OPERATIONAL & MAINTENANCE MANUAL

AG - 176 SERIES

MOTOR GRADER - BSIV

(Part Code :- 260300600100)

Nothing beats an ACE

Action Construction Equipment Ltd. - II
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Important Safety Information

Most accident that involve product operation, maintenance and repair are caused by failure to observe basic rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards, including human factors that can affect safety. This person should also have the necessary training, skill and tools to perform these function properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance, or repair on this product, until you verify that you are authorized to perform this week, and have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warning are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or o other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “Danger”, “Warning or “Caution”. The safety Alert “Warning”label is shown below.

WARNING	
✓ The meaning of this safety alert symbol is as follows: ✓ **Attention! Become Alert! Your Safety is Involved.** ✓ The message that appears under the warning explains the hazard and can be either written or pictorially presented.	

ACE can not anticipate every possible circumstance that might involve a potential hazard. The warning in this publication and on the product are, therefore, not all inclusive. You must not use this product in any manner different from that considered by this manual without first satisfying yourself that you have considered all safety rules and precautions applicable to the operation of the product in the location of use, including site-specific rules and precautions applicable to the work-site. If a tool, procedure, work method or operating technique that is not specifically recommended by ACE is used, you must satisfy yourself that it is safe for you and for others. You should also ensure thar you are authorized to perform this work, ad that the product will not be damaged or become unsafe by the operation, lubrication, maintenance or repair procedures that you intend to use.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications. Torques, pressures, measurements, adjustments, illustrations, and other item can change at any time. These changes can affect the service that is given to product. Obtain the complete and most current information before you start any job. ACE dealers have the most current information available.

✓ When replacement parts are required for this product ACE recommended using ACE replacement parts. ✓ Failure to follow this warning may lead to premature failures. Product damage, personal injury or death.	

In the united states, the maintenance, replacement, or repair of the emission control devices and systems may be perform by any repair establishment or individual of the owner’s choosing.

Table of contents

Foreword

- **Literature Information :-**

  This manual should be stored in the operator's compartment in the literature holder or seat back literature storage area.

  This manual contains safety information, operation instruction, transportation information, lubrication information and maintenance information.

  Some photographs or illustrations in this publication show details or attachment that can be different from your machine. Gaurds and covers might have been removed for illustrative purposes.

  Continuing improvement and advancement of product design might have caused changes t your machine which are not included in this publication. Read, study and keep this manual with the machine.

  Whenever a question arises regarding your machine or this publication, please consult your ACE dealer for latest available information.

- **Safety :-**

  This safety section list basic safety precautions. In addition, this section identifies the text and locations of warning signs and labels used on the machine.

  Read and understand the basic precaution listed in the safety section before operating or performing lubrication, maintenance and repair on this machine.

- **Operation :-**

  The operation section is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of gauges, switches, machine control, attachment controls, transportation and towing information.

  Photographs and illustrations guide the operator through correct procedures of checking, starting, operating and stopping the machine.

  Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the machine and its capabilities.

- **Maintenance :-**

  The maintenance section is a guide to equipment care. The maintenance interval schedule (MIS) lists the items to be maintained at a specific intervals are listed under the "when required" service interval. The maintenance interval schedule lists the page number for the step by step instructions required to accomplish the scheduled maintenance. Use the maintenance interval schedule as an index or "one safe source" for all maintenance procedures.

- **Maintenance Interval :-**

  Use the service hour meter to determine servicing intervals. Calender interval shown (daily, weekly, monthly and etc.) can be used instead of service hour meter intervals if they provide more convenient servicing schedule and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first.

  Under extremely severe, dusty or wet operating conditions, more frequent lubrication than is specified in the maintenance intervals chart might be necessary.

  Perform service on item at multiples of the original requirement. For example, at every 500service hours or 3moths, also service those items listed under every 250servixe or monthly and every 10service hour or daily.

- **Certified Engine Maintenance :-**

  Proper maintenance and repair is essential to keep the engine and machine systems operating correctly. As the heavy duty off-road diesel engine owner, you are responsible for the performance of the required maintenance Manual and service manual.

  It is prohibited for any person engaged in the business of repairing, servicing, seiling, leasing or trading engines or machines to remove, alter or element of design installed on or in an engine or machine that is in compliance with the regulations (40CFR Part 89). Certain elements of the machine and engine such as the exhaust system, fuel system, electrical system, intake air system and cooling system may be emission related and should not be altered unless approved by ACE.

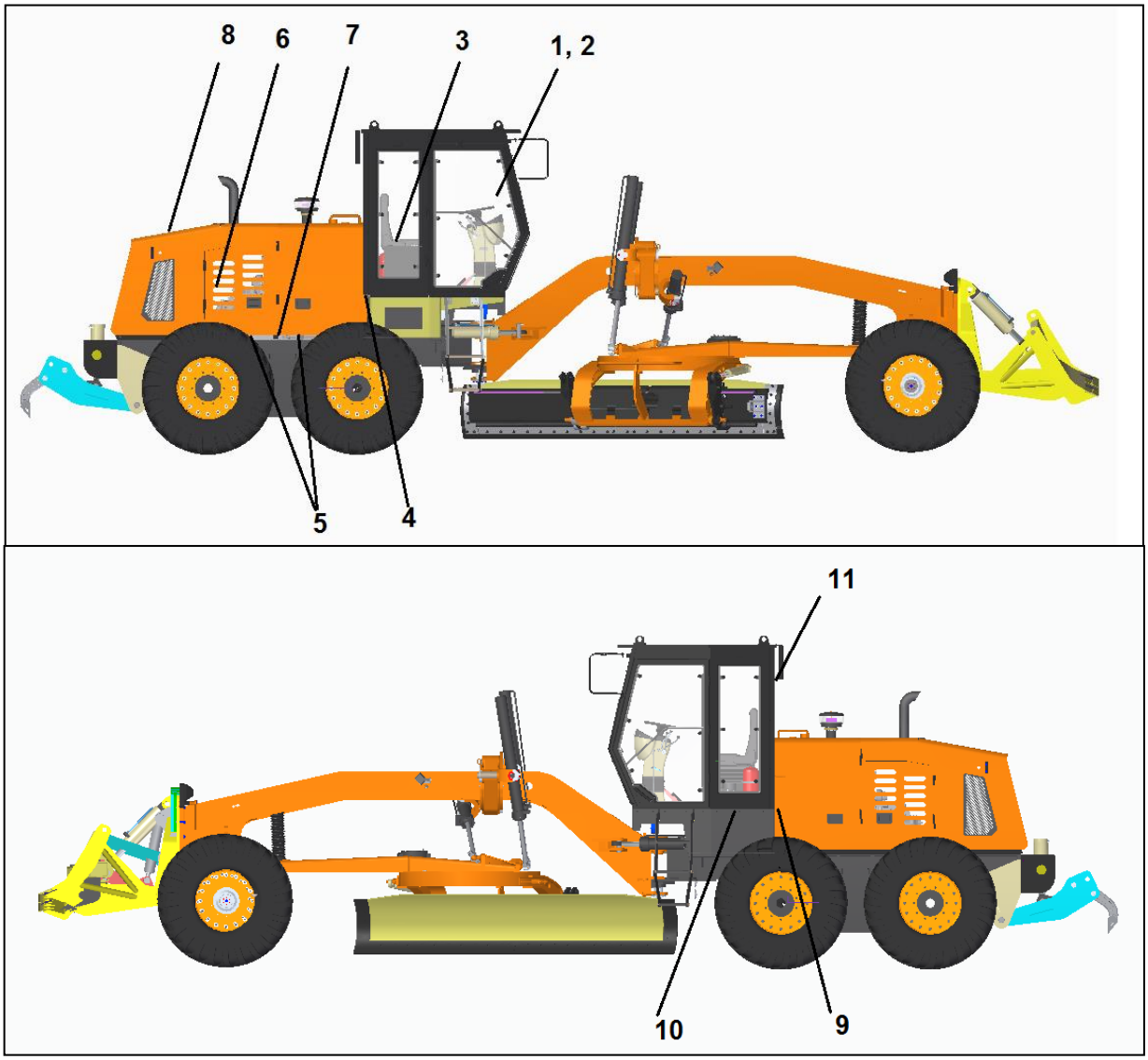
- **Machine Capacity :-**

  Additional attachment or modifications may exceed machine design capacity which can adversely affect performance characteristics. Included would be stability and system certification such as brakes, steering and rollover protective structure (ROPS). Contact your ACE dealer for further information.

TECHNICAL SPECIFICATION

ENGINE	ASHOK LEYLAND
TYPE	TCIC,DI 6 cylinder - H6C418022
RATED SPEED (rpm)	2200
LENGHT x WIDTH x HEIGHT (mm)	9200x2530x3500
TOTAL WEIGHT (kg.)	15000
SWIVELING ANGLE (°)	360
INCLINED ANGLE (°)	90
CUTTING DEPTH (MM)	500
DRIVEN MODE	MOTOR + GEAR BOX
DRIVE TYPE	REAR AXLE
MINIMUM TURNING RADIUS (m)	16.4
GRADEABILITY (°)	20
MAX. PULLING CAPACITY (kN)	≤ 98
CLEARANCE BETWEN WHEELS (mm)	2156
TYRE	14.00x25 - 20PR
INCLINED ANGLE (°)	+/- 17
STEERING ANGLE (°)	+/- 45
CLEARANCE (mm)	430
ARTICULATION ANGLE (°)	+/- 25
BRAKE SYSTEM	HYDRAULIC

Safety Messages



There are several specific safety messages on this machine. The exact location of the messages and the description of the messages are reviewed in this section. Please become familiarized with all safety messages.

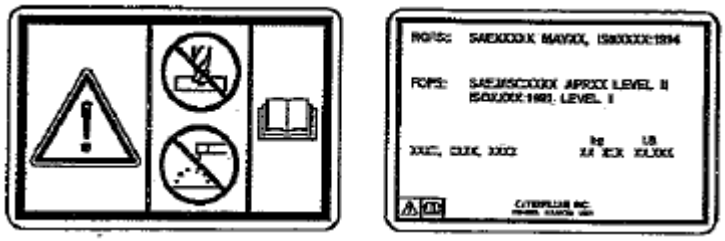
Make sure that all of the safety messages are legible. Clean the safety messages or replace the safety messages if you cannot read the word. Replace the illustrations if the illustration are not legible. When you clean the safety messages, use a cloth, water and soap. Do not use solvent, gasoline or other harsh chemicals to clean the safety messages. Solvent, gasoline or harsh chemical could loosen the adhesive will allow the safety message to fall.

Replace any safety message that is damaged or missing. If a safety message is attached to a part that is replaced, install safety message on the replacement part. Any ACE dealer can provide new safety messages.

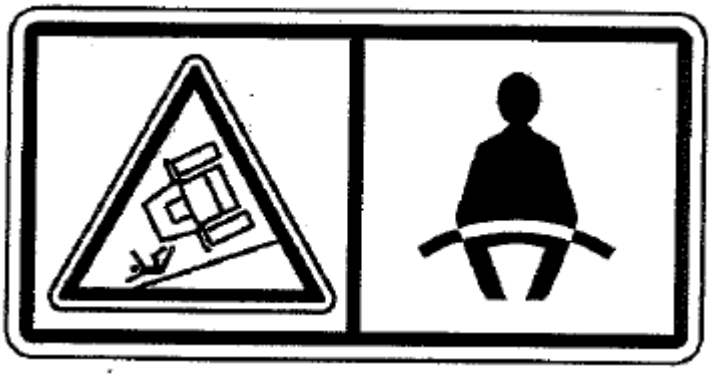
1) **Do Not Operate :-** This safety message is located on the right side of the operator compartment.

WARNING	
Do not operate or work on this machine unless you have read and understand the instructions and warning in the operation and maintenance Manuals. Failure to follow the instruction or heed the warning could result in injury or death. Contact any ACE dealer for replacement manuals. Proper care is your responsibility.	

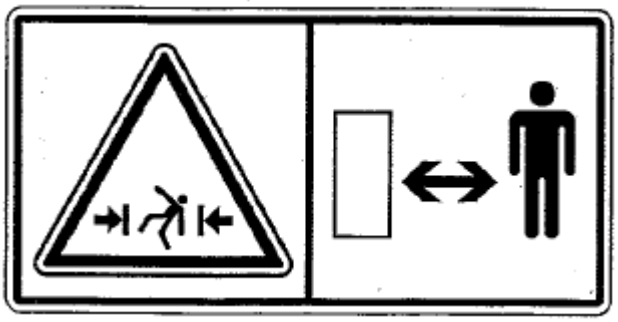
2) **Do Not Weld On The ROPS/FOPS Structure :-** This safety message is positioned on the ROPS.

WARNING

Structure damage an overturn, modification, alternation or improper repair can impair this structure's protection capability thereby voiding this certification. Do not weld on or drill holes in the structure. This will void the certification. Consult with your ACE dealer to determine this structure's limitation without voiding its certification. This machine has been certified to the standards that are listed on the certification film. The maximum mass of the machine, which includes the operator and the attachments without a payload, should not exceed the mass on the certification film. Refer to operation and maintenance Manual, "Guard (Operator Protection)" for more information.

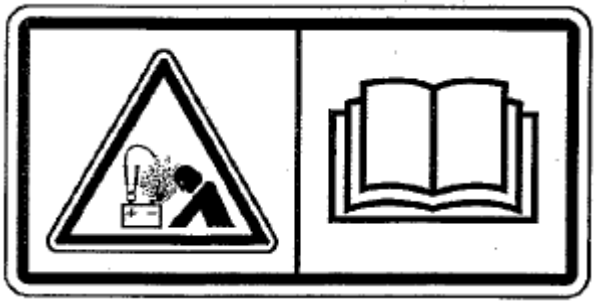
3) **Seat Belt:-** This safety message is located on the left side of the operator compartment.

WARNING

A seat belt should be worn at all times during machine operation to prevent serious injury or death. In the event of an accident or machine overturn failure to wear a seat belt during machine operation may result in serious injury or death. Refer to Operational & Maintenance Manual, "Seat Belt" for more information.

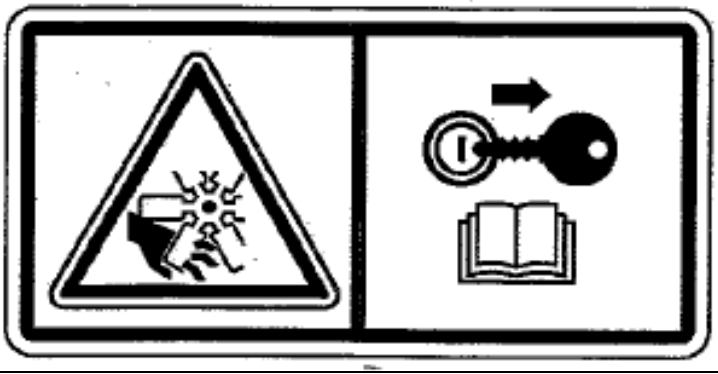
4) **No Clearance :-** This safety message is positioned at the front right and front left of the engine compartment.

WARNING

Stay back a safe distance. No clearance for a person in this area when the machine turns. Severe injury or death from crushing could occur.

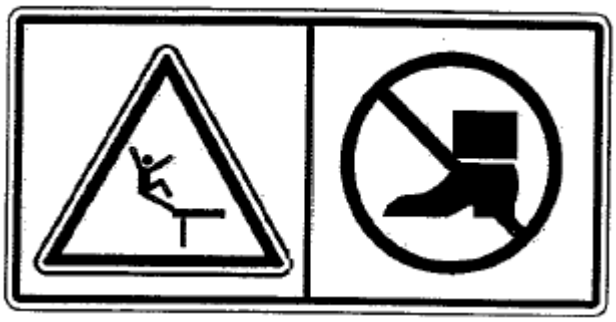
5) **Improper Connections for Jump Start Cables :-** This safety message is positioned below the batteries inside the service center.

WARNING

Explosion Hazard! Improver jumper cable connection can cause an explosion resulting in serious injury or death. Batteries may be located in separated compartments. Refer to the Operation & Maintenance Manual for the correct jump starting procedure. Refer to Operation & Maintenance Manual, “Engine Starting with Jump Start Cable” for more information.

6) **Radiator Fan:-** This safety message is positioned on the fuel tank and the side panel on each side of the machine.

WARNING

Keep hands clear of fan while engine is running. May cause serious injury or death.

7) **Fall Hazard:-** This safety message is positioned on the battery bos on each side of machine.

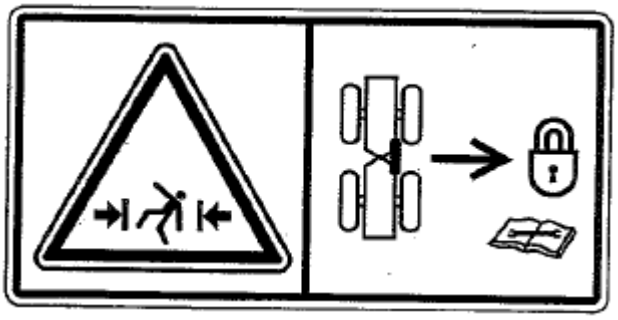
WARNING

Do not use this surface as a step or platform. This surface may not support additional weight or may be slippery. Serious injury or death could occur from a fall.

8) **Engine Coolant:-** This safety message is positioned on the underside of the radiator cap access cover on top of the engine compartment.

WARNING

Pressurized system! Hot coolant can cause serious burns, injury or death. To open the cooling system filler cap, stop the engine and wait untill the cooling system components are cool. Loosen the cooling system pressure cap slowly in order to relieve the pressure. Read and understand the Operation & Maintenance Manual before preforming any cooling system maintenance. Refer the Operation and Maintenance Manual, “Cooling System Coolant Level-Check” for more information.

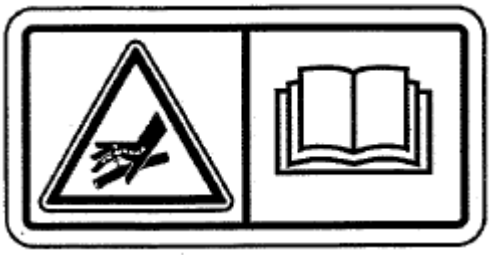
9) **No Clearance :-** This safety message is positioned near the center pivot on both sides of the machine.

WARNING


Connect the steering frame lock between the front and the rear frames before lifting, transporting or servicing the machine in the articulation area. Disconnect the steering frame lock and secure the steering frame lock before resuming operation. Serve injury or death could occur.
Refer to Operation and Maintenance Manual “Steering frame Lock” for more information.

10) **No Clearance :-** This safety message is positioned on the brake accumulators. The brake accumulators are located at rear of the cab.

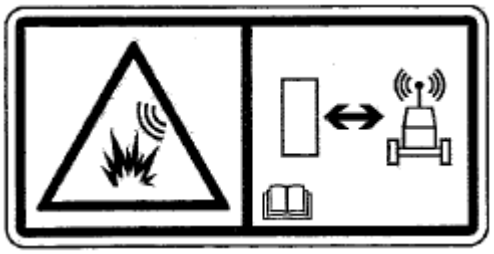
WARNING



Cold ambient temperature could result in the loss of secondary braking capability due to inadequate hydraulic accumulator nitrogen pre-charge. The loss of the secondary braking system as well as the main hydraulic pressure will result in little or no braking capability and a potential for injury or death.
It is recommended to perform a brake accumulator check anytime the machine has been idle for longer than two hours below -25°C (-13°F). Refer to Operation and Maintenance Manual before performing any check of the brake accumulator.
Hydraulic accumulator contains gas and oil under high pressure. Improver removal or repair procedures could cause severe injury. To remove or repair, instruction in the service manual must be followed. Special equipment is required for testing and charging.

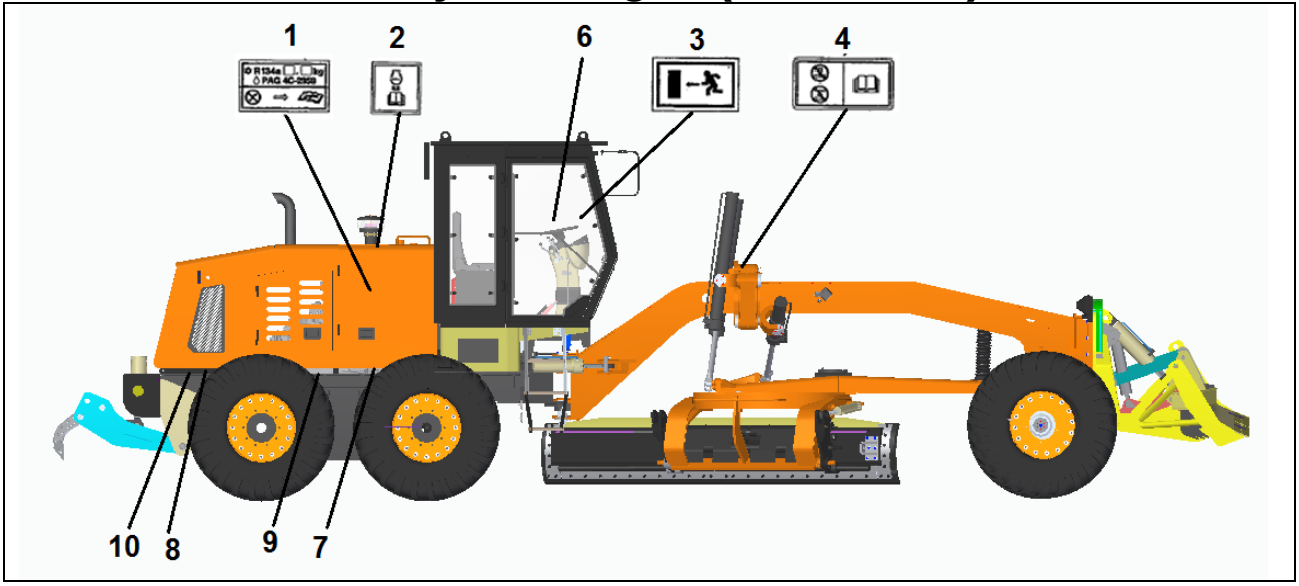
11) **Product Link (If Equipped) :-** This safety message is attached to the dash or to another area of the cab that is visible to the operator.

