times when driving uphill.

   NOTE

   Shift cycling or “gear hunting” on certain uphill applications can be eliminated by driving in manual gearshift mode or using gear hold switch.

“Gear Hunting”

NOTE

See "Gear Hold Switch" for more information on this function.

Under certain conditions, the transmission may start shift cycling or "gear hunting" i.e. the transmission changes up and down between two gears at short intervals. This is because the power is insufficient for operating in the higher gear but is sufficient for up shifting from the lower gear.

When the range hold switch is **ON** the transmission will hold the gear that it is in at the time of the switch being activated. Normal down shifting will occur, but the transmission will not up shift to a higher gear until the switch is switched **OFF** or an over speed condition occurs.

It is important to lock transmission in correct gear to prevent shift cycling. Lock in lower gear; e.g. if cycling between 2nd and 3rd, lock in 2nd gear.

When level ground is reached the machine must be operated normally.

Downhill Operation

WARNING

DO NOT OVER SPEED THE MACHINE!
Under NO circumstances must engine revolutions exceed 2800 rpm as serious damage can result.

- When driving downhill the exhaust brake and retarder must be utilised to assist the service brakes and to reduce brake pad wear.
- If necessary, slow down before the downhill slope begins so that the transmission automatically selects a low gear.
- During icy or other slippery conditions, utilise the inter-differential lock to improve traction and braking effect.
- Full use of the retarder must be made before applying service brakes.

WARNING

If the operator just down shifts or just uses the service brakes while going downhill, he may lose full control of the machine.

- To help in keeping full control on down hills, use a combination of down shifting, braking and the retarder.
- Downshifting to a lower gear increases engine braking and helps the operator maintain full control.

- The transmission has a feature which prevents automatic up shifting above the lower gear selected. However during downhill operation, if engine governed speed is exceeded in the lower gear, the transmission may up shift to the next higher gear. This will reduce braking and may cause a loss of control.

CAUTION

Apply the service brakes and/or retarder to prevent exceeding engine governed speed in the lower gear selected.

- To use the engine as a braking force, the operator must take his foot off the accelerator. The transmission will start to down shift and the exhaust brake will be applied.
- If the machine is exceeding the maximum speed for this gear, use the service brakes and/or retarder to slow the machine.
- When a lower speed is reached, the TCU will automatically down shift the transmission.
- Engine braking provides good speed control for travelling downhill. When the machine is fully loaded, or the gradient is steep, it may be desirable to pre-select a lower gear before reaching the gradient.
- Use the hydraulic retarder on severe gradients.
- If engine-governed speed is exceeded, the transmission will up shift automatically to the next gear.
- The maximum speed down slopes calculations are given on the decal in the cab (and in the decal chapter of this manual).
- A knowledge of the site is important, especially the altitude of the site and the maximum percentage slope liable to be encountered and also the continuous slope at the site. Remember that the calculations on the decal were calculated at sea level. Also take into account the ground conditions at the site when deciding upon gear selection.
- The maximum slope values on the following charts are calculated with the exhaust brake and exhaust valve brake fully functional, the transmission retarder set to maximum and the transmission locked in a specified gear.
- The continuous slope values are with the exhaust brake and exhaust valve brake fully functional.

B18E 6X4 Gradient Values At Altitude (with Retarder)

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	26%	13%
	500	25%	12%
	1000	24%	12%
	1500	22%	11%
	2000	21%	11%
	2500	20%	10%
	3000	19%	9%
2	0	23%	8%
	500	22%	8%
	1000	21%	7%
	1500	20%	7%
	2000	19%	6%
	2500	18%	6%
	3000	17%	6%
3	0	22%	6%
	500	21%	6%
	1000	20%	5%
	1500	19%	5%
	2000	18%	5%
	2500	17%	5%
	3000	16%	4%
4	0	16%	5%
	500	15%	5%
	1000	14%	5%
	1500	14%	4%
	2000	13%	4%
	2500	12%	4%
	3000	11%	4%
5	0	13%	4%
	500	12%	4%
	1000	12%	4%
	1500	11%	3%
	2000	11%	3%
	2500	10%	3%
	3000	9%	3%
6	0	11%	4%
	500	10%	4%
	1000	10%	4%
	1500	9%	3%
	2000	9%	3%
	2500	8%	3%
	3000	8%	3%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

B18E 6x4 Gradient Values At Altitude (without Retarder)

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	26%	13%
	500	25%	12%
	1000	24%	12%
	1500	22%	11%
	2000	21%	11%
	2500	20%	10%
	3000	19%	9%
2	0	23%	8%
	500	22%	8%
	1000	21%	7%
	1500	20%	7%
	2000	19%	6%
	2500	18%	6%
	3000	17%	6%
3	0	22%	6%
	500	21%	6%
	1000	20%	5%
	1500	19%	5%
	2000	18%	5%
	2500	17%	5%
	3000	16%	4%
4	0	16%	5%
	500	15%	5%
	1000	14%	5%

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
	1500	14%	4%
	2000	13%	4%
	2500	12%	4%
	3000	11%	4%
5	0	13%	4%
	500	12%	4%
	1000	12%	4%
	1500	11%	3%
	2000	11%	3%
	2500	10%	3%
	3000	9%	3%
6	0	11%	4%
	500	10%	4%
	1000	10%	4%
	1500	9%	3%
	2000	9%	3%
	2500	8%	3%
	3000	8%	3%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

B20E 6x4 Gradient Values At Altitude

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	500	12%	12%
	1000	12%	12%
	1500	11%	11%
	2000	11%	11%
	2500	10%	10%
	3000	9%	9%
2	500	8%	8%
	1000	7%	7%
	1500	7%	7%
	2000	6%	6%
	2500	6%	6%
	3000	6%	6%
3	500	6%	6%
	1000	5%	5%
	1500	5%	5%
	2000	5%	5%
	2500	5%	5%
	3000	4%	4%
4	500	5%	5%
	1000	5%	5%
	1500	4%	4%
	2000	4%	4%
	2500	4%	4%
	3000	4%	4%
5	500	4%	4%
	1000	4%	4%
	1500	3%	3%
	2000	3%	3%
	2500	3%	3%
	3000	3%	3%
6	500	4%	4%
	1000	4%	4%
	1500	3%	3%
	2000	3%	3%
	2500	3%	3%
	3000	3%	3%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

B20E Non-Retarder Gradient Values At Altitude (Low Ground Pressure)

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	22%	22%
	500	21%	21%
	1000	20%	20%
	1500	19%	19%
	2000	18%	18%
	2500	17%	17%
	3000	16%	16%
2	0	12%	12%
	500	11%	11%
	1000	11%	11%
	1500	10%	10%
	2000	10%	10%
	2500	9%	9%
	3000	9%	9%
3	0	10%	10%
	500	10%	10%
	1000	9%	9%
	1500	9%	9%
	2000	8%	8%
	2500	8%	8%
	3000	7%	7%
4	0	8%	8%
	500	8%	8%
	1000	7%	7%
	1500	7%	7%
	2000	7%	7%
	2500	6%	6%
	3000	6%	6%
5	0	6%	6%
	500	6%	6%
	1000	5%	5%
	1500	5%	5%
	2000	5%	5%
	2500	5%	5%
	3000	4%	4%
6	0	6%	6%
	500	6%	6%
	1000	5%	5%
	1500	5%	5%
	2000	5%	5%
	2500	5%	5%
	3000	4%	4%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

2304E Gradient Values At Altitude

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	10%	10%
	500	10%	10%
	1000	9%	9%
	1500	9%	9%
	2000	8%	8%
	2500	8%	8%
	3000	8%	8%
2	0	6%	6%
	500	6%	6%
	1000	6%	6%
	1500	5%	5%
	2000	5%	5%
	2500	5%	5%
	3000	5%	5%
3	0	5%	5%
	500	5%	5%
	1000	5%	5%
	1500	4%	4%
	2000	4%	4%
	2500	4%	4%
	3000	4%	4%
4	0	4%	4%
	500	4%	4%
	1000	4%	4%

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
	1500	4%	4%
	2000	3%	3%
	2500	3%	3%
	3000	3%	3%
5	0	4%	4%
	500	4%	4%
	1000	4%	4%
	1500	4%	4%
	2000	3%	3%
	2500	3%	3%
	3000	3%	3%
6	0	4%	4%
	500	4%	4%
	1000	4%	4%
	1500	4%	4%
	2000	3%	3%
	2500	3%	3%
	3000	3%	3%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

B25E Gradient Values At Altitude — S.A

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	30%	23%
	500	29%	22%
	1000	28%	22%
	1500	27%	21%
	2000	26%	20%
	2500	25%	19%
	3000	24%	19%
2	0	26%	12%
	500	25%	12%
	1000	24%	11%
	1500	24%	11%
	2000	23%	10%
	2500	22%	10%
	3000	21%	10%
3	0	22%	9%
	500	21%	9%
	1000	21%	8%
	1500	20%	8%
	2000	19%	8%
	2500	19%	8%
	3000	18%	7%
4	0	16%	6%
	500	15%	6%
	1000	15%	6%
	1500	14%	5%
	2000	14%	5%
	2500	13%	5%
	3000	13%	5%
5	0	13%	5%
	500	13%	5%
	1000	12%	5%
	1500	12%	5%
	2000	11%	4%
	2500	11%	4%
	3000	11%	4%
6	0	11%	5%
	500	11%	5%
	1000	10%	5%
	1500	10%	5%
	2000	10%	4%
	2500	9%	4%
	3000	9%	4%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

B25E Gradient Values At Altitude — Euro

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	33%	25%
	500	32%	24%
	1000	30%	23%
	1500	29%	22%
	2000	27%	20%
	2500	26%	19%
	3000	24%	18%
2	0	27%	13%
	500	26%	12%
	1000	25%	12%
	1500	23%	11%
	2000	22%	11%
	2500	21%	10%
	3000	20%	9%
3	0	23%	10%
	500	22%	10%
	1000	21%	9%
	1500	20%	9%
	2000	19%	8%
	2500	18%	8%
	3000	17%	7%
4	0	17%	7%
	500	16%	7%
	1000	15%	6%
	1500	15%	6%
	2000	14%	6%
	2500	13%	5%
	3000	12%	5%
5	0	13%	6%
	500	12%	6%
	1000	12%	5%
	1500	11%	5%
	2000	11%	5%
	2500	10%	5%
	3000	9%	4%
6	0	12%	5%
	500	11%	5%
	1000	11%	5%
	1500	10%	4%
	2000	10%	4%
	2500	9%	4%
	3000	9%	4%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

2806E Gradient Values At Altitude

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	17%	17%
	500	16%	16%
	1000	16%	16%
	1500	15%	15%
	2000	14%	14%
	2500	14%	14%
	3000	13%	13%
2	0	10%	10%
	500	10%	10%
	1000	9%	9%
	1500	9%	9%
	2000	8%	8%
	2500	8%	8%
	3000	8%	8%
3	0	8%	8%
	500	8%	8%
	1000	7%	7%
	1500	7%	7%
	2000	7%	7%
	2500	6%	6%
	3000	6%	6%
4	0	6%	6%
	500	6%	6%
	1000	6%	6%
	1500	5%	5%
	2000	5%	5%

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
	2500	5%	5%
	3000	5%	5%
5	0	5%	5%
	500	5%	5%
	1000	5%	5%
	1500	4%	4%
	2000	4%	4%
	2500	4%	4%
	3000	4%	4%
6	0	5%	5%
	500	5%	5%
	1000	5%	5%
	1500	4%	4%
	2000	4%	4%
	2500	4%	4%
	3000	4%	4%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

B30E Stage 2 Gradient Values At Altitude

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	47%	20%
	500	36%	15%
	1000	24%	10%
	1500	13%	6%
	2000	2%	1%
	2500	-9%	-4%
	3000	-21%	-9%
2	0	42%	13%
	500	32%	10%
	1000	22%	7%
	1500	12%	4%
	2000	2%	1%
	2500	-8%	-3%
	3000	-18%	-6%
3	0	37%	9%
	500	28%	7%
	1000	19%	5%
	1500	10%	3%
	2000	1%	0%
	2500	-7%	-2%
	3000	-16%	-4%
4	0	27%	7%
	500	21%	5%
	1000	14%	4%
	1500	8%	2%
	2000	1%	0%
	2500	-5%	-1%
	3000	-12%	-3%
5	0	19%	5%
	500	14%	4%
	1000	10%	3%
	1500	5%	1%
	2000	1%	0%
	2500	-4%	-1%
	3000	-8%	-2%
6	0	16%	5%
	500	12%	4%
	1000	8%	3%
	1500	4%	1%
	2000	1%	0%
	2500	-3%	-1%
	3000	-7%	-2%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

B30E Stage 4 & 5 Gradient Values At Altitude

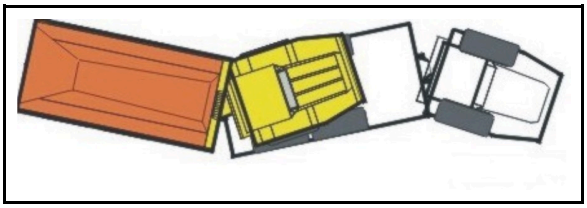
Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
1	0	38%	25%
	500	32%	21%

Gear	Altitude (m)	Max slope at altitude	Continuous slope at altitude
	1000	25%	17%
	1500	19%	12%
	2000	12%	8%
	2500	6%	4%
	3000	0%	0%
2	0	29%	16%
	500	24%	13%
	1000	19%	11%
	1500	14%	8%
	2000	9%	5%
	2500	5%	3%
	3000	0%	0%
3	0	23%	11%
	500	19%	9%
	1000	15%	7%
	1500	11%	5%
	2000	8%	4%
	2500	4%	2%
	3000	0%	0%
4	0	16%	8%
	500	13%	7%
	1000	11%	5%
	1500	8%	4%
	2000	5%	3%
	2500	3%	1%
	3000	0%	0%
5	0	12%	6%
	500	10%	5%
	1000	8%	4%
	1500	6%	3%
	2000	4%	2%
	2500	2%	1%
	3000	0%	0%
6	0	11%	6%
	500	9%	5%
	1000	7%	4%
	1500	5%	3%
	2000	4%	2%
	2500	2%	1%
	3000	0%	0%

GRADIENT VALUES PUBLISHED ON THE RETARDATION DECAL ARE SUBJECT TO MAXIMUM BRAKE SLOPE VALUES PER BRAKE TEST STANDARD. THE ABOVE GRADIENT VALUES REPRESENT MAXIMUM RETARDATION CAPABILITY AND EXCLUDES BRAKE STANDARD REQUIREMENTS.

