OPERATION & MAINTENANCE MANUAL

WHEEL LOADER

9020





LARSEN & TOUBRO

OPERATION & MAINTENANCE MANUAL





WHEEL LOADER

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Improper & unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who will come into contact with the machine.

Foreword

This manual provides rules and guidelines which will help you to use this machine safely and effectively. Keep this manual handy and have all personnel read it periodically. If this manual has been lost or has become dirty or damaged and cannot be read, request a replacement manual from your L&T dealer. If you sell the machine, be sure to give this manual to the new owners.

Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult your L&T dealer for the latest available information of your machine or for questions regarding information in this manual.

This manual may contain attachments and optional equipments that are not available in your region. Consult your L&T dealer for those items you may require.

Operation, inspection, and maintenance should be carefully carried out, and safety must be given first priority. The "Information on safety" contained in this manual is intended only to supplement safety codes, insurance requirements, local laws, rules, and regulations.

Some photographs and illustrations are different from your machine as technical improvement is continually reflected on it. Revision to up-to-date manual's content is performed in later editions.

This operation & maintenance manual may contain attachments and optional equipment that are not available in your area. Please consult your local L&T dealer for those items you may require.

Materials and specifications are subject to change without notice.

- Improper/unsafe operation and maintenance of this machine can be hazardous and could result in serious injury or death.
- Operators and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.
- Some actions involved in operation and maintenance of the machine can cause a serious accident if they are not done in a manner described in this manual.
- The procedures and precautions given in this manual are applicable only to intended uses of the machine. If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for you and others.
- L&T delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult your L&T dealer before operating the machine.

Introduction to the owner

Congratulation! You are now a proud owner of L&T 9020 Wheel Loader.

All the components of this unit have been thoroughly checked and tested to meet the standards of quality and reliability you are entitled to expect in the field.

Your machine will remain a highly profitable tool, provided you carefully observe the operating and servicing recommendations outlined in this manual, which covers the following items.

- Basic safety rules
- Operation
- Maintenance and consumables
- Specifications

Wherever you may be, our representative is at your disposal for any information or help you may require at all times.

This manual has been prepared for the safe operation and benefit of your Operators and mechanics to help them derive the most optimum performance from your machine and to keep, down time to the barest minimum. This manual should be consulted frequently and should be understood.

Warranty

Contact your L&T dealer for details about warranty period of your machine.

After the expiry of the WARRANTY PERIOD, our SPARE PARTS and SERVICE personnel will remain at your disposal for any assistance and supply of ORIGINAL SPARE PARTS, the interchangeability and quality of which are guaranteed.

Intended use

This machine is intended mainly for the following operations.

- Scooping operations
- Re-handling operations
- Pushing operations
- Piling up operations
- Levelling operations

For detailed operating procedure, refer chapter 2.9.

Features

- Improved sealing for reduced noise in cabin.
- Low vibration rubber mounts are used for cabin, engine, transmission, and radiator.

- Easy to operate the hydraulic joystick. Both the lift arm & bucket operations are done by a joystick.
- Fully hydraulic and effective wet-disc brake control, with no need to drain water or any need to worry about freezing or rust.

Breaking in the new machine

Each of your Wheel Loader machine has been thoroughly adjusted and tested before shipment. However, a new machine requires careful operation during the initial 100 hours as indicated by the service meter.

If a machine is subjected to unreasonably hard use at the initial operation stage, the potential of performance will prematurely deteriorate and the service life will be reduced. A machine must be operated with care, particularly with regard to the following items.

During breaking in:

- Idle the engine for 5 minutes after starting, to allow proper engine warm-up prior to actual operation.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts or acceleration, unnecessarily abrupt stops and sharp steering except in cases of emergency.
- At the first 250 hours of operation, the machine should be maintained in the manner described in chapter 3.
- If the machine is delivered without any cooling water in the radiator, flush the cooling system with clean water to clean the system, and then fill the radiator with coolant.
- When replacing oil filter elements check for dirt and dust. If heavily collected, check for possible cause before starting operation.

NOTICE: Hours of operation is indicated by the service meter reading.

Information on safety

Operations that prohibited in this manual must never be carried out under any circumstances.

Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. To avoid accidents, read, understand and follow all precautions and warnings in this manual and on the machine before performing operation and maintenance.

L&T cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, you must be sure that you and others can do such procedures and actions safely and without damaging the machine. If you are unsure about the safety of some procedures, contact your L&T dealer. To identify safety messages in this manual and on machine labels, the following signal words are used:

 The signal word DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.



The signal word WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.



 The signal word CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. This word might also be word for hazards where the only result could be damage to the machine.



 The signal word NOTICE is used to indicate the interlocking functions, operator tips, precautions that must be taken to avoid actions which could shorten the life of the machine.





Identifying your machine



Table to enter Machine & Engine serial numbers (to be filled by the owner for reference):

MACHINE MODEL NO	
MACHINE SERIAL/PIN NO	
ENGINE MODEL NO	
ENGINE SERIAL NO	
	DEALER DETAILS
NAME	
ADDRESS	
PHONE NUMBER	
SERVICE PERSONNEL	

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1. SAFETY

1.1 General Safety

NOTICE: To know your machine parts / components, refer Chapter 2.

This section is very important. Read and follow all safety precautions. Failure to do so may result in serious injury or death.

NOTICE: Any modification made without authorisation from L&T, can create problem on safety. L&T will not be responsible for any injury or damage caused by any unauthorised modifications. Before making modifications consult your L&T dealer.

1.1.1 Preparing For Safety

NOTICE: A careful operation is the best prevention against an accident.

- You and others can be injured if you operate or maintain the machine without studying the Operator's Manual. Read the safety instructions before operating the machine. If you do not understand anything in the machine, ask your employer or L&T dealer to explain it.
- Labels on the machine, warn you of particular hazards. You can be injured if you do not obey the label safety instructions. Keep all labels clean and readable. Replace lost or damaged labels.
- DO NOT OPERATE THE MACHINE OUTSIDE THE OPERATING SPECIFICATIONS. It can damage the machine and it can also be dangerous.
- DO NOT RUSH in operating the machine. Hurrying can lead to accidents. Haste, carelessness, and lack of training are the primary causes of equipment related injuries.
- It is extremely dangerous to operate the machine, when under the influence of alcohol or drugs. Be aware of medicines which can cause drowsiness.

1.1.2 Safety Rules

Always obey all local rules and laws of worksite, which affect you, other people and your machine. If your country demands licence to drive your loader, you should get the licence before operating your loader.

- Only trained and authorized personnel can operate and maintain the machine.
- Always use safety features properly. Always keep them in good working condition. In case of any failure or malfunction, replace them with new ones.
- Bad communications in worksite can cause accidents. Refer chapter 1.1.6.
- If you have an attachment which is not covered in the Operator Manual, do not install it. Install attachments only on the machines for which they were designed.
- A first-aid kit should be available in case of an injury. If you do not have first-aid kit, ask your employer.
- You must know the alternate exit routes from the cabin, for use in case of emergency refer chapter 1.1.3.

1.1.3 Safety Features

Improper use of safety features could result in serious personnel injury or death.

1. Hazard switch

- If the System or machine had a problem while working, turn this switch in ON position. So that all the lamps will glow and beep sound will be heard. This is to alert the personnel who are working near to the machine.
- To know the placement & operation of this switch refer chapter 2.2

Notice: If this switch is used when there is no hazard, or if this switch is pressed by mistake, it can cause unnecessary interruptions to the public.

2. Transmission cut-off switch

- When travelling or working on slope, set the transmission cut-off switch in OFF position. This will help in using the engine braking force to brake the machine when travelling downhill.
- To know the placement & operation of this switch refer chapter 2.2

NOTICE: If this is not used during travelling in slope, there is a chance; the operator may lose the control of the machine particularly when travelling downhill.

3. Battery disconnect switch



 Battery disconnect switch - Switching off this switch will disconnect the electrical connection between the battery and the electrical system, to avoid accidental short circuit between the wirings. After switching off this switch, the lever should be removed which will prevent others from switching on this again.



Without disconnecting the electrical connections, the maintenance or inspection should not be carried out. Failure to follow this instruction will cause electrical short circuit and result in personnel injury.

4. Parking Brake

- This is an additional brake which is to be engaged when the machine is left in unattended condition or parked after the operations are completed.
- To know the operation details of the parking brake refer chapter 2.12.1

The machine parked or left unattended without engaging the parking brake can make the machine to move without the operator and result in personnel injury.

5. Parking Brake Indicator

- It is indicating to the operator that the parking brake is engaged.
- To know the placement of this indicator refer chapter 2.2

NOTICE: Moving the machine without disengaging the parking brake will reduce the life of the parking brake shoes. To avoid this parking brake indicator lamp is used.



• Steering lock bar – To lock the front and rear frames from steering. Particularly this steering lock bar is used at the time of maintenance and parking.

NOTICE: Steering the machine without noticing that the steering is locked by using this feature, will reduce the life of the steering cylinder.

7. Lift arm lock



 Lift arm lock – It is an optional feature which is used at the time of maintenance. This can be detached after the maintenance is over. During the maintenance, fixing this lift arm lock in any one of the lift cylinder, will prevent the lift arm from lowering even it is operated by mistake.

NOTICE: Forgetting to remove the lift arm lock from the lift cylinder after the maintenance is over will reduce the life of the lift cylinder.

8. Right side cabin window for emergency

• This window can be used as an emergency exit from the cabin at the time of hazardous situations.

9. Accumulators for brake system

 Accumulators – It is a pressure storage device which is used for braking purpose. Even if the engine is in shut off condition, the accumulator pressure lasts for a minimum of 20 operations of braking.

6. Steering Lock bar

WARNING

Accumulator is pressure storage device. So, hitting the accumulator with any metal part force fully can cause explosion of the accumulator which may result in personnel injury.

10. Joystick deactivation switch

When the work equipment is under maintenance or during the transport of the machine from one site to another, set the joystick deactivation switch in OFF position. This will stop the operation of the work equipment even if the joystick is operated mistakenly. To know the placement of this switch refer chapter 2.2.

11. Reverse buzzer

• Reverse buzzer is to be provided so that the person standing behind the vehicle is alarmed when the vehicle is making a reverse operation.

1.1.4 Clothing



- Obtain and wear safety/protective clothing such as hard hat, safety shoes, ear protectors, reflective clothing, safety goggles, heavy gloves, etc., when you doubt on safety.
- Avoid loose clothing, jewellery, and loose long hair. That can catch on controls or moving parts and cause serious injury or death. Also do not wear oily clothes, because they will easily fire.
- Check all protective clothing properly for any damages before using. Replace damaged clothing immediately with new ones.

WARNING

Do not wear loose clothing. It can get caught in the controls or moving parts of the machine which leads to personnel injury or even death.

1.1.5 Safety during Climbing up and Down

A DANGER

Never jump on or off the machine. Never get on or off of the moving machine. These acts may result in unexpected injury or even death.

- When getting on or off of the machine, always face the machine and maintain three point contact (both feet and one hand or one foot and both hands) with the handrails and steps to ensure that you support yourself.
- Before getting on or off the machine, check the handrails and steps, and if there is any oil, grease, or mud on them, wipe it off immediately. In addition, repair any damage and tighten any loose bolts.
- NEVER HOLD ANY CONTROL LEVERS, when getting on or off the machine.

DANGER

Do not operate control levers from outside the cabin. This act may result in serious injury or death. Operate the control levers only when you are correctly seated inside the cabin.



 NEVER ALLOW ANYONE TO STAND ON THE LADDER when the bucket is raised or the machine is moving or turning to prevent injury from falling, crushing, or falling material.

DANGER

Do not walk or work under raised attachments unless they are safely supported. Raised attachments may fall and will lead to severe injury or even death. Keep away from the raised attachments.



Never allow anyone near the centre articulation pivot, before starting and running the machine. If the machine is turned, they could be crushed. Keep away from working machine.

1.1.6 Communications in Worksite

- Worksites can be noisy; do not rely on spoken commands.
- When working with another operator or with a person on worksite traffic duty, be sure that all personnel understand all hand signals that are to be used in the worksite.
- Always keep people around you informed of what you will be doing.

1.1.7 Precaution on Fuel and Oil



Fuel is FLAMMABLE and can be HAZARDOUS.

- Keep flame away from flammable fluids. Fuel, Oil and antifreeze liquids when wind sprayed will cause fire.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.



- Do not smoke when you are near service / fuelling area.
 Stop the engine when refuelling.
- Refuelling and oiling should be made in well ventilated areas.
- Tighten all fuel and oil tank caps securely after fuelling.

1.1.8 Ventilation for Enclosed Areas



• Strictly avoid starting the engine in an enclosed area, if it is necessary to start the engine, provide adequate ventilation.

DANGER

Do not operate the machine in closed spaces. Exhaust gases from the machine can harm and possibly kill you.

• If you begin to feel drowsy, immediately stop the machine and get into the fresh air.

1.1.9 Visibility

Do not operate the machine if you cannot see the path or worksite clearly. Accidents can be caused by working with poor visibility. Always keep your machine front & rear glasses and rear view mirrors clean to ensure clear and good visibility.

- When working in dark place, install working lamps and head lamps, and set up lighting in the work area if necessary.
- Stop operation if the visibility is poor, such as in mist, snow, or rain, and wait for the weather to improve to a condition that allows the operation to be carried out safely.

1.1.10 Waste Material Disposal



 NEVER DRAIN OIL DIRECTLY IN GROUND. Always drain oil from your machine in a container.

Never dump or dispose harmful objects such as oil, fuel, coolant, solvent, filters, batteries, etc. in a sewer system, rivers etc. Obey and follow appropriate laws and regulations in your country or worksite, when disposing them.

1.2 Safety for Transporting

1.2.1 General Safety

NOTICE: When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

- Obey all state and local laws governing the weight, width, and length of a load. Observe all regulations governing wide loads.
- Ensure the suitability of the transporting vehicle.
- Make sure the transporter is aware of the maximum height of your machine loaded on to the transporting vehicle and clearance height to be maintained while driving.

1.2.2 Loading and Unloading



- Loading and unloading the machine always involves potential hazards. Extreme caution should be used.
- When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.
- Always block the wheels of the transporting vehicle and place blocks under both ramps before loading and unloading.
- Always use ramps of adequate strength. Be sure that ramps are wide and long enough to provide a safe loading slope.
- Make sure the ramp has sufficient width, length, and thickness to enable the machine to be safely loaded and unloaded.
- Be sure the ramp surface is clean and free of grease, oil, ice, and loose materials.
- Make sure that the transmission cut-off switch is in OFF position, before loading or unloading.
- When loading or unloading the machine, run the engine at low idle and travel at low speed.
- Never change the direction of travel, when your loader is on the ramps. If it is necessary to change direction, come to the ground and correct the direction, then drive on to the ramps again.

1.2.3 Shipping

A DANGER

If you do not obey laws governing the width and height limitations of your country during transportation, the machine may hit on to the electrical cables, bridges, etc., and it may fall off the vehicle, killing the people nearby. Tie the machine properly, so that it does not fall off from the vehicle easily.

- When shipping the machine on a transporting vehicle, obey all safety and local laws governing the weight, width, and length of the load. Also obey all applicable traffic regulations of your country.
- Take into account the width, height, and weight of the machine when determining the shipping route. Beware of electrical cables crossing the shipment routes.

1.3 Safety during Operation

Do not operate a machine which is defective or has parts missing. A defective machine can injure you or others.

1.3.1 Precautionary steps

- It is your responsibility to understand and follow manufacturer's instructions on machine operation, service and observe applicable rules and regulations.
- Be particularly careful if this machine is new to you.
- Safety of yours and others are highly dependent upon the care and good judgment of your exercise while using this equipment.
- Be sure to check all controls in a safe open area before starting your operations.
- DO NOT USE THE MACHINE IN ANY CLOSED AREA where there is flammable material, vapour, or dust. It may cause explosion/fire by sparks from hot exhaust or electrical system.
- Before starting the machine, thoroughly check the area for any unusual conditions that could be dangerous. Examine the shape of the ground and quality of the soil at the jobsite.

When working in water or crossings banks, first check condition of the ground and the depth and speed of flow of the water. Be sure not to exceed the permitted water depth. To know details refer chapter 2.6.4.

1.3.2 In cabin

- Do not leave tools or spare parts lying around in the cabin. They may damage or break the control levers or switches. Always put them in the tool box of the machine.
- Keep the cabin floor, controls, steps, pedals, and handrails free from oil, grease, snow and excess dirt.
- Adjust the seat so that you can comfortably reach all the driving controls. You should be able to apply full brake pedal travel with your back against the seat back.
- Set the rear view mirrors to give you a good view close behind the machine when you are correctly seated.
- Check the engagement of parking brake (refer chapter 2.12.1) when the machine was last parked. If parking brake is not engaged, engage it now. Disengage it after starting the engine.

1.3.3 Before Operating Machine

Do not leave spilled-out or leaked-out oil, fuel or other flammable materials near the high temperature parts such as exhaust muffler, turbo charger, etc. Failure to do so may lead to fire. Wipe / clean them immediately, if found.

 Walk around machine, checking for people, animals, or objects that might be in the way.

WARNING

Never start the engine when the Warning tag has been attached to the drive control switch.

- Inspect the machine generally for damaged and missing parts (refer chapter 2.4.1).
- Do not allow any person other than the operator in the cabin or any other place of the machine.
- Start and operate the machine only after seated.
- Check reverse alarm buzzer for its proper working.
- Check and remove the steering & lift arm locks.

1.3.4 Safety When Travelling

Passengers in or on the machine can cause accidents. Do not carry passengers.