WARNING



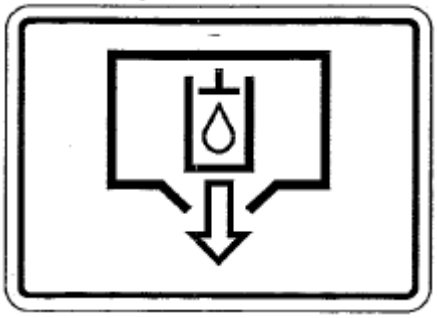
This machine is equipped with a ACE product link communication device. When electric/electronic detonators are used, this communication device should be deactivated within 12m (40feet) of a blast site or within the distance mandated under applicable legal requirement. Failure to do so could cause interface with blasting operation and result in serious injury or death.

Safety Messages (Additional)

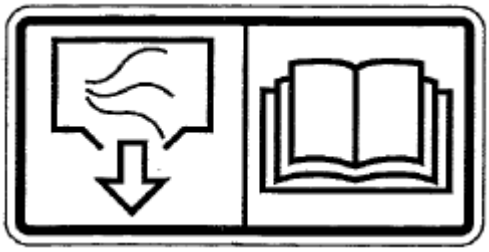


1. **X :-** This safety message is
2. **X :-** This safety message is
3. **X :-** This safety message is
4. **X :-** This safety message is
5. **X :-** This safety message is
6. **Data Privacy :-** This message in the cab.

7. **Hydraulic Tank Drain :-** This message is located at the left of the machine near the drain valve for the hydraulic system.

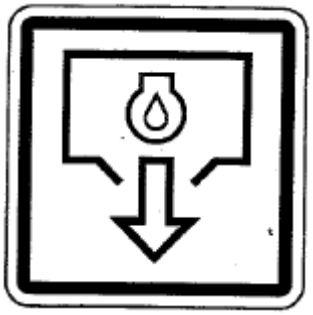


8. **Air Tank :-** This message is located on the left rear side of the machine.



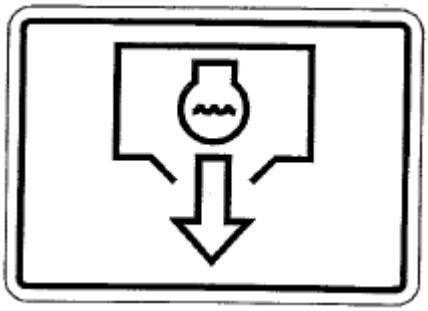
Refer to Operation and Maintenance Manual “Air tank Moisture and Sediment-Drain” for further information.

9. **Engine Oil Drain:-** This message is located at the left rear of the machine near the drain valve for the engine oil.



Refer to Operation and Maintenance Manual “Air tank Moisture and Sediment-Drain” for further information.

10. **Cooling System Drain:-** This message is located at the left rear of the machine near the drain valve for the cooling system.



General Hazard Information

Attach a “Do Not Operate” Waring tag or a similar warning tag to the start switch or to the controls. Attach the warning tag before you service the equipment. These warning tags (Special Instruction) are available from your ACE dealer.

WARNING
Operating the machine while distracted can result in the loss of machine control. Use extreme caution when using any device while operating the machine. Operating the machine while distracted can result in personal injury or death.

Know the width of your equipment in order to maintain proper clearance when you operate the equipment near fences or near boundary obstacles. Be aware of high voltage power lines and power cables that are buried. If the machine come in contact with these hazards, serious injury or death may occur from electrocution.


Wear a hard hat, protective glasses, and other protective equipment as required.
Do not wear loose clothing or jewelry that can snag on controls or an other parts of the equipment.
Make sure that all protective guards and all covers are secured in place on the equipment.
Keep the equipment free from foreign material. Remove debris, oil, tools and other items from the deck, from walkways and from steps.
Secure all lose items much as lunch boxes, tools, and other items that are not a part of the equipment.
Know the appropriate work site hand signals and the personal that are authorized to give the hand signals. Accept hand signals from one person only.

Do not smoke when you service an air conditioner. Also, do not smoke if refrigerant gas may be present. Inhaling the fumes that are released from a flame that contacts air conditioner refrigerant can cause bodily harm or death. Inhaling gas from air conditioner refrigerant through a lighted cigarette can cause bodily harm or death.

Never put maintenance fluids into glass containers. Drain all liquids into a suitable container.
Obey all local regulations for the disposal of liquids.
Use all cleaning solutions with care. Report all necessary repairs.
Do not allow unauthorized personal on the equipment.

Unless you are instructed otherwise, perform maintenance with the equipment in the servicing position. Refer to Operation and Maintenance Manual for the procedure for placing the equipment in the servicing position.

When you perform maintenance above ground level, use appropriate devices such as ladders or main lift machines. If equipped, use the machine anchorage points and use approved fall arrest harnesses and lanyards.

Pressurized Air Water

Pressurized air and water can cause debris and hot water to be blown out. The debris and hot water could result in personal injury.

When pressurized air or water pressurized water is use for cleaning, water protective clothing, protective shoes, eye protection. Eye protection includes goggles or a protective face shield.

The maximum air pressure for cleaning purposes must be reduced to 205kPa (30psi) when the nozzle is deadheaded and the nozzle is used with an effect chip deflector and personal protective equipment. The maximum water pressure for cleaning purpose must be below 275kPa (40psi).

Avoid direct spraying of water on electrical connectors, connections and components. When using air for cleaning, allow the machine to cool to reduce the possibility of fine debris igniting when redeposit on hot surfaces.

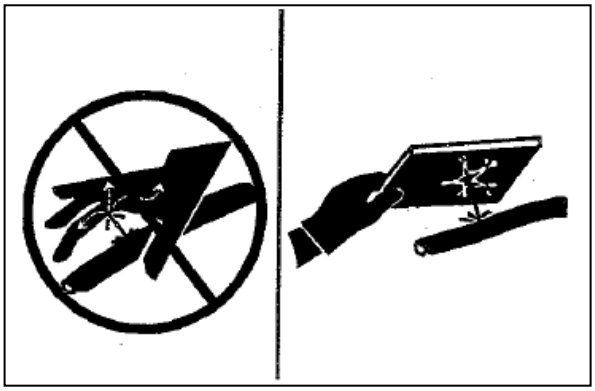
Trapped Pressure

Pressure can be trapped in a hydraulic system. Releasing trapped pressure can cause sudden machine movement or attachment movement. Use cation if you disconnect hydraulic lines or fittings. High-pressure oil that is released can cause oil to spray. Fluid penetration can cause serious injury and possible death.

Fluid Penetration

Pressure can be trapped in the hydraulic circuit long after the machine has been stopped. The pressure can cause hydraulic fluid or item such as pipe plugs to escape rapidly if the pressure is not relieved correctly.

Do not remove any hydraulic components or parts until pressure has been relieved or personal injury may occur. Do not disassemble any hydraulic components or parts until pressure has been relieved and personal injury may occur. Refer to the Service Manual for any procedure that are required to relieve the hydraulic pressure.



Always use a board or cardboard when you check for a leak. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin , you must get treatment immediately. Seek treatment from a doctor that is familiar with type of injury.

Containing Fluid Spillage

Care must be taken in order to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the equipment. Prepare to collect the fluid with suitable containers before opening any compartment or disassembling any components that contains fluids.

Refer to special publication, NENG2500, “ACE dealer Service Tool catalogue” for the following items:

- Tools that are suitable for collecting fluids and equipment that is suitable for collecting fluids.
- Tools that are suitable for containing fluids and equipment that is suitable for containing fluids obey all local regulations for the disposal of liquids.

Inhalation

Exhaust:
Use caution. Exhaust fumes can be hazardous to your health. If you operate the machine in an enclosed area, adequate ventilation is necessary.

Asbestos Information:
ACE equipment and replacement parts thar are shipped from ACE are asbestos free.
ACE recommended the use of only genuine ACE replacement pats. Use the following guidelines when you handle any replacement parts that contain asbestos or when you handle asbestos debris.

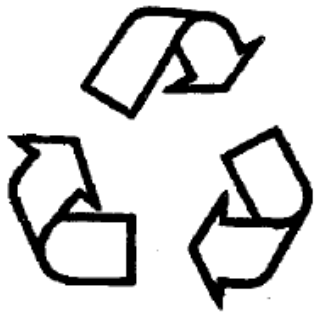
Use caution. Avoid inhaling dust that might be generated when you handle components that contains asbestos fibers. Inhaling this dust can be hazardous to your health. The components that may contain asbestos fibers are brake pads, brake bands, lining material, clutch plates and some gaskets. The asbestos that is used in these components is bound in a resin or sealed in some way. Normal handling is not hazardous unless airborne dust that contains asbestos is generated.

If dust that may contains asbestos is present, there are several guidelines that should be followed:

- Never use compressed air for cleaning.
- Avoid brushing materials that content asbestos.
- Avoid grinding materials that content asbestos.
- Use a wet method in order to clean up asbestos materials.
- A vacuum cleaner that is equipped with high efficiency air filter (HEPA) can also be used.
- Use exhaust ventilation on permanent matching jobs.
- Wear an approved respirator if there is no other way to control the dust.
- Comply with applicable rules and regulations for the work place. In the United State, use Occupational Safety and Health Administration (OSHA) requirements. These OSHA requirements can be found in “29 CFR 1910.1001” in Japan, use the requirements found in the “Ordinance on Prevention of Health Impairment due to Asbestos” in addition to the requirements of the industrial safety and health Act.

- Obey environment regulations for the disposal of asbestos.
- Stay away from areas that might have asbestos particles in the air.

Dispose of Waste Properly



Improperly disposing of waste can threaten the environment. Potentially harmful fluid should be disposed of according to local regulations.
Always use leakproof containers when you drain fluids. So not pour waste onto the ground, down a drain, or into any source of water.

Crushing Prevention and Cutting Prevention

Support the equipment properly before you perform any work or maintenance beneath that equipment. Do not depend on hydraulic cylinder to hold up moved or if a hydraulic line breaks.
Do not work beneath the cab of machine unless the cab is properly supported.
Unless you are instructed otherwise, never attempt adjustment while the machine is moving or while the engine is running.
Never jump across the starter solenoid terminals in order to start the engine. Unexpected machine movement could result.
Whenever there are equipment control linkage the clearance in the linkage area will change with the movement of the equipment pr the machine. Stay clear of areas that may have a sudden change in clearance with machine movement or equipment movement.
Stay clear of all rotating and moving parts.
If it is necessary to remove guards in order to perform maintenance, always install the guards after the maintenance is performed.
Keep objects away from moving fan blades. The fan blade will throw object or cut object.
Do not use a kinked wire cable or a frayed wire cable. Wear gloves when you handle wire cable.
When you strike a retainer pin with force, the retainer pin can fly out. The loose retainer pin can injure personal. Make sure that the area is clear of people when you strike a retainer pin. To avoid injury to your eyes, wear protective glasses when you strike a retainer pin.

Chips or other debris can fly off an object when you strike the object. Make sure that no one can be injured by flying debris before striking any object.

Burn Prevention

Do not touch any part of an operating engine. Allow the engine to cool before any maintenance is performed on the engine. Relieve all pressure in the air system, Oil system, Lubrication system, Cooling system before any lines, fittings or related items are disconnected.

Coolant:-

When the engine is at operating temperature, the engine coolant is hot. The coolant is also under pressure. The radiator and all lines to the heaters or to the engine contain hot coolant.

Any contact with hot coolant or with steam can cause severe burns. Allow cooling system components to cool before the cooling system is drained.

Check the coolant level only after the engine has been stopped.

Ensure that the filler cap is cool before removing the filler cap. The filler cap must be cool enough to touch with a bare hand. Remove the filler cap slowly in order to relieve pressure.

Cooling system conditioner contains alkali can cause personal injury. Do not allow alkali contact the skin, eye and mouth.

Oils:-

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

Remove the hydraulic tank filler cap only after the engine has stopped. The filler cap must be cool enough to touch with a bare hand. Follow the standard procedure in this manual in order to remove the standard tank filler cap.

Batteries:-

The liquid in a battery is an electrolyte. Electrolyte is an acid that can cause personal injury. Do not allow electrolyte the skin or eyes.

Do not smoke while checking the battery electrolyte levels. Battery give off flammable fumes which can explode.

Always wear protective glasses when you work with batteries. Wash hands after touching batteries. The use gloves is recommended.

Fire Prevention and Explosion Prevents

General:-

All fuels, most lubricants and some coolant mixtures are flammable.

To minimize the risk of fire or explosion, ACE recommended the following actions.

Always perform a Walk-Around Inspection, which may help you identify a fire hazard. Do not operate a machine when a fire hazard exists. Contact your ACE dealer for service.

Understand the cause of the primary exit and alternative exit on the machine. Refer the Operation and Maintenance Manual, “Alternative Exit”.

Do not operate a machine with a fluid leak. Repair leaks and clean up fluids before resuming machine operation. Fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire. A fire cause personal injury or death.

Remove flammable material such as leaves, twigs, papers, trash and so on. These items may accumulate in the engine compartment or around other hot areas and hot parts on the machine.

Keep the access doors to major machine compartment closed and access doors in working condition in order to permit the use of fire suppression equipment, in case a fire should occur.

Clean all accumulations of flammable material such as fuel, oil and debris from the machine.

Do not operate the machine near any flame.

Keep shields in place. Exhaust shields (if equipped) protect hot exhaust components from oil spray or fuel spray in case of a break in a line, hose and seal. Exhaust shield must be installed correctly.

Do not weld or flame cut on tanks or lines that contain flammable fluids or flammable material. Empty and purge the lines and tanks. Then clean the lines and tanks with s nonflammable solvent prior to welding or flame cutting. Ensure that the components are properly grounded in order to avoid unwanted arcs.

Dust that is generated from repairing nonmetallic hoods or fenders may be flammable and explosive. Repair such components in a well ventilated area away from open flames or sparks. Use suitable Personal Protective Equipment (PPE).
Respect all lines and hoses for wear or deterioration. Replace damaged lines and hoses. The lines and hose should have adequate support and secure clamps. Tighten all the connections to the recommended torque. Damage to the protective cover or insulation may provide fuel for fires.

Store fuels and lubricants in properly marked containers away from unauthorized personal. Store oily rags and flammable materials in protective containers. Do not some in areas that are used for storming flammable materials.

Use caution when you are fueling a machine. Do not smoke while you are fueling a machine. Do not fuel a machine near open flames or sparks. Do not use cell phone or other electronic device while you are refueling. Always stop the engine before fueling. Fill the fuel tank outdoors. Properly clean areas of spillage.

Avoid static electricity risk when fueling. Ultra low sulfur diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations with a higher sulfur content. Avoid death or serious injury from fire or explosion. Consult with your fuel or fuel system supplier to ensure that the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

Never store flammable fluids in the operator compartment of the machine.

Battery and Battery Cable:-

ACE recommended the following in order to minimize the risk of fire or an explosion related to the battery.

Do not operate a machine if battery cable or related parts show signs of wear or damage. Contact your ACE dealer for service.

Follow safe procedure for engine starting with jumpstart cables. Improver jumper cable connections can cause an explosion that may result in injury. Refer to Operation and Maintenance Manual, “Engine Starting with Jump Start Cables” for specific instructions.

Do not charge a frozen battery. This may cause an explosion.

Gases from a battery can explode. Keep any open flames or sparks away from the top of a battery. Do not smoke in battery charging areas. Do not use cell phones or other electronic devices in battery charging areas.

Never check the battery charge by placing a metal object across the terminal posts. Use a voltmeter in order to check the battery charge.

Daily inspect battery cables that are in areas that are visible. Inspect cable, clips, straps and other restraints for damage. Replace any damaged parts. Check for sign of the following, which can occur over time due to use and environment factors:

- Fraying
- Abrasion
- Cracking
- Discoloration
- Cuts on the insulation of the cable
- Fouling
- Corroded terminals, damaged terminals and loose terminals

Replace damaged battery cables and replace any related parts. Eliminate any fouling, which may have caused insulation failure or related component damage or wear. Ensure that all components are reinstalled correctly.

An exposed wire on the ground cable between the battery and the disconnect switch may cause the disconnect switch to be bypassed if the exposed area come into contact with a grounded surface. This may result in an unsafe condition for servicing the machine. Repair components or replace components before servicing the machine.

WARNING

Fire on a machine can result in personal injury or death. Exposed battery cables that come into contact with a grounded connection can result in fires. Replace cable and related parts that show sign of wear of damage. Contact your ACE dealer.

Wiring :-

Check electrical wires daily. If any of the following conditions exit, replace parts before you operate the machine:

- Fraying
- Sign of abrasion or wear
- Cracking
- Discoloration
- Cuts on insulation
- Other damage

Make sure that all clamps, guards, clips, and straps are reinstalled correctly. This will help to prevent vibration, rubbing against other parts and excessive heat during machine operation.

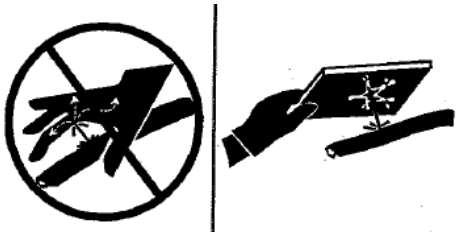
Attaching electrical wiring to hoses and tubes that contain flammable fluids or combustible fluids should be avoided.

Consult your ACE dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes and Hoses:-

Do not bend high pressure lines. Do not strike high pressure lines. Do not install any lines that are bent or damaged. Use the appropriate backup wrenches in order to tighten all connections to the recommended torque.



Check lines, tubes and hoses carefully. Wear personal protection equipment (PPE) in order to check for leaks. Always use a board or cardboard when you check for leak. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin, you must get treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

Replace the affected parts if any of the following conditions are present:

- End fittings are damaged or leaking
- Outer coverings are chafed or cut
- Wire are exposed
- Outer covering are swelling or ballooning
- Flexible parts of the hoses are kinked
- Outer covers have exposed embedded armoring
- End fittings are displaced

Make sure that all clamps, guards and heat shields are installed correctly. During machine operation, this will help to prevent vibration, rubbing against other parts, excessive heat and failure of lines, tubes and hoses.

Do not operate a machine when a fire hazard exists. Repair any lines that are corroded, loose or damaged. Leakage may provide fuel for fires. Consult your ACE dealer for repair for equivalent for capabilities of both the pressure limit and temperature.

Ether:-

Ether (if required) is commonly used in cold-weather applications. Ether is flammable and poisonous,

Only use approved ether canisters for the ether dispensing system fitted to your machine, do not spray ether manually into an engine, follow the correct cold engine starting procedures. Refer to the section in the Operational and Maintenance Manual with label “Engine Starting”.

Use ether in ventilated areas. Do not smoke while you are replacing an ether cylinder.
Do not store cylinder in living areas or in the operator compartment of a machine. Do not store ether cylinder in direct sunlight or in temperatures above 49°C (120.2°F). Keep ether cylinders away from open flames or sparks.

Dispose of used ether cylinder properly. Do not puncture an ether cylinder. Keep ether cylinders away from unauthorized personnel.

Fire Extinguisher:-

As an additional safety measure, keep a fire extinguisher on the machine.

Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly. Follow the recommendations on the instruction plate.

Consider installation of an aftermarket fire suppression system, if the application and working conditions warrant the installation.

Fire Safety:-

Locate secondary exits and how to use the secondary exits before you operate the machine.

Note:- locate the extinguishers and how to use a fire extinguishers before you operate the machine.

If you find that you are involved in a machine fire, your safety and that of others on site is the top priority. The following actions should only be performed if the actions do not present a danger or risk to you and any nearby people. At all times you should assess the risk of personal injury and move away to a safe distance as soon as you feel unsafe.

Move the machine away from nearby combustible material such as fuel/oil stations, structures, trash, mulch and timber.

Lower any implements and turn off the engine as soon as possible. If you leave the engine running, the engine will continue to feed a fire. The fire will be fed from any damaged hoses that are attached to the engine or pump.

If possible, turn the battery disconnect switch to the OFF position. Disconnecting the battery will remove the ignition source in the event of electrical short. Disconnecting the battery will eliminate a second ignition source if electrical wiring is damaged by the fire, resulting in a short circuit.

Notify emergency personnel of the fire and your location.

If your machine is equipped with a fire suppression system, follow the manufacturers procedure for activating the system.

Note:- Fire suppression system need to be regularly inspected by qualified personnel. You must be trained to operate the fire suppression system.

Use the on-board fire extinguisher and use the following procedure:

1. Pull the pin
2. Aim the extinguisher or nozzle at the base of the fire
3. Squeeze the handle and release the extinguishing agent.
4. Sweep the extinguisher from side to side across the base of the fire untill the fire is out.