Off-road Operation

- Do not operate too close to quarry edges, ramp edges, quay edges and soft edges that may collapse under the machine weight.
- Always use the inter-axle differential lock and six-wheel drive during off-road operation when there is a risk of wheels slipping.
- Always engage the inter-axle differential lock before any of the wheels begin to slip.



- To cover difficult areas (e.g. soft mud) use the articulation steering combined with the inter-axle differential lock to move through the area in the so called “duck waddle”.
- Where the ground is particularly soft and there is no space restriction, choose a new track for each approach to avoid making deep tracks.

Loading

Ensure there is sufficient space for the machine before entering confined areas.

Ensure that no personnel are near the machine or loading area.

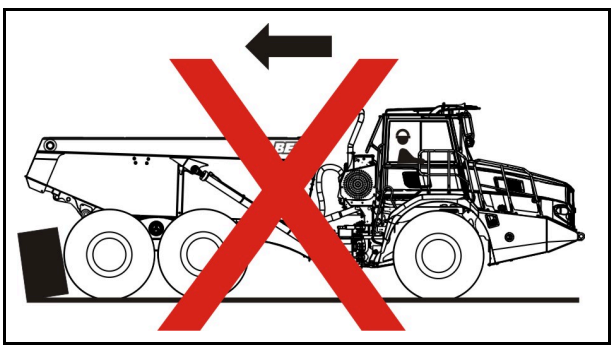
Take special care during loading as the machine mass changes during this operation.

- Do not operate too close to quarry edges, ramp edges, quay edges and soft edges that may collapse under the machine's weight.
- Be aware of other machines and personnel when entering or leaving the loading area.
- If a spotter is present follow only his instructions.
- Reverse up to a loading machine in a single, straight manoeuvre so that you can maintain eye contact at all times with the operator of the loader.
- Steer the machine so that it is straight. The operator must have clear and unobstructed vision through his rear view mirrors. If the machine is articulated and not in the straight ahead position the operator may find it difficult to observe the spotter and the loading machines.
- Stop the machine on a firm level surface.
- Ensure that the bin is fully lowered so that the load is not dumped into a bin which is supported on the tip cylinders.
- Do not overload by exceeding the rated capacity of the machine. The operator of the dump truck is responsible for the size and mass of the load.
- Ensure the machine is loaded evenly. An uneven load will cause tyre and axle damage.

Before moving off with a load ensure that it is safely contained in the bin and no part of it can fall off. Ensure that no parts of the load are protruding from the bin.

WARNING

When reversing the machine to tip or load, be sure to bring the machine to a complete stop using the brakes. Do not let the wheels run into any bund walls or solid structures, as this may lead to structural damage of the machine.



Tipping

WARNING

Be careful when tipping the bin. It is possible that the material may stick to the bin and when the bin reaches a certain point, the front chassis may lift from the ground. Also see "Avoid Machine Tipping Accidents" in the SAFETY section.

Do not operate the bin tip unless the transmission is in Neutral (or dumping in 1st or Reverse). This practice can over-ride the safety functions and could cause damage to the machine and/or personal injury.

There is a risk that the ADT will "tip" over if the leafspring fails and the tailgate does not open while tipping.

Clean out any blockage on the bin especially the area that the tailgate rests on. This will insure that the tailgate closes fully and that no stress is put onto the leafsprings.

- If the bin position is greater than 70% and the transmission is in reverse, the engine torque will be limited to 20% to avoid that the operator use the bin as a scraper when fully tipped or drives into a pile.
- When tipping a load from the bin, the centre of gravity will continuously change and the condition of the ground will determine the stability of the machine.
- Special care must be taken when tipping sticky material eg. wet clay or freezing material. Material sticking to the bin will influence the stability of the machine.
- Ensure there is sufficient space for the machine before entering confined areas.
- Ensure that the bin tipping path is free of obstruction, such as overheard structures, Bund walls or material stock piles. Tipping against such obstructions may restrict the bin movement resulting in the tip cylinders being over pressurised while try to force the bin, this could cause damage to the tip cylinders or their parts and may render them inoperable.
- Do not operate or stop too close to quarry edges, ramp edges, quay edges and soft edges that may collapse under the machine mass. The use of stopping chocks or other safety devices is recommended. Take special care during loading and tipping as the machine mass changes during these operations.
- Reverse up to the unloading site in a single, straight manoeuvre so that you can maintain eye contact at all times with the spotter and have all-round vision from the machine.

- If a spotter is present follow only his instructions.
- Steer the machine so that it is straight and on level ground. The operator must have clear and unobstructed vision through his rear view mirrors. If the machine is articulated and not in the straight ahead position the operator may find it difficult to observe the spotter and the dumping action.
- The front and rear of the machine must be aligned (no articulation) while tipping and loading, in order to ensure maximum machine stability.
- When raising the bin ensure that when the bin is fully raised it is no less than 3 metres (10') away from any power lines.
- Ensure that no personnel are near the machine or dumping area.
- Ensure that there are no debris or obstructions between the bin and chassis before lowering the bin.
- Be aware of other machines and personnel when entering or leaving the dumping area.
- Refer to machine's ability to signal warning for tipping angle through the inclinometer. The roll percentage warning limit can be set between 5% and 20% (default of 10%).

Operating Indoors

Machines may only be operated in buildings approved by site management.

When operating the machine indoors ensure that there is sufficient ventilation for the exhaust fumes to escape.

Do not exceed the maximum floor load when operating indoors.

Ensure that there is enough space overhead to raise the bin to the maximum position.

Preservation and Storage of Machine

Short-term storage covers periods up to two months and long-term storage periods exceeding two months.

The intended safe storage temperature range of a standard machine is -20 ˚C to 45 ˚C.

Short Term Storage of Machine

Overnight Parking

When the machine is to be parked overnight the following must be done:

- Ensure the machine is unloaded.
- Park the machine on firm level ground.
- Move all the switches to the **OFF** position.
- Ensure the transmission is in Neutral **N**.
- Ensure the park brake is applied.
- Shut down the engine.
- Lock the cab door.
- Ensure the battery box is locked.
- Ensure that the fuel cap and the bonnet release levers are locked.

Long Term Storage of Machine

The following must be done to the machine prior to storage.

- Wash the machine and touch up the paint finish to avoid rusting.
- Treat exposed parts with anti-rust agent, lubricate the machine thoroughly and apply grease to unpainted surfaces such as steering, tip and cab tilt cylinders. Pull the pistons in the hydraulic cylinders in as far as possible and coat the chrome with a viscous lubricant. (General Purpose Grease)
- Inflate the tyres to the recommended tyre pressure.
- Fill the fuel tank and the hydraulic oil tank to the maximum marks.
- Check the anti-freeze properties and drain fluids as appropriate.
- Cover the exhaust pipe (when parked outdoors for some time).
- Use inhibitor paper to protect the paint work of the machine.
- Grease all greasing points.
- Use a suitable coating to protect all rubber surfaces.
- Use a thin film of oil on all exposed metal surfaces.
- Batteries to be removed and maintained off-site.

Removal of Preservation Material

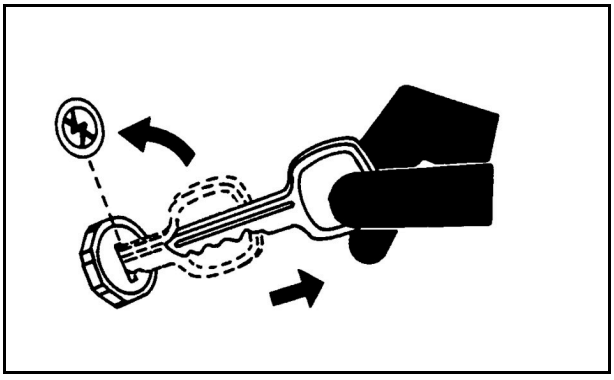
The following must be done to the machine prior to use (After long term storage).

- Unwrap inhibitor paper.
- Clean all grease nipples at the greasing points and grease the machine.
- Wash all rubber and exposed metal surfaces using a suitable detergent.
- Wash the machine and touch up the paint finish to avoid rusting.
- Inflate the tires to the recommended tyre pressure.
- Fill the fuel tank and the hydraulic oil tank to the maximum marks.
- Check the anti-freeze level and replenish if required.
- Remove the cover from the exhaust pipe.

Crime Prevention Tips

- Keep proof of ownership.
- Mark the machine with your own unique numbering system.
- Take photographs from several angles of your machines.
- Maintain an up-to-date inventory of your machines. Keep your documented identification numbers, photographs and inventory in a safe and secure location.

Keep Machines Secure



When the machine is in storage lock the doors, battery box, fuel cap etc. and remove any keys.

Remove batteries.

When parking indoors, put large equipment in front of exits and lock your storage buildings.

When parking outdoors, store in a well-lit and fenced area. Make note of suspicious activity and report any thefts immediately.

Notify your **BELL EQUIPMENT** dealer of any losses.

Park Indoors And Out Of Sight

- Park large equipment in front of exits.
- Remove batteries when in storage.
- Lock cab doors, windows, latches, battery box and fuel cap.
- Lock the building.

When Parking Outdoors

Park in well-lit, fenced area.

Remove batteries when machine is in storage.

Lock cab doors, windows, latches, battery box and fuel cap.

Operator Comfort

Operator comfort can be improved by reducing vibrations, the following guidelines can help:

Machine Operation

1. Drive around obstacles and rough terrain.
2. Slow down when it is necessary to travel over rough terrain.
3. Steer Gently.
4. Brake Gently.
5. Operate the bin correctly to prevent hard cylinder end-stop impacts.

Machine Suspension Maintenance

1. Maintain tyre pressures according to **BELL EQUIPMENT** specifications.
2. Check the suspension strut heights and maintain to **BELL EQUIPMENT** specifications if necessary.
3. Check suspension linkages to ensure correct operation.
4. Adjust the seat height so that the seat does not hit the end-stops.

5. Adjust the variable damper in the seat to prevent impact on the end-stops.

General Machine Maintenance

1. Ensure that the bin float function is working correctly.
2. Maintain bin pads and inspect bin pad clearance.
3. Maintain brake and steering systems according to **BELL EQUIPMENT** specifications.

Further Comfort Tips

1. Adjust the seat and adjust the controls so that good posture can be maintained.
2. Adjust the mirrors to avoid having to twist for good visibility.
3. Organise breaks in order to reduce long periods of sitting.

Site and Road Conditions

1. Carrying out maintenance on surface.
2. Removing large rocks and obstacles.
3. Filling ditches and holes.

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SERVICE INFORMATION

♦ GENERAL SERVICE INFORMATION
♦ FLUIDS AND LUBRICANTS INFORMATION

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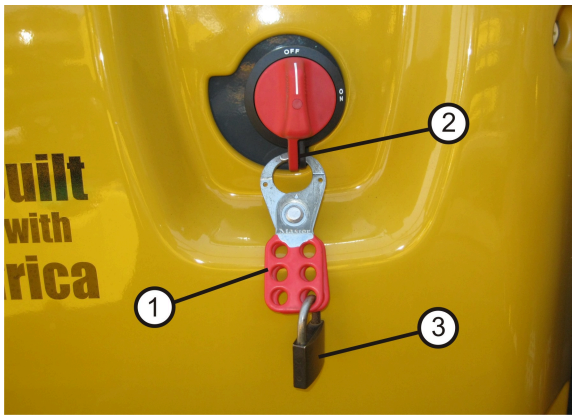
Lock-Out Points

Folding lockout scissor clamp, allowing six different padlocks to lock out one device.

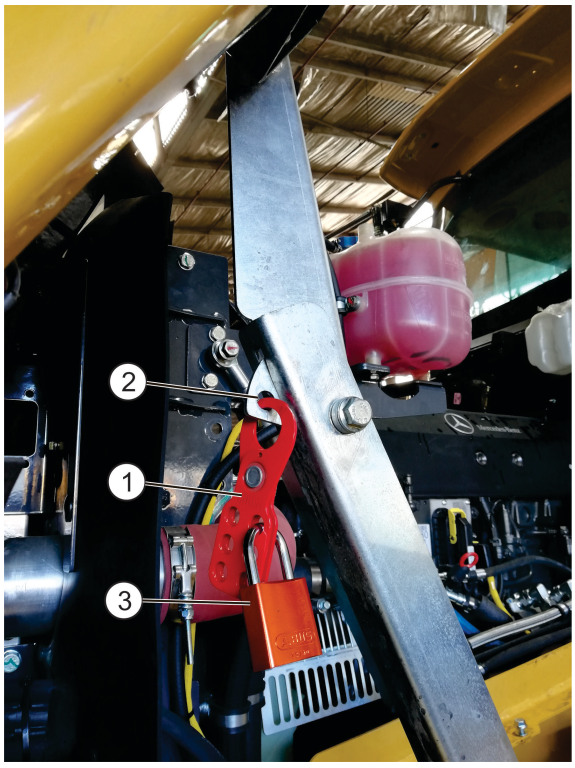
Battery Isolator Switch

Folding lockout scissor clamp (1) should be installed to the lock-out point (2) with your own pad lock (3) when ever the Isolator switch is in the Off position.