- Before travelling or operating, check that the steering lock bar is securely fixed in the free condition.
- Travel on level roads with the bucket 40 50 cm (16 20 Inch) above the ground level.
- When travelling on rough ground surface, travel at low speeds, and avoid sudden turns when changing direction.
- NEVER travel with a loaded bucket at full height. Keep the bucket as low as possible for better machine balance and visibility.



If the engine stops when machine is travelling, the steering will not work. This is dangerous, so apply the brakes immediately, and stop the machine.



A DANGER

Going close to high voltage cables can cause electric shock. Always maintain a safe distance between the machine and the electric cables.

 NEVER leave the machine unattended with the engine running. Engage the parking brake, lower the attachments to the ground, and shut off the engine.

Do not apply the brakes suddenly to stop the machine, except in case of emergencies. Your machine is equipped with Hydraulic Power brakes, which may stop your machine with sudden jerks harming you. NOTICE: When travelling on public roads always switch the working lamp off.

1.3.5 Safety When Service Brake Fails

- If the machine is not stopped by depressing the brake pedal, use the parking brake to stop the machine.
- After the parking brake is used as an emergency brake, replace the worn brake shoes with new ones.

1.3.6 Safety When Travel On Slopes

Always drive the machine slowly when on hillsides, ramps, or rough terrain. Be extremely careful when working around trenches or banks. Failure to do so could cause the machine to roll over.

- Travel on hill, banks or slopes that are steep could cause the machine in tipping over or slipping.
- When travelling on slopes, ensure that transmission cutoff switch is in OFF position (refer chapter 2.2).

DANGER

If the machine has to be started on a slope, always turn transmission cut-off switch in OFF condition and depress the brake pedal. Then start the engine and depress the accelerator pedal while releasing the brake pedal to move the machine slowly.

 On hills, banks or slopes carry the bucket closer to the ground, approximately 20-30 cm (8-12 inch) above the ground. In case emergency, quickly lower the bucket to help the machine prevent it from tipping over.





- Do not turn on slopes or travel across slopes. Always go down to a flat place to perform these operations.
- If the engine stops on the slope, depress the brake.

When engine stops while working on slope, the machine may run out of control leading to accident. To avoid this, depress the brake pedal immediately, lower the bucket and apply the parking brake. To restart the engine again, put the drive control switch in neutral, and re-start.

• Keep the transmission in low gear when going down steep hills.

It is dangerous to turn the machine, with work equipments at raised position in slope. Failure to do so may result in tip off the machine. Before turning on slopes, lower the centre of gravity by lowering the attachments to increase the stability of machine.



When carrying the load on downhill slopes, travel in reverse. Failure to do so may lead to the machine tip off and can cause serious injury or even death.

- While carrying the load, travel forward when going uphill, and reverse when going downhill.
- When travelling on downhill, if the service brake is used too frequently, the brake may over heat and be damaged. To avoid this problem, shift down to a low range and make full use of the braking force of the engine.

DANGER

Do not apply brake suddenly while travelling in steep hill. Failure to do so will cause the machine to tip off and can lead serious injury or even death.

1.3.7 Travel in Reverse

- Sound the horn to warn the people in the operating site.
- Check that there is no one near the machine. Be particularly careful to check behind the machine. If necessary, designate/assign a person to check safety. This is particularly necessary when travelling in reverse.



DANGER

Do not allow anyone to stand near the operating machine. Failing to follow can kill surrounding persons. Always maintain a safe distance of 3 meters between people and the machine.

• When operating in areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.

DANGER

Do not allow anyone to enter in the line of travel of the machine. Failure to do so may cause severe damage to people. This rule must be strictly observed even on machines equipped with a reverse alarm or rear view mirrors.

1.3.8 Precautions When Operating

NOTICE: Do not let the lift arm to raise or lower rapidly to reach its maximum height or hit the ground. It will reduce the life of the equipment.

Earth lay in the ground and the soil near ditches are loose. They can collapse under the weight or vibration of your machine and can cause the machine to roll over. Be careful on those areas.

- Before starting the operation, the operator must know about the operating specification and capacity of the machine. This will avoid the machine from over loading.
- When the bucket is fully loaded, be sure in particular to avoid sudden starting, turning, or stopping.
- Always carryout loading operation up wind to protect yourself from dust.
- When operating machine in dust, smoke or fog, slow down if your vision is obstructed.

A WARNING

When working in the places, where there are height limits such as tunnels, under bridges, under electric cables, or in garages, be extremely careful not to hit them with the work equipment.

• Be careful not to let the bucket to hit the dump truck while loading.

Know the location of underground cables, water mains etc., ruptured water lines, or electrical lines could result in personal injury.

1.3.9 Safety in Parking

A WARNING

An incorrectly parked machine can move without an operator and can kill people nearby. Follow the instructions in the Operator Manual strictly, to park the machine correctly.



- Park on a level ground whenever possible. If the machine must be stopped on a slope, engage parking brake and also block wheels to prevent the machine from moving.
- Provide fences, flags, signs, lights or any other necessary signs to ensure that people passing nearby can see and notice the machine clearly.
- When parking on public roads, park the machine so that machine, flags, and fences do not obstruct the traffic.
- When leaving the machine, lower the work equipment completely to the ground, engage the parking brake and then stop the engine. Lock the equipment (refer chapter 2.12.2) and take the key(s) with you.

1.4 Safety during Maintenance

During the maintenance, always fix "Do Not Operate" warning tag on to Steering Wheel knob. This will alert others from starting the engine or operating the machine unknowingly which may cause personnel injury or even death.



1.4.1 Before maintenance

- Before carry out the maintenance, always be sure to stop the machine on flat ground, lower the bucket, set the drive control switch in neutral, apply the parking brake, the engine is stopped and ignition key is removed.
- Remove the battery disconnect switch.
- Never work under the machine if the machine is not supported or poorly supported on all the tyres. If the tyres are removed for maintenance purpose, use solid blocks to support the machine at the axles. If necessary, change

the maintenance site itself for safe maintenance operation.



 Before carrying out the maintenance or inspection in the machine, lock front and rear frames with the steering lock bar and block the wheels safely (refer chapter 2.12.1). Use padlocks for the steering lock bar if required.



 While doing maintenance or inspection, mount the lift arm lock to prevent the lift arm from lowering. Ask your employer for the availability of lift arm lock.



Use proper tools in good condition for all tasks. Using damaged, low quality, faulty or makeshift tools could cause personnel injury to you and can cause damage to your machine.



When working with tools such as spanners, levers etc., beware of surrounding metallic parts

and sharp corners. If your hands or other parts of body hit with them, it can cause serious injury.

- When it is necessary to run the engine during maintenance, carry out the operation with two workers. One worker should sit in the operator's seat so that he can always stop the engine immediately if necessary in case of urgency or any unintended movement of parts. He should also be extremely careful not to touch any levers by mistake.
- Use joy stick disconnect switch to disable the attachment. (refer chapter 2.2)

1.4.2 Precautions during Maintenance



Do not try to do inspection or maintenance on the machine by yourself, without reading the operator & maintenance manual. This may lead to serious injury to you or can damage your machine. Read the manual thoroughly before inspection or maintenance.



Do not touch any rotating part. If your body touches the engine fan blades or fan belt, they may be cut off resulting in severe injury.

• Keep away from rotating parts and be careful not to let anything get caught into them.



When checking fuel, oil, coolant or battery electrolyte with electrical lights, always use lights and bulbs with anti-explosive specifications. If such lighting equipment is not used, there is a danger of explosion. Always lower all movable work equipment to the ground or their lowest position before performing maintenance or inspections under the machine. If the lift arm is necessary to be raised for maintenance, always use lift arm lock for safety (refer chapter 1.4.1).

WARNING

Keep the attachments that have been removed from the machine in a safe place, so that they do not fall. If they fall on you or others, it can result in serious injury.

1.4.3 High Pressure Hoses

 Do not loosen any hydraulic circuit when the engine is running. Remember that all hydraulic circuits are under pressure.

Immediately repair any loose or broken fuel hoses or oil hoses. If fuel or oil leaks, it may react with your environment and can pollute it or can cause fire.

 Do not add oil, drain oil, or carry out maintenance or inspection before completely releasing the internal pressure.



If oil is leaking under high pressure through a small hole, it is dangerous if the jet of high pressure oil hits your skin. Always wear safety glass, and thick gloves, and use a piece of cardboard or a sheet of wood to check the leakage.

 If you are hit by a jet of high pressure oil, consult a doctor immediately for medical attention.

DANGER

Do not bend high pressure hoses or hit them with hard objects. Do not use any cracked tube, piping, or hoses. They may burst during use.

1.4.4 Precautions When Handling the Tyres

DANGER

You could be killed or injured if a machine tyre bursts. Do not use the machine with damaged tyre.

- If the following defects are found in tyres, for safety reasons, the tyre should be replaced with a new one.
 - Bead wire is broken, bent, or the tyre is greatly deformed.
 - Wear is excessive and the carcass ply (excluding breaker) is exposed for more than 1/4 of the circumference.
 - Damage to the carcass exceeds 1/3 of the tyre width.
 - Tyre layers are separated.
 - ✤ Radial crack reaches the carcass.
 - Deformation or damage which makes the tyre unsuitable for use.



Do not use the machine with damaged, incorrectly inflated, or excessively worn tyres. You could be killed or injured if a tyre bursts.



Stand to the side of the lock ring when filling air into the tyres. Tyre bursting can be extremely dangerous. NEVER STAND INFRONT OF THE LOCK RING WHILE FILLING AIR IN THE TYRE.

- To maintain the tyres in safe condition, always keep to the following conditions.
 - Inflate the tyres to the specified pressure (refer chapter 3.6). Abnormal heat is generated particularly when the tyre inflation pressure is too low.
 - Avoid overloading.

SAFETY

- Use the specified tyres.
- If the tyres are not used under these specified conditions, they may be cut and burst by sharp stones on rough road surfaces. They may also overheat and burst.
- Disassembly, repair, and assembly of tyres require specialist equipment skill. So please ask your specialist tyre repair shop to carry out repairs.



If the tyre should fall over, get out of the way quickly. The tyres for construction equipment are extremely heavy. So trying to hold the tyre may lead to serious injury.



• While storing the tyres, stand the tyre on level ground, and block it securely, so that it cannot roll or fall over.

1.4.5 Precautions with Load and Carry Method

- When travelling continuously with load and carry operations, choose the correct tires to match the operating conditions, or choose the operating conditions to match the tyres.
- If this is not done, the tyre will be damaged. This will reduce the tyre life, so contact your L&T dealer when selecting tyres.

1.4.6 Checking Radiator Coolant Level

A WARNING

Do not open the radiator cap immediately after operations are stopped. Always wait for the temperature to go down and proceed further. Failure to do so may lead to splashing of hot coolant on your body causing injury.



- Before checking the coolant level of radiator, stop the engine and wait for the engine to cool down, and then carry out the inspection.
- While opening the radiator cap, open slowly to release the internal pressure and prevent the hot coolant splashes outside.

1.4.7 Working with Electrical systems

- Before working with batteries, stop the engine, turn the starting switch to OFF position and disconnect the battery using battery disconnect switch.
- Avoid short circuiting the battery terminals with metallic objects such as tools, across the terminals.
- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- Always disconnect the negative (-) terminal (ground side) first when removing the battery. When installing the battery, connect the positive (+) terminal first, and connect the ground last. Tighten the battery terminals securely.
- Flammable hydrogen gas is generated when the battery is charged, so remove the battery from the chassis, take it to a well-ventilated place, and remove the battery caps before charging it.
- Never smoke or use any flame near the battery.



 Battery electrolyte contains sulphuric acid and can quickly burn the skin and create holes in clothing. If you spill acid on yourself, immediately flush the area with water



Always wear safety glasses or goggles, when working with batteries. If battery acid gets into the eyes, flush the eyes immediately with large quantity of water and see a doctor for medical attention. Battery acid can cause blindness, if it is splashed into your eyes.

NOTICE: If the wiring gets wet or the insulation is damaged, the electric system leaks and this could result in hazardous malfunction of the machine.

Loosen battery terminals can create sparks and may lead to explosion. Tighten the battery cap and terminals securely.

1.4.8 Cleanliness of Machine



NOTICE: When working on the seashore (or) when it in rains, carefully clean the electrical system free of water to prevent corrosion, which may lead to malfunction of the electrical system.

- Keep your machine clean and tidy. Spilled oil or grease, scattered tools or broken pieces are dangerous because they may cause you to slip; so always wipe it immediately.
- Always tighten the tank manholes, fuel and oil fillers, and all caps securely.
- Do not direct high-pressure water/steam directly for cleaning the radiator.
- Do not use water or steam to clean sensors, connectors, or the inside of the cabin. If water gets into the electrical system, there is danger that the machine may not move.

1.5 Safety for Towing

A DANGER

Do not allow anyone to come in between the two machines, when towing. This may lead to personnel death or serious injury.



- Towing in a wrong way may lead to serious injury or death.
- Never tow a machine on a slope.
- When using another machine to tow your machine, use a wire rope which is sufficiently strong.

1.6 Location of Safety Labels

- Maintain all the labels free from environmental dust particles. Fix the labels or change it if labels are damaged or lost.
- Carefully read the instructions given in the labels and be aware of hazards.



SAFETY













1. Do not stand under raised attachments



3. Precautions in articulation area



5. Do not touch rotating parts.



7. Precaution for accumulators

2. Do not stand near the machine. Precaution in reverse



4. Always use steering lock bar during maintenance.



6. Instruction for operator



8. Caution foot





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2. OPERATION

2.1 General View



OPERATION

2.2 Controls and Gauges



1. Ignition switch



- This switch is used to start the engine. There are three positions for this key:
 - OFF position This is the only position the key can be inserted or removed. When the key is turned to this position, the electric circuit will be turned off; if the machine is equipped with "electric engine shut off", the engine will be shut off.
 - ON Position When the key is turned to this position, electric circuit get connected. The key should be left in this position, when the engine is running.
 - START Position Turning the key to this position will crank the engine, and the engine will be started. After starting the engine, the key should be released immediately, allowing it to automatically return to ON position.

2. Power socket

• This socket is used to charge the mobile.

3. Front head light / park lamp switch

- It is a 3 way switch and the positions of the switch are explained below:
 - To switch OFF Park lamps, tail lamps and front head lamps.
 - ✤ P≤ : To switch ON Park lamps and Tail lamps.
 - ✤ ■D : To switch ON Park lamps, tail lamps and front head lamps.

4. Cabin fan switch

• This switch is to set the fan inside the cabin to ON / OFF position.

5. Front work light switch

• This switch is to set the front working lamps to ON / OFF position.

6. Rear work light switch

This switch is to set the rear working lamps to ON / OFF position.

7. Float switch

 When the float switch is switched on the lift arm follows the ground irregularities by using its self-weight only, without using its hydraulic circuit. This system is useful in collecting the spilled – soil during/after loading operation. Refer chapter 2.8.2

8. Transmission cut-off switch

• When travelling or working on slope, always set the transmission cut-off switch to OFF position.

9. Hazard switch

 If any system in the machine encounters a problem while working, set this hazard switch to ON position; so that all the four turn indicator lamps will glow with beep sound. This is to alert the personnel who are working or standing near the machine.

10. Joystick deactivation switch

• This is used to lock the joystick while the machine in moving state.

11. Joystick

• This joystick operates the lift arm and the bucket. To know how to operate, refer chapter 2.7

12. Cluster



A. Engine coolant temperature gauge:

• This gauge indicates the engine coolant temperature. When the pointer of the temperature gauge shows the green range, the coolant temperature is normal. When it enters the red range, the coolant temperature is abnormal.

B. High beam indicator:

• This lamp lights up when the head lamp is at high beam.

C. Left Turn indicator (direction):

• When the left side turn signal lamp flashes, this pilot lamp also flashes.

D. Engine RPM meter:

• This gauge shows the rpm of engine.

E. Right Turn indicator (direction):

• When the right side turn signal lamp flashes, this pilot lamp also flashes.

F. Battery charging indicator:

• This lamp warns the operator that the battery charging system is abnormal. This light should not glow when the engine is running. If it lights up, check the battery charging circuit.

G. Transmission oil pressure gauge:

 This gauge indicates oil pressure in the transmission. If the needle in the gauge points to first red region, oil pressure is normal. If it points to green region, the oil is in working range. If it points to second red region, slowdown the engine speeds and let the engine to cool.

H. Fuel level gauge:

- This gauge indicates the amount of fuel in the fuel tank.
 - ✤ E: Tank is EMPTY
 - ✤ F: Tank is FULL
- If the fuel gauge indicates E during operation, the fuel tank is empty.

I. Neutral indicator:

• This lamp glows when the transmission is in neutral. When starting the engine, ensure that the drive control switch is in neutral position and this lamp glows.

J. Brake pressure indicator:

 When this lamp glows, it indicates that the brake oil pressure is very low and the machine will not stop when the service brake is applied. It is dangerous to engage the service brakes, when this light glows (refer chapter 2.5.3).

K. Hour meter:

 This meter shows the total operation hours of the machine. The meter works whenever the engine is running - even if the machine is not travelling. The hour meter progresses by 1 unit, for one hour of engine running regardless of the engine speed.

L. Parking brake indicator:

This lamp glows when the parking brake is applied.

M. Hydraulic filter clog indicator

• This lamp glows when the filter in the hydraulic tank is clogged.

N. Engine oil pressure gauge

• This gauge indicates engine lubrication oil pressure.

- It has three zones in two colours. The zones are low, normal, and high. Low and high pressure zones are in red colour and normal pressure zone is in green colour.
- When the engine is running, the pointer of this gauge should always be in the green zone. If it is in red zone (either low or high), necessary action should be taken as indicated in chapter 3.9.