Remember,if you are unable to do anything else, shut off the machine before exiting. By shutting off the machine, fuels will not continue to be pumped into the fire.

If the fire grows out of control, be aware of the following risks:

- Tires on wheeled machine pose a risk of explosion as tires burn. Hot shrapnel and debris can be great distances in an explosion.
- Tanks, accumulators, hose and fittings can rupture in a fire, spraying fuels and shrapnel over a large area.
- Remember that nearly all of the fluids on the machine are flammable, including coolant and oil. Additionally, plastics, rubbers, fabrics and resins in fiberglass panel are also flammable.

Fire Extinguisher Location:-

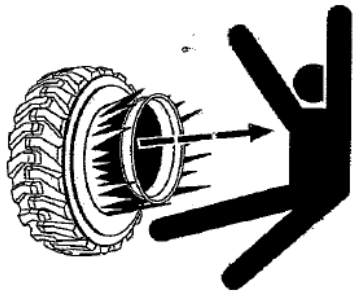
Do not weld a bracket on the rollover protective structure (ROPS) in order to install the fire extinguisher. Also, do not drill holes in the ROPS in order to mount the fire extinguisher on the ROPS.

Strap the mounting plate to a leg of the ROPS in order to mount the fire extinguisher. If the fire extinguisher weighs more than 4.5kg (10lb), mount the fire extinguisher low on one leg of the ROPS. Do not mount the fire extinguisher on the upper one third portion of the leg.

Tire Information:-

Explosions of air inflated tires have resulted from heat included gas combustion inside the tires. Explosions can be caused by heat that is generated by welding, by heating rim components by external fire, or by excessive use of brakes.

A tire explosion is much more violent than a blowout. The explosion can propel the tire, the rim components and the axle components from the machine. Stay out of the trajectory path. Both the force of the explosion and the flying debris can cause property damage, personal injury or death.



Typical example of tire is shown

Do not approach a hot or an apparently damaged tire.

ACE recommends against using water or calcium as a ballast for the tires except in machines designed for this additional mass. For those applicable machines, the maintenance section will contain instructed on the correct tire inflation and filling procedure. Ballast, such as fluid in the tires, increases overall machine weight and may affect braking, steering, power train components, or the certification of the protective structure such as the ROPS. The use of tire/rim rust preventatives or other liquid additives is not required.

WARNING

Proper nitrogen inflation equipment and training in using the equipment, are necessary to avoid over inflation. A tire blowout or rim failure can result from improver or misused equipment and personal injury or death can occur.

A tire blowout and rim failure can occur if the inflation equipment is not used correctly, due to the fact that a fully charged nitrogen cylinder's pressure is approximately 15000kPa (2200psi).

Dry nitrogen gas is recommended for inflation of tires. If the tires were originally inflated with air, nitrogen is still preferred for adjusting the pressure. Nitrogen mixes properly with air.

Nitrogen inflated tires reduce the potential of a tire explosion because nitrogen does not aid combustion. Nitrogen help to prevent oxidation of the rubber, deterioration of rubber and corrosion of rim components.

To avoid overinflation, proper nitrogen inflation equipment and training in the usage of the equipment ae necessary. A tire blowout or a rim failure can result from improper equipment or from misused equipment.

When you inflation a tire, stand behind the tread and use a self attacking chuck.

Servicing tires and rims can be dangerous. Only trained personnel that use proper tools and proper procedures should perform this maintenance. If correct procedures are not used for servicing tires and rims, the assemblies could burst with explosive force. This explosive force can cause serious personal injury or death. Carefully obey the specific instructions from your tire dealer.

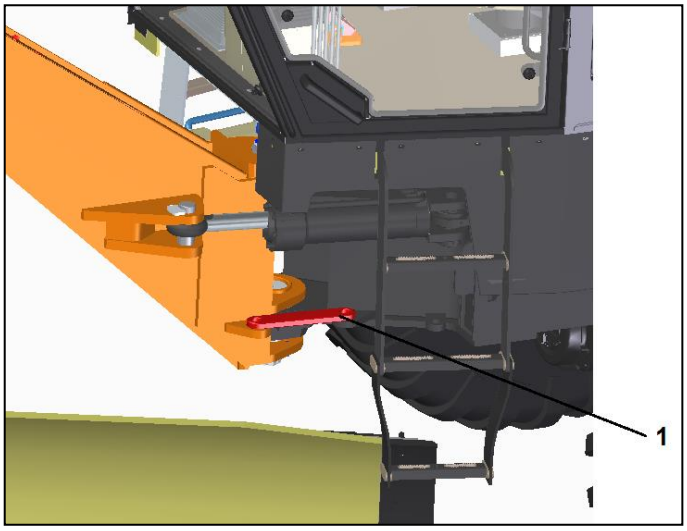
Electrical Storm Injury Prevention :-

When lighting is striking in the vicinity of the machine, the operator should never attempt the following procedures:

- Mount the machine
- Dismount the machine

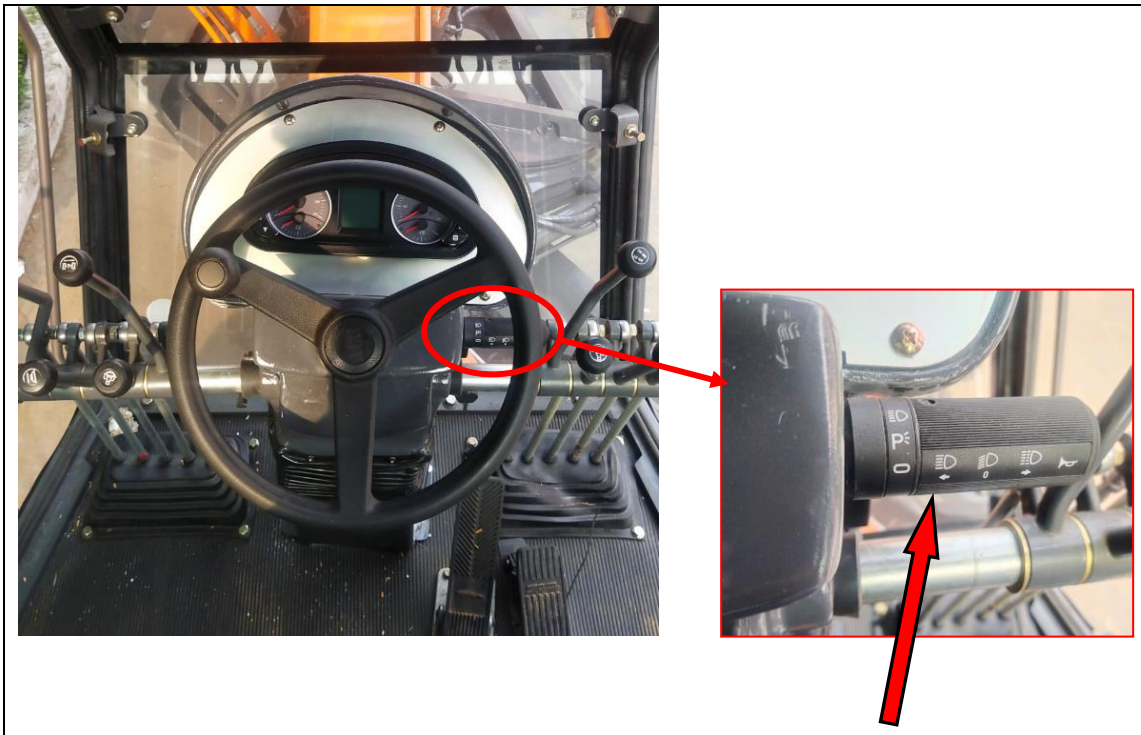
If you in the operator's station during an electrical storm, stay away from the vicinity of the machine.

Before Starting Engine :-



Place frame lock link (1) in the storage bracket. The frame lock link must be removed from the locked position in order to articulate the machine.

Start the engine only from the operator's compartment. Never short across the starter terminals or cross the batteries. Shorting could bypass the engine neutral start system. Shorting could also damage the electrical system.



Make sure that the machine horn works properly.

The mirrors on your machine may be different. Adjust the mirror for the best operator vision. Adjust the inside mirror or the inside mirror before you operate the machine. If the machine is equipped with outside mirrors, adjust the outside mirrors before you operate the machine.

Inspect the condition of the seat belt and the condition of mounting hardware. Replace any damaged parts and any worn parts. Regardless of appearance, replace the seat belt after three years of use. Do not use seat belt extension on a retractable seat belt.

Adjust the seat in order to achieve full pedal travel when the operator's back is against the back of the seat. Adjust the steering column tilt lever in order to

enhance the operation of the machine from the operator's seat.

Make sure that the machine is equipped with a lighting system that is adequate for the job conditions. Make sure that all lights are working properly.

Before you start the engine or before you move the machine, make sure that no one is on the machine., underneath the machine or around the machine. Make sure that there are no personnel in the area.

Engine Starting :-

If a warning tag attached to the engine start switch or to the machine controls, do not start the engine. Also, do not move any machine controls. Move all hydraulic controls to the HOLD position or to the OFF position before you start the engine.

Move the transmission control (Lever) to the NEUTRAL position.

Engage the parking brake control.

Diesel engine exhaust contains products of combustion which can be harmful to your health. Always start the engine in a well ventilated area. Always operate the engine in a well ventilated area. If you are in an enclosed area, vent the exhaust to the outside.

Briefly sound the horn the machine and from the area.

Before Operation :-

Clear all personnel from the machine and from the area.

Clear all obstacles from the path of the machine. Beware of hazard such as wires, ditches and etc.
Make sure that all window are clean. Secure the doors in the open position or in the shut position. Secure the window in the open position or in the shut position.

Remove the wheel lean locking bolt from the wheel lean lock bracket. Make sure that the frame lock pin is stored in the unlocked position. The frame lock pin must be removed i order to steer the machine.

For the best vision of the area tat is close to the machine, adjust the rear view mirrors (if equipped).
Make sure that the machine horn, the backup alarm (if equipped) and all other warning devices are working properly.

Fasten the seat belt securely.

Visibility Information :-

Before you start the machine, perform a walk-around inspection in order to ensure that there are no hazards around the machine.

While the machine is in operation, constantly survey the area around the machine in order to identify potential hazards as hazards become visible around the machine.

Your machine may be equipped with visual aids. Some example of visual aids are Closed Circuit Television (CCTV) and mirrors. Before operating the machine, ensure that the visual

aids are in proper working condition and that the visual aids are clean. Adjust the visual aids using the procedures that are located, the work area vision system shall be adjusted according to Operation and Maintenance Manual, ACE.

It may not be possible to provide direct visibility on large machines to all area around the machine. Appropriate job site organization is required in order to minimum hazards that are caused by restricted visibility. Job site organization is a collection of rules and procedures that coordinates machine and people that work together in the same area. Example of job site organization include the following:

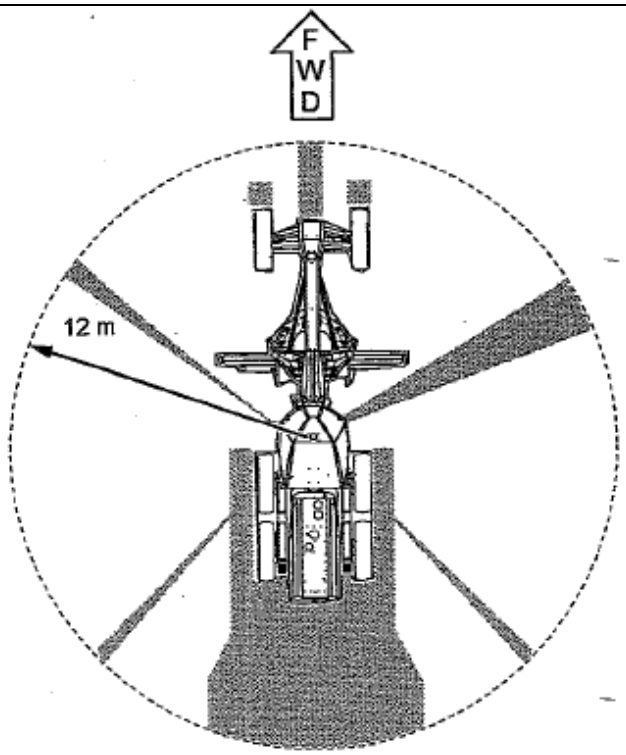
- Safety instructed
- Controlled patterns of machine movement and vehicle movement
- Workers that safe movement of traffic
- Restricted areas
- Operator training
- Warning symbols or warning sign on machine or on vehicles
- A system of communication
- Communication between workers and operators prior to approaching the machine

Modification of the machine configuration by the user that result in a restriction of visibility shall be evaluated.

Restricted Visibility :-

The size and the configuration of this machine may result in areas that can not be seen when the operator is seated. Illustration 42 provides an approximate visual indication of areas of significant restricted visibility. Illustration 42 indicates restricted visibility areas at ground level inside a radius of 12m (39.37ft) from the operator on a machine without the use optional visual aids. This illustration does not provide areas of restricted visibility for distances outside a radius of 12m (39.37ft).

This machine may be equipped with optional visual aids that may provide visibility to some of the restricted visibility areas. Refer to this Operation and Maintenance Manual, “Mirror” for more information on additional visibility. If your machine is equipped with camera, refer to this Operation and Maintenance Manual, “Camera” for more information on additional visibility. For areas that are not covered by the optional visual aids. The job site organization must be utilized to minimize hazards of this restricted visibility. For more information regarding job site organization refer to Operation and Maintenance Manual, “Visibility Information”.



Top view of the machine

Note:- The shaded areas indicate the approximate location of areas with significant restricted visibility.

Operation

Machine Operating Temperature Range :-

The standard machine configuration is intended for use within an ambient temperature range of -40°C (-40°F) to 50°C (122°F). Special configurations for different ambient temperatures may be available. Consult your ACE dealer for additional information on special configurations of your machine.

Machine Operation :-

Only operate the machine while you are in a seat. The seat belt must be fastened while you operate the machine. Only operates the controls while the engine is running.

Before you operate the machine, remove the wheel lean locking bolt from the wheel lean lock bracket. Make sure that the frame lock pin is stored in the unlock position. The steering frame lock link must be removed in order to steer the machine.

Do not use the wheel lean locking bolt and the wheel lean lock bracket in order to center the wheel lean of the machine.

While you operate the machine slowly in an open area, check for proper operation of all controls and and all protective devices.

Before you move the machine, you must take make sure that no one will be encourage.

Do not allow riders on the machine.

Reduce engine speed when you maneuver in tight quarters gears or when you are going over a hill.

When you operate the machine downhill, use two transmission gears less that is used when you operate the machine up the same hill.

Do not allow the engine to over-speed exits, use the service brake control to decrease the speed to a level that will alow you to downshift. Repeat this process until a stable speed is obtained.

Note:- any needed repairs during machine operation. Report any needed repairs.

Carry attachments approximately 40cm (15inch) above above ground level. Do not go close to the edge of a cliff, an excavation, or an overhang.

If the machine begins to sideslip downward on a grade, immediately remove the load and turn the machine downhill.

Avoid any condition that can lead to tipping the machine. The machine can tip when you work on hills, banks and slopes. Also the machine can tip when you cross ditches, ridges or other unexpected obstructions.
Maintain control of the machine. Do not overload the machine beyond the machine capacity.

Never straddle a wire cable. Never allow other personnel to straddle a wire cable.

Before you maneuver the machine, make sure that no personnel are between the machine and attachments.

Know the maximum dimensions of your machine.

Always keep the Rollover Protective Structure (ROPS) installed during.

Engine Stopping :-

Do not stop the engine immediately after the machine has been operated under load. Stopping the engine immediately can cause overheating and accelerated wear of engine components.

After the machine is parked and the parking brake is engaged, allow the engine to run at low idle for 5minutes before shutdown. Running the engine allow hot areas of the engine to cool gradually.

Parking :-

Park the machine on a level surface. If you must park on a grade, chock the machine's wheels with suitable chocks. Take into account the following:

- Tire size
- Machine weight
- Ground condition

Apply the service brake in order to stop the machine. Move the transmission control (lever) to the NEUTRAL position. Move the throttle control to the LOW IDLE position.

Engage the parking brake.

Lower all equipment to the ground. Activate any control locks.

Stop the engine.

Turn the engine start which to the OFF position and remove the engine start switch key.

Turn the battery disconnect switch to the OFF position. Remove the disconnect switch key if you do not operate the machine for an extended period of time. This will prevent drainage of the battery. A battery short, any current draw from certain components, and vandalism can cause drainage of the battery.

Slope Operation:-

Machine that are operating safely in various applications depend on these criteria: at machine model, configuration, machine maintenance, operating speed of the machine, condition of the inflation pressure. The most important criteria are the skill and judgment of the operator.

A well trained operator that follows the instructions in the Operation and Maintenance Manual has the greatest impact on stability. Operator training provides a person with the following abilities: observation of working and environmental conditions, feel for the machine, identification of potential hazards and operator the machine safely by making appropriate decisions.

When you work on side hills and when you work on slops, consider the following important points:

Speed of travel - At higher speeds, forces of inertia tend to make the machine less stable.

Roughness of terrain or surface - The machine may be less stable with uneven terrain.

Direction of travel - Avoid operating the machine across the slope. When possible, operate the machine up the slops and operate the machine down the slops. Place the heaviest end of the machine uphill when you are working on a incline,

Mounted equipment - balance of the machine may be impeded by the following components: equipment that is mounted on the machine, machine configuration, weights and counterweights.

Nature of surface - ground that has been newly filled with earth may collapse from the weight of the machine.

Surface material - Rocks and moisture of the surface material may drastically affect the machine's traction and machine's stability. Rocky surfaces may promote side slipping of the machine.
Slippage due to excessive loads - This may cause downhill tracks or downhill tires to dig into the ground, which will increase the angle of the machine.
Width of track or tires - Narrower tracks or narrower tires further increase the digging into the ground which causes the machine to be less stable.
Implements attached to the drawbar - This may decrease the weight on the uphill tracks. This may also decrease the weight on the uphill tires. The decreased weight will cause the machine to be less stable.
Height of the working load of the machine - When the working loads are in higher positions, the stability of the machine is reduced.
Operated equipment - Be aware of performance features of the equipment in operation and the effects on machine stability.
Operating technique - Keep all attachment for pulled loads low to the ground for optimum stability.
Machine system have limitation on slopes - Slopes can affect the proper function and operation of the various machine systems. These machine systems are needed for machine control.

Note :- Safe operation on steep slopes may require special machine maintenance. Excellent skill of the operator and proper equipment for specific applications are also required. Consult the Operation and Maintenance Manual sections for the proper fluid level requirements and intended machine use.

Equipment Lowering with Engine Stopped :-

Before lowering any equipment with the engine stopped, clear the area around the equipment of all personnel. The procedure to use will vary with the type of equipment to be lowered. Keep in mind most systems use a high pressure fluid or air to raise or lower equipment. The procedure will cause high pressure air, hydraulic, or some other media to be released in order to lower the equipment. Wear appropriate personal protective equipment and follow the established procedure in the Operation and Maintenance Manual, "Equipment Lowering with Engine Stopped" in the Operation Section of the manual.

Sound Information and Vibration Information

Sound Level Information :-

The operator Equivalent Sound Pressure Level (Leq) is 78dB (A) when “ANSI/SAE J1166 OCT 98” is used to measure the value for an enclosed cab. This is a work cycle sound exposure level. The cab was properly installed and maintained. The test was conducted with the cab doors and the cab windows closed.

Hearing protection may be needed when the machine is operated with an open operator station for extended periods or in a noisy environment. Hearing protection may be needed when the machine is operated with a cab that is not properly maintained or when the doors and windows are open for extended periods or in a noisy environment.

The average exterior sound pressure level is 84dB (A) when the “SAE J88Feb2006-Constant Speed Moving Test” procedure is used to measure the value for the standard machine. The measurement was conducted under the following conditions: distance of 15m (49.2ft) and “the machine moving forward in an intermediate gear ratio”.

Sound Level Information for Machine in European Union Countries and in Countries that Adopt the “EU Directives” :-

The dynamic operator sound pressure level is 77dB (A) when “ISO 6396:1992” is used to measure the value for an enclosed cab. The cab was properly installed and maintained. The test was conducted with the cab doors and the cab windows closed.

“The European Union Physical Agent (Vibration) Directive 2002/44EC”

Vibration Data for Motor graders

Information Concerning Hand/Arm Vibration Level :-
When the machine is operated according to the intended use, the hand/arm vibration of this machine is below 2.5meter per second squared.

Information Concerning Whole Body Vibration Level :-
This section provides vibration data and a method for estimating the vibration level for motor graders.

Note:- Vibration levels are influenced by many different parameters. Many items are listed below.

- Operator training, behavior, mode and stress
- Job site organization, preparation, environment, weather and material.
- Machine type, quality of the seat, quality of the suspension system, attachments and condition of the equipment

It is not possible to get precise vibration levels for this machine. The expected vibration levels can be estimated with the information in table 1 in order to calculate the daily vibration exposure. A simple evaluation of the machine application can be used.

Estimate the vibration levels for the three vibration directions. For typical operating conditions, use the average vibration levels as the estimated level. With an experienced operator and smooth terrain, subtract the Scenario Factors from the average vibration level. For aggressive operations and severe terrain, add the Scenario Factors to the average vibration level in order to obtain the estimated vibration level.

Note:- All vibration levels are in meter per second squared.

