

**HD76** 4WD**HD96** 4WD**HD100** 4WD

OPERATION & MAINTENANCE MANUAL

MAY- 2023

**BULL HD 76 ,96 ,100HP [4WD] – INSTALLATION REPORT CECC – FORM - A**

1.BASIC INFORMATION			
Customer Name & Address:	Date		
	Machine Serial No		
	Machine Model		
	Machine Application		
	Dealer name & address		
	Machine Hour Meter reading & Status (Please tick mark)		
Reading	Working	Not Working	
2.STATUS OF DOCUMENTS HANDED OVER			
S.No	Documents List	Status	
1	Operator's Hand Book	Handed Over	Not Handed Over
2	Battery Warranty Card	Handed Over	Not Handed Over
3	Machine Parts Manual	Handed Over	Not Handed Over
4	Service Coupon (Part of Operation Manual)	Handed Over	Not Handed Over
5	Engine Operation & Maintenance Manual	Handed Over	Not Handed Over
6	Engine Parts Manual	Handed Over	Not Handed Over
7	Engine Parts Manual	Handed Over	Not Handed Over
3.STATUS OF EXPLANATIONS GIVEN			
S. No	Documents List	Status	
1	Operator's Hand Book - Use & How to Read	Given	Not given
2	Service requirements (Daily/weekly/Dealer)	Given	Not given
3	Operation of all controls of the machine	Given	Not given
4	Specification of Oils and Lubricants	Given	Not given
5	Recommended Parts to be stocked at Customer End	Given	Not given
6	Attachments & Operations (Demo)	Given	Not given
7	Warranty period, Procedures & Parts covered under warranty	Given	Not given
4.OTHER DETAILS			
Service work	Started on	Total manhours taken for installation	
	Started on		
Service Engineer's Remarks (if any) on the observations made Customer's Remarks (if any) during installation		Customer's remark (if any)	
		Machine WORKING SATISFACTORILY, Installed and tested to the fullest satisfaction.	
Service Engineer's Name	Signature	Customer's/Representative's Name	Signature
BULL REGIONAL OFFICE ADDRESS & CONTACT NUMBER		BULL AUTHORISED DEALER'S SALES & SERVICE MANAGER CONTACT NAME & CONTACT NUMBER	
Is there any possibility for the Customer to go for one more machine? OR has he referred any other potential customer? If yes, please provide the contact person's name and contact number		Seal	
<p>Note: Machine will not be covered under warranty if the hour meter is found not working and if RTO registration is not completed with in 100 hours of operation. It is the customer's responsibility to keep the hour meter always in working condition and arranging the RTO registration All disputes shall be subject to COIMBATORE jurisdiction only. Send the WHITE COPY-to Customer Care Division, Coimbatore. PINK COPY-to Dealer. YELLOW COPY - to Customer.</p>			



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**BULL HD 76 ,96 ,100HP [4WD] – CUSTOMMER FEEDBACK FORM CECC – FORM -B****1. BASIC INFORMATION**

Customer Name & Address:		Date	
		Machine Serial No	
		Machine Model	
		Machine Application	
		Dealer Name & Address	

Owner's Mobile Number		Date of Despatch	
Driver's Mobile Number		Machine Received On	
Vehicle Registration Number		Transporter Name	

2. STATUS OF OIL LEVELS OBSERVED WHILE RECEIVING THE MACHINE

S.No	Documents List	Status
1	Level of Diesel in the diesel tank	LOW CORRECT HIGH
2	Level of Hydraulic Oil in the Hydraulic Tank	LOW CORRECT HIGH
3	Transmission Oil level	LOW CORRECT HIGH
4	Engine Oil level	LOW CORRECT HIGH

3. OBSERVATIONS ON RECEIVING THE MACHINE (Please Vmark the appropriate box)

S.No	Observations	Comments if any	Okay	Not okay
1	Tool Kit - No. of tools and the conditions			
2	Rear View Mirror			
3	Grease Gun			
4	Locks & Keys (Key Packet)			
5	Battery Condition			
6	Manuals & Catalogues set (Operator's hand book, battery warranty card, machine parts manual, service coupon, engine operation & maintenance manual, engine parts manual)			
7	Lights/Fuses/Wiper			
8	Tyres-Front/Rear			
9	Cabin Fan			
10	Behaviour of Service Engineer/Transporter Crew	Good. Customer centric	Average	Bad
11	Any other visible damage to the machine			
12	Parts/Attachments received along with the machine x	YES (Please mention the qty received by you)	No	
Customer name		Signature	Date	
(H.O Copy)				



1. BASIC INFORMATION

Customer Name & Address:		Date	
		Machine Serial No	
		Machine Model	
		Machine Application	
		Dealer Name & Address	
Owner's Mobile Number		Date of Despatch	
Driver's Mobile Number		Machine Received On	
Vehicle Registration Number		Transporter Name	

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S.No	Documents List	Status
1	Level of Diesel in the diesel tank	
2	Level of Hydraulic Oil in the Hydraulic Tank	
3	Transmission Oil level	
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8	Tyres-Front/Rear			
9	Cabin Fan			
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Customer name		Signature	Date	
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Warning

Study this manual before starting the machine. You must understand and follow the instructions in this manual, abide by all laws and regulations. If you are not sure about anything ask your BULL HD dealer or employer. Do not assume or guess, you or others may get into fatal accidents or get injured.

WARRANTY POLICY

WARRANTY POLICY

CECC-SOG-01

M/s BULL MACHINES PVT LIMITED, undertake to make the machine into a good condition by repair or replacement by a similar part, at its sole and absolute discretion. One Year and 3Months from the Date of Shipment or 2000hours of working whichever is Earlier. If any Faulty Parts or Manufacturing defect, if proven will replace parts on CIF basis at our Cost. At the end of the aforesaid warranty period, all liability on the manufacturer's part gets automatically cancelled.

Aforesaid warranty is subject to the following terms and conditions:

1. All the benefits of warranty is extended to the first buyer or to the second owner provided the appropriate communication has been given to Bull and it's Authorized dealer in writing within 7 days. In both the cases, the warranty period will be calculated from the date of first Installation only.
2. Bull Machines liability extends only to repair or replacement and it will not become liable for any other Consequential or other loss, damage or injury resulting from any defect in the machine.
3. Warranty does not extend to failures due to defects or damage arising as the result of wear and tear, improper adjustments, un-authorized services, use of non-genuine spares, neglect alteration of specification or accident.
4. Warranty does not extend to the proprietary or other components which are not under Bull's manufacturing scope. However, as much as possible, BULL will try to pass on the warranty benefits (if any) given to BULL by the supplier with respect to such failed components.
5. Allied equipment including tyres, electrical equipment including battery etc., and other components / tools are not manufactured by Bull and is covered only by the standard warranty of the manufacturer of such allied equipment though sold or operated with the Bull's machine.
6. When the warranty claim made by the customer or the dealer is rejected by BULL, the part or parts returned to BULL will be destroyed unless otherwise it is clearly stated in a written form when the part or parts were returned to BULL.
7. All recommended scheduled services must be performed at the specified time period through an authorized dealer. In the event any service is missed by the customer, the warranty on the machine is liable to be ceased. All service reports should be kept by the dealership for future references.
8. Warranty will not be extended to the machine where the hour meter is found faulty. It is the purchaser's responsibility to ensure that the hour meter is always in working condition.
9. No claim will be considered if other than genuine parts manufactured by the BULL or to its order and listed in its catalogue are used or of other than the BULL's recommended lubricants are used.

10. This warranty should be construed as strictly limited in its application and is valid only for Bull machine and its variants. If the machine shall change ownership during the period of this warranty, warranty will be considered only when the proper information about the change of ownership is given to Bull and its authorized dealer in writing. Information on the change of ownership has to be given within the period of 7 days of resale.

11. BULL accepts no responsibility for damage by fire or accident of any kind to any items returned under the terms of this warranty.

12. For parts supplied as warranty replacement on a machine during its warranty period, the warranty will be applicable only to the extent of the UN-expired portion of machine warranty.

13. If BULL makes any alteration or modification to its products, the forgoing warranty shall extend to such alteration or modification, the period of warranty being the period, UN-expired thereof, applicable to the machine concerned.

14. Bull and its authorized dealers accepts no liability for any loss or damage, direct or consequential or the effects of any accident resulting from defective materials, faulty workmanship or otherwise at the user end.

15. Bull is not liable for any loss of time to the user whilst the equipment is out of commission or for any labor and other expenses, damage or loss occasioned or claimed to be occasioned.

16. Any claim or obligation in connection with the sale of Bull Backhoe Loader or other CE products shall be subject to the Jurisdiction or courts in Coimbatore, Tamil Nadu.

NO REPRESENTATIVE OF BULL HAS AUTHORITY TO CHANGE THIS WARRANTY or the contents of this warranty clauses in any manner whatsoever and no attempt to repair or promise to repair or improve the machine covered by this contract by any representative of the manufacturer shall waive any consideration of the warranty clauses or change or extend this warranty in any manner whatsoever.

For

BULL MACHINES PVT LIMITED

AUTHORISED SIGANTORY

IMPORTANT SAFETY INFORMATION

IMPORTANT SAFETY INFORMATION

Improper Product operation, maintenance and faulty unauthorized repair, caused due to not following the basic safety rules or precautions results in accidents. An accident can be avoided by recognizing potentially hazardous situations before an accident occurs. An operator must be alert to hazards. The operator should also have the necessary training skills and tools to perform their function properly. Improper usage, Lack of lubrication, Maintenance or repair of this product can be dangerous and could result in injury or fatal accidents.

SAFETY ALAERT SYMBOL

 **WARNING**

 **CAUTION**

 **DANGER**

The meaning of this safety alert symbol is as follows:

Attention: Become Alert! Your safety is involved.

The message appearing under this warning explains that "Hazard" can either be written or pictorially presented. Operations that may cause product damage are identified by "NOTICE" lapels on the product and in this publication.

BULL cannot anticipate every possible circumstance that might be a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by BULL is used, you must satisfy yourself that is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

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

WARNING

When replacement parts are required for this Product. BULL HD recommends only genuine parts or parts with equivalent specifications including but not limited to physical dimensions type, strength and material. Failure to heed this warning can lead to performance failures, product damage, personal injury or fatal accidents.

WARNING

When ever any electrical work is need to be carried out in the panel box, please switch OFF the ignition key and remove the key from the ignition switch.

FOREWORD

FOREWORD

This manual should be stored in the operator's Compartment in the literature holder in the literature storage area.

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

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

Continuous improvement and advancement of the product design might have caused changes in your machine which would not have included in this publication. Always read and keep this manual with your machine.

Whenever a question arises regarding your machine or this publication. Please consult your BULL HD Dealer for the latest available information.

Safety

The safety section lists basic safety precautions in addition, this section identifies the text and locations of warning signs and labels used in the machine.

Read and understand the basic precautions listed in the safety section before operating or performing lubrication, maintenance and regular service schedules.

Operation

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

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

Operating techniques outlined in this manual are basic skill and techniques which will develop as the operator gains knowledge of the machine and its capabilities.

Maintenance

The maintenance section is a guide to equipment care. The Service Schedule lists the items to be maintained at a specific service interval. Items without specific intervals are listed under the Head "When needed" Use the service schedule as a source for all maintenance procedures.

Service Schedule

Use the Dash Board Hour meter to determine servicing intervals. Calendar intervals shown (Daily, Weekly, and Monthly etc) can be used instead of hour meter intervals. If they provide mere convenient servicing schedules and approximate indicated hour meter reading, recommended service schedules should always be performed at the interval that occurs first.

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

Perform service on items at multiples of the original requirement. For example every 500 service hours or 6 months, service those items also, listed, under every 250 hours of service or monthly and every 10 hours of service or daily.

Warning

Battery posts, Terminals, and related accessories contain lead and lead compounds. Wash hands after handling.

Certified Engine Maintenance

Proper maintenance and repair is essential to keep the engine and machine systems operating correctly. As a heavy duty off road diesel engine owner, you are responsible for the performance of the required maintenance listed in the Operation and Maintenance Manual.

It is prohibited for any person engaged in the business of repairing, servicing, selling, leasing, or trading engines or machines to remove, alter or render inoperative any emission related.

Device or element of design installed on or in an engine or machine that is in compliance with the regulations.

Certain elements of the machine and engine such as the exhaust system, fuel system, electrical system, intake air system and cooling system may be emission related and should not be altered unless approved by BULL.

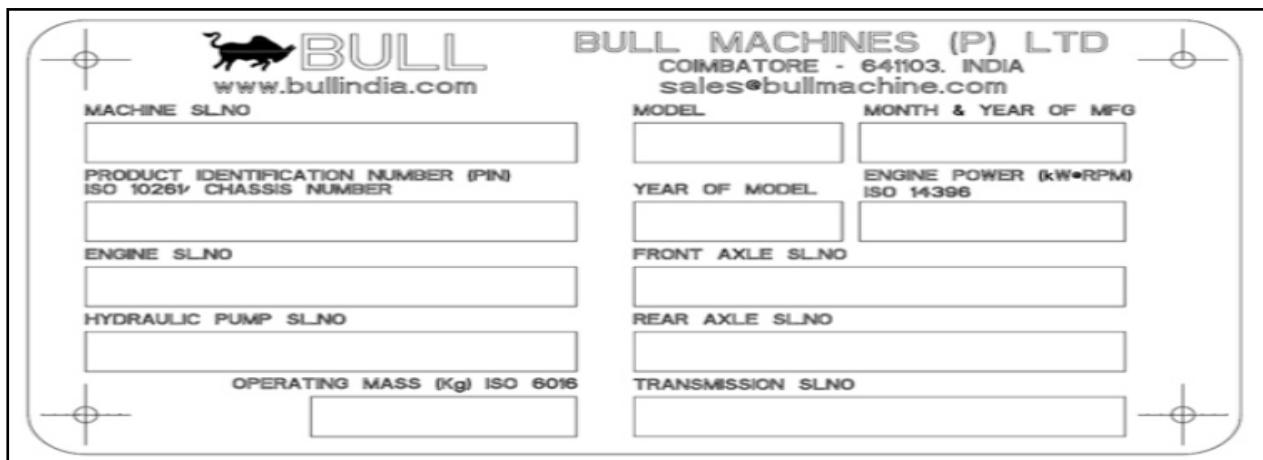
Machine Capacity

Additional attachments or modifications may exceed machine design capacity which can adversely affect performance and characteristics, including stability and system certifications such as brakes and steering. In case you want to use additional attachments, or to do modifications contact your BULL HD dealer.

BULL Product Identification Number

The BULL HD 76,96,100HP 4WD Backhoe Loader Carries an identification number (PIN) with 12 characters.

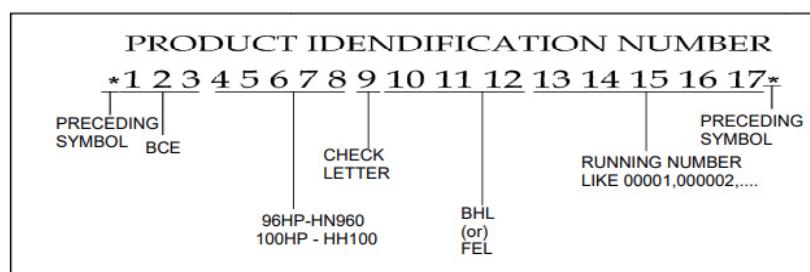
NAME PLATE AS FIXED ON EACH MACHINE



The PIN plates and frame marking will display the 12 character. The format will look like the above figure:

1. BS Machine Serial Number - This indicate the machine model and the running serial number of the machine. This serial number should be always referred with the dealer or with BULL representatives at the time of service requirements.

2.



3. Apart from the machine

Serial number, this name plate carries the serial number of Engine, Chassis, Transmissions, Rear axle, Hydraulic Pump etc.

SAFETY SECTION

SAFETY SECTION

Safety Signs and labels

There are several specific warning signs on this Machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Please be familiar with all warning symbols. Make sure that all of the warning signs are visible. Clean the warning signs or replace the warning signs if you cannot read the words. When you clean the warning signs, use a washcloth & soap. Do not use solvent, gasoline or other harsh chemicals to clean the safety signs. Solvents, gasoline or harsh chemicals could loosen the adhesive. Loose adhesive will allow the warning sign to fall. Replace any safety sign that is damaged or missing. If a safety sign is attached to a part that is replaced. Fix a safety sign on the replaced part. Any BULL HD dealer can provide new safety signs.

WARNING

Do not operate or work on this machine unless you have read and understood the instructions and warning in the Operation and Maintenance Manual.

Failure to follow the Instructions or heed the warnings could result in injury or death. Proper care is your responsibility.



Keep Clear



Pressurized system



WARNING

Stay clear of this area when machine is operating. You will be crushed by swinging boom Pressurized system - Hot fluid under pressure. Stay clear of this area.

⚠ WARNING

Improper attachment of implements could result in injury or Fatal accidents.

Always engage the parking brake before demounting the machine, operating the backhoe or engaging the boom lock for the transport position. Failure to do so will allow unexpected machine movement, resulting in personal injury or fatal accidents.

⚠ WARNING

This is not an entrance or exit when the machine is in operation. Start and operate the backhoe from the operator seat only. Failure to follow this warning could result in injury or death.

**⚠ WARNING**

Pressurized system - Hot fluid under pressure. Stay clear of this area.

Do not remove pressure cap when hot as this could result in injury or severe burns.

⚠ WARNING

Improper cable connections may cause explosion and result in personal injury. Always connect positive (♦) cable from the starter solenoid to the Positive (+) terminal of battery, and Negative (-) Cable from the engine block or chassis to the Negative (-) terminal of the battery.



GENERAL SAFETY

GENERAL SAFETY

WARNING

Clothing

You can be injured if you do not wear proper clothing. Loose clothing can get caught in the machinery. Wear protective clothing to suit the job.

For example: A hard hat, safety shoes, safety goggles, a well fitting overall, ear protectors and industrial gloves. Keep cuffs fastened. Do not wear a neck tie or scarf. Keep long hair restrained.

WARNING

Regulations

Obey all laws of the worksite local regulations, common road traffic rules, regulations which will affect you and your machine.

WARNING

Machine Limits

It is dangerous to operate the machine beyond its design limits.

Do not try to upgrade the machine performance by any unapproved alterations.

The machine should not perform outside its limits.

WARNING

General Site Safety

Before you start the machine, inspect the job site because you could be injured or killed if the ground gives way under your machine, or if piled material collapses on to it. Check for pot holes and hidden debris, logs, iron work etc. Any of these could cause you to lose control of your machine or your machine could get damaged.

CAUTION

Machine Limits

You could be electrocuted or badly injured or burned if you drive the machine too close to electrical power cables limits.

CAUTION

Reversing

Reversing at high speed can cause accidents. Always drive at a safe speed to suit the conditions and do not reverse in third or fourth gear with full throttle.

CAUTION

Care and Alertness

All the time you are working with or on the machine, take care and stay alert! Always be careful.

Always be Alert for hazards.

OPERATING SAFETY

OPERATING SAFETY

⚠ WARNING

Machine Condition

A defective machine can injure you and others. Do not operate a machine which is defective or has missing parts. Make sure the maintenance procedures in this manual are completed before using the machine.

⚠ WARNING

Engine

The engine has rotating parts. Do not open the engine bonnet while the engine is running. Do not operate the machine with the bonnet open.

⚠ WARNING

Hydraulic Hoses

Hydraulic fluid at pressure will injure you at any condition, the operator must not disconnect the hydraulic hoses. The engine should not be started while the hoses are open. When connecting or disconnecting attachments, they should be rested on the ground, the engine must be stopped and the control levers should be operated to release, pressure trapped in the hydraulic circuit. Finally the attachments can be connected are disconnected.

⚠ WARNING

Practice

Do not do unfamiliar operations without practicing them first. Do not perform new operations until you have the experience to do it safely. Practice away from the job site and in a clear area, keep other people away.

⚠ CAUTION

Reworking old sites

There could be dangerous materials such as asbestos, poisonous chemicals or other harmful substances buried in the site. If you uncover any containers or you see any toxic waste, stop the machine and inform the site manager immediately.

⚠ CAUTION

Entering/Leaving

Always face the machine while entering and leaving the cab. Use the steps and handrails. Make sure the step, handrails and your boot soles are clean and dry.

Do not jump from the machine. Never try to alight from a moving machine.

Do not use the controls as hand holds.

⚠ WARNING

4WD Warning Sticker

To avoid damage only in neutral 4WD need to be on and off.

⚠ WARNING

Engine/Steering failure

If the engine/steering fails, immediately stop the machine.

Do not use the machine unless & until the fault has been identified and rectified.

⚠ WARNING**Communications**

Work sites may be noisy. Inform people around of what you will be doing. Make sure they understand any hand signals you will be using.

Bad communication leads to accidents. Do not rely on spoken commands.

⚠ WARNING**Hill Sides**

Operating on hill sides can be dangerous, especially while moving across a slope. If the slope is too steep, your machine could roll over. Remember that loose materials and mud will change the ground conditions.

⚠ DANGER**Sparks**

Do not use the machine in closed areas where there are flammable materials, vapour or dust. Explosions and fire can be caused by sparks from the engine exhaust or electrical system.

⚠ DANGER**Safe working Loads**

Overloading can damage and also tip the machine over. Know the weight of the load which you are going to lift.

⚠ WARNING**Manual**

You and others can be injured if you operate or maintain the machine without studying this manual.

Read the instructions before operating the machine. If you do not understand anything ask your employer or BULL HD Dealer. Keep this manual clean and in good condition.

Do not operate the machine without a manual in the cab. Make sure you understand everything given in the manual.

⚠ WARNING**Exhaust Gases**

You could be harmed or killed by breathing exhaust gases of the machine.

Do not operate the machine with poor ventilation.

If you begin to feel drowsy, stop the machine immediately and get out of the cabin in to the fresh air.

⚠ WARNING**Engine/Steering failure**

If the engine/steering fails, immediately stop the machine.

Do not operate the machine unless & until the fault has been identified and rectified.

⚠ WARNING**Parking**

An incorrectly parked machine can move without an operator. Read the instruction in this manual on how to park the machine.

⚠ WARNING**Petrol**

Do not use petrol in this machine. Do not mix petrol with the diesel fuel in storage tanks, the petrol will rise to the top and form a flammable vapour.

⚠ WARNING**Water supplies &drains**

Before you start using the machine check with your local public water supplier to see if there are buried pipes and drains on the site. Ask there is a map of their location and follow the advice of the water supplier.

⚠ WARNING**Fires**

Do not use water to put out a machine on fire. Water can spread an oil fire or cause you to get a shock from an electrical fire. Use carbon di-oxide, dry chemical or foam extinguishers. Contact your nearest fire station immediately. Fire fighters should use self contained breathing apparatus.

⚠ WARNING**Oil**

Used Engine oil contains harmful contaminants. Always use hand gloves to prevent skin contact. Wash oil contaminated skin thoroughly with soap and water not petrol, diesel, fuel or paraffin.

⚠ CAUTION**Hydraulic Fluid**

A fine jet of hydraulic fluid can penetrate your skin. Do not use fingers to check small leaks. Oil is slightly toxic if it is absorbed in your mouth and induces vomiting. Get medical help in such cases.

⚠ WARNING**Hoses**

Damaged hoses can cause fatal accidents. Check hoses daily for damaged end fittings, chafed outer covers ballooned outer covers, kinked or crushed hoses, embedded armoring in outer covers or displaced end fittings.

⚠ WARNING**Modifications and welding**

Any alterations/ modification done against our design limits may cause injury and damage. Parts of the machine are made of special alloy steel plates. Do not weld on cast iron parts.

⚠ WARNING**Loader Arm & Backhoe/Traveling**

You could be seriously injured or killed if you operate the Loader arm or Backhoe while traveling as it can tip the machine.

⚠ CAUTION**Cleaning**

Cleaning metal parts with incorrect solvents can cause corrosion. Use non-toxic solvents only.

The loader should always be lowered and the backhoe locked while traveling.

▲ CAUTION**O Rings, Seals, Gaskets.**

Badly fitted damaged or rotted O rings, seals, gaskets can cause leakages and possible accidents. Renew whenever disturbed. Coat with light hydraulic oil unless otherwise instructed. Do not use thinners in the presence of O rings and seals.

▲ WARNING**Diesel Fuel**

Diesel Fuel is highly flammable. Keep flames away from the machine. Do not smoke while operating the machine or refueling the machine. Do not run the engine while refueling. If you do not follow these instructions it may result in fire or injury.

▲ DANGER**Electrolyte**

Battery electrolyte is corrosive and toxic. Do not breathe the gases given off from the battery. Keep your eyes, skin, mouth & clothes away from electrolyte. Wear Safety glasses.

▲ Warning**Tyres and Rims**

The tyres can explode if inflated beyond the prescribed limits mentioned in this manual. Tyres will explode due to overheating. Do not weld or cut wheel rims.

▲ DANGER**Cylinders**

The efficiency of the cylinders will be affected if they are not free from solid dirt. Clean the dirt regularly before operating the machine.

While leaving or parking the machines close all cylinders to avoid weather corrosion.

▲ CAUTION**Radiator**

The cooling system is pressurized when the engine is hot. Hot water may spray out when you open the radiator cap. To remove the cap, unlock the first notch and let the system pressure escape and then remove the cap.

▲ WARNING**Safety Strut**

A raised loader arm can drop suddenly and it will cause injury. Before working under a raised loader arm, install the brace for the loader arm or a safety strut.

Safety Stickers

There are safety stickers in the Cabin. They are there for the operator's benefit. Keep them clean and readable.

Replace lost or damaged Stickers.

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INTRODUCTION

INTRODUCTION

About this Manual

This Manual gives the information of BULL HD 100HP 4WD Backhoe Loader. This manual helps in understanding the good operation and maintenance procedures and provides specific data.

Study this manual carefully before you try to operate or maintain the machine. Give close attention to the safety statements mentioned as well as general warnings and specific warnings given throughout the manual. Read all safety statements regularly so that you do not forget them.

Always remember the best operators are safe operators

The BULL HD 100HP 4WD Backhoe Loader can do many jobs. If the jobs are to be done safely you must know the machine and have the skill to operate it. This manual guides you on the controls and safe operational methods of the machine. It is not a training material which tells you about the art of excavation, if you are a new operator, get yourself trained on the skills of operating a BULL HD 100HP 4WD Backhoe Loader before trying to operate it. If you don't, you can be a danger to yourself and others.

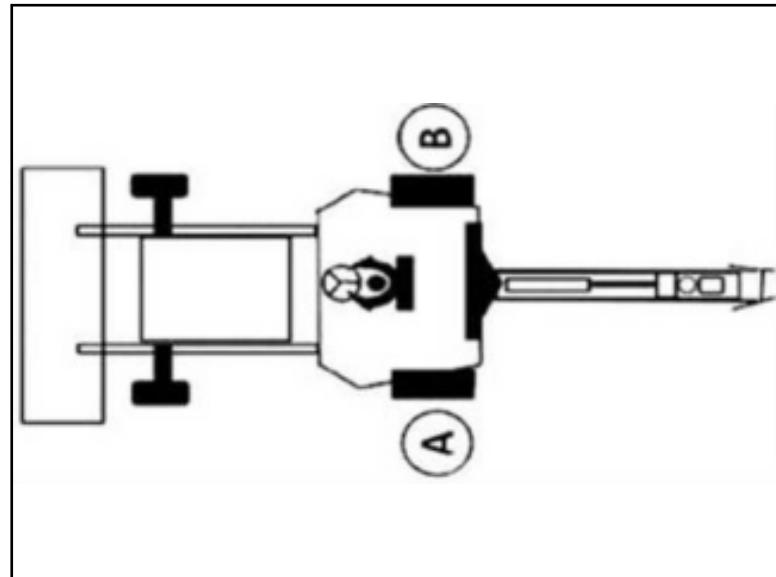
Last but not least, please treat this manual as a part of the machine. Read thoroughly to understand the contents of operation of the machine. Keep it clean and handy in the cabin for your reference when needed.

Left and right side

In this manual left "A" right "B" means your left and right side when you are seated normally in the driver's position. (Ref illustration)

Units of Measurement:

In this manual, the S.I system of units is used. For example the liquid quantities are given in litres.



Page Cross References:

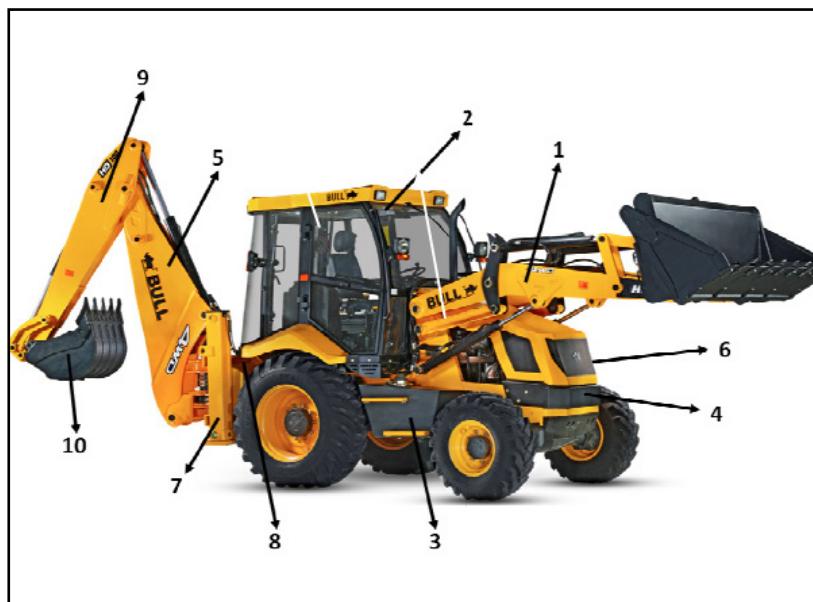
In this manual, page cross references are made by presenting the subject followed by the section containing the subject. The letters are printed in bold and Italic to signify that they are cross references for example:

1. Raise and lock the Loader Arms. See **Loader Arm Safety Strut** (Maintenance Section).

The aim of this part of the manual is to introduce you to the machine which you will be operating. The main parts will be described and identify they do and how they do, will be explained. Some unfamiliar words used later in this manual will also be explained. Your BULL HD dealer has more information if you want it.

General Description :

The BULL HD 100HP 4WD Backhoe Loader is a mobile digging and Loading machine with many optional attachments as per the application in which the machine is to be used. (For example lifting, loading, breaking etc) The machine is based on a steel chassis carrying a one man cabin Power is provided by a diesel engine driven through a Synchro Shuttle Transmission unit to the wheels. The steering and the brakes are hydraulically powered, as are the digging tool (Backhoe) and loading tool (Loader) Two hydraulic stabilizers are provided to give rigid support to the machine while in operation. Hydraulic power is provided by the pump driven from the engine.



Main Chassis and Cabin

The main chassis is a very rigid and strong construction of steel box sections. The fuel tank & hydraulic oil tank are attached by fasteners to the right hand side and left hand side of the machine respectively, for better access and easy serviceability. The cabin floor is mounted on the main chassis on rubber members. A fully closed and glazed cabin when **ROPS (Roll over protective structure)** and **FOPS (Falling Object protective structure)** is provided for the operator's protection.

On the glazed cabin three doors are provided, fully opening on the right & left side, and the rear door can be slide up & down and locked. The doors and windows can be latched partly open while in operation. All the controls of the machine are inside the cabin with the backhoe controls by the rear window. The seat is adjustable for operator comfort, and can be rotated in to position for the operator to use the backhoe controls or driving and loading controls. The seat can also be moved backward and forward for the ease of operator.

Power Train

The power train includes the engine, transmission unit (Synchro Shuttle/Power shift), Front Axle with 4WD Option and rearaxle. These major components of the power train are explained in the following sections.

Engine

The BULL HD100 4WD Backhoe Loader is fitted with Perkins Diesel engine and in case of HD96/HD76 is fitted with Kirloskar Engine. The engine is fixed in the front side to give good distribution and easy serviceability. For driving the machine, engine speed is controlled by an accelerator pedal. For stationary work, the speed is set by a hand accelerator lever. An integrated digital hour meter is provided which calculates the total operational hours. Other engine indicator sareafuel,gauge, Battery caution indicator and audio visual warnings for low oil pressure, low and high water temperature.

Transmission Unit:

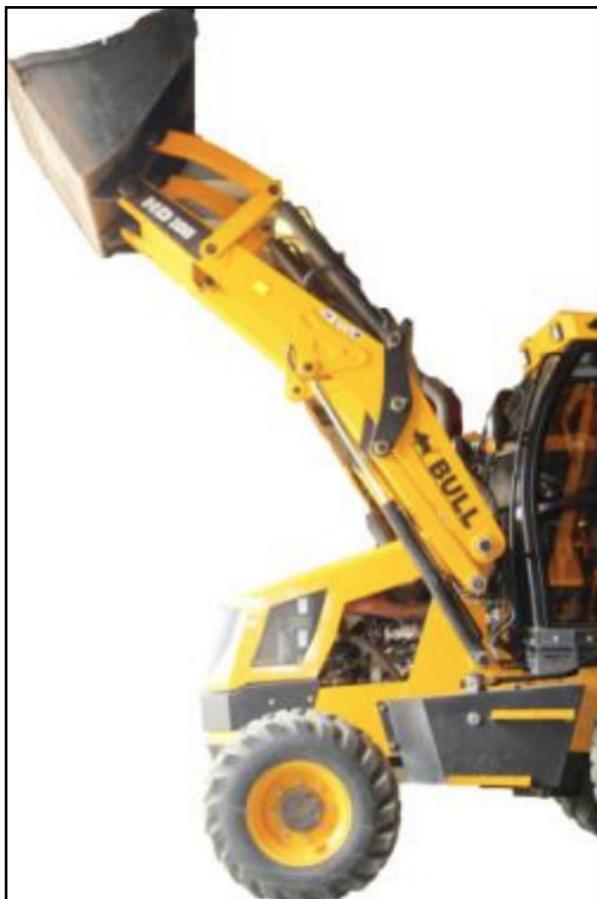
In BULL Backhoe Loader Transmission consists of a Torque Convertor, a hydraulic reverser unit and four speed gearbox.

The torque converter is a fluid coupling which increases the torque and gives smooth power take-off from the engine and the hydraulic reverser unit consists of two hydraulic operated clutches one forward and one reverse. Transmission fluid to operate the clutches is delivered by a pump driven by the torque convertor.

Operations of forward and reverse are selected by a lever-operated switch positioned on the left-hand side of the operator. The switch operates the transmission. The valve directs the transmission of oil pressure to the forward and reverse clutches. The transmission oil is cooled by a tubular radiator situated in the front of the radiator.

In case of Carraro Transmission, the gearbox has synchromesh on all four gears. It is manually operated by a lever in the cabin and another transmission which is SPS (Synchro power shift) can be operated electrically and automatically. In the case of ZF Transmission the Gear Box has Constant Mesh on all Four Gears and it is electrically operated by a combination switch which is located at LH side of the steering. The front Axle also gets drive from the transmission for 4-wheel drive machines.

The final drive to the rear axle fitted with wheels is through a short output shaft to the drive axle.



Loader

The loader consists of a bucket pivoted on the end of a pair of arms. Heavy Duty Loader arms are self-levelling and have parallel linkage. They keep the bucket angle relative to the ground as the arms move up and down. We provide an option to customers who are using standard buckets without link brackets.

The Loader arm and the bucket are operated by Hydraulic cylinders. Oil circulated to the cylinders by a loader valve.

The loader valve is directly operated by a joystick in the cabin. With help of the single joystick the arm can be raised and lowered and also the bucket can be rolled back (to gather the load/material) or rolled forward (to dump the load / material). The arm and bucket can be worked separately or together.

A special position of the lever makes the loader arm and bucket float so the bucket is free to ride up and down over the ground as the machine travels.

Electrical System

The electrical system is a 12 Volt. DC system, with a belt driven alternator and a battery. The starter motor is connected through a safety switch which prevents the engine starting unless the forward / reverse lever is in neutral.

The electrical system fuses and relays are located in a side panel provided in the cabin.

⚠ WARNING

Safety Switch

Never start the machine by directly connecting to the starter motor. This will bypass the safety switch and allow the engine to start when the gear is applied condition. The machine could move with no one in the cabin.

Front Axle (A)

The front axle works in the same principle as the rear axle but has 3 single piece housing which carries stub axles with the axle pin mounted with power steering.

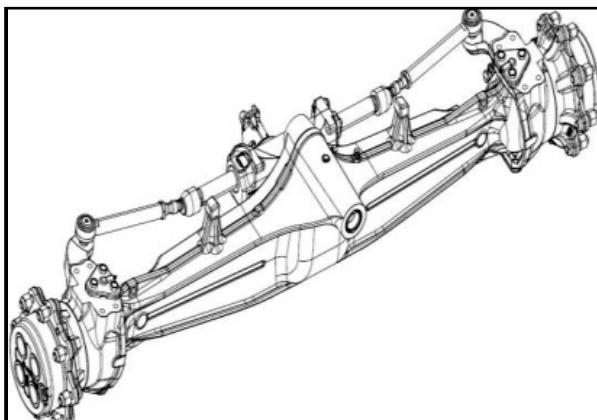
The wheel hub assemblies are trunnion mounted, this allows the hubs to swivel the steering. The wheel hubs are connected to the stub axle.



On two wheel drive machines the front axle is known as the steer able axle or dead axle. The axle is connected with a single horizontal centre pivot. This helps the front wheel to rise up and down while the machine is travelling in an uneven ground to keep the machine and its load level.

Front Axle (A)

Front Axle for 4-Wheel drive machines is hydraulic operated with drive taken from transmission. The front axle is fitted with power steering with heavy duty.

