

AARD SCALER

3 WHEELER



OPERATOR MANUAL



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NOTE:

In view of the constant improvements to our products, the specification data, as well as other information included in this manual is subject to change without notice.



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INTRODUCTION

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Contents

FOREWORD

WARNING

WARNING—All specifications in this manual apply to 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 **AARD** 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

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 **AARD** 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 **AARD** machine.



The following symbols and words are used throughout this manual:

DANGER

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

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



CAUTION

These symbols are orange in colour.

CAUTION indicates a hazard with a low level 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

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



INTRODUCTION

Machine Identification

Write product identification numbers (P.I.N.) 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 off the machine.

Warranty

Warranty is provided as part of **AARD'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 Engineering Department of **AARD**. Every effort has been made to ensure that the information in this manual was correct at the time of publication. **AARD** has a policy of continuous product development, improvement and design. **AARD** reserves the rights 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, **AARD** 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.



MODULE 2

SAFETY

PAGE NO.

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Contents

1. CERTIFICATIONS AND STANDARDS

Unauthorised Machine Modifications

WARNING

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.

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.

Unauthorized Modifications of Machine Cab (ROPS & FOPS)

WARNING

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

Do not perform or undertake any unauthorized 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 AARD 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 or 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 or 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 it must be replaced with new parts as specified in the parts manual. 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).

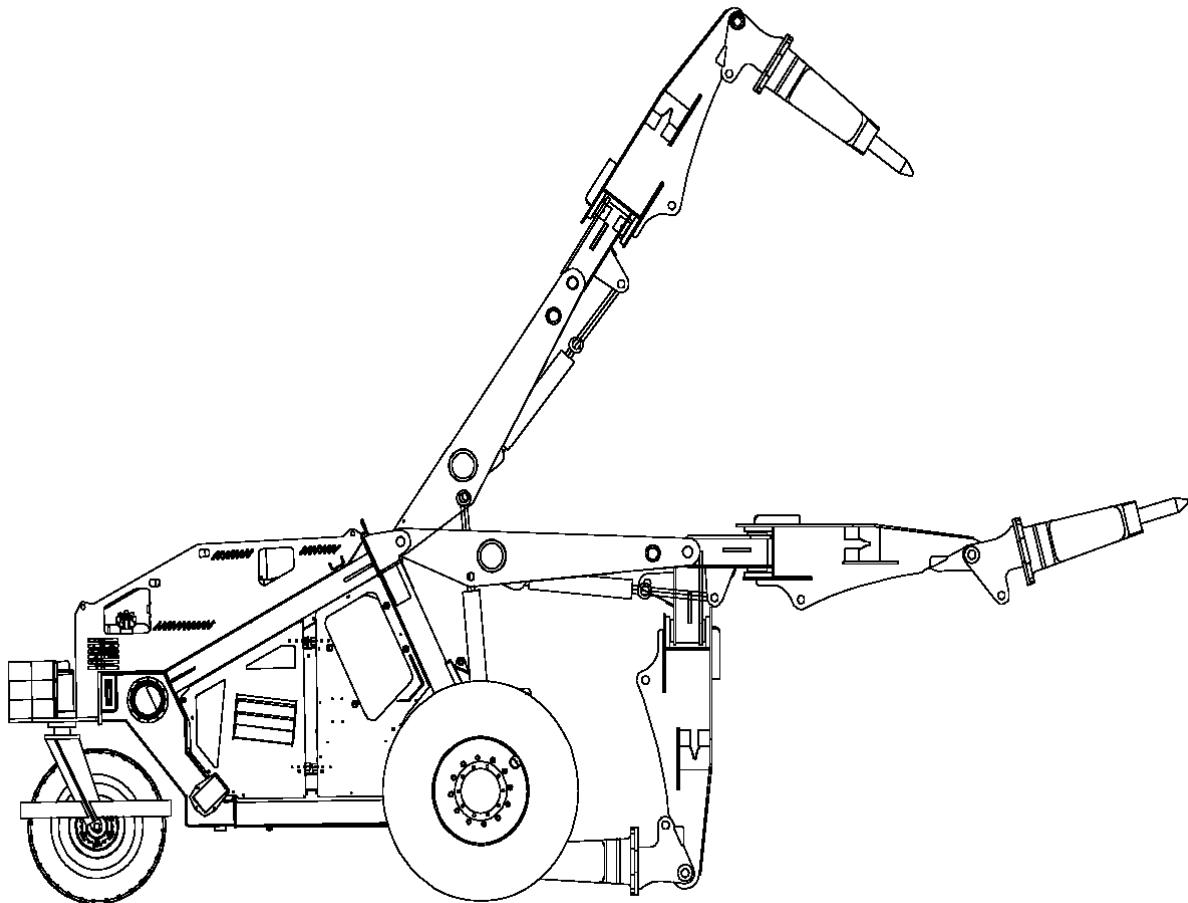
To ensure a prompt response, please be sure to include your return address and postal code, along with the model, serial number and/or VIN number of your machine.

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.

2. SAFETY AND OPERATOR CONVENiences

2.1 Safety Features





1. ROPS/FOPS Cab Protection. The Roll Over Protective Structure has been certified to meet specified test requirements according to ISO 3471. The Falling Objects Structure has been certified to meet specified test requirements according to ISO 3449.
2. LED Lights
3. Horn
4. Beacon lights
5. Backup Alarm
6. Spring applied Hydraulic release brakes (Fail safe brakes on all four wheel ends)

3. GENERAL SAFETY PRECAUTIONS

3.1 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.



3.2 Operator Qualifications

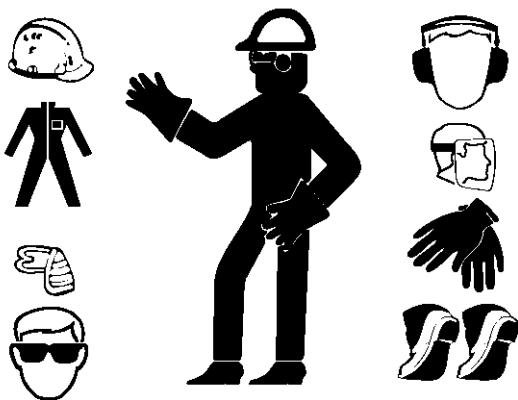
Operators must be trained and supervised by a training instructor before operating the machine.

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.

3.3 Wear Protection 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 catch 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.

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

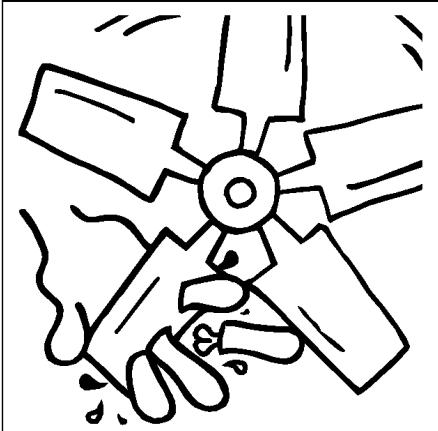
Wear gloves when handling wire rope cable.

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.



3.4 Stay Clear of Moving Parts

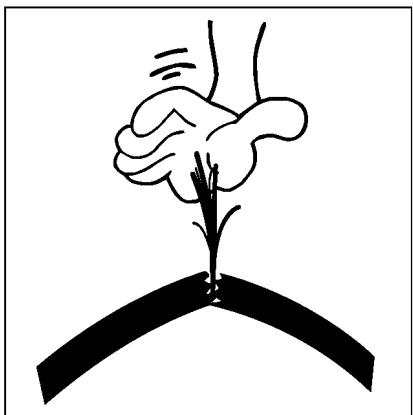


Entanglements in moving parts can cause serious injury.

Stop engine and park the machine safely 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.

3.5 Avoid High Pressure Fluids



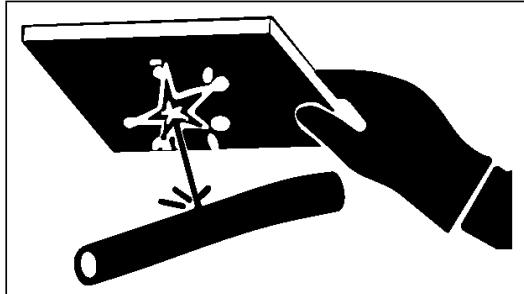
Relieve the pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

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

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

Relieve the

pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pin-holes 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 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.

3.6 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 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 or 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:

- Move the machine away from the danger area.
- Shut down the engine and leave the cab.
- 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 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.

3.7 Clean Trash from Machine

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

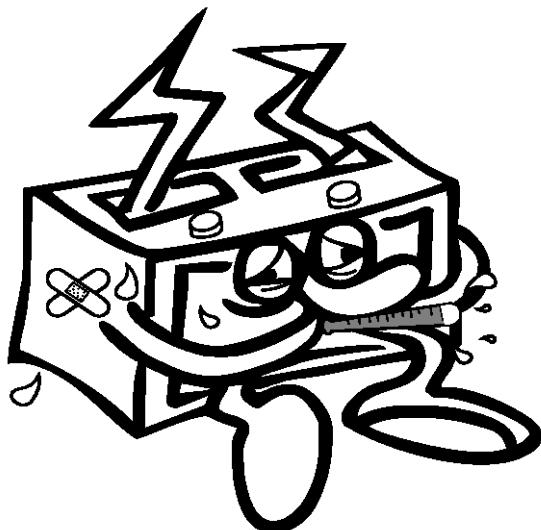
Clean any oil spills or fuel spills on machine surfaces.

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.



3.8 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.

If a non-sealed battery is subsequently installed, keep sparks and flames away from the batteries. Use a flash-light to check the battery electrolyte level. Use a voltme-ter 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.

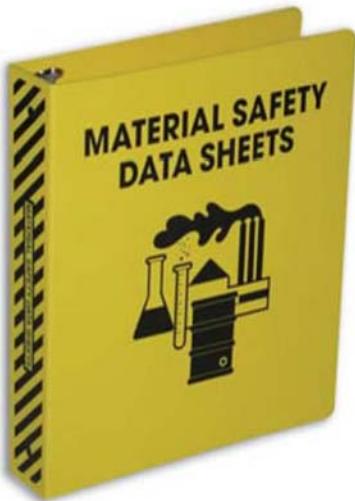
Avoid the hazard by:

- 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.

3.9 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.

3.10 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 trans-mission 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.



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.

3.11 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 Mineral Engine Oil 10W40

BELL Semi Synthetic Engine Oil 10W40

BELL Gear Oil Limited Slip 80W90

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

3.12 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.

AARD 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. Also, it is possible that additional data could be made available after this MSDS was issued.

If any effects continue, refer to a doctor.

3.13 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 line that are present on or close to the work site, the owner of the site should obtain the relevant MSDS's.

3.14 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.

3.15 Prepare for Emergencies

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 recharged. 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.



4. OPERATING SAFETY PRECAUTIONS

4.1 Mounting and Dismounting the Machine

Maintain a three-point contact when climbing on/off the machine or moving around on the machine exterior. (The 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 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, handholds), including slip-resistant surfaces, for signs of wear or damage. Repair/replace as necessary.

4.2 Start from Operator's Seat Only



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

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



4.3 Use Seat Belt

Use a seat belt at all times to minimise the chance 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 of the seat only.



4.4 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.

4.5 Avoid 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.

4.6 Operating on Slopes

Avoid side slope travel whenever possible.

Check service brakes frequently when operating on slopes.

5. MAINTENANCE SAFETY PRECAUTIONS

5.1 Prepare for Maintenance and Service

Warn others of maintenance or service work.

Park machine on a level surface.

Engage the park brake.

Stop the engine.

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

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





5.2 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 micro-processors if necessary.

Separate the harness connectors to the engine and to the machine microprocessors.

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 though any assemble that has bearings in it because this could cause the bearing to fail.

In cases where the repair is done close to a bearing assemble, ensure that the earth point is as close to where the repair is being done and that the current does not have to pass through a bearing.

5.3 Storage for Flexible Hoses

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

5.4 Replacing Hoses

Damaged hoses and fittings should be replaced and not repaired.

Replacing of high pressure hoses should only be done by qualified personnel.

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

5.5 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 gasses.

Only use a Bell Equipment approved ventilation filter element.



6. SAFETY SIGNS

6.1 Safety Decals

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

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 **AARD** Representative for new decals.

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



Located on the right side of the machine frame inside the cab above the operator seat.

Located on the right side of the machine below the operator seat.



Located inside the PM pack wallet.



DIESEL FUEL HYDRAULIC OIL

Located on the engine fan housing.



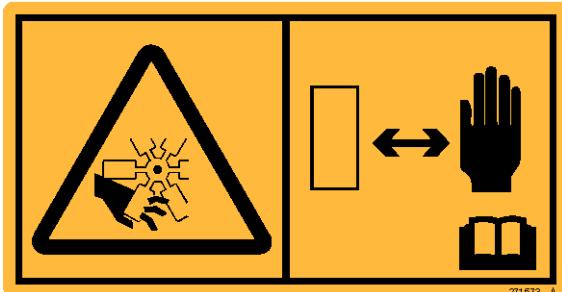
Located on the back - Firewall Top Right.



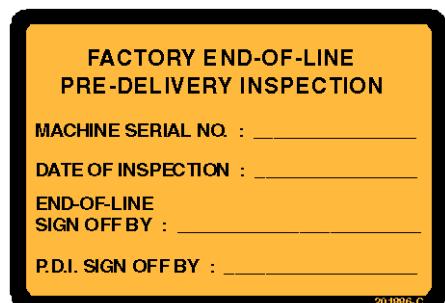
Located inside the cab next to the right side control lever.

Located on the tank below the fuel filler cap.

Located on the right of the machine frame outside the cab above the wheels.



Located at the rear of the machine on the counter weight.

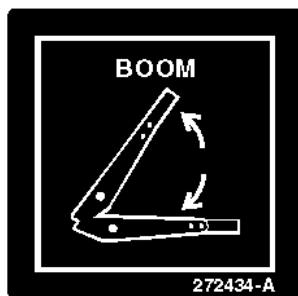


Located on the front, left and right sides of machine frame outside the cab above the wheels.





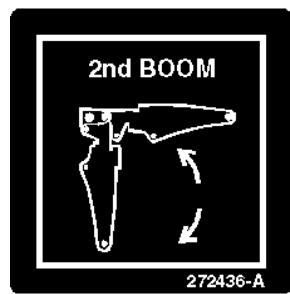
Located on the valve bank in the cab. (Hammer)



Located on the valve bank in the cab. (Boom - move up & down)

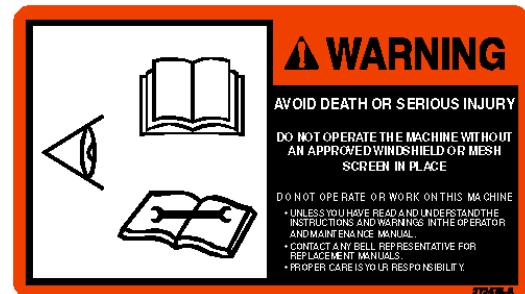


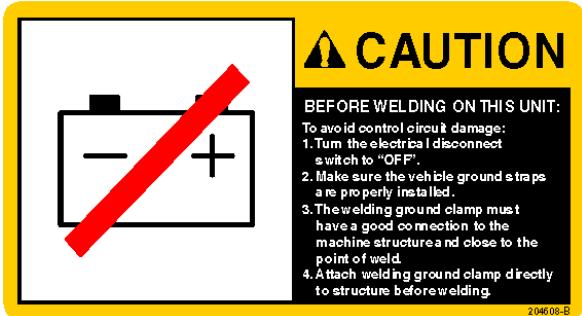
Located on the valve bank in the cab. (Hammer - move up and down).



Located on the valve bank in the cab. (2nd Boom—move up & down).

Located on the right side of the machine frame inside the cab above the operators seat.