Table 1

"ISO Reference Table A - Equivalent vibration levels of whole body vibration emission for earthmoving equipment"

Machine Type	Typical Operating Activity	Vibration Levels			Scenario Factors		
		X axis	Y axis	Z axis	X axis	Y axis	Z axis
Motor Graders	Finish grading	0.41	0.48	0.38	0.22	0.26	0.14
	Hard grading	0.61	0.64	0.78	0.21	0.21	0.30
	transfer	0.39	0.36	0.58	0.25	0.25	0.34

Note:- Refer to "ISO/TR 25398 Mechanical Vibration Guidelines for the assessment of exposure to whole body vibration of ride on operated earthmoving machine" for more information about vibration. This publication uses data is measured by international institutes, organizations and manufacturers. This document provides information about the whole body exposure of operators of earthmoving equipment. Refer to Operation and Maintenance Manual, SEBU8257, "The European Union Physical agent (Vibration) Directive 2002/44/EC" for more information about machine vibration levels.

The ACE suspension seat meets the criteria of "ISO 7096". This represents vertical vibration level under severe operating conditions. This seat is tested with input "spectral class EM4" the seat has a transmissibility factor of "SEAT<1.1".

The whole body vibration level of the machine varies. There is a range of values. The low value is 0.5meter per second squared. The machine meets the short term level for the design of seat in "ISO 7096". The value is 0.63 meter per second squared for this machine.

Guidelines for reducing vibration levels on earthmoving equipment

Properly adjust machines. Properly maintain machine. Operate machine smoothly. Maintain the conditions of the terrain. The following guidelines can help reduce the whole body vibration level:

1. Use the right type and size of machine, equipment, machine and attachment.
2. Maintain machines according to the manufacturer's recommendations.

- Tire pressure

- Brake and steering system
- Controls, hydraulic system and linkage
- Keep the terrain in good condition.
- Remove any large rocks or obstacles.
- Fill any ditches and holes.
- Provide machine and schedule time in order to maintain the conditions of the terrain.

3. Use a seat that “ISO 7096”. Keep the seat maintained and adjusted.
- Adjust the seat and suspension for weight and the size of the operator.
- Inspect and maintain the seat suspension and adjustment mechanisms.

4. Perform the following operations smoothly.
- Steer
- Brake
- Accelerate
- shift the gears

5. Move the attachments smoothly.

6. Adjust the machine speed and the route in order to minimize the vibration level.
- Drive around obstacles and rough terrain.
- Slow down when it is necessary to go over rough terrain.

7. Minimize vibrations for a long work cycle or a long travel distance.
- Drive around obstacles and rough terrain.
- Use the ride control system on motor graders.
- If no ride control system is available, reduce speed in order to prevent bounce.
- Haul the machines between workplaces.

8. Less operator comfort may be caused by other risk factors. The following guidelines can be effective in order to provide better operator comfort:
- Adjust the seat and adjust the controls in order to achieve good posture.
- Adjust the mirrors in order to minimize twisted posture.
- Provide breaks in order to reduce long periods of sitting.
- Avoid jumping from the cab.
- Minimize repeated handling of loads and lifting of loads.
- Minimize any shocks and impact during sports and leisure activities.

Sources

The vibration information and the calculation procedure is based on “ISO/TR 25398 Mechanical Vibration - Guidelines for the assessment of exposure to whole body vibration of ride on operated earthmoving machines”. Harmonized data is measured by international institute, organizations and manufacturers.

This literature provides information about assessing the whole body vibration exposure of operators of earthmoving equipment. The method is based on measured vibration emission under real working conditions for all machines.

You should check the original directive. This document summarizes part of the content of the applicable law. This document is not meant to substitute the original sources. Other parts of these documents are based on information from the United Kingdom Health and Safety Executive.

Refer to Operation and Maintenance Manual. SEBU8257, “The European Union Physical Agents (Vibration) Directive 2002/44/EC” for more information about vibration.

Consult your local ACE dealer for more information about machine features that minimize vibration levels. Consult your local ACE dealer about safe machine operation.

Use the following web site in order to find your local dealer:
ACE, Inc.
www.ace-cranes.com

Operator Station

Any modifications to the inside of the operator station should not project into the operator space or into the space for the companion seat (if equipped). The addition of a radio, fire extinguisher and other equipment must be installed so that the defined operator space and the space for the companion seat (if equipped) is maintained. Any item that is brought into the cab should not project into the defined operator space or the space for the companion seat (if equipped). A lunch box or the loose items must be secured. Objects must not pose an impact hazard in rough terrain or in the event of a rollover.

Guards
(Operator Protection)

There are different types of guards that are used to protect the operator. The machine and the machine application determine the type of guard that should be used.

A daily inspection of the guards is required in order to check for structure that bent, cracked or loose. Never operate a machine with a damaged structure.

The operator becomes exposed to a hazardous situation if the machine is used improperly or if poor operating techniques are used. This situation can occur even though a machine is equipped with an appropriate protective guard. Follow the established operating procedures that are recommended for your machine.

Rollover Protective Structure (ROPS), Falling Object Protective Structure (FOPS) or Tip Over Protection Structure (TOPS)

The ROPS/FOPS structure (if equipped) on your machine is specifically designed, tested and certified for that machine. Any alternation or any modification to the ROPS/FOPS structure could weaken the structure. This place the operator into an unprotected that cause the machine to exceed the weight that is stamped on the certification plate also place the operator into an unprotected environment. Excessive weight may inhibit the brake performance , the steering performance and the ROPS. The protection that is

offered by the ROPS/FOPS structure will be impaired if the ROPS/FOPS structure has structure can be caused by an overturn, a falling object, a collision, etc.
Do not mount items (fire extinguishers, first aid kits, work light, etc) by welding brackets to the ROPS/FOPS structure or by drilling holes in the ROPS/FOPS structure. Welding brackets or drilling holes in the ROPS/FOPS structures can weaken the structures. Consult your ACE dealer for mounting guidelines.

The Tip Over Protection Structure (TOPS) is another type of guard that is used on mini hydraulic excavators. This structure protects the operator in the event of a tip over. The same guidelines for the inspection, the maintenance and modification of the ROPS/FOPS structure are required for te Tip Over Protection Structure.

Other Gaurds (If Equipped)

Protection from flying objects and falling objects is required for special application. Logging application and demolition applications are two examples that require special protection.

A front guard needs to be installed when a work tool that creates flying object in used. Mesh front guards that are approved by ACE or polycarbonate front guards that are approved by ACE are available for machines with a cab an open canopy. On machines that are equipped with cabs, the windows should also be closed. Safety glasses are recommended when flying hazards exist for machines with cabs and machines with open canopy.

If the work material extends above the cab, top guards and front guards should be used. Typical examples of this type of application are listed below :

- Demolition application
- Rock quarries

Additional guards may be required for specific applications or work tools. The Operation and Maintenance Manual for your machine or your work tool will provide specific requirements for the guards. Refer to Operation and Maintenance Manual, “Demolition” for additional information. Consult your ACE dealer for additional information.

Product Information Section

General Information

Specifications

This basic shipping specifications are listed in the following tables :

Table 2

AG 176 Motor Grader	
Engine	**Diesel Engine**
Transmission	**Six Forward Speeds** **Three Reverse Speeds**
Approximate operating weight	15,000 kg
Maximum length	9200mm
Width across front tires	2600mm
Height at top of ROPS	3500mm

This weight includes a full fuel tank, an operator, a ripper, a push plate and a 12feet blade.

Intended Use

This Motor Grader is an earthmoving machine as described in ISO 6165:2001 and the machine is classified as a grader. This machine is primarily used for grading, sloping, ditching and scarifying materials through a forward motion.

The maximum certified mass of this grader is 15000kg according to ISO 3471:2008. There are combinations of attachments that may be installed that would exceed that mass. Do not exceed the maximum certified mass.

Identification Information

Plate Locations and Film Location

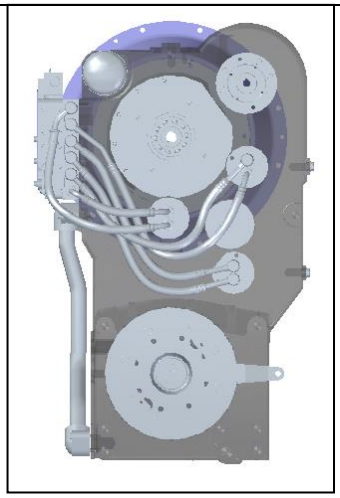
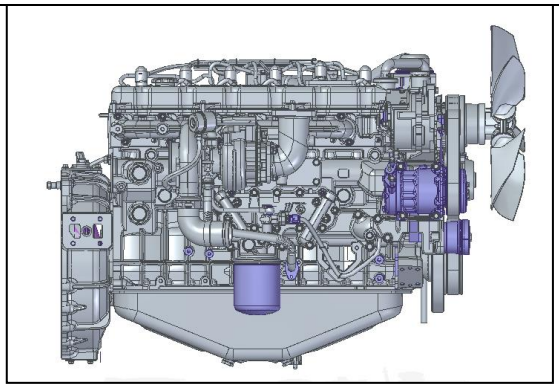
The product Identification Number (PIN) will be used to identify a powered machine that is designed for an operator to ride.

ACE products such as engines, transmissions and attachment that are not designed for an operator to ride are identified by Serial Numbers.

For quick reference record the identification numbers in the spaces thar are provided below the illustrations.

Model number ..... PIN ..... Engine model number ..... Engine serial number ..... Engine arrangement number ..... Transmission model number ..... Transmission serial number ..... Transmission arrangement number	

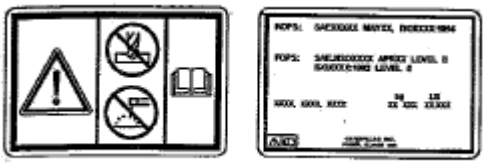
The Product Identification Number (PIN) is located on the left side of the front frame. This plate will have the following information :

Typical Example Shown Transmission serial number ..... Transmission arrangement number	
Serial number ..... Engine Model ..... Arrangement Number	

Certification

ROPS/FOPS structure

This message is positioned on the ROPS.



WARNING
Structure damage, an overturn, modification, alteration or improver repair can impair this structure's protection capability thereby voiding this certification. Do not weld on drill holes in the structure. This will void the certification. Consult your ACE dealer to determine this structure's limitations without voiding its certification.

This machine has been certified to the standards that are listed on the certification film. The maximum mass of the machine, which includes the operator and the attachments without a payload, should not exceed the mass on the certification film.
Refer to Operation and Maintenance Manual, "Guards (Operator Protection)" for more information.

Product Link

If equipped, this message is used to verify the certification of the Product Link as a RF transmitter. The following specifications are provided to aid n ensuring compliance with all local regulations:

Table 3

Operating frequency range	148 to 150 MHz
Transmitter power	5-10w

This message is located on the control group for the Product Link. The control group is located on the top of the cab.

Operation Section

(Before operation)

Mounting and Dismounting

Mount the machine and dismount the machine only at locations that have steps and

handholds. Before you mount the machine, clean the steps and handholds. Make all necessary repairs.

Face the machine whenever you get on the machine and whenever you get off the machine.

Maintain a three point contact with the steps and withe the handholds.

Note:- Three point contact can be two feet and one hand. Three point contact can also be one feet and two hands.

Do not mount a moving machine. Do not dismount a moving machine. Never jump off the machine. Do not carry tools or supplies when you try to mount the machine or when you try to dismount the machine. Use a hand line to pull equipment onto the platform. Do not use any control as handholds when you enter the operator compartment or when you exit the operator compartment.

Machine Access System Specification

The machine access system has been designed to meet the intent of the technical requirements in “ISO 2867 Earth-moving Machinery - Access Systems”. The access system provides for operator access to the operator station and to conduct the maintenance procedure described in maintenance section.

Alternate Exit

Machine that are equipped with cabs have alternate exits. For additional information, see Operation and Maintenance Manual, “Alternate Exit”.

Daily Inspection

For a maximum service life of the machine, complete a through walk-around inspection before you mount the machine and before you start the engine.

Inspect the area around the machine and under the machine. Look for loos bolt’s, trash buildup, oil, coolant leakage, broken parts and warm parts.
Note :- Watch closely for leaks. If you observe a leak, find the source of the leak and correct the leak. If you suspect a leak or you observe a leak, check the fluid levels more frequently.

Inspect the condition of the equipment and of the hydraulic components.

Check the condition of tires. Adjust the inflation pressure, if necessary.

Check all of the oil levels, all of the coolant levels and all of the fuel levels.

Remove any trash buildup and debris. Make all necessary repairs before you operate the machine.

Make sure that all covers and guards are securely attached.

Adjust the mirrors for the correct rear view of the machine.

Make sure that the engine air filter service indicator is not in the red Zone.

Grease all of the fittings that need to be serviced on a daily basis.

Remove frame lock pin (1) and store pin (1) in the storage bracket. Pin (1) must be removed in order to articulate the machine.

NOTICE

Do not operate the machine with the wheel lean bolt in the locked position. Machine damage may occur.
Daily, perform the procedures that are applicable to your machine :

- Operation and Maintenance Manual, “Air Tank Moisture and sediment - Drain”
- Operation and Maintenance Manual, “Backup Alarm - Test”
- Operation and Maintenance Manual, “Brakes, Indicators and Gauges - Test”
- Operation and Maintenance Manual, “Circle Drive Pinion teeth - Lubricate”
- Operation and Maintenance Manual, “Circle Top - Lubricate”
- Operation and Maintenance Manual, “Cooling System Level - Check”
- Operation and Maintenance Manual, “Engine Air Filter Indicator - Inspect”
- Operation and Maintenance Manual, “Engine Oil Level - Check”
- Operation and Maintenance Manual, “Fuel System Water Separator - Drain”
- Operation and Maintenance Manual, “Seat Belt - Inspect”
- Operation and Maintenance Manual, “Transmission and Differential oil Level - Check”

Steering Frame Lock

WARNING
No clearance for person in this area when machine turns. Severe injury or death from crushing could occur.

The steering frame lock prevents the machine from articulating.

Before you perform any of the following operations, insert steering frame lock (2) into storage bracket (1):

- Lift the machine
- Transport the machine
- Perform any work near the center of the machine

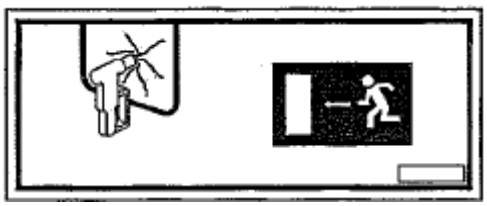
Secure the steering frame lock in the **locked** position with the locking pin.

Remove steering frame lock (2) before the machine is operated. Secure the steering frame lock in storage bracket (1) with the locking pin.

Machine Operation

Alternate Exit :-

The door on the left side of the machine is the primary exit. Use the door on the right side of the machine as an alternate exit.



If the machine is equipped with a snow wing, the door on the right side of the machine cannot be used as an alternate exit. Use the rear window as an alternate exit. If equipped, the hammer is located on the right side of the operator on the ROPS. Use the hammer in order to break the window. Push out the window and exit the cab.

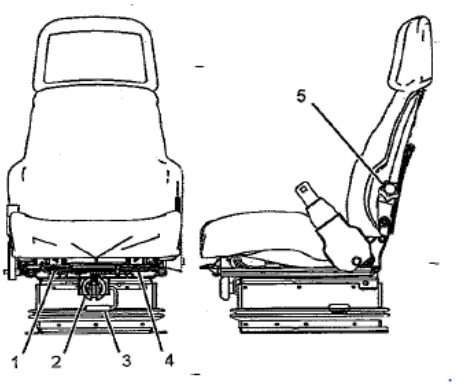
Seat :-

The operator's seat that is provided with this machine is in compliance with the appropriate class of "ISO7096".

Note :- Adjust the seat for another operator or at the beginning of each shift.

The operator should be seated against the seat backrest. Adjust the seat so that the operator is allowed full travel of the foot controls.

Mechanical Suspension



Backrest Adjustment Lever (1) - Push down on the lever for the seat backrest in order to adjust the angle of the seat backrest. Adjust the backrest to the desired position. Release the lever for the seat backrest in order to lock the seat backrest in order to lock the seat backrest in position.

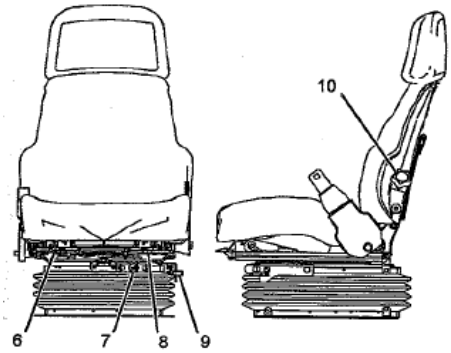
Weight Adjust Knob (2) - Use the handle on the knob in order to adjust the seat to the weight of the operator. Turn the handle clockwise in order to increase the height of the seat. Turn the handle counterclockwise in order to order to decrease the height of the seat.

Seat Height Lever (3) - Pull up the seat height lever in order to adjust the seat to the upward or adjust the seat downward. Adjust the seat height to the desired position. Release the seat height lever in order to lock the seat in position.

Fore/Aft Lever (4) - Pull up on the fore/aft lever in order to move the seat forward or backward. Adjust the seat to the desired position. Release the fore/aft lever in order to lock the seat in position.

Lumbar Support Knob (5) - The lumbar support knob is located on the left rear side of the seat. Turn the lumbar support knob counterclockwise in order to increase the stiffness of the lumbar support. Turn the lumbar support knob clockwise in order to decrease the stiffness of the lumbar support.

Air Suspension



Backrest adjust ever (6) - Pull up on the lever for the seat backrest in order to adjust the angle of the seat backrest. Adjust the seat backrest to the desired position. Release the lever for the seat seat backrest in order to lock the seat backrest in position.

Height Adjustment Knob (7) - To raise the seat, push in the knob. To lower the seat, pull out the knob.

Note:- Operator must not change the height of the suspension so that the stroke is inadequate for the particular application. The suspension height must be changed if the seat bottoms out excessively or if the seat bounces too much to the maximum height.

Fore/Lever (8) - Pull up on the fore/aft lever in order to move the seat forward or backward. Adjust the seat to the desired position. Release the fore/aft lever in order to lock the seat in position.

Lumbar Support Knob (10) - The lumbar support knob is located on the left rear side of the seat. Turn the lumbar support knob counterclockwise in order to increase the stiffness of the lumbar support. Turn the lumbar support knob clockwise in order to decrease the stiffness of the lumbar support.

Seat Belt

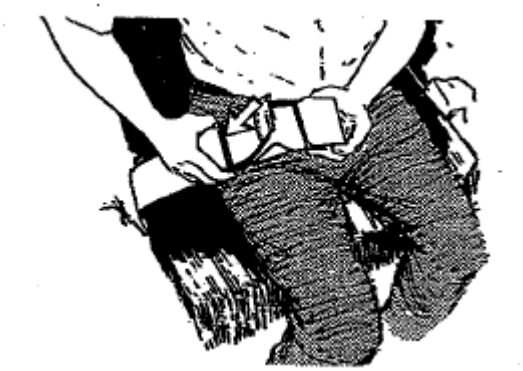
This machine was equipped with a seat belt. When the machine was shipped from ACE. At the time of installation, the seat belt and the instructions for installation of the seat belt meet the SAE J386 and ISO 6683 standard. Consult your ACE dealer for all replacement parts.

Always check the condition of the seat belt and the condition of the mounting hardware before you operate the machine.

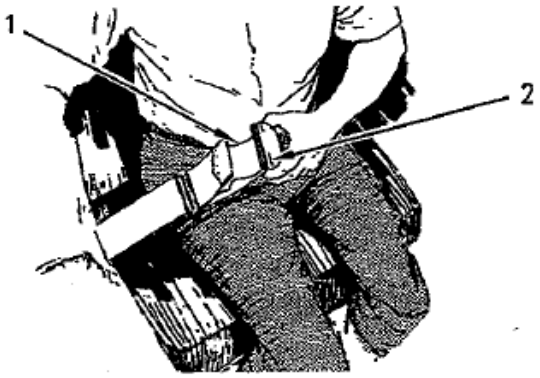
Seat Belt Adjustment for Non-Retractable Seat Belts

Adjust both ends of the seat belt. The seat belt should be snug but comfortable.