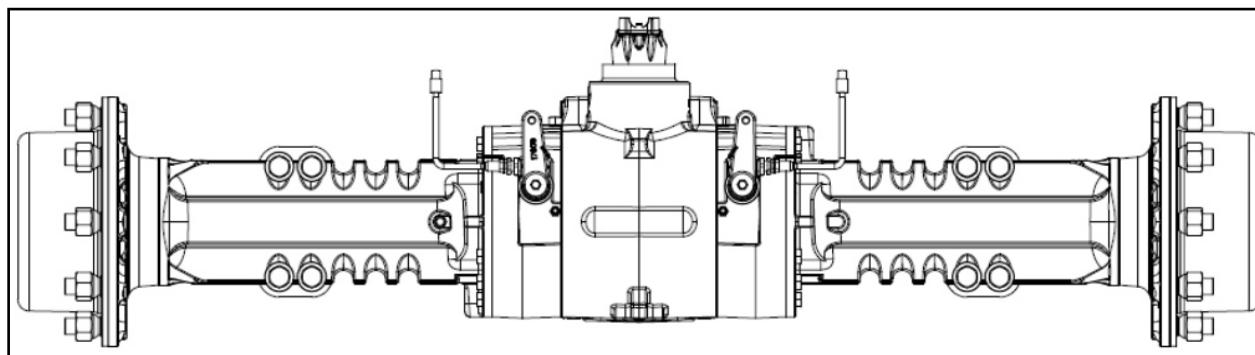


Rear Axle (B)

The rear axle has a centre housing (drive head), two axle arms and wheel hub assemblies which are fastened to the axle arms. The drive head holds the differential gearing and two oil immersed disc brake units. The differential casing is specially designed with spider gears that provide "Torque proportioning". This means that the drive transmitted to the wheels will be kept on one wheel when the other wheel is slipping.

The rear axle arm house half shafts, drive the drive head differential gearing and the power is transmitted through the half shafts to sun and planet gears inside the wheel hubs.

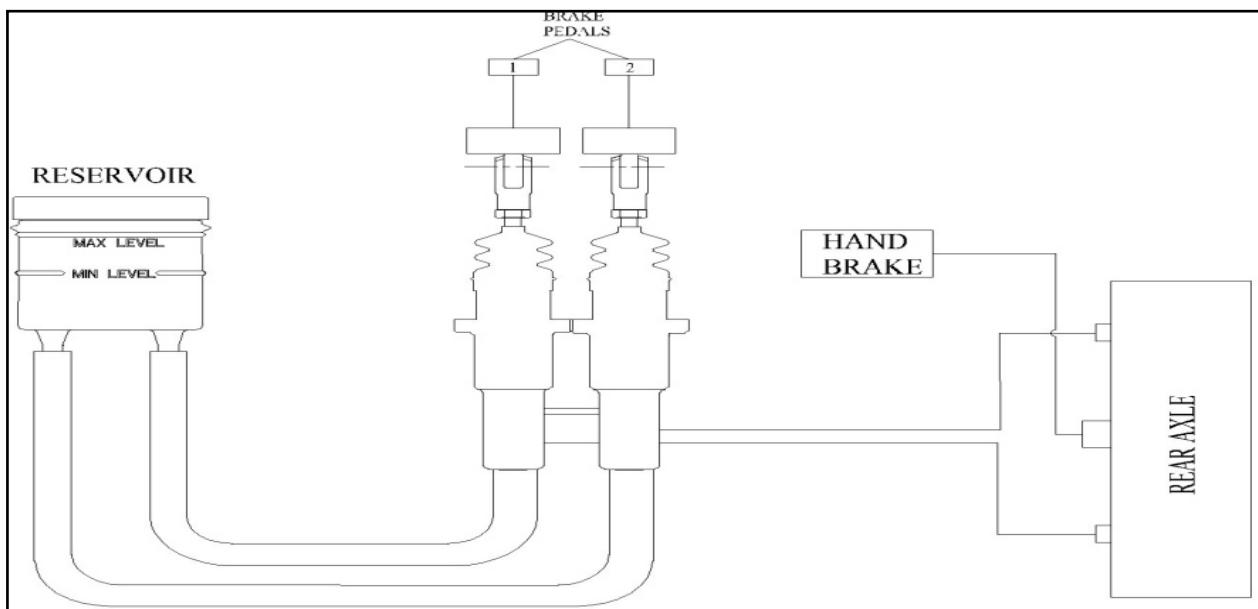
Pads are used to mount the axle on to the chassis.



Brakes

Hydraulic immersed brakes act through the rear axle half shafts. There are two brakes one on each half shaft. Each brake consists of oil immersed multi discs which are hydraulically operated.

BOTH brake has separate master cylinder, brake pedal Cylinders shares the reservoir of power steering.



On site, at low speeds the brakes can be operated separately. Brakes allow operation of wheel to make short radius turns. For normal road travel the brakes must be locked together using the bar provided on top of the brake pedals.

A periodical check need to done on reservoir tank in order maintain the oil level & oil level should not exceed max level.

The parking brake actuates a disc, mounted on the rear axle pinion shaft. It is cable operated from a lever located in the cabin.

The list of mineral oil recommended by carraro are as follow and it should be used.

1. Savsol HY Fluid AF 46
2. J20C Hygard oil (Savita or Shell)
3. Savita Sa voil UTTO
4. IOCL Servo Contrac 15W30
5. Texaco TDH special 10W
6. Valvoline EVHI 46

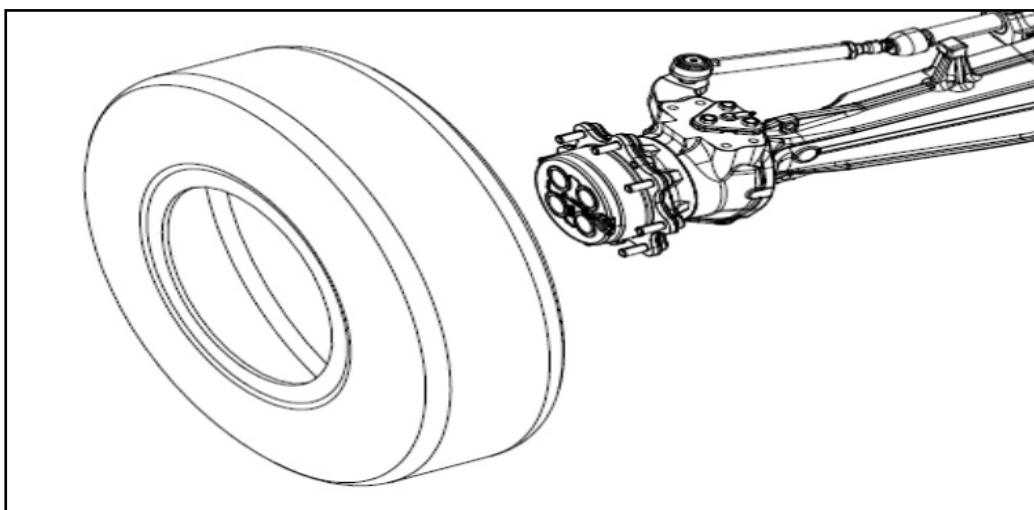
**⚠️ WARNING
BREAKS**

The brake pedals must be locked together for high speed and road travel. Using only one brake will cause the machine to spin around out of control, greatly increasing the risk of an accident.

Steering

For normal operation the machine is steered by the front wheels (For operation on site the brakes may be used to turn the machine See Brakes). The Steering is hydraulically assisted power steering.

The hydraulic cylinder piston rod is connected to the hub shaft of both LH & RH wheels. The two hub shafts are connected together by a rigid tie rod.



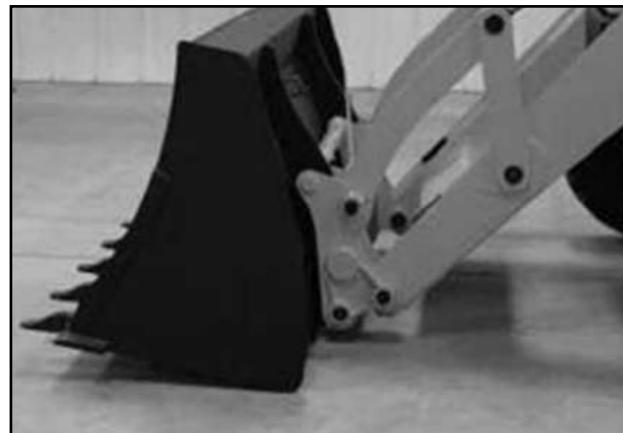
In the machine the steering gets priority over other hydraulics. Oil is delivered by the hydraulic pump to the priority valve which directs the oil to the steering unit when in use. The steering unit is on the bottom of the steering column. A Valve directs the oil to the left or right hand end of the steering cylinder, depending on the way the steering wheel is turned. This system is designed so that the machine can be steered manually in case of pump drive failure / engine failure (although more effort is required).

Link Bracket

It is optional link bracket loader arm and bucket.

It is use for detaching / attaching various types of buckets.

If customer uses more than one bucket, link bracket is required otherwise it is not required. In future if customer wants to ad link bracket, the hooking plate in bucket has to be modified



Backhoe

The Major components of the backhoe are the Carrier Structure, Sliding base, Swivel Base, Boom, Dipper & Bucket.

They are pivoted together with high quality grade pins and are operated by Hydraulic Cylinders. (See illustration).

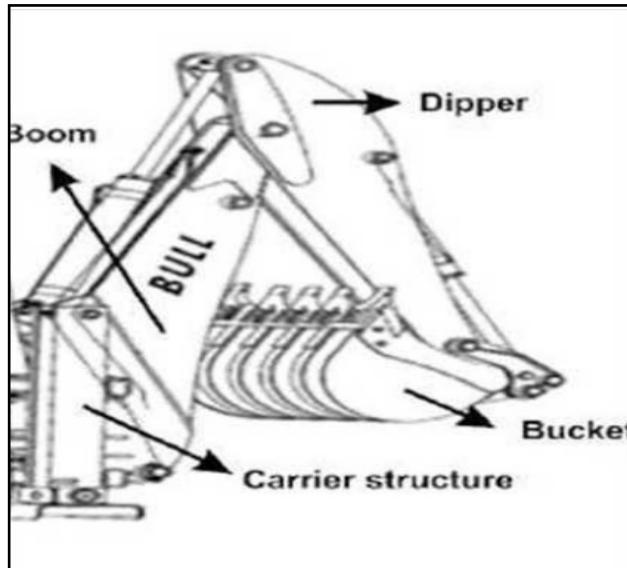
Backhoe

Hydraulic Oil from the pump is sent to the Cylinders by operating the valve provided in the cabin. The valves are directly operated by joysticks.

The sliding base is mounted on the rails of the carrier structure assembly and the backhoe can be shifted from side to side across the carrier structure assembly. During operation of the backhoe the sliding base is locked hydraulically by button cylinders.

There is a separate locking system for both the boom and dipper for use during transportation. The boom can be locked fully up for traveling.

Different sizes of bucket attachments can be fitted at the end of the dipper. Some attachments need an extra operational control which is in the cabin.



Stabilizers

Two stabilizers are fitted at the rear of the machine. They must be used when you operate the backhoe. Stabilizers are operated by hydraulic cylinders. Separate cylinders are provided in each stabilizers which can be operated independently to different heights. Each has a separate joystick in the cabin. The stabilizers should be lifted until the tyres are one inch above the ground. During excavation all four tyres of the machine should be lifted.

Identification plate

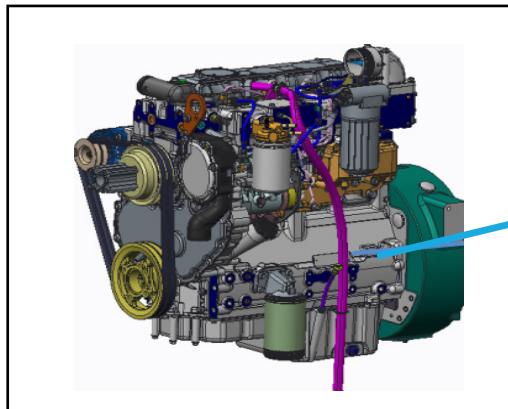
Your machine has an identification slate mounted on the right hand side of the loader arm (below the loader arm) The machine serial number, model and other relevant information's are stamped on the plate.

Each machine has a unique serial number which is used to identify the customer and relevant details when the machine is serviced.

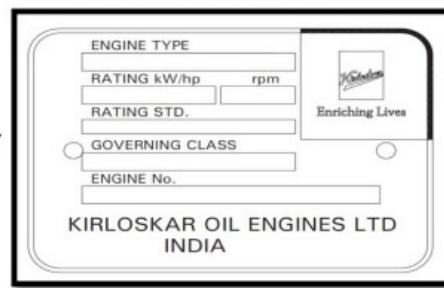
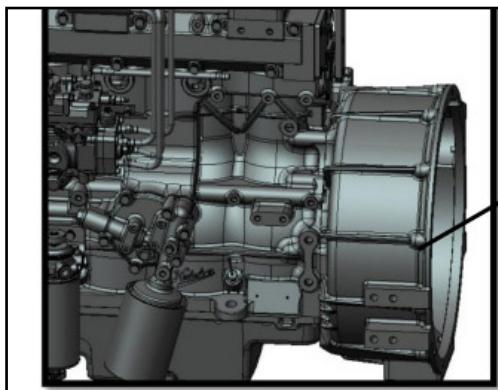


Unit identification - Engine

The engine identification plate is fixed on flywheel housing as shown and provides the serial number and relevant data of the engine.



Location of Nameplate



OPERATION

OPERATION

INTRODUCTION

This chapter will enable you to understand & learn step by step how to operate the machine. Read carefully from beginning to end. By then you should be able to understand to the best of your knowledge and operate it.

Pay special attention to all safety information provided. They warn you about the hazards you will face. Do not just read them but also think about what they mean. Understand the hazards and how to avoid them during operation. If there is anything you do not understand, ask your BULL HD dealer and he will be pleased to advise you.

When you have learnt about the vehicle driving controls and what they do, practice them. Practice driving the machine in an open space, clear of other people. Move to operating the machine controls only when you can drive the machine confidently and safely.

Take special care to practice the attachment controls. Practice in open area. Keep people away from the machine operating area. Do not jerk the controls. Work slowly until you understand their operation clearly what they do and what effect they have on the machine.

Do not learn in a hurry, Take your own time and drive it safely.

Always Remember

BE SAFE I BE CAUTIOUS I BE ALERT

WARNING

Do not walk under the raised attachments or working attachments. You will be crushed by the attachments or caught between the linkages.

Always lower the attachments on to the ground surface before you start to check, or call an experienced operator to lower them for you.

If there is nobody to help, study this manual until you have learnt how to lower the attachments.

Ensure the parking brakes are engaged before you start doing these checks

BEFORE ENTERING THE CABIN

The below mentioned checks should be made each time when you return to the machine after leaving it for any period of time. It is also best to stop the machine occasionally during long working hours and do the checks again.

All these checks concern the serviceability and safety of the machine. Tell your service engineer to identify any defects.

BEFORE ENTERING THE CABIN**1. Check for cleanliness**

- a) Clean the doors, windows, light lenses and rear view mirrors.
- b) Clean the dirt and mud from linkages, cylinders, bush and pin joints and radiator.
- c) Ensure the climbing handles and footsteps are clean and dry.
- d) Clean all safety stickers. Replace them if they are torn /damaged.

2. Check for Damages/Looseness / Leakages

- a) Walk around the machine to check for any carnage or missing parts.
- b) Ensure the bucket and its teeth's are safe and in tight condition.
- c) Make sure all pin and bush joints are seated in place.
- d) Check the windows/glasses are free from damage/crack. Glass splinters can blind you.
- e) Check for coolant, oil and fuel leakages below the machine.

3. Check the Tyres

- a) Ensure the tyres are inflated as per the pressure limit. See tyre pressure in Maintenance (Page No. 91) for inflating the tyres.
- b) Check for any cuts or penetration by any sharp/metal objects. Do not operate / drive the machine with damage tyres.

4. Check the fuel Cap

- a) Ensure the fuel filter cap (A) is tightly closed.

**⚠ WARNING**

Do not use machine controls as hand holds while climbing or leaving the machine.

⚠ WARNING

While climbing and leaving the cabin face the machine. Ensure your shoes are clean and dry otherwise you could slip and fall.

DOORS AND WINDOWS**1. Opening and Closing the Doors**

To open a door from outside unlock it with the key, Press the Button provided in the latch and pull the handle (A). The door is provided with an assister which will spring it open and hold it open. Close the door from inside of the cabin by pulling the door firmly, it will latch itself.



To open the door from inside operate the handle (B)

**Opening and closing the side windows**

To open the side window, release locks. The window will slide down half open. The window can be closed using the holder to lift the glass and lock it with the lock provided.



When the backhoe is shoved across the back of the machine and the bucket closed as shown in figure, the rear window can hit the bucket teeth (see warning below) If the backhoe is in position, move the Bucket clear before closing or opening the rear window.

To open the rear window, swing the locking levers, take a firm grip on the handrails, move the window towards the front and up as far it will move, to get it locked at the sides.

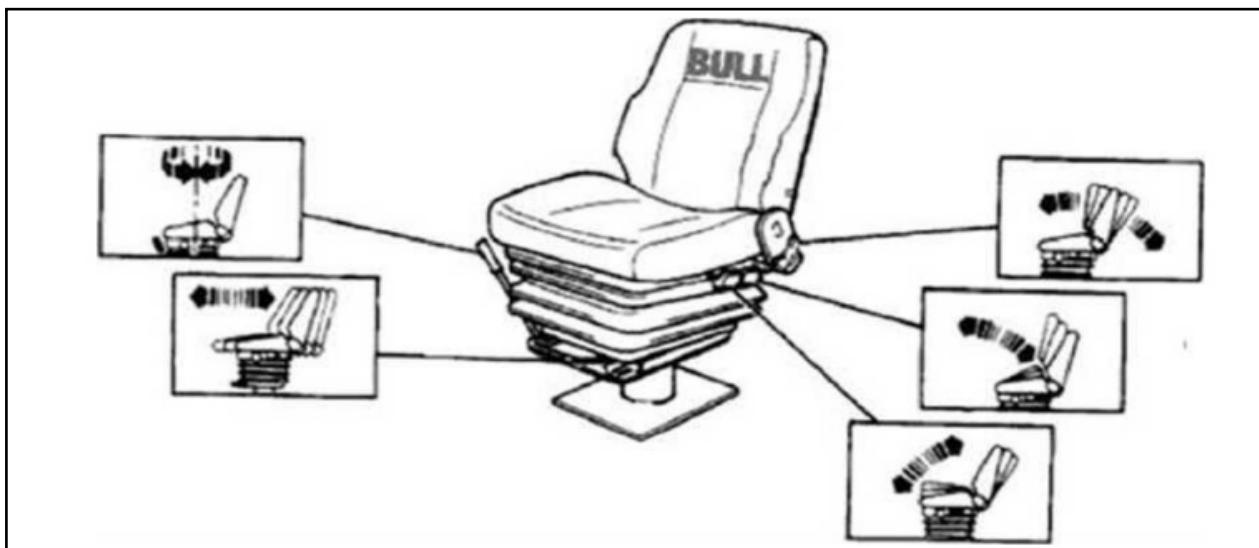
Secure the rear window in its open position by releasing the locking levers. Make sure the window is locked before releasing the locking levers.

**⚠️ WARNING**

The rear window is heavy. Take care while moving up and down. If necessary, slide the seat towards the loader to give you more room when moving the window.

SEAT CONTROLS

The operator's seat can be adjusted for your ease and comfort. A correctly adjusted seat reduces operator's fatigue. Adjust your seat so that you can comfortably operate the machine controls. For driving the machine adjust the seat so that you can press the brakes fully with your back against the seat back place.



Fore/Aft (B):

To move the seat fore and aft, lift the bar and slide the seat to the position you want, release the bar to lock the seat position. Make sure the seat is locked.

Back rest Angle (C):

Press your pack firmly against the backrest. Lift the control lever at the side and adjust the backrest as required. When the back rest has moved to the desired position release the control lever.

Height and Slope (D) Rear :

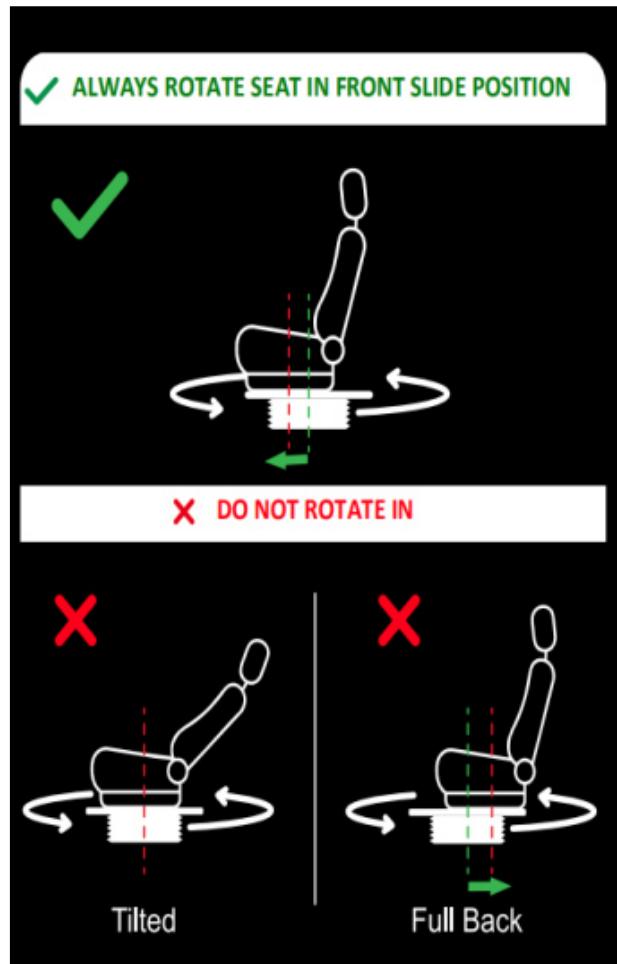
To move the rear of the seat up and down lift the control lever. Allow the seat to move to the position correct and then release the lever. Make sure the seat is locked into position.

Height and Slope (E) Rear :

To raise or lower the front of the seat lift the control lever. Allow the seat to move to the position correct and then release the lever. Make sure the seat is locked into position.

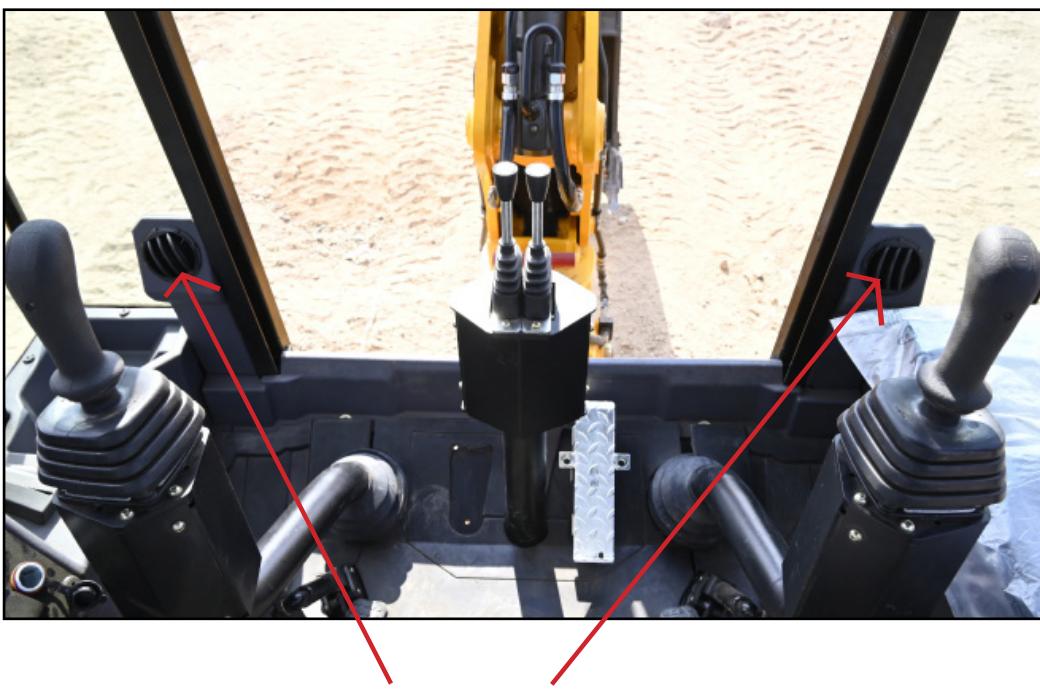
SAFETY GUIDE WHILE USING ROTATION:

1. All ways rotate seat at slide front position. To prevent collision with loader joystick.



AC / HEATER LOUVER

Louver are placed at the front and back side of the cabin.

**Front louver****Back Louver**

NOTE- Do not block the louver to obtain actual cooling or heater

SEAT BELT

Fasten the seat belt

- a) Sit straight in the seat. Pull the belt from its reel holder in one continuous movement.
- b) Push the male fitting into buckle and lock it. Make sure the belt is not twisted and ensure that it is over your hips and stomach.

Note: If the seat belt gets locked before the male fitting has been engaged, allow the belt to get retracted fully in its reel holder and then try again. The inertia mechanism may get locked if you pull the belt sharply or if the machine is in inclined position. In such cases ease the belt gently from its reel holder.

Check the seat belt functions correctly

- a) Sit straight in the seat and fasten the seat belt as described.
- b) Hold the middle of the seat belt as shown and tug it. The seat belt should lock.



Release the seat belt.

- a) Press the Red button in the seat belt and pull the male fitting from the buckle.
- b) Leave the seat belt retracted into the reel holder.



⚠ WARNING

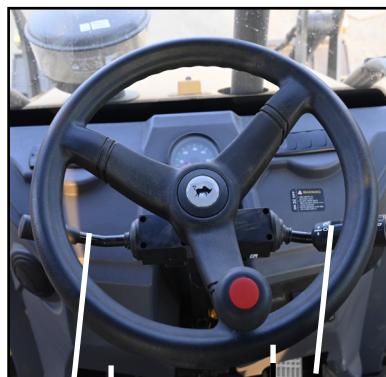
When you check the seat belt for its correct operation and if the seat belt does not "Lock" do not drive the machine. Get it repaired / replaced.

⚠ WARNING

The ROPS cabin is designed to give you protection from an accident. If you are not wearing seat belt you will be thrown out of the machine and crushed. Wear/fasten seat belt before starting the engine.

⚠ WARNING

Do not use a damaged/torn / worn out seat belt. Do not use a seat belt that has been in an accident. A damaged/worn out/ torn seat belt could break or give way during a collision leading to possible injury or death.

DRIVING CONTROLS,SWITCHES AND INSTRUMENTS FOR 76HP & 96HP


3 7
1 11

1. Steering Wheel
2. Dashboard
3. Forward/Reverse lever
4. Gear Shift lever
5. Accelerator (Foot pedal)



12 10 9 2
6. Parking Brake Lever
7. Brake Pedals
8. Loader operating lever
9. Switches
10. Ignition Key



5 4 13 8 6
11. Horn
12. Hour meter
14. Operating lever
13. Booster Bucket

DRIVING CONTROLS,SWITCHES AND INSTRUMENTS FOR 100HP


3 7
1 11

1. Steering Wheel
2. Dashboard
3. Forward/Reverse lever
4. Gear Shift lever
5. Accelerator (Foot pedal)



12 10 9 2
6. Parking Brake Lever
7. Brake Pedals
8. Loader operating lever
9. Switches
10. Ignition Key



5 4 13 8 6
11. Horn
12. Hour meter
14. Operating lever
13. Booster Bucket

Controls

Steering Wheel: Turn the wheel in the direction you want to go.

Dash Board - See Dashboard (page 52)

Gear Lever:

To select a gear positioning move the lever as show in shift pattern. When the machine is stationary, make sure that the forward/reverse lever is at neutral (N) and the engine at idle before selection of gear.

The machine can be moved in any gear depending on ground conditions.

Change the gear on the move:

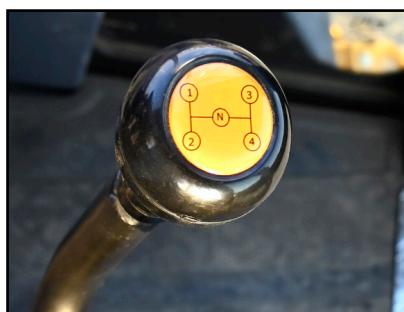
1. Push the transmission switch fully in on the gear lever.
2. Select the new Gear.
3. Release the transmission switch.
4. Use the accelerator pedal to produce a smooth gear change.

Accelerator Pedal

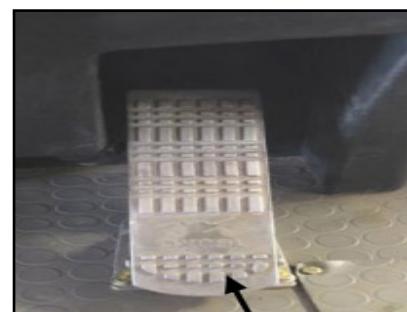
Push the pedal down to increase engine speed. Leave the pedal to control the engine speed. When you take your foot off the pedal, the engine will run in idle speed (700-800 RPM).

For operation of the Backhoe the constant rated RPM can be set in the Hand Accelerator (6) which is shown below

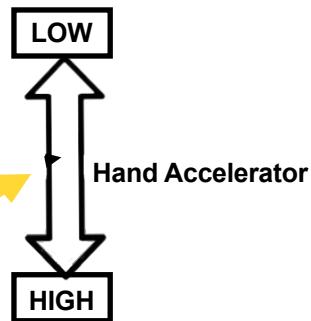
**GEAR SHIFTING
PATTERN MANUAL TRANSMISSION**



ACCELERATOR PEDAL



**GEAR SHIFTING
PATTERN AUTO TRANSMISSION**



⚠ WARNING

While driving the machine do not use the hand accelerator lever to set the engine speed. Use only the foot accelerator.

DRIVING CONTROLS,SWITCHES AND INSTRUMENTS

Hand Accelerator

Pull the lever towards the seat to increase the engine speed. Push the lever fully away from the seat for idling speed.

Parking Brake lever

Before leaving the machine always engage the parking brake. The machine will not move forward/reverse as this operation disconnects the forward reverse solenoid electrically.

To engage the parking brake pull the lever up and ensure the parking light is "ON". To release the parking brake move the lever down and ensure the parking light is "OFF".

CAUTION

The parking brake should not be used to slow the machine when the machine is traveling, except in an emergency. This will reduce the brakes efficiency. Replace brake pads after using the brake during emergency.

PARKING BRAKE LEVER



Brake Pedals

Push down on the brake pedals to slow/stop the machine. While travelling down in a slope use brakes to avoid over speeding. There are two pedals. The left rear brake is operated by the left pedal. The right rear brake is operated by the right pedal.

The pedals can be locked together by a locking lever (A). To lock the lever swing the lever as shown

Note: Separate the pedals only when the machine is moved in 1st gear (1) off the road.

Lock the pedals together whenever you are driving in second (2) third (3) and fourth (4) gear off the road.

Lock the pedals together when driving on the road in any gear.

The stop lights should "ON" when the brakes are applied. Do not drive unless otherwise both stop lights are working correctly.



LOADER OPERATING LEVERS

SEE LOADER CONTROLS

Forward/Reverse lever

Stop the machine before moving the lever. To select forward, reverse or neutral lift and operate the lever. All four gears are available in forward and 1st & 2nd in reverse. The engine will start only if the lever is in neutral (N) and the dashboard display shows (N)

To Reverse direction down

- Stop the machine. Engage the foot brakes.
- Let the engine speed come down to idle.
- Select the new direction to be moved and release the foot brakes and accelerate away.



WARNING

If the brake pedal locking lever is not engaged properly results in personal injury or death. If only one brake is applied in a sudden stop, the machine will go out of control.

DRIVING CONTROLS,SWITCHES AND INSTRUMENTS

Switches- Ignition Switch

This is operated by the starter key. There are three positions: a). "OFF" position (C) when the key is inserted in the slot. b). "Ignition "ON" (1) where the battery is connected to all electrical circuits, and c). self starter position (2). When the key is released it returns to the "ON" position (1).



Windscreen Wiper:

a) Switch "ON" the 4th switch from left side to switch the windscreen wiper "ON" & "OFF" (Ref Pg -55)



COMBINATION SWITCH

Direction Indicators

Pull the lever towards you to indicate a "RIGHT" TURN" and push the lever away from you to indicate a 'LEFT TURN".

Switch the indicators off when you have completed the turn. They operate only with the starter switch is in the "IGNITION ON" Position.



Head Lights

When the starter switch is in the "IGNITION ON" (1) position, rotate the barrel clockwise (away from you) for high beam. The centre position is for the Dipped beam for the Headlight flash function push again the barrel downwards and upwards.

Warning

Do not drive on the road with your headlights "ON" in high beam. You can dazzle other drivers and cause an accident.



DRIVING CONTROLS,SWITCHES AND INSTRUMENTS (For 96HP)

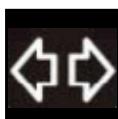
The instruments are grouped on an instrument panel placed at the right hand side of the operator.

Indicator Lights:

Other than indicator lights and headlights there are many other warning lights. When a warning light glows, on you will hear an audible alarm. The only way to turn off the alarm is to switch “OFF” the ignition key. Do not use the machine if it has a fault because you may damage the equipment.

**Parking Brake engaged (P)- Red light:**

This visual indication lights up when the parking brake is “ON”, both lights goes “OFF” when the parking brake is released. Always put the parking brake “ON” when leaving the machine.

**Direction Indicators On-RH/LH Green Flashing light**

The left and right hand signals flash once the LH/RH switch is activated on the column switch. Always use the indicators to signal before turning.

Switches

- A. Front working lamp
- B. Loader dump mode
- C. Wiper switch
- D. Hazard
- E. Rear Working Lamp (2 & 4 operations)
- F. Side shift lock
- G. Beacon light
- H. Wiper washer
- I. Rocker breaker switch



Note: If any of the following lights are “ON” while the engine is running, stop the engine as soon as possible. Do not use the machine until the fault has been rectified.

**No Charge (B) - Red Light**

When the engine is running and if the battery charging circuit fails this light will be “ON”. The light should go “OFF” a few seconds after the engine is started.

**Hydraulic filter element choke Indicator (C):**

A buzzer sounds when the filter element is choked, and also a warning symbol lights up on the instrument panel. Now change the filter element in the hydraulic tank.

Transmission oil temperature sensor (T):

A buzzer sounds and the 4th light with “T” mark will be “ON” if the temperature rises in the transmission due to oil contamination or low oil level in the transmission.

DRIVING CONTROLS,SWITCHES AND INSTRUMENTS (76 & 96 HP)


Engine Oil pressure Low - When engine oil pressure goes below 1.5 bar needle of the gauge moves to red band and the engine gets switched off.



Air Filter Choked - Red Band visible in air choke indicator A Red band comes up when the air filter gets choked. Replace/ Clean Filter and refit it. Press the button provided in the air choke indicator so that the red band will disappear.



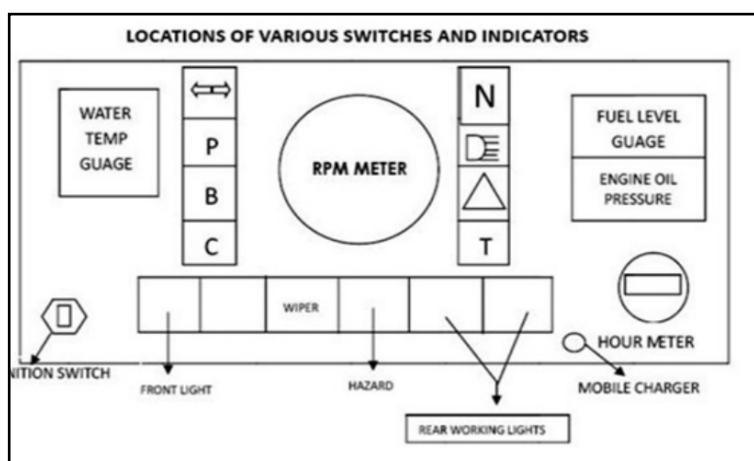
Speedometer - The graduation in the inner ring Indicates the road speed in kilometers per hour (Km/Hr).

Digital Hour meter - The total running time of the engine is recorded and displayed in this meter. Use this record to check the running hours during between two consecutive maintenance checks.

Water Temperature Gauge - Indicates the status of working temperature of engine coolant. Do not run the engine if the indicator goes into the red area.

Fuel gauge-Indicate the diesel level in the tank. See **MAINTENANCE** for the type of fuel used. Do not drive with a minimum/low or dry fuel tank because air will enter into the fuel system.

Mobile Charger - A provision is available in the panel box to charge the mobile phone of the operator.



Note : If any of the working lights are "ON" while the engine is running, stop the engine as soon as possible. Do not use the machine until the fault has been rectified.

DRIVING CONTROLS, SWITCHES AND INSTRUMENTS

The instruments are grouped on an instrument panel placed at the right hand side of the operator.

Indicator Lights:

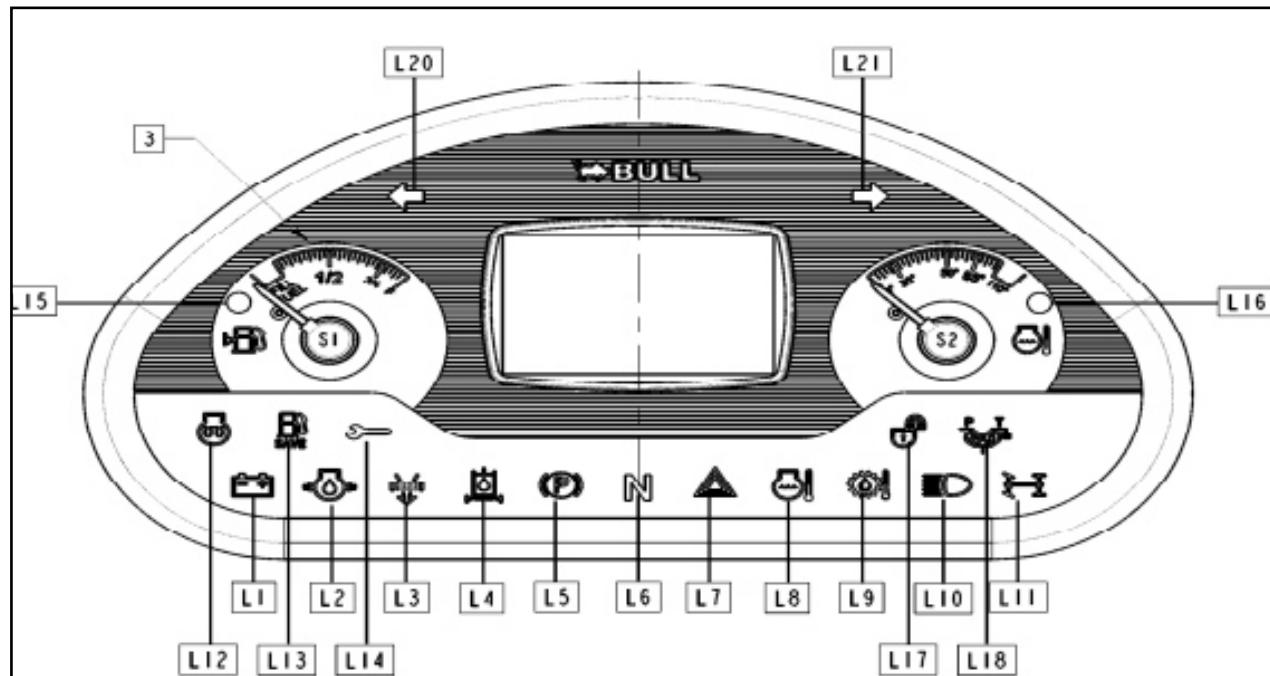
other than indicator lights and headlights there are many other warning lights. when a warning light glows, on you will hear an audible alarm. the only way to turn off the alarm is to switch "off" the ignitionkey. do not use the machine if it has a fault because you may damage the equipment.