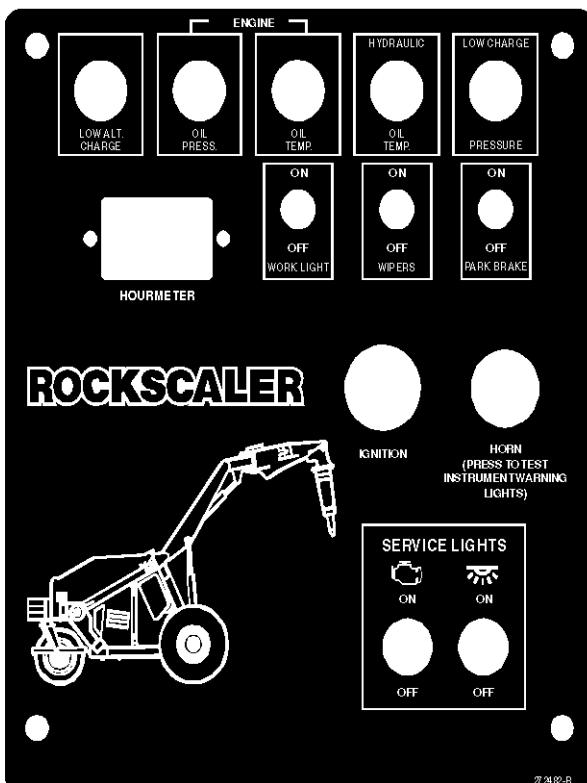
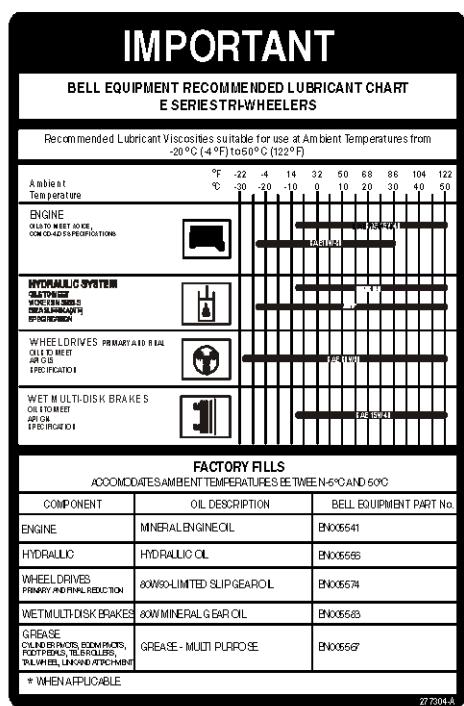
Located on the right side of the machine below the operator seat.



Located on the machine - hydraulic tank.

Located on the machine -
Hydraulic tank.

Located in the cab
of the machine
(Instrument Panel)





Located on the firewall behind the seat

SERVICE 10 SMR

FUEL FILTER
DRAIN WATER DAILY

Located on the machine frame right of the secondary / water separator / fuel filter.



Located in cab of the machine.

Located on the fuse panel inside the cab.



220E ROCKSCALER

Located on the outside tubing of the machine - on the left & right hand side.
(Branding)



Located on all greasing points on the machine.



Located on the outside (window) of the cab.



Located on the outside of the machine on the left & right hand side.



Located inside the cab, Rear Firewall.



7. TYRE INFORMATION

7.1 Tyres and Rims

Unless otherwise specified, the standard Tyres and rims fitted to **AARD** Dump Trucks are approved for use at the specified machine tyre loads (half of the axle loads) at a maximum speed of 50 km/hr, 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.

7.2 Tyre Pressure - General

Air under pressure, in the correct quantity, enables a tyre to carry the load 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 **AARD** Dump Trucks 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 vehicles' 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, e.g. real axle loads, haul conditions and ambient operating temperature. Both over- and under-inflation of a tyre 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 vehicle, but also overload load-carrying components which could result in premature failure.

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

7.3 Tyre Pressure - 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 vehicles and / or after long periods without operating the vehicle. 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 vehicle / 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 vehicle starts operating, the pressure will increase due to heat build-up inside the tyre. The increasing of pressure on an operational vehicle 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 - AARD has done everything in its power to source Tyres suited for the ADT application. Customers and Operators are reminded that AARD cannot control the applications in which AARD ADTs 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 strongly recommends that respective tyre companies are approached to establish safe working parameters of each ADT & Tyre combination prior to operation on any site.





WARNING

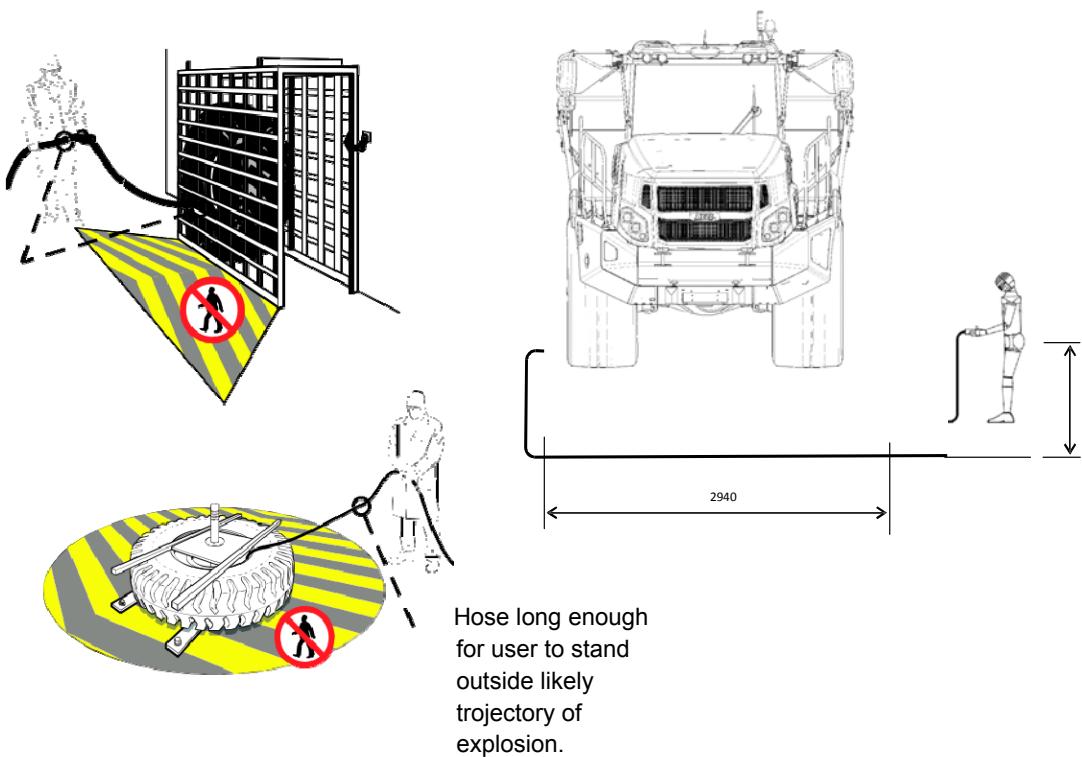
WARNING - Welding or modifying rims is strictly prohibited. Rims are manufactured in a controlled environment and any welding or other modifications to factory issued rims

will immediately render the rims unsafe. Overheating of a tyre caused by application of an external heat source, internal heat source e.g. 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 (1640 ft) 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 within any area included in the shaded area in the drawing and restrict access underneath the truck, until such time that the tyre has cooled down sufficiently. Never deflate over-heated 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 inflation 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 'bead-blaster' if seating is difficult.	DON'T use 'unrestricted' airlines (ie 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).



7.4 Recommended Operator Position During Tyre Inflation



Schrader MASTAIR gauge with 6 mm input and output hose.

Schrader Gauge Instructions:

1. Measurement Scale: 0.7 to 12 bar (10 to 170 psi).

2. Recommendations and first time operation:

- Use only filtered oil and water free compressed air.
 - Max. pressure of air source: 15 bar.
 - Do not use inflating or checking pressure of hydroflated Tyres or those containing corrosives.
 - Attach a hose (7 mm interior diameter) to air-intake neck (fitted with an R987 - 2 coupler)
 - Insert a flexible intermediate connector:
 - Refer. R153-1 on the air-intake neck for connection to a quick-acting coupler. Ref. 39066-67 for a 1/4 thread connection.
3. Check regularity 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.



MODULE 3

MACHINE INFORMATION

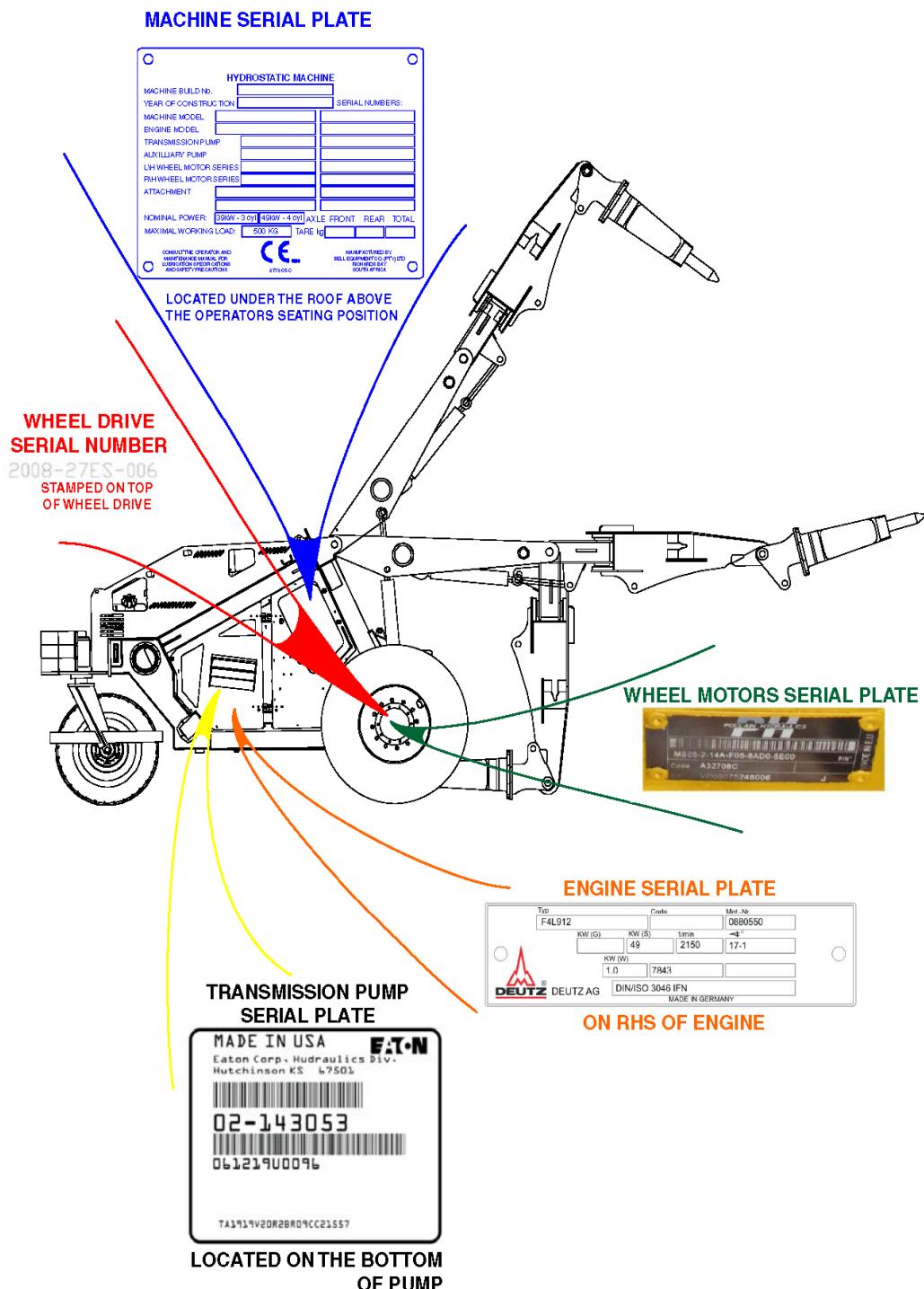
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3. MACHINE DIMENSIONS	11



Contents

1. MACHINE NUMBERS

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



TD0009516-B



2. MACHINE SPECIFICATIONS

The specifications for the 220E Rockscaler as follows:

BN030412

Engine	
Model	Deutz F4L912W
Configuration	Four cylinder, in-line, air cooled with integrated flower fan.
Governed Power (Kw)	40
Maximum torque (Nm @ Rpm)	198@1550
Governed full Power Engine speed (Rpm)	2500
Max. Rated Speed (Rpm)	2800
Aspiration	Naturally aspirated
Displacement (cc)	4086
Cylinder bore (mm)	102
Stroke (mm)	125
Compression Ratio	22:1
Frame Mounting	4 point rubber mounting
Dynamic balancer	With
Sump material	Cast Aluminium
Oil Capacity	9l
V-Belt	Dual belt - separate blower (with spring tensioned jockey pulley) and alternator. No aircon belt provision.
Blower pulley	104mm - single groove



Crank pulley	Double groove - sparate blower and alternator belt. No provision for air conditioner belt.
Blower failure warning	Mechanical linkage induces injector pump shut-off
Injection type	Direct, in-line pump with mechanical governor, 5-hole nozzles.
Injector Pressure (bar)	250
Oil Cooling System	Air cooled with integrated axial-flowe and spray-oil piston cooling
Max oil temperature (Deg C)	135
Inlet/exhaust valve clearance (cold)(mm)	0.15
Low idle (Rpm)	650
High idle (Rpm)	2500
Fuel filtration	Two stage. Spin-on water separator primary, replaceable spin-on secondary.
Oil filtration	Replaceable spin-on paper type micro filter - full flow.
Width (mm)	679
Height (mm)	796
Length (mm)	807
Basic dry weight (kg)	300
Angularity Limit	20 degrees flywheel up/down, 30 degrees left/right
Exhaust	
Type	
Cooling fin hot air outlet	



Air cleaner	
Type	
Pre-cleaner system	
Type	
Fuel Inlet System	
Water separator primary filter-spin-on	
Secondary filter-spin on	
Engine / transmission Coupling	
Type	
Hydrostatic Transmission	
Type	Variable displacement closed loop manual control axial piston tandem pump, Closed Loop motor circuit with remote charge pump, Filtered charge pressure with non-filtered direct-return to tank.
Drive Pumps	
Make	Eaton
Type	Axial piston, closed loop servo controlled
Control	Direct control, foot linkage
Pump Displacement (cc/rev per wheel)	41
Relief pressure (Bar)	310
Flow rate at governed Rpm (l/min per wheel)	92
Drive Motors	
Make	Poclain
Type	Axial piston, closed loop
Motor Displacement	560



Transmission Charge Circuit	
Model	Bosch Double
Type	Aluminium gear pump
Pump displacement (cc/rev)	16
Pump Flow (l/min) @ Governed engine Rpm	36.8
Relief Pressure Setting (Bar)	17
Pressure Filter Rating - Beta 75 rating (micron)	13
Wheel Drive System	
Primary wheel motor reduction	14.06
Secondary (hub) reduction ratio	4.82
Hub reduction oil capacity (L)	5.00
Total wheel drive reduction	67.77
Motor Vol./wheel rev. (L/Rev)	2.751
Drive motor series	29
Wheel torque (kNm per drive wheel)	1.58
Wheel Rpm @ governed engine Rpm	33.4
Transmission Corner Power (kW)	95.1
Drive Wheels	
Drive Tyre Type	17.5R25 L5 Mine Spec, 20 ply
Drive Tyre Size	17.5 x 25
Drive Wheel Rim	14 x 25 1 piece
Drive Tyre rolling radius (m)	0.664
Drive Wheels Tractive Effort (kN machine)	40.889