Lengthening the Seat Belt

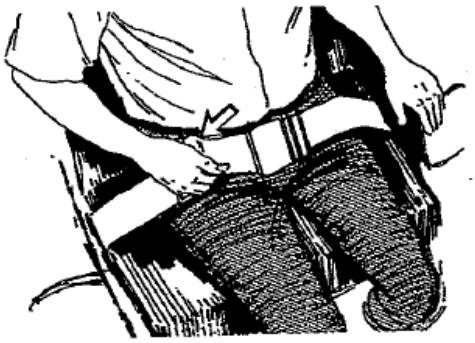


1. Unfasten the seat belt.



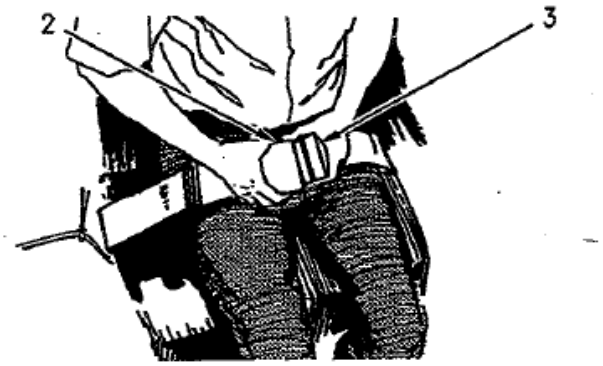
2. Remove the slack in outer belt (1), rotate buckle (2). This will free the lock bar. This permits the seat belt to move through the buckle.
3. Remove the slack from the outer belt loop by pulling on the buckle.
4. Loosen the other half of the seat belt in the same manner. If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Shortening the Seat Belt



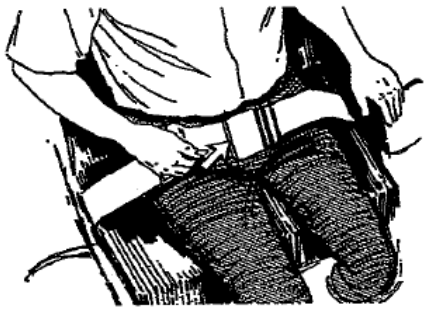
1) Fasten the seat belt. Pull out on the outer belt loop in order to tighten the seat belt.
2) Adjust the other half of the seat belt in the same manner.
3) If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Fastening the Seat Belt



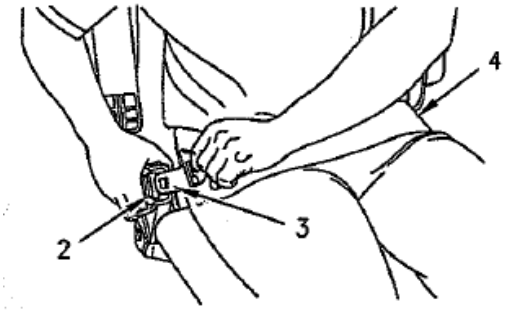
Fasten the seat belt catch (3) into the buckle (2). Make sure that the seat belt is placed low across the lap of the operator.

Releasing the Seat Belt



Pull up on the release lever. This will release the seat belt.

Seat Belt Adjustment for Retractable Seat Belts
(Fastening the Seat Belt)

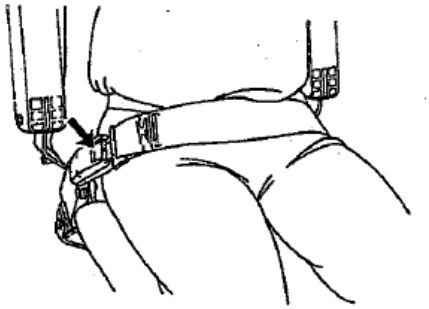


Pull seat belt (4) out of the retractor in a continuous motion.

Fasten seat belt catch (3) into buckle (2). Make sure that the seat belt is placed low across the lap of the operator.

The retractor will adjust the belt length and the retractor will lock in place. The comfort ride sleeve will allow the operator to have limited movement.

Releasing the Seat Belt



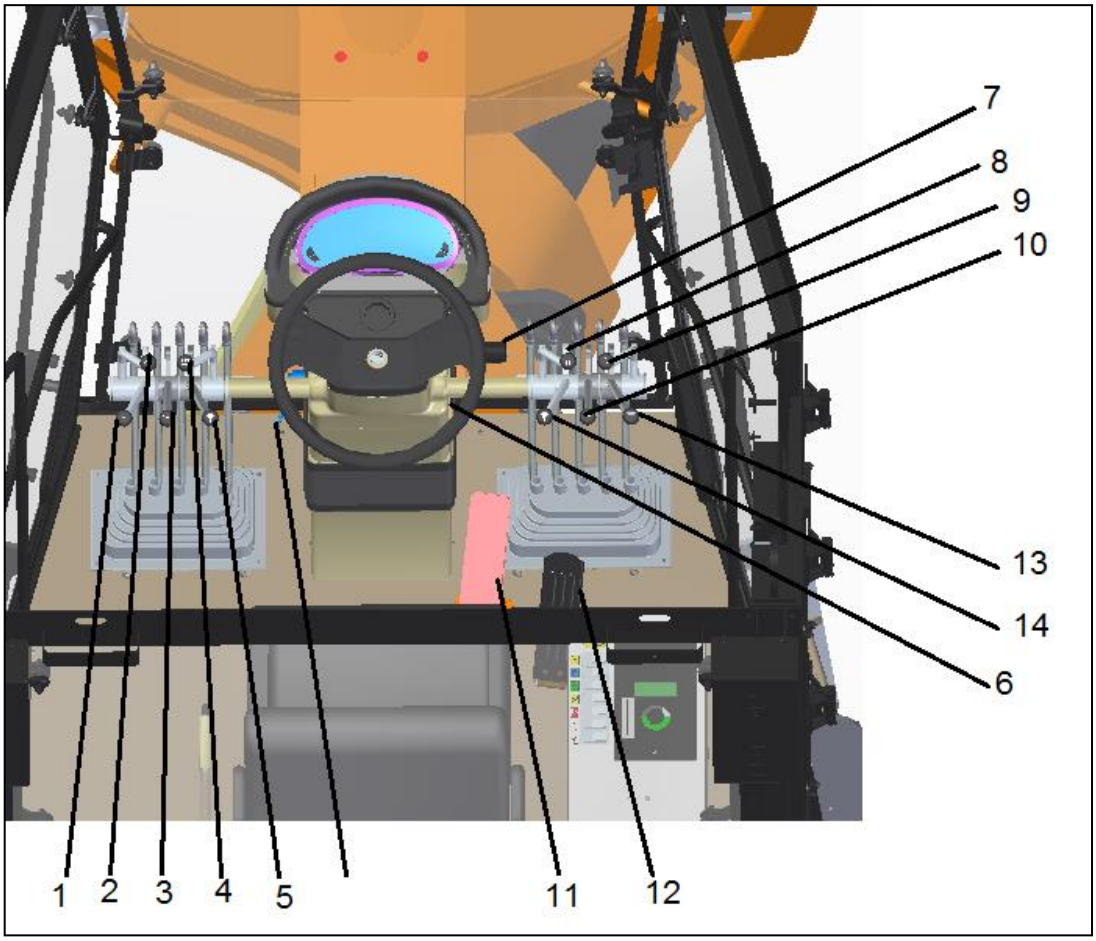
Push the release button on the buckle in order to release the seat belt. The seat belt will automatically retract into the retractor.

WARNING
When using retractable seat belts, do not use seat belt extensions, or personal injury or death can result. **The retractor system may or may not lock up depending on the length of the extension and the size of the person. If the retractor does not lock up, the seat belt will not retain the person.**

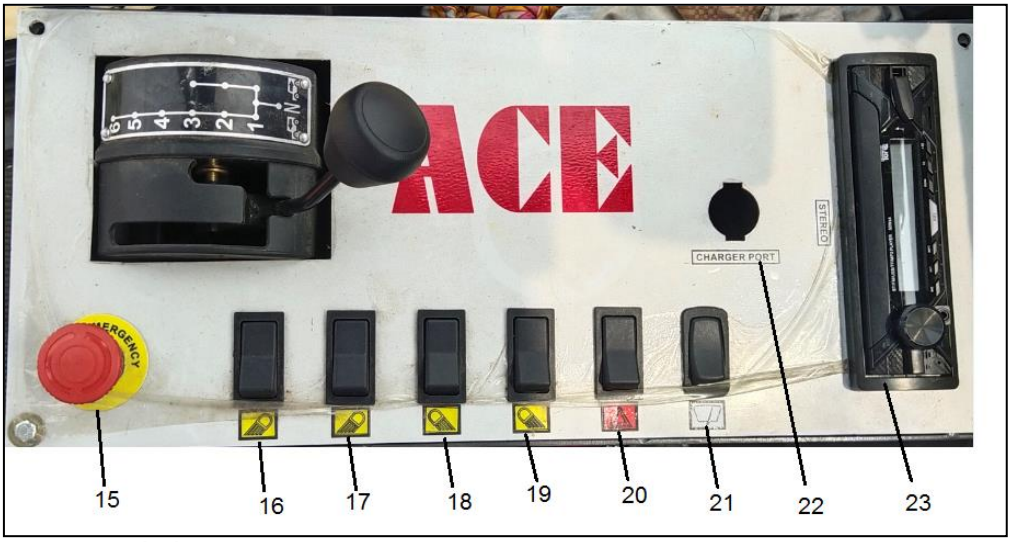
Longer, non-retractable seat belts and extensions for the non-retractable seat belts are available.
ACE requires only non-retractable seat belts to be used with a seat belt extension.
Consult with ACE dealer for longer seat belts and for information on extending the seat belts.

Operator's Controls

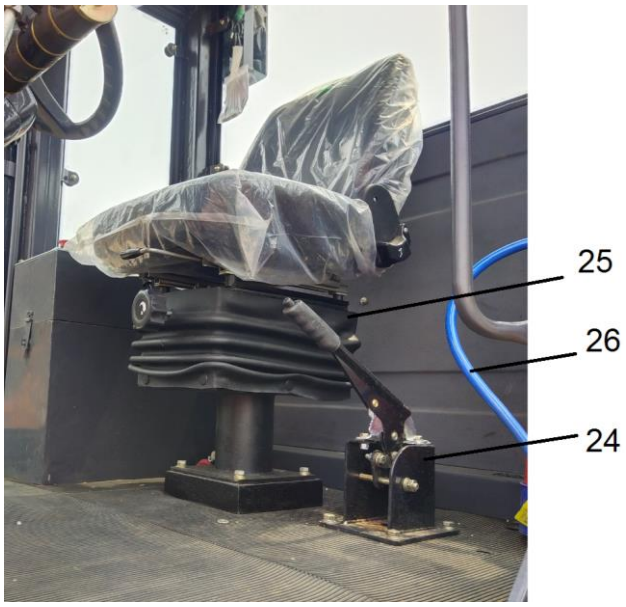
Note :- Your machine may not be equipped with all of the controls that are described in this topic.



1. Dozer angle cylinder control (if equipped)
2. Shovel Forking cylinder control
3. Blade side-shift lever
4. Axle inclining cylinder control
5. Moldboard circle shift cylinder control
6. Engine start switch
7. Combination switch
8. Articulation cylinder control
9. Blade lift cylinder control
10. Shovel rising cylinder control
11. Service brake control
12. Accelerator control
13. Ripper control (if equipped)
14. Circle movement right



15. Emergency switch
16. Head light front
17. Work light (Moldboard & cabin front)
18. Work light (Cabin rear)
19. Interior light switch
20. Hazard switch
21. Front window wiper and window washer
22. Cigar lighter
23. Sterio



24. Parking brake
25. Driver seat
26. Fire extinguisher

Engine start switch

When you turn engine start switch to the ON position, electrical power is supplied to the systems in the operator compartment.

 **OFF -** When you insert the engine start switch key and when you remove the engine start switch key, the engine start switch must be in the OFF position. To disconnect the power to the electrical circuits in the cab, turn the engine start switch to the OFF position. Also, turn he engine start switch to the OFF position in order to stop the engine.

 **ON -** To activate the electrical circuits in the cab, turn the engine start switch key clockwise to the ON position.

 **Start -** To start the engine, turn the engine start switch key clockwise to the START position. When the engine start switch key is released, the engine start switch key will return to the ON position.

Note :- If the engine fails to start, return the engine start switch key to the OFF position. This must be done before you attempt to start the engine again.

Auto-shift Control (If Equipped)

The auto-shift control (if equipped) is located in the operator compartment to the right of operator. The number of switches on your machine may vary. The auto-shift control will always occupy the position at the left of the operator's console.

 **Auto-shift Control -** Move the switch to the top position in order to turn ON the auto-shift transmission. Move the switch to the bottom position in order to turn OFF the auto-shift transmission.

Note:- In the event of this failure of a transmission solenoid, the machine is equipped with a limp home mode. The following procedure should be used in such a situation.

When one of the solenoids fails to operate properly, the machine can use the limp home mode. You can only use he gears that have solenoids that are operating properly. Shift the transmission control to the NEUTRAL position. NEXT, shift the transmission control forward position or REVERSE position. Not all speeds will operate.

Auto-shift Operation

Note :- The auto-shift function is an optional attachment on this machine.

ON Position

The lowest gear of the range can be configured to be any gear from second gear through fifth gear. The default lowest gear shall be fourth gear.

When auto-shift control is in the ON position and transmission control is any gear that is higher than the lowest gear that has been configured by the dealer, the machine will upshift automatically. The transmission will automatically upshift from the lowest configured gear through the gear that has been selected by the operator. Also, the transmission will automatically when auto-shift control is in the ON position. The transmission will not shift to a higher gear than the gear that is selected by transmission control.

Move auto-shift control to the ON position

Move transmission control to the desired top running gear. This gear must be above the configured lowest gear. The auto-shift alert indicator will turn on. The transmission will start in lowest configured gear. The upshift will be based upon engine RPM and machine ground speed. The transmission will downshift automatically to no lower than the lowest configured gear.

OVERRIDE Function

The auto-shift function will be override when transmission control is moved below the lowest configured gear. The auto-shift alert indicator will turn off when auto-shift control is in the ON position and transmission control is in any gear that is below the lowest configured gear.

The transmission will stay in the specified gear. The auto-shift function can be enabled again by moving transmission control to any gear above the lowest configured gear. The auto-shift alert indicator will turn on and the transmission will engage the auto-shift function.

OFF Position

The machine is controlled manually by the operator with auto-shift control in the OFF position. When auto-shift control is in the OFF position, the transmission shifts when transmission control is moved manually. The auto-shift alert indicator is off.

MANUAL Position

When auto-shift control is turned to the OFF position and transmission control is positioned higher than the current gear, the auto-shift alert indicator will blink. The auto-shift alert indicator will blink until transmission control is moved to the current operating gear. The auto-shift alert indicator will turn off. The transmission will stay in the gear specified by transmission control.

Power Port 12V (If Equipped)

A twelve volt power port is located to the left of the operator on the cup holder. This power port can be used to power automotive electrical equipment or accessories. Remove the cap before use.

Interior Dome Light

Push in the rear half of switch in order to turn on the interior dome light. Push in the front half of switch in order to turn off the interior dome light.

Directional Turn Signal and Hazard Flasher Control

LEFT - Pull down on control in order to activate the left turn signal. When control is pushed down, an indicator light will illuminate on the front dash. The left turn signal will remain on until control is manually returned to the OFF position.

OFF - Move control to the MIDDLE position in order to deactivate the turn signal. The directional signal lights will remain off.

RIGHT - Push up on control in order to activate the right turn signal. When control is pushed up, an indicator light will illuminate on the front dash. The right turn signal will remain on until control is manually returned to the OFF position.

Hazard - Pull out on control in order to activate the hazard lights. Push in on control in order to turn off the hazard lights.

Low Beam for the Work Light

Push in the top of switch in order to turn on the low beam of the work light. Push in the bottom of switch in order to turn off the low beam of the work light.

Panel Light, Tail Light and Running Lights

Push in top of switch in order to turn on the panel lights, tail lights and the running lights. Move switch to the MIDDLE position in order to turn off the panel lights, tail lights and running lights. Push in the bottom of switch in order to turn on the panel lights and the tail lights only.

Headlight Dimmer Switch

Push switch (11) downward in order to change the headlight beams to the high beam. Push switch (11) upward in order to change the headlight beams to the low beam.


Push in the top of switch in order to turn on the front floodlights. Push in the bottom of the switch to the MIDDLE position in order to turn off the front floodlights.

Front Floodlights and Rear Floodlights

Note - Before you turn on the front floodlights, you must turn on the panel lights, the tail lights and the running lights.


Push in the bottom of the switch in order to turn to turn on the front floodlights and the rear floodlights. Push in the top of the switch to the MIDDLE position in order to turn off the front floodlights and rear floodlights.

Differential Lock Control

Notice - To prevent damage to the differential, do not engage the differential lock control at high speeds.
Do not turn machine with differential lock engaged.

Do not engage the differential lock control while one wheel is spinning. Decrease engine RPM until the wheel stop spinning. Anticipate using the differential lock before wheel slippage occurs.
In areas of high resistance, it may be necessary to turn the machine slightly in order to aid in unlocking the differential lock. Decreasing the engine RPM may also be helpful.


Locked - push the bottom of switch (13) in order to lock the differential. When the differential is locked, an indicator light will illuminate on the front dash. The differential lock will help to prevent wheel slippage. Use the differential lock when you grade on soft ground or on wet ground. Engage the differential lock only when the wheels are not slipping.


Unlocked - Push the top of switch in order to unlock the differential.

Lock the differential in order to increase the traction, as required.

Make sure that differential is unlocked when you turn the machine or when you articulate the machine. Also, make sure that the differential is unlocked when you are roading the machine.
Note :- Use of the differential lock when turning, articulating or roading may cause drive train component damage.

When one of the tandem wheels encounters loose surfaces or slippery surfaces, the differential lock will provide maximum traction at all times by eliminating wheel spin. Any

excessive uncontrolled wheel spin can cause accelerated wear on certain components of the drive train. This is due to inadequate lubrication while the wheel is spinning.

Do not engage the differential lock control (13) while one wheel is spinning. Decrease engine RPM until the wheel stops spinning. Anticipate using the differential lock before wheel slippage occurs.

Transmission Control and Parking Brake Control

Lever controls both the transmissions and the parking brake.

Transmission Operation

The features and controls of the transmission are listed in table 5 below-

Table 5

Feature	Description
ET Auto Cal	Fill calibration available on all eight clutches. Smoother shifter and better power transfer.
Shift Torque Management	Features limits torque during a shift, increases torque after the shift. Ensure consistent power to the ground to minimize blade disruptions. Engine will lug back and shift harshness. Most noticeable on the double dutch shifts fourth to fifth forward and third to fourth reverse.
Load Compensation	Provides smooth shifts under light load conditions and under heavy loads or rapid acceleration shifting will be more aggressive to provide requested machine power.
Oil Temperature Compensation	Transmission actively monitors transmission oil temperature to compensate for transmission oil temperature performance
Neutral Coast Protection	Protects the transmission from potential damage caused the high speed coasting in neutral. Clutch eight is commanded to engage to prevent clutch damage and auto engagement. The operator may notice s jerking in first to fourth forward and first to third reverse if coasting in neutral.
Engine Over-speed Protection	Limits engine speed to allow downshift to occur. Result in lower engine speed needed to perform a downshift

Transmission Control

Note :- You must move lever from the PARKING BRAKE ENGAGED position before you can move lever (14) to the NEUTRAL position.

Forward - Move lever to the left and pull back the lever to the desired forward speed setting. The machine will move forward.

Neutral - Move lever to the NEUTRAL position when you are preparing to park the machine.

Reverse - Move lever to right and pull back lever to the desired speed. The machine will move in reverse.

Changing Direction and Speed

Note - To improve shift performance, all shifts above 4F and 3R should be performed at or above 1600RPM. Using the throttle hold mode feature will improve shift smoothness and will reduce shift variability.

1. Cycle all control for inspection of proper operating function.
2. Make sure that the accelerator control is in the LOW IDLE position.
3. Engage the transmission modulator control.
4. Raise all the equipment.
5. Engage the service brake.
6. Move transmission control (lever) to the position for the desired direction and for the desired speed.
7. Release the transmission modulator control.
8. Push down the accelerator control until the desired speed is attained.
9. Upshift one speed at a time. Increase engine speed, as required.

Notice :- To prevent possible damage to the machine. Reduce ground speed before downshift.

Note - Downshift speed protection is provided while you downshift, but the following steps are recommended:

10. Downshift one speed at a time. When you downshift a loaded machine, increase the engine RPM in order to match the engine speed to the lower transmission gear speed.
11. To change the machine's direction of travel, slow the machine by using the service brakes. Engage the transmission modulator control in order to stop the machine.

Then move transmission control lever to the position for the desired speed. After you select the desired direction and the desired speed, release the service brakes and the transmission modulator control (pedal).

Note :- In the event of the failure of a transmission solenoid or in the event of the failure of the position sensor, the machine is equipped with a limp hose mode. The following procedure should be used in such a situation.
If the position sensor fails, not all of the solenoid will operate properly. You can only use the gears that have solenoids that are operating properly. Shift the transmission control to the NEUTRAL position. Next, shift the transmission control into a FORWARD position or REVERSE position. Not all speeds will operate.

Parking Brake Control

WARNING
Personal injury could result from the sudden stop of the machine. **If the brake system air pressure drops below normal operating pressure, an action alarm will sound and the brake alert indicators on the operators panel will flash. The action light will start flashing. If the air pressure continues to drop further, the parking brake will engage automatically. Be prepared for a sudden stop.** **Correct the reason for the loss of air pressure. Do not move the machine without normal brake air pressure.**

Notice :- Do not engage the parking brake while the machine is moving unless the service brake fails. The use of the parking brake as a service brake in regular operation will cause severe damage to the parking brake.
Notice :- Moving the machine with the parking brake engaged can cause excessive wear of damage to the brake. If necessary, have the brake repaired before operating the machine.

Transmission control (lever) is located on the right side of the operator in the operator compartment.

The parking brake is controlled by lever. Engage the parking brake after the machine has stopped.

In order to engage the parking brake, push down on lever as you push lever forward into the PARKING BRAKE ENGAGED position. When lever is released, the parking brake will remain engaged.

In order to release the parking brake, push down on lever as you pull back on lever. Lever is no longer in the PARKING BRAKE ENGAGED position. When you release lever, the parking brake will remain disengaged.