Note : Warning lights - (WL)

W/L	Symbol	Function	Color	Notes
L1		Battery charging	Red	Buzzer ON with W/L ON
L2		Engine Oil Pressure	Red	Buzzer ON with W/L ON
L3		Air filter clogging	Red	Buzzer ON with W/L ON
L4		Oil filter clogging	Red	Buzzer ON with W/L ON
L5		Parking Brake	Red	Buzzer ON with W/L ON
L6		Neutral	Green	
L7		Hazard	Red	
L8		Engine high temperature	Red	Buzzer ON with W/L ON
L9		Transmission oil temperature	Red	Buzzer ON with W/L ON
L10		High beam	Blue	
L11		4WD	Blue	
L12		Engine heater coil	Amber	
L13		Engine economic mode	Green	

L14		Service Alarm	Red
L15	No Symbol	Low fuel level	Amber Buzzer ON with W/L ON
L16	No Symbol	Engine high temperature	Red Buzzer ON with W/L ON
L17		Hydraulic clamp off	Amber Buzzer ON with W/L ON
L18		Hydraulic economy mode	Amber
L20		Left direction	Green
L21		Right direction	Green

LOCATIONS OF VARIOUS SWITCHES AND INDICATORS



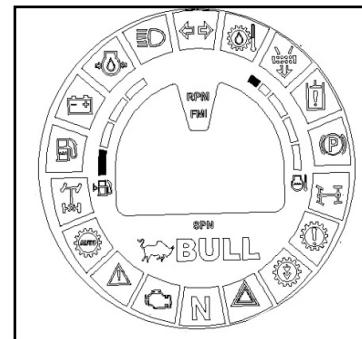
DRIVING CONTROLS,SWITCHES AND INSTRUMENTS (100HP)

Engine Oil pressure Low - When engine oil pressure goes below 1.5 bar needle of the gauge moves to red band and the engine gets switched off.



Air Filter Choked - Red Band visible in air choke indicator A Red band comes up when the air filter gets choked. Replace/ Clean Filter and refit it. Press the button provided in the air choke indicator so that the red band will disappear.

Speedometer - The graduation in the inner ring Indicates the road speed in kilometers per hour (Km/Hr).



Digital Hour meter - The total running time of the engine is recorded and displayed in this meter. Use this record to check the running hours during between two consecutive maintenance checks.

Water Temperature Gauge - Indicates the status of working temperature of engine coolant.

Do not run the engine if the indicator goes into the red area.

Fuel gauge-Indicate the diesel level in the tank. See **MAINTENANCE** for the type of fuel used. Do not drive with a minimum/low or dry fuel tank because air will enter into the fuel system.

Mobile Charger - A provision is available in the panel box to charge the mobile phone of the operator.

Switches

- A. Front working lamp
- B. Loader dump mode
- C. Wiper switch
- D. Hazard
- E. Rear Working Lamp (2 & 4 operations)
- F. Side shift lock
- G. Beacon light
- H. Wiper washer
- I. Rocker breaker switch



NOTE: If any of the working lights are "ON" while the engine is running, stop the engine as soon as possible .Do not use the machine until the fault has been rectified.

Loader controls

On Standard machines the loader bucket is operated with a single lever joystick.

For separate loader movements (Arm - Move Up and Down, Bucket Roll forward and back). The operating joystick is moved in (+) position.

Combined movements are not recommended and are to be avoided. The speed or the loader actions depends on how far you move the lever. The more you move the lever the faster the leaders actions are. The operating joystick is spring loaded to its central (hold) position. The loader will stay at any position until you operate the joystick.

A plastic sticker on top of the loader operating joystick with the symbols, indicate the type of movement. The symbols, joystick movements and loader actions are described as below.



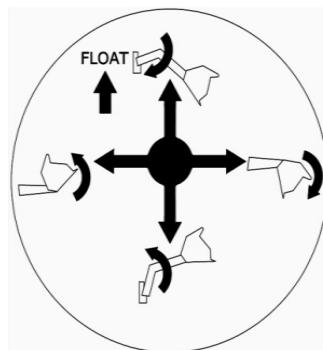
WARNING

When the transmission lever is pressed, the engine has no braking effect on the machine. Use stop the brakes to the machine.

Move Up (A) To move the Loader arm "UP", pull the operating joystick straight back. As the loader rises it will stop at the same angle to the ground due to the parallel linkages on the loader arms.

Move Down (B)

To move down the loader arm, push the operating joystick forward. The Loader will stop at the same angle to the ground.



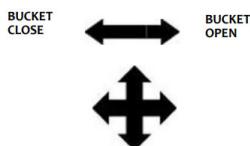
LOADER CONTROLS

Bucket Roll Forward

To roll the bucket forward (e.g. To pick up) push the operating joystick to the right.

Bucket Roll Back

To roll the bucket back (e.g. To dump a load) pull the lever to the left.

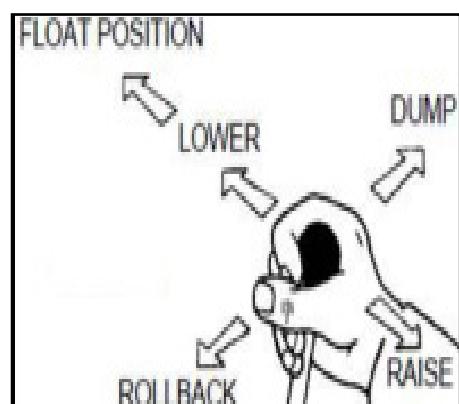


Float Position:

Option given to use loader bucket to float in the ground. This can be used for dozing operation

Position of joystick:

The below illustration shows the operation movement of the loader operating ever which has four movements as shown below.



**Note : Note: Roll Back - Bucket Close
Dump - Bucket Open**

BACKHOE CONTROLS - STABILIZER**Stabilizer Move Up - A & C**

To raise the stabilizers and lower the machine, push the levers towards the rear of the machine. Stabilizer

Move Down - B & D

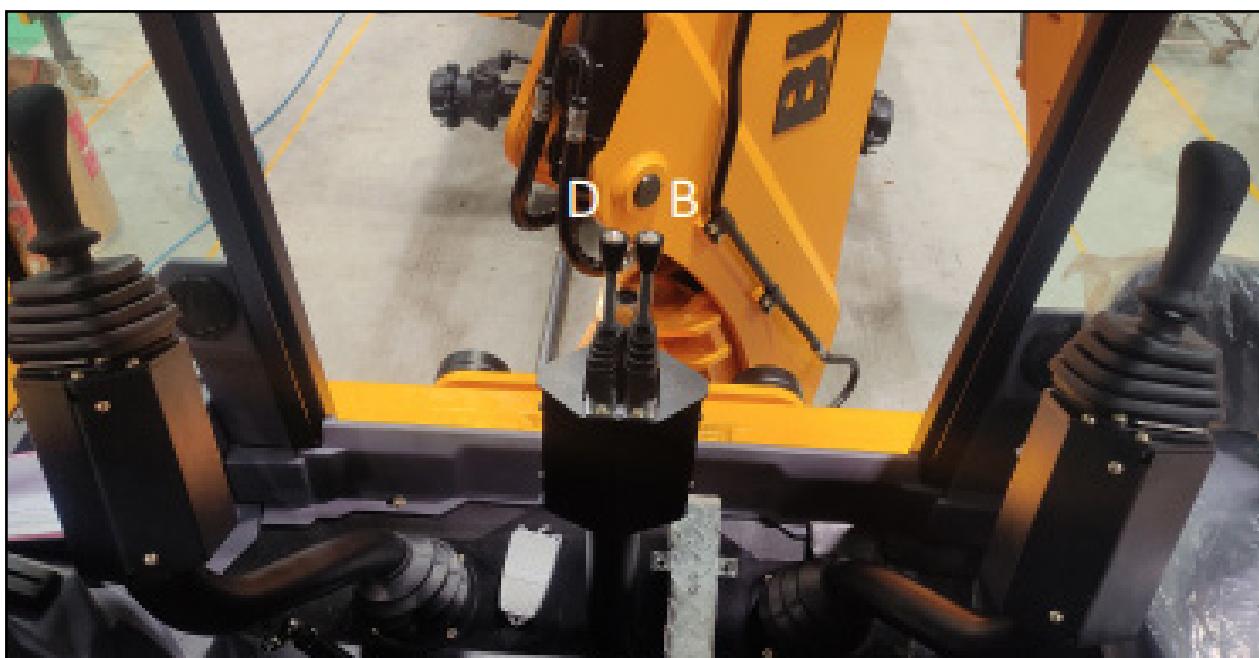
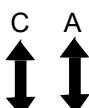
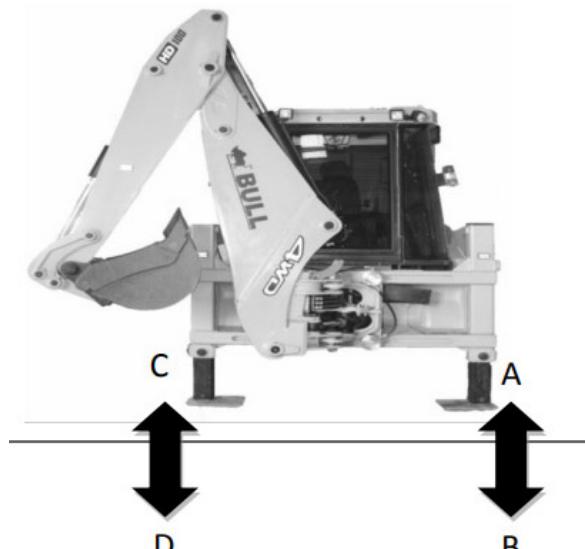
To move down the stabilizer and raise up the machine, pull the levers towards the front of the machine.

⚠ WARNING

The operator must be in the seat, facing the rear window, before operating the stabilizer controls. Do not operate the stabilizer joystick from outside the machine or standing near the backhoe. You could be crushed or killed when the backhoe moves.

The stabilizer must be moved down when you use the backhoe otherwise the machine will shake violently. Each stabilizer joystick can be operated independently.

Move down the stabilizer to level the machine and reduce the weight on the rear tyres. The loader bucket should be moved down along with the stabilizers to level and steady the machine. While the Backhoe is in operation, ensure all four wheels are lifted above the ground.



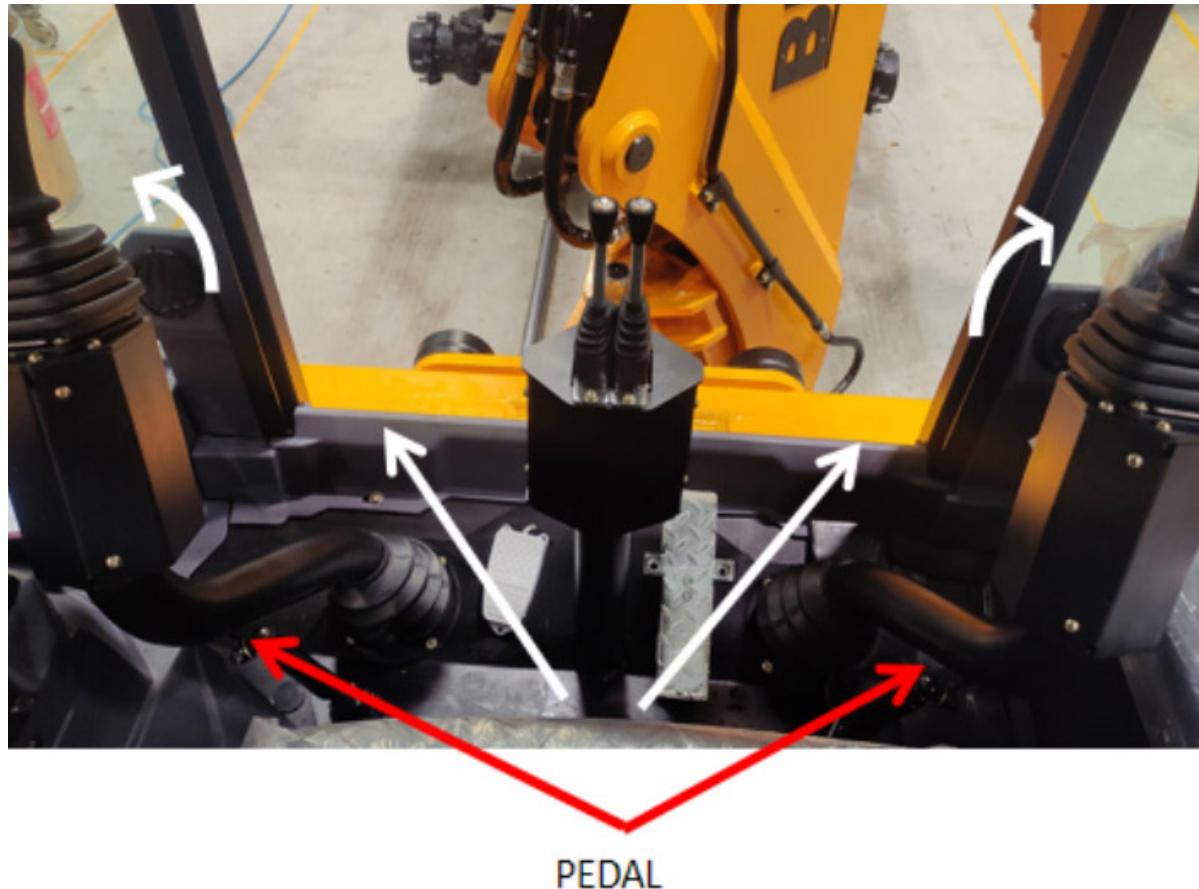
BACKHOE CONTROLS

The Backhoe joysticks are pilot operated. The joystick assembly can be adjustable to operator's required position by pressing the pedal and pulling the handle.

There are two operating joysticks. The left (A) operating joystick operates the Boom and Swing. The right (B) operating joystick operates the Dipper and Bucket. The Stabilizers are operated as mentioned in the Stabilizer Controls (Operation Section)

The joystick moves in a (X) pattern for separate operating movements and we have another option of operating the joystick in (+) pattern by turning the joystick to 45°. The speed of the backhoe depends upon how you handle the joysticks.

A Sticker with symbols indicates the joystick movements and related backhoe actions respectively. The Backhoe will stay at any position until you move with the joysticks.



BACKHOE CONTROLS - BOOM & SWING OPERATION

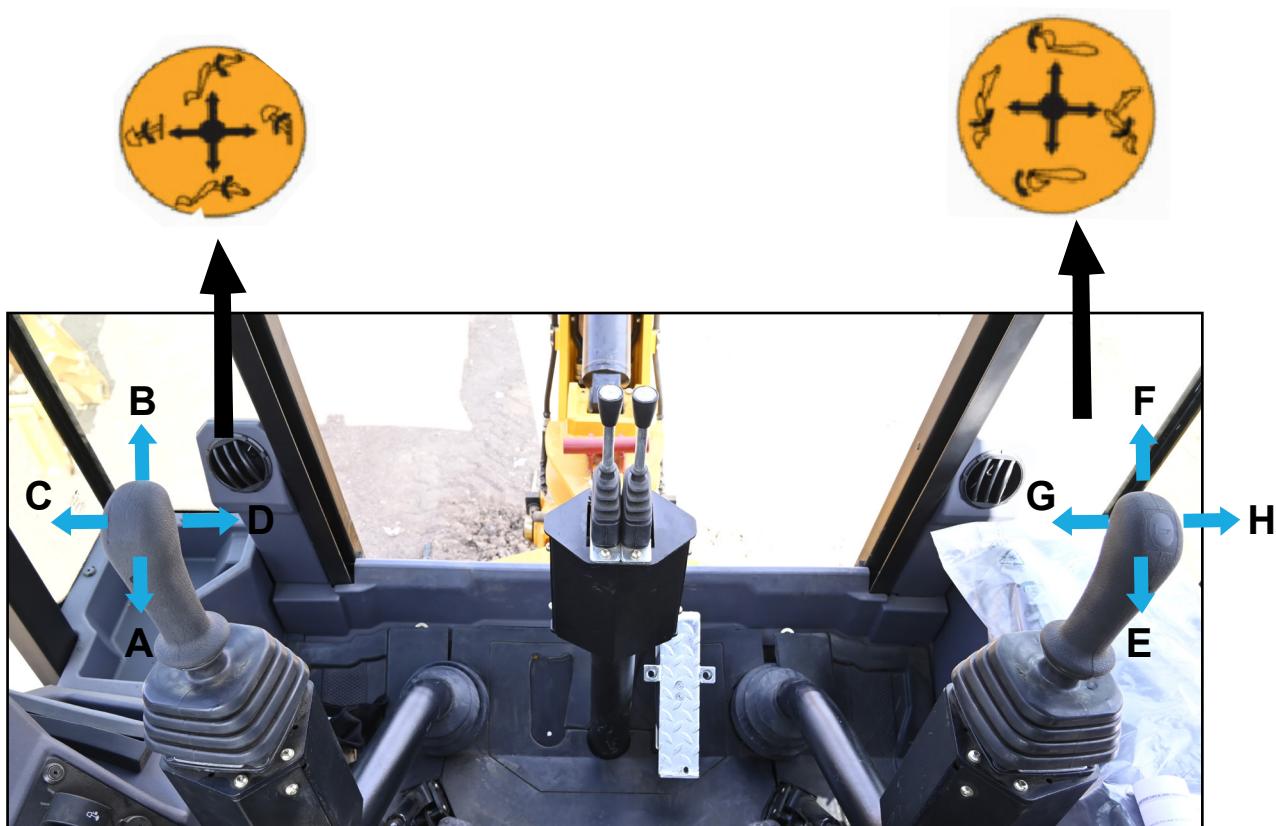
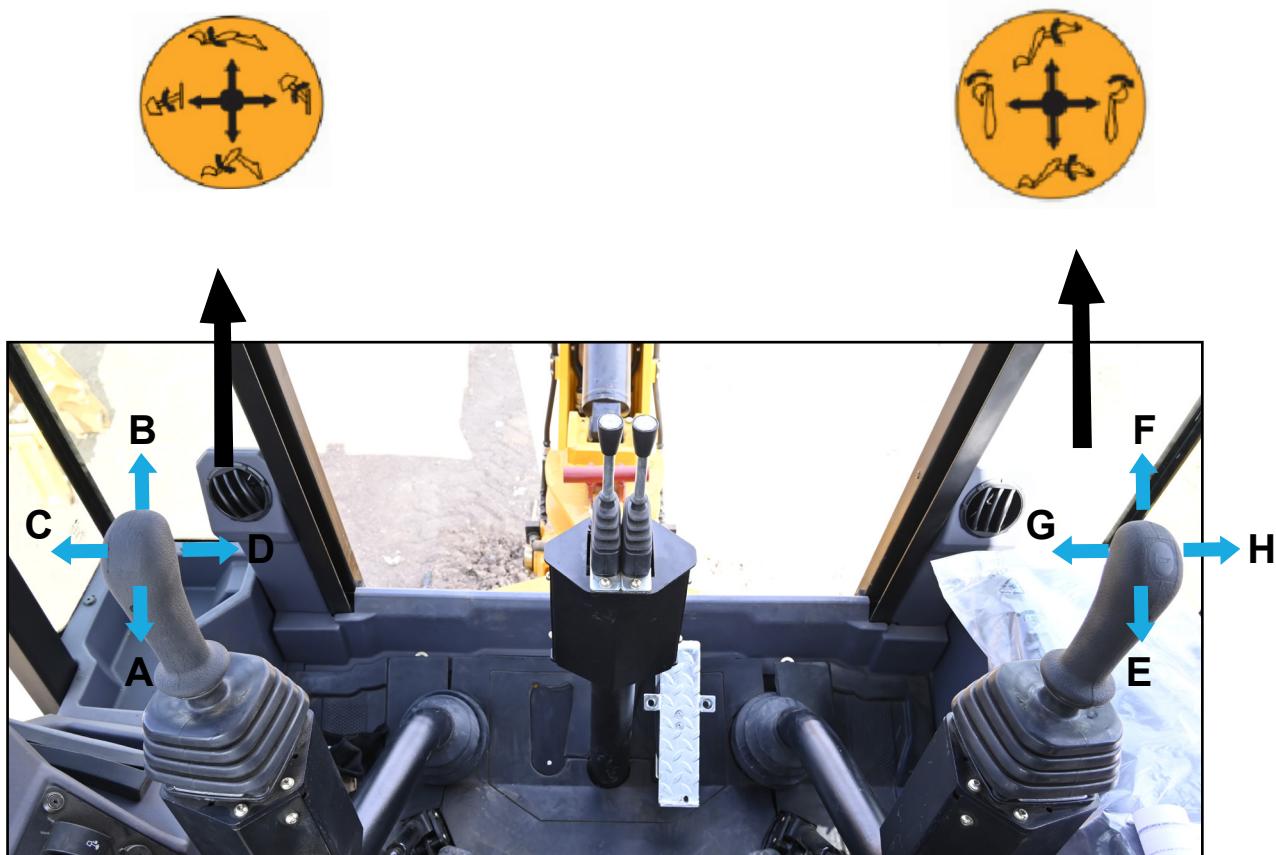
Move Boom Up: To move the Boom (A) upwards pull the left operating joystick. (See image below) Before raising the boom, ensure the safety lock has been removed from the boom and ensure the boom is clear overhead.

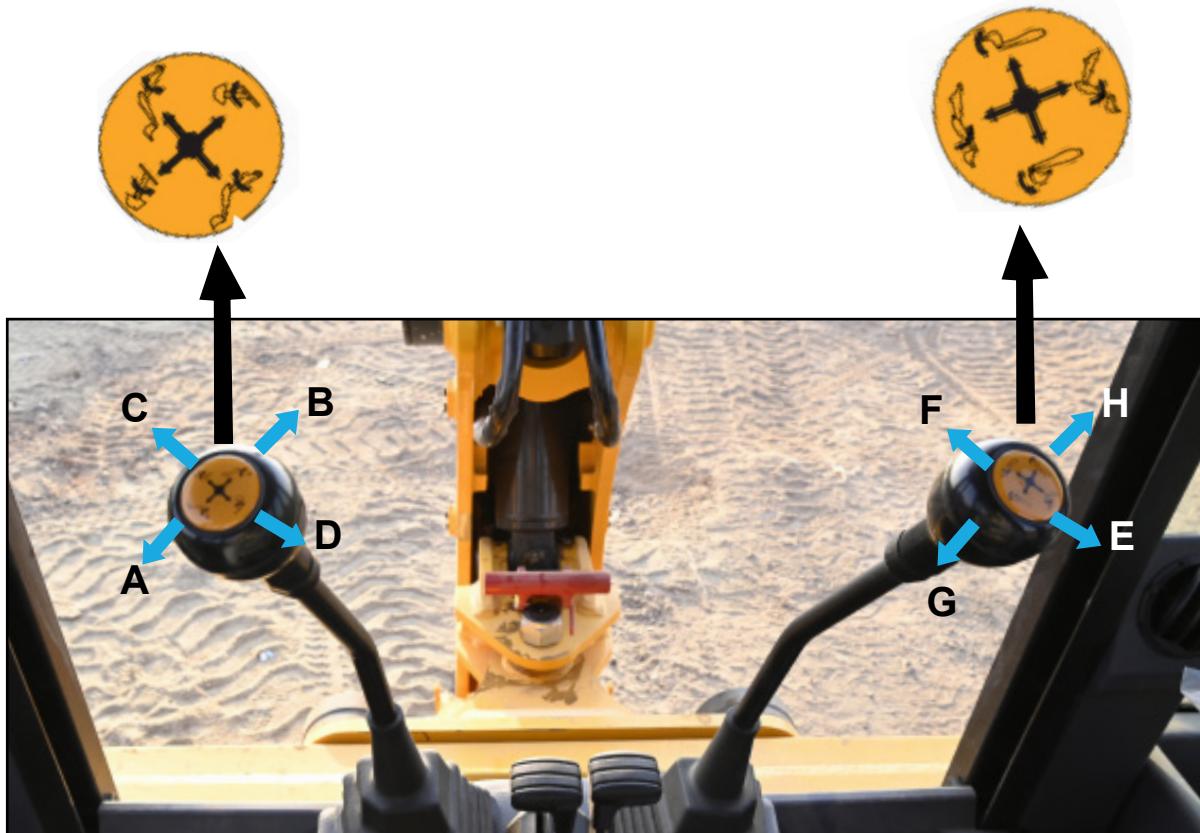
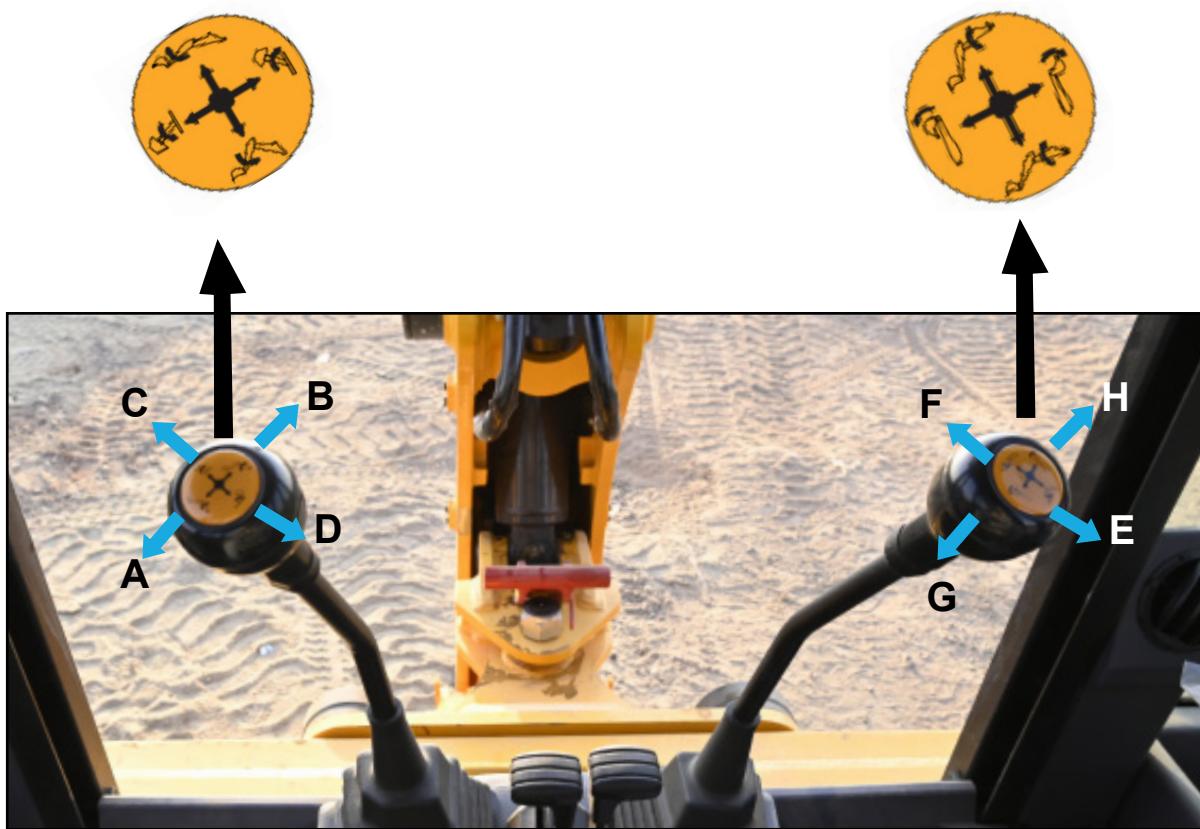
Move Boom Down: To move the Boom downwards (B) push the left operating joystick. (See image below)

Swing left: To swing the boom to your left (C) push the left operating joystick. (See image below)

Swing right: To swing the boom to your right (D) pull the left operating joystick. (See image below)

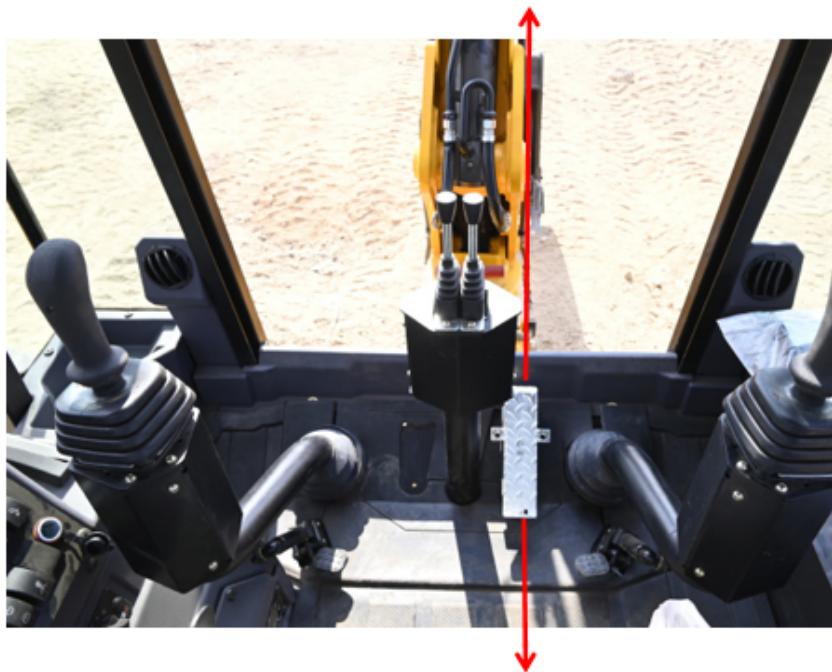
Note: Some backhoe buckets and attachments may collide with the Carrier Structure frame and Stabilizer legs if swung too far around. Check the swing cylinder adjustments

FOR PILOT JOYSTICK**SAE STANDARD****ISO STANDARD**

FOR MECHANICAL JOYSTICK**SAE STANDARED****ISO STANDARED**

HOW TO MOVE TELESCOPIC BOOM ON FORWARD & REVERSE DIRECTION
PRESS ON FRONT TO MOVE ON FORWARD DIRECTION

PRESS ON FRONT TO MOVE ON FORWARD DIRECTION



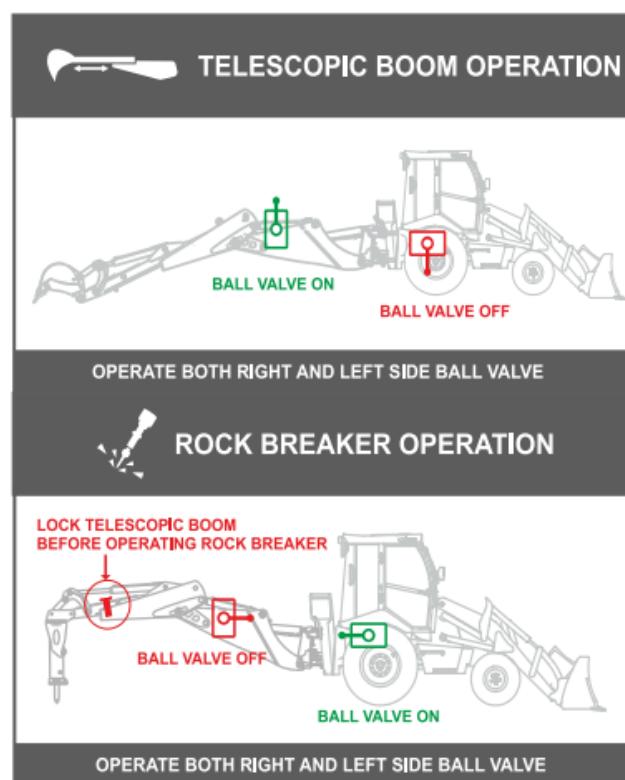
PRESS ON BACK TO MOVE ON BACKWARD DIRECTION

In our machine we providing telescopic dipper & rock breaker provision (both optional).

Note :

- 1.In case of not using telescopic dipper, retract the dipper completely and lock the dipper with the PIN provided.
- 2.Don't Engage rock breaker option at extended telescopic condition.

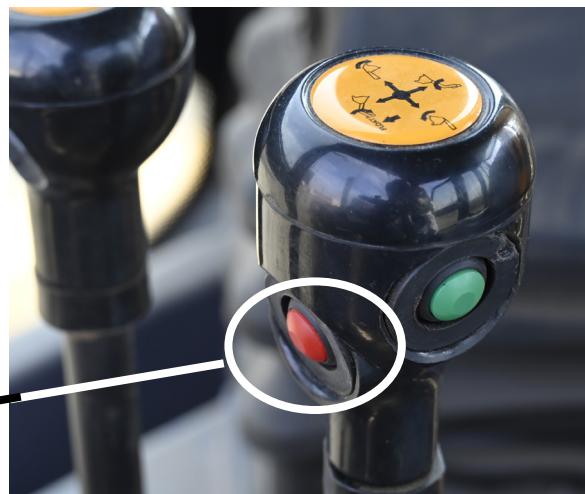
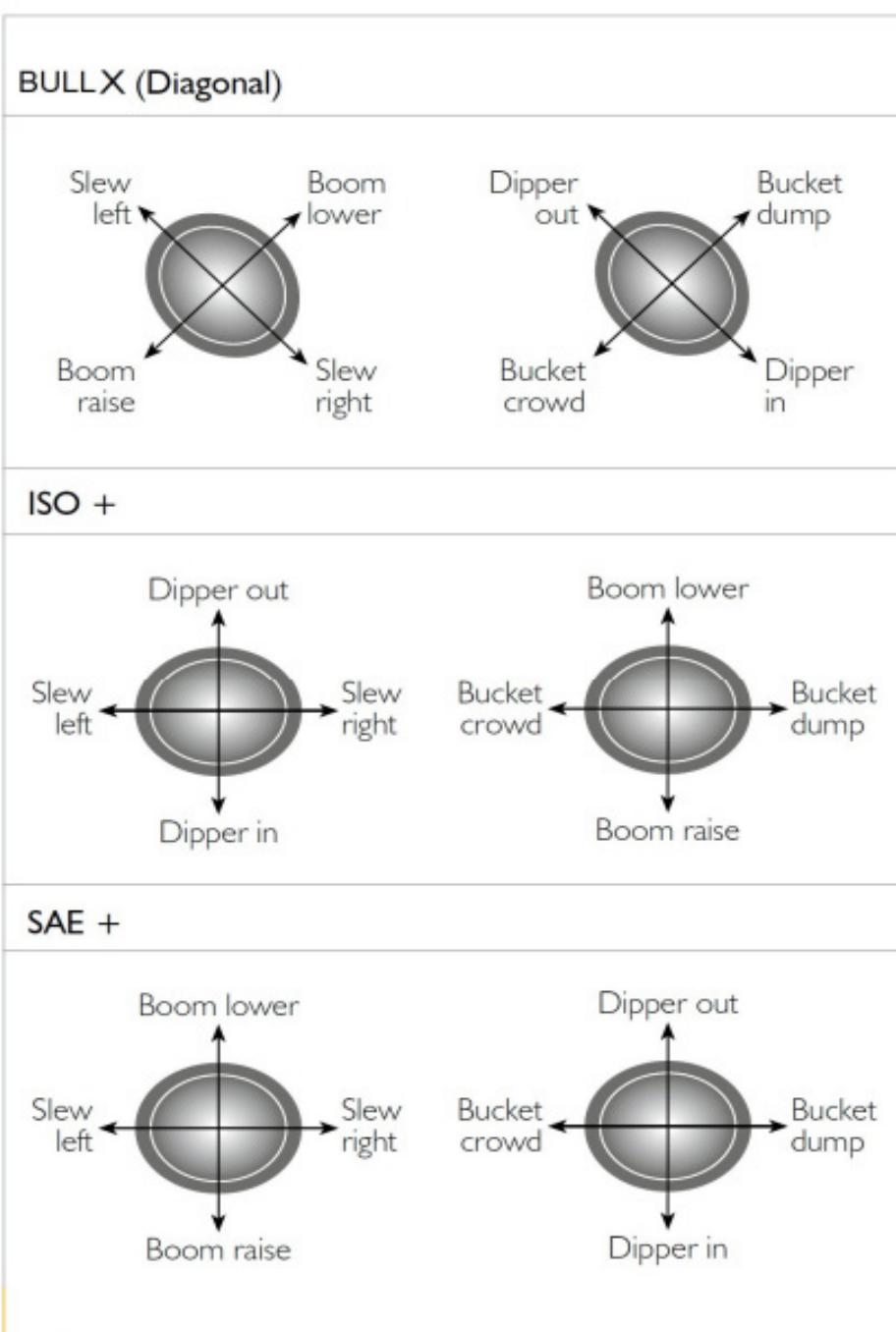
BALL VALVE ON & OFF POSITION FOR TELESCOPIC&ROCK BREAKER OPERATION



KICKDOWN FUNCTION:

Kickdown is a request for a downshift from the current engaged second gear to the first gear. It will be activated when pressing the Joystick knob (red push button switch).

Strategy: Pressing the switch will downshift the gear from second to first, Releasing the switch will up shift to the current second gear.