Road speed (km/hr at governed engine speed)	8.4
Drive Wheel Inflation Pressure (Bar)	1.5
Drive Wheel Free Radius (m)	0.675
Drive Wheel Width (m)	0.462
Unladen Ground Pressure - Front (Bar)	0.62
Tail Wheel	
Tail Wheel Tyre Type	High Floating, 14 ply, with inner tube
Tail Wheel Tyre Size	18 x 15,5
Tail Wheel Rim	16 x 15,5 3 piece
Tail Wheel Free Radius (m)	0.4375
Tail Wheel Width (m)	0.4
Tail Wheel Inflation Pressure (Bar)	2
Unladen Ground Pressure - Rear (Bar)	1.22
Service Brakes	
Type	Closed Loop Hydrostatic Wheel retardation
Maximum Wheel Brake Torque (KNm - machine)	27.15
Motor Displacement	40.89
Park Brakes	
Type	Spring applied, hydraulic release wet multi disc
Full release (multi disc hold-off)pressure (Bar)	16
Wheel motor SAHR brake torque (ea wheel) (Nm)	226
Maximum Wheel Brake Torque (KNm-machine)	30.63
Maximum Wheel Retardation Force (KN)	46.13



Attachment	
Type	Hydraulic Hammer Drill
Hydraulic Tank	
Type	External
Oil Type	VG 68
Capacity (L)	264 liter
Maximum operating temperature	90°C @ 45 ambient
Level Measurement	High - Low level sight
Filler	Lockable
Breather	Remote to filler cap, 3 Micron, 0.75 bar pressurised
Hydraulic system cleanliness	ISO 20/18/15- ISO 4406
Implement Hydraulic System	
Type	Fixed displacement, gear pumps with full flow suction filtering. WO return filtration or cooling.
Suction Filtration	20 Micron
Return Filtration	None
Boom / mast Hydraulic Function	
Pump Type	Gear, open centre, engine geartrain drive
Pump displacement (CC / rev)	16
Pump Flow (l/min) @ Governed engine RPM	36.8
Relief Pressure setting- up (Bar)	138
Relief Pressure setting- down (Bar)	69
Non-Boom aux. hyd. functions	Cooling
Fuel Tank	
Type	Remote to frame, rear mounted
Capacity (l)	100
Level Measurement	3 x round-type sight glasses
Filler	Lockable
Breather	Remote to cap, 40 Micron with anti-slosh check valve



Electrical System

Voltage	12V
Battery type	Maintenance free, sealed type
Starter motor rating (Kw)	2.7 kW
Alternator rating (V/A)	14V / 55A
Battery rating (Ah)	100
Fuse box	Inside cabin- instrumentation box

Steering System

Type	Front wheel hydraulic skid steer via foot operated treadle control system.
Cabin	
Type	Integral with steel frame, with doors
Guarding	HD windscreen guard and bonnet guard. Additional bonnet rock guard and window expanded metal mesh. Rear engine bay doors.
Safety / Ergonomics	FOPS Certified Cab Over- centre lock-down latches x 2 to prevent accidental seat plate tip-up. Low profile padded seat with retraceable lap strap seat belt.

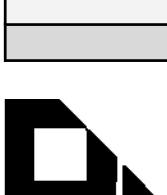
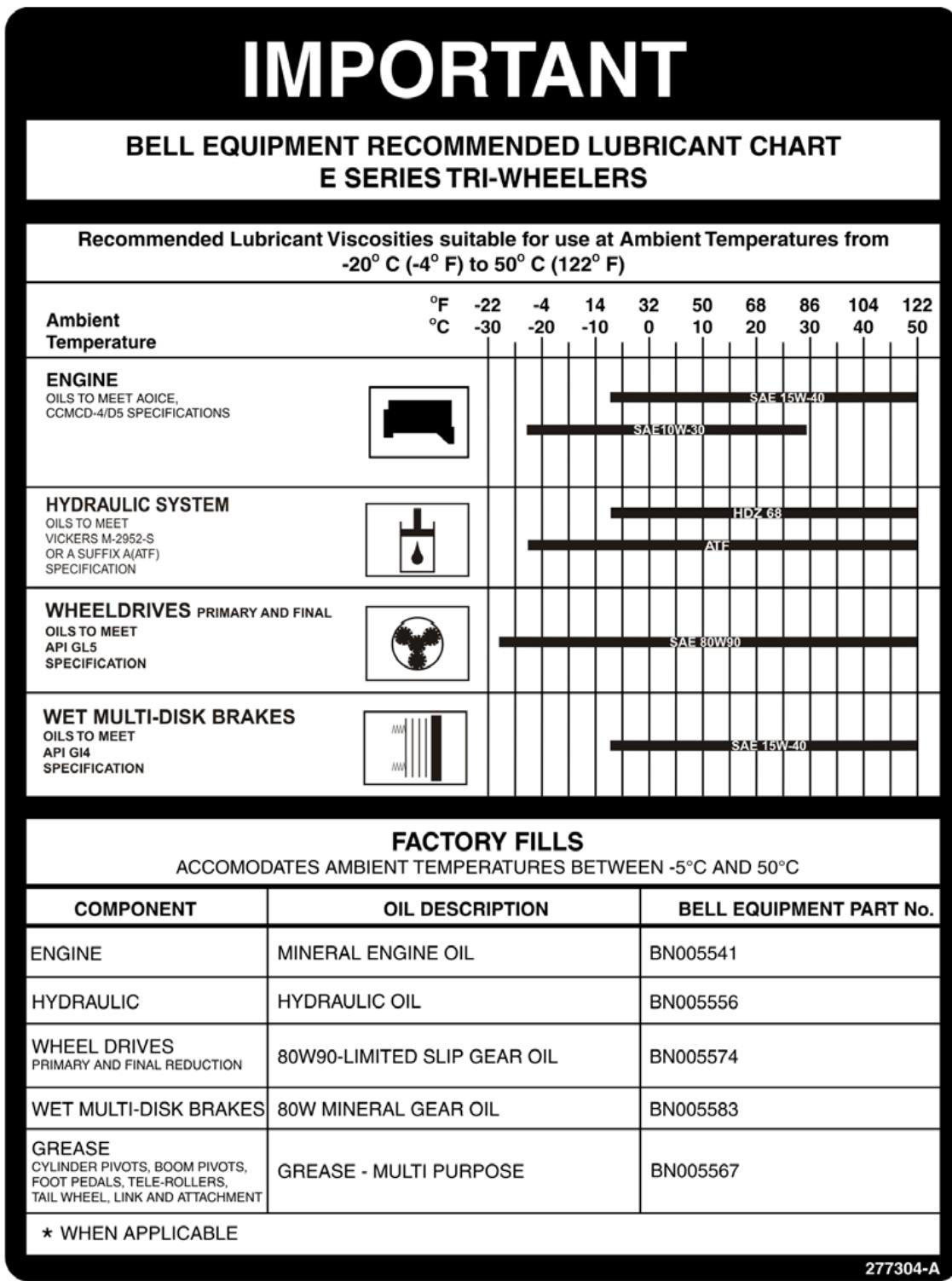


Warning Lights	
Engine Oil	Pressure sensor switch-on point: 0.25 + .1 bar
Operator Switches/Controls	Brake-on safe start Key ignition Augomatic engine cut off solenoid Friction-hold hand throttle lever Dash mounted direct acting hydraulic control levers Electrical toggle switch park brake actuation with switch light Compact scroll-type hour meter
Noise Level	
7 m ahead of machine (dBA)	76
7 m behind machine (dBA)	80
7 m to left of machine (dBA)	83
7 m to right of machine (dBA)	86
Cabin	97
Operating Mass	
Unladen Front (Kg)	5,905
Unladen Rear (Kg)	1,675
Unladen Total	7,580
Shortest Wheelbase	2,753

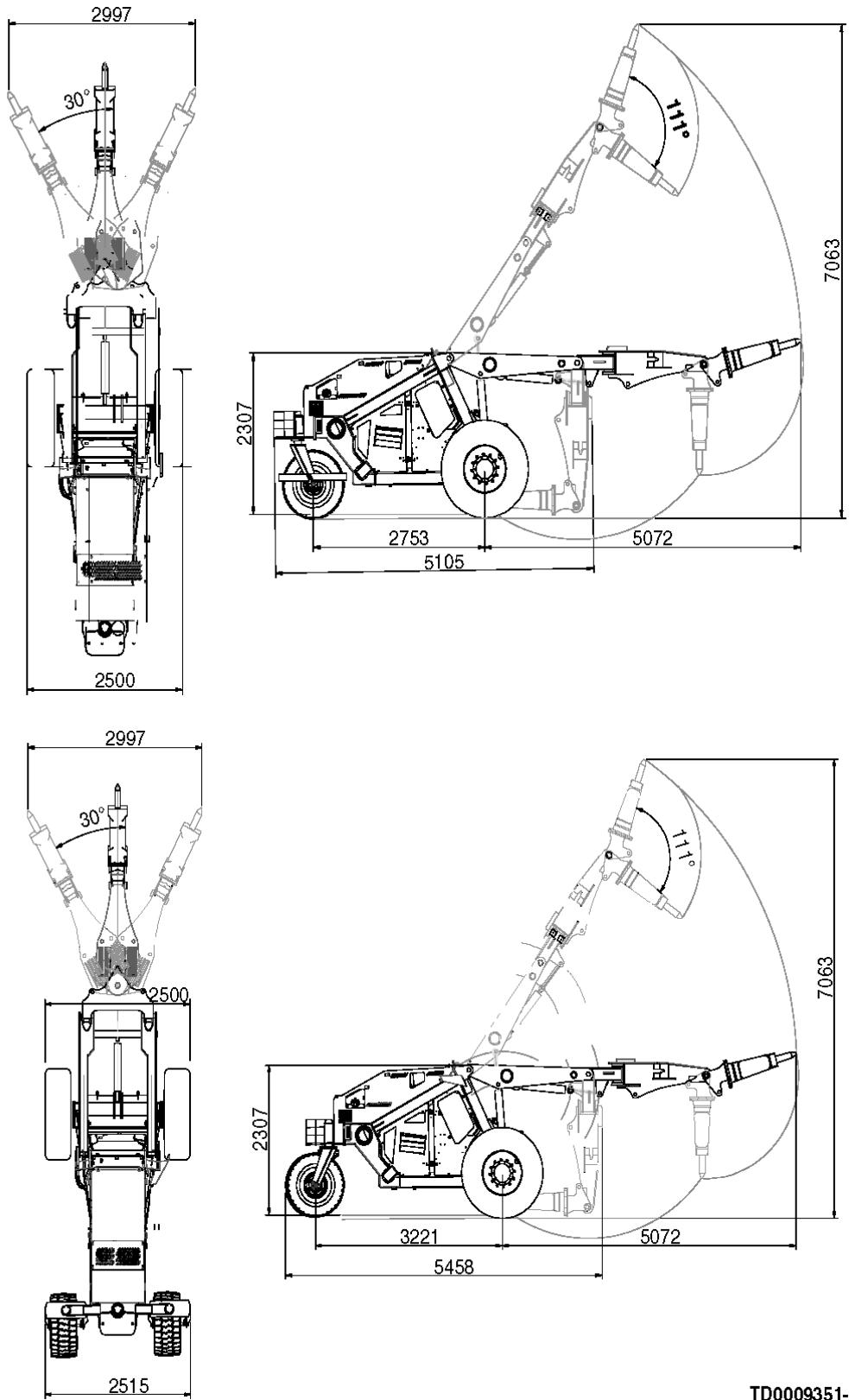


Recommended Fuel and Lubricants

The following illustration details the recommended fuel and lubricants.