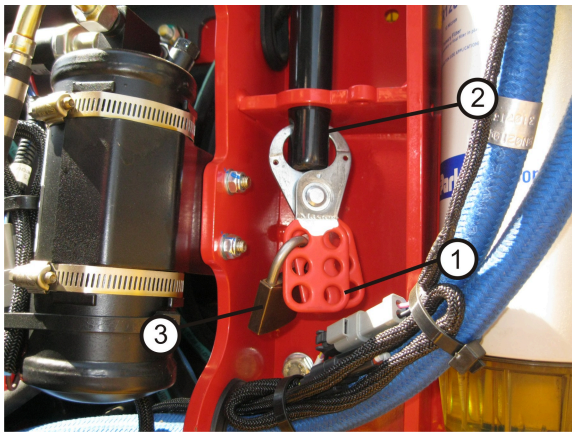
Bonnet Lock-Out Point

Folding lockout scissor clamp (1) should be installed to the lock-out point (2) with your own pad lock (3) when ever the bonnet is opened for inspection or maintenance.



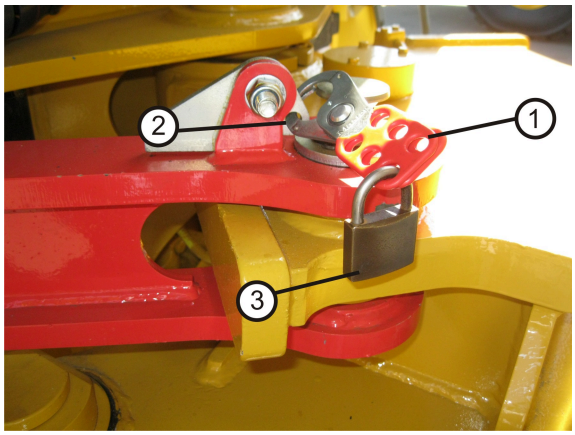
Cab Tilt Pump Lock-Out Point

Folding lockout scissor clamp (1) should be installed to the lock-out point (2) with your own pad lock (3) when ever the cab has been tilted for inspection or maintenance.



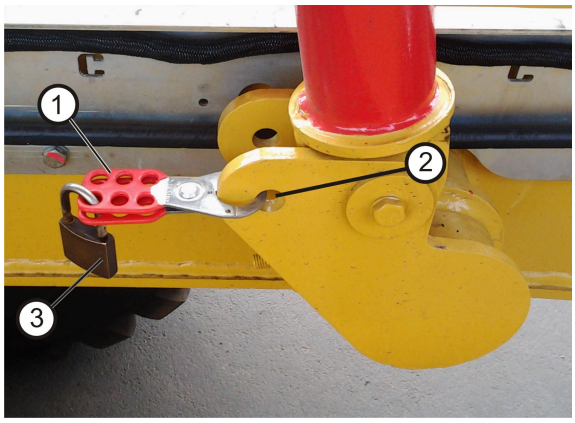
Articulation Safety Bar Lock-Out point

Folding lockout scissor clamp (1) should be installed to the lock-out point (2) with your own pad lock (3) when ever the Articulation Safety Bar is installed.



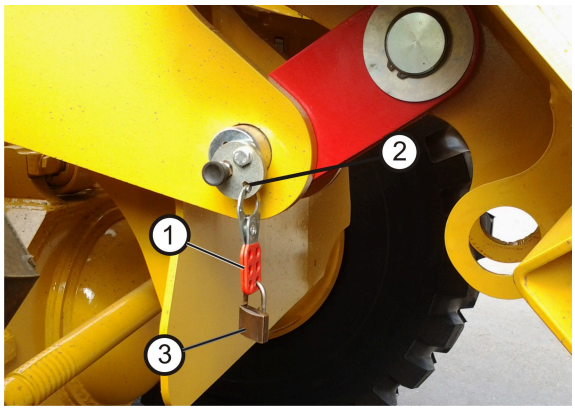
Bin Prop Lock-Out point

Folding lockout scissor clamp (1) should be installed to the lock-out point (2) with your own pad lock (3) when ever the Bin Prop is installed.



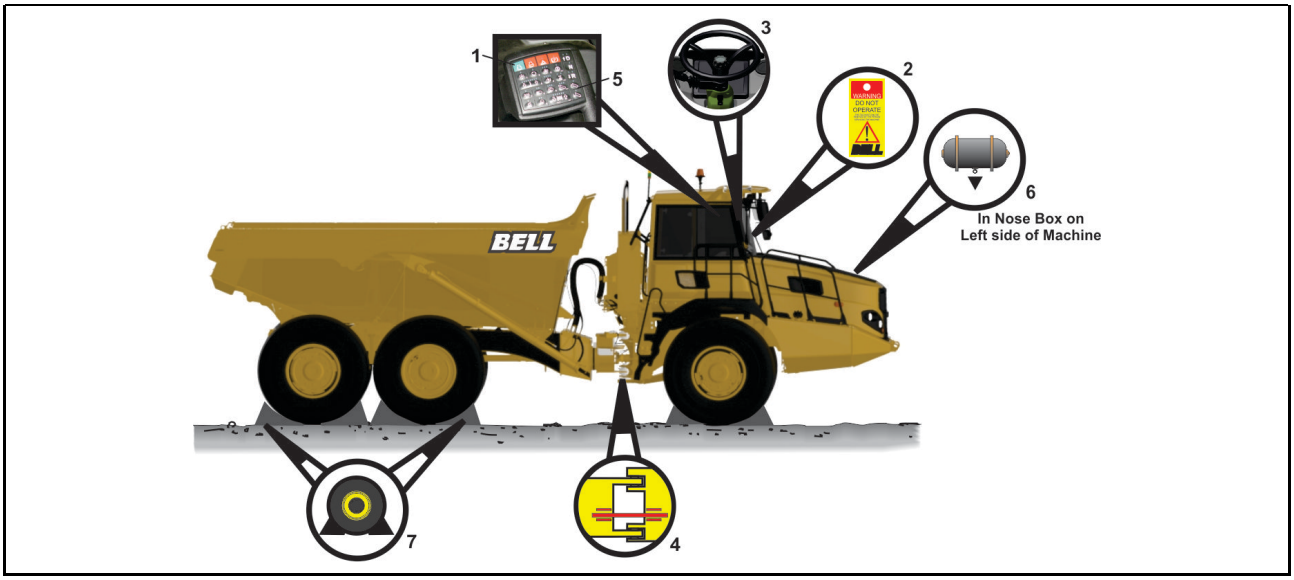
Over Centre Bin Lock, Lock-Out point

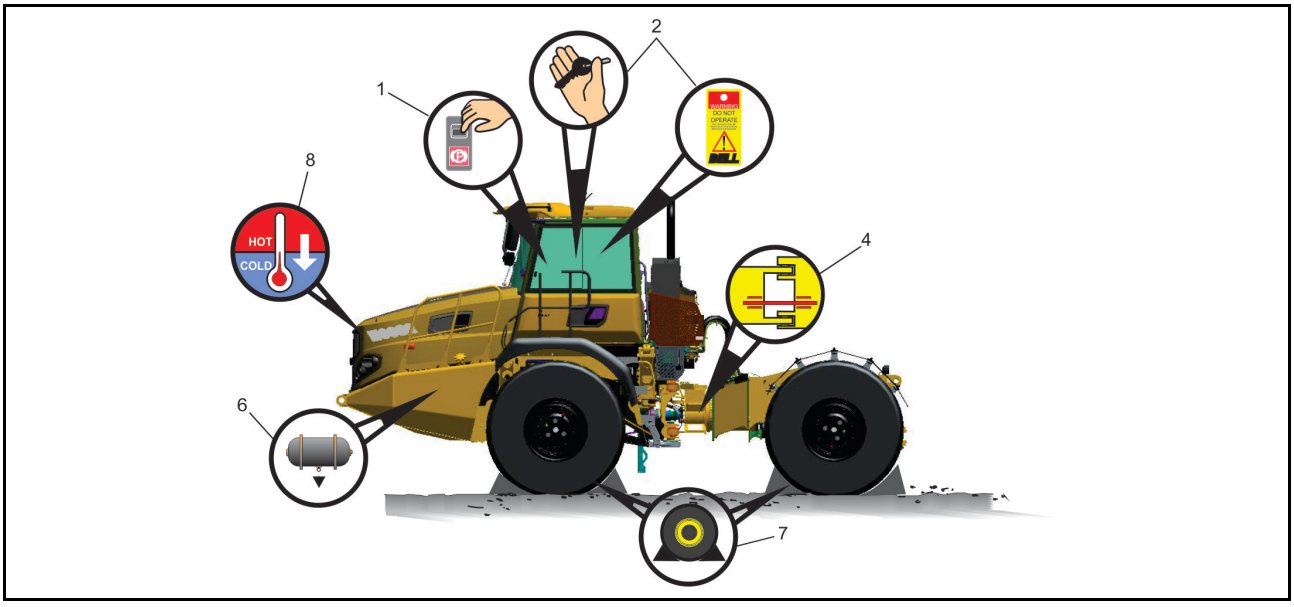
Folding lockout scissor clamp (1) should be installed to the lock-out point (2) with your own pad lock (3) when ever the Over Centre Bin Lock is installed.



Service Position

Before starting to work on the machine, unload it, wash it thoroughly and park it on firm level ground with the bin lowered.





WARNING

If the following steps are not observed it could result in injury or death.

When servicing the machine and one of the axles of the machine is raised off the ground using jacks, the wheels on at least one of the other axles must be chocked. This is because there is a risk that the machine may roll off the jacks, even if the park brake is applied. Beware of hot fluids and components. Do not work on a hot machine.

Park the machine in the straight ahead position and prepare for servicing as detailed below:

1. Shut down the engine and apply the park brake.
2. Attach the **DO NOT OPERATE** warning sign to the steering wheel.
3. Relieve hydraulic pressure by turning the steering back and forth 3 times.
4. Install the articulation safety bar and lock out using a folding lockout scissor clamp. (Refer to "Lock Out Points" in this manual)
5. If bin is fully lowered, hydraulic pressure is automatically relieved. When raised and bin prop and / or bin up-lock is installed, operate

bin-up and bin-down 3 times to ensure that the weight of the bin is securely settled onto the bin prop and / or bin up-lock.

6. Relieve pneumatic pressure.
7. Install wheel chocks to ensure that the machine cannot move backwards or forwards during the service.
8. Allow the machine to cool down.
9. Relieve all pressure in the relevant system before any lines, fittings or related items are disconnected or removed, as follows:
   a. Relieve the air pressure by holding open the drain valve on the air reservoir.
   b. The cooling system pressure can only be safely relieved by allowing the engine coolant to cool down until it is safe to remove the filler cap.
   c. The hydraulic, fuel and air conditioner system pressures must only be relieved by qualified personnel.
   d. Relieve pressure in brake accumulators by applying and releasing the brake pedal at least 20 times.

Service Safety

Maintenance and repair work must be carried out by competent and suitably qualified personnel. Refer to Service and Parts Manuals for recommended tools and parts.

WARNING

Read and understand all of the safety information in this manual before performing any of the following procedures and obey all Warnings and Cautions contained in the sections. Refer to the detailed procedures in the relevant chapter.

Other safe servicing procedures are summarised below.

- Do not carry out any work on the machine unless you are trained and have the knowledge to carry out the work.
- Service which is not carried out in the correct way may be dangerous. Make sure that you have sufficient knowledge, the correct information, the correct tools and the right equipment in order to carry out the service in the correct way.
- Never articulate the machine before checking that the articulation area is clear of obstructions.
- Repair or change broken tools and faulty equipment. Read all plates and decals on the machine and in the manual before you start servicing the machine. Each of the instructions contains important information about handling and servicing.
- Do not wear loose fitting clothing or jewellery when working on the machine.
- Always wear a hard hat, safety glasses, gloves, shoes and other protective articles as the job requires.
- When carrying out service work in the articulation area, ensure that the articulation safety bar has been installed and locked out.
- Always stop the engine to service the machine, unless otherwise instructed in this manual.
- When changing oil in the engine, fluid in the hydraulic system or transmission, remember that the oil and fluid may be hot and can cause burns.
- When lifting or supporting components, use equipment with a lifting capacity which is at least as great as the components.
- All lifting devices, for example slings and ratchet blocks, must comply with national regulations for lifting devices. **BELL EQUIPMENT COMPANY SA (PTY) LTD** will not accept any responsibility if any lifting devices, tools or working methods are used other than those described in this manual.
- Stop the engine before removing engine covers or similar.
- Make sure that no tools or other objects which can cause damage are left in or on the machine.
- Switch OFF the batteries disconnect switch (Isolator Switch) and lock out or disconnect the battery before performing maintenance on the machine.
- Relieve the pressure in the relevant system gradually before starting to work on a system component or assembly.
- All pressurised vessels must be opened very carefully.
- When checking for leaks, use a piece of paper or wood, do not use your hands.
- Never set a pressure limiting valve to a higher pressure than that recommended by the manufacturer. Only qualified personnel must adjust any valve settings.

- Before starting the engine indoors, make sure that the ventilation is sufficient to cope with the exhaust gases.
- Do not stand behind the machine while the engine is running.

Service History

If there is a service due within the next 50 machine hours, there will be a single "pop-up" message displayed on the CDU screen (on ignition-on), with a buzzer beep to alert the operator that a service is due. This "pop-up" will display the number of hours left until the service is due.

If the machine surpasses the service due machine hours, without the service being done [or the service done signal being re-set (by Service Personnel)] then the ignition-on "pop-up" message will display **Service X hours Overdue**.

In addition to these service messages there will is an option to have a "pop-up" message with a buzzer beep every 5-minutes to alert the operator that the scheduled service is due within the 50 hour service period.

This 5-minute "pop-up" will include the number of hours that the service is due or overdue.

The 5-minute warning option is enabled by default from the factory.

This 5-minute warning option can be disabled by Technical Personnel, under the options in Service Mode.

The "service done" flag can be re-set by service technicians via the CDU.

Refer to the Operator Controls section - CDU display screens for more information.

Daily Walk Round Check Before Servicing

- Check the radiator coolant level.

  Check when cold.
- Check the engine oil level.

  Report, if replenishing required.
- Check for oil and fluid leaks.