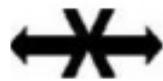
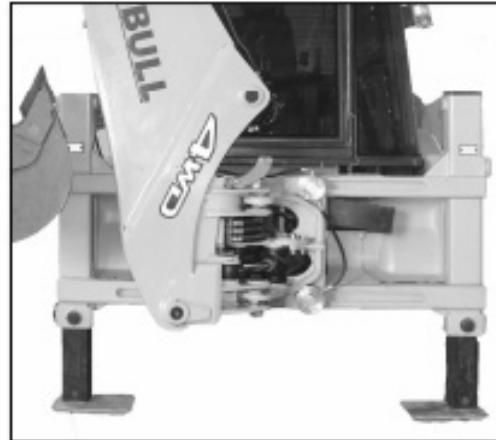
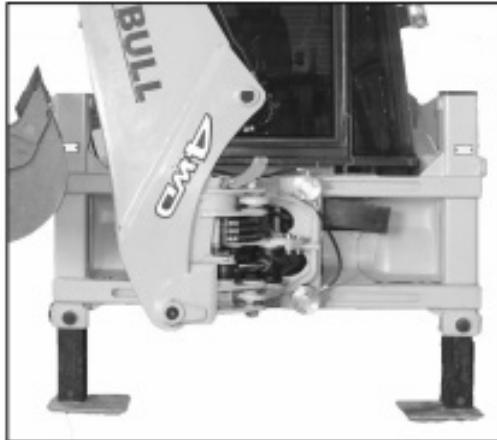
**PILOT & ROD TYPE OPERATED BHO JOYSTICK WITH THREE CONT**

BACKHOE CONTROLS - MOVING SLIDING BASE (KING POST TRAVEL)

Backhoe sliding base travel is possible by turning on Backhoe Side Shift Lock Switch which is situated on the panel board. This releases the button cylinders and the sliding base is ready for travel. Stretch the boom and place the bucket on ground in sideways. By doing this way the sliding base will move on the guide roll to the other end.

Locking the sliding base: Turn off the switch (C)

Releasing the sliding base: Turn on the switch (C)



BEFORE STARTING THE ENGINE

Note: If you are using the machine at extreme low or high temperatures, read operating in low Temperature or High Temperature (OPERATION SECTION).

1. Engage the Parking brake

2. Lower the attachments to the ground

Lower the backhoe bucket and loader Bucket to the ground. The attachments will lower themselves due to their own weight when you operate the levers. Control the levers carefully to control the rate of descent.

DANGER

Before lowering the attachments, ensure the area is clear of people. They could fall or get caught in the linkages and be crushed

3. On a Pre start Inspection

For your own safety and others and for a maximum long run of your machine, do a pre start inspection before starting the engine.

- a. Walk around the outside of the machine. (See: Before Entering the Cab) Operation Section
- b. Clean all dirt and rubbish from inside the cabin, especially around the pedals and control levels
- c. Remove oil, grease and mud from pedals, control levers, and the steering wheel.
- d. Make sure your hands and shoes are dry (See: WARNING)
- e. Remove or keep safe all loose articles in the cabin such as tools, levers, lunch box etc
- f. Inspect the FOPS/ROPS structure for damages, if cabin belts are loose, contact your BULL HD dealer to get it repaired (See FOPS/ROPS structure Maintenance Section)
- g. Inspect around the cabin for any loose bolts, screw, etc. Replace or tighten it.
- h. Check all lights, warning lights. Horn, Indicator lights, all switches and windscreens wiper.



BEFORE STARTING THE ENGINE

4. Adjust the seat & Steering Column

Adjust the seat in such a way that you can comfortably reach all the machine controls. You should be able to engage the brake pedal fully with your back and adjust the steering by pressing the pedal (A) so that you can easily access the steering wheel.



5. Set the rear view mirrors

Align the rear view mirror so that you have a good view behind the machine when you are seated correctly.

6. Forward / Reverse control

be in neutral. The engine will not start unless the forward /reverse lever is in neutral.



7. Put the gear in Neutral Position

8. Set the hand accelerator to the minimum or idle position.

STARTING THE ENGINE

1. Start the engine.

The starter switch is to be turned ON, The audible alarm and red lights of the battery charger and transmission oil pressure will light up.

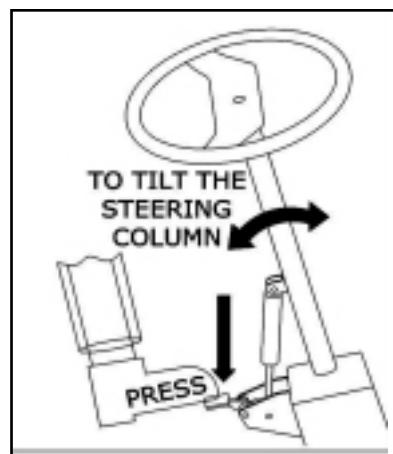
Turn the starter switch clockwise to the position 2 and start the engine.

2. Warm up the engine and Hydraulics.

Run the engine in idle speed for five minutes. Operate the Backhoe and loader for a while to warm up the hydraulic system.

3. Check the warning lights.

If any warning lights remain in the ON position while the engine is running, it is essential to immediately stop the engine. Once the engine has started the warning lights should go OFF. Do not raise the engine RPM until the oil pressure low light goes OFF. Check that the audible alarm is silent.



CAUTION

do not continuously turn the ignition switch on for long it can damage your starter motor.

PREPARE THE MACHINE FOR TRAVELLING IN ROAD**1. Set the sliding base (Either side)**

Shift the kingpost to either side and apply the hydraulic lock (See: Page

2. Set and lock the Backhoe

Raise the boom and lock the boom using the lock provided in the boom. Fold the dipper and close the bucket.

3. Raise the loader bucket and ensure visibility

Fold the loader bucket fully back, Raise the Bucket to a distance of 300 mm from ground. While traveling, ensure good visibility so that you can drive safely and avoid being a nuisance to other drivers

4. Check all lights

Ensure all head lights, brake lights, working lights, including the indicator lights work.

5. Raise the stabilizer legs

Before moving the backhoe, ensure that the stabilizer are raised fully up.

CAUTION

Follow the procedures and warnings described to make the machine safe to move on the road.

In BULL HD Backhoe Loader the sliding base must be locked on either side while travelling. If it is in centre the balance will be off and you could loose control over the machine.

The boom should be locked with the clamp provided in the boom.

The bucket should be in the closed position as shown in the figure below.

The front and rear work lights should be off or it could dazzle other drivers.

Note: Before travelling on the road, ensure that you and your machine comply with relevant local laws



PREPARE THE MACHINE FOR TRAVELLING IN ROAD**OPERATING HINTS:**

The machine can move in any gear. Do not overheat the engine by engaging too high gears. For example if you are climbing up a hill operating in a too high gear will overheat the torque convertor fluid.

While moving the machine always be alert and cautious. Keep the machine under control. Do not use the brake pedals as footrests.

Select the necessary gear before you drive down a slope. Use the same gear when you move up the slope. Do not change gear on the slope. If the load is pushing the machine when moving down the slope engage first gear (1).

Use the brake pedal to stop moving too fast down a slope. Approach deep mud in first gear (I) with the front wheels straight. Always stop the machine and drop the engine speed to idle before changing from forward to reverse gear or vice versa.

⚠ WARNING

You and others could be killed or injured if you reverse the machine suddenly, because the change in direction will be sudden with no warning.

⚠ WARNING

Use the accelerator pedal to control the engine speed while driving. Do not set the speed with the hand accelerator.

TO BEGIN MOVING THE MACHINE

1. Check the seat belt and seat

Adjust the seat belt and the seat so that you will be comfortable while driving the machine.

2. Engage a gear

Select the suitable gear for the conditions of the job you are working.

Note: It is recommended to turn on ECO Mode switch on road travel for more fuel efficiency.

3. Select Forward/Reverse and Move off

a. Check the attachments are in one of the ir travel positions. Push the brake pedals hard down. Release the parking brake lever. Press and select the forward/reverse button to move forward or reverse.

When the forward/reverse position is selected a warning light with alarm will be "ON" to remind you that the parking brake is still engaged and the machine cannot move.

b. The machine will start moving smoothly when you release the brake pedals and push down on the accelerator pedal.

c. Check the brakes and steering while travelling. Do net drive unless the steering and brakes are functioning correctly.

b. A switch is provided on the right hand side of steering to ON/OFF the 4Wheel drive option. This is to be operated only in neutral position only. Do not operate the switch while machine is on move.

4WD ENGAGING & DISENGAGING SWITCH

TO ENGAGE 4WD (DO'S AND DON'T)

1. In case of high speed roading on level terrain as the requirement is on the lower side it is not required to have 4WD engaged

2. The transmission 4wd PTO has been designed to engage (without damage) at a maximum rear to front output speed difference of 250 RPM,Which is more than adequate for normal use of the machine

3. Any 4WD engagement at speed difference over 250 delta RPM ,causes serious damage or failure to 4WD PTO

For any vehicle check the procedure to test each machine running on the stabilizers and front bucket must be perform as follows:

1. Run just rear wheel at maximum transmission shaft rear output of 500 RPM for a short time (4wd PTO disengage -Do Not engage 4WD PTO).

2. Run both rear and front wheels running at any RPM and time (4WD PTO engage starting from transmission output shaft at 0 RPM)

3. Avoid 4WD engagement with rear wheels running at high transmission output RPM and front wheels at 0 RPM : see below for the max.

4. 4WD should never be engaged when all the 4 wheels are lifted in the air ,as this can result into major delta RPM between front and rear wheel.



PARKING AND STOPPING THE MACHINE**1. Stop the machine**

Ease up the accelerator pedal and pushdown the brake pedals to bring the machine to a smooth stop. Keep the foot brakes "ON" unless the parking brake is engaged and the drive is disconnected.

2. Engage the parking brake

Pull the parking brake fully up. Ensure the parking light is "ON" and then release the brake pedals.

Note: If you engage the parking brake and when the machine is still in forward /reverse drive the warning light with alarm will be ON. The warning light goes "OFF" when the neutral drive is selected in Neutral (N).

3. Disengage the drive

Select the Neutral button in the gear lever to disengage the forward/reverse position.

4. Lower the attachments to the ground

Operate the control levers to lower the attachments to the ground. Once they reach the ground operate them more so that they share the weight of the machine.

5. Read these instructions before stopping the engine

Turn "OFF" the ignition key to make the engine to get stopped. Once the engine is stopped remove the key from the machine.

6. Switch off all unnecessary switches

Check all the switches to be in "OFF" position when you are leaving the machine. If necessary leave the side lights or working lights switches "ON".

7. Lock and secure the machine

Use the handrails and holding clamps while climbing down the machine, if you are leaving the machine close and latch all doors and windows and lock the doors. Ensure the diesel filler cap is locked.



HOW TO WORK WITH A LOADER

Remember that you will be driving the machine when you are using a loader. Be aware of possible hazards and keep away from other people.

Set the backhoe in a locked position as per the site working conditions. When you are carrying a loaded bucket downhill always travel in reverse. Travel forward when you are climbing a hill. Do not increase the speed of the machine above 3 km / hr when you are carrying a loaded bucket.

Filling the loader bucket

When you enter the pile start rolling the bucket back, while raising it at the same time. This will make the bucket sweep over the material gathering up the material as it goes.

Try to fill the bucket in one stretch. Half filled buckets are less productive.

While moving the bucket, roll the bucket right back towards the engine to prevent material spillage. When you are loading the material from a heap or pile of loose material start at the bottom of the heap and move up the face as shown in figure and approach the pile with the bucket level and skimming the ground. For tight packed/ hard material start from top and work down.

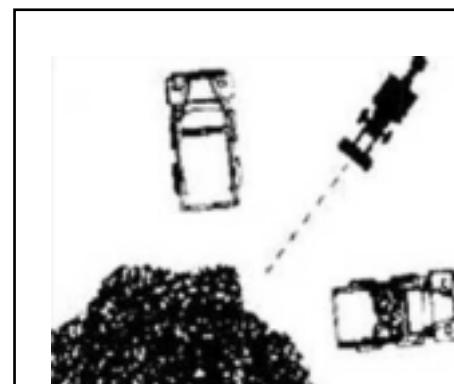


Loading a Truck/Lorry

Arrange the website for loading. Put the trucks/lorry at 45 degrees to the pile or heap as shown. This will minimize the cycle time of the loader. Allow enough distance for the bucket to reach its unloading height while you are travelling without slowing down.

Move the machine as close as possible to the truck before unloading. If the truck width is about as long as the bucket's width tip the load into the centre of the truck, if the truck is longer than the bucket width, load the front of truck first.

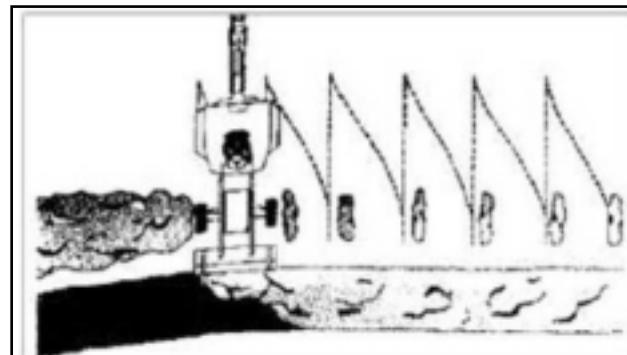
Do not dump the material in one sudden movement. Roll the bucket forward in stages until it empties. Use the control lever and rock the bucket back and forwards to remove all material from the bucket.



Backfilling

When backfilling a slope, dump the material on the high side of the trench if possible.

Set the bucket level to the ground and chose a suitable gear to give a maximum depth of cut without overloading the engine. Work at right angles to fill the bucket one width at a time. Leave some spillage until the trench is filled. Use the spillage to finish the work by driving the length of the trench with the bucket low to the ground.



How to release the machine when it gets stuck

If the machine gets stuck in the trench, use the Loader bucket to free it. Set the drive in neutral position, and then roll the bucket forward as shown. Next lower the Bucket and lift until the front wheels are free, and slowly roll back the bucket to push the machine backwards. When the front wheels are on firm ground select reverse gear and drive clear. Repeat the process again if necessary, to come out from the trench.



Dozing or Leveling

Set the loader bucket parallel to the ground, while using the machine for dozing or leveling. Move forward to remove high spots. Use the soil filled in the bucket for filling the troughs when reversing. Do not put excessive pressure on to the bucket otherwise the machine could loose traction.



How to Work With A BACKHOE

Preparing to use the Backhoe

When you are choosing to dig or excavate, avoid digging downhill if possible. Always dump the load on-theuphill side of the excavation, which will help to keep the machine stable.

1. Set the loader position

Park the machine in the desired position on the site, rest the loader bucket parallel to the ground, then lower again to take the weight of the front tyres. The front tyre also can be lifted slightly.

2. Disengage the drive.

Select the neutral position on the forward/ reverse lever.

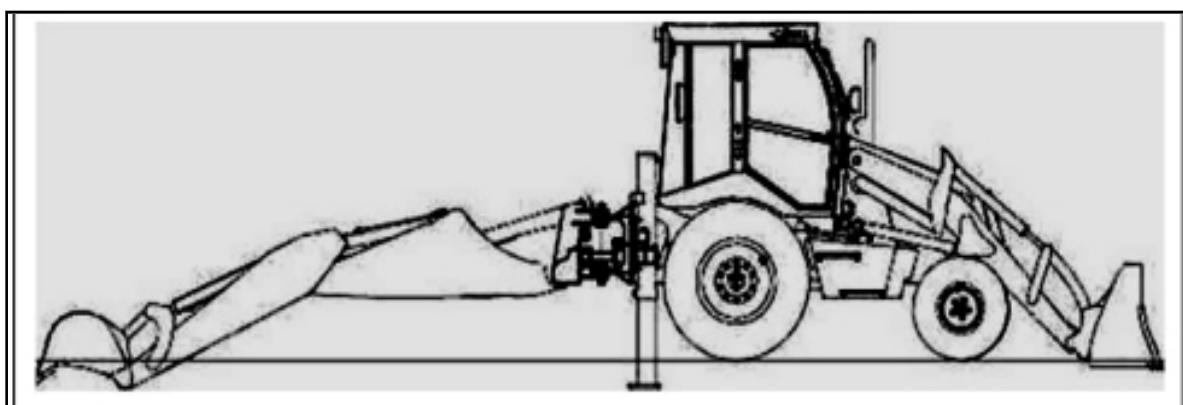
3. Engage the parking brake.

4. Lower the stabilizers

Turn around to face the backhoe, ensure the seat lock is in position. Lower the stabilizers to raisethe rear tyres just clear of the ground. Adjust the stabilizers positions until the machine is level.

5. Disengage the boom lock

Release the boom lock before operating the backhoe joystick, or else the boom locking pin will shear out-



HOW TO WORK WTH A BACKHOE**Digging**

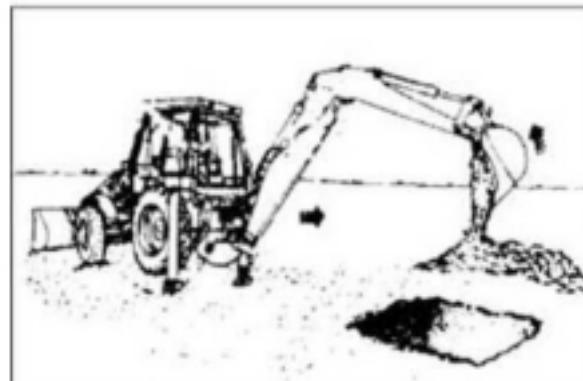
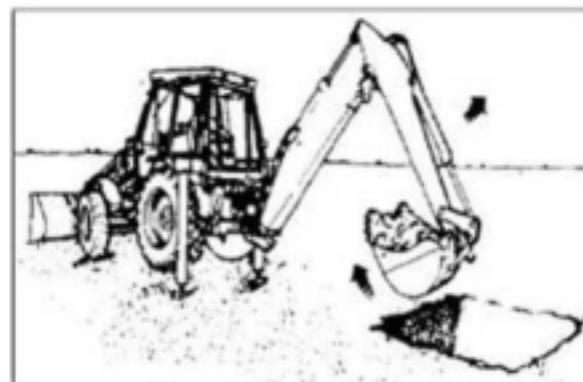
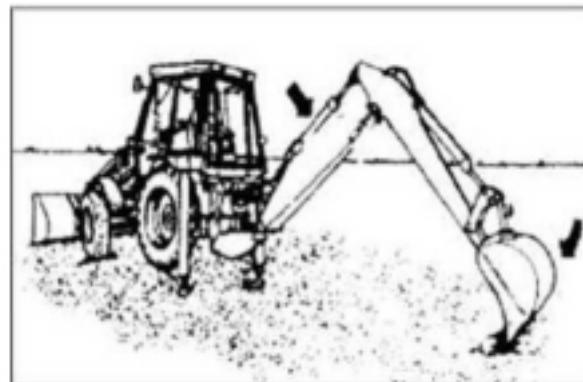
To start the digging, stretch out the boom and dipper to maximum position as shown in the figure.

Slowly close the bucket and at the same time bring in the dipper. The bucket should stay at the same angle to the ground when it travels. At the same time apply slight downward pressure on the boom to increase the digging force of the bucket.

When the bucket is full, close it fully and at the same time move the dipper out a little way. This will keep the soil from building up under the machine.

Swing the bucket towards the dumping area and open the bucket and start dumping as you reach the pile. Do not waste time dumping too far from the excavation.

Swing back to the excavation and start the next digging,



Note: Avoid hitting the bucket on to the sides of the excavation. This will damage your machine. Backfill the excavation by loading the bucket with soil from the pile. Do not use the sides of the bucket for pushing the soil.

HOW TO WORK WTH A BACKHOE

Moving the machine while digging on a level surface

If you are digging on level ground you can move the machine along the digging line with the backhoe



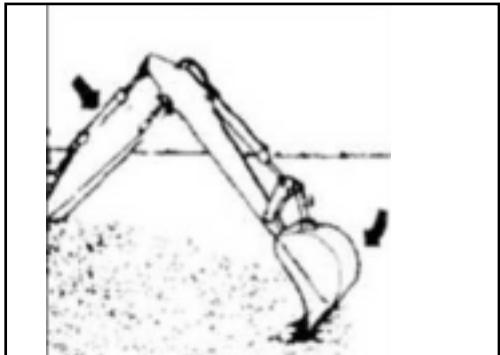
1. Lower the engine speed to 1000RPM



2. Ensure the front wheels are pointing straight forward



3. Raise the boom and bring the bucket towards your end of the trench. Set the bucket down on the bottom of trench.



4. Raise the stabilizers and bucket clear of the ground.



5. Make sure the forward /reverse position is in neutral and gear reverse are in neutral



6. Release the parking brakes



7. Move the machine by moving the dipper out while lowering the boom

8. Raise using the stabilizers the machine.

Petrol

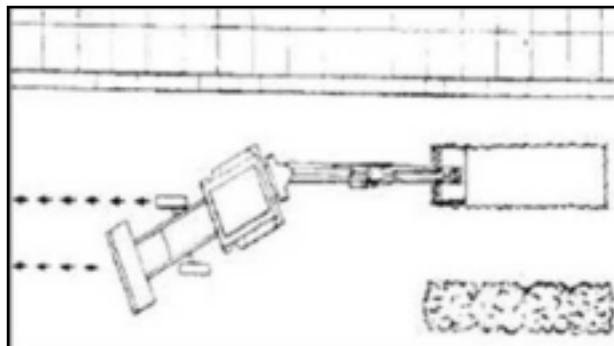
⚠ WARNING

Do not use this procedure for excavating the machine downhill See (Excavating while digging dovenhilly

HOW TO WORK WTH A BACKHOE

MOVING THE MACHINE WHILE DIGGING DOWN HILL

To move the machine when digging a downhill, raise the backhoe stabilizers and bucket. Drive carefully to the next position in first gear (1)



Digging near Walls

Park the machine close to the wall as shown. Ensure the front wheels are in line with the wall and point in the direction to be dug.

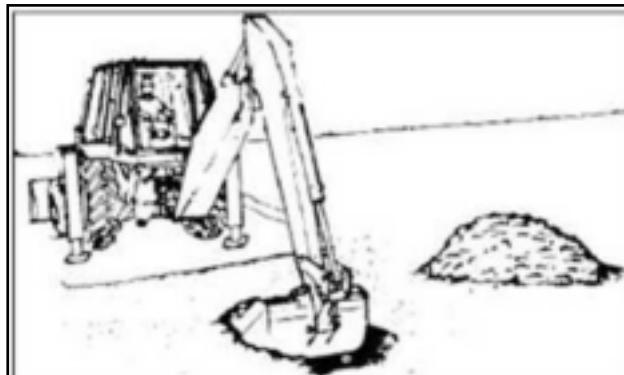
WARNING

Be aware when you are digging near a wall and if you excavate under the wall's foundations The wall could collapse.

Digging on Slopes.

For digging a trench across a slope, use the stabilizers and bucket to level the machine.

On steeper slopes cut a level ground surface to work on. Unload the material far away from the slope to prevent material falling again inside the trench



WARNING

Do not use the backhoe to push heavy loads, tree trunks, or do any demolition work. If the ARV is not fitted in the hydraulic circuit, see with your BULL HD Dealer to have it fitted.

HOW TO WORK WTH A BACKHOE

Side shifting the backhoe (Electrically operated)

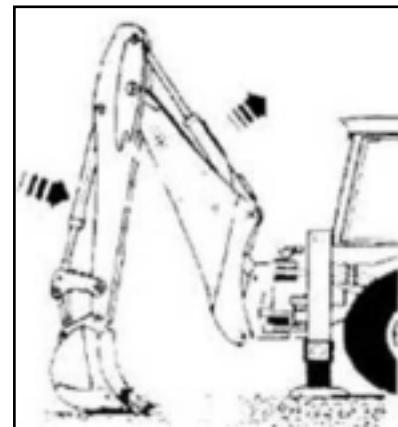
Note: Before side shifting the backhoe ensures the carrier structure rails are free of mud and debris.

1. Leveland stabilize the backhoe

Use the stabilizers to level and stabilize the backhoe with the sliding base vertical.

2. Position the backhoe

Place the bucket on the ground, as shown in figure directly behind the middle of the machine.



3. Turn ON the side shift lock switch

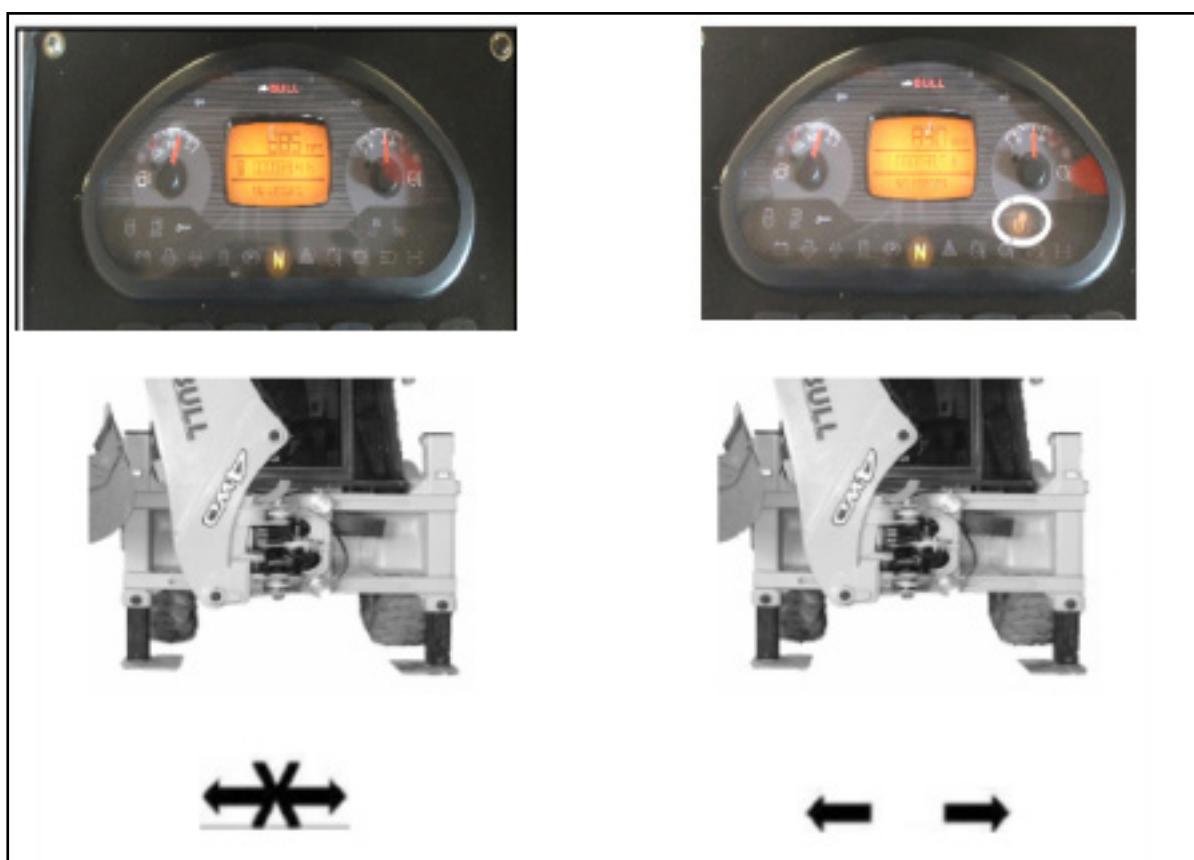
Turn ON the side shift bck switch in the dashboard, as shown in the figure, which bosen the boom assembly from, the carrier structure.

4. Side shift

Raise and swing the backhoe sideways. If you want to side shift to the Left Swing the backhoe to the left or wise versa. Place the bucket to the ground, with the dipper at 90 deg to the boom as shown in the figure. Open the bucket, as the bucket opens the boom assembly will be shifted across the rails.

5. Turn off the side shift bock switch

Once the boom assembly is moved to the desired position, turn off the side shift lock switch to bck it with the carrier structure. (Side shift lock switch is shown in page No:62)



OPERATING THE BACKHOE IN LOW TEMPERATURES

When the backhoe is operated in low temperatures, follow the instructions below which will make starting easy and prevent possible damage to the backhoe.

1. Use the correct viscosity engine oil.
2. Use the correct coolant mixture.
3. Always ensure the battery is fully charged.
4. Fill the fuel tank at the end of each work period.
5. Park the machine inside a building, or cover with tarpaulin when not in use.

Note: Do not connect two batteries in series this could damage the system. If extra batteries are needed for starting connect two batteries in parallel.

6. Remove snow from the bonnet before starting otherwise snow could get into the air cleaner.

OPERATING BACKHOE IN HIGH TEMPERATURES

1. Use the correct viscosity engine oil.
2. Use the correct coolant mixture.
3. The coolant system should be checked regularly. Keep correct coolant level. Ensure there are no leaks.
4. The radiator should be clean. Remove dust and debris regularly from the radiator and engine.
5. Check the fan belt condition and adjust the tension regularly (if required).
6. Check the engine pre cleaner to ensure it is dust free.
7. Check the dust valve.



BATTERY OF 100HP BHL MACHINE

MOVING A BREAK DOWN MACHINE

Note: Do not tow the machine unless otherwise there is no alternative method. Always remember further damage may occur by towing the machine. If possible repair the machine where it has become faulty. If the machine has to be towed, read the instructions and also the contents in "CAUTION".

How to tow the machine..

1. Set the gear lever to neutral position (N). (If the engine and hydraulic systems are functioning properly See: Preparing to raising travel on road or Preparing to travel on site)
2. Raising the loader bucket to approximately 300 mm above the ground will make connection with the draw bar easily.
3. If the engine cannot run, the backhoe loader, stabilizers should be hoisted and secured in the transport position.
4. How this is done will depend on the condition of the machine and the hydraulic occurs.
5. Contact your BULL HD dealer for his advice before attempting to move the machine.

▲ CAUTION

The transmission may get damaged if the machine is towed too far or too fast. Do not tow the machine more than 2 Kms. Use a trailer for greater distances. Travel at a safe speed of 25km/hr. Use a solid, rigid drawbar. If you are using towing chain use a two towing vehicles, one in the front and other at the back of the disabled machine to provide braking power. The towing vehicles must have enough pulling and braking power to move and stop the break down machine.

▲ WARNING

Before attaching the drawbar block the loader arm. The machine is now ready for towing. Make sure the towing driver knows what he should be doing and ensure all road safety regulations are being followed.

HOW TO TRANSPORT A MACHINE

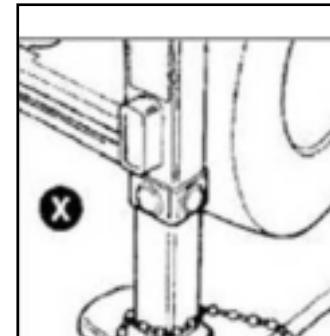
The safe transport of the machine is the sole responsibility of the transport contractor and driver. Any machine parts or attachments that may move in trans it must be well secured.

Note: Make sure before transporting the machine you are following all the rules and laws for all the areas where the machine will be carried through. Make sure the transporting vehicle is suitable (See: Static Dimension in SPECIFICATIONS section)

WARNING

Ensure before moving the machine into the trailer, the climbing ramps are free of oil, grease and ice. The ramp angle should not be so steep that the machine bottom become stuck.

Check (Staticsection)Dimension in SPECIFICATIONS



1. Block wheels of the Transporting vehicle wheels

Place wooden blocks in front and to the rear of the trailer wheels.

2. Move the machine onto the trailer

Ensure the ramps are correctly placed. Set the loader bucket and backhoe (as in Preparation for road travel OPERATION section) Carefully drive the machine onto the trailer. And apply the parking brakes.

When the machine is safely parked on the trailer, lower the loader bucket, stabilizers and lock the boom on either side and ensure that there will be no movement during transit. Check the overall height is within the safety regulations and adjust if necessary.

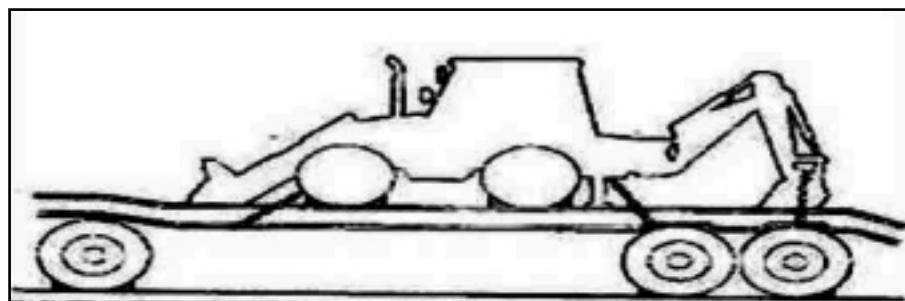
Switch off the engine and lock the cabin. Cover the silencer pipe.

3. Anchor the machine on to the trailer

Place wooden blocks in front and behind all four tyres. Lash the machine using chains as shown in the figure below.

4. Measure the Machine height

Measure the maximum height of the machine from the ground level and tell the truck driver about the maximum clearance height before he drives away.

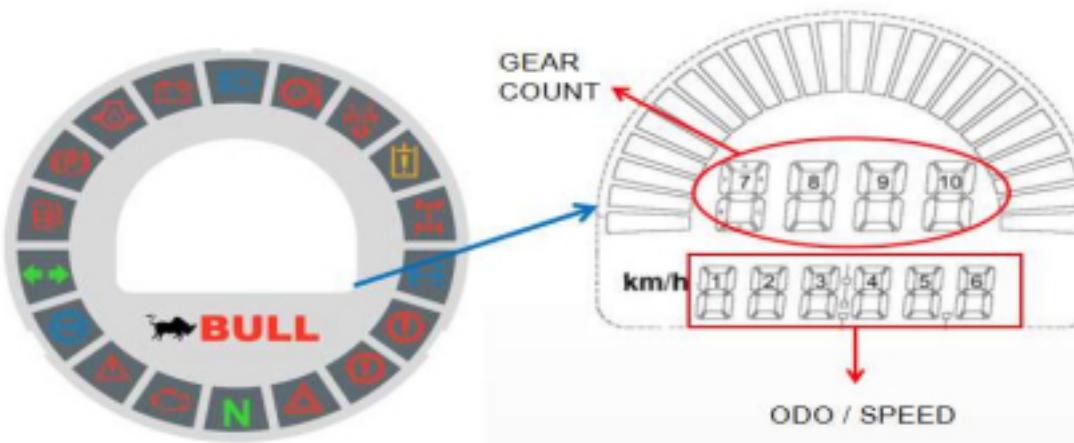
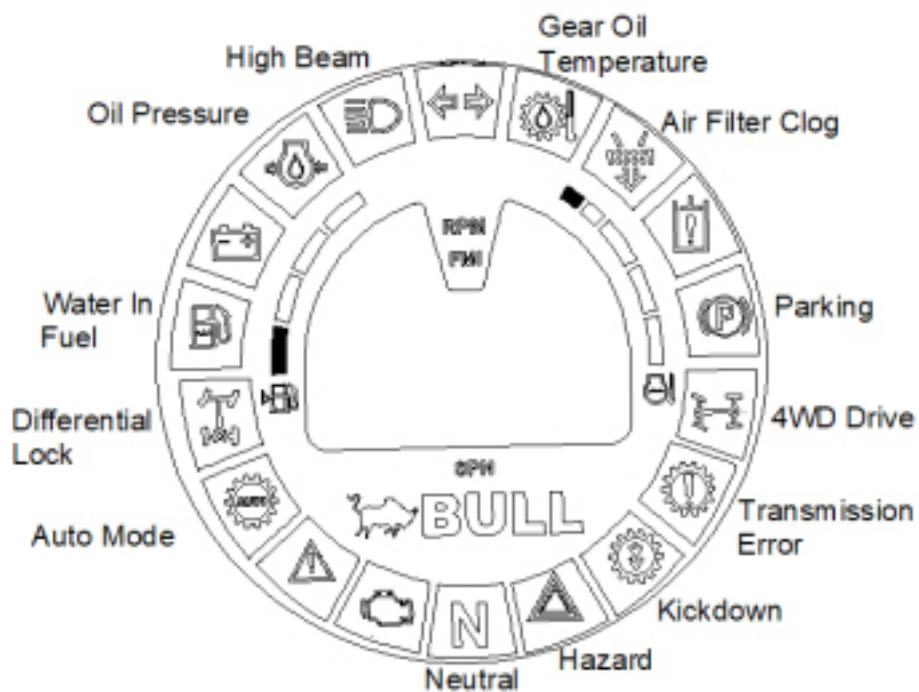


MANUAL BLEED PROCEDURE FOR QUICK FILL MASTER CYLINDER

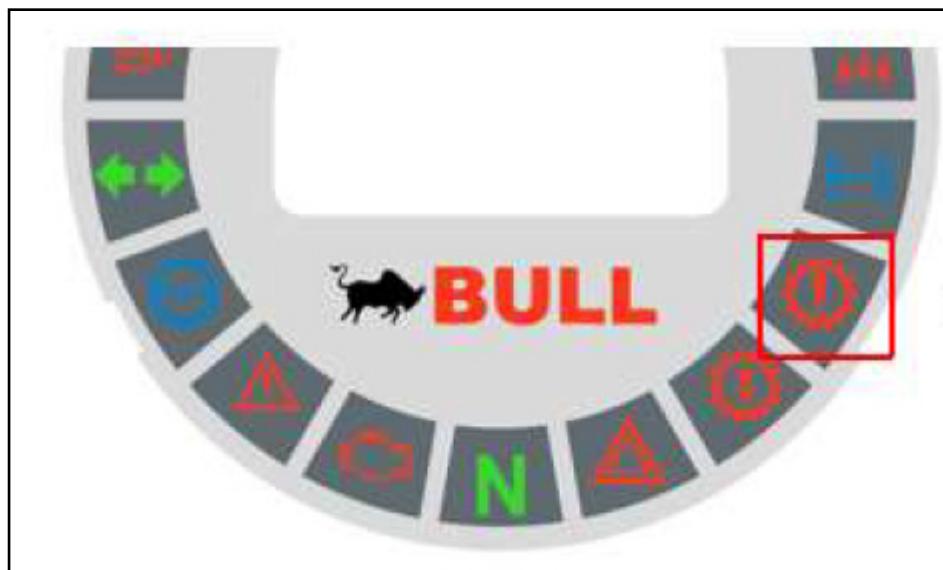
1. Remove reservoir cap and ensure the fluid level is maintained above The “MIN Level” during bleeding procedure.
2. Install clear/transparent bleed pipes to the bleed screws of the LH and RH brakes.
3. Open LH & RH Bleed Screws.
4. Fully stroke the LH & RH brake pedals (coupled) at a controlled rate (approx 50mm/sec). Close bleed screws.
5. Fully release the LH & RH brake pedals (coupled) at a controlled rate (approx 50mm/sec). Open bleed screws.
6. Repeat actions 4 and 5 ten times or until there are no air bubbles visible in the expelled brake fluid.
7. Close the RH & LH bleedscrew and torque tighten to the drawing Specification.
8. De-couple the RH & LH brake pedals for independent operation. 9. Open RH Bleed Screw.
10. Fully stroke the RH brake pedal at a controlled rate (approximately 50mm/sec). Close the RH bleed screw.
11. Fully release the RH brake pedal at a controlled rate (approximately 50mm/sec). Open the RH bleed screw.
12. Repeat actions 10 and 11 ten times - or until there are no air bubbles visible in the expelled brake fluid.
13. Close the RH bleedscrew and torque tighten to the drawing Specification.
14. Open LH Bleed Screw.
15. Fully stroke the LH brake pedal at a controlled rate (approximately 50mm/sec). Close the LH bleedscrew.
16. Fully release the LH brake pedal at a controlled rate (approximately 50mm/sec). Open the LH bleedscrew.
17. Repeat actions 15 and 16 ten times - or until there are no air bubbles visible in the expelled brake fluid.
18. Close the LH bleedscrew and torque tighten to the drawing Specification.
20. Replenish the fluid in the reservoir to “MAX Level” and refit the cap.
21. Independently check the LH & RH brake pedal travel to verify that a Successful bleed condition was achieved.
22. Repeat the bleed procedure until a satisfactory condition is obtained.