3. MACHINE DIMENSIONS

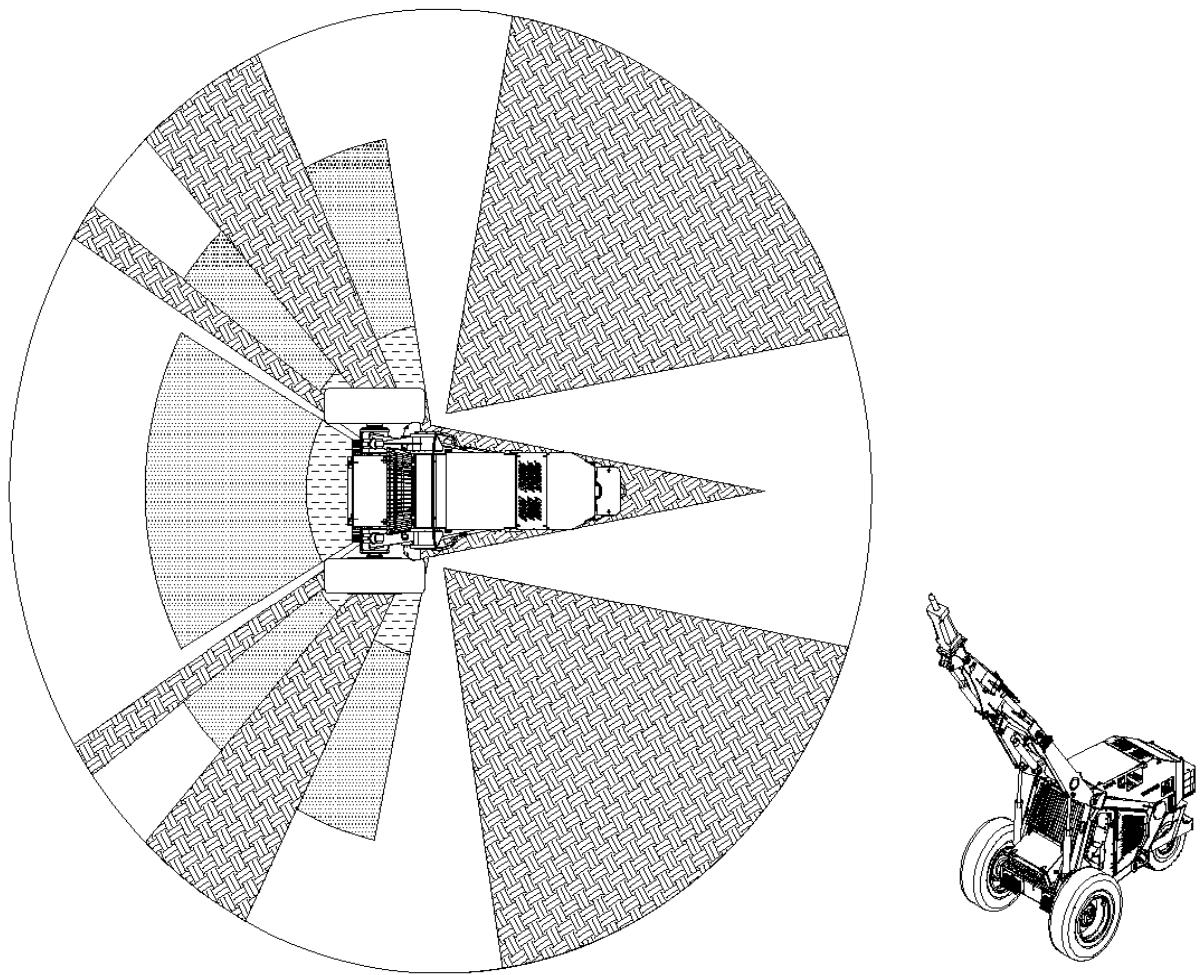


TD0009351-A



3.1 Visibility Diagram

NOTE:
THE ILLUSTRATION IS FOR THE MACHINE IN A WORKING POSITION WITH
THE BOOM IN AN UPRIGHT ORIENTATION



BLIND AREA



GROUND LEVEL BLIND AREA



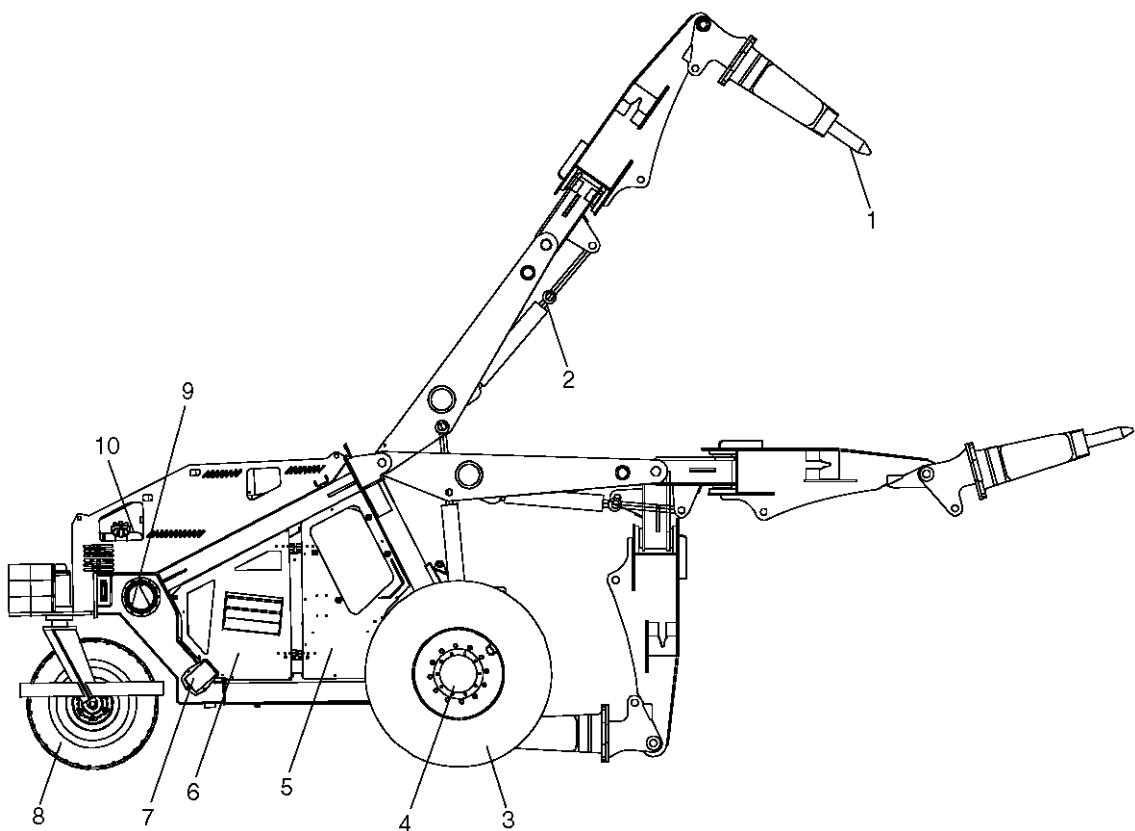
1M OFF GROUND LEVEL BLIND AREA

TD0009638-A



3.2 Component Terminology

The following illustration details the component terminology used throughout the manual.



- | | |
|------------------|---------------------------------|
| 1. Hammer | 6. Engine Access Door |
| 2. Cylinder | 7. Hydraulic Filter Cover |
| 3. Front Wheel | 8. Tail Wheel |
| 4. Final drive | 9. Cover/Hydraulic Tank/Coolers |
| 5. Operator Seat | 10. Fuel Tank |



MODULE 4

OPERATION

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3. OPERATING TECHNIQUES	21
4. RECOVERY AND TRANSPORTATION	23



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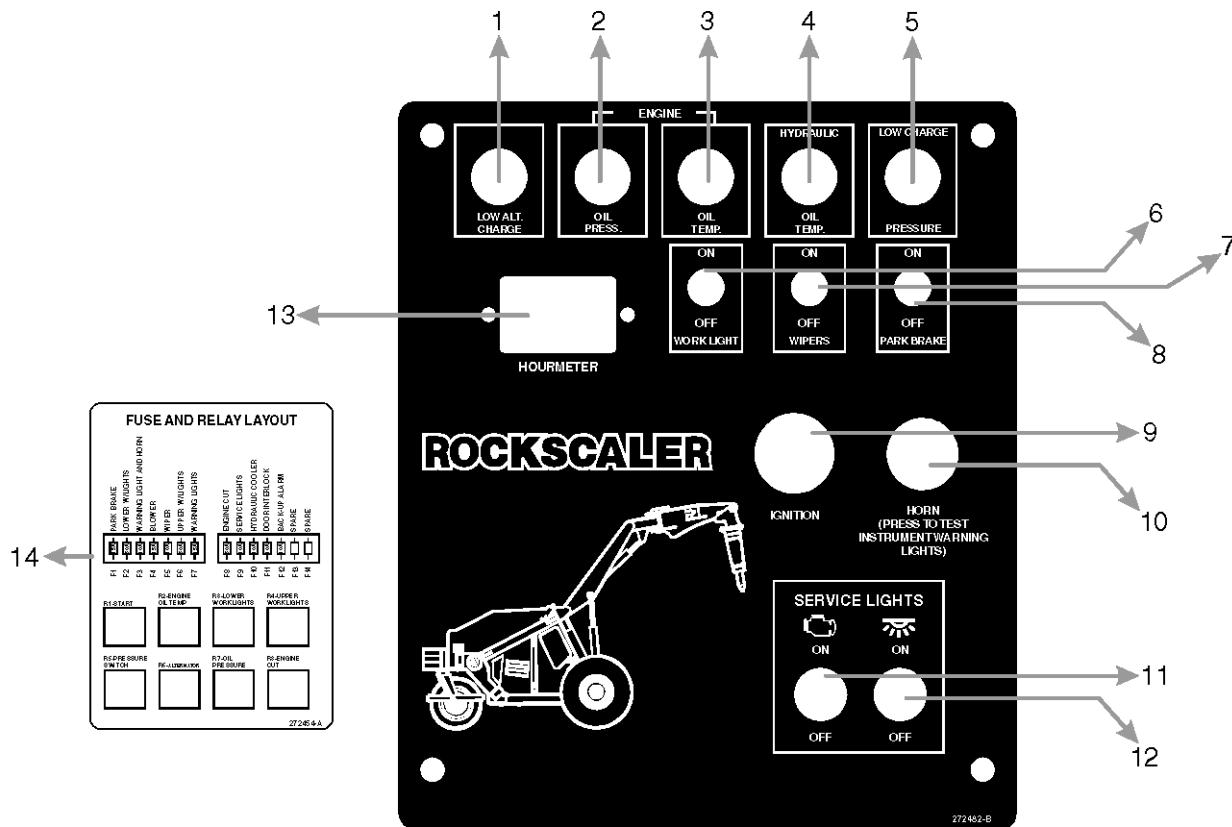
1. OPERATING COMPONENTS

Introduction

This chapter details the layout and operation and the controls and instruments in the Rockscaler.

All the operator controls and instruments for the Rockscaler are located in the cab.

The following figure details the controls and instruments on the instrument panel.



1. LIGHT ALT. CHARGE
2. ENGINE - OIL PRESSURE
3. ENGINE - OIL TEMPERATURE
4. HYDRAULIC OIL TEMPERATURE
5. LOW CHARGE PRESSURE
6. LIGHTS (ON / OFF SWITCH)
7. WIPERS (ON / OFF SWITCH)

8. PARK BRAKE (ON / OFF SWITCH)
9. IGNITION
10. HORN
11. SERVICE LIGHTS - ENGINE (ON / OFF SWITCH)
12. SERVICE LIGHTS - CAB LIGHT (ON / OFF SWITCH)
13. HOURMETER
14. FUSE BOX LAYOUT



GAUGE

Hourmeter

The hour meter is located on the instrument panel.

The hour meter displays the service meter reading (SMR) for the machine service life.

The purpose of the meter is to determine the service intervals for the machine.



Warning Indicators

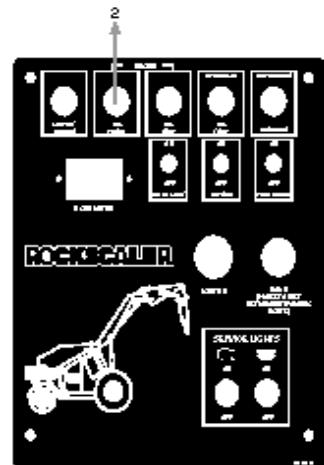
When the start push button is the **ON** position and the ignition switch is tuned to the **ON** position the following indicators illuminate/flash:

- Engine Oil Pressure Indicator.
- Alternator Charge Indicator.

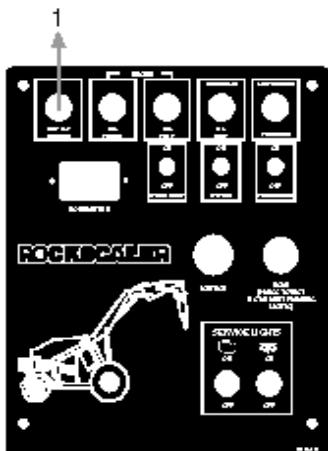
Engine Oil Pressure Indicator

The engine oil pressure indicator is located on the instrument panel.

The indicator illuminates when the oil pressure is low.



Alternator Charge Indicator



The alternator charge indicator is located on the instrument panel.

The indicator will illuminate when the alternator is not charging the battery.

When the indicator illuminates the cause must be investigated and rectified immediately.



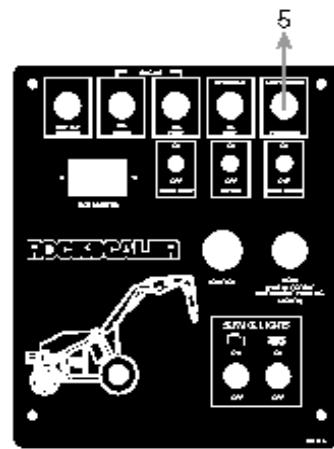
CAUTION - Failure to rectify the case of the alternator charge indicator illuminating will result in battery failure.



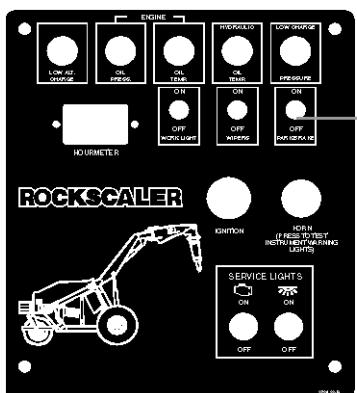
Park Brake Indicator

The park brake indicator is located on the instrument panel.

The indicator will illuminate when the park brake is applied.



Park Brake Switch



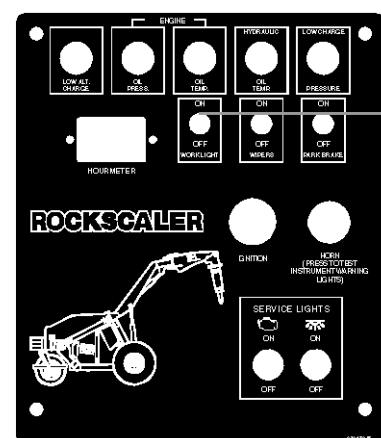
The park brake switch (8) is located on the instrument panel.

NOTE: The switch has two positions:

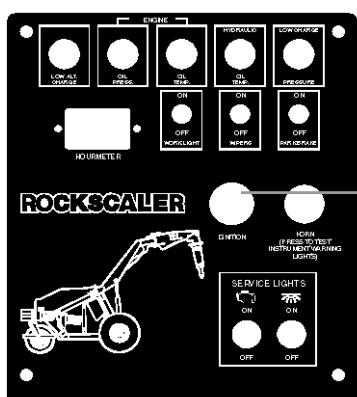
- The first position (down) is park brake **OFF**.
- The second position (switch in the up position) is park brake **ON**.

Light Switch

The lights switch (6) is located on the instrument panel.



Ignition Switch



The ignition switch (1) is located on the instrument panel.

NOTE: The ignition switch is a key operated switch has two positions:

- ON
- OFF



When the ignition switch is moved on the **ON** position the following indicators will illuminate or are activated:

- Engine Oil Pressure Warning Indicator.
- Park Brake indicator.
- Alternator Charge Indicator.

The park indicator will extinguish when the park brake switch is pressed to the **OFF** position.

NOTE:

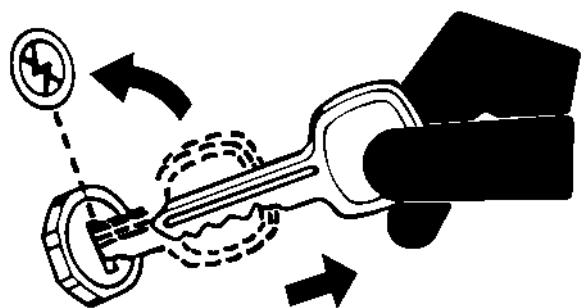
The engine will not start until the park brake switch is in the ON position.

Start (Ignition - key)

To start - Place key in ignition & turn the key.

To start the engine proceed as follows:

1. The key placed in the ignition.
2. The park brake is applied.
3. The control pedals are in the neutral position.
4. The engine throttle is set at quarter throttle.
5. Turn the key in the ignition.



CAUTION

CAUTION - Do not turn and hold the key in the ignition or operate the starter for more than 17 seconds. If the engine does not start, wait

one minute before attempting to start the engine. If the engine does not start after two attempts, investigate the cause.



⚠ CAUTION

CAUTION - Do not continually operate/turn the key in the ignition when the battery is flat as this may cause serious damage to the starter motor.

CONTROLS

Engine Throttle and Shutdown

The engine throttle is located on the left side of the cab behind the operators seat.

Push the engine throttle back to increase the engine rev/min.

Push the engine throttle forward to decrease the engine rev/min.



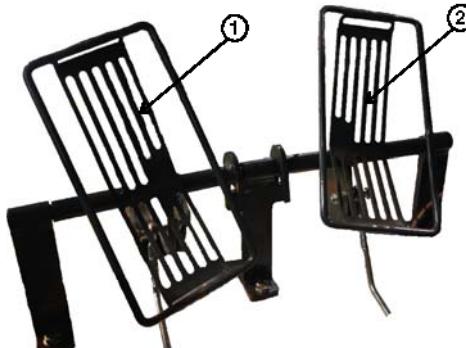
⚠ CAUTION

CAUTION - Allow the engine to run at low idle for three minutes before turning the machine off. This allows the engine temperature to stabilize.

The engine will shut down when the key is turned off in the ignition.



Control Pedals



② The machine is directionally by two foot control pedals (1 and 2) which are located on the floor in front of the operator's seat.

Pushing the top of the right or left control pedals rotates the respective sprocket drives forwards.

Pushing the bottom of the right or left control pedals rotates the respective sprocket drives backwards.



CONTROL LEVERS

Left Side Control Lever



Slew - The left side control lever (1) is used to move the slew boom left and right.

Hammer - The left side control lever (2) is used to operate the hammer.

Right Side Control Levers



The right side control lever (1) is used to move the 1st Boom up and down.

The right side control lever (2) is used to move the second Boom up and down.

The right side control lever (3) is used to move the Hammer up and down.

NOTE:

The control levers are spring loaded to the central position.



OPERATOR SEAT



Backward and Forward Adjustment

The slide adjustment lever (1) is located on the left side of the seat.

The slide adjustment lever allows the seat to be moved closer or further away from the control pedals.

To move the seat the following needs to be done

1. Pull and hold the lever up.
2. Move seat towards or away from the control pedals until the required position is reached.
3. Release the lever.

Backrest Adjustment

The backrest adjustment control (2) is located on the left side of the seat.

Move the backrest adjustment control upwards and hold to obtain the required angle of the backrest.

Release the backrest adjustment control.

Armrest Adjustment (if fitted)

The armrest adjustment knob allows the height of the armrest to be adjusted.