13. Indicator assembly

• This indicator's lamp glows with a beep sound when abnormal condition occurs in the machine.



P. Engine oil pressure indicator

• If engine oil pressure goes to lower than the normal pressure this indicator will glow.

R. Engine water temperature indicator

• Engine water temperature goes high it will indicate.

S. Logo

• This logo glow when any one of the parking/head lights is switched on.

T. Air Filter clog indicator

• When the air filter filled by dust, it will indicate.

U. Transmission oil temperature indicator

• If transmission oil temperature goes higher than the normal temperature it will indicate.

14. Transmission oil temperature gauge

• This gauge indicates the transmission oil temperature. When the pointer of the temperature gauge shows the green range, the oil temperature is normal. When the pointer enters the red range, the oil temperature is abnormal.

15. Accelerator pedal

• To increase the engine speed, this pedal should be pressed; releasing it will decrease the engine speed.

16. Combination switch

• This switch has several functions and that are explained below:



HEAD LIGHT CONTROL – This switch lever will function only when the head light \ Park light switch is ON. By keeping this lever in middle position, head lights glow in low beam. By shifting this lever from middle to lower position, head light changes from low beam to high beam. By shifting this lever in upward direction, head light glows in high beam and when overtaking any vehicle, it can be used as PASS function. The lever will return to low beam automatically, if you leave the switch.



TURN INDICATOR – This switch is to indicate the turn-direction of the loader. Shifting lever to the front will glow the left turn indicators. When shifting this to back, right turn indicators will glow.



 WIPER CONTROL – By rotating this switch in forward direction, wipers switch OFF; rotating it in reverse direction switches the wipers ON.

17. Operator's seat

 Operator's seat is adjustable type and it can move front and back. It also has back rest that allows you to recline. To know the adjustments of the seat refer chapter 2.5.1.

18. Parking brake lever

• This lever is used to engage the parking brake to prevent the machine from moving without the operator when it is parked or left in unattended condition. The parking brake is mounted on the transmission output shaft. To engage the parking brake, pull the lever.

19. Steering wheel

 This wheel is to steer the machine. Rotating the steering wheel right (clockwise) / left (anti-clockwise) side activates the hydraulic power-steering system and turns your machine to right / left directions.

20. Drive control switch

- This switch does the following actuations (For actuation details, refer chapter 2.6.1)
 - DIRECTION CONTROL This machine has two FORWARD and one - REVERSE speed transmission. Placing the switch in a suitable position, will cause the machine to move in the required direction and speed.
 - SPEED CONTROL There are two speeds for this machine. 1st gear speed is used for loading operation. 2nd gear speed is used for travelling.
 - HORN There is a button at the top centre of the drive control switch. When it is pressed, the horn will sound.

NOTICE: If the drive control switch is not in neutral position, the engine will not start.

NOTICE: When it is in FORWARD (F) position, 1st and 2nd speeds will work. When it is in NEUTRAL position, 1st and 2nd speeds will not work. When it is in REVERSE position, 1st speed will work and 2nd speed will not work.

21. Brake pedal

• This pedal actuates the hydraulically operated service brakes, mounted both on front and rear axles. Depressing this pedal applies the brakes.

2.3 Transportation

2.3.1 Instructions for Transportation

NOTICE: It is the responsibility of the transporter and his driver for the safe transport of the machine. Be particularly careful for the attachments adequately secured during transport.

- Obey all state and local laws governing the weight, width, and length of a load. Observe all regulations governing wide loads.
- Ensure the suitability of the transporting vehicle.
- Make sure the transporter is aware of the maximum height of your machine loaded on to the transporting vehicle and clearance height to be maintained while driving.

NOTICE: Always transport the machine using low bed trailers (height of bed from ground shall be 1.28 m approx.). If the machine is not transported using low bed trailers, cabin should be removed while transportation.

Failure in transporting the machine on low bed trailer will lead hitting with overhead bridges/tracks.

2.3.2 Loading and Unloading



- When loading or unloading, always use ramps as a platform and carry out the operations as follows.
 - Position the transporting vehicle to the right place.
 - Properly apply the brakes in the transporting vehicle and insert blocks under the tyres to ensure that it does not move.
 - Then fix the ramps in line with the centres of the trailer and the machine. Be sure that the two sides are at the same level as one another.

- Remove the mud from the undercarriage of your machine to prevent the machine from slipping on slopes.
- * If the ramp bends, reinforce it with blocks, etc.
- Set the direction of the ramps, then slowly load or unload the machine.
- Carefully drive the machine onto the transporting vehicle, to the correct place and stop the machine.

2.3.3 After loading

- After loading the machine in the specified position, secure it in place as follows.
 - Lower the work equipment slowly.
 - Put the direction control switch and the joystick in Neutral position.
 - ✤ Apply the parking brake.
 - Turn the ignition switch to the OFF position and stop the engine.
 - $\label{eq:relation} \bullet \quad \text{Remove the key from the ignition switch.}$



- Lock front frame and rear frame with safety bar as shown.
 - Cover exhaust pipe and air filter to prevent entry of rain water.
 - Put blocks in front and behind the wheels, and secure the machine with chains or wire rope to prevent the machine from moving during transportation.

2.3.4 Tying the machine

- Secure the machine with proper tying on the trailer.
- Use rope or chain that is capable of tying the machine. Ensure the machine has been well supported on the trailer.








Always take care when handling rope or chain will lead injury.

2.4 General Checks before Starting

Before starting the engine, following inspections have to be performed on your loader to make it ready to operate:

- Walk around check
- Bucket should be lowered, so that it does not hinder visibility.
- Parking brake should be in fully applied condition.
- Transmission and hydraulic system controls should be in Neutral condition.

WARNING

Do not leave spilled-out or leaked-out oil, fuel or other flammable materials near the high temperature parts such as exhaust muffler, turbo charger, etc. Failure to do so may lead to fire. Wipe / clean them immediately, if found.

2.4.1 Walk-Around Check

Remove any waste paper or dead leaves inside the engine compartment. These may cause fire.

- Look around the machine and under the machine for the following inspections.
 - Walk around machine, checking for people, animals, or objects that might be in the way or under the machine.
 - Make sure that the attachment and all pivot pins are secured correctly in place and in good condition.
 - Check wheel nuts and axle nuts are not loosened. Tighten if they are loose (refer chapter 0)
 - Ensure proper AC compressor belt tension.
 - No air leaking from the cabin to maintain proper temperature.
 - * No fouling of hoses in the AC circuit.
 - No leakage of oil, fuel, lubricant, and Coolant.
 - ✤ No loose wiring connections.
 - No wear and damage of the tyres.

- Tyres inflated to specified pressures (refer chapter 3.6)
- No excessive wear of the bucket tooth.
- No water leakages in radiator.
- Check lubrication points for sufficient lubrication.
- No oil leaks, particularly at high pressure joints and hoses.
- Check the drain plugs for tightening to prevent oil leaks. To know the locations of drain plugs refer chapter 3.4
- Check for damage to hand rails and steps.

2.4.2 Checking Engine Oil Level

NOTICE: Check the engine oil level before starting the engine (or) 5 minutes or more after the engine is stopped.



- Before checking the oil level, park the machine on level ground.
- Open the engine hood main door on the right side of the machine.
- Remove the engine crankcase dipstick, wipe it, and reinsert it to the crankcase.
- Again remove the dip stick from the engine and observe the oil marking in the dipstick.
- Oil marking in the dipstick should be in between the upper and lower marks of the dipstick.
- If the Lubrication oil level is below the lower mark of the dipstick, fill the oil until it reaches upper mark. Follow the procedure given in chapter 3.5.3 for filling. Use the specified Lubricants only (refer chapter 3.3.5).

NOTICE: Never operate the Engine with the oil level below the lower mark or above the upper mark. Insufficient oil will cause Wear and tear of Engine components. Excessive oil causes foaming and other problems.

2.4.3 Checking Radiator Coolant Level

NOTICE: Check the coolant level before starting the engine (or) 5 minutes or more after the Engine is stopped.

• When checking the coolant level, park the machine on level ground.



Do not open radiator cap immediately after the engine stops. Wait for the temperature to come down and check the coolant level. Failure to do so may lead to personnel injury.

- Open the radiator cover in the hood above the radiator cap.
- Remove the radiator cap and check the coolant level in De-aeration tank whether it is visible or not. If it is not visible by seeing normal, pour the coolant below (approx. 40mm below) the air vent tube.
- Coolant level should be below the air vent. Follow the filling procedure given in chapter 3.5.7. Use the specified Coolant only. (Refer chapter 3.3.10).

NOTICE: Insufficient coolant will cause Boiling of coolant. Excessive coolant causes foaming and clogging of air vents.

2.4.4 fuel level



A DANGER

When adding fuel, never let the fuel overflow. Also do not bring fire or sparks near the fuel tank. It may cause explosion leading to serious personnel injury or even death.

NOTICE: When checking the fuel level using fuel gauge, the ignition key should be kept in ON position (refer chapter 2.5.2).

- When adding fuel, park the machine on level ground.
- Check the fuel level using fuel gauge of the cluster. If the fuel gauge pointer touches red mark, fill the fuel as quick as possible.
- For filling the fuel, open the fuel neck.
- Fill the fuel at the end of the shifts to avoid idle time of the machine.

2.4.5 Checking Hydraulic Oil Level



NOTICE: Check the oil level before starting the engine (or) 5 minutes or more after the Engine is stopped.

- When checking the oil level, park the machine on Level ground.
- Before checking hydraulic oil level in the sight gauge, slowly loosen the breather to release the pressure in tank & tighten it.
- After 5 minutes, check hydraulic oil level using sight gauge in the hydraulic tank.
- Hydraulic oil level should be visible through sight gauge.
- If the Hydraulic oil level is below the Sight gauge, fill the oil until it reaches Sight gauge. Follow the procedure given in the chapter 3.5.15 for filling. Use the specified hydraulic oil only. (Refer chapter 3.3.7).

NOTICE: Never operate the Machine with the oil level below the Sight gauge. Insufficient oil will cause Vacuum, Wear and tear of Hydraulic elements. Excessive oil causes foaming and other problems.

2.4.6 Checking Transmission Oil Level

Cold Check

- Before starting the engine, be sure of oil level is equal to or slightly above the FULL level on the dipstick (refer figure below).
- Operate the engine at 1200-1500 rpm with transmission is NEUTRAL for 1 minute.
- While engine is running at the above rpm add oil as required to establish level of the lower ADD level.

Hot Check

 Perform stall check for 30 seconds maximum in FWD HIGH range to get transmission converter out temperature reaches to normal operating temperature of 80-100°C.

Necessary care shall be taken to take care of safety of the property and people while performing the stall check.

- With the engine at idle speed, shift through all the range positions slowly.
- In neutral, operate engine at 1200-1500 rpm and add or remove oil is required to establish oil level at FULL mark in the dipstick.
- Follow the procedure given in the Maintenance for filling. Use the Transmission oil given in chapter 3.3.8.



NOTICE: Never operate the Transmission with the oil level below the Low or above the Full. Insufficient oil will cause Wear and tear of Transmission elements. Foaming may cause faulty level in the dipstick.

2.4.7 Checking Air Filter Dust

NOTICE: Do not operate the engine with more dust in the Air Filter which will cause the engine stall.



- Check the Air Filter clog indicator mounted in the indicator assembly.
- If it glows, clean the dust collector in the Air Filter. Follow the cleaning procedure given in chapter 3.5.2. The dust collector should not be filled with dust more than half.
- After ensuring that there is no dust in the dust collector, refit the dust collector.

2.4.8 Checking Tyres

- Inspect all the tyres for breaks, cuts, imbedded debris, or other damages.
- Check the tyre pressure with an accurate gauge.
- Inflate the tyres to the specified pressures. (Refer chapter 3.6).

NOTICE: Higher or lower pressures will cause damage of Tyres, Valves & Tubes.

2.4.9 Checking Electrical Wires

- Check the electrical wires for no loose connections, disconnections or short circuits.
- Check any rust on the electrical terminals.

2.5 Starting the Engine

NOTICE: Before starting the engine, follow the instructions mentioned in chapter 2.4.

2.5.1 Adjustments before to start



Operator seat

- Adjust the seat before starting operations or when changing operators.
- Park the machine in a safe place and stop the engine when carrying out adjustment of the operator's seat.
- For adjusting forward and backward move lever 1 upward, move the seat to the best position, and then release the handle.
- For adjusting seat height, rotate the knob 2 in clockwise and anti-clockwise direction to move the seat up and down.
- For adjusting backrest, rotate the lever 3 to front, set the seat to the desired angle and then release the handle.
- After adjusting the operator seat, check that you can depress the brake fully with your back against the seat backrest.

Rear view mirror



• Sit in the operator seat and adjust the rear view mirror so that you can see the rear view properly.

Do not operate the machine if you cannot see the path clearly. Accidents can be caused by working

Starting the Engine

with poor visibility. Keep your machine rear view mirrors always clean and in good condition. Failing may affect your visibility.

2.5.2 Starting engine

NOTICE: Keep the direction control switch in neutral. If it is not in neutral, the engine will not start.

Ensure AC switch is in off condition before starting on & switching off the engine.



Do not start the engine when the joystick is not in neutral position. Failure to do so will make the lift arm or bucket move suddenly, causing personnel injury or damage to your machine.

NOTICE: Do not keep the starting motor rotating continuously for more than 20 seconds. Failure to do so will damage your motor or will discharge the battery.



- Insert the ignition key in ignition switch, turn the key to "ON" position
- Check that all the indicator lamps in the cluster glow for 5 seconds continuously. This ensures that the lamps are working properly. If any lamp does not glow, do not start your loader. Contact your service personal for replacement of those lamps.
- Check whether the parking brake lamp glows continuously even after 5 seconds. If it does not glow, apply the parking brake first.

If the machine has to be started on a slope, always turn transmission cut-off switch in OFF condition and depress the brake pedal. Then start the engine and depress the accelerator pedal while releasing the brake pedal to move the machine slowly.

• Turn the key of starting switch to the "START" position to start the engine.

- This will crank the engine. After the engine is started, release the ignition key and the key will return automatically to "ON" position.
- If the engine does not start, wait for at least 2 minutes before trying to restart the engine again.
- If still it does not start, slightly depress the accelerator pedal at the right side of dash board, and then retry starting.

2.5.3 After starting

NOTICE: After starting the engine, do not start operating your loader immediately. Perform the checks after starting and then start operating.

Checks after starting

- Depress accelerator pedal slightly and run the engine with no load at mid-range speed for about 5 minutes.
- Check the engine oil pressure gauge, for pointing the pressure in green zone.
- If the engine lubricating oil pressure gauges does not register oil pressure or it is not in the green zone within 10 to 15 seconds, shut-off the engine to prevent any damage until the trouble is corrected.

NOTICE: Do not run your engine with low engine lubricating oil pressure. This will damage the engine parts and reduce the engine life.

 Check the battery charging indicator lamp extinguish automatically.

Do not move the machine until the brake oil pressure indicator extinguishes automatically. Failure to do so will cause your brakes to fail and may cause accident killing you or nearby personnel.

- Check the brake oil pressure indicator lamp extinguish automatically. If it does not extinguish, do not try to move the machine. Raise the engine speed and wait for the lamp to extinguish.
- Check the engine sound and exhaust gas colour are normal.
- Check the horn for proper working.
- Check the head lamps to work properly.
- Check the cut-off sensors of the work equipment to work properly. To know the operation of work equipment refer chapter 2.7.

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- Check the reverse buzzer for proper working.
- Check the Tail lamp & Turn indicator working properly.

NOTICE: Do not run the engine at low idling or high idling continuously for more than 20 minutes.

- If it is necessary to run the engine at idling, operate the lift arm from time to time or run the engine at a mid-range speed.
- Check the transmission oil level for hot level-checking. For checking procedure, refer chapter 2.4.6
- Check the hydraulic oil level for hot level-checking. For checking procedure, refer chapter 2.4.5.

2.6 Travelling

WARNING

- Before moving the machine, check that the area around the machine is safe, and do not allow people near the machine. Failure to do so will cause serious personnel injury or even death.
- There is a blind spot behind the machine; so be particularly careful when travelling in reverse.

2.6.1 Moving the Machine

• Sound the horn to clear the personnel around the Machine.



 Operate the joystick to set the work equipment to travel posture as shown in the above diagram. To operate the joystick, refer chapter 2.7.



 Depress brake pedal and by pressing the centre button of parking brake lever, push the lever downwards fully to disengage the parking brake completely.



- Set the drive control switch to the desired direction (forward or reverse).
- Rotate the drive control switch to 1st gear position.
- Release the brake pedal, and slightly depress the accelerator pedal to slowly move the machine.
- After the speed of the machine picks up, change the gear from 1st to 2nd to travel at the maximum speed of the machine.(refer chapter 4.1 for machine speeds)

NOTICE: When travelling at high speed in 2nd gear, do not change the gear from 2nd to 1st suddenly. Failure to do so will reduce the life of the transmission.

- When changing the gear, apply the brake to reduce the speed and change the gear.
- When switching between FORWARD and REVERSE, depress the brake pedal to reduce the travel speed sufficiently then change the direction of travel.
- When moving the machine on slopes, set transmission cut-off switch to the OFF position, depress brake pedal when depressing accelerator pedal, then gradually release brake pedal to allow the machine to start moving.

2.6.2 Turning the Machine

WARNING

Make sure that there are no personnel near the machine, when turning the machine. Failure to do so may cause personnel injury or even death.