SPS TRANSMISSION TROUBLE SHOOTING & D100 CLUSTER INDICATION

CLUSTER INDICATION



- i) ODO will be shown when the speed is ZERO
- ii) SPEED will be shown when the speed is above ZERO
- ii) Error code will be shown like, FM
 - I - On top row SPN
 - On bottom row (Refer Error code sheet for trouble shooting)



LAMP INDICATION :

No error -> Lamp OFF

Error mode -> Lamp blinking the error code (CTC)

At Failure presence, Dashboard lamp reports an error code switching on and off in a particular sequence of n_2 short flashes (0.5 seconds switched on and 0.5 seconds switched off), a long pause of 3 seconds. Then, the error code is $n_1 \times 10 + n_2$.

ERRCODE = 23 = $2 \times 10 + 3 \Rightarrow n_1=2, n_2=3$

- LAMP ON
- LAMP OFF

KICKDOWN :

Kickdown is a request for a downshift from the current engaged gear. It could be activated:

- In Manual Mode, from every gear engaged from 2nd to 4th
- In Automatic Mode, only when 2nd gear is engaged.

Strategy: a button push for entering Kickdown mode, a button push for exiting. Exit conditions for Kickdown mode are:-

Kickdown command OR ·C

Change on gear selector OR ·Ch

Change on FNR selector AUTO

MODE : Enter

Condition: AUTO MODE SWITCH ON and Gear in 4th Exit

Condition: AUTO MODE SWITCH OFF and engaged gear fits selected gear (enter Manual mode) 0 n Auto

mode, the control system automatically selects transmission gear to provide the most efficient machine condition within the operator selected maximum gear limit. The maximum gear limit is set by the twist grip on the shuttle lever. Default engaged gear at zero speed is 2nd gear.

TROUBLE SHOOTING SHEET-SPS TRANSMISSION

owing table describes transmission control unit related failure and warning codes , The codes are grouped as regards the involved component as shown by the dashboard codes. meaning of each column Is described in the following.

Carrara Trouble Code

Warning or alarm meaning Diagnostics of the failure

CTC:

Possible cause of the code and suggested checks

Meaning:

Reaction of the system to recover the failure.Possible actions to a fault are:

Detection:

o Previous gear backup: TCU engage starting gear

Cause/ Checks:

o Neutral backup: allcontroller outputs OFF

Action:

o limp-home mode 2: FWD/REV allowed without any modulat on; 2nd gear only
o limp-home mode 3: FWD/Rf>/ allowed without any modulat on; 3rd gear only

NOTE: if a fault leads to limp-home mode,a pre-emergency mode is activated if vehicle speedis above 4 kph: TCU forces Neutral and then the vehicle will safely evolve to zero speed. Limp-home mode will be activated as soon as vehicle speedis below 4 kph,

1.FAILURE CODESTBLE

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
2	0	0	No error CTC_NoER-ROR	No error		None
21	127	2	Main ring pressure fail CTC_MAINRING_PRESS_FAIL	Engine speed over 700rpm and pressure switch open for more than 10s.	Line pressure under 10Bar, Open circuit an pressure switch cable , Faulty pressure switch. ----- Check line pressure. Check pressure switch cable. Change pressure switch.	FAILURE Warning lamp RED Neutral backup. Key off to exit failure conditions.
22	589	1	Engine speed fail CTC_ALTENGSPEED_FAIL	Engine speed under 80rpm and pressure switch closed for more than 10s,	Wrong engine speed signal Faulty pressure switch. ----- Check engine speed signal. Change pressure switch	FAILURE: Warning lamp AMBER Engine speed at default value (1600rpm). Key off to exit failure conditions.

TABEL 2

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
24	604	2	FNR lever error CTC_FNRLEVER_ERR	Forward command and Reverse command both active for 500ms.	Short circuit between forward command wire and reverse command wire. Short circuit to 12V voltage. ----- Check FNR lever cable for short circuit	FAILURE: Warning lamp RED Neutral backup. Key off to exit failure conditions.
25	604	31	FNR lever NOT in Neutral at cranking CTC_FNRSWITCH_KEYON_ERR	Main ring pressure switch falling edge after key-on and FNR lever NOT in Neutral	FNR lever NOT in Neutral at cranking ----- Bring FNR lever in Neutral position	FAILURE: Warning lamp AMBER Neutral backup, Error reset with FNR lever in Neutral position.
26	177	16	High transmission oil temperature, CTC TEMP_HIGH	Transmission oil temperature over +110°C	Unusual high ambient temperature, Misuse, Problems on hydraulic cooling circuit, ----- Check hydraulic cooling circuit.	FAILURE: Warning lamp AMBER Error reset with oil temperature under +110°C.
27	177	18	Low transmission oil temperature, CTC TEMP_LOW	Transmission oil temperature under -30°C	Especially low ambient temperature. ----- Warm up is recommended.	FAILURE: Warning lamp AMBER Error reset with oil temperature over -30°C.

TABEL 3

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
27	177	2	Erratic transmission oil temperature signal. CTC TEMPSENS FAIL	50°C temperature signal variation on short time.	Temperature sensor is not correctly connected at TCU pin. ----- Faulty temperature sensor, ----- Check temperature sensor cable, Change temperature sensor,	None
37	177	4	Short circuit on transmission oil temperature signal. CTC_TEMPSENS_LOW	Low resistance at TCU input pin.	Short circuit to a voltage above 5V on cable Faulty temperature sensor. ----- Check temperature sensor cable, Change temperature sensor,	FAILURE: Warning lamp AMBER Oil temperature at default value (60°C). Key off to exit failure conditions,
32	177	5	Open circuit on transmission oil temperature signal. CTC_TEMPSENS HIGH	High resistance at TCU input pin.	Open circuit on cable. Short circuit to a voltage above 5V on cable Faulty temperature sensor. ----- Check temperature sensor cable, Change temperature sensor,	FAILURE: Warning lamp AMBER Oil temperature at default value (60°C). Key off to exit failure conditions.
33	3509	0	Sensor supply overvoltage CTC SENSOOUT_HIGH	Sensor supply voltage greater than 5.5V for more than 2.5s	Short circuit to a voltage above 5V on sensor supply cable. ----- Check sensor supply cable.	FAILURE: Warning lamp AMBER Neutral backup, Key off to exit failure conditions

TABEL 4

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
34	3509	1	Sensor supply undervoltage. CTC SENSOOUT_LOW	Sensor supply voltage less than 4.5V for more than 2.5s	Short circuit to ground on sensor supply cable ----- Check sensor supply cable.	FAILURE: Warning lamp AMBER Neutral backup, Key off to exit failure conditions
35	158	0	Power supply overvoltage. CTC PWR SUPP_HIGH	The voltage supply is greater than 16V for more than 2.5s.	Power supply overvoltage. ----- Check power supply line. Replace the TCU.	FAILURE: Warning lamp AMBER Neutral backup, Key off to exit failure conditions
36	158	1	Power supply undervoltage. CTC_PWR_SUPP_LOW	The voltage supply is less than 9V for more than 2.5s	Power supply undervoltage. ----- Check power supply line. Replace the TCU.	FAILURE: Warning lamp AMBER Neutral backup, Key off to exit failure conditions
41	522261	5	Gear switch 1 fail CTC_GEAR1SW_STARTUP_FAIL	Gear switch 1 OFF at TCU wake-up,	Open circuit at switch cable. Faulty switch. ----- Check switch cable for open circuit. Replace the switch.	FAILURE: Warning lamp RED Neutral backup. Key off to exit failure conditions,
42	522262	5	Gear switch 2 fail CTC_GEAR2SW_STARTUP_FAIL	Gear switch 2 OFF at TCU wake-up.	Open circuit at switch cable. Faulty switch. ----- Check switch cable for open circuit. Replace the switch.	FAILURE: Warning lamp RED Neutral backup. Key off to exit failure conditions,

TABEL 5

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
43	522263	5	Gear switch 3 fail CTC_GEAR3SW_STARTUP_FAIL	Gear switch 3 OFF at TCU wake-up.	Open circuit at switch cable, Faulty switch. ----- Check switch cable for open circuit. Replace the switch,	FAILURE: Warning lamp RED Neutral backup, Key off to exit failure conditions,
44	522264	5	Gear switch 4 fail CTC_GEAR4SW_STARTUP_FAIL	Gear switch 4 OFF at TCU wake-up.	Open circuit at switch cable, Faulty switch. ----- Check switch cable for open circuit. Replace the switch,	FAILURE: Warning lamp RED Neutral backup, Key off to exit failure conditions,
49	522280	12	Gear valves command-gear switches signal mismatch CTC_SVFAIL	Gear switch signals are not consistent with valves command. Typical cabling problem on valves and gear switches.	Problem on gear switches cable. Problem on valves cable. Line pressure low. Hydraulic or mechanical problem. One or more faulty gear switch, One or more faulty valve among digital S1, 52, 53, 54 valves. ----- Check gear switches cable. Check valves cable, Check line pressure, Check for hydraulic or mechanical problem, Replace switches if faulty, Replace valves if faulty,	FAILURE: Warning lamp RED Neutral backup, Key off to exit failure conditions,

TABEL 6

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
51	522280	31	Previous gear backup strategy. CTC_EFAIL	Gear switch signals are not consistent with gear lever command,	Previous gear backup strategy. Repeat last gearshift maneuver,	FAILURE: Warning lamp AMBER Error reset with failure solved,
52	522280	7	Neutral backup strategy, CTC_TFAIL	Transmission on Neutral condition and no gear engaged,	Neutral backup strategy, Repeat last gearshift maneuver,	FAILURE: Warning lamp RED Neutral backup. Error reset with failure solved,
53	191	10	Transmission output shaft speed signal loss CTC_SPDVEH FAIL	Speed signal decrease 500Hz with a rate less than 30Hz/ms	Faulty speed sensor Faulty speed sensor harness Check speed sensor Check speed sensor harness	FAILURE: Warning lamp AMBER Speed signal freezing. Key off to exit failure conditions.
61	522011	6	Over-current on forward PWM valve. CTC_PWM12_OVER-CUR	The hardware detects an over-current event (current higher than a threshold value) on the PWM output driving the valve related to forward clutch. Over-current events are mostly caused by short-circuits to ground.	Short circuit to ground. Power supply undervoltage. Check forward PWM valve cable for short-circuit to ground. Check power supply line. Replace the TCU.	FAILURE: Warning lamp RED Neutral backup. Key off to exit failure conditions,

TABEL 7

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
62	522012	6	Over-current on reverse PWM CTC PWM34 OVER-CUR	The hardware detects an over-current event (current higher than a threshold value) on the PWM output driving the valve related to reverse clutch. Over current events are mostly caused by short-circuits to ground. The hardware mechanism is driven by the power supply: the loss of power supply gives the same behavior of over-current event.	Short circuit to ground. Power supply undervoltage. ----- Check reverse PWM valve cable for short-circuit to ground. Check power supply line. Replace the TCU.	FAILURE: Warning lamp RED Neutral backup. Key off to exit failure conditions.
63	52203	1	Overcurrent or no supply on all digital output. CTC PWM34 OVER-CUR	The hardware detects an over-current event (current higher than a threshold value) on the PWM output driving the valve related to reverse clutch. Over current events are mostly caused by short-circuits to ground. The hardware mechanism is driven by the power supply: the loss of power supply gives the same behavior of over-current event.	Cause/Short circuit to ground. Power supply undervoltage. ----- Check digital outputs cable for short-circuit to ground. Check power supply line. Replace the TCU.Checks	FAILURE: Warning lamp AMBER Neutral backup. Key off to exit failure conditions.
64	5220121	6	Over-current on the on the S1,S2 valve, CTC_0012_OVER-CUR	The hardware detects an over-current event (current higher than a threshold value) on digital outputs driving the digital S1, S2 valve. Overcurrent events are mostly caused by short circuits to ground. The hardware mechanism is shared between the two outputs, so you can't tell which output is not working. The hardware mechanism is driven by the power supply: the loss of power supply gives the same behavior of over-current event,	Short circuit to ground. Power supply undervoltage. ----- Check digital S1, S2 valve cable for short-circuit to ground. Check power supply line, Replace the TCU.	FAILURE: Warning lamp AMBER Limp-home mode 3. Key off to exit failure conditions
65	522022	6	Overcurrent on the on the pital 53, 54 vale CTC_0034_OVER-CUR	The hardware detects an over-current event (current higher than a threshold value) on the digital outouts driving the digital 53, 54 valve. Over-current events are mostly caused by short circuits to ground. The hardware mechanism is shared between the two outputs, so you can't tell which output is not working. The hardware mechanism is driven by the power supply: the loss of power supply gives the same behaviour of overment event,	Short circuit to ground. Power supply undervoltage. ----- Check digital S3, S4 valve cable for short-circuit to ground. Check power supply line. Replace the TCU.	FAILURE: Warning lamp AMBER Limp-home mode 2. Key off to exit failure conditions
CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
66	522023	6	Over cument on the othe digital 4WD, HDL valve CIC_0056 OVER-CUR	The hardware detects an overcurrent event (current higher than a threshold value) on the digital outputs driving the digital 4WD, HDL valve. Over-current events are mostly caused by short circuits to ground. The hardware mechanism is shared between the two outputs, so you can't tell which output is not working. The hardware mechanism is driven by the power supply: the loss of power supply gives the same behaviour of overment event,	Short circuit to ground. Power supply undervoltage. Check digital 4WD, HDL valve cable for short-circuit to ground, Check power supply line. Replace the TCU.	FAILURE: Warning lamp AMBER Engage 4WD, open differential. Key off to exit failure conditions
67	522024	6	Over-cument on Transmission statuse lamp output or Aut made lamp output CTC_0078_OVER-CUR	The hardware detects an over-current Short circuit to power supply. vent (current higher than a threshold value) on the digital output driving the lamps. Overcurrent events are mostly caused by short circuits to ground. The output is a "connect to ground" output the output connects to ground a load which, on the other side, is connected to pomer supoly Check lamps cable for shortcut to power supply.	Short circuit to power supply. Check lamps cable for short-circuit to power supply. Replace the TCU.	FAILURE: Warning lamp AMBER Lamps OFF Key off to exit failure conditions

TABEL 8

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
71	522241	3	OVER feedback current on Forward PWM valve. CTC_PWM1_OVER-FEED	TCU reveals current on valve current feedback without current command.	Wrong connection between TCU and valve. Short-circuit to a voltage greater than 0 at valve wiring. Faulty valve. ----- Check connection between TCU and valve. Check for short-circuit at valve wiring. Replace the valve, Replace the TCU.	FAILURE: Warning lamp RED Neutral backup Key off to exit failure conditions
72	522241	5	NO feedback current on Forward PWM valve. CTC_PWM1_NOFEED	TCU reveals no current on valve current feedback with current command greater than 0.	Wrong connection between TCU and valve. Open-circuit between TCU command pin and feedback pin, Faulty valve. ----- Check connection between TCU and valve. Check for open-circuit at valve wiring. Replace the valve, Replace the TCU.	FAILURE: Warning lamp AMBER Neutral backup Key off to exit failure conditions
73	522241	0	Forward PWM valve draws more current than commanded. CTC_PWM1_ERR-CURR_HIGH	The control error between current actuation and current target is over 20% (overshoot).	Wrong connection between TCU and valve. Faulty valve. Check connection between TCU and valve. ----- Replace the valve. Replace the TCU.	FAILURE: Warning lamp RED Neutral backup Key off to exit failure conditions
74	522241	1	Forward PWM valve draws less current than commanded. CTC_PWM1_ERR-CURR_LOW	The control error between current target and current actuation is over 20% (undershoot),	Wrong connection between TCU and valve. Faulty valve. ----- Check connection between TCU and valve, Replace the valve, Replace the TCU,	FAILURE: Warning lamp AMBER Neutral backup Key off to exit failure conditions
85	522242	3	OVER feedback current on Reverse PWM valve. CTC_PWM4_OVER-FEED	TCU reveals current on valve current feedback without current command,	Wrong connection between TCU and valve, Short-circuit to a voltage greater than 0 at valve wiring. Faulty valve, ----- Check connection between TCU and valve. Check for short-circuit at valve wiring. Replace the valve. Replace the TCU,	FAILURE: Warning lamp RED Neutral backup Key off to exit failure conditions
86	522242	5	NO feedback current on Reverse PWM valve. CTC_PWM4_NOFEED	TCU reveals no current on valve current feedback with current command greater than 0,	Wrong connection between TCU and valve. Open-circuit between TCU command pin and feedback pin. Faulty valve, ----- Check connection between TCU and valve, Check for open-circuit at valve wiring. Replace the valve, Replace the TCU.	FAILURE: Warning lamp AMBER Neutral backup Key off to exit failure conditions
87	522242	0	Reverse PWM valve draws more current than commanded. CTC_PWM4_ERR-CURR_HIGH	The control error between current actuation and current target is over 20% (overshoot),	Wrong connection between TCU and valve. Faulty valve. ----- Check connection between TCU and valve. Replace the valve. Replace the TCU.	FAILURE: Warning lamp RED Neutral backup Key off to exit failure conditions
88	522242	1	Reverse PWM valve draws less current than commanded. CTC_PWM4_ERR-CURR_LOW	The control error between current target and current actuation is over 20% (undershoot).	Wrong connection between TCU and valve. Faulty valve. ----- Check connection between TCU and valve. Replace the valve. Replace the TCU.	FAILURE: Warning lamp AMBER Neutral backup Key off to exit failure conditions
97	522051	212	Serial line communication problem, CTC_SERIALLINEERROR	RS232 serial line protocol (FMI=2) or hardware (FMI=12) error.	Serial line not correctly connected between communicating devices. ----- Wrong software installed on TCU. ----- Check serial line connections, Check TCU software Replace TCU.	FAILURE: Warning lamp AMBER Key off to exit failure conditions

TABEL 9

CTC	SPN	FMI	Meaning	Detection	Cause/Checks	Action
98	630	12	Minor data are not congruent or corrupted, CTC_MINORINTERNALERROR	Hystoric or statistic stored data are not congruent or corrupted. These kinds of data are stored at key off before the complete shut down TCU.	Ignition key not correctly connected to TOU congruent or corrupted, pin, Low power supply voltage at engine off. Check ignition key connection, Check power supply line, Replace TCU,	FAILURE: Warning lamp RED Key off to exit failure conditions
99	629	12	TCU internal hardware damage CTC_UNCOVERABLEERROR	Severe error on internal TCU hardware mainly related to ADC hardware conversion and software execution,	Wrong TCU connections causing over-voltages or overcurrents that produce TCU internal hardware damage, Old electronic hardware, Check pins connections. Check power supply line. Replace TCU,	FAILURE: Warning lamp RED Key off to exit failure conditions
99	630	2	Flash storage error CTC_UNCOVERABLEERROR	Flash stored data are not consistent	Wrong TCU connections causing over-voltages or overcurrents that produce TCU internal hardware damage, Old electronic hardware, Check pins connections. Check power supply line. Replace TCU,	FAILURE: Warning lamp RED Key off to exit failure conditions

MAINTENANCE

STICKER AVAILABLE INSIDE THE CABIN

Please read the stickers made available in the cabin and carry out the maintenance activities regularly. Not adhering to the given schedule will lead to pre-mature failure of the components

**MAINTENANCE SCHEDULE DAILY/
PERIODICALLY CHECK (HD 100)**

DESCRIPTION	CHECK
CHECK FUEL CONNECTOR	
HOSE & CLAMPS-INSPECTION/ REPLACEMENT	500 hrs/ 1 year
CHECK ALL FASTNERS	
REMOVE SEDIMENTS FROM FUEL TANK	250 hrs
ENGINE AIR CLEANER ELEMENT (DUAL ELEMENT)-CLEAN/REPLACE	500 hrs/ 1 year
CHANGE ENGINE OIL	100 hrs/ (1st Time)/
CHANGE ENGINE OIL FILTER	Every 500 Hrs
CHANGE DIESEL FILTER	
CHANGE TRANSMISSION OIL	100 hrs/ (1st Time)/
CHANGE DRIVE AXLE OIL	Every 1000 Hrs
CHANGE HYDRAULIC OIL	Every 1500 Hrs
CHANGE TRANSMISSION FILTER	100 hrs/ (1st Time)/
CHANGE HYDRAULIC FILTER ELEMENT	Every 500 Hrs
BATTERY ELECTROLYTE LEVEL CHECK	Every 500 Hrs
ALL ELECTRICAL CONNECTORS & FITTINGS	Every 250 Hrs
CHECK BALL JOINTS OF CONTROL LEVER & PROPELLER SHAFT	
CHECK AND ADJUST WEAR PAD	Every 50 Hrs
WATER SEPARATOR DRAIN	
V-BELT INSPECTION/ADJUST/REPLACE	Every 500 Hrs /
RADIATOR CLEAN	Every 50 Hrs / 1 Year
ENGINE VALVE CLEARANCE (ADJUST IF NECESSARY)	
COOLER CORE-INSPECTION	
ALTERNATOR-INSPECTION	
ENGINE MOUNTS-INSPECTION	
STARTING MOTOR-INSPECTION	
FUEL INJECTOR-TEST/CHANGE	Every 2000 Hrs /
COOLING SYSTEM COOLANT (COMMERCIAL HEAVY-DUTY)-CHANGE	Every 3000 Hrs / 2 Years

STICKER AVAILABLE INSIDE THE CABIN

Please read the stickers made available in the cabin and carry out the maintenance activities regularly. Not adhering to the given schedule will lead to pre-mature failure of the components

MAINTENANCE SCHEDULE DAILY CHECK	
S NO	DESCRIPTION
1	ENGINE OILLEVEL
2	COOLANT LEVEL
3	RADIATOR FIN CLEANLINESS
4	DIESEL LEVEL
5	SECURITY & CONDITION OF AIR CLEANER HOSES, EVACUATOR VALVE & CLIPS
6	ENGINEAIR PRECLEANER CHECK/CLEAN
7	TRANSMISSION OIL LEVEL
8	DRIVE EQUIPMENT
9	HYDRAULIC OIL LEVEL
10	GREASE FOR ALL PINS
11	TIGHTNESS OF WHEEL NUTS
12	AIR PRESSURE (FRONT AND REAR TYRE)
13	ENGINEAIR CLEANER SERVICE INDICATOR
14	FUEL FILTER / WATER SEPARATER·DRAIN
15	FUEL FILTER / WATER SEPARATER·DRAIN
16	WALK - AROUND INSPECTION

PRESS TO TILT THE STEERING COLUMN	MAINTENANCE SCHEDULE IS MEANT TO SERVE AS A GUIDE ONLY CHECK / CHANGE HOURS MAY VARY DEPENDING UPON THE OPERATING CONDITIONS																		
	<table border="1"> <tbody> <tr> <td>HYDRAULIC OIL</td><td>BULL HYDRAULIC OIL</td></tr> <tr> <td>TRANSMISSION OIL</td><td>EXXON MOBIL OIL</td></tr> <tr> <td>ENGINE OIL</td><td>API CH-4 SAE 15W40 (-10° to +50° C)</td></tr> <tr> <td>ENGINE OIL</td><td>EXXON MOBIL OIL</td></tr> <tr> <td></td><td>1) SAVSOL Hy Fluid AF 46, 2) J20C Hygard oil (Savita or Shell), 3) Savita Savoil UTTO, 4) IOCL Servo Contrac 15W30 , 5) Texaco TDH special 10W, 6) Valvoline EVHI 46</td></tr> <tr> <td>GREASE</td><td>BULL GREASE (SPECIAL)</td></tr> <tr> <td colspan="2">USE OF INCORRECT LUBRICANT WILL CAUSE SERIOUS DAMAGE</td></tr> <tr> <td>PERKINS ENGINE TOLL FREE NUMBER</td><td>BULL CUSTOMER CARE HELPLINE NUMBER: +91 422 392 2222 SMS: +91 88832 88832, 044 306 86 380</td></tr> <tr> <td></td><td>care@bullmachine.com</td></tr> </tbody> </table>	HYDRAULIC OIL	BULL HYDRAULIC OIL	TRANSMISSION OIL	EXXON MOBIL OIL	ENGINE OIL	API CH-4 SAE 15W40 (-10° to +50° C)	ENGINE OIL	EXXON MOBIL OIL		1) SAVSOL Hy Fluid AF 46, 2) J20C Hygard oil (Savita or Shell), 3) Savita Savoil UTTO, 4) IOCL Servo Contrac 15W30 , 5) Texaco TDH special 10W, 6) Valvoline EVHI 46	GREASE	BULL GREASE (SPECIAL)	USE OF INCORRECT LUBRICANT WILL CAUSE SERIOUS DAMAGE		PERKINS ENGINE TOLL FREE NUMBER	BULL CUSTOMER CARE HELPLINE NUMBER: +91 422 392 2222 SMS: +91 88832 88832, 044 306 86 380		care@bullmachine.com
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***NOTE : FOR COLD COUNTRIES ,**
ENGINE OIL : API CI-4/SAE 5W30 (FOR TEMPERATURE -30°C TO +30°C)
HYDRAULIC OIL : SHELL TELLUS S2M46

MAINTENANCE

CLEANLINESS OF THE MACHINE SAFETY PRECAUTION:

1. Park the machine firmly on a level ground.
2. Engage the parking brake and set the transmission to neutral.
3. Lower the attachments to the ground and stop the engine.

⚠ WARNING

External particles such as grass, wires, straws, wood shavings, threads etc must not be allowed to accumulate within the engine compartment or in the transmission drive area (especially propeller shaft). Inspect these areas frequently and clean daily before starting work.

Before opening the engine cover, ensure the environment is dust free.

Do not allow the mud, debris etc to build upon the machine. When cleaning your BULL HD. Pay special attention to hydraulics.

1. All cylinder piston rods especially the swing cylinder piston rods.
2. Carrier structure sliding rails.
3. Bottom of the stabilizer leg assembly.
4. Backhoe hoses especially where they pass through swivel base.

Cabin interior cleanliness

1. Use pressurized air to clean the entire cabin.
2. Wash off any remaining dirt or debris. Do not use water to clean electrical connections.
3. Excessive pressure used for washing may damage The seals.

Note:

- a. Do not spray high pressure water jets into the radiator while the engine is running.
- b. Do not spray water jets directly onto seals and universal joints.
- c. Avoid using highly concentrated detergents to clean the machine, to avoid the paint fading or damage to the paint finish.
- d. You can use compressed air, High pressure water or steam to remove dust and debris from the radiator fins, however compressed air is best.

LOADER ARM SAFETY STRUT

Install a loader arm safety strut before working underneath raised loader arms.

1. Empty the loader bucket and raise the loader arms to their full height.
2. Stop the engine and remove the starter key.
3. Replace the loader safety strut over the arm pistonrod.
4. Bring down the loader arm slowly so that the weight is supported by the loader safety strut.

Take care not to trap your fingers.

5. Feather the lever up and down to ensure the accurate seating of the strut in the arm piston rods.

Removing the struts

1. Fully raise the loader arms to take off the weight of strut.
2. Stop the engine.
3. Remove the strut from the arm piston rods.
4. Secure the strut in its storage position for future use.

⚠ WARNING

Raised loader arms can drop suddenly and cause serious injuries. Before working underneath loader arms do not forget to fit the safety strut.

⚠ WARNING

If the loader control is accidentally operated, you could be injured or killed. Make sure no one comes near the loader.



SAFETY STRUT



BONNET- Opening and closing

1. Park the machine on firm level ground, engage the parking brake and put the transmission into neutral. Lower the loader arms and backhoe into the ground. Switch OFF: the engine and remove the starter key.
2. To release the bonnet, pull the bonnet lever cable on the left hand side near the steering wheel. This releases the lock and the bonnet goes up with the help of two pneumatic cylinders provided with the bonnet.
3. Push the bonnet down holding it in your hands until it firmly sits on the side panels now it will close properly.
4. For daily engine checks access the engine from the left hand side.



PULL TO UNLOCK
THE BONNET

**⚠ WARNING**

Do not climb on the cylinders. Your foot may get trapped between the machine and cylinder and result in personal injury.



Bonnet opening switch

SERVICE SCHEDULES**TRANSMISSION, AXLE & POWER STEERING**

(Refer Page.No:140 for BULL HD 100HP Service Checklist)

FUNCTIONAL TEST AND FINAL INSPECTION**TRANSMISSION AXLE AND POWER STEERING**

INSPECTION	Operation	10hr	250hr	500hr	1000hr	2500hr	5000hr
2WD Selection	Check		•	•	•	•	•
Torque in wheel nuts	Check	•	•	•	•	•	•
Operation of forward/reverse & gear selection	Check		•	•	•	•	•
Sheer circuit pressure	Check		•	•	•	•	•
Transmission main line pressure	Check		•	•	•	•	•
Transmission dump operation	Check		•	•	•	•	•
Neutral start operation	Check		•	•	•	•	•

NOTE :

Refer ZF Operation & Maintenance manual for detailed service schedules for ZF Transmission.

SERVICE SCHEDULES**HYDRALICS - (Refer Page No:140 for Bull HD 100 HP service checklist)****FUNCTIONAL TEST AND FINAL INSPECTION HYDRAULICS**

INSPECTION	Operation	10hr	100hr	500hr	1000hr	1500hr	2000hr
MRV Pressure	Check&adjust		•	•	•	•	•
Operation - All service	Check		•	•	•	•	•
Auxillary circuit pressure	Check		•	•	•	•	•

SERVICE SCHEDULES- BRAKES

PRE START COLD CHECKS	Operation	10hr	100hr	500hr	1000hr	1500hr	2000hr
Brake system - Fluid level	Check	•	•	•	•	•	•
Brake system - Fluid	Change					•	
Parking brake	Check		•	•	•	•	•

FUNCTIONAL TEST AND FINAL INSPECTION - BRAKES

INSPECTION	Operation	10hr	100hr	500hr	1000hr	1500hr	2000hr
Operation of foot brake	Check	•	•	•	•	•	•
Operation of parking brake	Change	•	•	•	•	•	•

ELECTRICALS

PRE START COLD CHECKS	Operatfon	10hrl	50hr	500hr	1000hr	1500hr	2000hr
Battery electrolyte level (If applicable)	Check	•	•	•	•	•	•
Wiring routing	Check		•	•	•	•	•
Condition of terminals & tightness	Check		•	•	•	•	•

ELECTRICALS

INSPECTION	Operatfon	10hrl	50hr	500hr	1000hr	1500hr	2000hr
Starter motor	Check		•	•	•	•	•
Output alternator	Check		•	•	•	•	•
Operation of entire electrical equipments (Lights, alarm, horns, wiper etc)	Check	•	•	•	•	•	•

BODY WORK, CABIN AND AESTHETICS

PRE START COLD CHECKS	Operatfon	10hrl	50hr	500hr	1000hr	1500hr	2000hr
All pins and bushes	Check & adjust	•	•	•	•	•	•
Door/Window Hinges	Lubricate		•	•	•	•	•
Allcables	Lubricate		•	•	•	•	•
Button lever	Check & adjust		•	•	•	•	•
Operation of cabin seat	Check		•	•	•	•	•
Boomlock engagement	Check	•	•	•	•	•	•
Condition of painting	Check		•	•	•	•	•
Stabilizer legs	Check & adjust		•	•	•	•	•
Aesthetics	Check& Clean	•	•	•	•	•	•

BODY WORK, CABIN AND AESTHETICS

INSPECTION	Operatfon	10hr	50hr	500hr	1000hr	1500hr	2000hr
Teeth and side cutters	Check	•	•	•	•	•	•
Fitment of Doors and windows	Check		•	•	•	•	•

Note:

1. 1st 100 hours of service should be done by trained service technicians only.
2. While the machine is in travel position, ensure the level of hydraulic fluid level.
3. If the machine runs continuously change the engine oil and filter in every 250 hours.
4. Change air filters more frequently if you are continuously operating in dusty conditions.

GREASING

WHY GREASING IS IMPORTANT?

Regular greasing ensures efficient work, lengthens its machine working life by preventing friction between moving components.

If the machine is used for short periods in a day, grease the points at least once in a day.

Greasing should be done with a grease gun. Normally two strokes is enough. Stop greasing when grease appears in the pin joints.

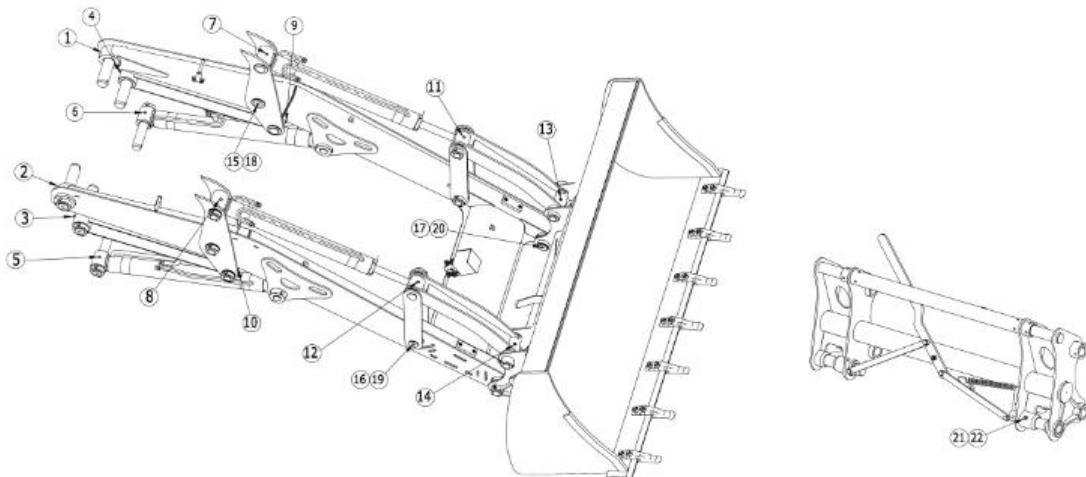
Note: The machine must always be greased after pressure washing or steam cleaning.

Following are the instructions for greasing:

1. Loader
2. Backhoe
3. Front axle & propeller shaft.

1. LOADER

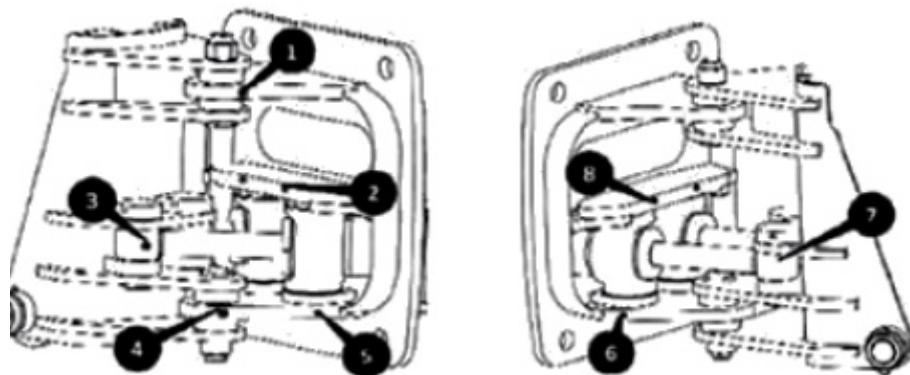
1. Loader - Greasing points



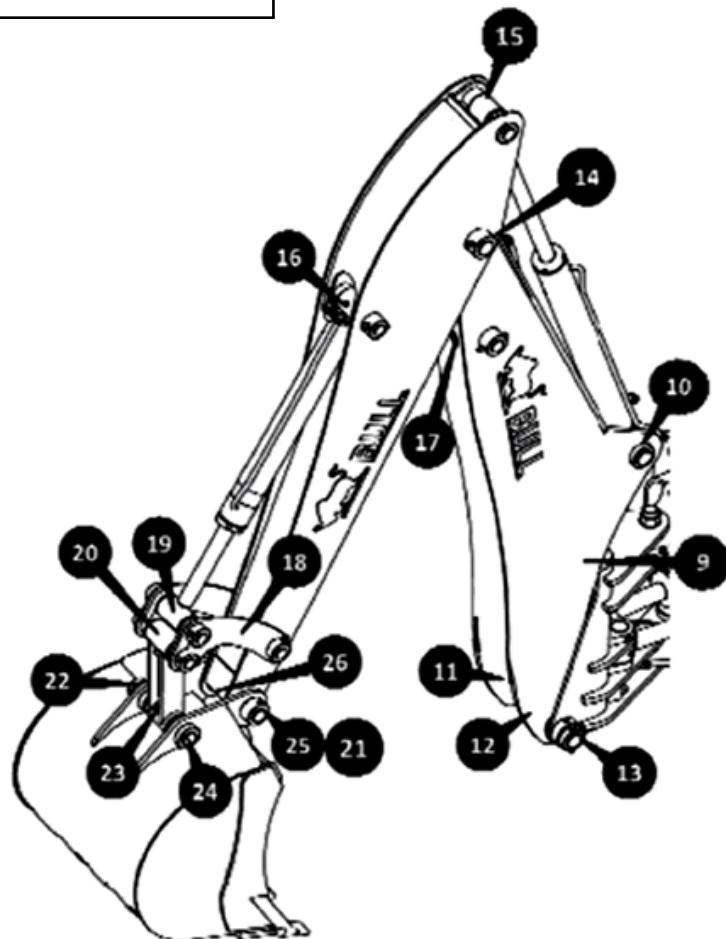
Illustrated points of the loader should be greased once in 6 hours with the grease gun.