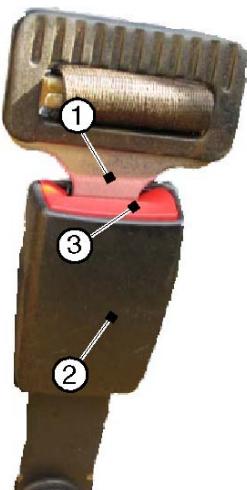
Turn the knob clockwise to raise or counterclockwise to lower the armrest.



SEAT BELT

A fully adjustable, lap strap seat belt (1) is an integral part of the seat.

The seat belt is designed to fit firmly across the Front of pelvis.



Fastening

Firmly push the buckle (1) into the fixed clasp (2) until it clicks, check the connection is secure.

Releasing

Press the red button (3) on the fixed clasp and remove the buckle.

⚠ WARNING

WARNING - Always wear a seat belt when operating the machine, in an accident it may save your life.

⚠ WARNING

WARNING - Check the condition of the seat belt and mounting hardware before operating the machine, replace the seat belt at least every three years, regardless of the condition.

Adjusting

When fastening, the seat belt may be adjusted as follows:

Shorten

1. Hold the buckle in your right hand in front of you and pull the free end of the belt across the left.

Lengthen

2. Hold the buckle in your right hand, tilt until the buckle is perpendicular to the belt and pull across the right.



PROCEDURES BEFORE STARTING

Safety Instruction

Before operating the machine the following safety instructions must be observed.

Read and fully understand this manual, before you start operating the machine.

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. Never jump off the machine.

The cab has 2 access and exit points.

Running-in Instructions

The machine run-in period is the First 100 SMR (hours) of operation. The machine **MUST** be serviced at 100 SMR (hours) to ensure maximum service life.

The 100 SMR (hor) service must only be done by AARD Service Personnel.

Procedures Before Starting

Safety Rules

Operator Duties

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.
- Only trained personnel may operate the machine.
- Check that a "**DO NOT OPERATE**" tag is not attached to the instrument panel. If the tag is attached, do not operate the machine.
- Complete the Walk Round Check, if any defect is found, do not operate the machine. Attach the "**DO NOT OPERATE**" tag to the instrument panel and remove the machine key.
- Report all defects and problems encountered during the Walk Round Check to the **SERVICE PERSONNEL**.



Daily Walk Round Check



CAUTION - Ensure that service personnel have performed the Daily (10 hourly service) before starting the machine.

The Walk Round Check must always be carried out before operating the machine.

NOTE:

The machine must be parked on level ground with the hammer on the ground.

It is recommended that the machine is thoroughly washed before starting the Walk Round Check.

NOTE:

For detailed instruction of the different maintenance procedures, refer to the Maintenance Information of this manual, Service and Maintenance Section.

NOTE:

The following checks are VISUAL Inspection procedures of the machine and its components and must be completed prior to operating the machine.

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.

1. Open the engine access covers.
2. Check the engine oil level.
3. Check the condition and tension of the alternator belt.
4. Check for loose, frayed or corroded connection in the wiring harness.
5. Check for engine mountings and secure and are damaged.
6. Ensure that all the hose connections are right and inspect for leaks, cracks or chafing damage.
7. Check that the exhaust connections are secure.
8. Check that the battery secure and the connections are tight.
9. Check the cooling system for cleanliness and ensure there are no restrictions to the cooling function.
10. Inspect the air cleaner assembly for damage and security.



11. Check the hydraulic fluid level.
12. Check the throttle linkage connection are secure.
13. Drain the fuel/water separator filter.
14. Lubricate all the lubrication points.
15. Check the fuel level.
16. Ensure that there are no obstructions around the machine before moving off.
17. Ensure that there are no obstructions in the cab, especially under and around the pedals and controls before moving off.
18. Ensure that the seat belt is in proper working order and fasten the seat belt before start-up.

DAILY CHECKS SAFETY INFORMATION

Maintenance Position

Before starting to work on the machine, wash it thoroughly and park it on firm level ground in the required maintenance position.

Prepare for the daily checks and maintenance as detailed below:

Place in Machine in the Maintenance



WARNING

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

1. Park the machine on firm, level ground.
2. Apply the park brake.
3. Stop the engine and remove the keys from the ignition switch.
4. Chock the wheels.
5. Attach the “**DO NOT OPERATE**” warning sign to the instrument panel.
6. Allow the machine to cool down.
7. Ensure that the attachment is safely resting on the ground.



WARNING

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



Rules When Working On The Machine

General

Do not carry out any work on the machine unless you are trained and have the knowledge to carry out the work.

Service and maintenance procedures which are 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 correct equipment in order to carry out the service or maintenance in the correct way. Repair or change broken tools and faulty equipment.

Read all plates and decals on the machine and in the manual before you start any work on the machine.

Each of the instruction contains important information about handling and servicing.

Do not wear loose fitting clothing or jewellery when working on the machine.

Always wear safety glasses, gloves, shoes and other protective articles as the job requires.

Always stop the engine before any service or maintenance procedure is carried out on the machine, unless otherwise instructed in the manual.

When changing oil in the engine or fluid in the hydraulic system, 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 the components.

All lifting devices, for example slings and ratchet blocks, must comply with national regulations for lifting devices. AARD will not accept any responsibility if any lifting devices, tools or working method 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.

All pressurised vessels must be de-pressurised and then open very carefully.

When checking for leaks, use a piece of paper or wood, not your hand.

Never set a pressure limiting valve to a higher pressure than that recommended by the manufacturer.

Before starting the engine in doors, ensure that the ventilation is sufficient to cope with the exhaust gases.

Do not stand behind the machine while the engine is running.

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

Oil and water in close proximity to electrical equipment are dangerous and any spills should be cleaned up immediately.



Oil clothes are a serious fire hazard.

! CAUTION

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.

! WARNING

WARNING - Do not point the high pressure jet at personnel.

! CAUTION

CAUTION - Disconnect the battery when welding on the machine.

Welding the 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.

Working on Painted Surfaces

When welding and cutting, the paint must be removed up to a distance of 100 mm (4") from the welding or cutting point. Paint which is heated gives off unhealthy gases.

Ideally paint should be removed using sand blasting.

If the paint cannot be removed using sand blasting, it must be removed in some other way for example using paint stripper or high speed grinder.

NOTE:

When using paint stripper or a high speed grinder, you must use a portable air extractor, safety glasses and protective gloves.

Working with Polymer Material

Polymer materials, such as rubber and certain kinds of plastics, can, when heated, give off gases which are dangerous to health and environment.

The following protective measures should be taken:

1. Protect the polymer material from heat before welding or cutting near the material.
2. Do not burn polymer materials when disposing of them.



Contaminated Oils and Fluids

When ever the engine oil and/or hydraulic fluid is changed always inspect the old oil and fluid for any sighns of contamination (water and foreign matter etc.) The presence of contamination could indicate a fault in system.

The old oil and hydraulic filters must also be checked for contamination.

Always use new, clean oil, fluids and filters when replenishing the system.

Measures to Prevent Fires.

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 if possible.
2. Stop the engine and turn the ignition to the **OFF** position.
3. Leave the cab.
4. Start putting out the fire and notify the fire brigade if required.

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

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

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

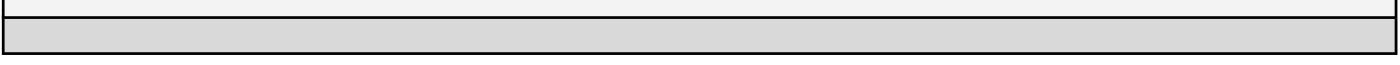
Store flammable starting aids in a cool, well ventilated location. Remember that such aids (starting gas) must be used in connection with pre-heating of the induction manifold.

IMPORTANT

Some environment in which the machine may be employed require additional care and maintenance to ensure safe and sustainable component and machine performance.

In these applications particular care needs to be take to keep the machine clean and free of any excessive build up of debris and/or split hazardous fluids such as oil and fuel. Failure to do so will pose a **SAFETY RISK** and **FIRE HAZARD** in addition to possible reducing the reliable and safe operating life of equipment.

In particular, the areas associated with containing high heat sources need to be kept clean e.g. the exhaust pipes and heat shield areas. The heat shields will need to be inspected daily for debris which may lie on the shield and affect its functionally.



Combustible material will need to be removed, because this is high heat area.

In addition to the removal of debris, regular maintenance should include the checking and reporting of any oil leaks. This should form part of the daily inspection routing.

2. OPERATING INSTRUCTIONS



CAUTION - Read and understand all of the operator related chapters in this manual before performing any of the following procedures and obey all the Warnings and

Cautions contained in this manual. Refer to the detailed procedures in the relevant chapter.

Safety Rules

No passengers are allowed on machines. Only personnel providing training.

Always wear the seat belt when operating the machine.

Check that all the working lights are correctly positioned for best visibility.

STARTING UP THE ENGINE

Before starting the Engine



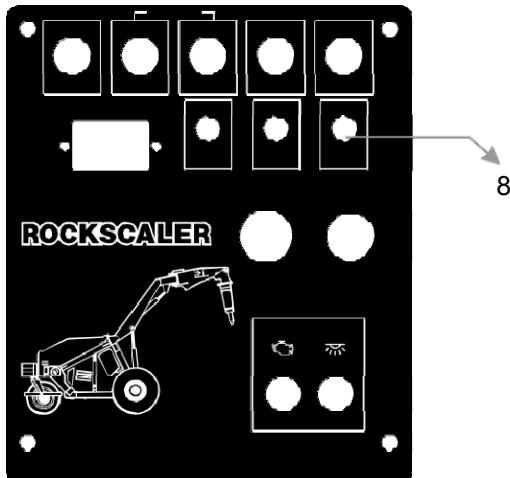
CAUTION - Ensure that the following checks have been carried out before starting the machine.

- Check the engine oil level.
- Check the hydraulic fluid level. Fasten the seat belt and adjust the seat belt to fit firmly across the front of the pelvis.

Starting the engine in Warm Weather

The following procedure must be used when starting the engine in warm weather:



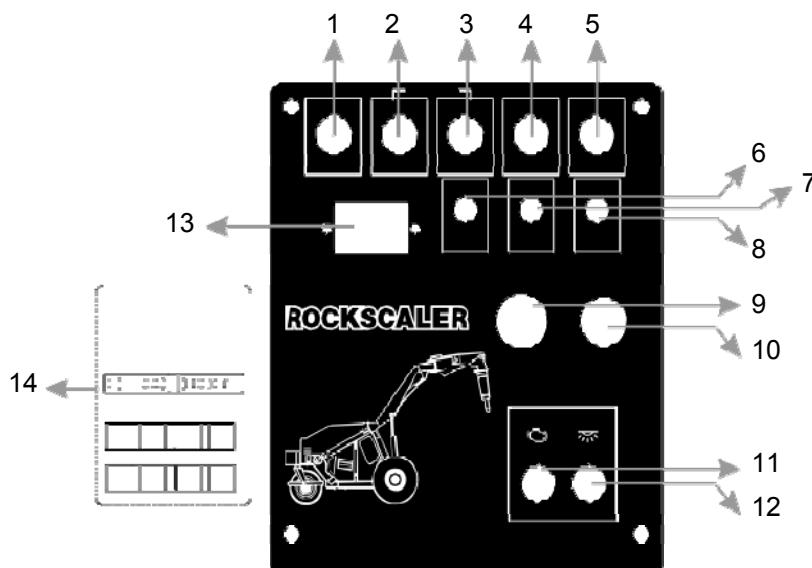


Ensure the park brake (8) is applied (toggle switch in the up position).

Ensure that the control pedals are in neutral position.

Insert the machine key into the master switch.

1. Ensure the park brake (8) is applied (toggle switch in the up position).
2. Ensure that the control pedals are in neutral position.
3. Insert the machine key into the master switch.
4. Move the throttle control (1) forward to the idle position.



5. Turn the master switch (9) clockwise to the **ON** position and check that the following indicators illuminate:
 - Engine Oil Pressure Warning Indicator (2)
 - Alternator Charge Indicator (1)
 - Park Brake Indicator (5)



The park brake indicator will extinguish when park brake switch is pressed to the OFF position.

NOTE: The engine will not start until the park brake switch is in the ON position.

CAUTION

CAUTION -

1. If any of the indicators do not illuminate then either the bulb is blown or there is an electrical fault. The fault must be rectified immediately.
2. Do not run the engine at high speed (rev / min) or heavy loading until the engine oil and hydraulic oil have warmed up to normal operating temperatures.
3. Do not hold the start button in the start position for more than seventeen seconds. If the engine does not start, wait one minute before attempting to restart the engine to allow the battery to stabilize. If the engine does not start after two attempts investigate the cause.
4. Do not start the engine until the Engine Pressure Warning Indicator and Alternator Charge Indicator have extinguished. If the indicators remain illuminated, investigate the cause before operating the machine.

6. Turn the ignition key.



Starting the Engine in Cold Weather

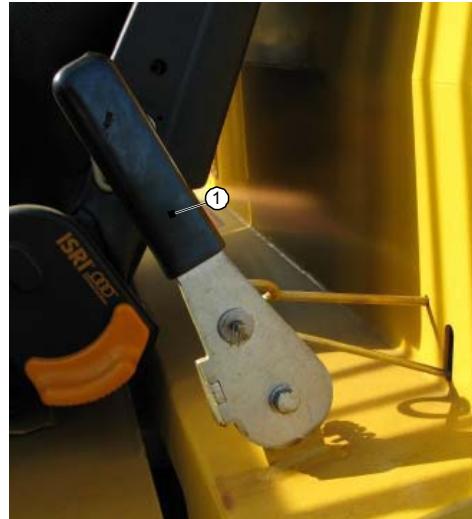
The following procedure ust be used when starting the engine in cold weather.

1. Ensure that the park brake is applied (toggle switch (8) in the up position).
2. Ensure that the control pedals are in neutral position.
3. Insert the machine key into the master switch.



4. Move the throttle (1) to the idle position.
5. Turn the master switch (9) clockwise to the **ON** position and check that the following indicators illuminate:
 - Engine Oil Pressure Warning Indicator (2)
 - Alternator Charge Indicator (1)
 - Park Brake Indicator (5)

The park brake indicator will extinguish when the park brake switch is pressed to the **OFF** position.



NOTE:

The engine will not start until the park brake is in the **ON** position.

⚠ CAUTION

CAUTION -

1. If any of the indicators do not illuminate then either the bulb is blown or there is an electrical fault. The fault must be rectified immediately.
2. Do not run the engine at high speed (rev / min) or heavy loading until the engine oil and hydraulic oil have warmed up to normal operating temperatures.
3. Do not hold the start button in the start position for more than seventeen seconds. If the engine does not start, wait one minute before attempting to restart the engine to allow the battery to stabilize. If the engine does not start after two attempts investigate the cause.
4. Do not start the engine until the Engine Pressure Warning Indicator and Alternator Charge Indicator have extinguished. If the indicators remain illuminated, investigate the cause before operating the machine.



1. Turn the key in the ignition clockwise until engine starts.
2. Idle the engine until it reaches operating temperature.
3. Perform full hydraulic movements with the boom and hammer until the hydraulic fluid temperature reaches operating temperature.



Shutting Down the Engine

The following procedure must be used to shut down the engine:

1. Stop the machine.
2. Apply the park brake.
3. Lower the hammer to the ground.
4. Reduce the engine speed to low idle.



CAUTION

CAUTION: Never stop the engine from high idle. Always allow the engine to run at low idle for one minute. This allows the engine temperature to stabilize.

5. Allow the engine to run for 3 minutes to allow the engine temperature to stabilise.
6. Turn the key in the ignition counterclockwise to the **OFF** position.
7. Remove the machine key from the ignition.

DRIVING

Safety Rules

Check that all the gauges and indicators are operational. Ensure the readings are correct. **Refer to Controls and Instruments** for the correct readings.

Check that there are no personnel on or around the machine before driving the machine.