• Use steering wheel to turn the machine.

In this machine, the front chassis is joined to the rear chassis at the centre of the machine by the centre pin. The front and rear frames bend at this point, and the rear wheels follows the same track of front wheels when turning.

If the engine stops when the machine is travelling, the steering will not work and this is dangerous which can lead to accident, particularly on hills. So never stop the engine when the machine is travelling.

- If the engine stops, stop the machine immediately at a safe place, without obstructing the road or other worksite operations.
- Turn the steering wheel lightly to follow the machine as it turns. When turning the steering wheel fully, do not turn it beyond the end of the stroke.

A DANGER

It is dangerous to turn the machine suddenly at high speeds, or to turn on steep hills. Failure to follow will cause the machine roll over, killing the operator.

2.6.3 Stopping the Machine

NOTICE: Avoid sudden stopping the machine, except in case of emergencies. Give yourself ample room when stopping.

• For stopping the machine and the engine, refer chapters 2.10.2 & 2.10.3.

2.6.4 Travel Instructions

NOTICE: Always travel with the bucket empty, when you travel between sites.

- When the machine travels at high speed for a long distance, the tyres become extremely hot. This will cause wear of the tyres quickly, so it should be avoided as far as possible. If the machine must be driven for a long distance, take the following precautions.
 - Before driving the machine, carry out the checks before starting.
 - Check the tyre pressure before starting, when the tyre is cool.
 - After travelling for 1 hour, stop for 3 minutes. Check the tyres for damages.
 - The most suitable tyre pressure, travel speed, or tyre type differ according to the condition of the travel surface. Contact your service personnel for more information.

NOTICE: Do not use the brake pedal repeatedly and do not rest your foot always on it, unless necessary.



- When working in water, the level of water can be up to the bottom of the axle housing, which is around 40 cm from ground level. Do not work beyond this permissible level.
- If the speed control lever is not placed in a proper speed position, transmission oil may overheat. If it overheats, place the speed control lever in the next lower gear speed to lower the oil temperature.
- If the transmission oil temperature gauge does not indicate the green range of the gauge even with the lever in the 1st speed position, stop the machine, place the lever in neutral, and run the engine at medium speed until the gauge indicates the green range.

2.7 Operating the Loader



2.7.1 Lift arm operations



Automatic Raise

• In this position bucket raises automatically, without holding joystick. After reaching the raise position, joystick returns back to hold position.

Raise

In this position bucket raises manually, by holding joystick.

Hold

• To keep the lift arm in the same position.

Lower

• In this position bucket is lowered manually, by holding the joystick.

Float

 In this position due to self-weight lift-arm lowering freely by holding joystick. Do not use the float switch when dumping the bucket.

Automatic float

• In this position due to self-weight lift-arm lowering freely without holding the joystick.

2.7.2 Bucket operations



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Dump

• To tilt the bucket downwards.

Hold

• To keep the bucket in the same position.

Roll back

To tilt the bucket upwards.

Automatic roll back

• To tilt the bucket upwards, without holding joystick.

2.7.3 Return to dig operation

- The lift-arm and the bucket can be returned automatically to scooping position, after dumping a load. This results in faster cycle time and allows the operator to concentrate on manoeuvring the machine.
- To simultaneously tilt the bucket upward & lower the arm by moving the joy stick in an angular position. (refer chapter 2.7).

2.8 Adjusting the Loader

2.8.1 Before adjusting

Do not go under the work equipment when the lift arm is raised. If it is necessary to go under work equipment, always fix the lift arm lock and proceed. Failing to do so may cause death or series personnel injury.

- Stop the machine on flat ground. Shut off the engine and remove ignition key from the ignition switch.
- Apply the parking brake and put blocks in front and rear of tyres.
- Lock the rear frame and front frame with steering lock bar.

2.8.2 Adjusting boom kick out

 Adjustments of attachments can be done depending upon the working conditions of your loader and your worksite instructions.



- The boom kick out is used to set the bucket height at a particular position, so that it automatically stops at the desired lifting height.
- Raise the bucket to desired height, set the lift arm at HOLD position. Then stop the engine and adjust as follows:
 - ✤ Loosen the screw.
 - Adjust the proximity sensor by moving in the slot, so that the top edge of the arm is in line with the centre of the proximity sensor.
 - * Retighten the screw.
- After adjusting the proximity sensor, start the engine, and check that lift-arm reaches the desired height and stops at that position.

2.8.3 Adjusting bucket angle



- The bucket positioner is used to set the bucket angle so that it automatically stops at the desired digging angle or cutting edge parallel to the ground.
- Lower the bucket to the ground and adjust the bucket to the desired digging angle. Set the bucket at HOLD, stop the engine and adjust as follows,
- Loosen the screws.

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- Adjust the proximity sensor over the tilt cylinder so that the edge of the actuator is in line with the centre of the proximity switch.
- Tighten the screws.
- After adjusting, start the engine and raise the lit arm, and check the bucket reaches the desired angle and stops at that position.

2.9 Possible Work Using Loader

NOTICE: Never carry out these operations with the machine articulated. Always keep the operating site flat, and remove any fallen rocks.

2.9.1 Operating tips

- Keep the drive control switch in a lower gear during loading operations and when transporting a load.
- If the tyres slip, the tyre life will be reduced, so do not allow the tyres to slip during operation.
- Always keep the working area flat.
- Following operations may cause overheating of transmission oil. To prevent overheating, watch the transmission oil temperature gauge; if the needle enters the red zone, select a lower gear, or reduce load:
 - Long periods of operation,
 - Working near stall speed,
 - Wheels or buckets moved slowly,
 - Machine not at all under load.

2.9.2 Digging operation

Do not drive or hit the loader bucket forcefully into the stockpile or blasted rock. Failing to follow may cause sudden increase in pressure in hydraulic hoses, resulting in hose bursting and personnel injury.

- Always set the machine facing directly to the front of the pile, when carrying out digging or scooping operations.
- This operation should be carried out in 1st gear.
- Always try to load the bucket in its centre. If the load is on one side of the bucket, the load will be unbalanced.

NOTICE: When carrying out digging operations, tyre may slip which may reduce the tyre life; so do not allow the tyres to slip during digging.

NOTICE: When digging with the bucket, avoid imposing the digging force onto only one side of bucket. Always set the bucket directly to the front of material.



- When driving the machine forward and lowering the bucket at the same time, stop the bucket about 30 cm (12 inch) from the ground, then lower it slowly as shown in figure. If the bucket hits the ground, the front tyres will come off the ground, and the tyres will slip.
- Shift down the bucket in front of the material to be loaded.



• When the material is in a stockpile, keep the cutting edge / teeth of the bucket horizontal, as shown in the above figure.

NOTICE: Avoid digging on HARD PILE. It may spoil vehicle and performance of hydraulic system.



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- When loading blasted rock, keep the bucket teeth tilting down slightly, as shown in the above figure. Be careful not to get blasted rock under the bucket, which can make the front tyres come off the ground and slip.
- Now depress the accelerator pedal and at the same time, thrust the bucket into the material.



- When thrusting the bucket into the material, slightly raise the lift arm to prevent the bucket from going in too far. By doing so, ample traction will be produced by the front tyres, which will help digging.
- Check that there is enough material loaded into the bucket, and then operate the joystick to tilt the bucket and load the bucket fully.



 If there is too much material loaded in the bucket, dump and tilt the bucket quickly to remove the excessive material. This prevents spillage of the load during hauling.



- When digging on level ground, do the following steps:
 - Set the bucket edge/teeth facing down slightly, as shown in the above figure.
 - For excavating the soil, drive the machine forward and operate the lift arm forward to cut a thin layer of the surface. If necessary, operate the lift arm slightly up and down to reduce the resistance when driving the machine forward.

NOTICE: Do not fill the bucket beyond the capacity of the bucket. This prevents spillage of load during loading and carrying operation.

2.9.3 Filling the Bucket

NOTICE: Always set the loader facing perpendicular to the stockpile. This will avoid over loading the bucket on one side.



- When filling the bucket to its full and raising it to the maximum height, shake the bucket first to stabilize the load before raising the bucket. This will prevent the load from spilling to the rear. But, avoid excessive shaking of the bucket.
- There are two methods of filling the loader bucket. The operator should judge the type of penetration needed for loading and vary the methods to suit the materials.

Arc penetration



- In this method, the loader bucket is penetrated into the stockpile in a continuous upward arc until the bucket is filled.
- Approach the stockpile or bank slowly with bucket horizontal at ground level and keep machine in forward motion, until the bucket is full. If necessary keep the engine, running at full throttle.
- Penetrate the bucket straight into the pile. Then coordinate between the lift-arm motion and bucket roll back motion, so that the rear of the bucket is filled as the machine moves forward.

NOTICE: During bucket filling, learn to coordinate between the lift-arm and bucket motions. Too much roll back will under fill the bucket and too little roll back will over load the bucket.

Step penetration



- In this method loader bucket is penetrated horizontally into the material with intermittent and successively higher levels, or steps, until the bucket is filled.
- Approach the material slowly, with bucket horizontal at ground level with engine running at full throttle, penetrate

the bucket straight into pile as for as possible during initial thrust.

- When engine speed starts to drop, depress brake pedal with transmission cut-off switch ON. Keep the bucket horizontal and raise approximately one foot.
- Resume forward motion of machine and drive bucket further into pile. Repeat this cycle as many times as necessary until the bucket is full.

2.9.4 Carrying the Material

Do not suddenly steer or apply the brake suddenly, when travelling with a raised load. Also, lower the bucket to bring the centre of gravity down, to increase the machine stability. Failure to do so will cause the machine to roll over and may even lead to death.

- Select the method of operation which will give the minimum amount of turning and travel in order to provide the most efficient method for the jobsite.
- When carrying the load, raise the bucket just high enough to clear obstacles in the loader's path. Raising the bucket higher than necessary reduces stability and traction of the loader.
- When reaching near the dump truck/spot, reduce the travel speed of the loader, to avoid hitting.

2.9.5 Loading into the truck

NOTICE: Raise the bucket at the time of reaching the dump spot, to avoid spillage of material.

- When dumping the load into the truck or hopper, gradually spill the load out of the bucket to ease the strain of added weight on the truck or hopper.
- If part of the load remains in the bucket after dumping, knock the bucket against its stopper to loosen any remaining material.



- When dumping into the truck, load in the direction of wind. This helps in pushing the dust away from the machine and eliminates chance of dust or loose materials impairing visibility. This would also reduce the engine air filter maintenance.
- Start raising the bucket, only at the time of reaching the dump truck/hopper/spot, so that it will reach required the dump height.
- If one side of truck is lower than the other, try to locate the truck, so that you can dump over the low side. This improves reach and distribution of load in truck.
- Reach over and dump into the far side of the truck first. Fill the truck gradually from the far side to the near side in order to distribute the load in the truck properly.

NOTICE: When piling up loads, be careful not to let the rear counterweight come into contact with the ground. Also, do not set the bucket to the DUMP position, when carrying out piling-up operations.

V-shape loading



- Position the dump truck so that, the direction of approach of the loader to the dump truck is not more than 60° to the direction of approach to the stockpile. Smaller the turning angle of the loader, more efficient is for V-shape loading.
- After loading the bucket, drive the wheel loader in reverse, and then turn it to face the dump truck and travel forward to load the dump truck.

Cross drive loading



- Position the dump truck at right angle from the direction of approach of wheel loader to the stockpile. Set the wheel loader facing at right angle to the stockpile.
- After digging in and carrying the load, drive the machine straight back in reverse, then bring the dump truck in between the stock pile and the wheel loader.
- After dumping the material into the truck move the truck away from the wheel loader.

NOTICE: Though V-shape loading requires more cycle time than the Cross type loading, it is safer, since the dump truck is stationary and there will be no confusion between the loader operator and the truck driver.

2.9.6 Levelling operation

A WARNING

When operating the machine in backward, be careful about all the personnel are away from the machine. Failing to do so may cause serious personnel injury or even death.



- Scoop soil into the bucket. Move the machine backward while spreading soil from the bucket little by little.
- Go over the spread soil with the bucket edge touching the ground and level the ground by back dragging.

 Scoop some more soil into the bucket, put the lift arm in float, level the bucket at ground level, and smooth the ground by moving backward.

NOTICE: Always move the machine backward during levelling operation. If it is necessary to carry out forward levelling operation, do not set the bucket dumping angle to more than 20° and do not dig the bucket into the ground. This will prevent quick wear and damage of the work equipment and frame.

During levelling operation, put Joy-stick in floating mode.

2.9.7 Pushing operation



- This operation is carried out to level the material which is dumped on the dumper, hopper, etc.
- Never set the bucket to the dump position, when carrying out pushing operation. When carrying out pushing operation, set the bottom of the bucket parallel to the ground surface.

2.10 After Operation

2.10.1 Checks after operation

- After completion of work, check the engine coolant temperature, engine oil pressure, transmission oil temperature, and fuel level.
- Service meter reading should be checked out every day for any necessary maintenance to be carried out.

2.10.2 Parking the machine

- Release accelerator pedal, and depress brake pedal to stop the machine.
- Place the drive control switch in neutral.
- Operate the joystick to lower the bucket to the ground (refer chapter 2.7).
- Make sure that the joystick is in neutral position, before leaving from the cabin.

• To apply the parking brake, follow the instructions given in chapter 2.12.1.

NOTICE: Do not stop the engine, unless you follow the above instructions.

2.10.3 Stop the engine

NOTICE: If the engine is overheated, do not abruptly stop it (except in case of emergencies). Run the engine at medium speed to allow it to cool gradually. Check the oil temperature gauge. If it reaches the green scale, stop the engine. Failing to follow will reduce the engine life.



 Electric engine shut-off - Turn the key in ignition switch to the OFF position, which will stop the engine. Remove the key from ignition switch.

2.10.4 Checks after stop the engine

- Perform Walk-around checks as given in chapter 2.4.1.
- Check the tyres for damage, trapped stones in the tyre buttons and cracks.
- Check for leakage of oil, fuel, and coolant. If any leakage or abnormality is found, contact your service personnel.
- Check the fuel level and top up the fuel tank.
- Remove any mud stuck to the under the entire machine.

OPERATION

2.11 Hot & Cold Weather Operations

2.11.1 Hot weather operation

- During periods of hot weather, extra precautions must be taken on the following items:
 - * Keep coolant up to the correct level.
 - * Keep engine cooling system pressurized.
 - Check fan belt tension frequently.
 - Use lubricants of correct viscosity for high temperature operation.

NOTICE: Replace the radiator cap immediately if engine cooling system cannot maintain the pressure.

NOTICE: Keep radiator free of bugs, dirt, and trash. Clean the radiator frequently.

2.11.2 Cold Weather Operations

Easy Start

- The machine is designed to work in all weather conditions. However certain precautions must be taken during cold weather to prevent damage and assure easy starting and efficient operation.
- If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows,
 - Use the fuel and lubricants according to the ambient temperature.
 - During extremely cold weather drain crankcase oil while it is still warm from operation and store it in a warm place. If possible preheat it before reinstalling in engine before starting of daily operation.
 - Contact your L&T service engineer for advice before commissioning the loader in extremely cold ambient.

Coolant

A WARNING

Anti-freeze coolant is flammable, so always keep the flame of fire away from coolant. Failing may cause fire accidents and personnel injury.

- Use antifreeze coolant during cold weather operation.
- Keep antifreeze fluid away from an open flame. Never shake when using antifreeze.
- Never use methanol, ethanol, or propane based antifreeze.

- Absolutely avoid using any water leak preventing agent either used independently or mixed with antifreeze.
- Do not mix antifreezes with different brands.
- Use a permanent antifreeze (ethylene glycol mixed with corrosion inhibition inhibitor, antifoam agent, etc.), meeting the standard requirements.
- With permanent antifreeze, no need to change coolant for a year. If it is doubtful that available antifreeze meets the standard requirements, ask the supplier of that antifreeze for information.
- Where permanent antifreeze is not available, ethylene glycol antifreeze without corrosion Inhibitor may be used only for the cold season. In this case, clean the cooling system twice a year (in spring and autumn). When refilling the cooling system, add antifreeze in autumn, but do not add any antifreeze in spring season.

Battery

- To avoid gas explosions, do not bring fire or sparks near the battery. Failing to follow may cause explosions and personnel injury.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult with doctor.
- When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%, and insulate it against cold temperature so that the machine can be started easily in the next day morning.
- During extremely cold weather, remove and store the battery in a moderate warm place, preferably around 21°C. Reinstall battery just before starting daily operation.
- Measure the specific gravity and calculate the rate of charge from the following conversion table.

SI.	RATE OF	TEMPERATURE OF FLUID				
No	CHARGE	20°C	0°C	-10°C	-20°C	-30°C
1	100%	1.28	1.29	1.30	1.31	1.32
2	90%	1.26	1.27	1.28	1.29	1.30
3	80%	1.24	1.25	1.26	1.27	1.28
4	75%	1.23	1.24	1.25	1.26	1.27

During operation

- After starting the engine run it at one-third to one-half speed for two minutes to circulate engine oil.
- Then run the engine at full speed for warming up.
- To maintain engine operating temperature in cold weather, whenever the engine is free from load, keep the engine runs at full speed except when shifting the machine.
- To warm up the hydraulic oil only in cold areas, do as follows;
 - During the warming up operation, maintain the engine to run smoothly.
 - Move the bucket control lever in and out at the TILT position to warm up the hydraulic oil.
 - The relief time at the tilt position should be a maximum of 10 seconds.
 - With this operation, the oil will reach the relief pressure and this will warm up the hydraulic oil more quickly.
- After carry out the warm-up operation, check the gauges and caution lamps are normal.
- If there is any abnormality, carry out maintenance or repair.
- Run the engine under a light load until the engine water temperature gauge and transmission oil temperature gauge are in green range Check that there is any abnormality in exhaust colour, sound & vibration. If there is any abnormality carry out repairs.