  Check all around and under the machine.
- Check the transmission oil level.

  Check cold or warm with engine idling. Electronically using the operator's display, report to service personal if replenishing required.
- Check the hydraulic oil level (sight glass).

  Check cold. Report, if replenishing required.
- Check the wet disk brake oil level (B30E only).

  Check cold. Report, if replenishing required.
- Check the operator controls and instruments.

  Functional test.
- Check the warning lights and warning buzzer.

  Check on start-up.
- Check that the external lights and reverse Camera are securely mounted and focused.

  Check on start-up.
- Clean the external lights and reverse Camera using a damp cloth too wipe the lenses.
- Check cleanliness of machine and coolers.

  Report to workshop any build up of debris especially around exhaust, heat shields and coolers.
- Check drive line and suspension fasteners.

  Not missing or loose.
- Check park and service brakes.

  Functional test.
- Regular inspection of the general condition of the propshaft is required as specified in the RSG (drive shafts).

  NOTE

  Should the propshaft bolts be removed for repair or inspection to the propshaft during the recommended service intervals, new bolts should be used when installing the propshaft back which should be torqued to 154 Nm.
- Check the tyre pressures, if the wheel nuts are still secure, the tyre condition for damage and rims for damage.

  Report, if in doubt about pressure.
- Check tailgate leaf springs condition and clean tailgate area of bin.

  Do not use chemical agents on leaf springs. Report to workshop any build up of debris.
- Check the auto-greasing system.

  Check the level. Report, if replenishing required.

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Handling and Storing Diesel Fuel

CAUTION

Handle diesel fuel carefully.
Do not fill the tank when engine is running.
DO NOT smoke while you fill the tank or service the fuel system.
The fuel tank is vented through the filler cap. Always replace the cap with an original filler cap.

Fill the tank at the end of each day's operation to prevent condensation and freezing during cold weather.

When fuel is stored for an extended period or if there is a slow turn over of fuel, contact your fuel supplier for recommendations on adding a fuel conditioner to stabilise the fuel and prevent water condensation.

Handling and Storing Lubricants

Use clean containers to handle all lubricants.

- Whenever possible, store lubricants and containers in an area protected from dust, moisture and other contamination. Store containers on their side to avoid water and dirt accumulation.
- Mark all containers properly. Dispose of all old containers and any residual lubricants they may contain.

Handling AdBlue® / DEF

As AdBlue® / DEF is non-toxic, handling this water-based solution is very simple. However, the following should be noted.

- If AdBlue® / DEF comes into contact with aluminium (e.g. an aluminium tank) a slight surface reaction will take place, which leads to cosmetic damage only and is therefore non-critical.
- If AdBlue® / DEF comes into contact with 1K lacquer (e.g. chassis frame) cosmetic damage will also take place.
- AdBlue® / DEF deposits can be removed with water.
- Only de-ionised water should be used in the system.
- AdBlue® / DEF should not be removed from the tank unnecessarily as in the tank this is pure, once it has been removed its not pure (treat like pure water).

Transportation and Storage of AdBlue® / DEF

Transportation of AdBlue® / DEF is in insulated tankers or plastic tank palettes. Suitable container materials are alloyed steels, aluminium, and various plastics, such as plastic coatings in metal containers.

- The following are not suitable for use: non-alloyed steel, copper, alloys with copper content and galvanised steel.
- If AdBlue® / DEF comes into contact with 1K lacquer (e.g. chassis frame) cosmetic damage will also take place.
- To prevent quality issues due to impurities and a high-test expenditure, AdBlue® / DEF may only be handled in the storage and filling systems designed exclusively for Adblue® / DEF. As AdBlue® / DEF freezes at -11°C and rapidly decomposes at temperatures above 25°C, storage and filling systems must be put in place so that a temperature range from 30°C to 11°C can be guaranteed.

AdBlue® / DEF Instructions for Maintenance and Repair

The Bubble storage in the AdBlue® / DEF supply pump can be filled up via a valve. Filling is only possible if the AdBlue® / DEF circuit is de-pressurised.

Every 3 years, the pressure should be checked and adjusted to approximately 3 bar with oil-free compressed air.

Replacing the Filter

The AdBlue® / DEF filter change is scheduled to coincide with the engine oil service. Therefore the AdBlue® / DEF filter should be replaced every 500hrs. The engine oil service interval is 1000hrs if MB 228.5 specification oil is used.

To prevent siphoning when removing the AdBlue® / DEF filter the return flow line to the pump module can be clamped off.

To change the filter you need to gain access to the AdBlue® / DEF pump module.

Refrigerant R134a

The air conditioning system contains refrigerant R134a. Servicing, refilling or emptying of the refrigerant R134a must only be done by trained and qualified service personnel.

WARNING

Refrigerant R134a can cause frostbite, if it comes into contact with bare skin.

The air conditioning system is pressurised. Never loosen the filling plug on the compressor or any hose and pipe unions, as an unintentional leak could result. If a leak is suspected, do not try to refill the system. Contact your BELL EQUIPMENT Representative.

- Avoid breathing in the air conditioner refrigerant and lubricant vapour or mist. Exposure may irritate the eyes, nose and throat.
- The refrigerant is under high pressure and the system must be serviced by qualified personnel only. Improper service methods may cause injury.
- If accidental system discharge occurs, ventilate the work area before resuming work.

Additional health and safety information may be obtained from your refrigerant and lubricant manufacturers.

Measures to Prevent Fires

WARNING

Do not point the high pressure jet at personnel.

CAUTION

If a high pressure jet is used for cleaning, take great care as the insulation of electrical leads can become damaged even at a moderately high pressure and temperature.

CAUTION

Switch OFF the battery isolator switch and disconnect the batteries, when welding on the machine.

Find out which type of fire extinguisher to use, where it is kept and how to use it.

Any fire fighting equipment stored on the machine must be maintained in working order.

At the slightest sign of fire, and if the situation allows, take the following steps:

1. Move the machine away from the danger area.
2. Shut down the engine and leave the cab.
3. Start putting out the fire and notify the fire brigade if required.

Do not smoke or have a naked flame near a machine when filling with fuel or when the fuel system has been opened.

Diesel fuel oil is flammable and should not be used for cleaning, use an approved solvent.

Remember that certain solvents can cause skin rashes and are usually flammable. Do not inhale solvent vapour.

Store flammable starting aids in a cool, well ventilated location. Remember that such aids (starting gas) must not be used in connection with preheating of the induction manifold.

Keep the work place clean. Oil and/or water on the floor makes it slippery.

Oil and/or water in close proximity to electrical equipment or electrically powered tools are dangerous and any spills should be cleaned up immediately.

Oily clothes are a serious fire hazard.

Check daily that the machine and equipment are free from dirt and oil. In this way the risk of fire is reduced and it is easier to detect faulty or loose components.

Check if the electric leads have been damaged by chafing which could lead to a short circuit and fire.

Check that there is no damage to hydraulic and brake hoses caused by chafing.

Welding and grinding may only be done on the machine when it is placed in a clean area where there are no fuel tanks, hydraulic pipes or similar lying around. Take extra care when welding and grinding near flammable objects. A fire extinguisher should be kept handy.

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SERVICE AND CHECKS

♦ RECOMMENDED SERVICE GUIDE
♦ 10 HOURLY OR DAILY SERVICE AND CHECKS

RECOMMENDED SERVICE GUIDE

The following tables list an example of the required service inspection to be carried out on Bell Articulated Dump Trucks and Haulers, check the Aftermarket Website for updates and the latest revision RSG to be used for servicing.

NOTE

There are individual RSG's available on the **BELL EQUIPMENT** Aftermarket Website for all models and PIN's.

BELL RECOMMENDED SERVICE GUIDE
ADT - E# - B18 - B20 - 2304 Pin 3

Rev 3
Customer:
Job Card No:
Service Technician:
Machine PIN:
Machine Model:
Fleet No:

The employees of Bell Equipment take pride in the Equipment we manufacture. With the Customer Service Centre and Bell Equipment working together, we can continue to improve the quality of our products.		**Daily & After Every Service**	**Every 500 hours**	**Every 1 000 hours**	**Every 2 000 hours**	**Every 4 000 hours**	**As Required**
1	**Engine**						
1.1	Drain water from the primary fuel filter. (Check cold, drain before starting engine)	X	X	X	X	X	
1.2	Check engine oil and coolant levels. (On CDU as well, in service mode)	X	X	X	X	X	
1.3	Change the oil and filters. (Additional oil level check after first test drive)		X (D)	X	X	X	
1.4	Change fuel tank breather filter.		X (C)	X (C)	X (O)	X (O)	
1.5	Check condition of fan belts, including idler and tentioner pulleys and bearings.		X	X	X	X	
1.6	Change the primary fuel filter / water separator. (RACOR)			X (D)	X	X	
1.7	Change secondary fuel filter. (Filter situated on engine)			X (D)	X	X	
1.8	Clean / Replace the fuel "Pre-Filter" screen.			X	X	X	
1.9	Clean crankcase breather filters.			X	X	X	
1.10	Check the coolant mixture.			X (J)	X	X	
1.11	Check and adjust the Engine Valve and Jacobs Brake clearances.(Refer to Service manual)			X	X	X	
1.12	Change the air cleaner primary filter.			X (G)	X (G)	X (G)	
1.13	Change the air cleaner secondary filter.				X (G)	X (G)	
1.14	Change fan belt.					X	
1.15	Change the coolant.						X (H)

The employees of Bell Equipment take pride in the Equipment we manufacture. With the Customer Service Centre and Bell Equipment working together, we can continue to improve the quality of our products.		Daily & After Every Service	Every 500 hours	Every 1 000 hours	Every 2 000 hours	Every 4 000 hours	As Required
1.16	Replace idler pulley bearing.						X
1.17	Change A/C pulley bearing and inspect pulley grooves for excessive wear.						X
2	**Transmission — Allison**						
2.1	Check for oil leaks.	X	X	X	X	X	
2.2	Check transmission oil level. (On CDU as well, in service mode)	X	X	X	X	X	
2.3	Change the transmission breather.		X (C)	X (C)	X (O)	X (O)	
2.4	Replace transmission filters.			X (K)	X (K)	X (K)	
2.5	Replace transmission oil. (Additional oil level check after first test drive)				X (A)(N)	X (A)(N)	
3	**Transfer Case**						
3.1	Check the oil level. (Sight glass)	X	X	X	X	X	
3.2	Change the transfer breather.		X (C)	X (C)	X (O)	X (O)	
3.3	Change the transfer case oil. (Additional oil level check after first test drive)				X (N)	X (N)	
4	**Hydraulics**						
4.1	Check the hydraulic oil level.	X	X	X	X	X	
4.2	Hydraulic oil reservoir breathers.		X (C)	X (O)	X (O)	X (O)	
4.3	Test the brake accumulator function. (Refer to Service Manual)		X	X	X	X	
4.4	Check that the rear brake system pressure reducing valve is functioning correctly (Refer to Service Manual for specs and procedure).		X	X	X	X	
4.5	Check visually - all hydraulic hoses for leaks, chaffing, routing		X	X	X	X	
4.6	Change the hydraulic return filter.			X	X	X	
4.7	Replace high pressure hydraulic filter kit. (Where applicable)			X	X	X	
4.8	Change the hydraulic oil.					X (N)	
4.9	Inspect hydraulic and emergency steering suction strainers - (clean if required).					X	
4.10	Inspect and clean the filter screen.					X	
5	**Axles, Chassis & Suspension**						
5.1	Inspect and clean breathers.		X (C)	X	X	X	X
5.2	Check park brake pads/disks for wear. (Where applicable) (Refer to Service Manual for specs and procedure)		X	X	X	X	

RECOMMENDED SERVICE GUIDE

The employees of Bell Equipment take pride in the Equipment we manufacture. With the Customer Service Centre and Bell Equipment working together, we can continue to improve the quality of our products.		Daily & After Every Service	Every 500 hours	Every 1 000 hours	Every 2 000 hours	Every 4 000 hours	As Required
5.3	Check and adjust bin shock pad clearance. (Refer to service manual for specs)		X	X	X	X	
5.4	Check suspension strut height, oil leaks & general conditions. (Refer to Service Manual for set up and charging)		X	X	X	X	
5.5	Check condition of all drive shafts. (Including securing bolt torque)		X (L)	X (L)	X (L)	X (L)	
5.6	Check condition of all axle driveline cross and rollers. (Replace as required)			X	X	X	X
5.7	Check the oil level in the axles and final drives.			X	X	X	
5.8	Change all axle and final drive oils. (Clean any debris off drain plug magnets)				X (N)	X (N)	
6	**Cab, Pneumatics & Electrical**						
6.1	Clean or replace air conditioner filter.	X (B)	X	X	X	X	
6.2	Check operator controls, SDC, SSM Functions, Bonnet Switch & HVAC functionionality.		X	X	X	X	
6.3	Check all lights including beacon and indicators, reverse buzzer.		X	X	X	X	
6.4	Check machine software version and update to latest revision.		X (I)	X (I)	X (I)	X (I)	
6.5	Check electrical connections and wire routing for chaffing.		X	X	X	X	
6.6	Record & delete fault codes found on CDU in service mode.		X	X	X	X	
6.7	Check and reset all accelerometers on CDU in service mode.		X	X	X	X	
6.8	Change the air drier filter.			X	X	X	
6.9	Check operation of seat belt.				X (F)	X (F)	
7	**Lubrication**						
7.1	Check the grease level in the auto greasing system. (Where applicable)	X	X	X	X	X	
7.2	Grease bonnet hinges.	X (E)	X (E)	X (E)	X (E)	X (E)	
7.3	Grease all remaining greasable lube points, including Oscillation joint.	X (E)	X (E)	X (E)	X (E)	X (E)	
7.4	Change the auto greasing filler filter. (Where applicable)		X	X	X	X	
7.5	Inspect all driveshaft slip joints and inspect/grease as required all driveshaft cross and rollers. (Greasable type only - where applicable)		X (E)	X (E)	X (E)	X (E)	
7.6	Grease cab tilt cylinder.			X	X	X	

RECOMMENDED SERVICE GUIDE

The employees of Bell Equipment take pride in the Equipment we manufacture. With the Customer Service Centre and Bell Equipment working together, we can continue to improve the quality of our products.		Daily & After Every Service	Every 500 hours	Every 1 000 hours	Every 2 000 hours	Every 4 000 hours	As Required
7.7	Carry out oscillation joint maintenance procedure.			X (M)	X (M)	X (M)	
7.8	Grease park brake eccentric shaft.			X	X	X	
8	**General**						
8.1	Check and clean all coolers.						X
9	**Tyres**						
9.1	Check tyre pressures. (Cold - Refer to Decal)	X					

A	Only Allison approved TES 295 oil to be used (BN005549). Drain intervals can be extended by oil sampling. (Use kit 261677 for oil sampling Allison Transmissions)
B	Daily depending on site conditions.
C	Inspect and clean the breathers and clean around the area if required, replace if blocked.
D	In severe conditions, halve lubrication intervals.
E	All grease points to be checked daily and greased if necessary.
F	See SIB 1016/2014/1800 for seat belt inspection procedure.
G	Very dusty conditions could trigger the air cleaner blocked warning light - Filters to be replaced should it trigger before suggested service interval.
H	Appropriate coolant to be used as recommended in the lubricants catalogue.
I	Updated file to be created before going to site, and only to be done if current software is outdated.
J	Coolant mixture to be checked seasonally. Coolant to be replaced according to sampling or minimum every 6 Years.
K	Note! Machines with remote transmission filters option installed can be serviced from under the bonnet. See Service manual for location.
L	All driveshaft bolts to be checked and torqued to specification if found loose.
M	Refer to SIB 2010/1004 to carry out oscillation joint maintenance.
N	Oil sampling as per the Bell Lube Check SIB 1015/2016 is recommended before any oils are drained for proactive maintenance. Sampling mandatory for extended wet driveline warranty applications. Ensure all component oil levels are rechecked after machines first test drive to confirm correct fill level.
O	Replace Breather/Filter.