MACHINE DIRECTION CONTROL

Forward and Reverse Movement



CAUTION - Ensure that the hammer is clear of the ground before moving the machine

1. Press down on the top of the pedals (1) to move the machine forward.



2. Press down on the bottom of the pedals (2) to move the machine rearward.

LEFT AND RIGHT MOVEMENT

Left Turn

1. When the pressure on the left pedal (1) is relieved and more pressure is applied to the top of the right pedal (2) the machine will turn to the left.



Turn Right

1. When the pressure on the right pedal (1) is relieved and more pressure is applied to the top of the left pedal (2) the machine will turn to the right.



3. OPERATING TECHNIQUES

The following information details suggested techniques to obtain the safest and most efficient use of your machine.

Safety Rules

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.

OPERATING TIPS

Pedal Controls

Use a smooth pedal movements when manoeuvring the machine. Practice smooth starts, acceleration, turns and stops.

Do not operate the pedals in an abrupt and/or jerky manner as this will result in uncomfortable ride.

Lever Controls

Use a smooth control lever movements when operating the boom and grapple.

Do not flick the control levers back and forth from the power position.

Do not hold the control levers in the stalled position as this causes heat build up in the hydraulic fluid.

Tail Swing (Tight Turns)



WARNING - DO NOT stand or work in the danger zone while the engine is running. Personal injury or death may result. Refer to the Fast Tail Swing decal at the rear of the machine.



The machine can be turned in a tight turning circle by operating the pedals to counter rotate the wheels (one wheel driving forwards and the other backwards).

When counter rotating the wheels, the machine rotates on the front wheels and can swing the boom and tail wheel around quickly.

Use smooth, controlled pedal movements when counter rotating the wheels.

Steep Terrain Operating Tips

Use gentle easy pedal movements. Get the feel of the slope with firm control of the pedals.

Keep the tines low, as close as possible to the ground.

Stuck Machine

Avoid driving into areas of deep mud.

If the machine becomes bogged down DO NOT allow the wheels to spin, this will dig the machine in deeper. Reverse the machine out slowly with a slight tail swinging action until ground is reached which will give better traction to the tyres.



4. RECOVERY AND TRANSPORTATION

Towing



WARNING - Remove the wheel motor and brake assemblies before towing the machine. Refer to "As Required Service for the procedures".

Always consult your **AARD** Product Support Representative before attempting to recover a disabled machine.

Transporting the Machine on Other Vehicles

The machine can be loaded onto the transporting vehicle by two methods:

- Lifting the machine.
- Driving the machine.

Safety Rules

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.

Ensure the lifting equipment is suitable for lifting the machine safely.

Ensure the securing equipment is sufficient to hold the machine in position.

Ensure there are no personnel near or under the machine when it is lifted.

Lifting the Machine

When lifting the machine the following must be done:

1. Park the transporting vehicle next to the machine being lifted.
2. Attach the chains to the machine lifting points and the lifting beam.

NOTE:

The lifting beam must be longer than the machine length to avoid damaging the machine and must be able to carry the total machine weight.



3. Attach the lifting beam to the crane.

NOTE:

The crane must be able to carry total machine weight.

4. Lift the lifting beam until all the play in the chain is removed.
5. Lift the machine until it is clear of the transporting vehicles trailer.

NOTE:

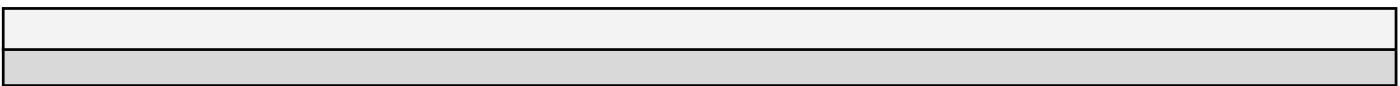
The crane must be moved slowly to prevent excessive swinging of the lifted machine.

6. Move the machine over the transporting vehicles trailer slowly.
7. When the machine is directly over the transporting vehicle's trailer - lower the machine onto the trailer slowly, following the instructions of the spotters.
8. Lower the lifting beam until the cahin can be removed from the lifting platform.
9. Lift the lifting beam and move it away from the machine.
10. Secure the machine to the transporting vehicles trailer with chains. Refer to the illustration which follows for the correct Machine Tie Down Points.
11. Drive transporting machine away slowly.

Driving the Machine onto a Transporting Vehicle

To drive the machine onto the transporting vehicle the following must be done:

- Position the transporting vehicle's trailer against the loading ramp.
- Drive the machine onto the trailer very slowly following the instructions of the spotter.
- Secure the machine to the transporting vehicle's trailer with chains. Refer to Machine Tie Down Points Illustration.
- Drive the transporting machine away slowly.



MODULE 5

SERVICE CHECKS & MAINTENANCE TASKS

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Contents

DAILY CHECKS & MAINTENANCE TASKS

Introduction

The daily or hourly maintenance checks must be performed by qualified operators or service personnel.

It is recommended that the machine is thoroughly washed before starting the tasks.

1. CHECK THE ENGINE AND ENGINE COMPARTMENT COMPONENTS

Open the Engine Compartment Doors



1. Ensure that the lock, hinges and door stop are undamaged and functional.
2. Ensure that the wheel spanner and brace are secure.

Check the Engine Compartment

1. Make a thorough inspection of the engine compartment.
2. Check for cleanliness and trash build-up. Clean and remove trash if necessary.
3. Report any problems immediately.
4. If it is necessary to remove fittings, cap or plugs always wipe them clean first to reduce the chance of system contamination.

WARNING

1. Trash build-up on and around high heat areas must be removed daily and the machine cleaned to prevent build-up and ignition of material.
2. Oil leakage in these critical areas is also a fire hazard. Critical areas are the areas around the exhaust, exhaust manifold and heat shield.



3. Machines being operated in areas where combustible material is being handled may require the heat shields to be removed by service personnel to clean these areas properly.

Check for Fuel and Oil Leaks

The following fuel system, electrical and lubrication components must be checked for leaks and security:

Engine Left Side



- Injector pump and injector (1)
- Fuel filter (2)
- Fuel hoses (3) and pipes
- Hydraulic hoses (4)
- Oil filler cap (5)
- Oil filter (6)
- Blower box cover (7)
- Throttle linkage (8)

Engine Right Side



- Alternator (1)
 - Starter motor (2)
 - Hydraulic charge filter (3) (Duramax)
 - Hoses and pipes (4)
 - Air conditioner compressor (5)
- If any leaks, damage or loose mountings are found contact service personnel.

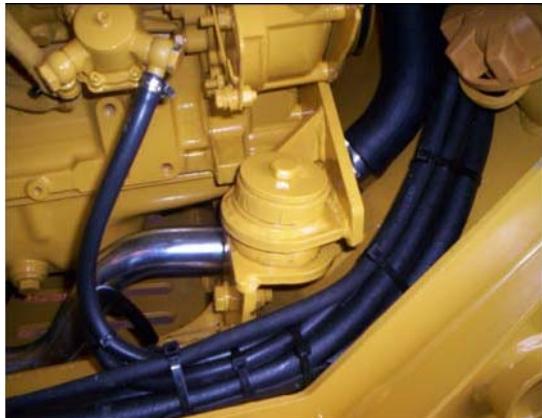
Check Wiring, Hoses and Clamps

1. Visually inspect all the hoses in the engine compartment for leaks, cracks, deterioration and chaffing damage.
2. Ensure that the hoses are routed correctly and that all securing straps are functional and undamaged.
3. Check that the hoses are fastened in the correct position and that no chafing can



- occur when the machine is in use.
4. Check that all clamps are secure.
 5. Visually inspect all the sender units and switches in the engine compartment for damage.
 6. Ensure that the electrical cables and wires are routed correctly and that all securing straps are functional and undamaged.
 7. Check that the cables and wires are fastened in the correct position and that no chafing can occur when the machine is in use.
 8. Check that all electrical connections in the engine compartment are secure.

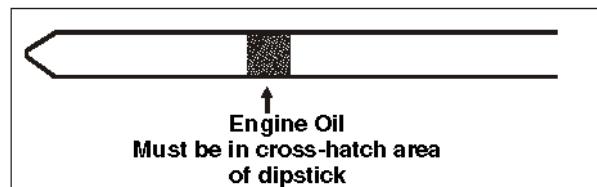
Check the Engine Mounting



1. Inspect all four engine mountings front and rear for security and damage.

Check the Oil Level

1. Ensure that the machine is on level ground
2. Remove the dipstick (1)
3. Wipe the dipstick clean with a lint free cloth
4. Re-insert the dipstick into the dipstick tube, ensuring it is properly seated
5. Remove the dipstick



6. Check the oil level.
7. If the level is in the crosshatch area it is within the acceptable operating range.
8. Replenish immediately if the level is below the area.



CAUTION

CAUTION - Do not over-fill above the top of the cross-hatch area.

Adding Oil

NOTES:

Whenever the oil filler cap is removed, check for any visible damage.



1. Clean the oil filler cap and the area around it.
2. Unscrew and remove the oil filler cap.
3. Place a funnel into the oil filler.
4. Filler with oil until the oil level is within crosshatch area on the dipstick. **Refer to Specifications** for the recommended oil.

CAUTION

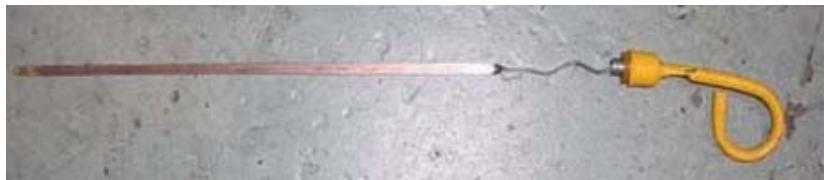
CAUTION - Do not over-fill above the top of the cross-hatch area.

5. Check continuously during the filling procedure to ensure that the engine oil reaches the crosshatch area on the dipstick.
6. Remove the funnel and clean any oil spillage.

CAUTION

CAUTION - Re-fit the oil filler cap securely.

7. Check the inside of the oil filler cap. Ensure that there is no damage.
8. Ensure that the oil filler cap seals tightly when replaced.





9. Check the dipstick and seal for damage.
10. Re-insert the dipstick into the dipstick tube, ensuring it is properly seated.

Checking the oil level prior to starting the engine ensure that there is sufficient lubrication for starting the engine.

CAUTION

CAUTION - It is recommended that the double check of the oil level is carried out before any prolonged engine SERVICE & CHECKS, particular if the check prior to engine start-up showed an oil level near to a level where oil needed to be added.

11. Clean the inside the oil filler cap. Ensure that there is no damage.
12. Ensure that the oil filler cap seals tightly when replaced.

Drain the Primary Fuel Filter



1. Push and hold up the drain valve (1)
2. Drain the accumulated water into a container
3. Release the valve when the water is drained and fuel starts to drain. The spring loaded valve will automatically close when released.
4. Clean the valve and the area around it.



Check and Clean the Cooling System

CAUTION

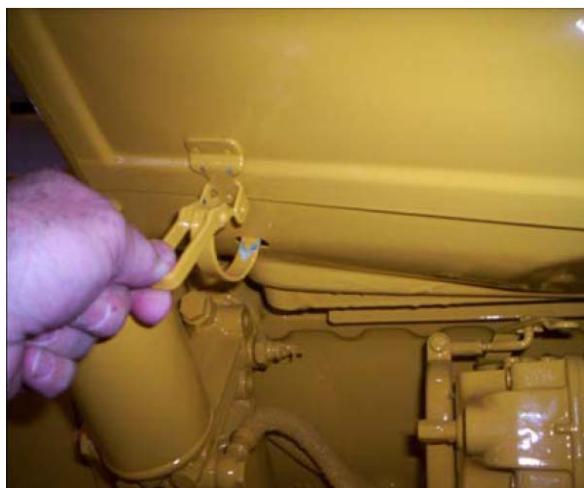
CAUTION - Do not use cold solvent or water on a hot engine. Do not force water onto the fins.

WARNING

WARNING - Compressed air is dangerous. Do not direct the jet of compressed air at yourself or any personnel.



1. Check the fins at the right of the engine. If they are choked with dirt and debris, clean with low pressure air.

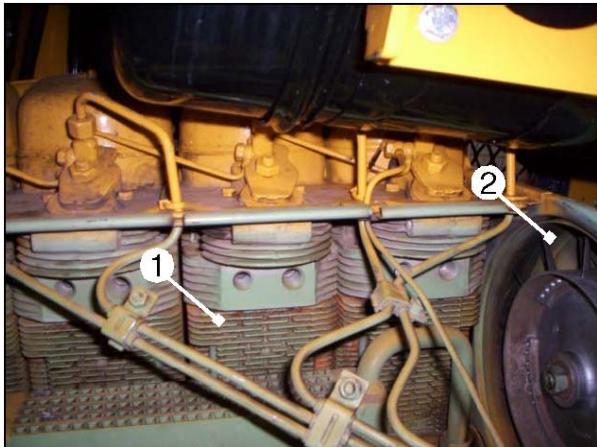


2. Open the blower box cover clips on the left of the engine.



3. Check the inside for cleanliness. If the fins and fan are choked with dirt and debris, remove the cover.





4. Blow clean the fins (1) with low pressure air.
5. Ensure fan (2) is undamaged and free of obstructions.

Check the Drive Belts



1. Inspect the drive belt of cracks, fraying and wear.

2. Check the Air Intake Components

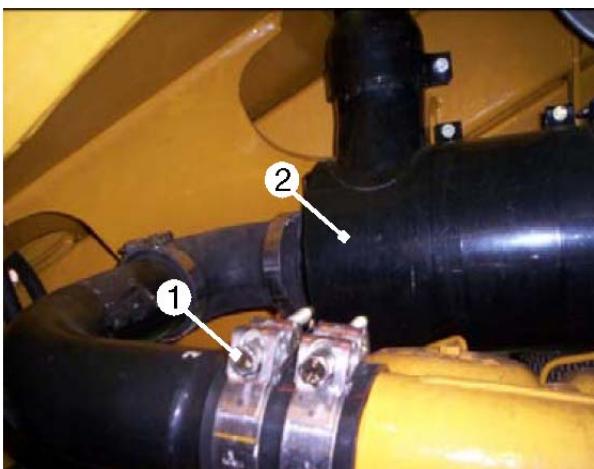
Check the Air Cleaner Assembly



CAUTION

CAUTION - A clogged air cleaner element will cause excessive intake restriction and a reduced air supply to the engine.

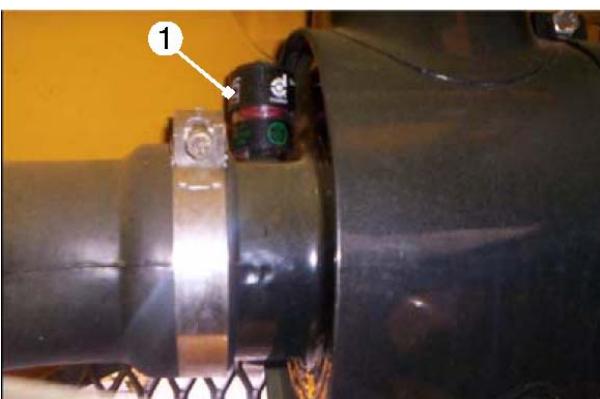




1. Ensure that the air cleaner components are clean prior to inspection.
2. Check the hoses and hose clamps (1) on the intake manifold.
3. Ensure that the air cleaner mounting is secure.
4. Check the housing (2) for security and damage.