After Completion of Operations

- Always do the following precautions when the operations are completed. So that this helps in the next day.
 - Park the machine on hard, dry ground. If this is impossible, park the machine on wooden boards. This helps to protect the tracks from being frozen in the soil and the machine can start next morning easily.
 - Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
 - As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again in the next morning.

NOTICE: To avoid battery electrolyte from freezing, cover the battery and keep it in a warm place.

NOTICE: Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by water in mud or dirt.

After cold weather

- When season changes and the weather becomes warmer, do as follows,
 - Replace the fuel and oil for all parts with oil of the viscosity specified.
 - Use the fuel and lubricants according to the ambient temperature.
 - If for any reason permanent antifreeze cannot be used, instead of that an ethyl glycol base antifreeze is used or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh coolant.

2.12 Parking & Locking the Machine

2.12.1 Parking

NOTICE: Never use the parking brake to stop the machine when travelling, except in case of emergencies.

Always apply parking brake, when leaving the machine and parking the machine. Failure to do so may cause serious injury.

• Stop the machine as per the instructions given in chapter 2.10.2.



 Pull the parking brake lever to apply the parking brake as shown in the above figure. • Press the button and push the lever down to relieve the parking brake.



- Always avoid parking the machine on slopes. If the machine needs to be parked on slope, set the machine facing directly down the slope, dig the bucket into the ground and put blocks under the tyres, as shown in the above figure, to prevent the machine from moving.
- For stopping the engine, refer chapter 2.10.3.

2.12.2 Locking

NOTICE: Always lock the doors before leaving the machine otherwise it may lead to theft of equipment or accessories.

- Lock the following places:
 - Cabin doors (left & right side window from inside)
 - ✤ Fuel tank filler cap
 - Engine hood doors (left, right & rear)
- Ensure that the key is kept at proper location.

2.13 Towing



NOTICE: Do not tow unless it is absolutely necessary. Towing may create further damage to the machined.

NOTICE: Before starting to toe the machine do not forget to disconnect the propeller shaft with the axles.

- The towing vehicle must have enough pulling power and braking power to move and stop the machine.
- Towing a machine too far or too fast can damage the transmission. Do not tow a machine more than 10km. Use trailer for greater distances. When towing do not travel more than 16km/h.

3. MAINTENANCE

3.1 Maintenance Instructions

NOTICE: Before starting maintenance, strictly follow the safety instructions mentioned in chapter 1.4. Contact L&T service personnel in case of any problem/doubt while doing maintenance.

NOTICE: Keep your pockets free of loose objects, which can fall out and drop into the machinery.

- Service meter reading should be checked out every day for any necessary maintenance to be carried out.
- Use only L&T spare parts specified in the Spare Parts Manual as replacement parts.
- Use oils & lubricants specified in the chapter 3.3. Always use clean oil & grease.

NOTICE: Do not use different grade oil(s) or coolant, when changing and adding oil.

- Use non-flammable cleaner / window washer fluid for cleaning the parts.
- Always keep the machine clean. This makes easier to find parts causing problems. Keep the grease nipples, breathers, and oil level gauges clean and avoid foreign materials getting into them.

NOTICE: Do not splash water on the electrical components.

- During the operation and maintenance, always obey the safety precautions on the safety labels attached to the machine.
- Attach the warning tag to the steering wheel, to prevent anyone from starting the engine during maintenance.
- Draining hot oils, coolants and removing their filters immediately after the engine stops, are hazardous. Allow the engine to cool and then remove.
- If the oil has to be drained when in cold climate, start the machine and warm up the oil to a suitable temperature (approx.20°C - 40°C), before draining.
- After oil is changed or filters are replaced, check the oil and filters for metallic particles and foreign materials. If large quantities of metallic particles or foreign materials are found, call your L&T service personal immediately.
- When O-rings or gaskets are removed, clean the faces and replace the O-rings and gaskets with new ones. Be sure to fit O-rings and gaskets when assembling.

 When working in rocky areas, check for damages to the undercarriage and for looseness, flaws, wear, and damage in bolts and nuts.



Keep flame or cigarette lights far away from oil. Failing to do so may cause fire accidents and may cause serious injury to the personal.

- If there is any welding operation to be done, follow the procedure given below:
 - ✤ Do not apply more than 200 V continuously.
 - Connect the grounding cable within 1 m (3.28 ft.) from the area to be welded.
 - * Avoid seals or bearings from the area to be welded.
 - * Never weld any pipe or tube containing fuel or oil.
- At worksites where the operations are heavy, do the maintenance on the machine more frequently than the specified intervals and carry out greasing more frequently than usual.
- When working in dusty worksites, follow the below procedures:
 - Inspect the air filter clogging indicator to see whether the air filter is blocked up. Clean the air filter at shorter intervals than specified.
 - * Clean the radiator core frequently to avoid clogging.
 - Clean and replace the fuel filter frequently.
 - Clean Electrical components, especially the starter motor and alternator, to avoid accumulation of dust.

3.2 Maintenance Chart

NOTICE: To obtain trouble free service from your loader, keep the regular schedule of inspection, maintenance, service, and lubrication. Use the lubricants & Oils, recommended in this manual. Refer chapter 3.3 for detailed specifications of consumables.

• Read the hour meter to determine the maintenance intervals.

NOTICE: If the machine is operated under dirty environment, clean all lubricating points and lubricate more often.





First time Maintenance - Table 1

S.No	SERVICE POINTS	CONSUMABLE	QTY	PLACES	INSTRUCTIONS
AFTER FIRST 250 HOURS WITH NEW MACHINE					
1	ENGINE CRANK CASE OIL-BSII/BSIII***	ENGINE OIL	16.5 L	1	DRAIN & REFILL
2	ENGINE CRANK CASE OIL-ALH6 ***	ENGINE OIL	14 L	1	DRAIN & REFILL
AFTER FIRST 500 HOURS WITH NEW MACHINE					
3	ENGINE CRANK CASE OIL-ALH6 *** (Refer Note)	ENGINE OIL	14 L	1	DRAIN & REFILL
AFTER FIRST 50 HOURS WITH NEW MACHINE					
4	DRIVE BELT TENSION			1	CHECK & ADJUST
	AFTER FIRST 10	0 HOURS WITH NE	EW MACHINE		
5	TRANSMISSION OIL FILTER ** (ELEMENT)			1	CHANGE
AFTER FIRST 200 HOURS WITH NEW MACHINE					
6	AXLE CENTRAL HOUSING OIL		261 (5) /261 (8)	2	
7	AXLE PLANETARY OIL	AXLE OIL	AXLE UIL 26L(F)/26L(R)	4	DRAIN & REFILL

Periodic Maintenance - Table 2

S.No	SERVICE POINTS	CONSUMABLE	QTY	PLACES	INSTRUCTIONS
	AFTER EVER	Y 10 HOURS (DAIL)	(CHECK)		
8	ARM - CHASSIS PIN			2	
9	CHASSIS - TILT CYLINDER PIN			1	
10	CRANK - TILTCYLINDER PIN			1	
11	CHASSIS – LIFT CYLINDER PIN			2	
12	ARM – LIFT CYLINDER PIN			2	
13	CRANK – CROSS PIN	GREASE		1	APPLY GREASE
14	BUCKET – LINK PIN			2	
15	CRANK – LINK PIN			1	
16	BUCKET - ARM PIN			2	
17	REAR AXLE TRUNNION PINS			2	
18	UPPER AND LOWER CHASSIS PIVOTS			2	
19	TRANSMISSION OIL *	TRANSMISSION OIL		1	
20	ENGINE CRANK CASE OIL ***	ENGINE LUBRICATION OIL		1	CHECK LEVEL /
21	RADIATOR COOLANT	ENGINE COOLANT		2	ADD
22	HYDRAULIC OIL	HYDRAULIC OIL		1	

Periodic Maintenance - Table 3

SI. No	SERVICE POINTS	CONSUMABLE	QTY	PLACES	INSTRUCTIONS
	AF	FER EVERY 50 HOURS	5		
23	PROPELLER SHAFT UNIVERSAL JOINTS &SLIP SPLINES			8	
24	FRONT PROPELLER SHAFT SUPPORT BEARING	GREASE		1	APPLY GREASE
25	STEERING CYLINDER PIN			4	
26	WATER SEPARATOR ***			1	DRAIN WATER
27	CABIN AIR FILTER			1	CLEAN
28	CONDENSER			1	AIR & WATER CLEAN
29	COMPRESSOR MOUNTINGS			1	CHECK & ADJUST
	AFTE	R EVERY 200 HOUR	S		
30	DRIVE BELT TENSION			1	CHECK & ADJUST
31	ENGINE WATER PUMP BEARING	GREASE		1	APPLY GREASE
32	AXLE PLANETARY OIL	AXLE OIL		4	CHECK LEVEL / ADD
AFTER EVERY 250 HOURS					
33	ENGINE CRANKCASE OIL-BSII/BSIII ***	ENGINE OIL	16.5 L	1	DRAIN & REFILL
34	ENGINE CRANKCASE OIL-ALH6 ***	ENGINE OIL	14L	1	DRAIN & REFILL
35	ENGINE OIL FILTER *** (FILTER ELEMENT & SEALING RING)			1	CHANGE
36	FUEL FILTER			1	CHANGE
37	MUD FILTER (ELEMENT)			1	CHANGE
38	AXLE CENTRAL HOUSING OIL	AXLE OIL		2	CHECK LEVEL / ADD
39	OPERATOR SEAT SLIDE RAILS	GREASE		1	APPLY GREASE
40	TRANSMISSION OIL FILTER** (ELEMENT)			1	CHANGE
	AFTE	R EVERY 500 HOUR	S		
41	ENGINE CRANKCASE OIL-ALH6 *** (Refer Note)	ENGINE OIL	14L	1	DRAIN & REFILL
42	WATER SEPARATOR ***			1	CLEAN
43	HYDRAULIC OIL FILTER (ELEMENT)			1	CHANGE
44	BRAKE ACCUMULATOR	NITROGEN GAS	40 BAR	2	CHECK / REFILL
45	FUEL STRAINER			1	CHANGE
46	BATTERY	ELECTROLYTE		2	CHECK LEVEL / ADD
	AFTE	R EVERY 1000 HOU	RS		
47	TRANSMISSION OIL (TOTAL SYSTEM) *	TRANSMISSION OIL	38 L	1	DRAIN & REFILL

48	HYDRAULIC OIL (TOTAL SYSTEM)	HYDRAULIC OIL	110 L	1			
49	TRANSMISSION OIL STRAINER			1			
50	TRANSMISSION BREATHER	ION BREATHER		1	CLEAN		
51	HYDRAULIC TANK SUCTION STRAINER			1			
	AFTER EVERY 1500 HOURS						
52	AXLE CENTRAL HOUSING OIL		26L(F)/	2			
53	AXLE PLANETARY OIL	AXLE OIL	26L(R)	4	DRAIN & REFILL		
54	RADIATOR COOLANT (FAIR COOLER)	ENGINE COOLANT	42L	1	DRAIN & REFILL		
55	RADIATOR COOLANT (AKG COOLER)	ENGINE COOLANT	25L	1	DRAIN & REFILL		

CHECK WHEEL NUT TORQUE INTIALLY AFTER 10hrs. & PERIODICALLY AFTER EVERY 200hrs.

* With oil warm, Transmission in neutral and engine at low idle.

** Replace the transmission oil filter after first 100 hours if new or the transmission has been repaired.

*** Change as recommended by the Engine Manufacturer.

Note: - For 500hrs replacement use GULF LEYPOWER XLL DIESEL OIL in ALH6 engine

When Required - Table 4

a.	APPLY GREASE FOR SERVICE BRAKE, PARKING BRAKE & ACCELERATOR PEDAL PIVOTS
b.	CLEAN THE PRIMARY OF AIR FILTER ELEMENT WHEN THE AIR FILTER CLOG INDICATOR SHOWS RED BAND ON THE TRANSPARENT GLASS, REPLACE THE PRIMARY AFTER 2 INTERVALS. SAFETY CATRIDGE OF AIR FILTER ELEMENT SHOULD BE REPLCAED ATER 2 YEARS OF DURATION OR AT THE TIME OF THIRD REPLCAMENT OF THE PRIMARY CARTRIDGE, WHICHEVER COMES FIRST.
C.	REPLACE HYDRAULIC OIL FILTER ELEMENT WHENEVER THE HYDRAULIC FILTER CLOG INDICATOR GLOWS.
d.	CHECK WHEEL NUT TORQUE AND TYRE PRESSURE AS INDICATED
e.	CLEAN THE RADIATOR CORE, THERMOSTAT VALVE & CHANGE THE COOLANT
f.	REPLACE THE BOLT ON CUTTING EDGE, BUCKET TEETH & BOLTS (IF NECESSARY)
g.	PARKING BRAKE - CHECK & ADJUST
h.	ADJUST ENGINE VALVE CLEARANCE AND CHECK THE INJECTOR
i.	CHECK FINAL DRIVE SYSTEM, TIGHT THE LOCK NUT AND CHANGE WASHERS FOR PLANET GEARS
j.	LUBRICATE ENGINE FAN BEARING
k.	TIGHTNESS OF BOLT ON DRIVE SHAFT SHAFTS, AXLE, RIM AND MOUNTINGS OF ENGINE, TRANSMISSION & RADIATOR

• Check the battery electrolyte level at every 4 weeks.

• For detailed information on Engine maintenance, refer Engine Operators Manual.

• For detailed information on Transmission maintenance, refer Transmission Operators Manual.

3.3 Consumables

- Consumables (service items) which are required for the maintenance of your machine are listed in the table as follows along with the total Quantity & manufacturer's names.
- Oil(s) used in the engine, transmission, and work equipment are under extremely severe conditions (high temperature and high pressure).
- Always use oil(s) given in the chapter 3.3. Even if the oil is not dirty; always replace the oil after the specified Intervals.
- Always add specified volume of oil. Increase or decrease in the volume of oil will cause problem.
- The majority of problems with machine are caused by the entry of impurities. Take particular care not to let any impurities get into that when storing or adding oil.
- When changing the oil, always replace the related filters at the same time.
- The fuel pump of the engine is precision equipment, and if the fuel containing water or dirt is used, it cannot work properly. Always be careful not to let impurities get in when storing or adding fuel.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the fuel line.
- Do not use water for radiator. Always use coolant given in the chapter 3.3.10
- The anti freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- The proportion of anti freeze to water differs according to the ambient temperature.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.
- If the engine temperature is high than the recommended limit, wait for the engine to cool before adding coolant.
- Grease is used to reduce noise and wear & tear of the parts at joints.

- When greasing, always wipe and clean all the old grease. Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause damage and wear to the rotating parts.
- Keep it in indoors to prevent any water, dirt, or other impurities from getting in.
- If drum cans have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long term storage, be sure to use in the order of first in first out (use the oldest oil or fuel first).

Refill Capacities

S. No	CONSUMABLES	QTY in Litres
1	Fuel (Diesel)	210
2	Engine lubrication oil - BSII & BSIII	16.5
3	Engine lubrication oil - ALH6	14
4	Engine Coolant	25
5	Hydraulic Oil (Total system)	110
6	Transmission Oil	38
7	Axle Oil	28 (each)
8	Battery Electrolyte	9 (each)

NOTICE: When changing and adding oil (or) coolant do not use different grade of oil (or) coolant.

3.3.1 Fuel

• Use commonly available Diesel as fuel for the engine.

NOTICE: Do not use petrol in this machine. Do not mix petrol with diesel fuel.

3.3.2 AC Refrigerant

• Use 1.5 kg of R134A gas as refrigerant for AC.

3.3.3 Battery Electrolyte

Use distilled water as electrolyte for Batteries.

3.3.4 Engine Coolant

 Use commonly available Coolant for Copper-Brass Radiator with 20% EURO COOL (MAX).

NOTICE: River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.