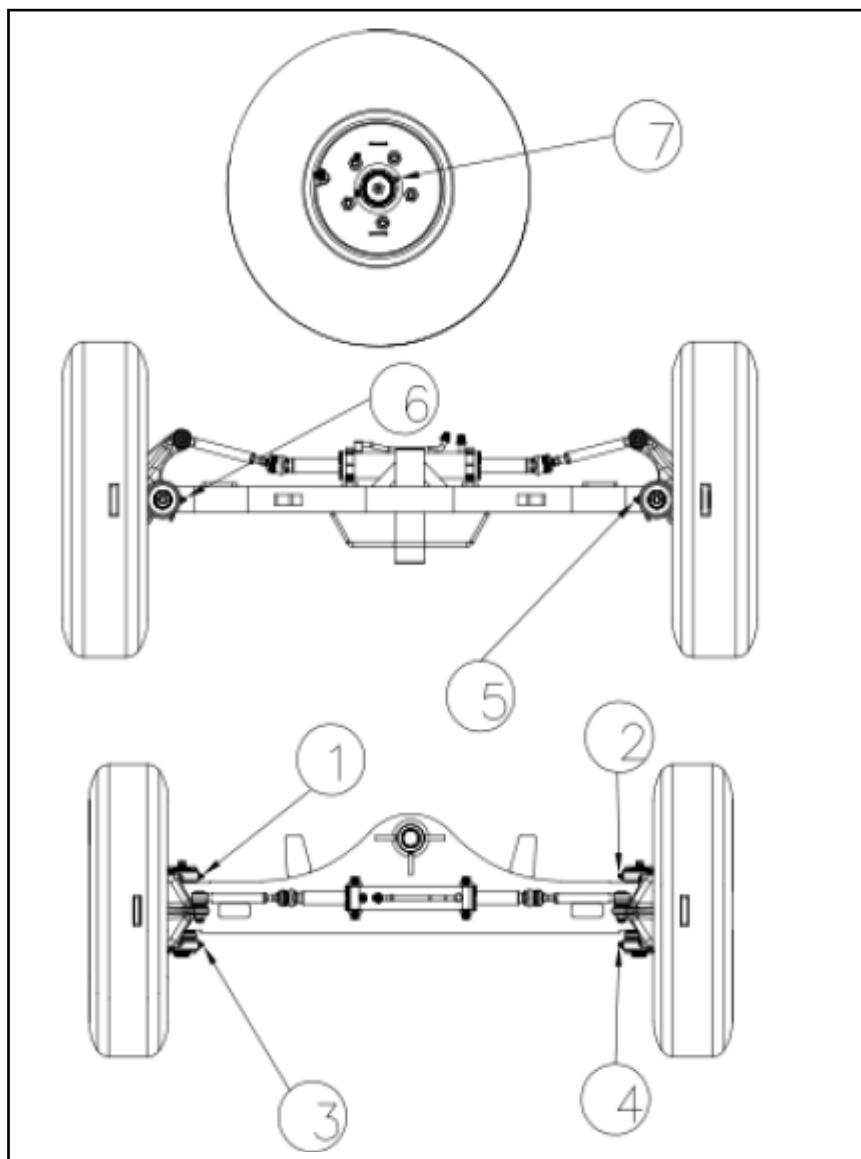
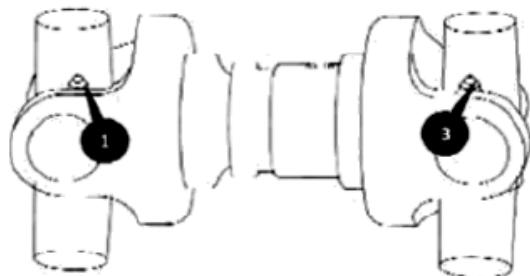
Greasing should be done both sides as indicated in the figure.

The total no of greasing points in Loader is 28. They should be greased once in 6 running hours.

GREASING - BACKHOE

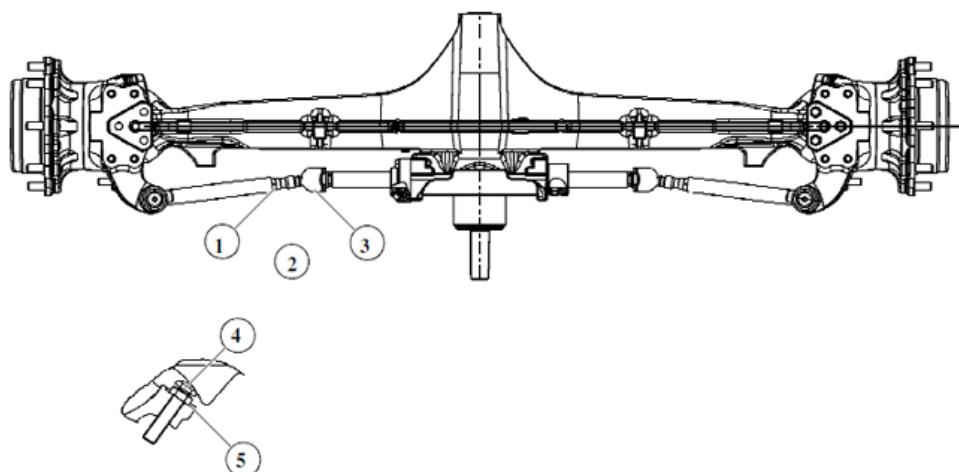
Do not grease the sliding rails of the carrier structure. The total no. of greasing points in the backhoe is 26. Points 18 to 26 should be greased once in every 4 hours.



GREASING - FRONT AXLE AND PROPELLER SHAFT**PROPELLER SHAFT**

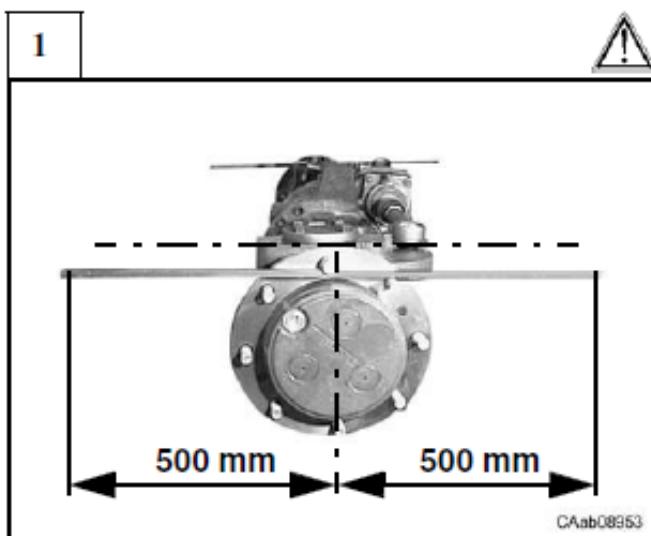
The total no. of greasing points is 6 grease once a day. While greasing the propeller shaft and front axle all four wheels should be checked and the parking brake engaged.

4WD TOE-IN/STEERING ANGLE



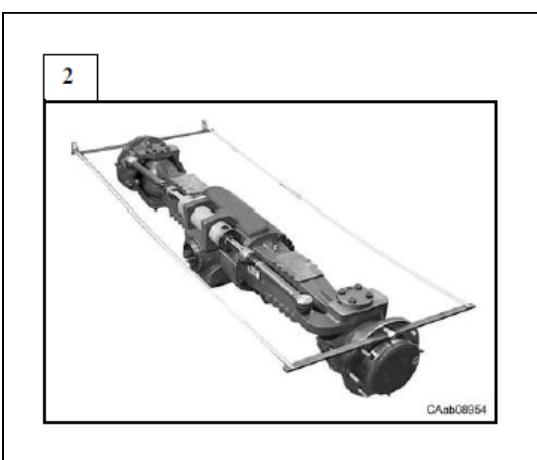
TOE-IN ADJUSTMENT

Some of the following pictures may not show exactly your axle, but the indicated operations are correct anyway.



Put two equal one-meter-long linear bars on the wheel sides and lock them with two nuts on the wheel hub stud bolt.

Warning: the two bars should be fixed on their middle so that they are perpendicular to the supporting surface and parallel to the pinion shaft axis; align the two bars.



Measure the distance in mm M between the bars ends with a tapeline.

Note: keep the minimum value, swinging the measurement point.

TYPES OF GREASES

1. AP3 GREASE : Brown in Colour, widely accepted both for Anti-friction & Plain Bearings Lubrication. Because of its excellent water resistant properties, shear stability and superior anti-rust & anti-corrosion properties.

2. EP2 GREASE : Blue / grey in colour, paste type petroleum jelly used for greasing in pins and all other machine parts expects high pressure bearings

LUBRICATION

The following parts should be applied with oil once in 100 hours

1. Parking brake cable.
2. Control lever links in valve.

⚠ WARNING

Oil in the brake discs will reduce braking efficiency. Keep oil away from brake discs. Used lubricants or oil may be harmful to your skin.



LUBRICATION OIL CHECKS & REFILLING

Lubrication oil checks at regular Intervals makes the BULL HD MACHINE to run more efficiently and ensures along life. Check the oil levels in 1,2,4,5 and check and refill the reservoirs of 3,4,6,7 if necessary

1. Engine.
2. Transmission
3. Radiator.
4. Differential.
5. Epicyclical reduction gear (Rear axle at both sides)
6. Braking system.
7. Hydraulic system.

LUBRICATION CHECKS & TYRE PRESSURES

(Refer Page.No:140 for BULL HD 100HP Service Checklist)

TYRES AND WHEELS**Tyre inflation**

These instructions are for adding air into an already inflated tyre. If a tyre has lost its full air pressure get it repaired by a tyre specialist. Make sure the rims are in good condition. Use an air supply system with a pressure regulator. Set the pressure regulator more than 40 psi or above the recommended tyre pressure. Make sure that the air hoses are correctly connected to the tyre valve. Make sure there are no bystanders. Stand behind the tread of the tyre while adding the air. Never over inflated.

**TYRE PRESSURE**

(Refer Page.No:140 for BULL HD 100HP Service Checklist)

Note: Low pressure shortens the life of tyres

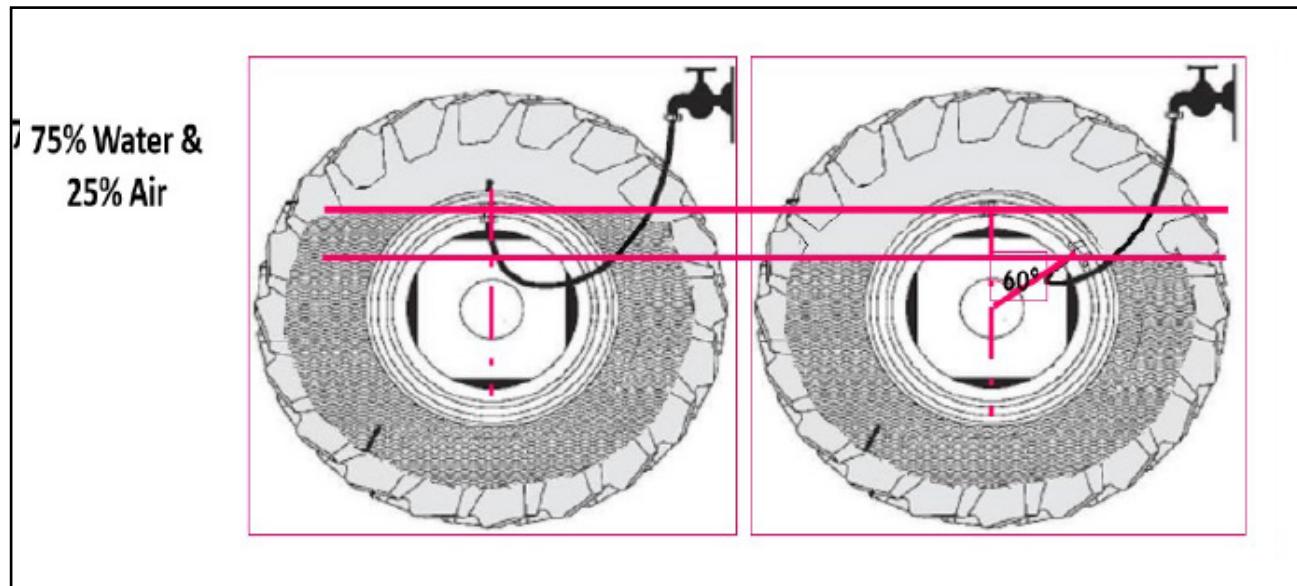
Checking the wheel nut torques

On new machines or whenever a wheel is removed check the wheel nut tightness and torque once in two hours until they do not change. Check the torque of the wheel nut in relation with tyre size.

WATER BALLAST (SUGGESTED FOR FRONTEND LOADER)

It is recommended that the rear tyres are water ballasted to add weight which ensures better grip during loading.

Make sure that the left and right tyres have equal amounts of water.

How to water ballast?

Ensure both air and water filling facility must be available with the service station before starting the water ballasting process.

- * Jack up the Machine to take the load off the tyre.
- * Put the tyre in such a position that the valve is at 12 O'clock.
- * Connect the hydro flation adaptor to the valve after removing the valve core.
- * Insert water till the level of valve.
- * Rotate the tyre to 2 o' clock position and allow the excess water to come out from the tube.
- * Rotate the tyre again to 12 o' clock position and inflate the tyre with air to the recommended pressure (20 ~ 25 psi).

⚠ CAUTION

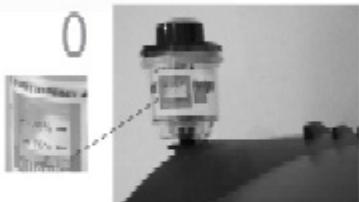
Inflation pressure of water ballasted tyres must be checked frequently as the volume of air is very much reduced. Never fill a tyre to more than 75% full with water. Any more would leave too little air space to absorb shocks. Damage to the tyre could occur.

ENGINE AIR FILTER CLEANING PROCEDURE

ENGINE AIR FILTER CLEANING PROCEDURE

Time for an element change.....

The restriction indicator mounted on your OptiAir® system indicates when your OptiAir® element needs changing.



1 Lift the lever as indicated on the OptiAir® cover label.



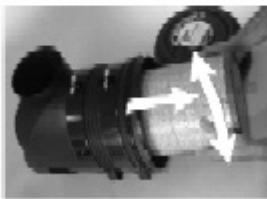
2 Twist the OptiAir® cover to the left into the 'open' position



3 Remove the OptiAir® cover



4 Twist the end of the filter to disengage seal. Gently remove the filter element* from the housing. Inspect the filter for foreign material on the sealing surfaces and potential marks of dust at the cleaning side.



* If servicing a system that contains a secondary element which needs to be replaced, apply the same procedure as indicated in step 4.

5 Thoroughly clean the sealing surfaces and the inside of the OptiAir® Housing



6 Inspect the new filter element* for damage and insert into the housing.



7 Place the OptiAir® cover back on the housing. Make sure dust ejection valve is orientated downwards.



* If servicing a system that contains a secondary element which needs to be replaced, apply the same procedure as indicated in step 6.

8 Twist the OptiAir® cover to the right and put into the 'close' position



9



Once the elements have been changed... make sure that you reset the restriction indicator

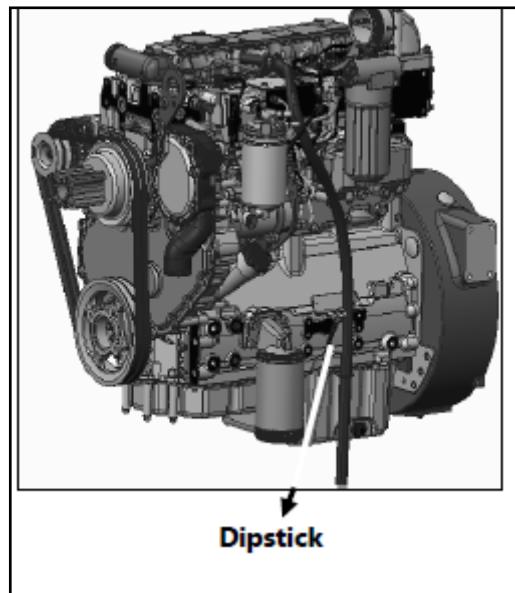
LUBRICATION OIL CIRCUIT - ENGINE

Checking Oil level.

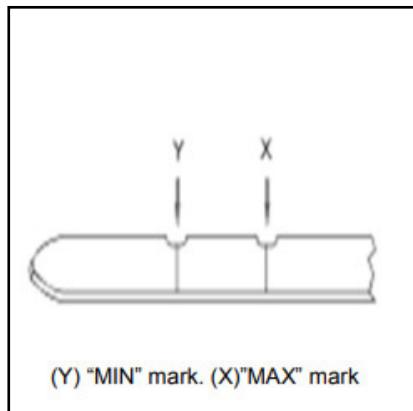
1. Stop the engine and wait for 35 minutes until the engine oil settles in the sump to avoid thread damage in body. Ensure the engine is in horizontal position.

2. Pull out the dipstick. Wipe it with a non fraying cloth, push it in as far as it will go then withdraw the dipstick again.

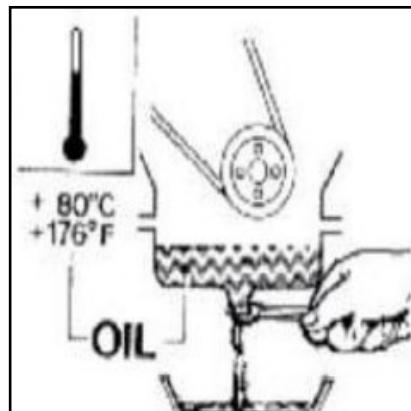
3. The film of oil on the dipstick should extend to the upper maximum mark. The oil should be topped up to the top mark of the level. The level reaches the lower mark, check whether there are no leakages. Under no circumstances should the level be lower than the bottom mark.



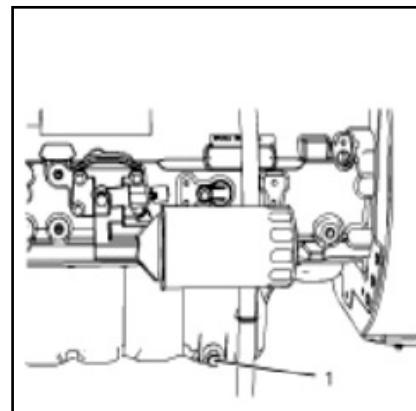
A. CHECKING THE ENGINE OIL



B. RUN THE ENGINE UNTIL IT WARMS



C. DRAINING THE OIL



4. Failure to top up the oil may result in serious damage to the engine by causing the piston and bearing to seize. Run the engine until it warms (Lube Oil Temperature 80

CHANGING THE ENGINE OIL

1. Put the engine in horizontal position.
2. Change the engine oil in recommended intervals.
3. Stop the engine and remove the starter key.
4. Place an oil tray below the engine compartment.
5. Unscrew the drain plug at the bottom of oil sump and wait till all the oil is drained out.
6. Refit the oil drain plug with a new bonded seal washer, O-ring and make sure it is tight.
7. Fill with fresh lube oil. Do not overfill the crankcase as this will result in engine damage.

Note: Take care while draining hot oil. Hot oil can contact with skin. Collect used oil in a suitable container, ready for proper disposal, to prevent environmental pollution. (For more details refer Perkins 1104D - 44TA Engine manual)

ENGINE COOLING SYSTEM

The Perkins 1104D – 44TA Engine is cooled by a closed circuit radiator system.

1. The radiator cap is located on top of the de aeration tank of the cooler assembly. Remove the radiator cap slowly in order to relieve the pressure. Do not open if the cap is hot. Fill the radiator via the reservoir (as shown in the picture). Keep the level of water in the reservoir topped up.
2. Maintain the coolant level within 13 mm of the bottom of the filler tube shown in figure. If you need to fill coolant daily check the cooling system for leaks.
3. Fill the radiators with coolant. Do not spray high pressure water into the radiator when the engine is running
4. Inspect the radiator cap seal and replace it if the ra-



Note: If necessary, tilt the oil cooler away from the radiator to remove dust and debris between the radiator and oil cooler.

 **WARNING**

The coolant used may cause serious burns. Do not attempt to open the system as you will be sprayed with hot coolant from the radiators. Be careful not to burn your hand.

FUEL SYSTEM

Fuel is supplied to the fuel pump with the help of a feed pump which is built into the fuel pump. A water separator and a mud filter is used in between the tank and fuel pump. In addition to this there is a dual filter (pre filter and micro filter) in between the feed pump and the fuel pump.

FUEL SPECIFICATION

Good engine performance requires both clean and the correct grade of fuel. The fuel injector is manufactured with, very close tolerances. Dirt and the wrong specification of fuel cause wear and tear in the fuel injector.

The specifications are:

1. High speed diesel oil corresponding to IS 1460 1989 or BS 2869 1987 or A5TM diesel oil No. 1 D and No. 2 D (ASTM designation D 975) with a minimum crane number of 35.
2. For ambient temperatures below freezing point and altitudes above 1500 m (5000 ft) fuel No. ID is recommended. Sulphur and water content should both be less than 1%.

Filling the fuel tank

At the end of every working day, fill the tank with the correct type of fuel. This will prevent overnight condensation of water into the diesel.

Water Separator

Drain the water separator every 50 hours or daily, before start of the work. Remove the drain plug fitted in the bottom of the bowl.

Note: If the water separator is not drained periodically water may rust precision components like pump and fuel injectors etc. This could result them being unserviceable in the future.

WARNING

Do not use petrol in the engine or do not mix petrol with diesel fuel. Diesel fuel is flammable; keep naked flames away from the machine. Do not smoke when refueling or when working on the engine. Lower the loader arms and stop the engine when refueling.

CARRARO TRANSMISSION

Checking the oil level

Note: The dipstick mark is for cold oil. The engine must be cold when you check the oil level. Make sure the engine is stopped and the starter key is removed.

The transmission oil dipstick is just adjacent to the engine oil dipstick. Check the oil is level within the top mark
Add recommended transmission oil (Ref Page:79) If necessary, Do not fill oil ever the top mark of the dipstick

Changing the oil and filter

Prepare the machine

Park the machine on level ground, Engage the parking brakes, Lower the attachments to the ground. Stop the engine and remove the starter key, also ensure the batteries are disconnected.

Drain the oil and remove the strainer

Drain the existing transmission oil into an 18 litre container kept beneath the machine. Remove the belt and pull out the strainer and gasket



Clean the strainer

Clean the strainer with a suitable solvent,

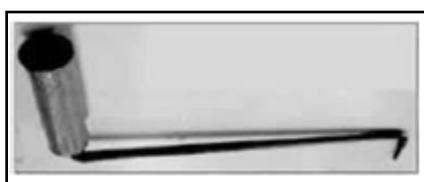
Refit the strainer

Fit the strainer and a new gasket, apply loctite before fitting and tightening them.

Renew the filter

Unscrew and remove the filter. Smear the seat on the new filter with transmission oil. Fit the new filter in place (Hand tight is sufficient).

Fill the system with new Oil



Fill the transmission system with new oil through a special type funnel shown in the figure.
(See: page 91 for recommended oil)

Note: Do not fill the oil over the top mark of the dipstick.

PERKINS MAINTENANCE INSTRUCTION

Maintenance Section

Fuel System Primary Filter/Water Separator - Drain

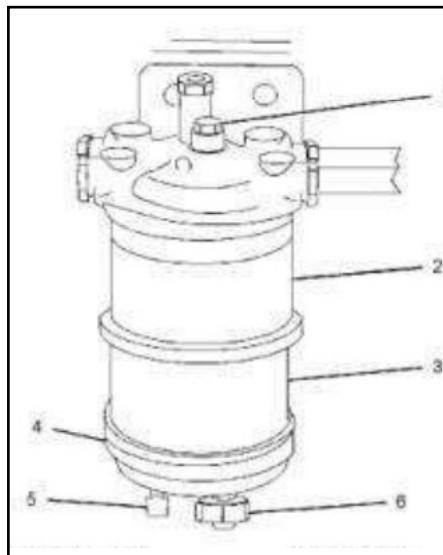


Illustration 37

g01353878

- 1) Screw
- 2) Element
- 3) Bowl
- 4) Bottom cover
- 5) Drain
- 6) Sensor connection

1. Turn the fuel supply valve (if equipped) to the OFF position.
2. Place a suitable container under the water separator. Clean the outside of the water separator.
3. Open the drain (5). Allow the fluid to drain into the container.
4. Tighten the drain (5) by hand pressure only.
5. Hold the element (2) and remove the screw (1). Remove the element and the bowl (3) from the base. Discard the old element
6. Clean the bowl (4). Clean the bottom cover (6)
7. Install the new O ring seal. Install the bottom cover onto the new element. Install the assembly onto the base.
8. Install the screw (1) and tighten the screw to a torque of 8 N·m (6 lb ft).

9. Remove the container and dispose of the fuel safely.

10. Open the fuel supply valve

11. Prime the fuel system. Refer to the Operation and Maintenance Manual, "Fuel System - Prime" for more information.

Fuel System Primary Filter/Water Separator - Drain

WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

NOTICE

The water separator is not a filter. The water separator separates water from the fuel. The engine should never be allowed to run with the water separator more than half full. Engine damage may result.

NOTICE

The water separator is under suction during normal engine operation. Ensure that the drain valve is tightened securely to help prevent air from entering the fuel system.

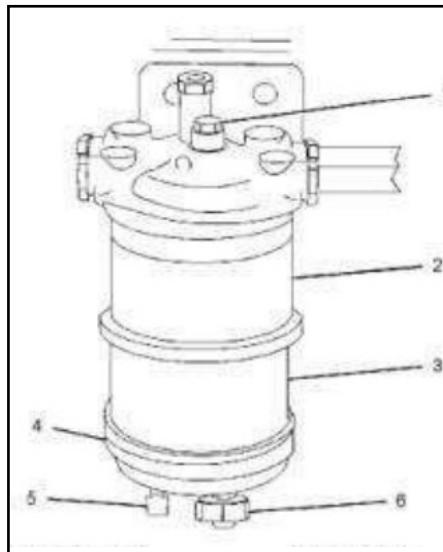
Maintenance Section**Fuel System Primary Filter/Water Separator - Drain**

Illustration 38 g01353878

- (1) Screw
- (2) Element
- (3) Bowl
- (4) Bottom cover
- (5) Drain
- (6) Sensor connection

- 1) Place a suitable container below the water separator.
- 2) Open the drain (5). Allow the fluid to drain into the container
- 3) When clean fuel drains from the water separator close the drain (5). Tighten the drain by hand pressure only. Dispose of the drained fluid correctly

Fuel System Secondary Filter - Replace**NOTICE**

Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system components.

Element filter

Turn the valves for the fuel lines (if equipped) to the OFF position before performing this maintenance. Place a tray under the fuel filter in order to catch any fuel that might spill. Clean up any spilled fuel immediately

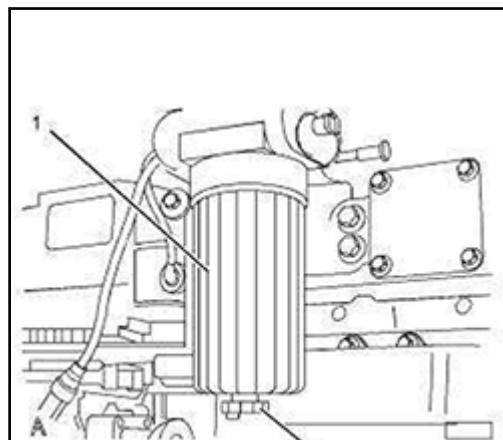


Illustration 39

- 1. Filter bowl
- 2. Drain

1. Close the valves for the fuel lines (if equipped).
2. Clean the outside of the fuel filter assembly. Open the fuel drain (2) and drain the fuel into a suitable container.

WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

Maintenance Section

Fuel System Secondary Filter - Replace

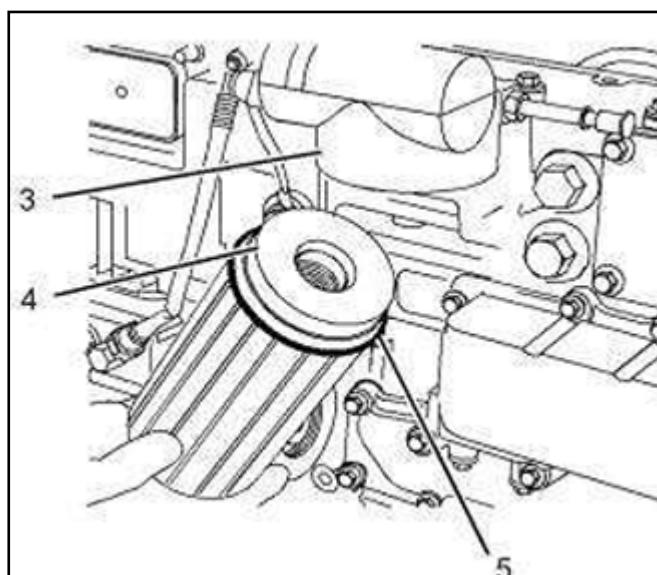


Illustration 40 g02659218

Typical example

(3) Filter head

(4) Element

(5) O ring seal

3. Remove the filler bowl (1) from the filler head (3). Press on the element (4). Rotate the element counterclockwise in order to release the element for the filler bowl and remove the element from the bowl. Discard the used element.

4. Remove the O ring (5) from the filter bowl and clean the filter bowl. Check that the threads of the Filter bowl are not damaged.

5. Install a new O ring seal (5) to the filter bowl (1).
 6. Locate a new filter element (4) into the filter bowl (1). Press on the element and rotate the element clockwise in order to lock the element into the Filter bowl.

7. Install the filter bowl (1) into the top of the filter head (3).

8. Tighten the filter bowl by hand until the filter bowl contacts the filter head. Rotate the filter bowl through 90 degrees

Note: Do not use a tool to tighten the filter bowl.

9. Open the valves for the fuel lines (if equipped).

Spin-on filler

Turn the valves for the fuel lines (if equipped) to the OFF position before performing this maintenance. Place a tray under the fuel filler in order to catch any fuel that might spill. Clean up any spilled fuel immediately.

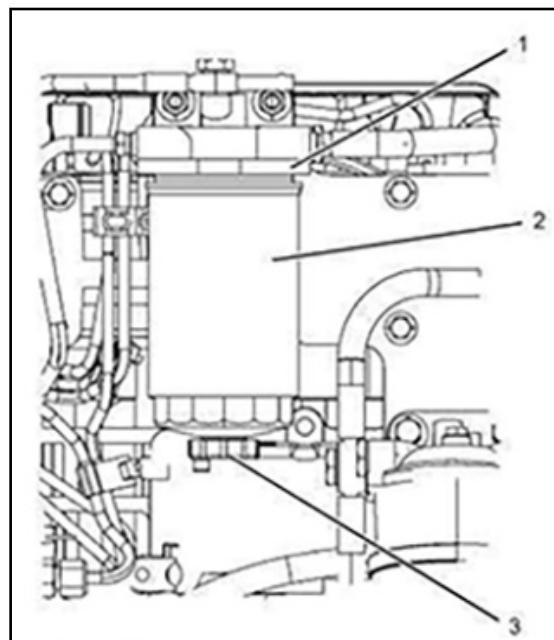


Illustration 41

(1) Filter Head

(2) Spin-on filter

(3) Drain

1. Clean the outside of the fuel filler assembly. Open the fuel drain (3) and drain the fuel into a suitable container.

2. Use a suitable tool in order to remove the spin-on Filter (2) from the filler head (1)

3. Ensure that the fuel drain (3) on the new spin-on filter is closed.

Maintenance Section

Fuel Tank Water Sediment - Drain

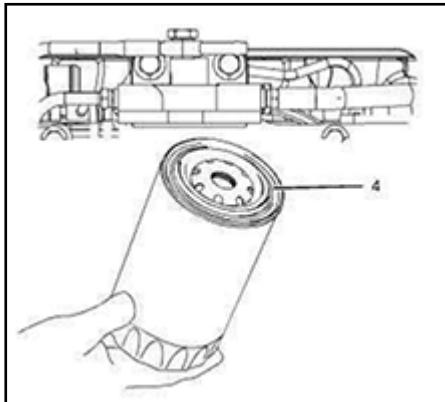


Illustration 42

Typical example

(4) O ring seal

4. Lubricate the sealing ring (4) with clean fuel oil.
5. Install the spin-on filter (2) into the top of the filter head (1).
6. Tighten the spin-on filter by hand until the sealing ring contacts the filter head. Rotate the spin-on Filter through 90 degrees.
7. Prime the fuel system. Refer to Operation and Maintenance Manual, "Fuel System - Prime".

Fuel Tank Water and Sediment

- Drain

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

Fuel Tank

Fuel quality is critical to the performance and to the service life of the engine. Water in the fuel can cause excessive wear to the fuel system. Water can be introduced into the fuel tank when the fuel tank is being filled. Condensation occurs during the heating and cooling of fuel. The condensation occurs as the fuel passes through the fuel system and the fuel returns to the fuel tank. This causes water to accumulate in fuel tanks. Draining the fuel tank regularly and obtaining fuel from reliable sources can help to eliminate water in the fuel.

Drain the Water and the Sediment

Fuel tanks should contain some provision for draining water and draining sediment from the bottom of the fuel tanks. Open the drain valve on the bottom of the fuel tank in order to drain the water and the sediment. Close the drain valve. Check the fuel daily. Allow five minutes after the fuel tank has been filled before draining water and sediment from the fuel tank. Fill the fuel tank after operating the engine in order to drive out moist air. This will help prevent condensation. Do not fill the tank to the top. The fuel expands as the fuel gets warm. The tank may overflow. Some fuel tanks use supply pipes that allow water and sediment to settle below the end of the fuel supply pipe. Some fuel tanks use supply lines that take fuel directly from the bottom of the tank. If the engine is equipped with this system, regular maintenance of the fuel system filter is important.

Fuel Storage Tanks

Drain the water and the sediment from the fuel storage tank at the following intervals:

- Weekly
- Service intervals
- Refill of the tank

This will help prevent water or sediment from being pumped from the storage tank into the engine fuel tank.

HD 100 ZF TRANSMISSIONS

Checking the oil level

Note: The dipstick mark is for cold oil. The engine must be cold when you check the oil level. Make sure the engine is stopped and the starter key is removed.

The transmission oil dipstick is just adjacent to the engine oil dipstick. Check the oil is level within the topmark Add recommended transmission oil (Ref Page: 79) If necessary. Do not fill oil ever the top mark of the dipstick.

Changing the oil and filter

Prepare the machine

Park the machine on level ground. Engage the parking brakes. Lower the attachments to the ground, Stop the engine and remove the starter key, also ensure the batteries are disconnected.

Drain the oil and remove the strainer

Drain the existing transmission oil into an 18 litre container kept beneath the machine, Remove the belt and pull out the strainer and gasket



Clean the strainer

Clean the strainer with a suitable solvent.

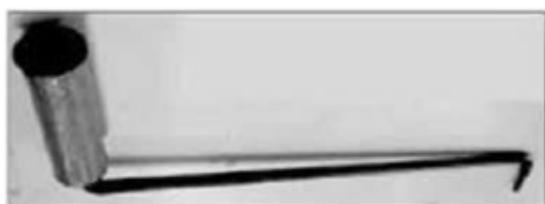
Refit the strainer

Fit the strainer and a new gasket, apply loctite before fitting and tightening them.

Renew the filter

Unscrew and remove the filter. Smear the seaton the new filter with transmission oil. Fit the new filter in place (Hand tight is sufficient).

Fill the system with new Oil



Fill the transmission system with new oil through a special type funnel shown in the figure. (See: page 91 for recommended oil)

Note: Do not fill the oil over the top mark of the dipstick.

HYDRAULIC OIL COOLER

The transmission oil cooled is in front of the hydraulic oil cooler, which is in front of the engine radiator. If the hydraulic oil cooler fins get clogged or damaged by foreign particles, the radiator and cooler will be less efficient.

Cleaning the fins.

1. Raise the loader arms (See Loader arm safety strut MAINTENANCE SECTION)
2. Shut off the engine
3. Raise the bonnet.
4. Clean the cooler by using fine tipped brushes to remove all debris and dust from the cooler
5. Make sure the loose materials are brushed out from the cooler enclosure.
6. Close the bonnet.

⚠ WARNING

Do not open the bonnet while
the engine is running



REAR AXLE

It is essential to park the machine on level ground to check the oil level in the rear axle. Park the machine on level ground so that the 'OIL LEVEL' Mark is horizontal. Engage the parking brakes. Put the transmission in neutral position. Lower all attachments to ground. Stop the engine and remove the starter key.

1. Checking hub oil level / Add new Oil

Clean the area around the plug. Remove the plug. Oil should be in level with the bottom

line of the hole. Add new oil if necessary. (See: recommended oil in Chart page: 79).

Check

the plug before refitting it.



Changing the Oil

1. Prepare the machine

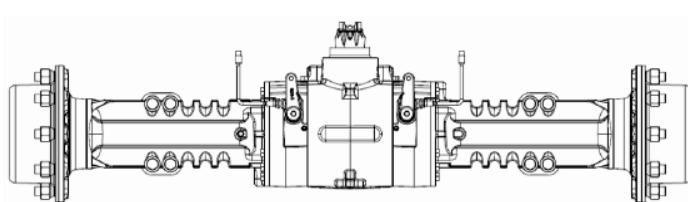
Park the machine on a level surface so that the "OIL LEVEL" mark in one of the hub is on the bottom, as shown in the photo. Engage the parking brakes. Put the transmission in neutral. Lower all the attachments to ground. Stop the engine and remove the starter key.