5. Ensure that the housing is secure in the bracket.



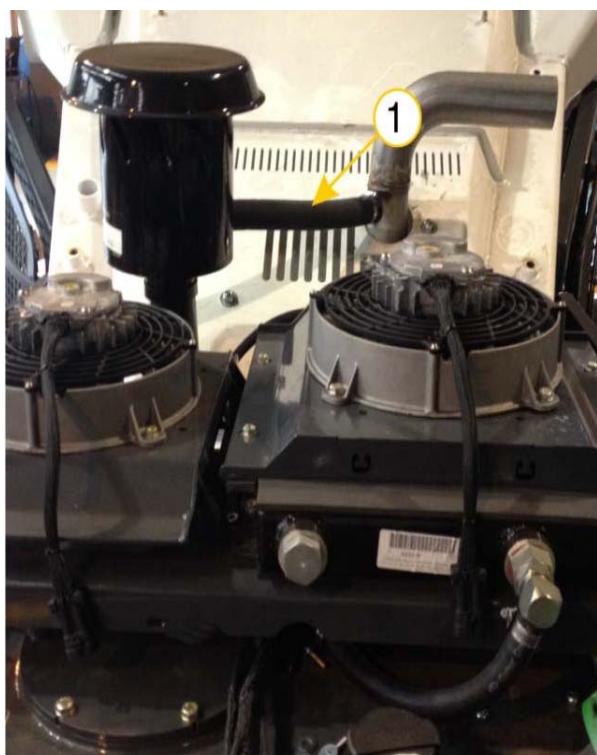
6. Check that the indicator is secure and that a green flag is showing.
7. Reset the indicator (1) by pressing the top down if the red flag is showing. Report the service personnel if it continues to show red.



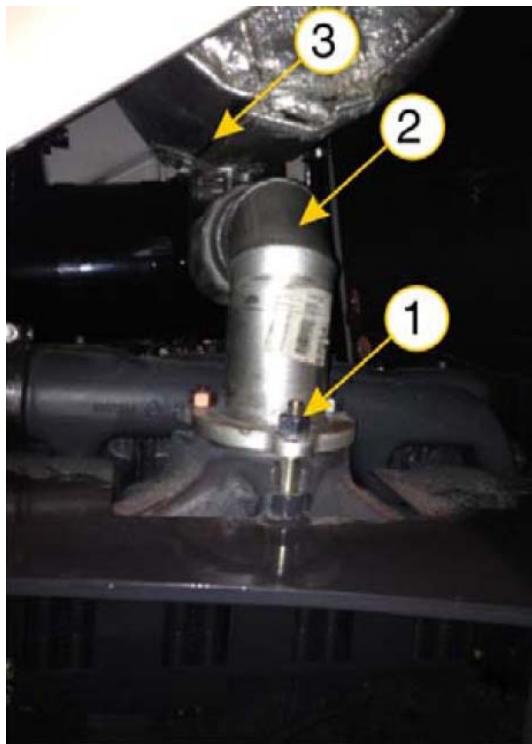
Check the Pre-cleaner



1. Check the hoses and hose clamps (1) on the pre-cleaner.
2. Check the housing for security and damage.
3. Check the hose from the pre-cleaner to the exhaust for damage. Ensure that the clamps are secure.

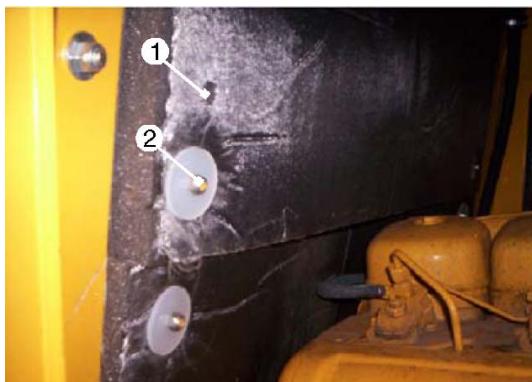


Check the Exhaust Assembly



1. Visually inspect the exhaust pipes for damage security.
2. Check that the manifold bolts (1) are secure on the flange.
3. Check that the exhaust flexible hose, clamps and pipes (2) are secure.
4. Ensure that the muffler / silencer (3) is secure and not damage.

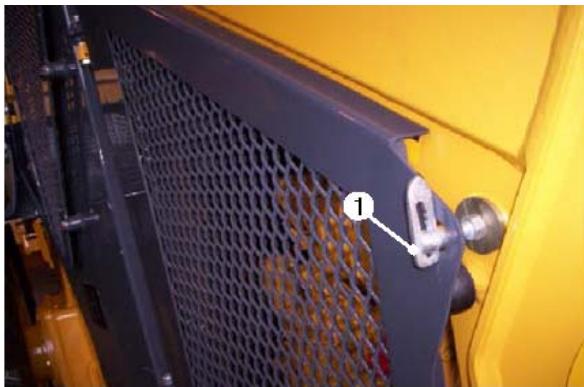
Check the Insulation Panels



Ensure that the insulation panels (1) are not damaged and firmly secured by the mounting bolts (2).



Close the Engine Compartment Doors



1. Close the doors and ensure they are secured by the fasteners (1).

3. CHECK OIL COOLER AND AIR CONDITIONER CONDENSER

Open Cooler Cover

WARNING

WARNING - Before opening the cover, ensure that the engine is shut-down, the fan is stationary and that the battery isolator switch is OFF. Always use the steps and holds when mounting or dismounting to obtain access to the cooler and condenser compartment.



1. Unlock the two latches.
2. Inspect the inside of the compartment for cleanliness, remove any trash build-up.
3. Check inside for oil leaks and ensure that all hoses pipes and connectors are secure.
4. Ensure that the fan (1) is undamaged and spins freely without obstructions.
5. Check that the hydraulic filler cap (2) is secure.
6. Ensure that the hydraulic tank breather (3) is undamaged.
7. Check that the air conditioner receiver drier (4) is undamaged and that the electrical connections for the switch on top are secure.



The oil cooler can be tied to the grille in an upright position if required.

Rais the air conditioner Condenser and check both sides for damage and cleanliness.
Clean if necessar with low pressure air only.

4. CHECK THE COMPONENTS UNDER CAB FLOOR PLATE

Raise the Cab's Floor Plate (Standard suspension seat fitted).



1. Slide the seat back as far as it will go by holding the lever (1) and pushing back on the seat.

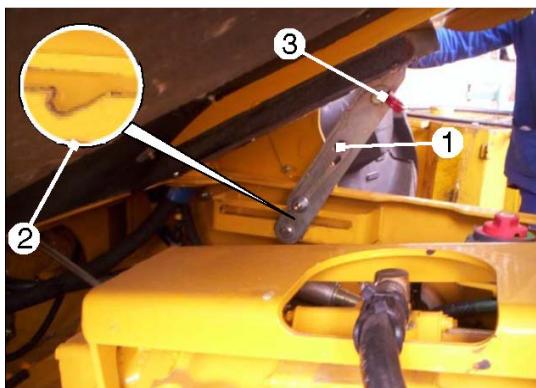


WARNING - Two people must be used to safely raise the floor plate. To avoid crushing injury, ensure that the floor plate is safely secured by the supporting stay's.





2. Raise the floor plate and ensure that the pin (1) is in position and securing the two stay plates together.
3. Locate the stays (1) in the notch (2) of the support bracket.
4. Ensure that the floor plate is secure and that the pin (3) is secure before starting to check under the door.



This position will raise the floor plate sufficient for the operator to perform his checks around the transmission.

To raise the floor plate high enough for servicing tasks proceed as follows:



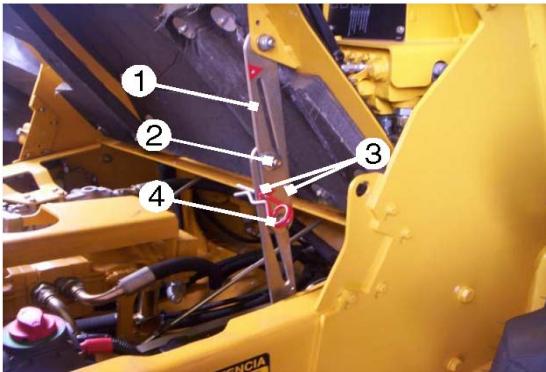
1. Support the floor plate while removing the pin (1).



WARNING

WARNING - Keep the pin in your hand so that you do not lose it or forget to replace it.





2. Raise the floor plate to locate the top section of the stay (1).

⚠️ WARNING

WARNING - The stays are only located correctly when the retaining lock (2) is located in the notch of the stay's top section AND the two holes (3) are aligned with the two holes in the bottom section.



3. When alignment is correct, insert the pin (4) securely in position as shown.

Both alignment holes are clearly marked with yellow painted arrows (1).

⚠️ WARNING

WARNING - If the top and bottom sections of the strut are not aligned parallel to each other the holes will not align and the pin will not be able to be

located. If the pin is not secured correctly the floor plate will be in an UNSAFE position and could cause injury.

Lower the Cab's Floor Plate

After performing the checks on the components under the floor plate must be secured as follows:

1. Support the weight of the floor plate and remove the pin (4)





WARNING

WARNING - Keep the pin in your hand so that you do not lose it or forget to replace it.

2. Disengage the retaining lock (2)

3. Loosen the floor plate and raise the seat's backrest



4. Ensure that the holes are aligned when the stays are fully retracted (top hole marked with yellow paint) and insert the pin (1)
5. Release the stays from notch (2), slide forward and allow the floor plate to close fully.
6. Lock the securing catches on both sides.

Raise the Cab's Floor Plate (Optional non-suspension seat fitted).

After performing the checks on the components under the floor, the floor plate must be secured as follows:

1. Support the weight of the floor plate and remove the pin (4)
2. Disengage the pin in your handles (2) (each side) to raise the cab floor plate.



WARNING

WARNING - Two people must be used to safely raise the floor plate. To avoid crushing injury, ensure that the floor plate is safely secured by the supporting stays.



3. Raise the floor plate and ensure that the pin (1) is in position and securing the two stay plates together.





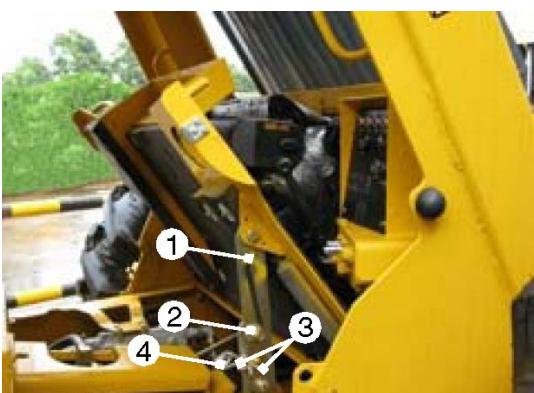
4. Locate the stays (1) in the notch (2) of the support bracket.
5. Ensure that the floor plate is secure and that the pin (3) is secure before starting to check under the floor.

This position will raise the floor plate sufficiently for the operator to perform his checks around the transmission.

To raise the floor plate high enough for servicing tasks to proceed as follows.

WARNING

WARNING - Keep the spin in your hand so that you do not lose it or forget to replace it.

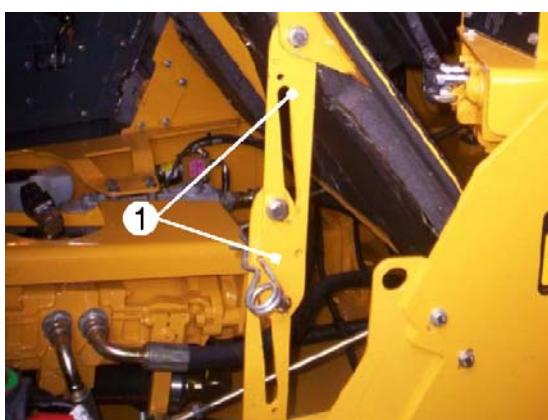


1. Raise the floor plate to locate the top section of the stay (1)

WARNING

WARNING - The stays are only located correctly when the retaining lock (2) is located in the notch of the stay's top section AND the two holes (3) are aligned with the two holes in the bottom section.

2. When the alignment is correct, insert the pin securely in position as shown.
3. Both alignment holes are clearly marked with yellow painted arrows (1)





⚠ WARNING

WARNING - If the top and bottom sections of the strut are not aligned parallel to each other the holes will not align and the pin will not be able to be located. If the pin is not secured correctly the floor plate will be in an UNSAFE position and could cause injury.

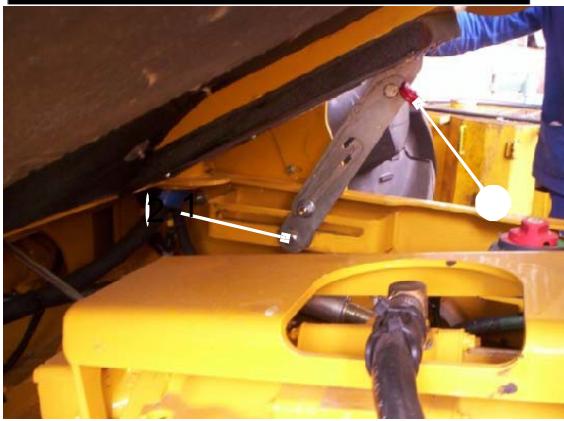
Lower the Cab's Floor Plate

After performing the check on the components under the floor plate, the floor plate must be secured as follows:

1. Support the weight on the floor plate and remove the pin (4)

⚠ WARNING

WARNING - Keep the pin in your hand so that you do not lose it or forget to replace it.



NOTE: The pin (1) must be installed from the inside as shown.

2. Disengage the retaining lock (2)
3. Lower the floor plate.
4. Ensure that the holes are aligned when the stays are fully retracted (top hole marked with yellow paint) and insert the pin (1).
5. Release the stays from the notch (2), slide forward and allow the floor plate to close fully.
6. Lock the securing catches on both sides.

Check the Transmission

Raise the floor plate to the first position as described in the previous procedure.



1. Inspect the transmission for damage and security.
2. Ensure that all mounting bolts, hoses and connectors are secure and not damaged.
3. Check for fluid leaks around the assembly.



Check the Control Pedal Linkage



1. Ensure that the pedal linkage (1) on both sides of the transmission is not damaged.
2. Check that the SERVICE & CHECKS is smooth when the pedals are operated.

Check the battery



- * Broken or loose connections.
- * Any corrosion build-up on the posts.

1. Check the battery for damage and leaks.
2. Check the battery is secured with the hold-down bar.
3. Check the battery cables for the following:
 - * Cables' condition.
 - * Loose cables.
 - * Frayed cables.

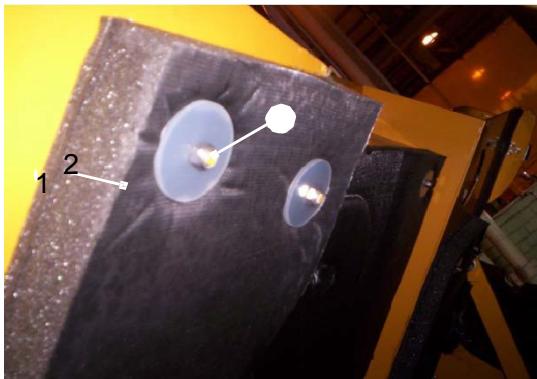
Check the Windscreen Wiper Reservoir



1. Check that the reservoir (1) is secure and undamaged.
2. Check the electric cable for security.
3. Top up the reservoir if required.



Check the Insulation Panels



Ensure that the insulation panels (1) are not damaged and firmly secured by the mounting bolts (2).

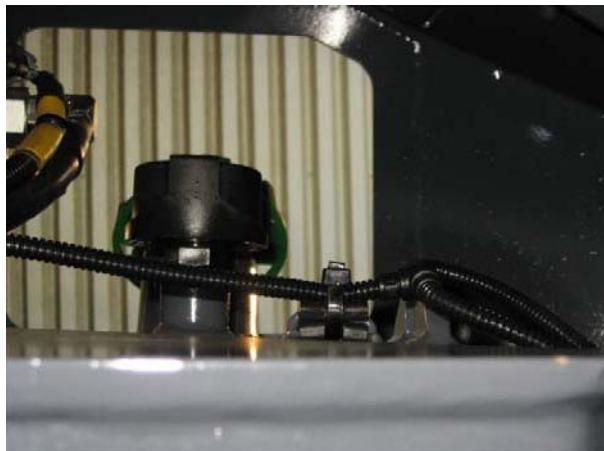
Close the cab floor plate and secure with the clips as described in the procedure “**Lower the Cab’s Floor Plate**”.