3.3.5 Engine Lubrication Oil

S.No	ENGINE	SPECIFICATION	BRAND NAME	MANUFACTURER
1	DOIL	TYPE: API CF-4 + MB228.1	SUPER FLEET MAX SAE 15W-40	GULF OIL INDIA
2	601	SAE GRADE:SAE15W-40	SERVO PREMIUM ALT 15W-40	INDIAN OIL CORPORATION
3	5.0111	TYPE: API CI-4 PLUS	GULF SUPREME DUTY LE	GULF OIL INDIA
4	BSIII	SAE GRADE:SAE15W-40	GULF SUPERFLEET LE DURA MAX	GULF OIL INDIA
5			GULF LEYPOWER XLL DIESEL OIL (service – 500 hrs.)	GULF OIL INDIA
6	ALH6 TYPE: API CI-4 PLUS SAE GRADE:SAE15W-40		GULF SUPREME DUTY LE	GULF OIL INDIA
7			GULF SUPERFLEET LE DURA MAX	GULF OIL INDIA

3.3.6 Grease

S.No	SPECIFICATION	BRAND NAME	MANUFACTURER
1		SERVO GEM EP2	INDIAN OIL CORPORATION
2		CASTROL EPL2	CASTROL INDIA LIMITED
3	EP2	BALMEROL LIPREX EP2	BALMER LAWRIE & CO. LIMITED
4		GADUS S2V 220-2	SHELL LUBRICANTS
5		GULF CROWN EP2	GULF OIL LUBRICANTS INDIA LTD

3.3.7 Hydraulic Oil

S.No	SPECIFICATION	BRANDNAME	MANUFACTURER
1	ISO VG 68	MAK HYDROL HLP 68	BHARAT PETROLEUM (BPCL)
		HYSPIN AWS 68	CASTROL
		SERVOSYSTEM HLP 68	INDIAN OIL (IOCL)
		HARMONY AW SC 68	GULF OIL (GOCL)
		TELLUS S2MX 68	SHELL
		ENKLO HLP 68	HIDUSTAN PETROLEUM (HPCL)

3.3.8 Transmission Oil

S.No	SPECIFICATION	BRAND NAME	MANUFACTURER
1		POWER GLIDE C-430	HINDUSTAN PETROLEUM CORPORATION
2	SAE GRADE : SAE 30	SERVO TRANSMISSION FLUID	INDIAN OIL CORPORATION
3		BHARAT HYDRAULIC TRANSMISSION FLUID	BHARAT PETROLEUM CORPORATION

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4	GULF HI FLUID	GULF OIL INDIA
5	DEUSOL TFC 430	CASTROL INDIA LIMITED
6	SHELL SPIRAX S4 CX 30	SHELL LUBRICANTS

3.3.9 Axle Oil

S.No	SPECIFICATION	BRAND NAME	MANUFACTURER
1	MIL-L2105 C-D-E API GL5 SAE 80W90 (with Limited Slip and Extreme Pressure Additives)	Q8 TWG 40 SAE90	Q8 OILS
2		SHELL SPIRAX S2 A 80W90	SHELL LUBRICANTS
3		PETRONAS ARBOR TTF 80W-90	PETRONAS
4		PETRONAS AMBRA AXF 80W-90	PETRONAS
5		PETRONAS AKCELA AXLEPOWER 80W-90	PETRONAS
6		CASTROL LS 90***	CASTROL INDIA LIMITED

3.3.10 Engine coolant

S.No	SPECIFICATION	BRAND NAME	MANUFACTURER	
1	JIS K 2334 – 94 CLASS2 AND PLUS	EUROCOOL LL MAX 50	GULF OIL INDIA	

3.3.11 Wear Parts

NOTICE: The wear parts should be changed correctly to the specified interval in order to use machine economically.

- For replacement, use only L&T genuine parts. While ordering parts, verify the part numbers specified in the Spare Parts Manual.
- Filters are extremely important safety parts. They prevent impurities in the fuel, oil, and air circuits from entering.
- Replace all filters periodically. For details refer chapter 3.2
- When replacing oil filters, check if any metal particles are stuck to the old filter. If any metal particles are found, please contact your L&T service personnel.
- Do not open packs of spare filters until just before they are to be used.

S.No	ITEM	PART No	PART NAME	QTY	REPLACEMENT
1	ENGINE OIL FILTER	Refer	FILTER ELEMENT	1	EVERY 250 HOURS
2	FUEL FILTER		FILTER ELEMENT	2	EVERY 200 HOURS
3	TRANSMISSION OIL FILTER	SPARE	ELEMENT	1	EVERY 250 HOURS
4	HYDRAULIC OIL FILTER	PARTS MANUAL	ELEMENT	1	EVERY 500 HOURS
5	HYDRAULIC TANK BREATHER		ELEMENT	1	WHEN REQUIRED
6	AIR FILTER		INNER ELEMENT ASSEMBLY OUTER ELEMENT ASSEMBLY	1 1	WHEN REQUIRED
7	WELD ON TOOTH		тоотн	8	WHEN REQUIRED
8	BUCKET TOOTH		тоотн	8	WHEN REQUIRED
9	BOLT ON CUTTING EDGE		BOLT ON CUTTING EDGE	3	WHEN REQUIRED
10	WEAR PAD		WEAR PAD	2	WHEN REQUIRED
11	PARKING BRAKE SYSTEM		EXPANDING SHOE	2	WHEN REQUIRED

3.4 of Maintenance Elements



3.5 Maintenance procedure

3.5.1 Safety critical parts

- To ensure safety during operating or driving the machine all times, always carry out periodic maintenance without fail.
- In addition, the user should also carry out periodic replacement of the parts given in the table, to improve safety further. These parts are particularly closely connected to safety.
- If these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.
- If the hose clamps show any deterioration such as deformation or cracking, replace it immediately.
- After the specified interval, hydraulic hoses must be replaced even though there is any apparent abnormality. As the time goes, these parts may have a tendency to worse in quality and to wear or deform.
- When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time. Ask your L&T service personnel to replace the safety critical parts.

S.No	PART DESCRIPTION	REPLACEMENT INTERVAL		
1	Brake circuit hoses	Every 2000 hours or every year (whichever comes first)		
2	Seals, O-Rings & hoses of steering cylinder	Every 4000 hours or every two years		
3	Fuel circuit hoses	(whichever comes first)		

3.5.2 Air intake system

General instructions

NOTICE: Check the Air filter more frequently in case of heavy dust accumulations.



- A dry type combination Air filter with the safety filter element is installed in the Air filter system.
- The additional safety filter element series connected to the main filter element offers protection in the potential maintenance failures (i.e. it protects the Air filter line between the air filter line and the Engine from contamination during maintenance operation).
- Check the air clog indicator which is in the indicator assembly. If it glows, it is necessary to remove the dust collectors and clean it. Otherwise the main filter element may become clogged prematurely as a consequence of excessive dust accumulations.
- Press cover onto dust collectors in such a way that the recess in the edge of the cover and the projection at the collector precisely fit into one another.
- Remove the main filter element, for cleaning. (I.e. if the air filter clog indicator remains in the glow position with the engine shut off).
- Check the air intake pipe for contamination with the engine shut off, and clean if necessary.

NOTICE: If air filter clog indicator remains in the glow position, immediately replace the filters. After four to five intensive cleaning operations of the main filter element, replace both the main & safety filter element. Check the connecting points of air intake system for proper sealing and tightness.

- Retighten hose clip if necessary and replace hoses if damaged.
- Retighten fastening screw of intake pipe at the cylinder heads if necessary.

NOTICE: Heavy smoke or insufficient performance may be an indication of a heavily contaminated main filter element.

Procedure

• For maintaining and cleaning of Dry Type Air Filter, refer section "Maintenance Instructions 5.14" of AL Engines Operator Manual.

3.5.3 Engine Oil Level Checking

• During run-in period of the new machine (i.e. within first 200 hours of operation), check engine oil twice a day.

Procedure

• Place machine in horizontal position.

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- After stopping the engine wait for approx. 10 minutes until all oil has run into the crankcase.
- Pull out oil dipstick, wipe it clean and reinsert it to the crankcase. Again pull out the dipstick and observe the crankcase oil level. Oil level should be in between the upper and lower marks.
- If the Lubrication oil level is below the lower mark, remove the oil filler neck cap and fill the oil through the filler neck (refer chapter 3.4) until it reaches maximum.

NOTICE: When filling the oil through the oil filler neck, if necessary clean the oil filler plug and its surroundings.

- After filling wait for approx. 1 minute until all oil has run into the crankcase and recheck the oil level.
- Screw it and tighten oil filler plug.

3.5.4 Engine Oil Changing

Procedure

- Place machine in horizontal position and stop the engine. After stopping the engine, clean surroundings of oil filler and oil drain plug.
- Unscrew oil drain plug (refer chapter 3.4) of engine oil pan and drain the oil into a suitable container.



- Remove the oil filter bowl by unscrewing dome nut provided on filter head.
- Remove the oil filter element y and drain out engine oil.
- Wash the oil filter bowl with fuel and blow dry.
- Replace new filter element and sealing ring.
- Refit and tighten oil drain plug.
- Fill the oil filter bowl with new engine oil and refit using dome nut.

- Refill new oil through oil filler neck (refer chapter 3.4) and wait for a minute until all oil has settled in the crankcase.
- Check oil level after a short trial run.
- After changing the oil and fitting the oil filter watch the low lubrication oil pressure indicating red lamp during the trial run. Also check for proper tightness of oil filter.

NOTICE: Do not clean and reuse the filter which is removed from the machine. Replace it by new one.

3.5.5 Fuel Filters & Pre-filter

General Instructions



NOTICE: Always replace the fuel filter element with new one. Do not clean/refit the old filter again that was removed from the machine.

- If there is decrease in Engine power, the fuel filter may be required to be replaced prematurely and the fuel will be excessively contaminated. In such case, clean fuel tank and cover.
- When mounting the fuel filter, check for proper tightness during the trail run.
- Check fuel tank cover for tightness.

Procedure

• For maintaining and cleaning of Fuel Filter and pre-filter, refer section "Maintenance Instructions - 5.03" of AL Engines Operator Manual.

3.5.6 Bleeding the fuel system

General instructions

NOTICE: Never run the fuel tank empty, otherwise the fuel system must be bled.

• Bleeding of the fuel system is required when air has entered during the time of removing and refitting the fuel filter, fuel lines etc.

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Procedure

 For bleeding procedure of Fuel System, refer section "Maintenance Instructions - 5.05" of AL Engines Operator Manual.

3.5.7 Cooling devices



General instructions

NOTICE: Never disconnect the thermostat of the Engine. It may lead to overheating of Engine.

- NOTICE: Use the recommended Anti rust coolant for the engine radiator. Confirm that there is no oil present in the coolant.
- Check all hoses and pipe connections for any water and hydraulic leak, swelling or deterioration and replace if necessary.
- When mud, debris, etc., are stuck at the radiator or oil cooler cores, the passage of cooling air is impaired. Hence such matter should be removed completely using compressed air.

Coolant Changing Procedure

Do not loosen the drain plugs when the engine is still hot. If you do so, scalding water can come out resulting in personnel injury.



- Stop the engine. Loosen the radiator drain plug to drain the coolant. Drainage will improve if you also loosen the drain plug on the cylinder block or remove the cap from radiator.
- To flush the system, completely tighten the radiator drain plug. Also tighten the drain plug on the cylinder block if it was loosened.
- Add water and flushing solution until the system is filled to the filler opening and run the engine the upper radiator hose gets hot.
- Loosen the drain plug and drain the water completely.
- Repeat the above 3 steps several times until the drained coolant becomes almost clear.
- Drain the complete system and tighten the radiator drain plug. Also tighten the drain plug on the cylinder block if it is loosened.
- Slowly feed coolant into the radiator through the filler up to below the air vent tube. When supplying coolant from pail, pour it slowly to prevent air from mixing with the coolant. Properly close the radiator cap.
- To ensure that the air in the engine and the piping is properly expelled, set the engine speed slightly higher than normal idling speed. Raise the water temperature to 78°C, then continue to idle the engine for another 10 minutes.
- Stop the engine and after the engine has cooled down sufficiently, check the coolant in the radiator. Add coolant to make up for any drop in the coolant level.
- Insufficient coolant will cause Boiling of coolant. Excessive coolant causes foaming and clogging of makeup line vents.

WARNING

Open radiator cap slowly when the engine is at operating temperature. Failing to do so will cause the boiling water splashes and will cause personnel injury.

3.5.8 Checking fan belt tension

NOTICE: A new fan belt for the Fan and Alternator must be well retightened after the first 50 hours of operation.



• Check the Alternator and Fan belt tension by depressing the fan belt with your thumb.

Procedure

- Loosen the alternator link bracket.
- To increase the fan belt tension, swing the alternator away from the engine and press the belt with your thumb, so that deflection on longest side (refer figure) of fan belt does not exceed 25 to 37 mm (1 to 1 ½ inches).
- Then retighten the alternator for the above said position.

NOTICE: A tight belt result in rapid wear of fan belt, water pump bearings and alternator bearings. A loose belt results in noise, engine overheating, and under charged battery.

3.5.9 Checking Transmission Oil Level

NOTICE: Check the transmission oil level more frequently if the machine works under extremely severe condition.

General instructions

- Check the transmission oil level every day with engine running at low idle and the oil at operating temperature.
- When checking the oil level, park the machine on level ground.

NOTICE: Never operate the Transmission with the oil level below the Minimum or above the Maximum.

Procedure

- Remove the Transmission Dipstick from the oil filler pipe, Wipe it clean, and reinsert it to the oil filler pipe.
- Remove it again and observe the oil level.
- Oil level should be in between the Minimum & Maximum level marks.

3.5.10 Changing Transmission Oil

• For oil changing intervals, refer chapter 3.1.

NOTICE: Changing the transmission oil to the specified interval will make the machine more efficient. Ensure that the presence of foreign material into the oil should be avoided.

Procedure

- Place the container of capacity 40 litres under the transmission drain port.
- Loosen & remove the drain plug gradually to prevent the oil from pouring out suddenly.
- After draining the oil, refit the drain plug and tighten it to the specified torque.
- Place a container below transmission oil filter.
- Remove the transmission filter drain plug and drain the oil.
- Refit the drain plug and tighten it.
- Remove the dipstick and fill the oil to the LOW level mark.
- Refit the dipstick and run the Engine at low idle to prime the transmission and the transmission lines.
- Recheck the oil level with the engine running at low idle speed and add oil to bring the level to LOW mark.
- When the oil reaches the operating temperature again check the oil level.
- Add the oil to bring the level to "FULL" mark.
- Check the system for leaks.

3.5.11 Cleaning Transmission Suction Strainer

NOTICE: If the strainer is damaged, replace the strainer with new one.

• Clean the suction strainer at every 1000 hours of operation.

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Procedure



- Remove the bolts of inspection cover and remove the cover.
- Take out the suction strainer.
- Remove the dust struck to the strainer, and wash it in clean diesel or flushing oil.
- Install strainer to the transmission, and then install cover to the required torque.
- Replace O-Ring or gasket with new part.
- Check for oil leakage from the transmission.

3.5.12 Changing Transmission Oil Filter

NOTICE: Do not clean and reuse the filter which is removed from the machine. Change the filter with new one.

Procedure

- Place the container below the transmission oil filter.
- Slowly remove filter case from filter top cover.
- Remove element and drain the oil form filter case.
- Clean the inside of filter case. Assemble a new element, and then fit it to the filter case.
- Fit the filter case to the filter top over with seal, if seal damaged replace with new seal.
- Then run the engine at low idle at shorter time.
- Check the transmission oil level and top up if required.



3.5.13 Maintaining Hydraulic Tank

General instructions



- The hydraulic tank on this machine is pressurized. Pressurization of hydraulic tank ensures positive oil flow to the loader and steering system.
- Therefore after cleaning or maintaining the hydraulic tank, always reinstall the filler cap, the suction strainer access plate and filter cover properly.
- Always check air leak as well as oil leak after oil changing.

Procedure

NOTICE: Use clean funnel and container for filling the oil. Ensure that the presence of foreign material into the oil should be avoided.

• Clean around the filler cap always before topping up the oil in the hydraulic tank.

- If any part of the hydraulic system is to be removed for replacement/repair, clean the part thoroughly before removal.
- Use clean tools and keep the parts in a clean place.

3.5.14 Checking Hydraulic Oil Level

General instructions

- Check the hydraulic oil level, before starting the day's work.
- Ensure the bottom of the loader bucket is flat on the ground.

Procedure

- Before checking hydraulic oil level in sight gauge, slowly loosen the breather to release the pressure in tank & tighten it.
- After 5 minutes, check hydraulic oil level using Sight gauge in the Hydraulic tank.
- Hydraulic oil level should be in the middle of the Sight gauge.
- If the Hydraulic oil level is below the Sight gauge, fill the Oil until it reaches the middle of the Sight gauge again. Use the Hydraulic oil given in the Consumables.
- Check the oil level before starting the engine (or) 5 minutes or more after the engine is stopped.
- Never operate the Machine with the oil level below the Sight gauge.

NOTICE: Insufficient oil will cause Vacuum, Wear and tear of Hydraulic elements. Excessive oil causes foaming and other problems.

3.5.15 Changing Hydraulic Oil General instructions

- Change the hydraulic oil at every 1000 hours of operation or every 6 months whichever is earlier.
- Also replace the hydraulic oil filter element located inside the hydraulic tank.
- Change the hydraulic oil, when it is still warm.

Procedure

- Stop the machine, and wait for five minutes to open the filler cap.
- Place the suitable container below the drain plug.
- Remove the drain plug below the tank, and drain the oil from the tank.
- Remove the access cover and suction strainer and clean it with a good organic solvent. Reinstall suction strainer.
- Refit the drain plug, and tighten it properly.
- Reinstall the suction strainer and the access cover and tighten the bolts properly.
- Refill the hydraulic oil in the hydraulic tank only through the oil filler port (not through breather) to the required level (refer figure in 3.5.13). Hydraulic oil level

should be visible in the upper sight gauge. Reinstall the hydraulic filler cap.

3.5.16 Changing Hydraulic Oil Filter

General instructions

- The hydraulic system has a filter which is located in return circuit. It is on the hydraulic tank. There is a suction strainer installed on the suction line inside the hydraulic tank.
- Change the hydraulic oil filters after the first 20 hours. There after change the filters every 500 hours.
 - Replace the filter whenever the hydraulic filter clogging indicator lamp glows.

Procedure





- For **type A**, open the tools box, remove wing screws and slide the tools box before removing hydraulic oil filter.
- For **type B**, open the platform door before removing hydraulic oil filter
- And Remove the mounting bolts of the filter at the top of the tank and remove the cover.
- When doing this, the cover may fly off because of the force of spring, so keep the cover pushed down while removing the bolts.
- Remove the spring and bypass valve, then remove the filter element.