2. Drain the oil (Wheel hubs on either sides)

Place a container under the machine to catch the existing rear axle oil.

(See Chart in MAINTENANCE SECTION for capacity)

- a. Remove the fill/level/drain plug from the rear axle. Allow the oil to drain out from the holes, The drain plug is magnetic.
- b. Wipe and clean the drain plug (Metal particles should be carefully removed) Clean and refit the drain plug. Refit the new oil to the specified level.
- c. Position the other wheel hub of the same axle so that the "OIL LEVEL" mark is at the bottom of the hub. Repeat the steps a & b above.



3. Drain the oil (Centre body with trumpet)

Remove the drain plug from the drive head casing and allow the oil to drain out. The drain plug is magnetic. Wipe and clean (Metal particles should be carefully removed). Clean and refit the drain plug. Place a container beneath the drive head casing drain plug to catch the oil. (See Chart in MAINTENANCE SECTION for capacity).

4. Fill with new Oil

Park the machine so that the 'Oil Level' mark on one hub is horizontal remove the fell/level/drain plug from that hub. Fill the axle with suitable and specified quantity of oil (Ref chart in MAINTENANCE SECTION) Clean and refit the fill/level plug.

▲CAUTION

It is not recommended that the machine be driven with the axle partially filled with oil

▲CAUTION

Oil will rush out from the hole when the drain plug is removed. keep to one side when you remove the plug.

HYDRAULIC SYSTEM**Checking the fluid level**

Position the machine on firm level ground. Set the loader bucket on the ground. Raise the boom and swing in the dipper and close the bucket. Stop the engine and remove the starter key. Look at the fluid level in the oil slight glass. The oil level is OK if the oil is visible through slight glass. If the oil level is low, remove the breather and replenish with recommended hydraulic oil as required. If the oil level is high, drain out the excess oil to the correct level.

**Hydraulic Tank Cap (Breather)**

The hydraulic tank breather and filter element are important parts of the hydraulic system. Replace the breather and filter element as per the service schedule.

**▲CAUTION**

If the hydraulic fluid appears to be cloudy, then water or air has entered the system. If the machine is operated the hydraulic pump could be severely damaged. Contact your authorized BULL HD dealer immediately.

▲WARNING

Do not use fingers to check hydraulic fluid leaks. Do not put your face close to suspected leaks. Fluid jets of hydraulic fluid can penetrate the skin. To see on oil leak hold a piece of card board up by it. If oil is leaking out it will be visible on the cardboard. If hydraulic oil penetrates your skin get medical help immediately.

Changing the filter element**1. Prepare the machine.**

Park the machine on the level ground. Raise the loader bucket forward and rest on the ground as shown. Close the backhoe bucket, swing out in the dipper and lower the boom as shown in figure. Lower the stabilizers to the ground. Stop the engine and remove the starter

**2. Remove the element.**

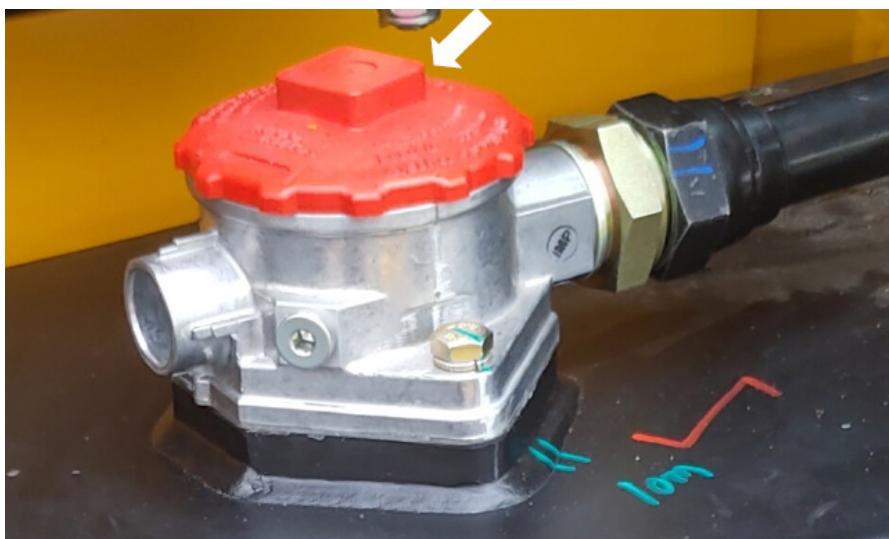
Undo the filter aluminum cover bolts and washers and remove the cover carefully as it is spring loaded.

Remove the filter element from the filter assembly. Inside the filter assembly body looks for dirt on the seating grooves, and check the O rings for damage.

**3. Fit the new element**

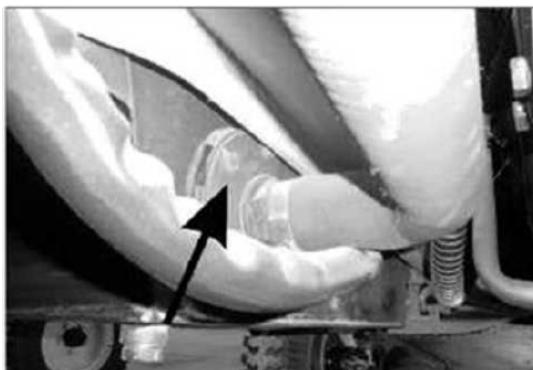
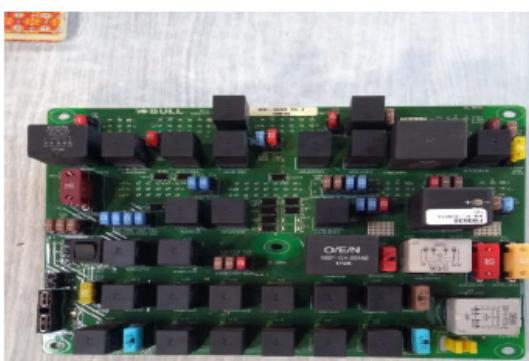
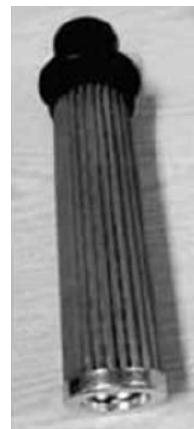
Clean the magnet in the top cover as shown Insert the new element with the spring on top and make sure it is seated properly. Fix the top cover facing the magnet towards oil delivery side and tighten the bolts and washers.

Add recommended oil (see page: 79)through the hydraulic oil tank cap and tighten the cap.

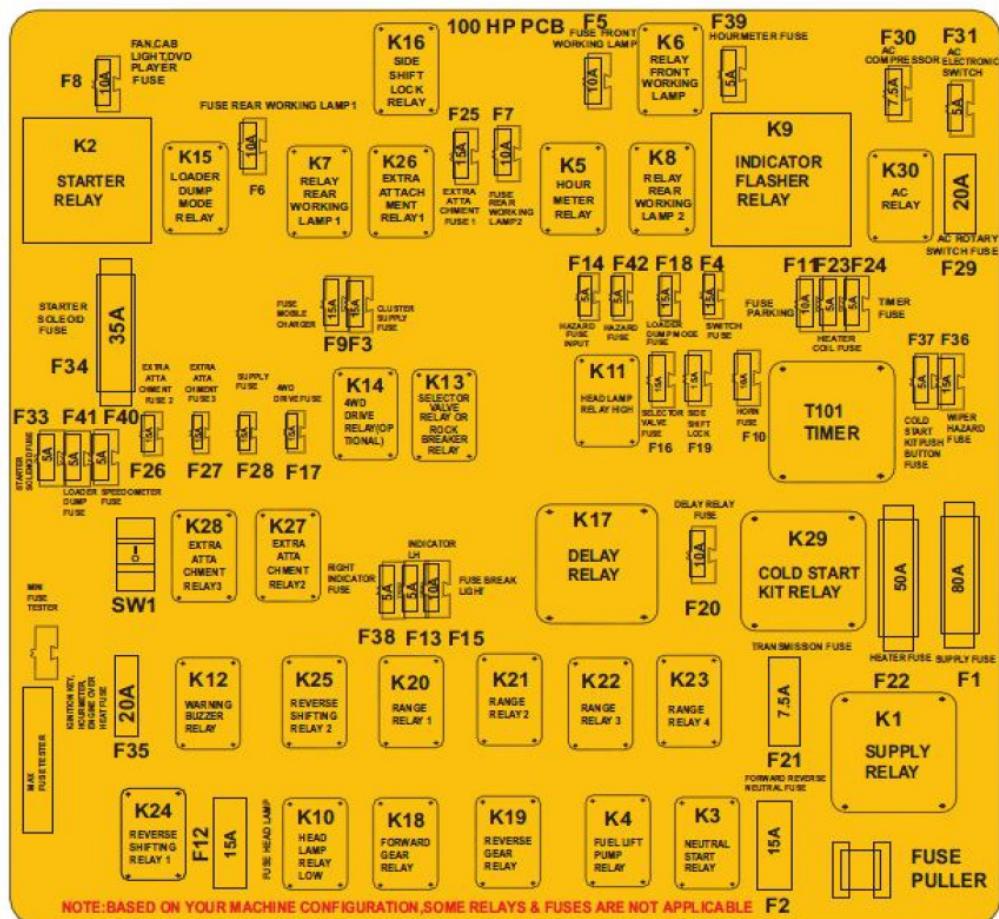


Cleaning and Changing the suction strainer

1. Park the machine on firm level ground. Roll the loader bucket forward and rest it on ground. Close the backhoe bucket and swing in the dipper and lower the boom until the bucket rests on the ground. Lower the stabilizers to the ground. Stop the engine and remove the starter key and disconnect the batteries.
2. Remove the hydraulic tank cap.
3. Place a container beneath the hydraulic oil tank to drain out the oil. Remove the drain plug to drain out the used hydraulic oil. Make sure the container is large enough to hold all the oil (See service capacities and lubricants) in this section.
4. Unscrew the outer nipple holding the suction strainer on the tank.
5. Take the suction strained out.
6. Clean the suction strainer with diesel and refit Clean the suction strainer at 1000 hrs and when the tank is drained for any oil service.
7. If the suction strainer is damaged or over its depreciation period refit with a new suction strainer.
8. Fit a new suction strainer and tighten it to a torque of 16-20 Nm.
9. Reconnect the suction hose. Make sure the hoses and suction strainer nipples are firmly tightened.
10. Refit drain plug and tighten it to a torque of 100 Nm.
11. Refill the hydraulic tank with new oil and fix the breather.

**FUSES AND RELAYS**

FUSE & RELAY STICKER

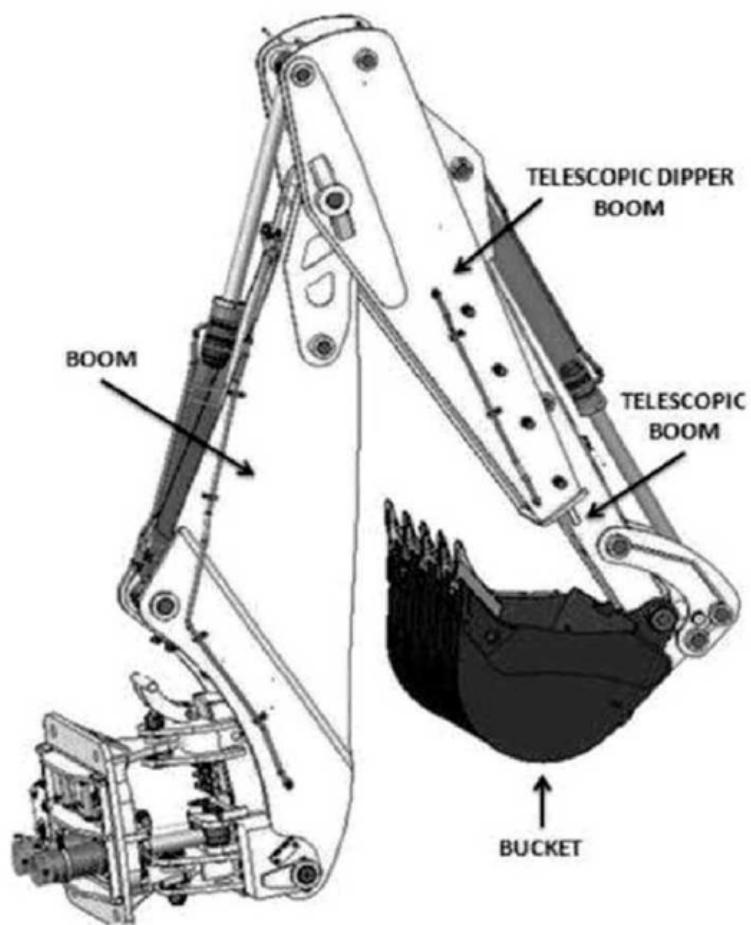


Note: Fuse & Relay sticker is available inside the panel box. The electrical circuit is powered by alternator for all lights, Ignition and like the fan, Tube light and music player.

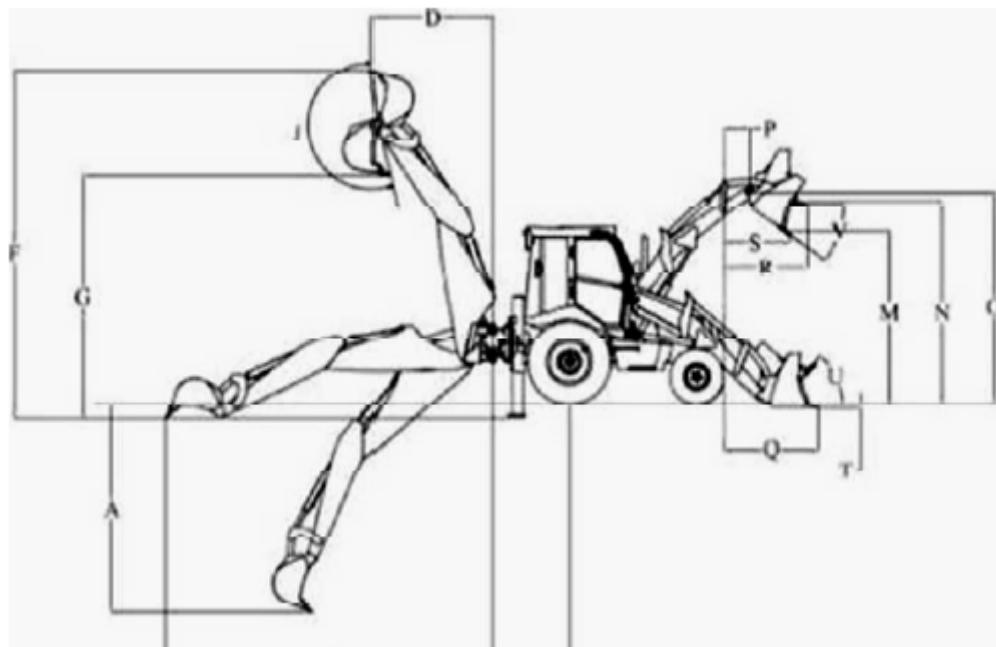
The motherboard is located inside panel box. Fuse prevent short circulating in any of the electrical connections. Spare Fuses are provided for your emergency purpose and same is located inside Toolbox above figure (See sticker above) shows the sticker pasted on the outer cover of the fuse box. This will be helpful to identify the appropriate fuses and rectify the respective problem. The Entire Electrical System is explained through electrical circuits in the following pages (See pages: 122-124)

⚠ WARNING

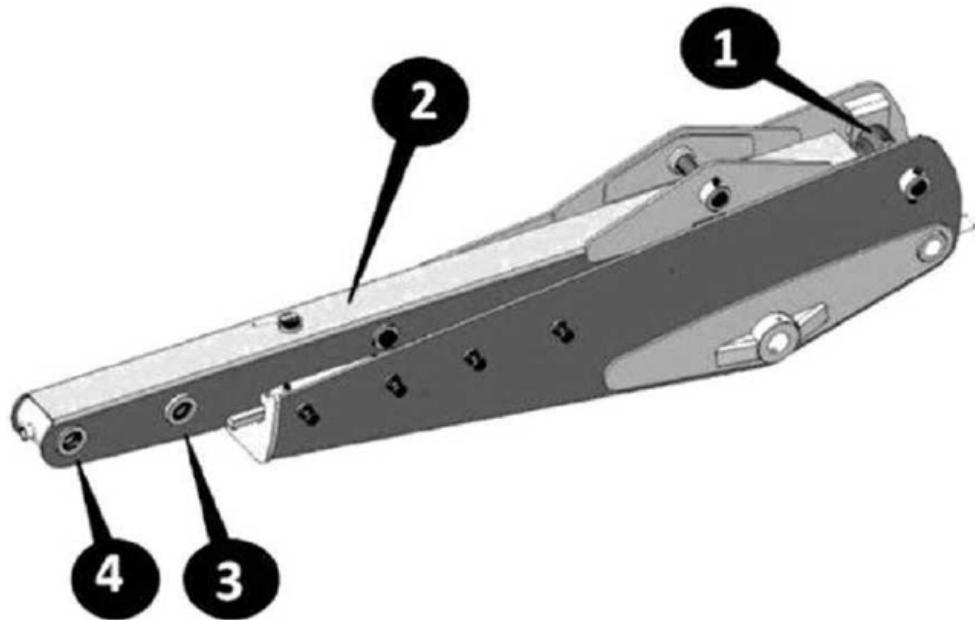
1. Any damaged / uncovered writing will cause a short circuit.
2. Ensure the PCB cover is kept dry while cleaning the interior cabin with water jets.
3. Use the correct fuses, over capacity fuses will melt writing and cause short circuits.
4. No extra wiring connection should be joined to or added into the PCB, If needed contact your authorized BULL HD Dealer.
5. The machine operator should keep an eye on the Ammeter on the dashboard to make sure the battery is charging.

TELESCOPIC DIPPER BOOM (OPTION)

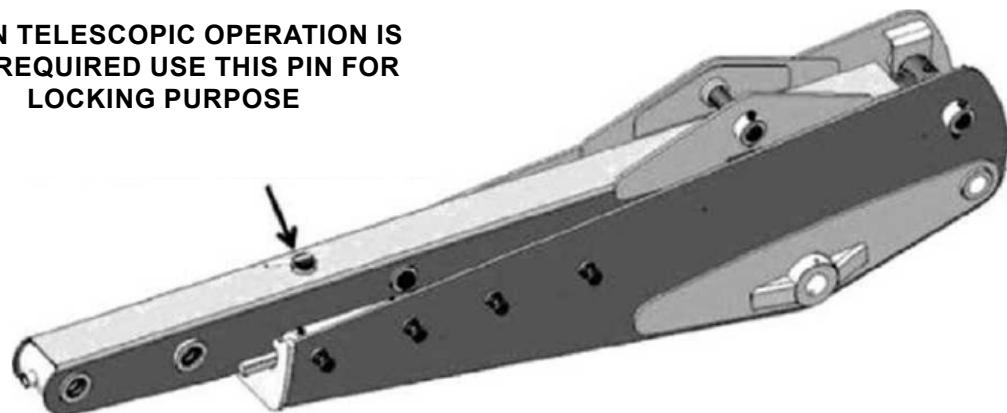
TELESCOPIC DIPPER BOOM SPECIFICATION

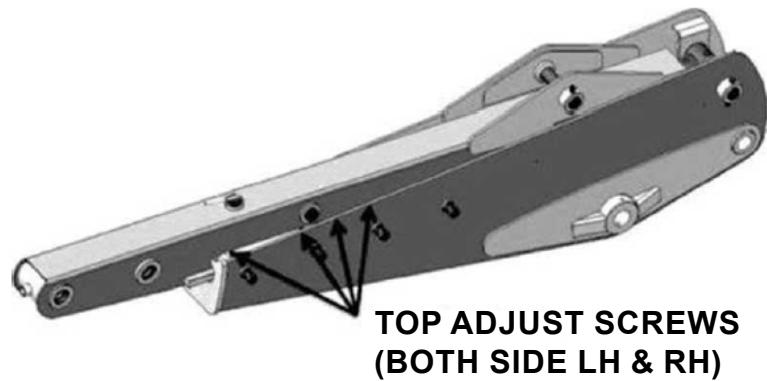
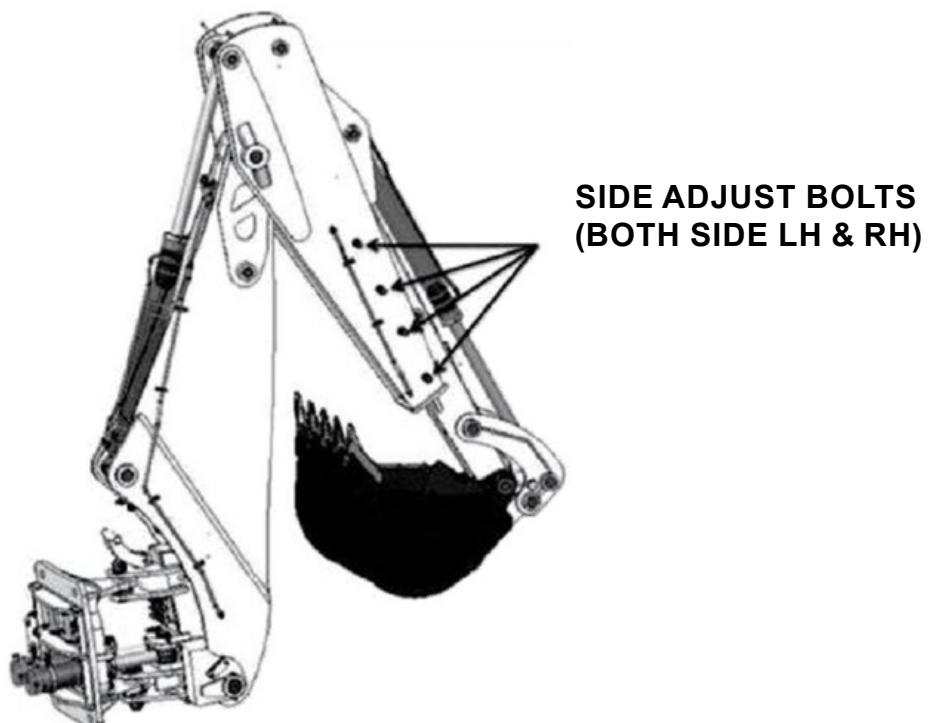


	EXCAVATOR PERFORMANCE	STANDARD	TELESCOPIC DIPPER (OPTION)
	STANDARD BUCKET CAPACITY	0.27 cu.m (standard)	
A	MAXIMUM DIG DEPTH	4.6 m	5.59 m
B	REACH GROUND LEVEL "O" REAR WHEEL CENTRE	6.8 m	7.91 m
C	REACH GROUND LEVEL 'O' SLEW CENTRE	5.50 m	6.61 m
D	REACH AT FULL HEIGHT TO SLEW CENTRE	2.85 m	3.56 m
E	MAXIMUM WORKING HEIGHT	5.92 m	6.77 m
F	MAXIMUM LOAD OVER HEIGHT	4.14 m	5.02 m
G	BUCKET ROTATION- POWER	188°	
H	BUCKET TEAR OUT FORCE	6072kgf	
I	DIPPER TEAR OUT FORCE	3150kg	
J	LIFT CAPACITY TO BUCKET PIVOT AT FULL REACH (NO BUCKET FITTED)	1400kgs	

TELESCOPIC DIPPER BOOM GREASING POINTS**HOW TO LOCK TELESCOPIC DIPPER BOOM**

WHEN TELESCOPIC OPERATION IS
NOT REQUIRED USE THIS PIN FOR
LOCKING PURPOSE

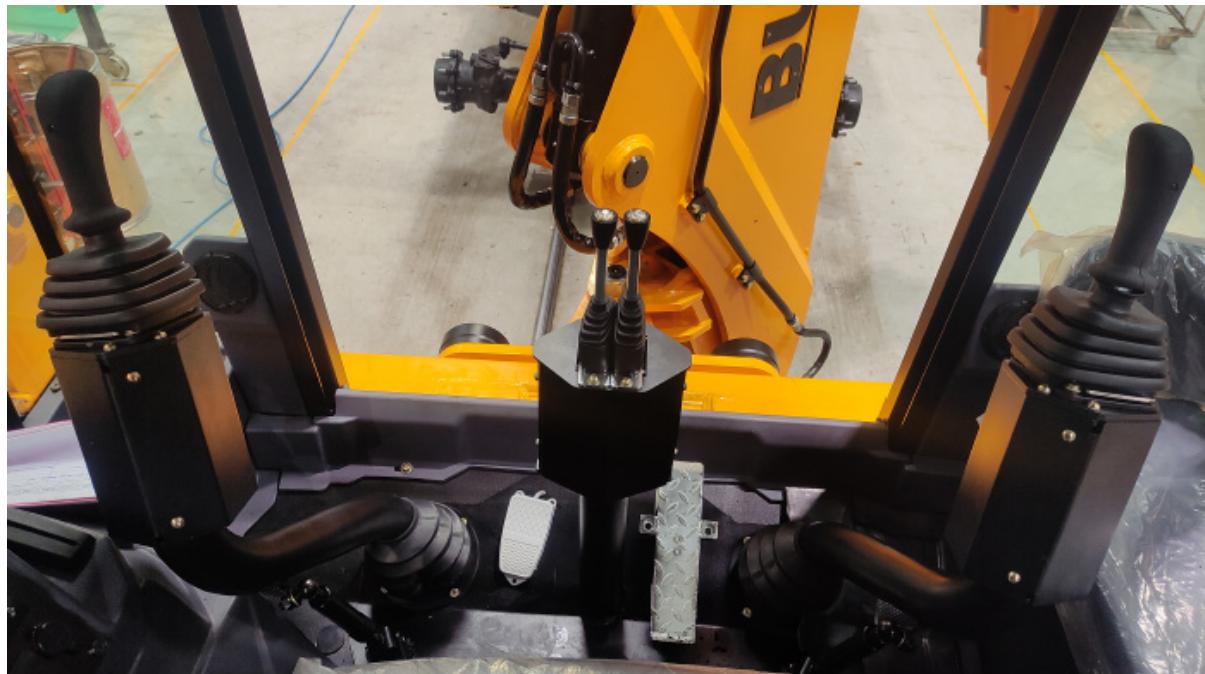


HOW TO ADJUST PLAY IN TELESCOPIC DIPPER BOOM

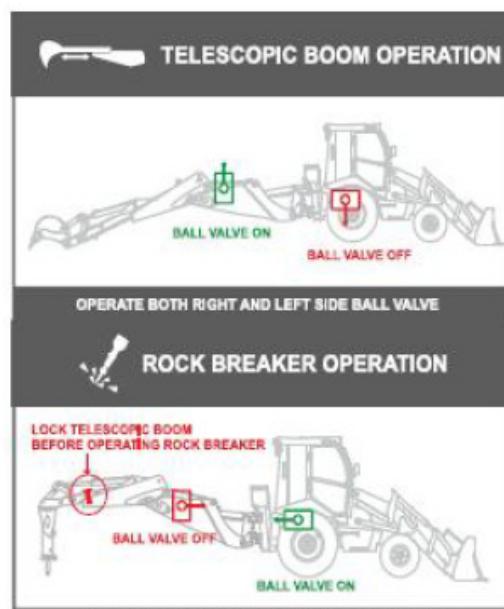
- If play is observed in the telescopic dipper boom, adjust the bolts (as shown in above pictures) by loosen the check nuts.
- After adjusting the play, lock the check nut on both sides.

HOW TO MOVE TELESCOPIC BOOM ON FORWARD & REVERSE DIRECTION

PRESS ON FRONT TO MOVE ON FORWARD DIRECTION



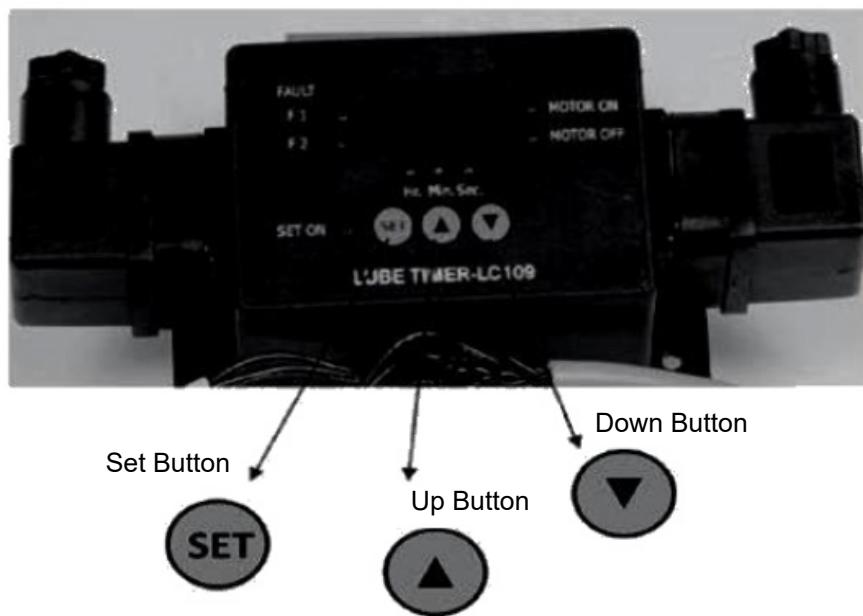
PRESS ON BACK TO MOVE ON BACKWARD DIRECTION

BALL VALVE ON & OFF POSITION FOR TELESCOPIC&ROCK BREAKER OPERATION

HOW TO SET TIMER FOR AUTOMATIC GREASING

This is the frequently asked question by our entire customer. Below are the solution which gives you clear idea about the timer and its set up.

TIMER:



TO SET THE TIMER:

Press the set button and down arrow button same time for 10 seconds

+ = SET MODE.

Once you enter into SET mode you have to press again SET button to operate its functionality.

Now you can see the SET ON light indicates in the Timer. Press down arrow for options

FOUR Options in the SET mode:

Timer ON

Timer OFF

Functional Mode

Exit - come out from set mode.

TIMER ON: HOW TO SET THE MOTOR ON TIME:

It is nothing but we can set the motor running time or called greasing time. In display you can see

1. Press the button and you can see motor on light will glow.
2. Press down arrow for options

There are four major options.

Four options in DisplayHours - Minutes - Seconds - Exit -  - come out from Timer ON

Press  and use up arrow  down arrow  for increase and decrease the time. Then Press 

Use one key  button for operating all operations hours, minutes and seconds.

After setting the Time please press  so that you come out from Timer On.

Repeat it TIMER OFF - MOTOR OFF TIME.

NO time should be in minutes & OFF time should be in hours.

Function Mode :Fn

It is a mode that based on the feedback signal comes from distributor. We are not using that one. it is for testing purpose not for customers.

EXIT :

You can exit from the SET mode. Any you have to wait for 5 min after setting time for saving data into its memory.

We can FORCED ON our motor by pressing  +  same time for 10 seconds.

AC CABIN (OPTION)
PREVENTIVE MAINTENANCE SCHEDULE FOR AIR CONDITIONING SYSTEMS

COMPONENT	MAINTENANCE INTERVAL (months)		
	3	6	12
Cleck noise level	.	.	.
Cleck clutch Pulley	.	.	.
Check oil level	.	.	.
Runsystem 5 minutes	.	.	.
Cleck belts for tension (1201b max)	.	.	.
Inspect shaft seal (leakage)	.	.	.
Check mounting bracket (tighten bolts)	.	.	.
Check alignment to clutch w/crankshaft drive pulley	.	.	.
Perform manifold gauge check	.	.	.
Verify clutch is engaging	.	.	.
Clean dirt/bugs/leaves from coils (w/compressed air)	.	.	.
Check inlet/outlet for obstructions /damage	.	.	.
Check inlet line from condenser (hot to touch)	.	.	.
Check sight glass (breaks or cloudiness)	.	.	.
Replace If system is opened	.	.	.
Inspect capillary tube (leakage/damage/looseness)	.	.	.
Clean dirt/bugs/leaves from fins/tubes (w/compressed air)	.	.	.
Check Solder Joints on inlet/outlet tubes (leakage)	.	.	.
Inspect condensate drain (R 12 or oil leak)	.	.	.
Check discharge lines (hot to touch)	.	.	.
Check suction lines (cold to touch)	.	.	.
Inspect fittings/damps/hoses	.	.	.
Check thermostatic switch (proper operation)	.	.	.
Inspect all wiring connections	.	.	.
Operate manual controls through full functions	.	.	.

General Guidelines for AC

I.AC OPERATING PROCEDURE

1. Start the Engine



Mode Switch Must be in Middle engaged position for OFF



2. Switch ON the AC Switch

3. Set the blower speed to the required level



Mode Switch Must Be In up engaged position For AC Mode



BLOWER KNOB

4. Set the cooling or heating knob to the required level to attain the minimum and maximum level of heating or cooling



Mode Switch Must Be In Down engaged position For HEAT Mode



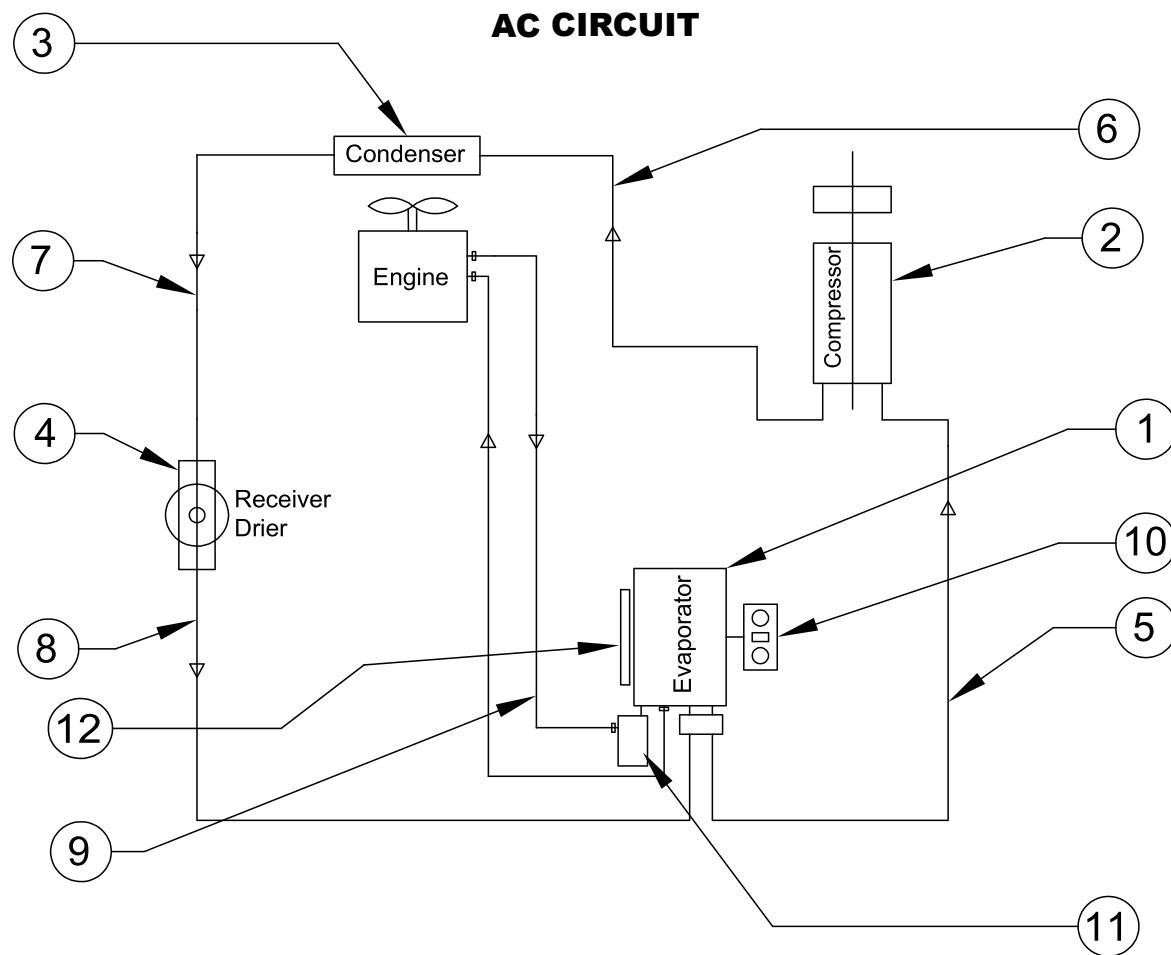
Blue Colour Controls Cooling

Red Colour Controls Heating

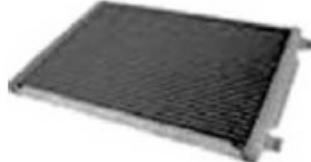
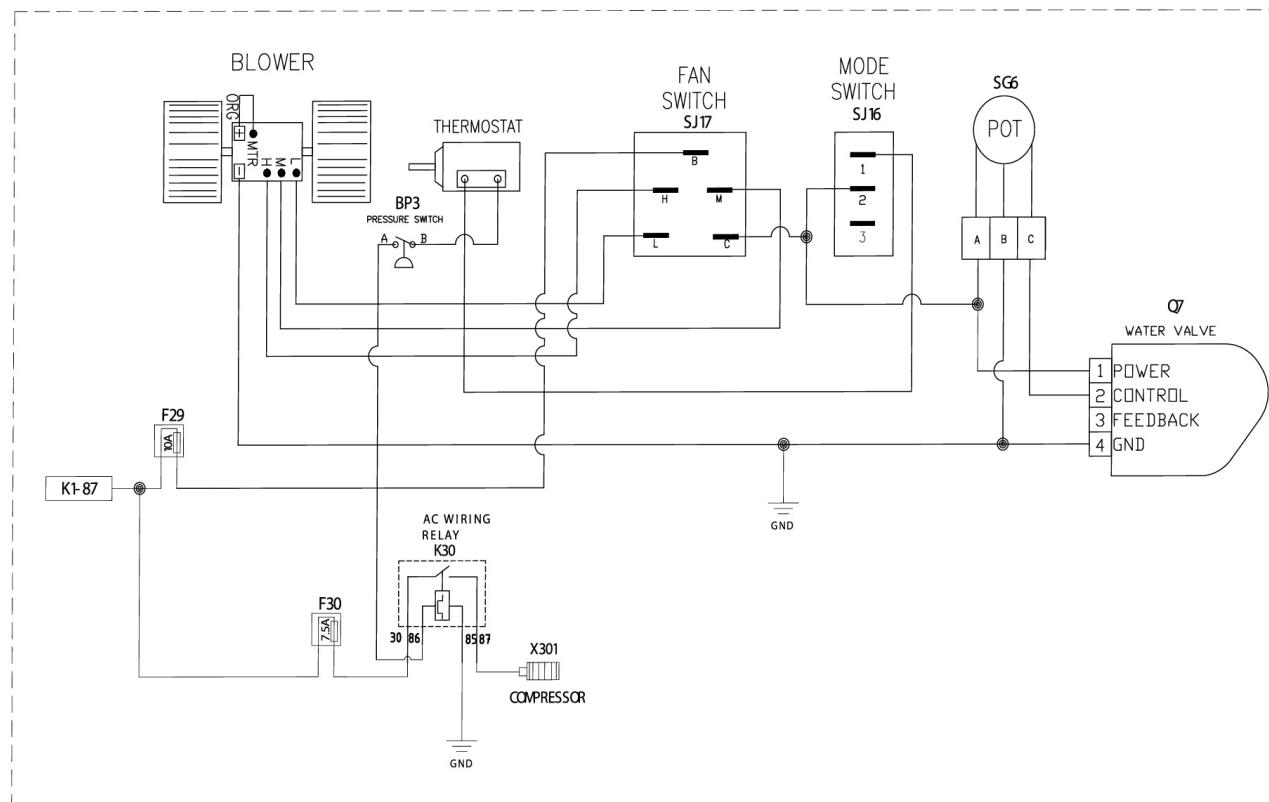
II. If blower is in “ON” condition, it will continue to work even if the engine is switched off, so switch off the blower once the engine is in “OFF” condition, to avoid battery drain.