Checks on Exterior of Machine

1. Check the machine exterior for general appearance of the bodywork.
2. Check for damage to the structure, frame and components. Report any damage.
3. Check for general cleanliness, especially to the mirrors, windows and lights.
4. Check that the decals are in place, not damaged and legible.
5. Report any problems immediately.

Check the Diesel Fuel Breather

Note: This check is important to perform daily if operating the engine in dusty conditions.



1. Check the diesel fuel breather (1) for damage and security.



Check the Hydraulic Fluid Level



1. Ensure that the machine is parked on level ground and that the grapple is lowered to the ground.

NOTES:

This check is carried out when the hydraulic fluid is cold.

2. glass (1) is level with the mark as shown on the decal (2).



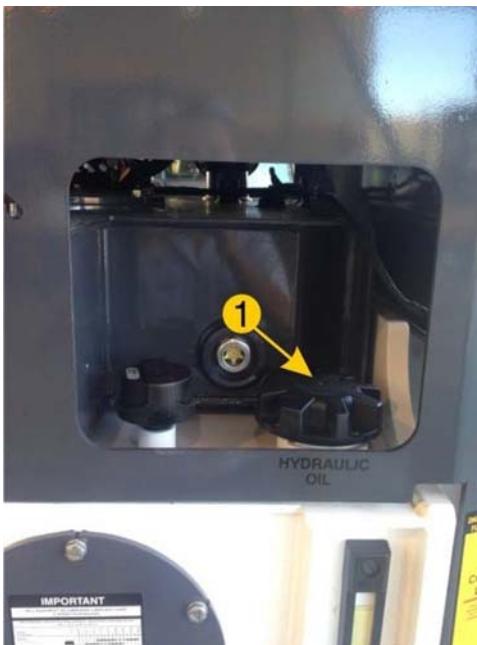
CAUTION - Do not allow the level to fall to the red, low level mark (3).

3. Replenish the fluid if necessary.

Replenish the Hydraulic Fluid



CAUTION - Use the correct hydraulic fluid. **Refer to Specifications** for the recommended hydraulic fluid.



1. Raise the hydraulic oil cooler cover as described in this chapter.
2. Unscrew and remove the hydraulic fluid cap (1).
3. Replenish the hydraulic fluid in the hydraulic tank.



CAUTION - Do not overfill the hydraulic tank.



4. Fill to the level in the sight glass (refer to previous instructions).
5. Remove the hydraulic fluid container to the storage area.
6. Close the cooler cover and secure.

Check the Hydraulic Fluid Filler Cap and Seal

Whenever the hydraulic fluid filler cap is removed, check for any visible damage.

1. Clean the filler cap.
2. Inspect the filler cap, seal and screen for damage.
3. Ensure that the filler cap closes and seals securely.

Check the Fuel Filler Cap and Seal

Whenever the diesel fuel filler cap (1) is removed, check for any visible damage.

1. Unscrew and remove the diesel fuel filler cap (1).
2. Clean the filler cap.
3. Inspect the filler cap, seal and screen for damage.
4. Ensure that the filler cap closes and seals securely.

Check the Wheels and Tyres

Ensure that the wheel nuts are secure (550 Nm {406 ft lb}).

NOTES:

Service Personnel must check the wheel nuts torque after the first 5 hours and then every 50 hours.

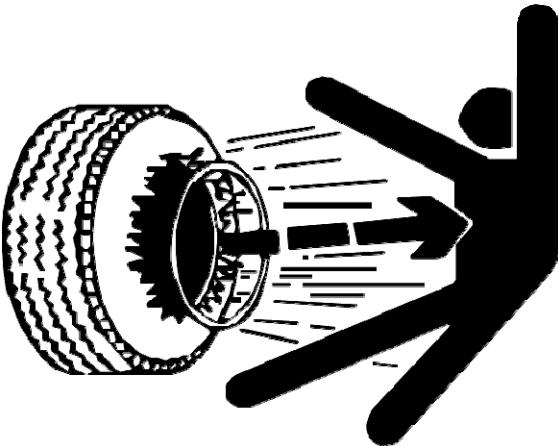
1. Ensure that there are no oil leaks at the final drives.
2. Check that the tyre valves are not damaged.
3. Check the tyres for wear, large cuts and pressures.



WARNING

WARNING - Improperly inflated tyres can cause excessive heat build-up, excessive or uneven tyre wear or rim damage resulting in blow outs.





NOTES:

Service Personnel must check the tyre inflation pressure (refer to specifications for the recommended tyre pressures relevant to the machine application and tyres fitted).

5. HAMMER AND BOOM

Check the Hammer



1. Check the rotator for damage and cracks.
2. Inspect all hoses, pipes and connections for leaks.
3. Ensure that the connections, pipes and hoses are secure and not damaged.
4. Check that the hoses are fastened in the correct position and that no chafing can occur when the machine is in use.
5. Ensure that the spiral wrap is secure and not damaged.
6. Ensure that the stop block is fitted.

Check the Boom

1. Check the boom for damage and cracks.
2. Inspect all hoses, pipes and connections for leaks.
3. Ensure that the connections, pipes and hoses are secure and not damaged.
4. Check that the hoses are fastened in the correct position and that no chafing can occur when the machine is in use.
5. Ensure there are no leaks at the cylinder seals.
6. Ensure that the spiral wrap is secure and not damaged.



Note: If the nuts require tightening, torque to 600 Nm (435 ft lb)

6. LUBRICATION POINTS

Boom Lift Cylinder

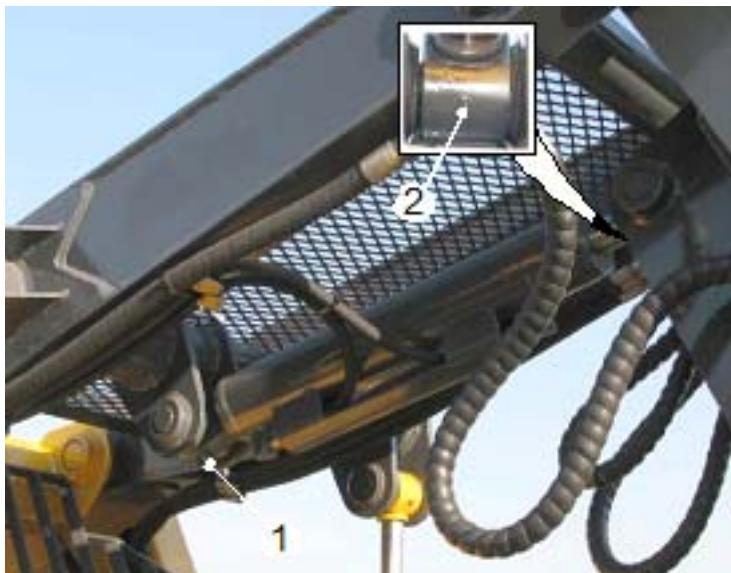


1. Grease the top cylinder end (1) LHS and RHS of machine.



2. Grease the lower cylinders end (1) LHS and RHS of machine.

Boom Tilt Cylinder



1. Grease the tilt top end of cylinder pivot point (1) and pivot end point (2).



Jib Angle Cylinder



1. Grease the top and bottom pivot (1) points on jib angle cylinder.

Pedal Assembly



1. Grease the pedal pivots .

ATTACHMENT

Lubricate the tool



1. Grease the top and bottom pivot (1) points on jib angle cylinder.

NOTES:

For proper tool lubrication the breaker must be vertical with enough down-force applied to push the tool into the breaker. This will prevent grease from entering the area above the tool.





2. Check that the tool moves freely in the bushings.
3. Visually check the tool retainer pins. The round retainer pins rotate during normal SERVICE & CHECKS.
4. Confirm that they are rotating by looking at the ends of the pins for fresh radial marks in the grease on the cross pin.

Check the Boom Hoses, Connectors and Attachment

1. Inspect all hoses and connections for leaks.
2. Ensure that the connections and hoses are secure and not damaged.
3. Ensure that the spiral wrap is secure and not damaged.
4. Check that the hoses are fastened in the correct position and that no chafing can occur when the machine is in use.



7. CAB AND ELECTRICAL

Check All Safety Guards



WARNING

WARNING - Ensure that all shields and guards installed around the cab are secure and not damaged.



The windscreen protection grilles are hinged to enable access to the windscreens and wipers.



IMPORTANT

To enable the grill to hinge down without folding on the boom it is necessary to lower the boom with the grapple OPEN and resting on the lines.

To hinge down the grille, remove the securing bolts (1).

Check the Cab

1. Ensure that the interior of the cab is clean and free from trash build-up, especially under the pedals.
2. Ensure that the doors and window latches are functional.
3. Ensure that the SERVICE Manual is present in the cab.



8. CHECK THE OPERATOR CONTROLS AND INSTRUMENTS

Check the Control Pedals

1. Check the control pedals for damage and security.
2. Check the pedal rods and pivots (1) for security and damage and ensure that the lock nuts are in position and secure.
3. Check that all the pedals are in the neutral position.



IMPORTANT

To three neutral plates (2) must be in line for the pedals to be in the neutral position.



WARNING - If the pedals do not return to neutral, do not start the machine. Report the fault to Service Personnel immediately.

4. Check that the pedals are functional.

Check the Control Levers

1. Check the boom control lever (1) for damage and security.
2. Ensure that the split pins (2) are installed and not damaged.



3. Check the boom (1) 220E only, rotator (2) and grab (3) control levers for damage and security.
4. Ensure that the split pins (4) are installed and not damaged.



Check the Instrument Panel

1. Check the instrument panel for damage and security.

CHECK THE SEAT AND BELT

Seat

1. Test all the seat positions and controls. Refer to previous chapter for controls for the seat adjustments.
2. Ensure the seat and back rest are clean and undamaged.
3. Ensure the seat is mounted securely.



Seat Belt

1. Check the fixed clasp (1) for damage and security.
2. Check the buckle for damage and security.
3. Check the belt for cuts and security.



Fire Extinguisher



1. Ensure that the fire extinguisher and bracket are secure.
2. Check that the needle of the gauge (1) is in the green area. Report immediately to service personnel if the needle is in the red area.
3. Ensure that the pin is in position and that the seal is unbroken.

Control Pedals



1. Grease the pedal's rod at two grease nipples behind the pedals.



Checks After Starting the Engine



WARNING - Refer to Starting the Engine for the correct procedure.

1. Ensure that the engine ONLY starts when the park brake is applied.
2. Sound the horn and ensure that the warning indicators illuminate.
3. Check that the work lights, windscreen wiper and
4. washer are serviceable. Refer to Starting the Engine for more information.

Perform Park Brake Test

1. Ensure that there are no personnel on or around the machine.
2. Ensure that the park brake is applied.
3. Start the machine.
4. Move the throttle lever to the $\frac{3}{4}$ idle position.
5. Press down on the top of the foot control pedals.

NOTE: If the machine remains stationary the park brake is still serviceable. If the machine starts moving the park brake needs to be replaced. Report this to the Service Personnel.

6. Ensure that the park brake is fully released when switches off.

Check the Levers

Check for correct lever functions and smooth boom and grab movements.

Unscheduled Maintenance

The following maintenance procedures may be required periodically depending upon working conditions.



Door Locks

Use an oil can to lubricate the locking mechanisms of both cab door.

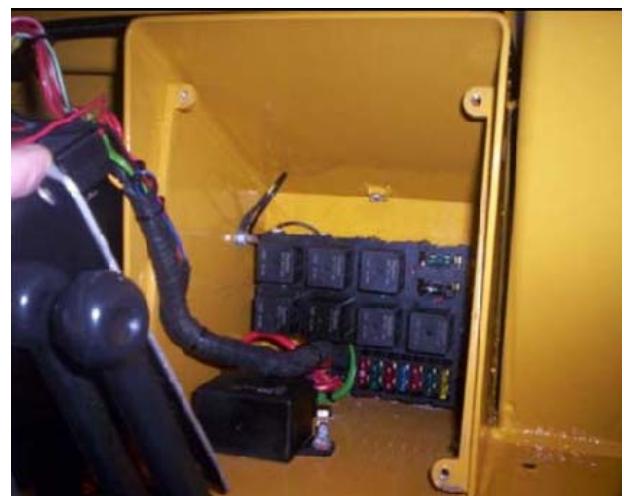


CAUTION - If a problem occurs with an electrical component function, first check the circuit breaker and fuses.

Fuses

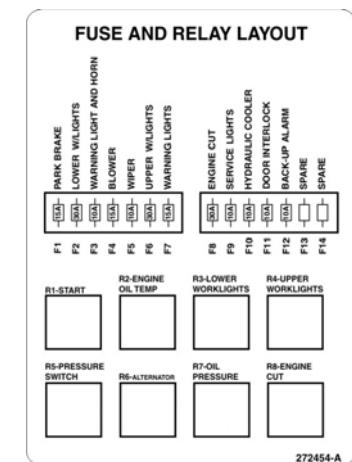
On the instrument panel is a graphic illustration of the layout of the fuses and solenoids in the electrical distribution box. For access to the fuses the instrument panel cover must be removed.

Remove Instrument Panel Cover



Unscrew and remove the four retaining bolts and remove the panel sufficiently to access the fuses.

The fuses and relays are arranged as shown on the cover.



MODULE 6

SERVICE AND CHECKS

PAGE NO.

1. RECOMMENDED SERVICE GUIDE

1



Contents

The following tables list all the required services for the Rockscaler, check with **AARD Technical Support** for any updates to the Service Bulletin after the publication date of this manual. **NOTE:** There are separate RSG's available on the **BELL Equipment Technical Support website** for the Rockscaler.

RECOMMENDED SERVICE GUIDE - 220E# ROCKSCALER (REV 1)		Customer: VIN (Vehicle Identification Number): BAT Serial Number			
Recommended Service Guide		250 HOURS	500 HOURS	1 000 HOURS	3 000 HOURS
1	Engine				TASK COMPLETE
1.1	Change oil and oil filters.	X			
1.2	Change primary fuel filter.		X		
1.3	Change secondary fuel filter.		X		
1.4	Check fan belt condition and adjust alternator / Aircon belt tensioning.	X			
1.5	Adjust valve clearance.		X		
1.6	Change fan belts.			X	
1.7	Change blower fan bearings.			X	
1.8	Change the Bowex coupling.				X
1.9	Change primary air cleaner filter element.		X	Or when suction indicator shows red	
1.10	Change secondary air cleaner filter element.			X	
1.11	Change fuel tank breather.				X
1.12	Service injectors and injector pump.				X
2	Wheel motors, wheels and tail wheel				
2.1	Change final drive oil.			X	
2.2	Change primary drive oil (Mk1 machines fitted with auborn reduction)			X	
2.3	Check and adjust tail wheel spindle bearings.			X	
2.4	Check and adjust tail wheel axle bearings.			X	
3	Hydraulics				
3.1	Change hydraulic charge filter.		X		
3.2	Change hydraulic oil and suction strainers.				X
3.3	Change the hydraulic return filter.		X		
3.4	Check and adjust all hydraulic pressures.				X
3.5	Change hydraulic tank breather filter.				X
4	Cab				
4.1	Change fresh air filter.		X		

Notes

1	Note: For further maintenance and service procedures, refer to the Deutz Engine Repair Manual F3-6L912/W
2	Note: The 100 hour service task to be done by a AARD Service Technician (Refer to QER). Daily Checks to be done by Customer.
3	Note: The RSG Checklist must be performed in conjunction with the "Daily Checks" and repairing task as details outlined in the Owners maintenance Manual supplied with the machine.

Please return this form, even if all items are satisfactory

CUSTOMER SERVICE CENTER / DEALER + SERVICE TECHNICIAN	SMR	DATE	CUSTOMER SIGNATURE