- Install a new filter element, then assemble the spring, bypass valve and cover.
- If the O-ring of the cover is damaged or deteriorated, replace with a new part.
- When installing the cover bolts, push down the cover against spring force and tighten the bolts evenly.
- Add Hydraulic oil through the filler port to the specified level, and then install the cap. Refer the specification of in Consumables. Ensure the hydraulic oil level through the sight gauge.
- Run the engine at low idling about five minutes to fill the oil in the filter. Operate the steering, lifting and tilting cylinders about 4-5 times. Be careful not to operate the cylinder to the end of its stroke (stop before 100 mm before the end of the stroke).
- If the engine is run immediately at high speed, or the cylinders are operated to the end of its stroke, the air inside the cylinders will cause damage of the piston packing.
- Check the hydraulic oil level and add the oil to the specified level.
- Next increase the speed and repeat the same procedure.
- Check that there is no leakage of oil from the filter cover mount.

NOTICE: Do not clean and reuse the filter which is removed from the machine. Change the filters after the specified interval. And check that there is no foreign matter inside the tank.

3.5.17 Hydraulic oil pressure setting

• This has to be done only by your L&T service Engineer.

 Hydraulic circuit diagram will be available with the L&T service engineer.

3.5.18 Pressure checking points



- Pump (1) pressure 225 bar.
- Steering unit pressure (2) pressure 158 bar.
- Feeding unit (3) pressure 35 bar.
- Brake accumulator (4) & (5) pressure 90 120 bar.

3.5.19 Cleaning of Breathers

Transmission Breather



Hydraulic tank Breather



• Clean the Transmission & Hydraulic tank breather whenever required.

NOTICE: Take care not to allow any dust or dirt inside the transmission and hydraulic tank, through the port where the breathers are removed.

Procedure

• Remove all mud and dirt around the breather, and then remove the breathers. Put in cleaning fluid and clean the breathers.

3.5.20 Battery



General instructions

NOTICE: Never interchange battery connections.

- Check charging condition of battery in case of need.
- If the battery has been dismounted, ensure a good contact of battery terminals after and only tighten clamping screws by hand, so as to avoid deformation of poles.

Never place the tools on the battery (or) inside the battery box wheels, due to danger of short circuits. Failing to follow may cause fire accidents.

Procedure

- Unlock battery box cover. Lift the battery by removing the nuts and secure the nuts and washers.
- Screw out battery cell plugs.
- The electrolyte within the individual cells must reach as far as to the bottom of the control inserts. If the control inserts are missing, proceed as follows:
 - Insert a clean wooden stick into the cell opening as far as to the upper edge of the lead plate.

- After drawing out, the stick must be wet for 10 to 15 mm.
- ✤ If the electrolyte level is too low, refill battery.
- Refit cell plugs tightly.
- Clean battery poles and apply a thin film of lubricating grease.
- Put the battery into the box and refit the nuts.
- Lower the box cover and fit it in position.

NOTICE:

Keep the terminal contact faces bright and clean.

Vent plugs should be kept clean, tight and free of blockage.

Do not crimp the exhaust tube as it may cause explosion.

3.5.21 Alternator



General instructions

- The Alternator charges the battery, when the Engine is running.
- When maintaining the electrical system, observe the following points.
 - * Replace charging current indicating light instantly.
 - Protect and cover the alternator before wet cleaning of the Engine.
 - When carrying out electrical welding operations, connect the ground terminal directly to the part to be welded.

NOTICE: Never disconnect the leads between Battery, Alternator, and Regulator switch with the Engine running.
3.5.22 Starter motor



- This has to be carried by the Engine expert only.
- For details refer Engine manufacturer's Operation & Maintenance manual.

3.5.23 Brake System

- Brake system is hydraulically operated and oil immersed wet disc brake inboard with the axle.
- 6 WELL-MANN discs are immersed in axle oil. Brake is operated by hydraulic oil pressure.
- If the discs are damaged / worn out, replace it with new one.

NOTICE: If the brakes are frequently used, change the axle oil at shorter intervals.

3.5.24 Recharging the accumulator with Nitrogen



- Remove the accumulator (1).
- Unscrew the protective cap (3).
- Remove O-ring (4).
- Slightly loosen the hexagon socket head screw (5).
- Install charging & testing unit (2) that is connected to the nitrogen bottle (7).
- Turn charging unit to a position where the gauge can be easily read.

• Charge the accumulator (6) to 40 bar using nitrogen gas.



Never use oxygen. Danger of explosion





• Tighten the hexagonal socket head screw (5) after charging unit is removed from accumulator.

WARNING

Nitrogen can escape when filling or testing the accumulator due to improper tightening of charging & testing unit. This will cause serious injury.

3.5.25 Checking Axle Oil Levels (Front & Rear)

General instructions

- The central housing and planetary ends of each axle have different oil levels.
- Circulation of lubricants between planetary end and the centre bowl of central housing is partially restricted by gears, bearings, washers and other components.

- Lubricant must be filled correctly especially if the loader is to be used immediately after an oil refill.
- The oil level at both planetary ends every 200 hours of operation and the centre bowl every 250 hours of operation of the differential should be checked.

Procedure

- Park the loader at level ground.
- Rotate the wheel until the oil level plugs of planetary ends should come horizontal.
- Remove filler plugs of planetary ends and the differential. The oil level should be level with the bottom of the filler plug openings.
- Add the oil if necessary. Use the lubricant given in consumables.
- Repeat the same procedure for other axle.

NOTICE: Always clean and refit the drain plugs. Do not allow any dust or dirt inside the axle.

3.5.26 Changing Axle Oils (Front & Rear)

NOTICE: When the axle starts sounding noisy, immediately change the oil.

For oil changing intervals refer chapter 3.1

Procedure

- Position the machine on level ground with the filler/drain plugs of each planetary end in the bottom position.
- Jack the axle and rotate the wheels by hand if necessary.



Handle the jack carefully which will cause personnel injury and damage to your machine.

- Remove the filler plug & drain plug from each centre bowl and from each planetary end.
- Drain all the lubricant from the centre bowls as well as planetary ends while the oil is still at the operating temperature.
- Reinstall the drain plug on each centre bowl and on each planetary ends.
- Fill each of the 4 wheel ends as follows,
 - Move the wheel until the fill/drain plug is at the horizontal position.

- * Remove level plug.
- Fill the oil until the oil level reaches the bottom of the level plug.
- ✤ Reinstall the plugs.
- Fill each of the 2 centre bowl of the differential as follows,
 - Remove level plug.
 - Fill the oil until the oil level reaches the bottom of the level plug.
 - ✤ Reinstall the plug.

3.5.27 Axles & Wheels

- During the loader run in period, check the tightening torque of the wheel nuts and axle bolts at every 2 hours until the torque is stabilized.
- Whenever the wheels are reinstalled after servicing, check each wheel nut torque every 2 hours until the same stabilizes.

NOTICE: Always maintain the given torque while tightening wheels and axles.

3.5.28 Linkage Pins

NOTICE: Always maintain 4mm clearance between the Lug Plate and Washer for the machines with studs.

For the machines with stepped boss, no clearance required.



3.5.29 Bucket

NOTICE: While welding the bucket for enforcement, pin joints should not be distorted.

3.6 Handling the tyres

NOTICE: Clearing fallen stones and rocks from the operating area and maintaining the surface will extend the tyre life and give improved economy.

- Measure the tyre pressure before starting operations, and that should be done when the tyres are cool.
- As a guideline that can be checked visibly, the deflection ratio of the front tyre is as follows,
 - When carrying normal load (lift arm in horizontal): Approx. 15 – 25 %.
 - When digging (rear wheels off ground): Approx. 25 – 35 %.
- When checking the tyre inflation pressure, check also for small scratches or peeling of the tyre, for nails or pieces of metal which may cause punctures, and for any abnormal wear.
- If the deflection of the tyre is excessive, raise the inflation pressure within the limits given in the table to give a suitable deflection.
 - For operations on normal road surface, rock digging operations take maximum range of pressure given in air pressure chart.
 - For operations on soft ground stockpile operations, take average pressure given in air pressure chart.
 - For operation on sand (operations not using much digging force) take low range of pressure in air pressure chart.
- If the tyre inflation pressure is too low, there will be overload. If it is too high, it will cause tyre cuts and shock burst. To prevent these problems, adjust the tyre inflation pressure according to the table.

Tyre inflation pressures

- Tyre pressure is determined by the tyre size and ply rating.
- Tyre inflation pressure for 14.00" X 25" are listed below,

S. NO	DESCRIPTION	INFLATION PRESSURE	
		psi	bar
1	Front wheel assembly	60	4.13
2	Rear wheel assembly	50	3.45

Tyre may burst if the pressure is improper. This will cause death or serious injury to the operator.

• The values given in this manual for tyre inflation pressure are general values. The actual value may differ depending on the type of tyre and the condition under which they are used. For details contact your L&T dealer or tyre manufacturer.

Note:

1 bar = 14.5 psi

3.7 Storage & Recommissioning

3.7.1 Long term storage

- This preservation measures will protect the machine for 6 to 12 months depending upon the respective climate conditions.
- When putting the machine in storage for a long time, do the following,
 - After every part is washed and dried, house the machine in a dry building. Never leave it outdoor.
 - If the machine must be in left outdoors, park it on well drained concrete and cover it with canvas.
 - ✤ Drain water from the radiator.
 - Clean engine outside with diesel fuel or cold cleaning agent.
 - Apply a thin coat of preserving oil (or) grease to the hydraulic piston rods.
 - Drain engine oil from crankcase when the oil is still warm or at operating temperature and fill in anticorrosion oil.
 - Drain fuel from the fuel tank.
 - Mix fuel thoroughly with 10% anti-corrosion oil and fill this preservative mixture into the fuel tank.
 - Remove V-belts and spray anti-corrosion oil on to the grooves of pulleys.
 - Thoroughly close up air filter intake and exhaust openings.
 - Remove battery from the machine and check its condition for every 4 weeks.
- During the time of storage do the following,

- Carry out rust prevention operation, when the machine is stored indoors. Open the doors and windows to improve ventilation and prevent gas poisoning.
- Operate the engine and move the machine for a short distance once a month. Also operate the attachments so that a new film of oil will be coated over the movable parts and surface of the components.
- Check the battery condition and charge it.
- Before operating the attachment, wipe off grease from the piston rods. After finishing the operation apply the grease over the piston rods.

3.7.2 Re-commissioning

- If the Loader has been stored for a long period, it is required to be re-commissioned before putting it into operation.
 - ✤ Wipe off grease from the piston rods.
 - Add oil and grease to all places.
 - Clear air filter and engine exhaust openings.
 - Clean the V-belt pulleys put on the V-belts and tension them.
 - Drain or draw off the anti-corrosion oil from the injection pump and governor and fill in fresh engine oil.
 - Drain anti-corrosion oil from engine crankcase and fill in fresh engine oil.
 - Refit the battery.
 - For putting the loader into operation, refer the chapter 2.
 - Approach L&T service engineer for help for recommissioning the machine.

3.8 Tools & Tightening Torque

3.8.1 Necessary tools



Usage of proper tools can avoid damaging your machine and injury on you.

- Following tools are provided along with the machine.
- If any of the tool broken or missed, please order them to your L&T dealer.

S.No	TOOL NAME	Qty
1	Double ended open jaw spanner kit	1 Nos
2	Cranked double ended ring spanner kit	1 Nos
3	Allen key – Hex kit	1 Nos
4	Allen key – Square kit	1 Nos
5	Grease gun	1 Nos
6	T – Rod	1 Nos
7	Box spanner	1 Nos
8	Extension Rod	1 Nos

3.8.2 Tightening torque table

S.No	Location	Tightening Torque in N-m	
		Min	Max
1	Axle bolts	1040	1150
2	Wheel Nuts	750	800
3	Articulation joint bolts	177	217
4	Counter weight mounting bolts	597	730
5	Floor plate Bolts	121	148
6	Cabin bolts	177	217
7	Engine bracket AVM mounting bolts	130	140
8	Transmission bracket AVM mounting bolts	130	140
9	Engine-Transmission joint bolts	51	56
10	Fuel tank mounting bolts	177	217
11	Retainer lug bolts	105	117

3.9 Trouble shooting

- The following trouble shooting table is designed for your guidance only and will not intended to cover all troubles. If any repairs are required beyond routine maintenance, your machine must be returned to your L&T service personnel who has the correct tools, facilities, and knowledge to perform repair to the correct specification and safe standard.
- If troubles are found, stop the machine immediately and solve those problems.
- In case of any abnormalities which are not listed below, contact your L&T dealer.

S.No	Troubles	Possible Causes	Remedies
		ENGINE	
		Starter motor does not work or crank slowly	Check the starting motor
		Drive control switch is not in the neutral position	Change the drive control switch to neutral
		Fuel tank is empty	Add fuel
		Air inside fuel system	Bleed the air in fuel system
1	Engine does not	Battery not charged fully	Charge the battery
1	difficulty	Defected fuel injection pump	Replace or repair fuel injection pump
		Incorrect fuel for operating temperature	Use specified fuel
		Defected nozzle	Replace or repair nozzle
		Engine used after long time	Flush and service engine thoroughly
		Obstruction in fuel suction line	Repair the system
		Engine overloaded	Shift to lower gear and reduce load
		Clogged Air filter element	Clog and clean the element
		Usage of improper Fuel	Use specified fuel
		Engine overheated	Check the coolant temperature gauge
		High idle speed is low	Check the engine lubricating system pressure and temperature
2	Engine does not develop full power	Check the fuel injector holes or nozzle needle sticking	Check and replace the injectors
		Fuel pump stop lever has not returned fully to the "Run" position	Push the lever to run position and ensure smooth operation of linkage
		Fuel pump accelerator lever cannot reach full open position	Adjust the linkage and ensure smooth operation of linkage
		Obstruction in fuel suction line	Repair the system
		Low engine operating temperature	Check thermostat vale
		Water mixed with fuel	Change fuel and clean fuel tank
		Clogged fuel filter	Clean or replace the filter
3	Engine starts but stops after sometime	Air in fuel line	Bleed the air
		Clogged air filter	Clean or replace the filter element
		Fuel tank empty	Add fuel
		Usage of poor quality or improper Fuel	Use specified fuel
4	Exhaust gas is blue	Faulty fuel pump setting	Send the fuel pump for recalibration
		Excess engine lubricating oil	Maintain the correct oil level
		Clogged Air filter element	Clog and clean the element
F	Exhaust gases	Defected turbocharger	Clean and replace the turbocharger
э	black	Engine compression pressure is wrong	Check and adjust engine compression
		Defected nozzle inside engine	Replace or repair nozzle

S.No	Troubles	Possible Causes	Remedies
6		Defected nozzle inside engine	Replace or repair nozzle
		Usage of improper Fuel	Use specified fuel
	Abnormal noise	Over-heating of engine	Check coolant temperature gauge
		Defected muffler	Replace the muffler
		Excessive valve clearance	Adjust valve clearance
	Engine coolant	Defected thermostat	Replace or repair thermostat
7	temperature gauge not working (always in the white range on left)	Defected temperature gauge	Replace the temperature gauge
		Insufficient coolant	Add coolant
		Leakage of coolant	Repair the system where it is getting leaked
	Steam is emitted in the radiator cap	Loosen fan belt	Adjust fan belt tension
8	Water temperature	Dirt or scale inside the cooling system	Clean the cooling devices
	gauge always in red	Loosen radiator cap	Tighten cap or replace the packing
	range	Clogged radiator fins or damaged radiator fins	Clean or repair the fins
		Defected thermostat	Replace or repair thermostat
		Defected temperature gauge	Replace the temperature gauge
		Insufficient engine lubricating oil	Add oil to the specified level
٥	Engine oil pressure	Leakage of oil	Check the connections
3	lights up	Defected engine oil pressure sensor	Replace or repair the sensor
		Defected engine oil pressure gauge	Replace the pressure gauge
		Engine overloaded	Shift to lower gear and reduce load
		Radiator fan v-belt broken	Replace the fan belt
		Dirty radiator core	Clean the radiator core
		Defected radiator cap	Replace or repair the cap
		Loose or defected fan belt	Check the fan belt tension. If it is damaged replace with the new one.
		Cooling system plugged	Flush cooling system
10	Engine over heating	Defected thermostat	Replace or repair thermostat
		Defected temperature gauge	Replace the temperature gauge
		Leakage of coolant	Tighten the hose connections
		Coolant temperature is high	Check the coolant temperature
		Insufficient coolant	Add coolant to the radiator
		Improper coolant	Use the specified coolant
		Lubricating oil pressure is high or low	Maintain the pressure
		Lubricating oil temperature is high	Maintain the temperature
	Engino oil	Defective cooling line	Replace defective parts
11	temperature is high	Engine oil level is high	Adjust oil level
		Necks on cooling line	Remove the necks
	Engine oil	Engine oil level too high or low	Maintain the specified oil level
12	consumption	Improper oil used	Use specified oil
	· · - · · · · · · · · · · · · · · ·	External oil leaks	Repair the leaks
		Incorrect fuel	Use specified fuel
	Engine fuel	Air filter getting clogged	Replace or clean the filter element
13	consumption	Engine overloaded	Shift to lower gear and reduce load
		Fuel connection leaks	Tighten the loose connections
		Incorrect valve clearance	Adjust valve clearance