Service Brake Control

Depress pedal in order to engage the service brake. Use the service brake in order to reduce ground speed. Use the service brake in order to stop the machine.

Release pedal in order to disengage the service brake.

Accelerator Control

Depress pedal in order to increase the engine speed. The engine will return to the setting of the throttle control when you release pedal. Release pedal in order to decrease the engine speed. The engine will return to the setting of the throttle control when you release pedal.


Set / ACCEL - When witch is not in off mode, push switch forward in order to set the engine speed. Push switch forward again in order to increase the engine speed by 100RPM. Push switch forward and hold down switch in order to increase the engine speed by 700RPM/Sec.


RESUME/DECELERATE - When switch is not in off mode, push switch backward in order to decrease the engine speed by 100RPM. Push switch backward and hold down switch in order to decrease the engine speed 700RPM/Sec. When switch is in auto mode, push switch backward in order to resume the preset engine speed.

Throttle Hold Mode Switch

This is a three-position switch. Switch allows the operator to set the mode for the throttle hold function. The following modes can be selected: automatic, off and manual.

A**utomatic Mode - Push switch forward in order to put the throttle control in automatic mode. When switch is in auto mode, the function of the throttle will be similar to a cruise control. Use the accelerator pedal in order to achieve the desired engine speed. Push switch in order to change the throttle setting.**

If either of the following conditions occur, the throttle setting of auto mode will be suspended and the engine speed will adjust to the setting of the accelerator pedal:

- The accelerator pedal is moved more than 20%.
- The service brake is applied.

Push switch backward in order to resume the preset engine speed.

The RESUME feature will be disabled if any of the following conditions occur:

- Switch is moved to OFF position.
- Switch is moved to MANUAL mode.
- The key switch is moved to the OFF position.
- The engine is stalled.

The indicator light for the throttle lock will be illuminated when the throttle setting is locked during auto mode.

Manual Mode - Push switch backward in order to put the throttle control in manual mode. Use the accelerator pedal in order to achieve the desired engine speed. Push switch forward in order to change the throttle at the current engine speed. Use switch in order to change the throttle setting.

The engine speed will increase if the accelerator pedal is pressed past the throttle setting. When the accelerator pedal is released, the engine will return to the preset engine speed. The following conditions will not cause the throttle lock to disengage:

- The service brake is applied.
- The accelerator pedal is moved.

The throttle lock will be disengaged if either of the following conditions occur:

- Switch is moved to the OFF position.
- The key switch is moved to OFF position.

The RESUME feature will not be available after the throttle lock is disengaged.

The indicator light for the throttle lock will be illuminated when the throttle is locked during MANUAL mode.

OFF Mode- push switch into the center position in order to put the throttle control in off mode. When switch is in the OFF position, auto mode and manual mode will not work. The throttle will only be operate by the accelerator pedal in OFF mode.

Center-shift Lock Control

Center-shift lock Control - Move switch to the bottom position in order to engage the center-shift lock, push the locking tab and move switch to the top position.

WARNING
Personal injury could result from the sudden movement of the blade when the center-shift lock pin is released. **Before releasing the center-shift lock pin be sure that all personnel are clear of the blade area, the circle and blade centered under the machine and the blade has been lowered to the ground.**

1. Use center-shift control lever in order to shift the drawbar. Move the drawbar toward the area that will be graded. Place both lift levers in FLOAT position in order to ground the moldboard.

2. Move switch to the disengage position. When switch is in the DISENGAGE position, an indicator light will illuminate on the front dash.

3. If you want to move the link bar to the first hole to either side of center or the second hole to either side of center, proceed to step 3.a. If you want to move or to the farthest hole to either side of center, proceed to Step 3.c.

a) Make sure that the blade lift levers are still in the FLOAT positon. Move center-shift control lever in the opposite direction that moved the lever in order to position the drawbar in Step 1. The center-shift cylinder moves. This allows the linkage to roll freely. Also, the link bar will move sideways.
b) Continue with Step 4.
c) Move the blade lift levers out of FLOAT position.
d) Simultaneously, move center-shift control lever forward and move the right blade lift lever forward. At the same time, pull back on the right blade lift lever .

4. Line up the center-shift lock pin with the desired hole in the link bar. Use the indicator that is on the right lift arm to check the engaged.

5. Move switch to the ENGAGED position. The indicator light for the center-shift lock will turn off when the center-shift lock pin is engaged.

Note :- If the indicator light for the center-shift lock does not turn off, slightly move the link bar for the center-shift in order to align the hole with the center-shift lock pin.

6. Side-shift the link bar toward the area that will be cut. Use the blade lift cylinders in order to adjust the angle of the slope that will be cut.

Center-shift control


C**enter-shift RIGHT -** To move the drawbar to the right, pull back on lever. When you release lever, the lever will return to the HOLD position. The drawbar will remain in the selected position.

Hold - Lever will return to the HOLD position when you release lever. The drawbar will remain in the selected position.

Center-shift LEFT - To move the drawbar to the left, push lever forward. When you release lever, the lever will return to the HOLD position. The drawbar will remain in the selected position.

Articulation Control


Articulation RIGHT :- To move the rear of the machine to the right, pull back on lever. When you release lever, the lever will return to the HOLD position. The machine will remain in the selected position.

HOLD - Lever will return to the HOLD position when you release the lever. The machine will remain in the selected position.

Articulation LEFT - To move the rear of the machine to the left, push lever forward. When you release lever, the lever will return to the HOLD position. The machine will remain in the selected position.

Snow Plow/Dozer Lift Control (If Equipped)


Lower - Push lever forward in order to lower the snow plow/dozer blade. When you release lever, the blade will remain in the selected position.
HOLD - Lever will return to the HOLD position when the lever is released. The blade will remain in the selected position.
RAISE - Pull back on lever in order to raise the snow plow/dozer blade. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.
FLOAT - Push lever to the most forward detent position. When you release lever, the lever will remain in the FLOAT position.

Note - Extra effort may be necessary to push the lever forward into the FLOAT (detent) position.

Note - When lever is in the FLOAT position and the engine is turned off, the lever will not return to the HOLD position. Before starting the engine, return lever to the HOLD position.

Dozer Angle Control (If Equipped)

 **RIGHT - Pull back on lever in order to angle the dozer blade to right. When you release lever, the lever will return to HOLD position. The dozer blade will remain in the selected position.**

HOLD - Lever will return to the HOLD position. when the lever is released. The dozer blade will remain in the selected position.

LEFT - Push lever forward in order to angle the dozer blade to the left. When you release lever, the lever will return to the HOLD position. The dozer blade will remain in the selected position.

Blade Lift Control for the Right Side

 **Blade LIFT -** Pull back on lever in order to raise the right end of the blade. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

HOLD - When the lever is released from the LOWER position or the LIFT position. The lever will return to the HOLD position. The blade will remain in the selected position.

Blade LOWER - Push the lever forward in order to lower the right end of the blade. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

Blade FLOAT for the Right Side - Push the lever to most forward detent position. When you release lever, the lever will remain in the FLOAT position.

Note : Extra effort may be necessary to push the lever forward into the FLOAT (detent) position.

Note :- When the lever is in the FLOAT position and the engine is turned off, the lever will not return to the HOLD position. Before you start the engine, return the lever to the HOLD position.

Wheel Lean Control

 **Wheel Lean RIGHT -** To lean the wheels to the right, pull back on lever (25). When you release the lever, the lever will return to the HOLD position. The wheels will remain in the selected position.

HOLD - Lever will return to the HOLD position when you release the lever. The wheels will remain in the selected position.,
Wheel Lean LEFT - To lean the wheels to the left, push lever forward. When you release

lever, the lever will return to the HOLD position. The wheels will remain in the selected position.

Transmission Modular Control

Note :- Using the transmission modular control will allow smooth engagement when selecting initial gear or during direction shifts. The transmission modular control can also be used during high controllability and commensurability situations. The transmission modular control can also be used to disengage power to the wheels. **The transmission modular control should not be used to make sequential upshifts or downshifts.**

Pedal disengage the power to the wheels.

Depress pedal in order to decrease the power to the wheels. A sensor will monitor the position of pedal. As pedal is depressed, the hydraulic pressure to the direction clutches will vary. When pedal is depressed completely, the power to the rear wheels will be disengaged.

Depressed pedal completely when ou start the machine and when you stop the machine. Also, depress pedal completely when you change the direction of the machine.

Release the pedal in order to engage the power to rear wheels again.

Use pedal in order to inch the machine.

Blade Side-shift Lever

 **Blade Side-shift RIGHT -** Pull back on lever in order to side-shift the blade to the right. When you release lever the lever will return to the HOLD position. The blade will remain in the selected position.

HOLD - Lever will return to the HOLD position whenever lever is released. The blade will remain in the selected position.

Blade Side-shift LEFT - Push the lever forward in order to side-shift the blade to the left. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

Blade Lift Control for The Left Side

 **Blade LIFT -** Pull back on lever in order to raise the left and of the blade. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

HOLD - When lever is released from the LOWER position of from the LIFT position,

lever will return to the HOLD position. The blade will remain in the selected position.

Blade LOWER - Push lever forward in order to lower the left of the blade. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

Blade FLOAT - Push lever to the most forward detent position. When you release lever, the lever will remain in the FLOAT position.

Note : Extra effort may be necessary to push lever forward into the FLOAT (detent) position.

Note :- When lever is in the FLOAT position and the engine is turned off, the lever will not return to the HOLD position. Before you start the engine, return lever to the HOLD position.

Snow Wing Lift Control, If Equipped

Note : Since the machine has several different options for the linkage, the location of the control may be different on your machine.

RAISE - To raise the snow wing, pull back on lever. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

HOLD - Lever will return to the HOLD position. When you release the lever. The blade will remain in the selected position.

LOWER - To lower the snow wing, push lever forward. When you release the lever. the lever will return to the HOLD position. The blade will remain in the selected position.

Snow Wing Tilt Control, If Equipped

Note :- Since the machine has several different options for linkage, the location of the control may be different on your machine.

RAISE - To tilt the snow wing upward, pullback on lever, when you release lever, the lever will return to HOLD position. The blade will remain in the selected position.

HOLD - Lever will return to the HOLD position. When you release the lever. The blade will remain in the selected position.

LOWER - To tilt the snow wing downward, push lever forward. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

Ripper/Scarifier Level (31) (If Equipped)

 **Ripper/Scarifier RAISE -** Move lever backward in order to raise the ripper/scarifier. When you release lever, the lever will return to the HOLD position. The ripper/scarifier will remain in the selected position.

HOLD - Lever will return to the HOLD position. When you release the lever. The ripper/scarifier will remain in the selected position.

Ripper/Scarifier LOWER - To lower ripper/scarifier, push lever forward. When you release lever, the lever will return to the HOLD position. The ripper/scarifier will remain in the selected position.

Blade Tip Control Lever

 **Blade Tip FORWARD -** Push lever forward. The top of the blade will tip forward. Lever will return to the HOLD position. When you release the lever. The lever blade will remain in the selected position.

HOLD - Lever will return to the HOLD position, when you release the lever. The blade will remain in the selected position.

Blade Tip BACK - Pull lever backward. The top of the blade will tip backward. Lever will return to the HOLD position, when you release the lever. The blade will remain in the selected position.

Blade Circle Drive Lever

 **Circle Drive Clockwise -** To rotate the blade in a clockwise direction, pull back on lever . When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

Hold-When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

Circle Drive COUNTERCLOCKWISE - To rotate the blade in a counterclockwise direction, push lever forward. When you release lever, the lever will return to the HOLD position. The blade will remain in the selected position.

Window Wiper/Washer Switch (If Equipped)

Front Window Wiper and Window Washer - Turn knob clockwise in order to turn on the window wiper. Turn knob counterclockwise in order to turn off the window wiper. Depress knob in order to activate the window washer. Spring force will return the knob when the knob is released.

Lower Front Window Wiper and Window Washer - Turn knob clockwise in order to activate the window wiper. Turn knob counterclockwise in order to turn off the window wiper. Depress knob in order to activate the window washer. Spring force will return the knob when the knob is released.

Rear Window Wiper and Window Washer - Turn knob clockwise in order to turn on the window wiper. Turn knob counterclockwise in order to turn off the window wiper. Depress knob in order to activate the window washer. Spring force will return the knob when the knob is released.

Moldboard Lights (If Equipped)

Moldboard Lights - Push in the top of switch in order to turn on the moldboard lights. Push in the bottom of switch in order to turn off the moldboard lights.

Heated Mirror Switch (If Equipped)

Heated Mirror Switch - Push in the top of switch in order to turn on the heated mirrors. The heated mirrors will be operational when the sky switch is in the ON position. Push in the bottom of switch in order to turn off the heated mirrors.

Snow Wings Light (If Equipped)

Snow Wing Light - Push in the top of switch in order to turn on the snow wing lights. Push in the bottom of switch in order to turn off the snow wing lights.

Auxiliary Backup Lights (If Equipped)

Auxiliary Backup Lights - Push in the top of switch in order to turn on the auxiliary backup lights in manual mode. The auxiliary backup lights will remain on at all times when the switch is in manual mode. Push in the bottom of switch in order to turn on the auxiliary backup lights in auto mode. The auxiliary backup lights will come on when the transmission control is moved to any reverse position. Move switch to the MIDDLE position in order to turn off the auxiliary backup lights.

Defroster Fan Control (If Equipped)

The defroster fan controls are three position switches.

Front Defroster Fan - Move switch to the center position in order to operate the defroster at low fan speed. Push in the top of switch in order to operate the defroster at high fan speed. The bottom position of switch is the OFF position.

Rear Defroster Fan - Move switch to the center position in order to operate the defroster at low fan speed. Push in the top of switch in order to operate the defroster at high fan speed. The bottom position of switch is the OFF position.

Warning Beacon (If Equipped)

Warning Beacon - Push in the top of switch in order to turn on the rotation beacon. Push in the bottom of switch in order to turn off the rotation beacon.

Steering Column Tilt Control

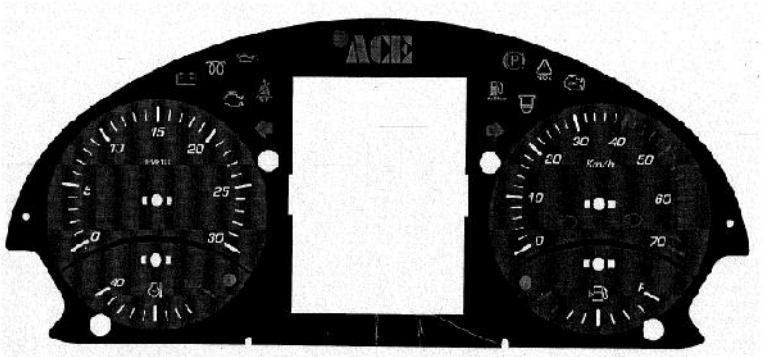
Push down on steering column tilt control lever in order to adjust the angle of the steering column. Pull the steering column toward you or push the steering column away from you. The steering column will remain in the desired position when you release lever.

Steering Wheel Tilt Control

Push down on tilt control in order to adjust the angle of the steering wheel. Move the steering wheel to the desired position. Release tilt control. The steering wheel will remain in the desired position.

Panel Dimmer Switch (If Equipped)

Panel Dimmer Switch - Push the bottom of switch in order to change the instrument panel lights to the low setting. Push the top of switch in order to change the instrument panel lights to the high setting.

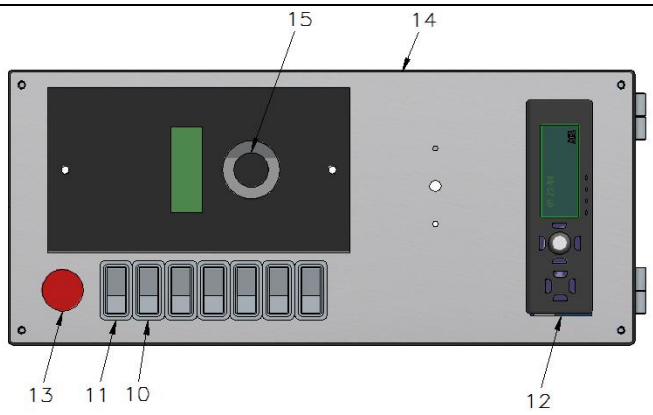
FRONT DASHBOARD	
CLUSTER 1. TEMP. OF ENGINE 2. RPM 3. DISPLAY 4. FUEL 5. SPEED	 
COMBINATION SWITCH	

L	LEFT TURN INDICATOR	SW4	HEAD LIGHT SWITCH
N	NEUTRAL POSITION	SW5	HORN SWITCH
R	RIGHT TURN INDICATOR	0	LIGHT OFF SWITCH
SW1	TURN SIGNAL SWITCH	P	PARKING
SW2	HEAD LIGHT, HI/LOW BEAM SWITCH		HEAD LIGHT SWITCH
SW3	PARKING SWITCH		

The monitoring system is designed to alert the operator of a problem in one or ore of the machine systems that are covered. The action lamp and individual alert indicators will light when a problem occurs.

SIDE DASHBOARD

10. SWITCH ON -OFF, 2P 20AMP
11. SWITCH ON -OFF, 3P 20AMP
12. FM WITH ANTEENA
13. CONTROL SAFETY (HWT)
14. CONTROL BOX
15. GEAR SELECTOR UNIT



Product Link

Note - Your machine may be equipped with the ACE Product Link system.

The ACE Product Link communication device utilize cellular and satellite technology to communicate equipment information. This information is communicated to ACE dealers and customers. The ACE Product Link communication device contain Global Positioning System (GPS) satellite receivers.

The capability of two way communication between the equipment and a remote user is available with the ACE Product Link communication device. The remote user can be a dealer or a customer.

Data Broadcasts

Data concerning this machine, the condition of the machine and the operation of the machine is being transmitted by Product Link to ACE and ACE dealers. The data used to serve the customer better and to improve upon ACE products and service. This information transmitted may include: machine serial number, machine location, operational data, including but not limited to : fault codes, emission data, fuel usage, service meter hours, software and hardware version numbers and installed attachments.

ACE and ACE dealers may use this information for various purposes. Refer to the following list for possible uses:

- Providing service to the customers and the machine
- Checking or maintaining Product Link equipment
- Monitoring the health of the machine or performance
- Helping maintain the machine and improve the efficiency of the machine
- Evaluating or improving ACE Products and services
- Complying with legal requirements and valid court orders
- Performing market research
- Offering the customer new products and services

ACE may share some or all of the collected information with ACE affiliated companies, dealers and authorized representatives. ACE will not sell or rent collected information to any other third party and will exercise reasonable efforts to keep the information secure. ACE recognizes and respects customer privacy. For more information, please contact your local ACE dealer.

Operation in a Blast Site for product Link Radios

WARNING
This equipment is equipped with a ACE Product Link communication device. When electric detonators are being used for blasting operations, radio frequency devices can cause interference with electric detonators for blasting operations which can result in serious injury or death. The Product Link communication device should be deactivated within the distance mandated under all applicable national or local regulatory requirements. In the absence of any regulatory requirements ACE recommended the end user perform their own risk assessment to determine safe operating distance.

Note - If using the previous version of Product Link radios (PL121SR, 522, 523, 420 or 421) refer to blast site requirements as stated in Operation and Maintenance Manual, SEBU8142, “Product Link - 121SR/321SR/420/421/522/523”.

- 12m (40ft) for Product Link 121SR and 321SR

- 3m (10ft) for Product Link 522/523

If required, the following are suggested methods to disable the ACE Product Link communication device :

- Turn the Product Link radio disable switch to the OFF position.
- Disconnect the ACE Product Link communication device from the main power source. This action is performed by disconnecting the wiring harness a the Product Link radio.

Note : If no radio disable switch is installed and the equipment will be operating near a blast zone, a Product Link radio disable switch may be installed on the equipment. The switch will allow the ACE Product Link communication device to be shut off by the operator from the equipment control panel. Refer to special instruction, REHS7339, Special Instruction, REHS2365, Special Instruction, REHS2368, Special Instruction, REHS5595, Special Instruction, REHS5596, Special Instruction, REHS8850 and Special Instruction, REHS9111 for more details and installation instruction.

Note : For Product Link devices with an internal battery backup without a radio disable feature including the PL420 system: Do not operate an asset with this type of device within a blast site. Do not operate within mandated or recommended distance from a blast site perimeter.

The following ACE Product Link communication device specifications are provided in order to aid in conducting any related hazard assessment and to ensure compliance with all local regulations :

Table 6

Radio Transmitter Specifications		
Radio Model (Maximum)	**Transmitter Frequency Range**	**Transmitter Power**
PL121SR	148MHz - 150MHz	5-10W
PL522/523	824MHz - 849MHz	1W
	880MHz - 915MHz	
	1710MHz - 1785MHz	
	1850MHz - 1910MHz	
PL420/421	850MHz - 900MHz	2W for lower frequency and 1W for frequency
	1800MHz - 1900MHz	
PL640 G0100	824MHz - 849MHz	0.5W typical, 2W max.
	880MHz - 915MHz	
	1710MHz - 1755MHz	
	1850MHz - 1910MHz	
	1920MHz - 1980MHz	
PL641	824MHz - 849MHz	0.5W typical, 2W max.
	880MHz - 915MHz	
	1710MHz - 1755MHz	
	1850MHz - 1910MHz	
	1920MHz - 1980MHz	

PL631	1616MHz - 1626.5MHz	5.1W max.
PL240	824MHz - 849MHz	0.5W typical, 2W max.
	880MHz - 915MHz	
	1710MHz - 1755MHz	
	1850MHz - 1910MHz	
	1920MHz - 1980MHz	
PL241	824MHz - 849MHz	0.5W typical, 2W max.
	880MHz - 915MHz	
	1710MHz - 1755MHz	
	1850MHz - 1910MHz	
	1920MHz - 1980MHz	

Engine Starting

WARNING
Diesel engine exhaust contains products of combustion which may be harmful to your health. **Always start and operate the engine in a well-Ven-dilated area and, if in an enclosed area, vent the exhaust to the outside.**
Notice - Do not crank the engine for more than 30 seconds. Allow the starting motor to cool for two minutes before cranking again.