Please return this form, even if all items are satisfactory			
CUSTOMER SERVICE CENTER / DEALER + SERVICE TECHNICIAN	**SMR**	**DATE**	

Please refer to the latest Lubricants Brochure for recommended lubricants. All Specified part numbers are for 20L containers.

LUBRICANTS AND COOLANTS

COMPONENT OR SYSTEM		NOTE	BELL RECOMMENDED OIL / COOLANT PART NUMBERS
ENGINE	(Semi Synthetic 10W40)	MB228.51 Approved Oil Only	BN005546
COOLANT	(Premix 50 Ultra)	MB326.5 Approved Coolant Only	BN005612
TRANSMISSION	(Syn ATF Ultra)	Allison TES 295 Approved Oil Only	BN005549
TRANSFER BOX (Kessler)	(Gear Oil Limited Slip 80W-90)	API GL-5 (ATF for reversing drive)	BN005575
AXLE OIL	(Gear Oil Limited Slip 80W-90) (EURO - Borate Axle Oil)	API GL-5	BN005575
HYDRAULIC SYSTEM	(Hydraulic Oil VG68)	ISO 11158 HM	BN005598
GREASE - SUPER HEAVY DUTY	(Pins, Bushes, Auto greasing, etc.)	NLGI 2	BN005601

Component Service Fill Quantities	B18, B20 & 2304E
ENGINE	16 L
COOLANT	28 L
TRANSMISSION	34 L
TRANSFER BOX (Kessler)	10 L
AXLE OIL / Per axle - including final drives.	35 L
HYDRAULIC RESERVOIR	135 L

The daily or 10 hourly service checks must be performed by qualified service personnel.

It is recommended that these service checks are performed in conjunction with the daily walk round checks so that the operator can assist in the service checks which require two people.

Ensure that the machine is in the service position.

Report any defects immediately to qualified service personnel. Damaged pressure hoses should be replaced by qualified service personnel (hoses must be replaced, never repaired).

Service Instructions

Ensure that the machine is in the service position.

Use the correct lubricants when topping-up, replacing and greasing.

NOTE

For further engine information or details not shown in this manual, refer to the Mercedes-Benz manual's OM 906/926 LA & OM 924 LA.

Engine Checks

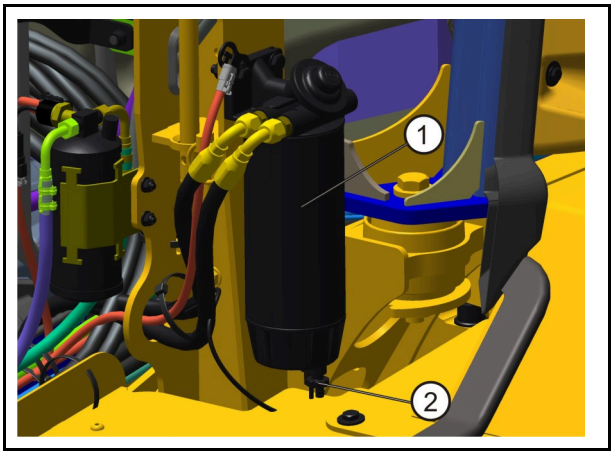
NOTE

For further engine information or details not shown in this manual, refer to the Service Manual and Mercedes-Benz Manual's OM 906/926 LA & OM 924 LA .

1. Open the bonnet.
2. Check the bonnet catch for damage and ensure that the bolts are secure.

Check Fuel Filter/Water Separator

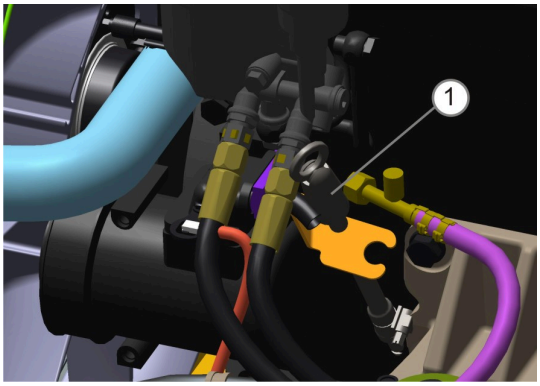
Check the fuel filter for water contamination and drain it at the start of every shift.



1. Open the black plastic tap (2) at the bottom of the filter (1).
2. After all the water has drained from the filter, tighten the tap.

Check Oil Level (Where applicable)

1. Remove the dipstick (1) and wipe clean with a lint free cloth.

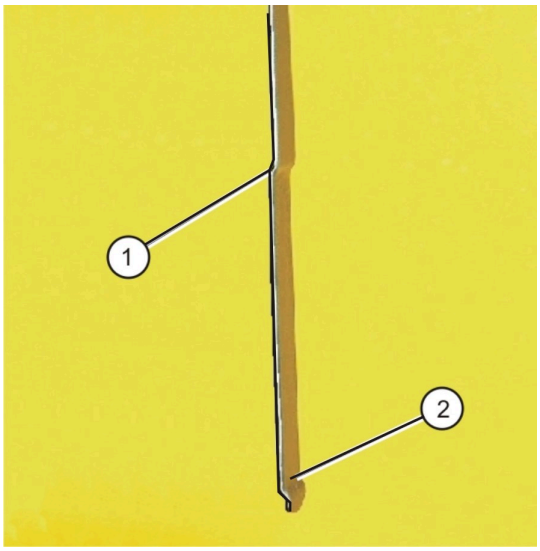


NOTE

When checking the oil level, hold the dipstick in an upright position with the point pointing down.

2. Re-insert the dipstick, ensuring that it is properly seated.
3. Check the oil level.

   When the oil is hot, the oil level must be on the top mark (1) of the dipstick, but not above it. When the oil is cold, ensure that the level is between marks (1) and (2), but not below mark (2).



4. Re-insert the dipstick, ensuring that it is properly seated and fasten the dipstick clip.
5. Report and replenish the engine oil if necessary.
6. Check the level again after replenishing.

Check Coolant Level

WARNING

Whenever the cap on the expansion tank needs to be removed, remember that the system may be under pressure which could cause hot coolant to be ejected.
Check the coolant level when the engine is cold.

CAUTION

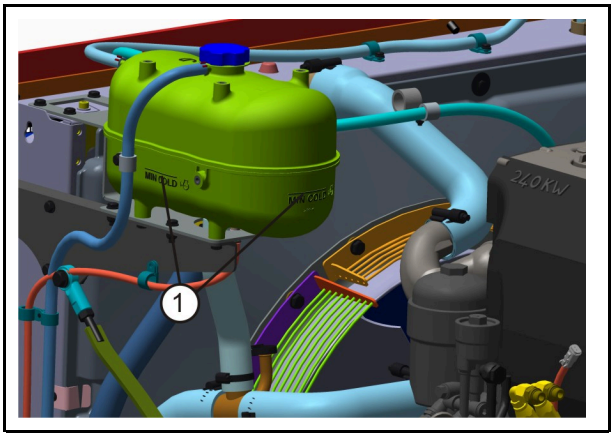
When coolant is drained from the cooling system it must be replaced with the recommended coolant specified by the manufacturer.

Report and replenish the coolant if necessary.

NOTE

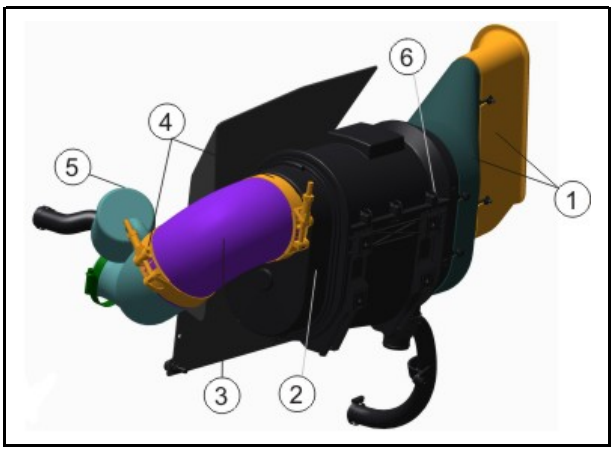
If there is too much coolant in the tank, when cold, the tank will purge itself and overflow with excess coolant.

Check Coolant Level



The coolant must not be lower than the Maximum Cold mark (1) when the engine is cold.

Check Engine Air Intake System



1. Check air cleaner air intake assembly for damage (1) and air cleaner housing (2).
2. Check rubber elbows, pipes (3) and clamps (4) for tightness, cracks or damage. Report any faults to service personnel.
3. Check and ensure that the cover of the powercore filter is properly secured with all 4 latches(6), and that there aren't any gaps between the housing and cover.

Check Exhaust Heat Shields and Material Build-up

WARNING

Build-up of combustible material on and around high heat areas must be removed on a regular basis and the machine cleaned to prevent build-up and igniting of material. Critical areas are the areas around the exhaust, turbo charger, between the cab and the transmission cooler/exhaust silencer and the area on top of the horizontal heat shield leading into the silencer heat shield. It might mean that from time to time the heat shields has to be removed by service personnel to clean these areas properly.

WARNING

If there is ANY build-up of combustible material on and around high heat areas the machine must be referred to the workshop for cleaning.

Area between the cab and the exhaust heat shield and cab and hydraulic tank is a critical area (B30E shown).

The remaining areas around the exhaust silencer are also critical areas.

Transmission Checks

Check Transmission For Oil Leaks

Check under the machine for oil leaks.

Take special care to check for oil leaks in the transmission region.

Check Transmission Oil Level

WARNING

When any maintenance is to be carried out with the engine running, the machine must still remain in the service position as described in Service Instructions and all procedures in "Procedures Before Starting" must be followed.

The electronic method of checking the transmission fluid level incorporates a fluid level sensor to display the fluid level on the CDU.

The electronic method compensates for transmission temperature between 40°C to 104°C (104°F to

220°F). Any temperature below 40°C (104°F) or above 104°C (220°F) will result in an **Invalid for Display** condition.

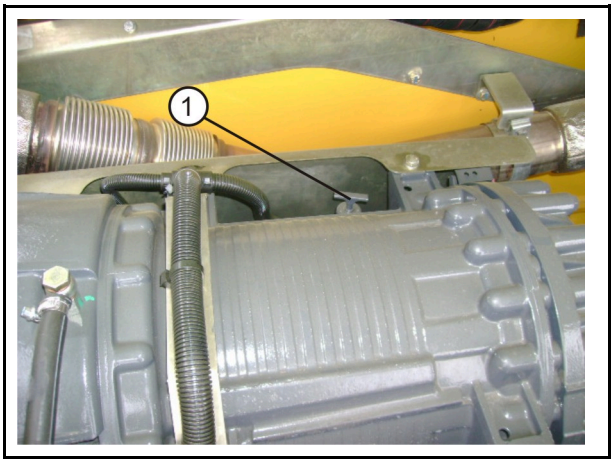
When referring to the "HOT" level markings on the transmission dipstick, the normal operating temperature of the transmission fluid is 71°C to 93° C (160°F to 200°F), measured at the transmission sump.

The "COLD" check levels are used to verify that the transmission has adequate oil for start-up and for operation until it can be checked ate the operating "HOT" temperature. This check should be used only to confirm an adequate volume of fluid for a cold start-up and must not be used to set fluid levels for continued operation.

The following procedure must be used to check the transmission fluid level using the push-button shift selector: Ensure that the machine is parked on a level surface and the park brake is applied.

Allow the engine to run at idle in **N** (Neutral).

Unscrew and remove the dipstick (1) from the tube and wipe clean.



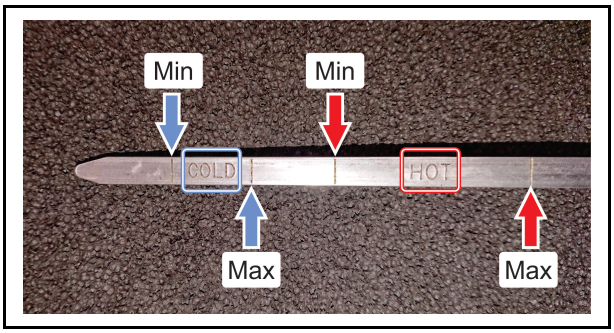
Clean the end of the tube before inserting the dipstick.