S.No	Troubles	Possible Causes	Remedies
		Engine operating temperature is low	Check thermostat
		Excessive load	Shift to lower gear and reduce load
		Defected nozzle	Repair or replace the nozzle
		TRANSMISSION	
		Propeller shaft may be disconnected	Connect the propeller shafts
	Engine is running but	Parking brake is applied	Release the parking brake
14	machine is not	Directional lever not shifted properly	Shift the lever properly
	moving	Input or output shaft broken	Replace the shafts
		Insufficient transmission oil	Add the oil to the correct level
	Transmission	Loose wiring connection	Check the electrical continuity
15	operation is poor or jerky	Torque convertor gears worn	Replace if necessary
		Insufficient transmission oil	Add the oil
	Engine is in full	Low pressure of transmission oil	Check the pressure
16	throttle, but machine	Clutch disc worn	Replace the disc
	is moving slowly	Rotary seal rings worn or broken	Replace the rings
		Strainer is clogged	Clean or replace the strainer
17	Slow engagement of	Low pressure in the lubricating system	Check the pump
17	the clutches	Engine speed is too low	Adjust the speed
		Insufficient transmission oil	Add the oil
		Too high engine speed	check the speed
18	Abnormal noise	High pressure of the regulation valve	Adjust the system
		Bad alignment of the convertor gears	check the alignment
		Machine is not travelling in the correct speed	Use suitable gear speed
		Insufficient transmission oil	Add the oil
19	violent clutches engagement	Too high engine speed	check the speed
	engagement	High pressure of the regulation valve	Adjust the system
		Insufficient oil or excessive oil	Maintain the oil level correctly
		Emulsified oil	Replace the oil
		Oil cooler flow blocked	Flush the cooling system
		Low pressure oil	Check the seals and pressure
		Machine is not travelling in the correct speed	Use suitable gear speed
20	Transmission oil	Slipping clutches	Replace the clutches
	temperature is high	Brakes dragging on	Adjust brake disc clearance
		Defective cooler unit	Repair or replace the system
		Engine is overheating	Check the engine coolant level
		Defective cooling line	Replace defective parts
		Damaged convertor	Replace the convertor
		Necks on cooling line	Remove the necks
		DRIVE AXLE	1
		Insufficient oil	Add oil to specified quantity
21	Abnormal noise	Leakage of oil	Check the connections for leakage
		Improper oil	Use specified oil
		Damaged gears	Replace the gears
	Machine moves	Damaged gears	Replace the gears
22	slowly when in full throttle	Insufficient oil	Add oil to specified quantity

S.No	Troubles	Possible Causes	Remedies
	BRAKES		
		Disc is reached the wear limit	Replace the discs
23	Brake is not applied	Insufficient oil	Add oil to the specified level
	when brake pedal is	Brake piston seal is leaking	Replace the seals
	depressed	Leakage in brake valve	Repair the connections
		Air inside the brake system	Bleed the air
		Vent hole of brake valve is clogged	Clean the vent hole
24	Brakes drags or remains applied	Brake piston seal leaking	Replace the seals
		Leakage in brake valve	Repair the connections
		Worn discs	Replace the discs
05	Drake aline	Improper oil	Use specified oil
25	Brake slips	Water is mixed with oil	Replace the oil
		Deteriorated axle oil due to overuse of brakes	Replace the oil
		STEERING SYSTEM	
		Insufficient oil in hydraulic system	Add oil to the specified quantity
		Play in steering cylinder pins	Grease the bearing or replace the pin where the play is required
26	Steering wheel is	Worn or damaged parts in steering unit	Repair or replace the parts
	heavy	Low tyre pressure	Inflate to specified pressure
		Low system pressure	Check the pressure setting of relief valve
		Steering wheel getting jammed	Replace the parts
		Insufficient oil in steering system	Add oil to the specified quantity
27	Steering wheel turns	Worn or damaged parts in steering unit	Repair or replace the parts
21	freely, no response	Leaking piston O-ring in steering cylinder	Check the cylinder for leakage, replace the O-rings
		Air in steering circuit	Bleed the air
28	Erratic steering response	Dirt prevents proper action of steering unit	Clean the steering unit
		PARKING BRAKE	
		Parking brake linkage is not working properly	Adjust the parking brake linkage
	Parking brake does	Worn discs	Replace the discs
29	not work properly	Oil or grease on the disc	Glean the brake pad
		Bends in the parking cable	Replace or repair the cable without bends
		HYDRAULIC SYSTEM	
		Pump not functioning	Repair the pump
		Pump worn	Replace the pump
30	All circuits failed to	Insufficient oil	Add oil to the specified quantity
	operate	Restricted flow in suction line	Check the suction line
		Faulty system relief vale	Replace the relief valve
24	cylinder vibrates	Insufficient oil	Add oil to the specified level
31	when operating	Bubbles in the oil	Check the breather
		Loose mounting bolts	Check the torque
32	Pump is noisy	Worn or damaged gears	Replace the gears
		Air leak in suction line	Repair the system
	Cluggich on protion	Incorrect main relief valve setting	Adjust the pressure setting
33	Sluggish operation or no movement	Excessive clearance between spool and spool bore	Replace or repair the spool valve

S.No	Troubles	Possible Causes	Remedies
		Spool not properly positioned	Measure spool travel and adjust
		Worn piston packing in cylinder	Check the cylinder
		Loose piston bolts in cylinder	Check and adjust the torque
		Lubrication of pivots	Lubricate the pivots as specified
		Hoses are not connected properly	Check the connections for leakage
		Insufficient oil	Add oil to the specified level
		Hydraulic tank filter was clogged	Replace the filters
34	Lifting time and lifting	Pump worn	Replace the pump
	capacity to tow	Restricted flow in suction line	Check the suction line
		Faulty system relief valve	Replace the relief valve
		Low quality oil	Use specified oil
35	Excessive bubbles in oil	Insufficient oil	Add oil to the specified quantity
		Air in oil line	Check the breather
		Oil level is low	Add oil to the specified quantity
26	Low hydraulic	Damaged gears in pump	Replace the gears
30	pressure	Plugged hydraulic oil filter	Clean or replace the filter
		Pump sucking the air	Add oil and bleed the air
		ELECTRICAL SYSTEM	
		Loose or corroded battery terminal connections	Clean and tighten connections
37	Electrical system does not functioning	Sulphated batteries	Check battery open circuit voltage for 12.6 volts minimum. Check the electrolyte level and specific gravity
		Battery cut off switch is turned off	Turn on the switch
		Main fuse blown	Replace the fuse
	Lamp does not glow	Defected wiring	Check the wiring for loose connections
38	brightly even the	Battery charge is low	Charge the battery
	high speed	Defected fan belt tension	Adjust fan belt tension
39	Lamp flickers when engine is running	Defected wiring	Check the wiring for loose connections
	Battery charge	Defected wiring	Check the wiring for loose connections
40	monitor lamp is	Defected alternator	Replace the alternator
40	glowing even engine	Low engine idle speed	Increase engine idle speed
	IS fullining	Loose fan belt tension	Adjust fan belt tension
	Abnormal noise	Defected alternator	Replace the alternator
41	generated from alternator	Defected fan belt tension	Adjust fan belt tension
		Insufficient battery charge	Charge the battery
42	Starting motor does not run when the starting switch turned	Directional and speed control lever not in the Neutral position	Adjust the Speed and directional control lever
	ON	Defected Power relay (near Starter motor)	Replace the relay
		Loose or corroded connections	Check and repair the wiring connections
	Otomton states 1	Loose or corroded connections	Check and repair the wiring connections
43	starter motor speed	Insufficient battery charge	Charge the battery
-	cranks slowly	Incorrect viscosity engine lubricant oil	Use specified engine lubricant oil for different conditions
	1	Infrequent driving	Charge periodically
44	Low specific gravity in cells	Loose fan belt tension	Adjust the tension
		Current leaks	Clean battery top terminals

S.No	Troubles	Possible Causes	Remedies
		Loose and corroded battery terminals	Clean, apply petroleum jelly and tighten the terminals
		Short circuits in wiring	Check the electrical system
45	Battery does not charge	Loose or corroded battery terminal connections	Clean, apply petroleum jelly and tighten the terminals
40	Starting motor turns	Defected starting motor	Replace the starting motor
40	engine sluggishly	Insufficient battery charge	Charge the battery
47	Starting motor	Defected wiring	Check the wiring for loose connections
47	engine starts	Insufficient battery charge	Charge the battery
48	Abnormal temperature raise on battery surface	Short circuit in cells	Replace or repair battery
49	Excessive topping up required in battery	Overcharging the battery	Check the battery
	Abnormal colour of	Contaminated electrolyte	Wash inside of cells with distilled water. Drain and fill with new electrolyte
50	battery electrode	Electrolyte level is low	Top up with distilled water
	plates	Sulphated plates	Try to recover by sulphating treatment
		Battery	Check Battery voltage
	Machine not starting /cranking	Disconnect Switch	Check disconnect switch is ON / output voltage
		Fuse	Check fuse F-01
		Ignition Key switch	Check the 24 V supply at terminal T17
		Push Button	Check the 24 V supply at terminal T158 when the push button is in pressed condition.
51		Neutral start Relay -R2	Check the 24 V supply at pin 1 and 3 of R2 relay.
		Re-cranking prevention Relay - R10	Check the 24 V supply at pin 1 and 5 of R10 relay.
		Power Relay	Check the 24 V supply at terminal T69 and T67
		Starter Motor	Check the 24 V supply at terminal T78 when the machine is cranked and continuous 24 V supply at T75. Also ensure the ground connection of starter motor.
		Fuse	Check fuse F04 and F07.
52	Machine not moving forward and reverse	Loose connection and dust accumulation	Remove the C16 round connector from transmission block and fit it again after cleaning.
		FNR shifter	Check 24 V supply at C04, P3 and P4. Remove the C16 round connector and check for power supply at various pin in this configuration. Forward 1st Position - Pin A Reverse position - Pin A and B Forward 2nd position - Pin A and C
		Declutch Relay - R4	Ensure declutch switch is OFF and check the supply across pin 1 and 3 of R4 relay.

		Fuse	Check Fuse F-11
53	53 Reverse buzzer not blowing.	Reverse Relay - R01	Check the 24 V supply at R1-P1 when the shifter is at reverse position. Also check the 24 V supply at R1-P5
		Reverse Buzzer	Check the 24 V supply at connector C14, P1.
54	Hour meter not working	Loose connection and dust accumulation	Check the connector C47 connected to alternator and connector C16 at instrument cluster.
		Fuse	Check Fuse F-17
55	Electric Horn not	FNR shifter	Check the continuity between C4-P1 and C4-P2 when the horn is pressed.
		Electric Horn	Check the supply across terminals T33 & T34
		Fuse	Check Fuse F-19
56	Cabin Fan not working	Rocker switch	Check the 24 V supply at terminal T23 and T22 when the switch is ON.
		Cabin Fan	Check 24 v supply at C08-P2 & C09-P3
		Fuse	Check Fuse F-10
57	Head Lamp not	Rocker switch	Check the 24 V supply at terminals T26 and T35.Also check the 24 V supply at terminals T24 and T25 when switch is ON.
57	glowing	Combination switch	Check 24 V supply at C07-P3 in high beam mode and at C07, P5 in low beam mode.
		Head Lamp Bulb	Check 24 V supply at connector L01- P2,L01-P3,L02-P2,L02-P3
59	Cabin Roof lamp not	Fuse	Check Fuse F-09
50	glowing	Roof Lamp bulb	Check 24 V supply at terminal T34
		Fuse	Check Fuse F-03
	Turn singelig diseter	Flasher	Check 24 V supply at R3-P5 when hazard switch is ON
59	not working	Relay - R5	Check 24 V supply at R5 -5.
		Combination switch	Check 24 V supply at connectors C07-11
		Turn indicator bulb	Check the 24 V supply at L02-5,L01- 4,L06-3 and L05-3
		Fuse	Check fuse F-18
60	Work Lamp (Rear)	Rocker switch	check 24 V supply at terminal T06
	not working	Work lamp bulb	Check 24 V supply to L11-2,L10-2,L07-2 and L08-1
	Work Lamp (front)	Fuse	Check fuse F-20
61	not working	Rocker switch	Check 24 V supply at terminal T20
	_	Work lamp bulb	Check 24 V supply to L03-1 and L04 - 1
		Fuse	Check Fuse F-05
	Stop light not	Brake pressure switch	Check the continuity between terminals T92 and T93 when the brake is applied.
62	working	Stop light Relay-R6	Check the 24 V supply at R6-1 and R6-5 when the brake is applied.
		Stop light bulb	Check 24 V supply at connector L05-1 and L06-1
		Fuse	Check Fuse F16 and F17
63	Detents coil not working	Proximity switch	Check 24 V supply at following terminals at various operation in automatic mode : Height operation - C28-2

			Float operation - C29-2
			Roll back operation - C30-2
64	Safety solenoid not working	Fuse	Check Fuse F-15
		Rocker switch	Check 24 V supply at terminal T08
		Safety solenoid	Check 24 V supply at C27-P2

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4. SPECIFICATIONS

SPECIFICATION

Centre pin support oscillating

Front - 45% Limited slip Rear - 45% Limited slip

14.00 x 25 - E3 - 20 PR

Hydraulically actuated,

for front & rear axle.

40° each direction

immersed, Wet multiple disc brakes with dedicated circuits

Articulated type, full hydraulic

power steering with arbitral

Oil

Fixed

12° up & down

Specifications 4.1

Engine (for machines from 0000-0040)

Make & Model	Ashok Leyland AL 412TC2
Туре	Liquid cooled, 4 Cycle
Aspiration	Turbocharged
Rated RPM	2300 rpm
Gross Power Rating	97.5 kW (131 HP) at rated
	rpm (as per ISO 1585)
Net Power Rating	88 kW (118 HP) at rated rpm
	(as per ISO 1585)

Engine (for machines from 0041-0115)

Make & Model	Ashok Leyland AL 412TAC3	
Туре	Liquid cooled, 4 Cycle	
Aspiration	Turbocharged & Intercooled	
Rated RPM	2300 rpm	
Gross Power Rating	97.5kW (131 HP) at rated rpm	
	(as per ISO 1585)	
Net Power Rating	82.77 kW (111 HP) at rated	
	rpm (as per ISO 1585)	

Engine (for machines from 0116 onwards)

Make & Model	Ashok Leyland		
	H6ETIC3RU23/3		
Туре	Liquid cooled, 4 Cycle	Hydraulic System	
Aspiration	Turbocharged & Intercooled	Pump type	Tandem Gear pump, Engine
Rated RPM	2300 rpm		driven, Transmission mounted
Gross Power Rating	99.17kW (133 HP) at rated	Loader circuit	2 Spool type
	rpm (as per ISO 1585)	Loader flow	158 lpm at rated rpm
Net Power Rating	78.29kW (105 HP) at rated	Steering Circuit	Dynamic Load sensing
	rpm (as per ISO 1585)	Steering flow	84 lpm at rated rpm
Transmission		Loader actuation	hydraulic Joystick
		Arm operations	Daiga hald lower & float

Torque converter	TT260 – 2 phase, 4 –	
	element, Twin turbine with	
	automatic phase transition	
Transmission	TT2221-1, Electric power shift	
	Constant mesh, Spur,	
	Planetary gears.	

Travel Speed

		KMPH
Forward – 1	Low Turbine	4.2
	High Turbine	8.7
Forward – 2	Low Turbine	16.1
	High Turbine	26
Reverse	Low Turbine	5.7
	High Turbine	11.8

Arm operations Raise, hold, lower & float tilt-back, hold, & dump (Auto **Bucket operations** Return to dig)

system.

Pressure settings

Axles & Tyres

Front

Rear

Tyre

Туре

Brakes

Service Brakes

Steering System

Steering angle

Differentials

Loader relief valve	225 bars
Steering relief valve	158 bar

Hydraulic cycle time (Rated load in bucket)

Raise	5.1 sec
Dump	1.9 sec
Lower	2.8 sec

Operating Specifications

Operating Weight	11500 kg
Rated Payload	3500 kg
Breakout Force	11200 kgf
Rated Bucket Capacity	2.0 m ³ (standard bucket)
Bucket Width	2700 mm
Bucket Weight G.P	
(With Weld on Tooth)	886 kg

Note:

- Operating Specifications are as per SAE J818, SAE J732 & SAE J742.
- Materials & Specifications are subjected to change without notice.
- Loader flow includes steering pump flow also.

4.2 Static & Operating Dimensions



Α	Overall Height	3072 mm
В	Height to top of exhaust stack	2961 mm
С	Ground clearance	410 mm
D	Overall length	7011 mm
Е	Wheelbase	2800 mm
F	Dump Height	2746 mm
G	Height to Hinge Pin – Fully Raised	3755 mm
н	Overall Operating Height – Fully Raised	4900 mm
J	Reach Fully Raised	1235 mm
К	Maximum Rollback – Fully Raised	64 deg
L	Dump Angle	45 deg
М	Maximum Rollback at ground	41 deg
Ν	Maximum Rollback at carry Position	49 deg
Р	Digging Depth	110 mm
Q	Tread	1920 mm
R	Overall Width	2325 mm
S	Machine Clearance Radius (Over the tyres)	5021 mm
Т	Loader Clearance circle	5795 mm
U	Articulation Angle	40 deg
W	Load Over Height	3495 mm
NISte		



Note:

Measured with Weld on Teeth & Standard tyre.

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5. MISCELLANEOUS

5.1 Manual Revision Request Form

Date :
Manual Name :
Manual Rev no :
Model :
Unit Sl. No :

Correction Details (Attach Photocopies or sketch, use Sheet if needed. Typing Preferable)

SI.NO	Group No.	Page No.	Correction Details

Comments / Suggestions to Improve

1.	
2.	
3.	

Publication review done by:

Sl.No.	Action Details	Remarks

Publication in charge

Service Manager

5.2 Quick Reference Information

ITEM NO	ITEM DESCRIPTION	QTY	REMARKS

5.3 Periodic Maintenance

	DATE	SERVICE METER READING	REMARKS
DELIVERY			
PERIODIC			