- Adjust the operator seat
- Fasten the seat belt
- Before you start the engine, check for the presence of bystanders or maintenance personnel. Ensure that all personnel are clear of the machine. Briefly sound the forward horn before you start the engine.
- Place the transmission control switch in NEUTRAL.
- Engage the parking brake.
- Turn the engine start switch key in order to start the engine.
- Release the engine start switch key when the engine starts.

Notice : Do not crank the engine for more than 30 seconds. Allow the starting motor to cool for two minuets before cranking again.

When the temperature is below -18°C, the use of optional cold weather starting aids is recommended. A coolant heater, a fuel heater, a jacket water heater or extra battery capacity may be required.
Before you operate the machine in temperatures below -23°C, consult you ACE dealer or refer to Special Publication, SEBU5898, “Cold Weather Recommendations for all ACE Machines.

Engine and Machine Warm-Up

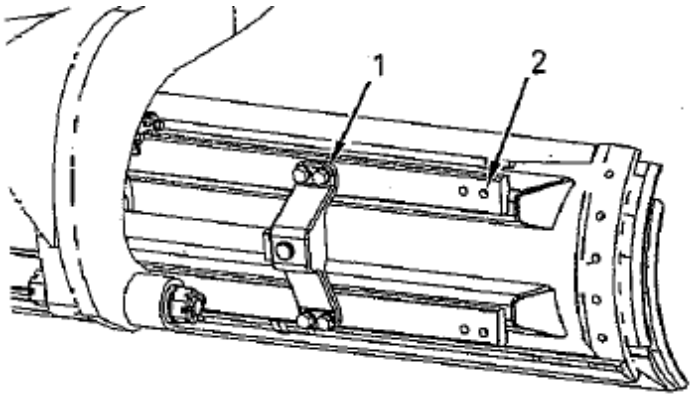
Notice : Keep engine speed low until the engine oil pressure registers on the gauge or the engine oil pressure indicator light goes out. If it does not register or the light does not go out within ten seconds, stop the engine and investigate the cause before starting again. Failure to do so, can cause engine damage.

1. When the engine is cold, operate the engine at low idle for at least five minutes. Cycle all controls in order to allow warm oil to circulate through all hydraulic cylinder and through all hydraulic lines. Idle the engine. If the hydraulic functions are sluggish additional time may be required for warm-up.
2. Release the brake. Move the equipment forward and backward for several meters. Exercise the machine for several minutes. In order to reduce the total warm-up time, start exercising the entire machine before you complete the hydraulic warm-up time.
3. Operate under a light load until the systems reach normal operating temperatures.
4. During machine operation, frequently look at the alert indicators and the gauges.

Adjustments

Moldboard Blade Adjust to the Right

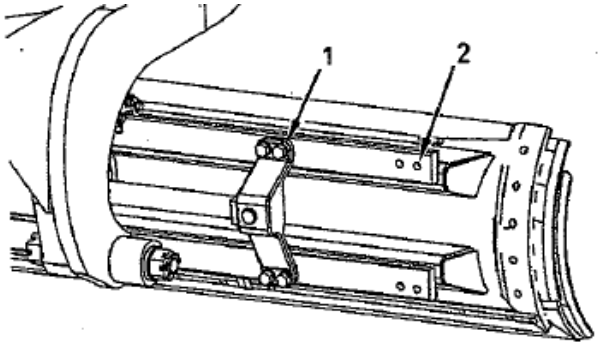
1. Side-shift the blade to the right
2. Lower the blade to the ground



3. Loosen the bolts that secure the cylinder rod and bracket to the moldboard at location (2). Remove the four bolts and lock-washers.
4. Retract the cylinder rod to location (1).
5. Align the bolt holes that are in the bracket with the alternate holes that are in the moldboard at location (1).
6. Install the four lock-washers. Install the four bolts and tighten the bolts.

Moldboard Blade Adjust to the Left

1. Side-shift the blade to the left
2. Lower the blade to the ground.



3. Loosen the bolts that secure the cylinder rod end bracket to the moldboard at location (1). Remove the four bolts and lock-washers.
4. Extend the cylinder rod.
5. Align the bolt holes that are in the bracket with the alternate holes that are in the moldboard at location (2).
6. Install the four lock-washers. Install the four bolts and tighten the bolts.

Parking

Stopping the Machine

Park on a level surface. If it necessary to park on a grade, chock the wheels securely.

1. Pull the throttle control lever backward in order to decrease the engine speed.
2. Apply the service brakes in order to slow the machine. Apply the transmission modulator control in order to stop the machine.
3. Move the transmission control lever to the NEURAL position.
4. Engage the parking brake.
5. Lower the attachments to the ground. Apply a slight downward pressure.

Stopping the Engine

Notice :- Stopping the engine immediately after it has been working under load, can result in overheating and accelerated wear of the engine components.

Refer to following procedure, to allow the engine to cool, and to prevent excessive temperatures in the turbocharger housing (if equipped) which could cause oil coking problems.

1. Stop the machine and run the engine at low idle for five minutes.
2. Turn the engine start switch to the OFF position and remove the engine start switch key.

3. Move all hydraulic control levers back and forth in order to relieve hydraulic pressure. Return the hydraulic control levers to the HOLD position.

Stopping the Engine if an Electrical Malfunction Occurs

Turn the engine start switch to the OFF position. Remove the key.

If the engine does of stop, lift the guard of engine shutdown switch (1). Move the engine shutdown switch to the STOP position.

Do not operate the machine again until the malfunction has been corrected.

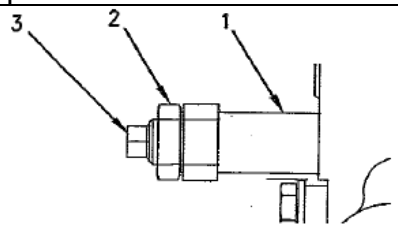
Equipment Lowering with Engine Stopped

WARNING
Be sure all personnel are clear of the equipment while the equipment is being lowered. **Failure to stay clear of the equipment while the equipment is being lowered may result in personnel injury.**

Note : If the engine is inoperable and if any of the equipment has not been lowered to the ground, use one of the following methods to lower the equipment to the ground.

Machine that are not Equipped with Lowering Valves

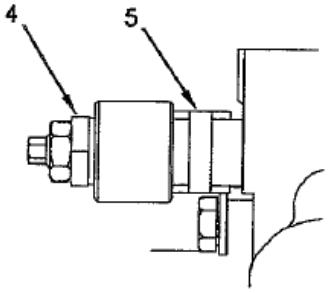
The relief valves are located under the cab on the implement control valves.

Hold relief valve (1) and loosen locknut (2). Slowly turn hex cap (3) counterclockwise until the equipment is lowered to the ground. **Note:** Do not allow the equipment to lower too quickly.	

After the equipment has been lowered to the ground, remove the cartridge assembly for the relief valve. Replace the cartridge assembly for adjust the relief valve setting. Refer to Testing and Adjustment, “Relief Valve (Implement) - Test and Adjust”.

Machines that are Equipped with Lowering Valves

The lowering valves are located under the cab on the implement control valves.



1. Hold relief valve (5) for the circuit of the equipment that needs to be lowered. Turn cap (4) on the implement control valves.

Note : Do not allow the equipment to be lowered to the ground too quickly.

Note : Do not remove the cap from the relief valve.

2. When the equipment is on the ground, hold relief valve (5). Turn cap (4) clockwise to a torque of 35+/- 3Nm.

Leaving the Machine

1. Use the steps and the handholds when you dismount. When you dismount, face the machine and use both hands.
2. Inspect the engine compartment for debris. Clean out any debris in order to avoid a fire hazard.
3. Remove all flammable debris from the bottom guard through the access doors in order to reduce a fire hazard. Discard the debris properly.
4. Turn the key for the battery disconnect switch to the OFF position. When the machine is not being operated, you should remove the key. This will help to prevent a battery short circuit. Removing the key will also help to protect the battery from vandalism and from the current draw that is made by certain components.
5. Lock all vandalism covers and all compartments.

Transportation Information

Shipping the Machine

Investing the travel route for overpass clearances. Make sure that there is adequate clearance for the machine that is being transported. This is especially important for machines that are equipped with a ROPS, with a FOPS, with a cab or with a canopy.

Remove ice, snow or other slippery material from the loading dock and from the truck bed before you load the machine onto the transport machine. Removing ice, snow, or other slippery material will help to prevent the machine from slipping in transit.

Note : Obey all laws that govern the characteristics of a load (height, weight, width and length). Observe all regulations that govern wide loads.

Remove the either starting aid cylinder, if equipped.

When you move the machine to a colder climate, make sure that the cooling system has the proper antifreeze.

1. Before you load the machine, chock the trailer wheels or the rail car wheels.
2. When the machine is positioned, connect the frame lock link. This will hold the front frame and the rear frame rigid. Also, connect the wheel lean lock. This will hold the front wheels in the upright position.
3. Lower all attachments to the floor of the transport machine. Move the transmission control lever to the PARKING BRAKE ENGAGED position.

4. Stop the engine.
5. Turn the start switch to the OFF position. Remove the start switch key.
6. Turn the battery disconnect switch to the OFF position. Remove the disconnect switch key.
7. Lock the door and access covers. Attach any vandalism protection.
8. Chock the tires. Secure the machine with tie-down.

Notice : Rotation of the turbocharger without engine operation can result in damage to the turbocharger.
Cover the exhaust opening or secure the rain cap in order to prevent the turbocharger from windmilling in transit.

9. Cover the exhaust opening or secure the rain cap on order to prevent the turbocharger from windmilling in transit.

Perform a walk around inspection and measure the fluid levels in the various compartments.

Travel at a moderate speed. Observe all speed limitations when you are roading the machine.

Consult your ACE dealer for shipping instructions for your machine.

Roading the Machine

Before you road a machine, consult you tire dealer for recommended tire pressures and for speed limitations.

Before you road a machine, place the front wheels in the vertical position. Also, install the hydraulic control lock group on the implement control levers. Installing the hydraulic control lock group will prevent the hydraulic controls from being activated during roading.

All blades and attached equipment should be in their transport position and positioned so that they are within the defined transport width.

Limitations for TON kilometer per hour must be obeyed. Consult your tire dealer for the speed limit of the tires that are used.

When you travel for long distances, scheduled stops in order to allow the tires and the components to cool. Stops for 30minutes after every 40km or after every hour.

Inflate the tires to the correct pressure.

Use a self attaching inflation chuck and stand behind the tire tread during the tire inflation. See the section in Operation and Maintenance Manual, “Tire Inflation Information” for more information.

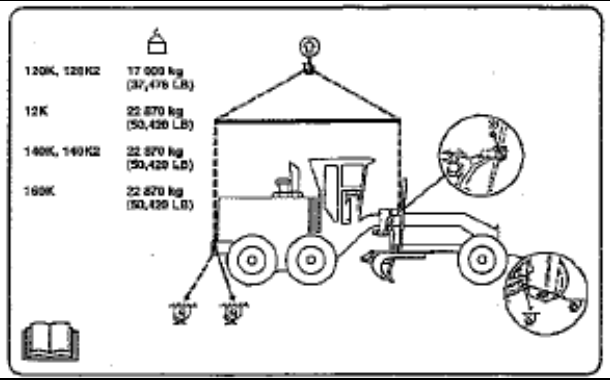
Perform a walk-around inspection and measure the fluid levels in the various compartment.

Check with the proper officials in order to obtain the required licenses and authorization.

Travel at a moderate speed. Observe all speed limitations when you road the machine.

Lifting and Tying Down the Machine

WARNING
A machine may shift if improver procedures or equipment are used for lifting and tying down for transport. Ensure that proper equipment and procedure are used for lifting and tying machines down for transport. If a machine shift it could cause personnel injury or death.

Notice : Improver lifting or tie-downs can allow load to shift and can cause injury and damage.	

Note : The machine shipping weight that is listed is the weight of the most common configuration of the machine. If attachment have been installed on your machine, the weight of your machine and the center of gravity of your machine may vary.

See Operation and Maintenance Manual, Specifications, “for the weight of the machine.

 **Lifting Point - In order to lift the machine, attach the lifting devices to the lifting points.**

 **Tie Down Point - In order to tie down the machine, attach the tie-downs to the tie down points.**

Lifting the machine

Illustration 103

Illustration 104

Use properly rated cables and properly rated slings to lift the machine.

Position the crane or the lifting device in order to lift the machine in a level position.

The width of the spreader bar must be sufficient to prevent the lifting cables or the lifting straps from contacting the machine.

1. Engage the parking brake before you attach a lifting device to the machine.
2. Install the frame lock pin prior to lifting the machine.
3. Wrap two lifting cables around the lift arm of the machine. The lift arms are located near the blade lift cylinders. There is one arm on each side of the front of the machine. The lifting areas are identified by a label that shows a hook. Refer to illustration 103.
4. Attach two lifting cables to the rear of the machine. There is one lifting eye on each side of the rear of the machine. The lifting eyes are identified by a label that shows a hook. Refer to illustration 104.
5. Connect the four lifting cables to the spreader bars. The spreader bars must be centered over the machine.
6. If equipped, secure any attachments.
7. Lift the machine. Move the machine to the desired position.
8. Secure the machine at the tie-down positions. The positions are identified on the machine by a label.

Refer to Operation and Maintenance Manual, “Shipping the Machine” for shipping instruction for your machine.

Tying down the Machine

Illustration 105

Illustration 106

Use properly rated cables and properly rated slings to tie down the machine.

1. Position the machine on the trailer
2. Install the frame lock pin.
3. Engage the parking brake.
4. Lower the blade to the floor of the transport machine. Lower all attachments to the floor of the transport machine.
5. Turn the engine start switch to the OFF position.
6. Turn the battery disconnect switch to the OFF position.
7. Attach four tie-down cables to the front of the machine. The front axle tube is used as the front tie-down point. The tie-downs are identified by a label that shows a tie-down position. Refer to illustration 105.

Note :- The four tie-down cable must secure the front of the machine.

8. Attach four tie-down chains to the rear of the machine. There is one tie-down eye on each side of the rear of the machine. The tie-down eyes are identified by a label that shows a tie-down position. Refer to illustration 106.

Note :- The four tie-down chains must secure the rear of the machine.

9. Add additional tie-downs if necessary.
10. Chock the wheels.
11. Obey all laws that govern the characteristics of a load (height, weight , width and length). Observe all regulations that govern wide loads.

Note :- Consult your ACE dealer for shipping instructions for your machine.

Jacking Location

WARNING
Personal injury or death can result from improper jacking or blocking. **When a jack is used to lift the machine, stand clear of the area. Use a jack that is rated for the correct capacity to lift the machine. Install blocks or stands before performing any work on the machine.**

Front of the machine

Before the front of the machine is raised, verify the following information :

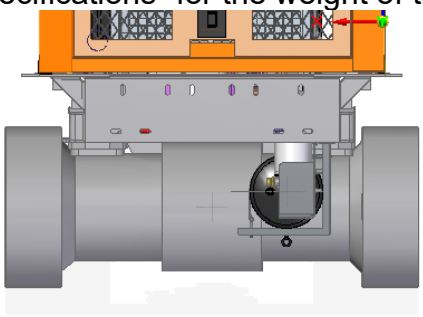
- The transmission control lever is in the PARKING BRAKE position.
- The wheel lean pin is in the front axle.
- The articulating lock pin is installed.
- The rear tires are chocked.
- The jack is sufficiently sized for the weight of the machine. See Operation and Maintenance Manual. “ Specifications” for the weight of the machine.

The location for jacking up the front of the machine is under the front axle.

Front of the machine

Before the rear of the machine is raised, verify the following information :

- The transmission control lever is in the PARKING BRAKE position.
- The wheel lean pin is in the front axle.
- The articulating lock pin is installed.
- The front tires are chocked.
- The jack is sufficiently sized for the weight of the machine. See Operation and Maintenance Manual. “ Specifications” for the weight of the machine.



The location for jacking up the rear of the machine is under the main frame on the rear of the machine.

Towing Information

WARNING

Improver hookup and towing is dangerous and could result in injury or death to yourself or others.

The towing connection must be rigid, or towing must be done by two machines are used, connect a machine on each end of the towed machine.

If only one machine is used for towing, that machine must be larger than the towed machine.

Be sure that all necessary repairs and adjustments have been made before a machine that has been towed to a service area is put back into operation.

Follow the recommendations that are listed below in order to property perform the towing procedure.

This machine is equipped with a parking brake that is spring applied. The parking brake is released by air pressure. The parking brake must be disengaged before towing the machine. If the parking brake is engaged, the machine can not be moved.

Notice : Towing of a disabled machine with the engine stopped may cause transmission damage. The transmission will not have lubrication.
Do not tow a disabled machine any farther than is necessary to provide for a convenient location for repairs.

These towing instructions are for moving a disabled machine for a short distance at low speed. Move the machine for a short distance at low speed.

MAINTENANCE

TYRES AND WHEELS

WARNING

An exploding tyre can kill, inflated tyre can explode if overheated. Do not cut or weld the rims. Use a tyre wheel specialist for all repair work.

TYRE INFLATION

These instructions are for adding air to a tyre which is already inflated. If the tyre has lost all its air pressure, call in a qualified tyre mechanic. The tyre mechanic should use a tyre inflation cage and the correct equipment to do the job.

WARNING

If, for whatever reasons, a wheel stud is renewed, all the stud for that wheel must be changed as a set, since the remaining studs may have been damaged.

TYRE PRESSURES

Front:	2WD:	14.00 X 25-20PR	475 kPa (4.8 kgf/cm²)
Rear:	4WD:	14.00 X 25-20PR	475 kPa (4.8 kgf/cm²)

1. **PREPARE THE WHEEL**

   Before you add air to the tyre, make sure it is correctly fitted on the machine or installed in a tyre inflations cage.

2. **PREPARE THE EQUIPMENT**

   Use only an air supply system which includes a pressure regulator. Set the regulator no higher than 1.38 bar (20 psi) above the recommended tyre pressure.

   Use an air hose fitted with a self-locking air chuck and remote shut off valve.

3. **ADD THE AIR**

   Make sure that the air hose is correctly connected to the tyre valve. Clear other people from the area. Stand behind the tread of the tyre while adding the air.

   Inflate the tyre to the recommended pressure. Do not over-inflate.

CHECKING THE ROAD WHEEL TIGHTNESS

On new machines, and whenever a wheel has been removed, check the wheel nut torques every two hours until they stay correct.

Every day, before starting work, check that the wheel nuts are tight.

RECOMMENDED LUBRICANTS

LUBRICANT MANUFACTURER (INDIAN)	ENGINE		TRANSMISSION (POWER SHUTTLE)		AXLE	HYDRA-ULIC OIL	GREASE
	TEMP 0-27. C	TEMP ABOVE 0-27. C	BELOW 0. C	ABOVE 0 . C			
INDIAN OIL	SERVO PRIDE 20 OR 15W/40	SERVO PRIDE 30 OR 15W40	SERVO TRANSMISSION C-4, SAE 10	SERVO TRANSMISSION C-4, SAE 30	SERVO GEAR 90	SERVO GEAR 45	SERVO GREASE MP
BHARAT PETROLEUM	BHARAT ACTUMA ULTRA SUPER OIL-20 OR 15W/40	BHARAT ACTUMA ULTRA SUPER OIL-30 OR 15W/40	TRANSMISION OIL C-4, SAE 10	TRANSMISION OIL C-4, SAE 30	BHARAT SPIROL 90-EP	BHARAT HYDROL -46	UNIVEX A
HINDUSTAN PETROLEUM	HYLUBE MILCY 20 OR 15W/40	HYLUBE MILCY 30 OR 15W/40	POWER GLIDE C-310	POWER GLIDE C-330	H.P. GEAR OIL EP-90	ENKLO 46	HP MULTI PURPOSE GREASE-3
CASTROL	DEUSAL SUPER CRD 20 OR 15W/40	DEUSAL SUPER CRD 20 OR 15W/40	TRANSMISSION OIL C-4 SAE 10	TRANSMISSION OIL C-4 SAE 10	HYPOY 90-EP	TELLUY 46	AP GREASE-3
GULF	GULF SUPER DUTY 20 OR 15W/40	GULF SUPER DUTY 30 OR 15W/40	TRANSMISSION OIL C-4 SAE 10	TRANSMISSION OIL C-4 SAE 10	EP GEAR OIL 90	GULF HARMONY 46	GULFSIL MULTI PURPOSE-3
TIDE WATER	VEEDOL HDC 20 OR 15W/40	VEEDOL HDC 30 OR 15W/40	TIDE WATER TRANS GEAR C-4 SAE 10	TIDE WATER TRANS GEAR C-4 SAE 30	MULTI GEAR 90	VEEDOL ATLINE-46	VEEDOL ALL PURPOSE GREASE - 3

RE-FILL CAPACITIES

HYDRAULIC OIL	110 Ltrs
FUEL TANK	320 Ltrs
TRANSMISSION OIL	28 Ltrs
GEAR OIL	20 Ltrs
ADBLUE-AUS32 (UREA)	24 Ltrs
ENGINE OIL - API CK4-10W30	16 Ltrs
COOLANT- LEYCOOL 40	27.5 Ltrs

TRANSMISSION SYSTEM

6.1 Oil Grade

We recommend using SAE15W-40 lubricants with the quality lever not lower than – API CD/CE/CF/SF/SG or – MIL – L – 46152C/ - D/ - E. Lubricants No. 8 is also admitted.