Insert the dipstick into the tube and remove to check the fluid level.

Repeat the check procedure to verify the reading.

CAUTION

Hold the dipstick upright with the point facing downward when checking the oil level.



If the transmission fluid is still cold (on startup) and anywhere in between the "COLD" minimum and maximum lines, the transmission may be operated until the fluid is at the normal operating temperature (71ºC to 93ºC / 160ºF to 200ºF), to perform the "HOT" check.

If the transmission fluid level is not in between the "COLD" minimum and maximum lines, add or drain transmission fluid as necessary to get it into the above range.

Service Brake Accumulator Test

WARNING

When any maintenance or testing is to be carried out with the engine running the machine must still remain in the service position as described in Service Instructions section and all procedures in "Procedures Before Starting" must be followed.

1. Start the engine. Wait until main pump has fully charged the accumulators (Listen to the tone of the engine, while charging the engine revolutions will be lower).
2. Apply the service brakes repeatedly to make the pump re-charge a few times. Discontinue applying the brakes in a re-charge cycle while the pump is still charging (to ensure the brakes are not consuming oil after the pump stops, wait 4 seconds while listening to the engine. Engine revolutions must go up after pump stops).
3. Shut down the engine.
4. Switch the ignition on and wait until the warning lights extinguish.
5. Fully apply the service brakes and count the number of applications before the accumulator low pressure light illuminates. If less than two full applications, have the system checked by **BELL EQUIPMENT** service personnel.

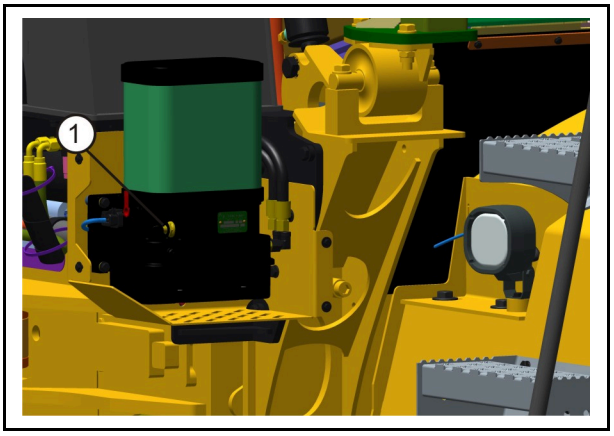
Lubrication Checks

Auto Greasing System (Where applicable)

The pump and reservoir are located on the right side of the truck below the exhaust silencer/ catalyst.

Check Grease Level

Remove the cover first.



The reservoir is refilled via a grease nipple (1) on the side of the unit.

Cab And Electrical Checks

WARNING

When any maintenance or testing is to be carried out with the engine running the machine must still remain in the service position as described in Service Instructions and all procedures in Procedures Before Starting must be followed.

CAUTION

Do not clean the cab with a pressure cleaner or a hose pipe.

Check Operating Components

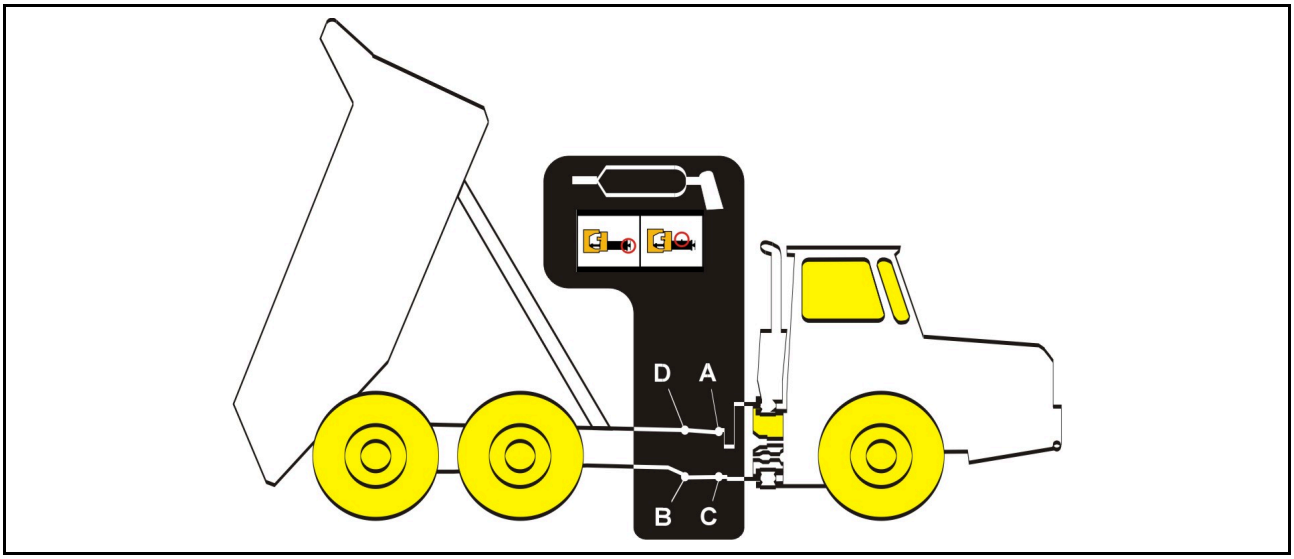
Carry out a functional check on all controls and instruments daily.

Check Working Lights and Horn

Two people are needed to perform this check. One person inside the cab to control the switches and the other outside to ensure all the lights are working.

1. Switch all the lights on in turn, including headlight (dipped and high beam), indicators, hazard and brake lights.
2. Ensure the path is clear behind the machine, and then reverse to ensure the buzzer and reverse lights are working.
3. Functionally test the horn.
4. Check the headlights — bright and dip to ensure bulbs are working.
5. Check rear lights — tail, brake and indicators.
6. Check bin switch for damage.

Daily Oscillation Joint Procedure

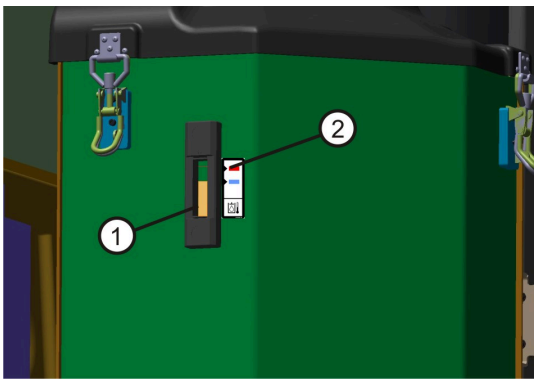


1. Park machine on level ground.
2. Apply the park brake.
3. Raise the bin fully.
4. Install the Bin Up-lock and / or Bin Prop (which ever is applicable).
5. Switch off the engine.
6. Wipe grease nipple.
7. Fill the oscillation joint with grease until ejected grease is visible at O-ring seals **A and B**.
8. Remove the Bin Up-lock and / or Bin Prop (which ever is applicable).
9. Start the engine and lower the bin.
10. Fill the oscillation joint with grease until ejected grease is visible at O-ring seals **C and D**.

Hydraulic Checks

Check Hydraulic Oil Level

1. Check the hydraulic oil level in the sight glass (1).



2. The fluid level must be on the mark (2) as shown on the decal with the engine shut down and the machine parked on level surface with the bin down and hydraulic oil at working temperature.

Report to service personnel if replenishing the hydraulic fluid is required.

Tailgate Checks

WARNING

When any maintenance is to be carried out with the engine running the machine must still remain in the service position as described in the "Service Information" section and all procedures in "Procedures Before Starting".

Check Tailgate And Leaf Springs (Option)

WARNING

Extreme caution should be taken when removing leaf springs as they are under tension. serious injury could result if proper safety measures are not taken into account.

Do not use chemicals to remove paint from the leaf springss as this can reduce the ductility and load bearing capacity of the leaf springs.

There is a risk that the ADTs will "tip" over if the springs fails and the tailgate does not open while tipping.

WARNING

No Grinding, Welding / Cutting or repairs to be attempted on the spring while on the machine as it may be under load / tension.

Note that the leaf springs are safety critical components

Report to service personnel if any damage is noted.

1. Check that the tailgate system is free from blockages (may also be caused by external source), and damages, which can affect the proper operation of the system.

2. Clean out any blockage on the bin especially the area that the tailgate rests on. This will ensure that the tailgate closes fully and that no undue stress is put onto the leaf springs.
3. Do not use chemicals to remove paint from the leaf springs as this can reduce the ductility and load bearing capacity of the leaf springs.

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CARE AND HANDLING TECHNIQUES

♦ RECOVERY, TOWING AND TRANSPORTATION

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Towing and Retrieval General Safety Rules

WARNING

When a STUCK machine is to be retrieved, use either the REAR retrieval point or use both the FRONT retrieval points IN CONJUNCTION WITH A SUITABLE SPREADER BAR.

The front and rear retrieval points have a maximum permissible total load capacity of 1.5 times the GVM when used in conjunction with a Y-Sling rigging arrangement with an included angle of 60°.

WARNING

Do not attempt to retrieve a Laden or Stuck machine from the front using a Y-Sling rigging system.

All components of the retrieval rigging system must comply with the load requirements contemplated in ISO 10532:1995 and ISO 10532 AMD 1: 2004.

WARNING

Ensure that recovery loads are applied to the retrieval points in a direction NO MORE than 10º off the longitudinal axis of the vehicle.

Towing Safety Rules

Always consult your **BELL EQUIPMENT** Product Support Representative before towing a disabled machine.

If the machine is not able to roll freely on its wheels, the operation is classed as retrieval and not towing.

A tow bar must be used when a machine is towed. The tow bar can be attached to front or rear retrieval points. If possible, both retrieval points at the front or the rear should be used.

Prior to towing or transportation of the machine the bin must be emptied or partially emptied where possible.

Never exceed 2 km/h (1.2 mph) when towing a disabled machine and never tow the machine for distances greater than 500 m unless the drivetrain is disconnected.

If a disabled machine is to be towed over a greater distance than 500 m, the drivetrain is to be disconnected by removing the drive shaft between the transmission and the transfer case or the vehicle is to be loaded onto a suitable breakdown vehicle.

Failure to load the machine onto a suitable break down vehicle or disconnect drive shafts can cause damage to the transmission.

Always chock the machine's wheels before releasing the brakes and/or disconnecting the drive shafts.

CAUTION

Failure to lift the wheels off the road or disconnect the drive train can cause damage to the transmission.

Shielding must be provided on the towing machine and the disabled machine, if the operator can possibly be injured due to a tow bar or recovery equipment failure.

Do not allow any unauthorized personnel on the disabled machine.

Gradual smooth movements are required for safe towing. Jerking could overload the rigging system and may cause it to break.

The Towing machine must be of the same size or larger than the disabled machine. Ensure that the towing machine has sufficient brake capacity, mass and power to control both machines. Take account of the ground conditions and gradient when towing a disabled machine.

A larger machine and a solid rigging system are required when towing a disabled machine downhill. An additional machine connected to the rear of the disabled machine may also be required to prevent the combination from rolling away.

Minimum towing capacity is required for towing on smooth level surfaces and maximum towing capacity is required for towing on gradients and on poor underfoot conditions.

The engine cannot be started by pushing or towing.

Retrieval Safety Rules

Retrieval of a vehicle must be carried out in such a manner that the directions and magnitudes of forces generated are in accordance with ISO 10532: and ISO 10532 AMD 1:

The retrieval process shall be executed by a competent person.

The competent person retrieving the vehicle must ensure that the rigging system is securely fastened, either to BOTH front retrieval points or to BOTH rear retrieval points.

During the retrieval process care must be exercised to apply retrieval forces to the machine in a gradual manner, without jerking or similar shock loading.

The retrieval loads should be applied to both front or rear retrieval points in a Y-Sling rigging system with an included angle of 60°.

The rigging system shall not transfer moments onto the retrieval points.

Remove or partially remove the load from the bin prior to attempting any retrieval operation, if at all possible.

Reduce the resistance to motion of the machine by excavating a retrieval path ahead of the machine in the direction of the intended retrieval, if at all possible.

Retrieval

Stuck Machine

1. If the ground is soft with deep wheel tracks constant attention must be given to the rear chassis angle.
2. If the machine does not move, get a towing vehicle to move the machine.
3. If the rear chassis starts to lean sideways excessively, stop the machine immediately and try another route.
4. If the machine becomes stuck the following must be done:
    a. Select Neutral **N**.
    b. Engage the inter-axle differential lock.
    c. Select Forward **D** (Preferably 1st gear).
    d. Check that the inter-axle differential lock indicator illuminates.
    e. Engage **CTD** (Control Traction Differential Lock).
    f. Select range hold switch to lock transmission in low gear and prevent transmission from trying to select higher gear and cycling.
    g. If possible the rolling resistance of a stuck machine must be reduced by digging a track ahead of the tyres in the direction of retrieval, before starting the retrieval operation.
    h. Ensure that all personnel are safely away from the machines involved in the retrieval operation. Use the hazard lights and the horn to keep bystanders away.
    i. Drive off slowly keeping the engine speed (rpm.) constant and not too high.
    j. To assist with traction, turn the steering wheel one way and then the other alternately causing the machine to adopt a “duck waddle”.
    k. Continue with this movement until the machine is free and can be operated normally.

Rocking Out

WARNING

To assist in avoiding injury or property damage caused by sudden movement of the machine, do not make shifts from N to D or R when the throttle is open.

CAUTION

Do not make N to D or directional shift changes when the engine speed is above idle. Also if the wheels are stuck and not turning, do not apply full power for more than 30 seconds in either D or R.

If the operator selects shifts (eg. from **N** to **D** or **R**) while the throttle is open too much, the transmission will engage only if the throttle is closed in the next three seconds.

That can cause a sudden movement of the machine. Leaving the throttle open longer than three seconds causes the transmission to remain in **N**. Avoid this condition by making shifts from **N** to **D** or **R** only when the throttle is closed.

Full power for more than 30 seconds under the above conditions will cause the transmission to overheat

If the transmission overheats, shift to N and operate the engine at 1 500 rpm. until it cools (2-3 minutes).

If the machine is stuck in deep sand, snow or mud, it may be possible to rock it out as follows:

1. Shift to **D** and apply steady, light throttle (never full throttle)
2. When the vehicle has rocked forward as far as it will go, apply the service brakes.
3. Allow the engine to return to idle.
4. Select **R**.
5. Release the service brakes and apply a steady, light throttle and allow the machine to rock in **R** as far as it will go.
6. Again apply and hold the service brake and allow the engine to return to idle.
7. This procedure may be repeated in **D** and **R** if each directional shift continues to move the machine progressively further.
8. Select range hold as described in this chapter.

Towing

Towing With Operable Engine

1. If the steering system has no fault and the engine can be run, an operator must steer the machine. If the failure is in the transmission do not run the engine, as the engine is directly coupled to the transmission. (Refer to Towing A Machine With Inoperable Engine (Next instruction).
2. If the failure is in the transfer case, engage neutral and disconnect the drive shaft connecting the transfer case to the front differential and the drive shaft connecting the transfer case to the through drive.
3. If the fault does not affect the braking system the brakes can be released using the park brake hand control **AFTER** the wheels have been chocked.

Towing With Inoperable Engine

WARNING

Before releasing the brakes, always chock the wheels to prevent the machine from rolling.
Ensure the brake system of the towing machine is sufficient to hold the combined mass of the towing machine and the disabled machine.
Removing the drive shafts on either side of the park brake renders the park brake inoperative.

WARNING

If there is torsion on the drive shaft, serious injury can occur to persons removing the drive shaft.
Release torsion from the drive shaft between the transmission and the transfer case.

WARNING

Because of the potential danger in towing a vehicle without an effective braking system it is recommended that the machine is transported on a suitable breakdown vehicle.

NOTE

The park brake may be released mechanically but the steering system will remain inoperative. Articulation can only be obtained by disconnecting the steering cylinders hydraulic supply hoses.

- When removing steering cylinder hydraulic hoses, the hoses and ports on the steering cylinders must be securely plugged. Care should be taken for the minimum spillage of hydraulic oil.
- With the engine stopped the machine hydraulic and pneumatic systems are not operative. This means there is no powered steering or braking system.
- Road speed must not exceed 2 km/hr. (1.2 mph).
- Before towing disconnect the drive shaft between the transmission and the transfer case.

  1. To release the torsion from the drive shaft, the effected wheel must be lifted off the ground.
  2. If there is torsion on the drive shaft, then when the wheel is lifted off the ground, the wheel will turn releasing the torsion on the drive shaft. It is then safe to remove the drive shaft.

- With the brakes released and the drive shafts disconnected, the towing machine must be capable of steering and stopping the complete mass of the disabled machine.

Towing With Inoperable Steering

Use these procedure in conjunction with relevant Engine Operative or Engine Inoperative Towing Procedures detailed previously.

If the machine must articulate while being towed and the steering system is inoperable disconnect as follows:

- Remove the supply hoses from the T-pieces on the left hand steering cylinder.
- Block off the two supply hoses using suitable plugs.

  NOTE

  Some oil spillage will be unavoidable. Clean up any oil spillage as soon as possible.
- Loop the two steering cylinder T-pieces together using a suitable hose.

Releasing Park Brake For Towing

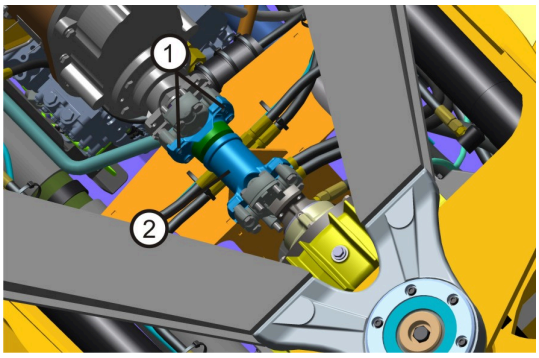
CAUTION

Machine will roll freely when drive shafts are disconnected.
To prevent injury or damage, chock wheels and connect machine to towing vehicle before disconnecting drive shafts.
To prevent damage to transmission, disconnect front axle and middle axle drive shafts when towing a machine with an inoperable engine.

1. Remove U-joint cap screws (1) and disconnect front axle drive shaft (2) at rear of front axle. Move drive shaft aside and support to allow front axle drive shaft yoke to turn freely.

   NOTE

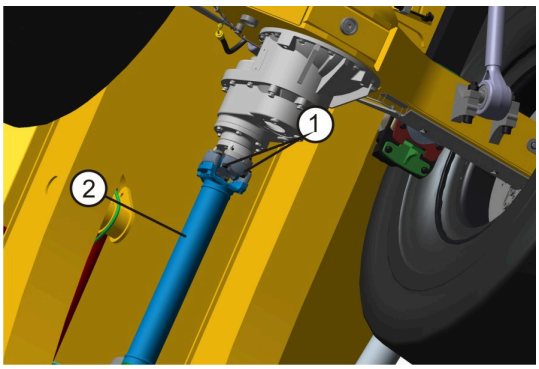
   The drive shaft must be removed completely, when towing the truck.



2. Remove U-joint cap screws (1) and disconnect middle axle drive shaft (2) at rear of middle axle. Move drive shaft aside and support to allow middle axle drive shaft yoke to turn freely.

   NOTE

   the drive shaft must be removed completely, when towing the truck.

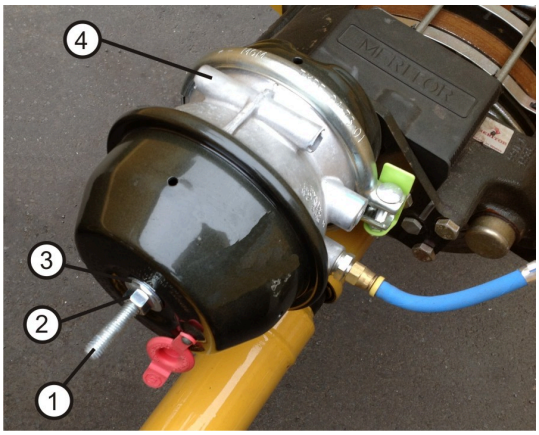


Mechanically Release Park Brake

WARNING

Machine will roll freely when park brake is released.
To prevent injury or damage, chock wheels and connect machine to towing vehicle before releasing park brake.

1. Remove release stud (1), nut (2) and washer (3) from storage position (4).



2. Install release stud in hole at rear of park brake actuator housing and rotate clockwise a ¼ turn to lock into place.
3. Install washer and nut unto release stud and tighten until park brake releases.

Transportation

Transporting

Due to the relative high unladen vehicle mass of an ADT, transporting of a machine will be done with a transporting vehicle.

A machine can be loaded by the following two methods:

1. Lifting the machine onto the transporting vehicle or,
2. Driving the machine onto the transporting vehicle.

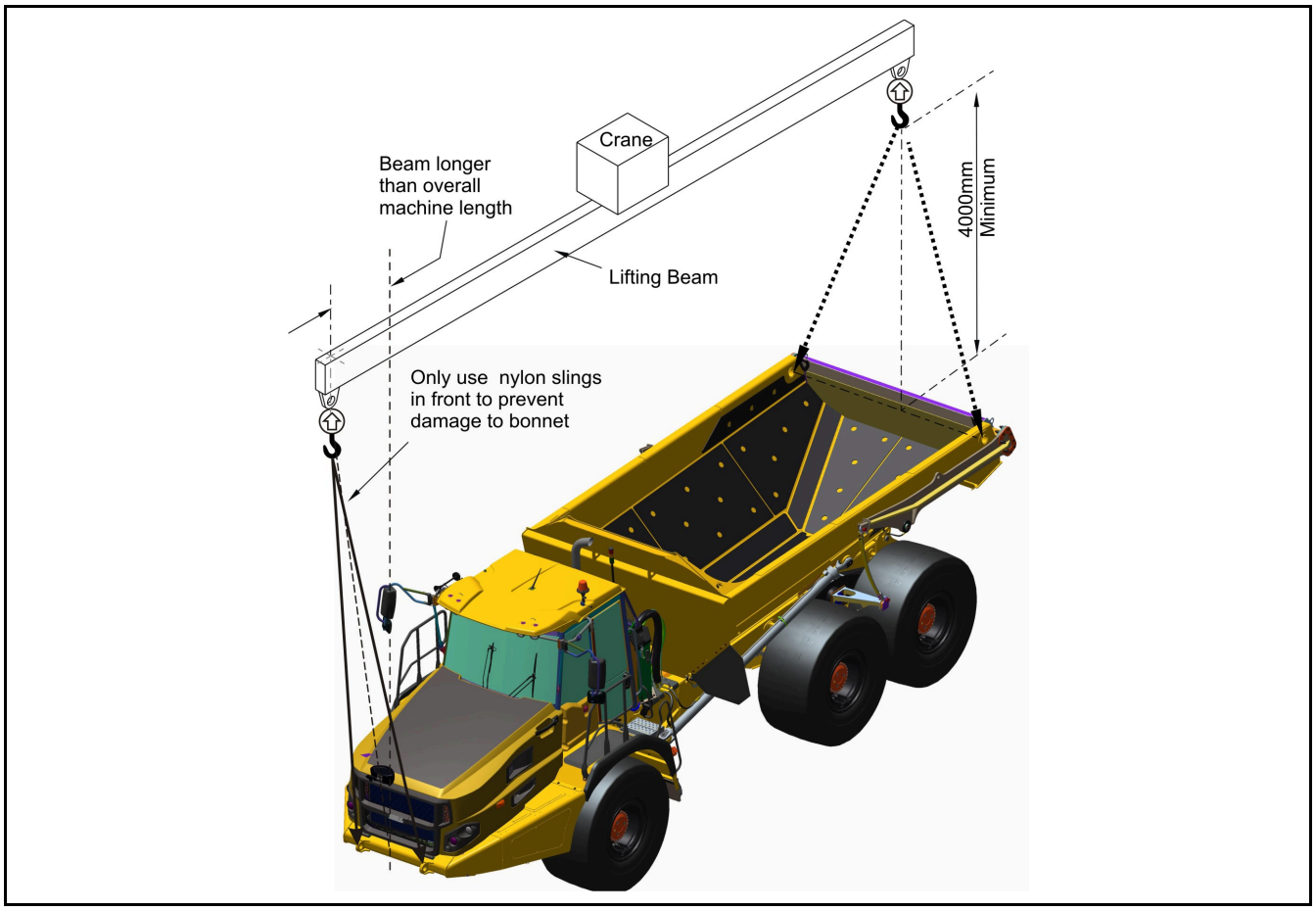
- After the machine has been loaded onto the transportation vehicle, the machine has to be securely tied down.
- During loading and transportation of a machine, hazards exist. These hazards pertain to the machine itself, the transport vehicle and the personnel involved in the loading and transport operations.
- Securely lock all doors and bins or any other moveable equipment that may cause a hazard during transportation.
- Always use the aid of spotters when loading the machine onto the transporting vehicle.
- Ensure the transporting vehicle is capable of safely carrying the machine.
- When driving the machine onto other transportation vehicles do not install the articulation safety bar until the machine is secured.
- When the machine is lifted onto the transportation vehicle the articulation safety bar must be installed.

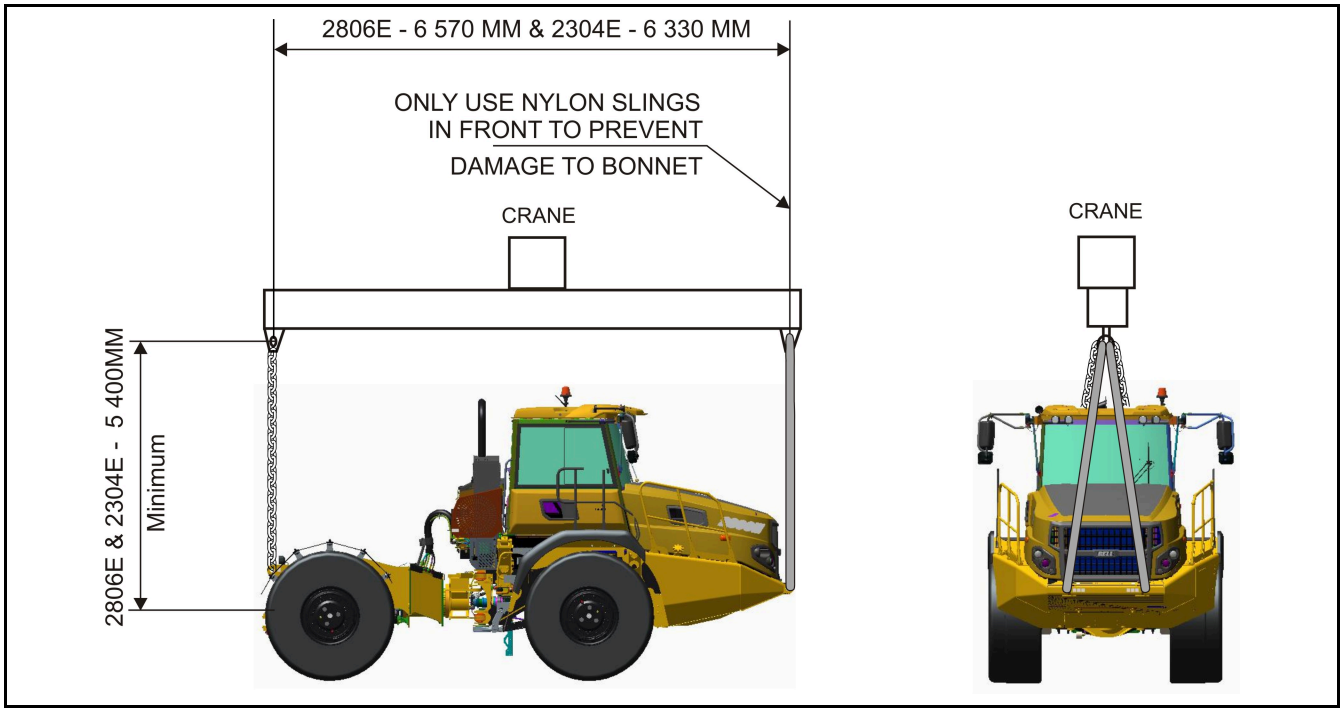
Lifting Machine - ADT and Hauler

WARNING

All lifting operations must be done SLOWLY to avoid jerking, impact loading and excessive swinging.
Do not attach soft slings directly to the machine lifting points.