Always use clean quality oil, or trouble would be taken place in the gearbox.

6.2 Oil Quantity

About 28L, this indicated value is a standard value. As to the correct amount mark on the oil dipstick should be always controlled!

6.3 Oil Change

The first oil change has to be carried out after 100 operating hous on duty. All further changes are done after 1000 operating hours on duty, at least, however, once a year.

6.4 Filter Replacement

The filter must be replaced with each oil change.

Note: Handle the filter with care during the installation, the transport and the storage! Damaged filters may not be used!

Transmission

The transmission is of the power shuffle type with 4 forward and 4 reverse speeds. The transmission is provided with electrically actuated forward/reverse control. Steering Column mounted shuttle lever enable smooth shifting of gears from forward to reverse using fingertip operations.

FORWARD SPEED

I Gear	Kmph	3.75
II Gear	Kmph	6.56
III Gear	Kmph	9.67
IV Gear	Kmph	15.15
V Gear	Kmph	21.84
VI Gear	Kmph	39.46

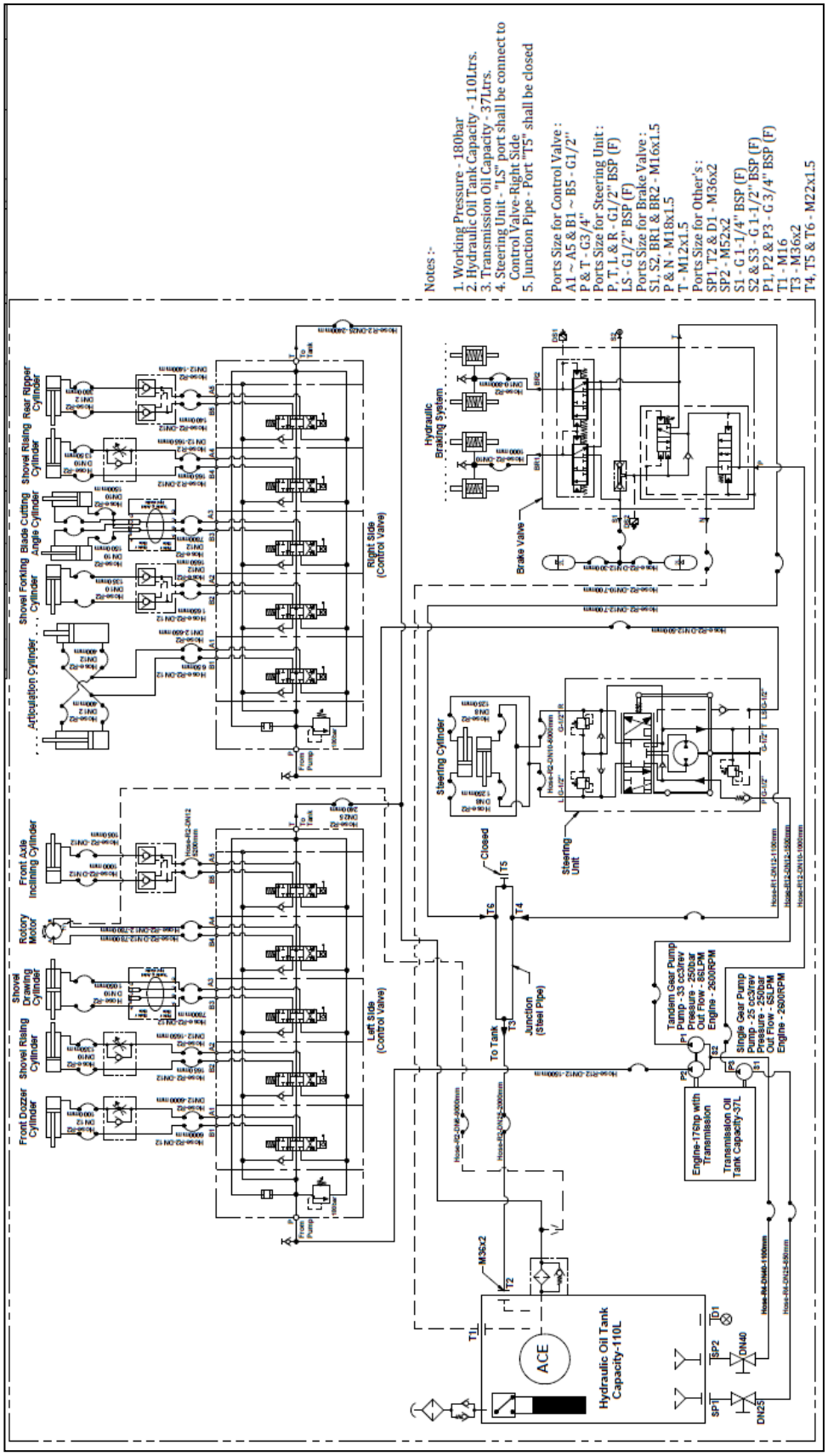
REVERSE SPEED

I Gear	Kmph	3.75
II Gear	Kmph	9.67
III Gear	Kmph	21.84

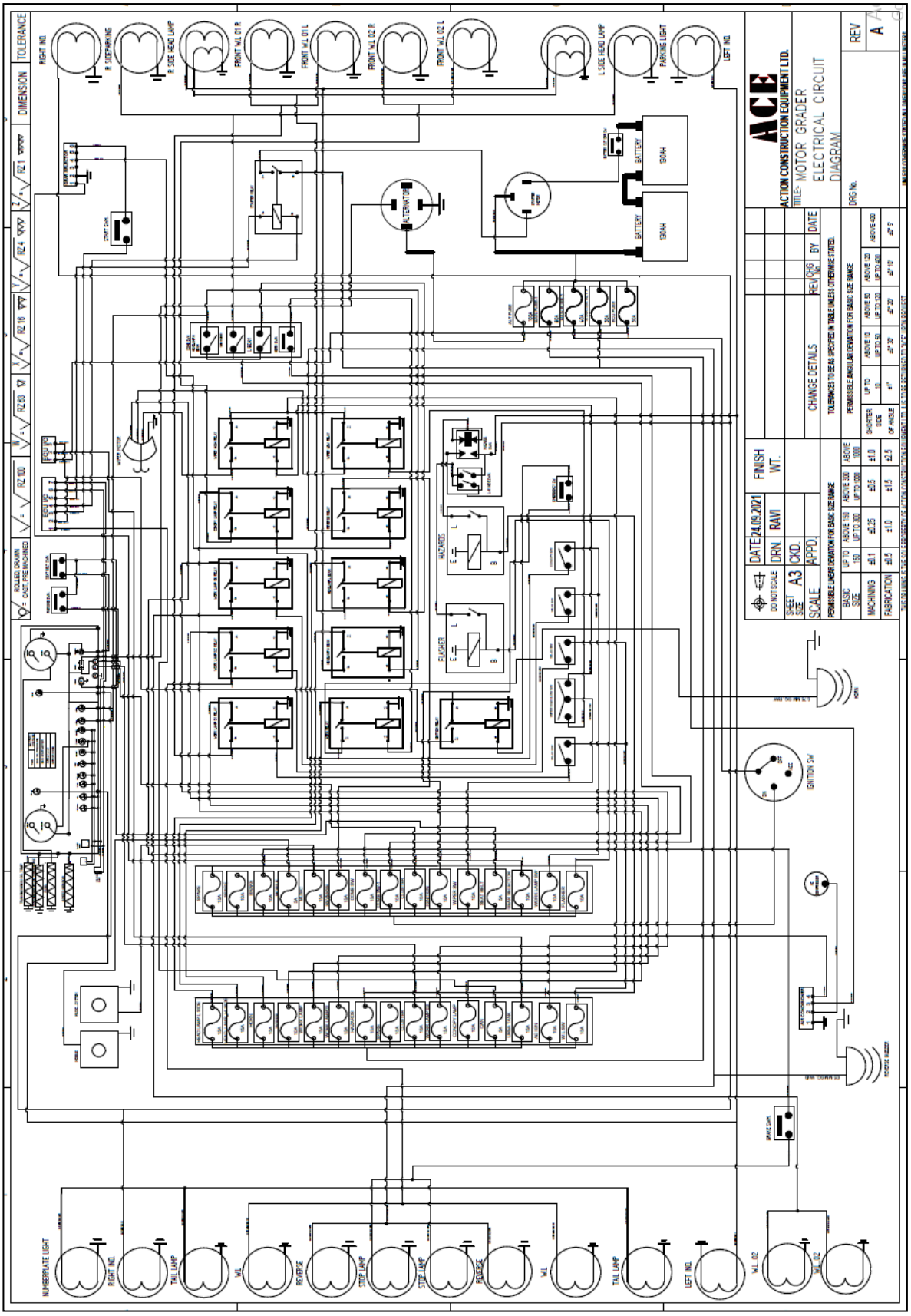
Power Train

The power train consists of the engine, torque converter shuttle gear box, Axle and connecting propeller shaft.

SCHEMATIC DIAGRAM HYDRAULIC



SCHEMATIC DIAGRAM ELECTRICAL



ENGINE MAINTENANCE

More frequent attentions will be necessary to engines working under adverse conditions such as Mine, sand quarry , gravel pit work or under severe hilly terrains / projects.

SL.NO	MAINTENANCE ACTIVITY	PDI	DAILY	WEEKLY	REMARKS
A	GENERAL				
1	Check and adjust valve clearance on cold engine				During every oil change
2	Check and tighten front and rear engine mounting rubber pads, mounting bracket fasteners				Every 1000 hours or Six months whichever is earlier
3	Check and replace engine mounting rubber pads, if necessary				Every 1000 hours or Six months whichever is earlier
4	Check engine fly up RPM / High speed RPM as per spec	√	√		Every 1000 hours or Six months whichever is earlier
5	Check and secure wiring harness away from temperature zones on the engine/equipment	√			
B	LUBRICATION SYSTEM				
1	Check engine oil level and top up if necessary	√	√		
2	Check for oil leakage and correct if any leak found	√	√		
3	Change engine oil and oil filter element				Every 500 hours or 6 months, whichever is earlier.
C	COOLING SYSTEM				
1	Check engine coolant level and top up if necessary.	√	√		
2	Check and tighten fan mounting bolts	√			Every 500 hours or 6 months, whichever is earlier

SL.NO	MAINTENANCE ACTIVITY	PDI	DAILY	WEEKLY	REMARKS
3	Check radiator hoses and clamps for leakages and tightness / replace if necessary				Every 500 hours or 6 months, whichever is earlier
4	Check fan belt tension / condition and adjust / replace if necessary				Every 250 hours or 3 months, whichever is earlier
5	Check & Tighten radiator stay rod and radiator mounting bolts	√			Every 500 hours or 6 months, whichever is earlier
6	Drain cooling system and fill recommended coolant.				Every 5000 hours or 2 years, whichever is earlier
7	Check Charge air cooler hoses and clamps for leakages and tightness / replace if necessary				Every 500 hours or 6 months, whichever is earlier
8	Clean radiator fins				Every 6 months or whenever is chocked, whichever is earlier
D	FUEL SYSTEM				
1	Replace both fuel filters (Strainer, Prefilter & Main Filter)				Every 500 hours or 6 months or whenever fuel filter is choked, whichever is earlier
2	Check water separator and drain water if necessary	√	√		
3	Clean Fuel tank and suction strainer (if applicable)				Every 1000 hours or 6 months, whichever is earlier
4	Check and replace fuel hoses if necessary				Every 1500 hours or 1 year, whichever is earlier
5	Check fuel piping routing for any kink and fouling	√			Every 1000 hours or 1 years, whichever is earlier

SL.NO	MAINTENANCE ACTIVITY	PDI	DAILY	WEEKLY	REMARKS
5	Check functioning of EDC and sensors with diagnostic tool & clear error codes if any. Also check the correctness of data set ID	√			Every 1000 hours - To be checked by Authorized AL Service personnel only
6	Check proper functioning of MIL lamp and EDC lamp. Both lamp should turn off in Engine running condition	√	√		
7	Check and note - Idle rpm and fly up rpm achieved with 100% accelerator position in static condition.	√	√		
8	Switch off Ignition key and isolator switch - Check and ensure proper locking of all ECU and Sensor connectors	√	√		
G	AIR COMPRESSOR				
1	Clean compressor fins from oil sludge and dust				Monthly
2	Check for leakages in lub oil connection and rectify if any	√		√	
3	Check compressor Inlet & delivery rubber hoses and pipes for deterioration and renew, if required				Every 1000 hours or 6 months, whichever is earlier
4	Remove cylinder head assembly and check for excessive carbon deposit and reed valve rivet loosening, de carbonize cylinder head and overhaul if necessary.				Every 2000 hours or 1 Year, whichever is earlier
5	Check for carbon deposit in delivery pipe and clean				Every 2000 hours or 1 Year, whichever is earlier
6	Overhaul the assembly, if required				Every 5000 hours or 2 Year, whichever is earlier

SL.NO	MAINTENANCE ACTIVITY	PDI	DAILY	WEEKLY	REMARKS
H	ELECTRICAL SYSTEM				
1	Check the battery electrolyte level. Top up if necessary with distilled water only.	√		√	
2	Check battery terminals. Apply petroleum jelly	√		√	
3	Check for function of instrument panel for engine parameter display	√	√		
4	Check battery cells - voltage and specific gravity, rectify / service if necessary				Every 500 hours or 3 months whichever is earlier
5	Wiring harness shall not rub against any sharp edges / hot zones / rotating or moving parts	√			Every 1000 hours
6	Wiring harness shall not be routed and clamped with fuel lines	√			Every 1000 hours
7	Check for proper fitment of all earthing points	√			Every 1000 hours
8	Visually check the wiring harness for any fouling and correct the same	√			Every 1000 hours
I	EATS (EXHAUST AFTER TREATMENT SYSTEM)				
1	Check Exhaust gas leak on all V band clamps	√			Every 1,000 hours or One year whichever is earlier
2	Check Urea Dozing System working using Scan tool	√			
3	Check for Air leak in Urea Dozing system at all joints and at the filter	√			
4	Replace the V-clamp nuts and gaskets in EATS	√			At the time of removal
5	Replace UDS injector nozzle Gasket	√			At the time of removal

SL.NO	MAINTENANCE ACTIVITY	PDI	DAILY	WEEKLY	REMARKS
6	Replace the DEF Air filter	√			Every 2000 Hrs
7	Replace Urea suction filter (Inside the tank on suction unit) and Supply Module filter with O ring	√			Every 2000 Hrs
8	Clean the DEF Tank neck filter (Replace if found damaged)	√			Every 2,000 hours
9	Ensure DEF tank cap proper locking.	√			Check each time while filling of DEF in tank & ensured the cap is locked properly
10	Check for any leak in Urea & Air pipe lines and replace/rectify	√			Every 1,000 Hours or One year whichever is earlier
11	Visually check Exhaust gas Leakage on bellow and V band integrity	√			Every 1,000 hours or One year whichever is earlier
12	Check tightness of U Clamp mounting of 1st Exhaust Pipe and also EATS mounting.	√			Every 1,000 hours or One year whichever is earlier
13	Check tightness of NOx sensors and clean the sensor tip for any dirt/dust deposits	√			Every 1,000 hours or one year which ever is earlier. Compressed air not to not to not to b
14	Compressed air not to to be used for cleaning.	√			Replace NOx sensors... Every 2000 hours
15	Check tightness of temperature sensors and clean the sensor tip for any dirt/dust deposits	√			Every 1000 hours or One year which ever is earlier

RECOMMENDED ENGINE LUB OIL & COOLANT

APPLICATION	ENGINE MODELS	RECOMMENDED LUB OIL	LUB OIL & FILTERS CHANGE INTERVAL
CEV Stage - IV Industrial and TREM Stage - IV Harvester Engines	H3 / H4 / H6	Gulf Leypower XLE Diesel Engine Oil	Every 500 hours or 6 months, whichever is earlier

APPLICATION	ENGINE MODELS	RECOMMENDED COOLANT	COOLANT CHANGE INTERVAL
CEV Stage - IV Industrial and TREM Stage - IV Harvester Engines	H3 / H4 / H6	Gulf LEYPOWER COOL 40	Every 5000 hours or 2 years, whichever is earlier

RECORD KEEPING

FREE SERVICE RECORD				
TYPE OF SERVICE	DUE/DONE	HOUR MTR RDG	DATE	REMARKS
INSTALLATION	DONE			
1ST FREE	DUE	100 HRS/30 DAYS		
	DONE			
2ND FREE	DUE	250 HRS/60 DAYS		
	DONE			
3RD FREE	DUE	500 HRS/90 DAYS		
	DONE			
4TH FREE	DUE	750 HRS/150 DAYS		
	DONE			
5TH FREE	DUE	1000 HRS/180 DAYS		
	DONE			
6TH FREE	DUE	1250 HRS/210 DAYS		
	DONE			
7TH FREE	DUE	1500 HRS/270 DAYS		
	DONE			
8TH FREE	DUE	1750 HRS/330 DAYS		
	DONE			
9TH FREE	DUE	2000 HRS/365 DAYS		
	DONE			

OIL CHANGE RECORD						
SL. NO	HRS/DATE	ENGINE	TRANSMISSION	AXLE	HYDRAULIC	REMARKS
1	HRS MTR					
	DATE					
2	HRS MTR					
	DATE					
3	HRS MTR					
	DATE					
4	HRS MTR					
	DATE					
5	HRS MTR					
	DATE					
6	HRS MTR					
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13	HRS MTR					
	DATE					
14	HRS MTR					
	DATE					

SL. NO	HRS/DATE	ENGINE	TRANSMISSION	AXLE	HYDRAULIC	REMARKS
15	HRS MTR					
	DATE					
16	HRS MTR					
	DATE					
17	HRS MTR					
	DATE					
18	HRS MTR					
	DATE					
19	HRS MTR					
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20	HRS MTR					
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25	HRS MTR					
	DATE					
26	HRS MTR					
	DATE					
27	HRS MTR					
	DATE					
28	HRS MTR					
	DATE					
29						

MAJOR PARTS CHANGE RECORD						
Sl. NO.	**Date**	**Report/J.C. No.**	**Part Description**	**Part No.**	**Qty.**	**Remarks**

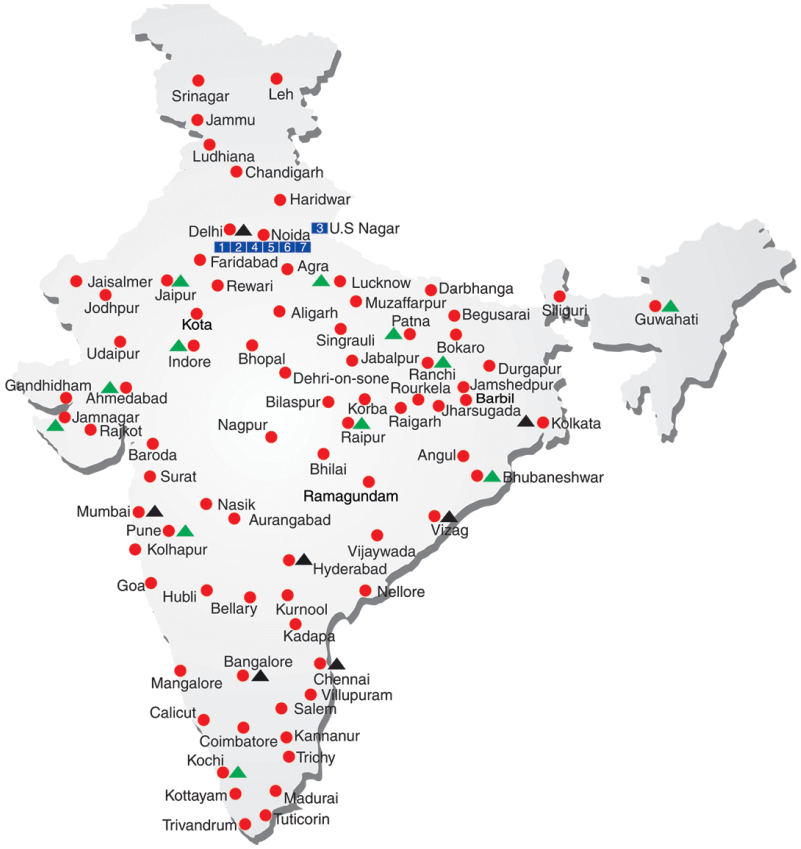
Sl. NO.	Date	Report/J.C. No.	Part Description	Part No.	Qty.	Remarks

OWNERSHIP TRANSFER RECORD			
Sl. No.	**Date**	**Transfer Details**	**Customer's details**

NOTES

NOTES

ALL INDIA NETWORK



Toll Free Help Line
1800 1800 004

- WORKS
- REGIONAL OFFICES
- AREA OFFICES
- SALES AND SERVICE DEALERS

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