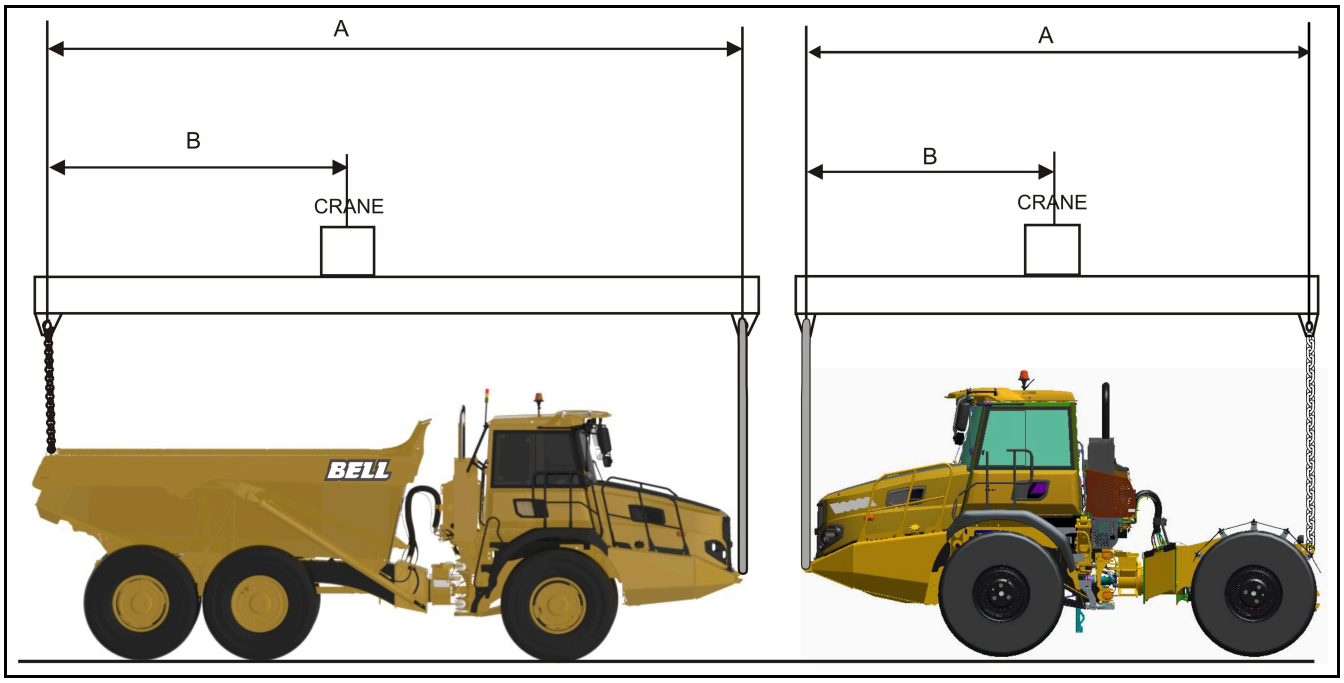
1. The engine must be stopped.
2. All doors must be locked.
3. The articulation safety bar must be engaged.
4. Ensure that the mirrors are stowed safely.
5. Ensure that the bin is empty and in the down position.
6. Attach the lifting equipment to the machine lifting points and the lifting beam.





7. The lifting beam must be longer than the overall machine length to avoid damaging the machine. Refer to table below for the overall length of **BELL EQUIPMENT** ADTs.

   The lifting device must be able to carry the total machine weight.



Machine Type	Overall Machine Length (A)	Approximate Centre of Gravity (B)	Unladen Machine Weight
B18E 6X6 & B18E 6X4	9271 mm	4387 mm	16 091 kg
B20E 6X4	9271 mm	4387 mm	15 624 kg
B20E 6X6	9271 mm	4387 mm	17 220 kg
2304E	6330 mm	2779 mm	12 785 kg
B25E 6X6	9957 mm	4283 mm	21 146 kg
2806E	6570 mm	2842 mm	14 589 kg
B30E 6X6	9957 mm	4104 mm	22 885 kg

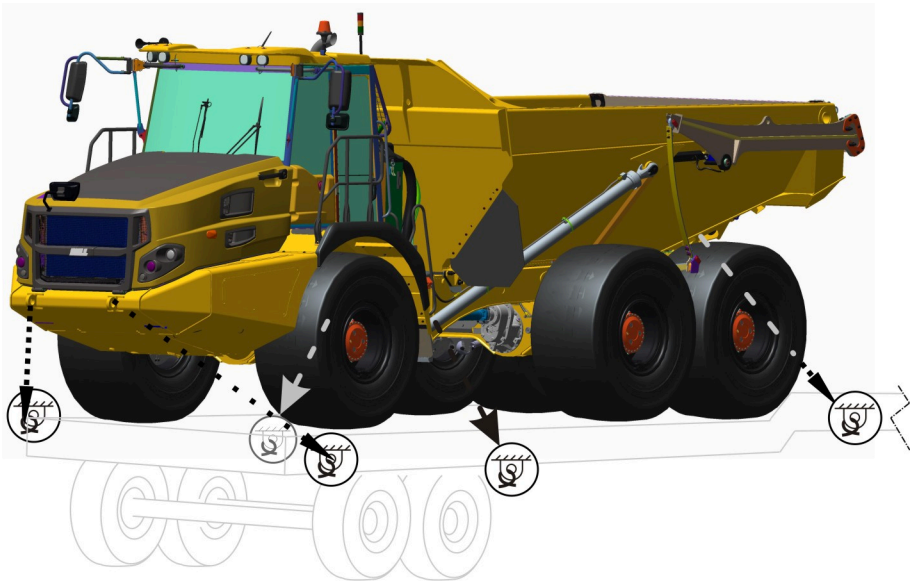
8. Attach the lifting beam to the crane.
9. Lift the lifting beam until all the play in the chain is removed. The machine must be lifted gradually keeping balance in order to prevent lifting accessories and devices from being impact loaded. The crane must be moved slowly to prevent excessive swinging of the lifted machine.
10. Lift the machine slowly until it is clear of any obstructions in the intended path.
11. Move the machine over the destination point slowly.
12. When the machine is directly over the destination point, lower the machine slowly, following the instructions of the spotters. If lowering the machine onto a trailer or rail wagon, the machine should be placed in the middle of the transporting vehicle's deck to ensure maximum stability during transportation.
13. Lower the lifting beam until the chains can be removed from the machine.
14. Lift the lifting beam and move it away from the machine.
15. Chock all the machine's wheels.
16. Insert the safety stop blocks. (If applicable)
17. Secure the machine to the transporting vehicle with chains. (Refer to Machine tie-down)

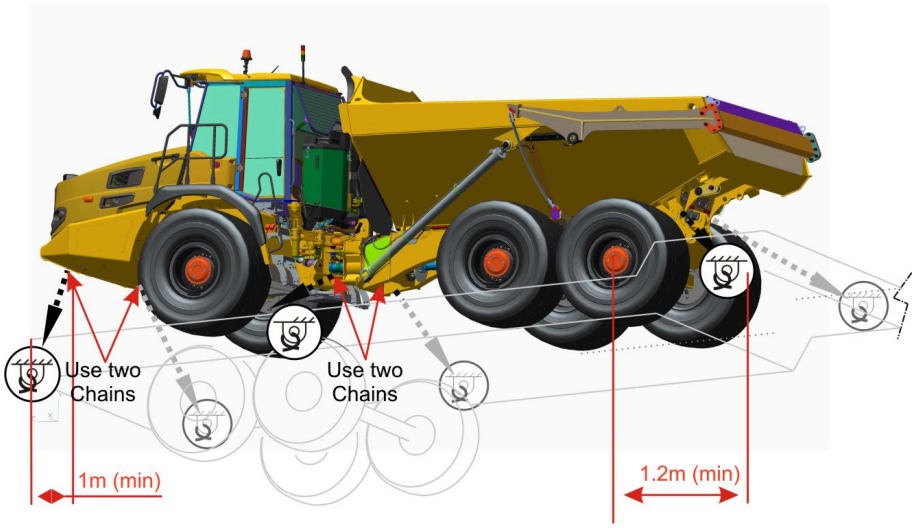
Driving Machine Onto Transport Vehicle

To drive the machine onto a transporting vehicle the following must be done:

1. Position the transporting vehicle against the loading ramp.
2. Drive the machine onto the transport vehicle very slowly, following the instructions of the spotter.
3. Install the articulation safety bar.
4. Chock all the machine wheels.
5. Lower the front suspension if equipped.
6. Secure the machine to the transporting vehicle with chains. (Refer to the Machine tie-down).
7. Drive the transporting vehicle away slowly.

Machine Tie-Down Guidelines





Machine must be securely tied down as per figure. A securely tied down machine, will prevent damage of machine and transportation vehicle while machine is being transported. Follow the instructions in the “Driving the machine onto a transporting Vehicle” section. (Remember to engage the articulation locking bar and to lower the suspension.

WARNING

Do not attach soft slings directly to any of the tie-down points on the machine, as this could lead to damage of the slings.

WARNING

The two central tie-down points must be secured with two individual ropes or chains in order to prevent the machine from shifting sideways on the transporting vehicle deck.

WARNING

The two front tie-down points must be secured with two individual ropes or chains in order to prevent the machine from slewing on the transporting vehicle deck.

WARNING

The ropes or chains attached to the front tie-down points need to be secured to the transporting vehicle deck at a minimum distance of 1 metre ahead of the tie-down eyes.

WARNING

The ropes or chains attached to the rear tie down points need to be secured to the transporting vehicle deck at a minimum distance of 1.2 metres behind the rear axle.

The rear of the machine may be secured with a single rope or chain passed through the rear tie down point with both ends of the chain secured to the transporting vehicle deck as shown.

WARNING

Use all 5 of the indicated tie down points on the machine and attach chains or ropes to all six locations on the transporting vehicle load deck.

WARNING

Ensure that the tie down chains or ropes are attached to the side of the transporting vehicle load deck. approximately 1.4 metres from the machine centre line.

WARNING

Ensure that the tie down chains attached to the two central tie down points are attached to the load deck so that they are in the same plane as the front plate of the rear chassis.

WARNING

Should one of the tyres have a slow puncture - the tie down will also lose tension, due to the height change of the machine.

Machine Jacking Procedure

WARNING

If the machine is parked on a soft uneven surface, there is a possibility that the machine may fall of the jack or sink into the ground.

Ensure that the machine is positioned on a firm, level surface, and that the park brake is engaged.

1. Ensure that the machine is on firm level surface.
2. Ensure that the park brake is engaged.
3. Install the articulation lock.
4. Ensure that the machine is switched off.
5. Disconnect the battery isolator.
6. Attach a “DO NOT OPERATE” tag in full view of anyone entering the operator’s station.
7. Chock the wheels on at least one axle that is not being lifted, to ensure that the machine cannot roll.
8. Position a suitable jack under the axle to be lifted and extend the jack until it is in contact with the axle.
9. Jacks may be located in any of the positions shown in red on Figure 1 or Figure 2
10. Make sure that the jack is in proper contact with the axle.
11. Do not support the machine or jack on cinder or wooden blocks, which may crumble or be crushed.
12. Do not make use of the angled surfaces of the axle housing to jack the machine up.
13. If the jack is deflected into the underfoot surface during the jacking operation, position a suitable wider base plate under the jack. If the problem persists, the machine should be moved to firmer ground.
14. Never allow any personnel underneath a machine supported only on a jack or jacks. Always support the machine on trestles that are fit and rated for the purpose before allowing personnel underneath any machine
15. Lower the jack as soon as possible. Do not support the machine on a jack or jacks for extended periods

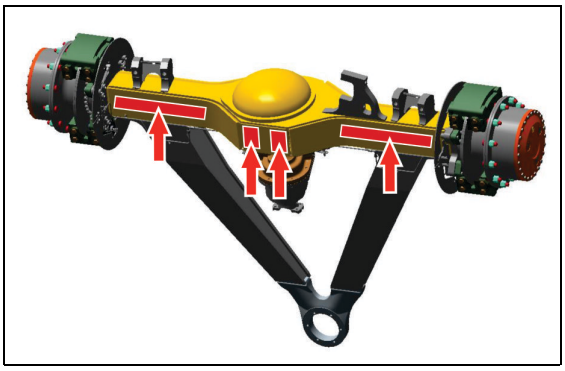


Figure 1: Jacking Positions on Front Axle

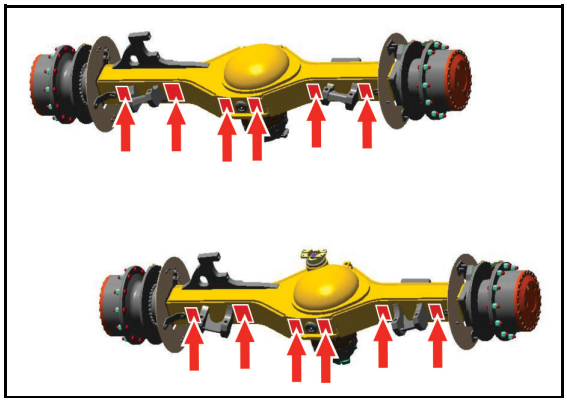


Figure 2: Jacking Positions on Mid & Rear Axles

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