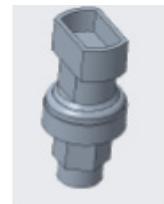
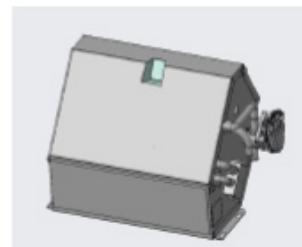
III. If you switched off the blower (by moving the blower to zero), it will automatically switch off both **AC & BLOWER**.

IV. If you switched off the **AC** button, the blower will continue to run.



SL. NO	DESCRIPTION	QUANTITY	
1	EVAPORATOR ASSEMBLY WITHOUT HEATER	AC WITHOUT HEATER	AC WITH HEATER KIT
1	EVAPORATOR ASSEMBLY WITH HEATER	1	0
2	COMPRESSOR	0	1
3	CONDENSER	1	1
4	RECEIVER DRIER	1	1
5	EVAPORATOR TO COMPRESSOR HOSE KIT	1	1
6	COMPRESSOR TO CONDENSER HOSE KIT	1	1
7	CONDENSER TO RECEIVER DRIER HOSE KIT	1	1
8	RECEIVER DRIER TO EVAPORATOR HOSE KIT	1	1
9	HEATER HOSE	0	2
10	ONLY AC CONTROL PANEL	1	0
10	AC WITH HEATER CONTROL PANEL	0	1
11	VALVE - WATER ASSY ELECTRIC	0	1
12	AIR FILTER	1	1


CONDENSER

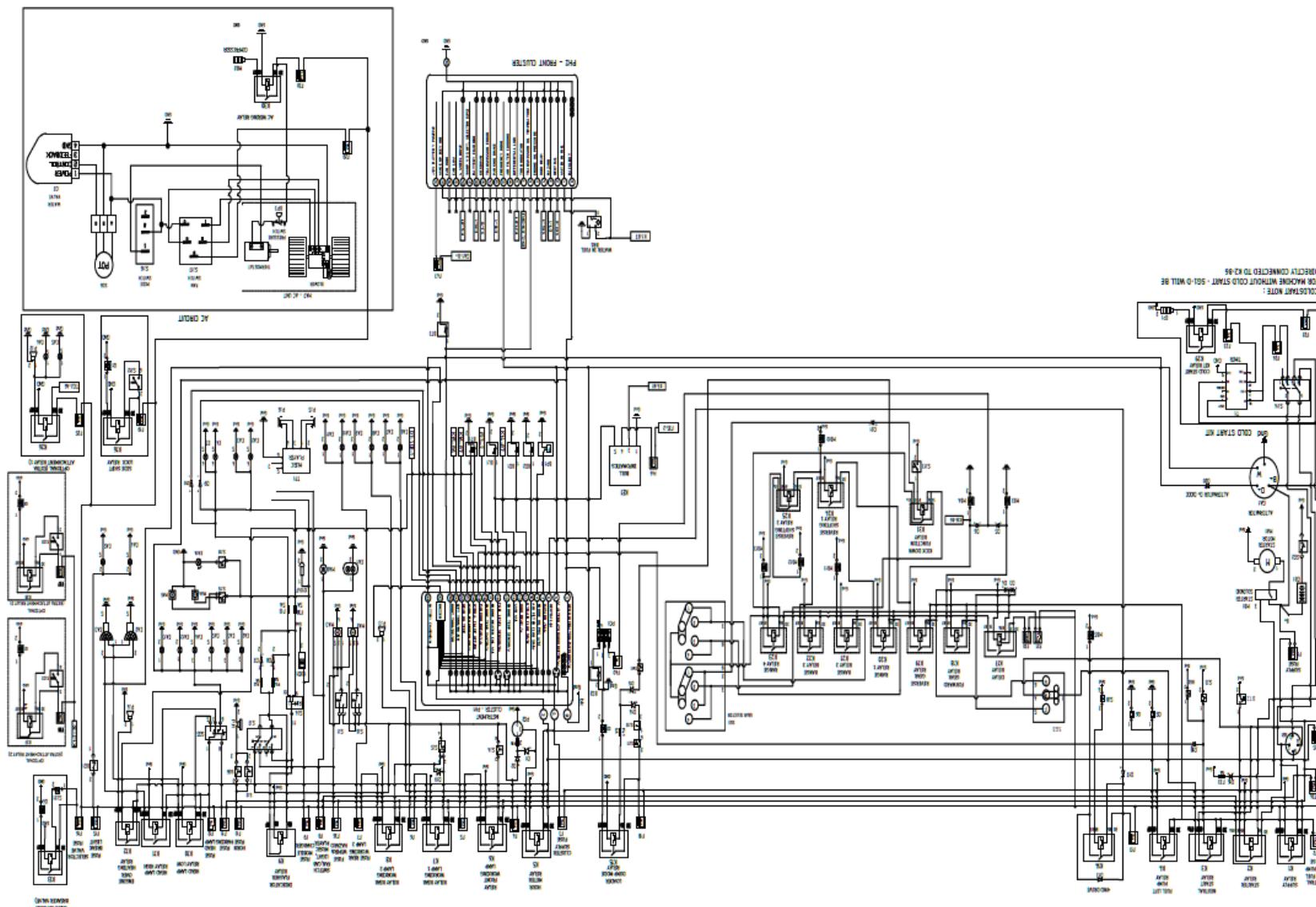
COMPRESSOR

PRESSURE SWITCH

**COMBO UNIT
BLOWER/EVAPORATOR/
HEATER COIL (OPTIONAL)**

RECEIVER DRIER

CONTROL PANEL

RECYCLING GRILL

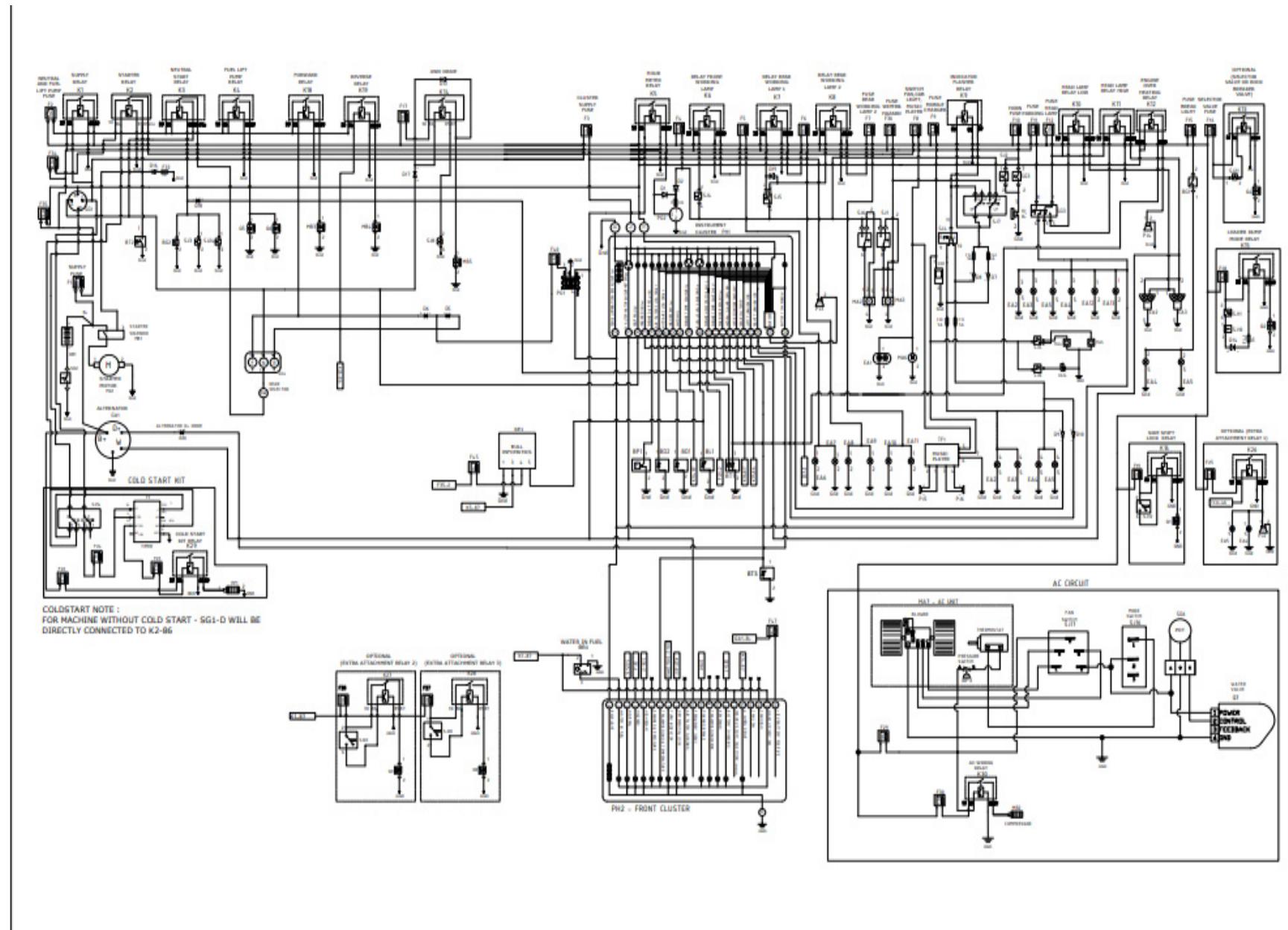
100 HP ELECTRICAL CIRCUIT (ZF TRANS)



100 HP ELECTRICAL CIRCUIT (ZF TRANS)

BD1	HYD. AIR CLOG SENSOR	EA2	PARKING LAMP FRONT LH	F11	PARKING FUSE	F47	CLUSTER FUSE	K26	EXT ATTACHMENT 1 RELAY
BD2	AIR RESTRICTION INDICATOR	EA3	PARKING LAMP FRONT RH	F12	HEAD LAMP FUSE	GA1	ALTERNATOR BATTERY	K27	EXT ATTACHMENT 2 RELAY
BL1	FUEL FLOAT SENSOR	EA4	PARKING LAMP FRONT RH	F13	LEFT INDICATOR FUSE	GB1	SUPPLY RELAY	K28	EXT ATTACHMENT 3 RELAY
BP1	ENGINE OIL PRESSURE SENSOR	EA5	TAIL LAMP RH	F14	HAZARD FUSE	K1	STARTER RELAY	K29	COLD START RELAY
BP3	AC UNIT PRESSURE SWITCH	EA4	BRAKE LAMP LH	F16	BRAKE LIGHT FUSE	K2	NEUTRAL START RELAY	K30	AC WIRING RELAY
BR1	WATER IN FUEL SWITCH	RA5	BRAKE LAMP RH	F17	SELECTOR VALVE FUSE	K3	FUEL LIFT PUMP RELAY	K31	AC WIRING RELAY
BS2	WATER IN FUEL SWITCH	EA4	INDICATOR REAR LH	F18	4WD DRIVE FUSE	K4	HOURMETER RELAY	KE1	XBULL INFOMATICS
BT1	ENGINE TEMP SWITCH	EA4	TAIL LAMP LH	F19	LOADER DUMP MODE FUSE	K5	RELAY FRONT WORKING LAMP	MA1	STARTER MOTOR
BT2	COLD START ADVANCE TEMP	EA5	TAIL LAMP RH	F20	SIDE SHIFT LOCK FUSE	K6	RELAY REAR WORKING LAMP 1	MA2	WINDSHIELD WIPER MOTOR
BT3	GEAR OIL TEMP SENSOR	EA6	FRONT WORKING LAMP RH	F21	DELAY RELAY FUSE	K7	RELAY REAR WORKING LAMP 2	MA3	WINDSHIELD WIPER MOTOR
BG1	BRAKE SWITCH	EA7	FRONT WORKING LAMP LH	F22	TRANSMISSION FUSE	K8	INDICATOR FLASHER	MA4	XWINDSHIELD WASHER MOTOR
BG2	HAND BRAKE SWITCH	EA8	REAR WORKING LAMP RH1	F23	HEATER FUSE	K9	HEAD LAMP RELAY LOW	MA5	REAR WASHER MOTOR
D1,D2	HOURMETER DIODE	EA9	REAR WORKING LAMP LH1	F24	HEATER COIL FUSE	K10	HEAD LAMP RELAY HIGH	MA6	CABIN FAN
D3,D4	DELAY RELAY DIODE	EA10	REAR WORKING LAMP RH2	F25	TIMER FUSE	K11	ENGINE OVER HEATING WARNING RELAY	MA7	BLOWER STARTER SOLENOID
D5,D6	SPEEDOMETER DIODE	EA11	REAR WORKING LAMP LH2	F26	EXT ATTACHMENT FUSE 1	K12	SELECTOR VALVE RELAY OR ROCK	MB2	COMPRESSOR
D7,D8	HAZARD DIODE	EA12	NUMBER PLATE LAMP 1	F27	EXT ATTACHMENT FUSE 2	K13	BREAKER RELAY	MB10	FORWARD SOLENOID VALVE
D9,D10	INDICATOR DIODE	EA13	NUMBER PLATE LAMP 2	F28	DIFFERENTIAL LOCK FUSE	K14	4WD DRIVE RELAY	MB11	REVERSE SOLENOID VALVE
D13,D17	4WD DRIVE DIODE	EA14	BEACON LIGHT	F29	AC ROTARY SW FUSE	K15	LOADER DUMP MODE RELAY	MB12	4WD DRIVE SOLENOID
D14,D15	LOADER DUMP MODE DIODE	EP1	HEATER COIL	F30	AC COMPRESSOR FUSE	K16	SIDE SHIFT LOCK RELAY	MB13	RANGE GEAR 1 SOLENOID
D16	STARTER SOLENOID SAFETY DIODE	F1	SUPPLY FUSE	F33	STARTER SOLENOID SAFETY FUSE	K17	DELAY RELAY	PH1	RANGE GEAR 2 SOLENOID
D18	STARTER SOLENOID SAFETY DIODE	F2	FWD, REV, NEU, FUEL LIFT	F34	STARTER SOLENOID FUSE	K18	FORWARD GEAR RELAY	PH2	RANGE GEAR 3 SOLENOID
D19	REAR WORKING LAMP 1 DIODE	F3	FWD, REV, NEU, FUEL LIFT	F35	IGNITION KEY, HOURMETER, ENGINE OVER HEATING FUSE	K19	REVERSE GEAR RELAY	PH2	RANGE GEAR 4 SOLENOID
D20	ALTERNATOR DIODE	F4	SWITCH FUSE	F36	WIPER, HAZARD FUSE	K20	RANGE RELAY 1	PH1	INSTRUMENT CLUSTER
D21	KICK DOWN FUNCTION DIODE	F5	FRONT WORKING LAMP FUSE	F37	RIGHT INDICATOR FUSE	K22	RANGE RELAY 2	PH2	FRONT CLUSTER
EA1	CABIN LAMP	F6	REAR WORKING LAMP 1 FUSE	F38	HOURMETER FUSE	K23	RANGE RELAY 3	PJ1	HORN
EA2	HEAD LAMP LH	F7	REAR WORKING LAMP 2 FUSE	F39	SPEEDOMETER FUSE	K24	RANGE RELAY 4	PJ2	REVERSE BUZZER
EA3	HEAD LAMP RH	F8	FAN, CAB LIGHT, DVD PLAYER FUSE	F40	HAZARD FUSE	K24	REVERSE SHIFTING RELAY 1	PJ3	WARNING BUZZER
EA2	INDICATOR LAMP FRONT LH	F9	MOBILE CHARGER FUSE	F45	BULL INFOMATIC FUSE	K25	REVERSE SHIFTING RELAY 1	PJ4	ENGINE OVER HEATING BUZZER
EA3	INDICATOR LAMP FRONT RH	F10	HORN FUSE	PJ5	SPEAKER LH	Q3	EXT ATTACHMENT SOLENOID 1	SG1	KEY SWITCH
SJ14	COLD START SWITCH	SJ20	DIFFERENTIAL LOCK SWITCH	PJ6	SPEAKER RH	Q4	SELECTOR VALVE SOLENOID	SG2	BATTERY CUTOFF SWITCH
SJ15	WIPER WASHERSWITCH	SJ21	SELECTOR VALVE SWITCH	PG1	SPEEDOMETER	Q5	FUEL LIFT PUMP SOLENOID	SG5	GEAR SELECTOR
SJ16	AC MODE SWITCH	SJ22	EXT ATTACHMENT SWITCH 1	PG2	HOUR METER	Q6	ELECTRIC SHUTOFF SOLENOID	SG6	COMBINATION SWITCH RH
SJ17	AC FAN SWITCH	SW1	PCB LOADER DUMP MODE SWITCH	Q1	SIDE SHIFT LOCK SOLENOID	Q7	WATER VALVE	SJ1	POT
SJ18	BEACON LIGHT SWITCH	T1	COLD START KIT TIMER	Q2	LOADER DUMP MODE SOLENOID	Q8	DIFFERENTIAL LOCK SOLENOID	SJ2	REAR WIPER MOTOR SWITCH
SJ4	LOADER JOYSTICK SWITCH	SJ11	ECO MODE BYPASS SWITCH FOR BACKHOE	TF1	MUSIC PLAYER	SJ7	REAR WORKING LAMP SWITCH	SJ3	HORN SWITCH FOR BACKHOE
SJ5	HAZARD SWITCH	SJ12	LOADER DUMP MODE SWITCH	X104F	AUTO GREASING	SJ8	WINDSHIELD WIPER MOTOR SWITCH		
SJ6	FRONT WORKING LAMP SWITCH	SJ13	SIDE SHIFT LOCK SWITCH	XD1	MOBILE CHARGER	SJ10	4WD DRIVE SWITCH		

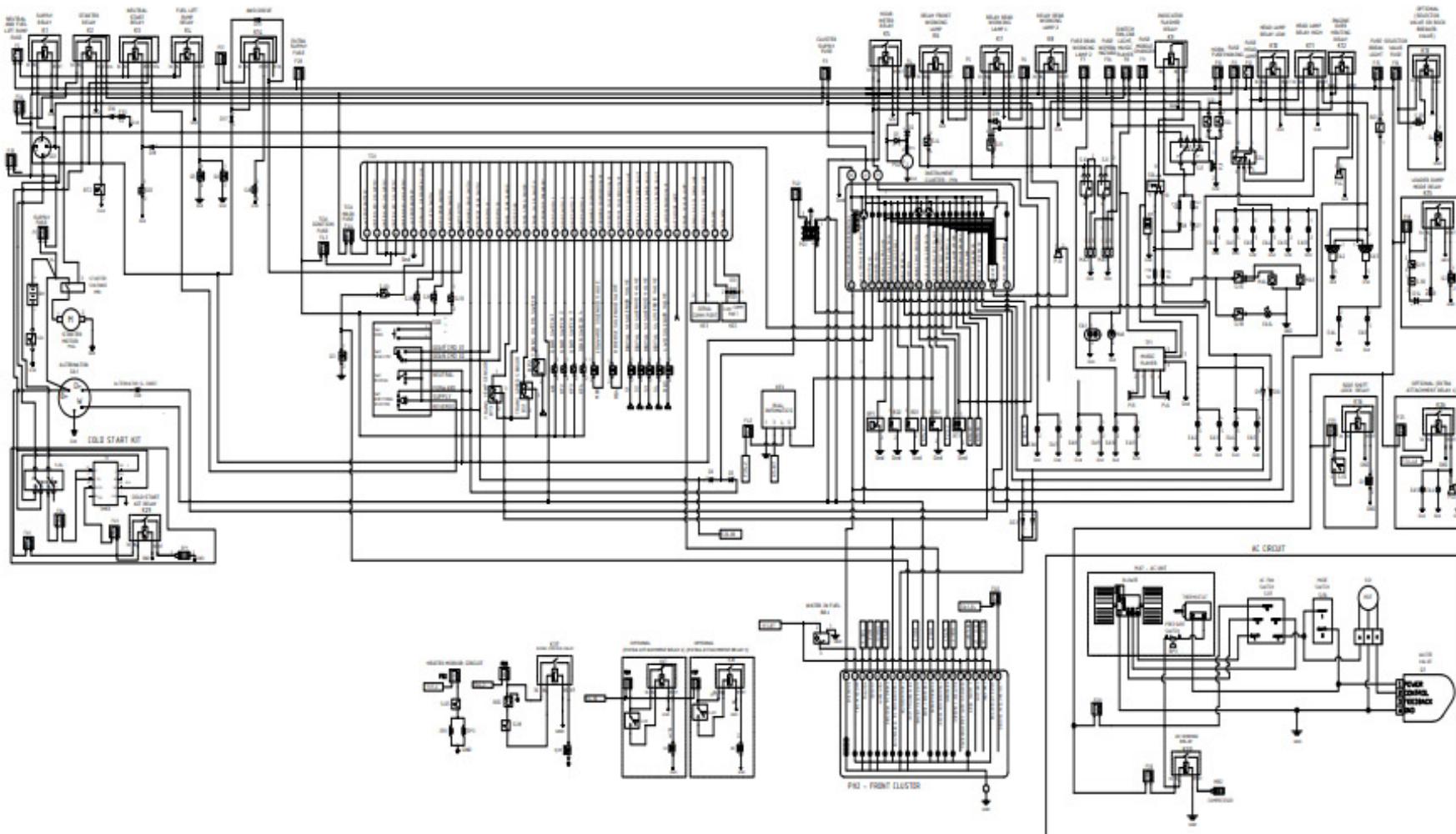
100 HP ELECTRICAL CIRCUIT (CARRARO TRANS)



ELECTRIC-CIRCUIT(CARRARO TRANSMISSION)

BD1	HYD. AIR CLOG SENSOR	EA4	BRAKE LAMP LH	F12	HEAD LAMP FUSE	K1	SUPPLY RELAY	MA5	REAR WASHER MOTOR	SG4	COMBINATION SWITCH LH
BD2	AIR RESTRICTION INDICATOR	EA5	BRAKE LAMP RH	F13	LEFT INDICATOR FUSE	K2	STARTER RELAY	MA6	CABIN FAN	BG2	PARKING BRAKE SWITCH
BL1	FUEL FLOAT SENSOR	EA4	INDICATOR REAR LH	F14	HAZARD FUSE	K3	NEUTRAL START RELAY	MA7	BLOWER	SG6	POT
BP1	ENGINE OIL PRESSURE SENSOR	EA5	INDICATOR REAR RH	F15	BRAKE LIGHT FUSE	K4	FUEL LIFT PUMP RELAY	MB1	STARTER SOLENOID	SJ1	REAR WIPER MOTOR SWITCH
BP3	AC UNIT PRESSURE SWITCH	EA4	REVERSE LAMP LH	F16	SELECTOR VALVE FUSE	K5	HOURMETER RELAY	MB2	COMPRESSOR	SJ2	HORN SWITCH FOR BACKHOE
BR1	WATER IN FUEL SWITCH	EA5	REVERSE LAMP RH	F17	4WD DRIVE FUSE	JK6	RELAY FRONT WORKING LAMP	MB3	FORWARD SOLENOID VALVE	SJ3	JOYSTICK NEUTRAL SWITCH
BT1	ENGINE TEMP SWITCH	EA4	PARKING LAMP REAR LH	F18	LOADER DUMP MODE FUSE	K7	RELAY REAR WORKING LAMP 1	MB4	REVERSE SOLENOID VALVE	SJ4	FRONT WORKING LAMP SWITCH
BT2	COLD START ADVANCE TEMP	EA5	PARKING LAMP REAR RH	F19	SIDE SHIFT LOCK FUSE	K8	RELAY REAR WORKING LAMP 2	MB5	4WD DRIVE SOLENOID	SJ5	REAR WORKING LAMP SWITCH
BT3	GEAR OIL TEMP SENSOR	EA6	FRONT WORKING LAMP RH	F22	HEATER FUSE	K9	INDICATOR FLASHER	PH1	INSTRUMENT CLUSTER	SJ6	WIPER MOTOR SWITCH
BG1	BRAKE SWITCH	EA7	FRONT WORKING LAMP LH	F23	HEATER COIL FUSE	K10	HEAD LAMP RELAY LOW	PH2	FRONT CLUSTER	SJ7	HAZARD SWITCH
D1,D2	HOURMETER DIODE	EA8	REAR WORKING LAMP RH1	F24	TIMER FUSE	K11	HEAD LAMP RELAY HIGH	PJ1	HORN	SJ8	4WD DRIVE SWITCH
D5,D6	SPEEDOMETER DIODE	EA9	REAR WORKING LAMP LH1	F25	EXT ATTACHMENT FUSE 1	K12	ENGINE OVER HEATING WARNING RELAY	PJ2	REVERSE BUZZER	SJ10	ECO MODE BYPASS SWITCH FOR BACKHOE
D7,D8	HAZARD DIODE	EA10	REAR WORKING LAMP RH2	F26	DIFFERENTIAL LOCK FUSE	K13	SELECTOR VALVE RELAY OR ROCK	PJ3	WARNING BUZZER	SJ11	LOADER DUMP MODE SWITCH
D9,D10	INDICATOR DIODE	EA11	REAR WORKING LAMP LH2	F27	EXT ATTACHMENT FUSE 3		BREAKER RELAY	PJ4	ENGINE OVER HEATING BUZZER	SJ12	SIDE SHIFT LOCK SWITCH
D13,D17	4WD DRIVE DIODE	EA12	NUMBER PLATE LAMP 1	F28	SUPPLY FUSE	K14	4WD DRIVE RELAY	PJ5	SPEAKER LH	SJ14	COLD START SWITCH
D14	LOADER DUMP MODE DIODE	EA13	NUMBER PLATE LAMP 2	F29	AC ROTARY SW FUSE	K15	LOADER DUMP MODE RELAY	PJ6	SPEAKER RH	SJ15	WIPER WASHER SWITCH
D16	STARTER SOLENOID SAFETY DIODE	EA14	BEACON LIGHT	F30	AC COMPRESSOR FUSE	K16	SIDE SHIFT LOCK RELAY	PG1	SPEEDOMETER	SJ16	AC MODE SWITCH
D18	PARKING BRAKE INPUT DIODE	EP1	HEATER COIL	F33	STARTER SOLENOID SAFETY FUSE	K18	FORWARD RELAY	PG2	HOUR METER	SJ17	AC FAN SWITCH
D19	REAR WORKING LAMP 1 DIODE	F1	SUPPLY FUSE	F34	STARTER SOLENOID FUSE	K19	REVERSE RELAY	Q1	SIDE SHIFT LOCK SOLENOID	SJ18	BEACON LIGHT SWITCH
D20	ALTERNATOR DIODE	F2	FWD, REV, NEU, FUEL LIFT	F35	IGNITION KEY, HOURMETER, ENGINE	K26	EXT ATTACHMENT 1 RELAY	Q2	LOADER DUMP MODE SOLENOID	SJ20	DIFFERENTIAL LOCK SWITCH
EA1	CABIN LAMP	F3	CLUSTER SUPPLY FUSE		OVER HEATING FUSE	K27	EXT ATTACHMENT 2 RELAY	Q3	EXT ATTACHMENT SOLENOID	SJ21	SELECTOR VALVE SWITCH
EA2	HEAD LAMP LH	F4	SWITCH FUSE	F36	WIPER, HAZARD FUSE	K28	EXT ATTACHMENT 3 RELAY	Q4	1 SELECTOR VALVE SOLENOID	SJ22	EXT ATTACHMENT SWITCH 1
EA3	HEAD LAMP RH	F5	FRONT WORKING LAMP FUSE	F38	RIGHT INDICATOR FUSE	K29	COLD START RELAY	Q5	FUEL LIFT PUMP SOLENOID	SJ23	EXT ATTACHMENT SWITCH 2
EA2	INDICATOR LAMP FRONT LH	F6	REAR WORKING LAMP 1 FUSE	F39	HOURMETER FUSE	K30	AC WIRING RELAY	Q6	ELECTRIC SHUTOFF SOLENOID	T1	COLD START KIT TIMER
EA3	INDICATOR LAMP FRONT RH	F7	REAR WORKING LAMP 2 FUSE	F40	SPEEDOMETER FUSE	KE1	BULL INFOMATICS	Q7	WATER VALVE	TF1	MUSIC PLAYER
EA2	PARKING LAMP FRONT LH	F8	FAN, CAB LIGHT, DVD PLAYER FUSE	F42	HAZARD FUSE	MA1	STARTER MOTOR	Q8	DIFFERENTIAL LOCK SOLENOID	XD1	MOBILE CHARGER
EA3	PARKING LAMP FRONT RH	F9	MOBILE CHARGER FUSE	F45	BULL INFOMATIC FUSE	MA2	WINDSHIELD WIPER MOTOR	SG1	KEY SWITCH		
EA4	TAIL LAMP LH	F10	HORN FUSE	GA1	ALTERNATOR	MA3	REAR WIPER MOTOR	SG2	BATTERY CUTOFF SWITCH		
EA5	TAIL LAMP RH	F10	PARKING FUSE	GB1	BATTERY	MA4	WINDSHIELD WASHER MOTOR	SG3	COMBINATION SWITCH RH		

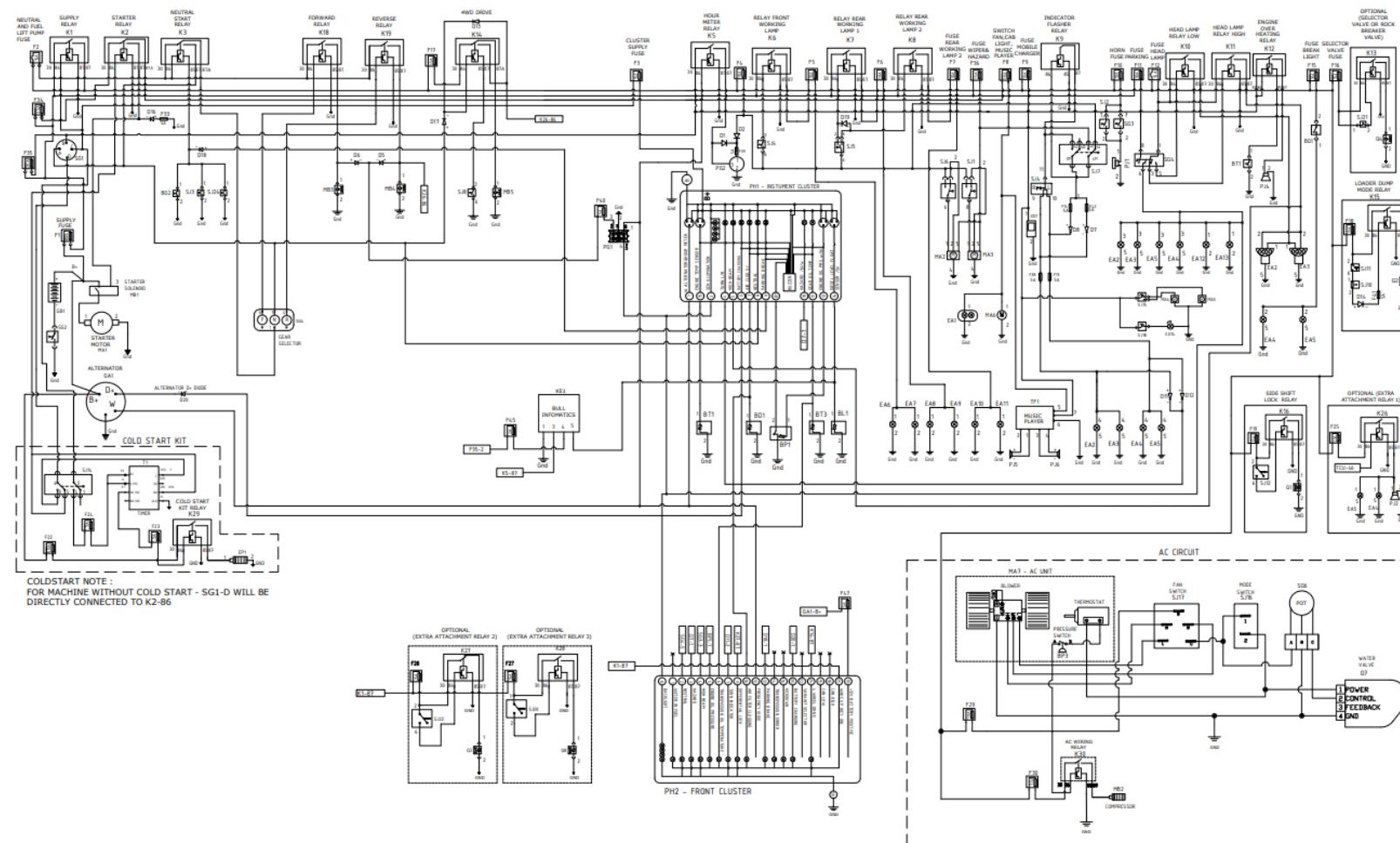
100HP ELECTRICAL CIRCUIT(CARRARO-SPS TRANS)



100HP ELECTRICAL CIRCUIT(CARRARO-SPS TRANS)

BD1	HYD. AIR CLOG SENSOR	EA4	TAIL LAMP LH	F10	HORN FUSE	F44	TCU IGNITION FUSE	KF1	GEAR SWITCH1	Q4	SELECTOR VALVE SOLENOID
BD2	AIR RESTRICTION INDICATOR	EA5	TAIL LAMP RH	F11	PARKING FUSE	F45	BULL INFOMATIC FUSE	KF2	GEAR SWITCH 2	Q5	FUEL LIFT PUMP SOLENOID
BL1	FUEL FLOAT SENSOR	EA4	BRAKE LAMP LH	F12	HEAD LAMP FUSE	GA1	ALTERNATOR	KF3	GEAR SWITCH 3	Q6	ELECTRIC SHUTOFF SOLENOID
BP1	ENGINE OIL PRESSURE SENSOR	EA5	BRAKE LAMP RH	F13	LEFT INDICATOR FUSE	GB1	BATTERY	KF4	GEAR SWITCH 4	Q7	WATER VALVE
BP2	TRANS. OIL PRESSURE SWITCH	EA4	INDICATOR REAR LH	F14	HAZARD FUSE	K1	SUPPLY RELAY	MA1	STARTER MOTOR	Q8	EXT ATTCHMENT SOLENOID 3
BP3	WATER IN FUEL SWITCH	EA5	INDICATOR REAR RH	F15	BRAKE LIGHT FUSE	K2	STARTER RELAY	MA2	WINDSHIELD WIPER MOTOR	RA1	RESISTANCE 120 OHMS
BR1	WATER IN FUEL SWITCH	EA4	REVERSE LAMP LH	F16	SELECTOR VALVE FUSE	K3	NEUTRAL START RELAY	MA3	REAR WIPER MOTOR	S1	DIGITAL S1 SOLENOID
BS1	TRANS. SPEED SENSOR	EA5	REVERSE LAMP RH	F17	4WD DRIVE FUSE	K4	FUEL LIFT PUMP RELAY	MA4	WINDSHIELD WASHER MOTOR	S2	DIGITAL \$2 SOLENOID
BT1	ENGINE TEMPERATURE SENSOR	EA4	PARKING LAMP REAR LH	F18	LOADER DUMP MODE FUSE	K5	HOURMETER RELAY	MA5	REAR WASHER MOTOR	S3	DIGITAL \$3 SOLENOID
BT2	COLD START ADVANCE TEMP	EA5	PARKING LAMP REAR RH	F19	SIDE SHIFT LOCK FUSE	K6	RELAY FRONT WORKING LAMP	MA6	CABIN FAN	S4	DIGITAL S4 SOLENOID
BT3	TRANSMISSION TEMP SENSOR	EA6	FRONT WORKING LAMP RH	F22	HEATER FUSE	K7	RELAY REAR WORKING LAMP 1	MA7	BLOWER	SG1	KEY SWITCH
BG1	BRAKE SWITCH	EA6	FRONT WORKING LAMP LH	F23	HEATER COIL FUSE	K8	RELAY REAR WORKING LAMP 2	MB1	STARTER SOLENOID	SG2	BATTERY CUTOFF SWITCH
	HOURMETER DIODE	EA8	REAR WORKING LAMP RH1	F24	TIMER FUSE	K9	INDICATOR FLASHER	MB2	COMPRESSOR	SG3	GEAR SELECTOR
	SPEEDOMETER DIODE	EA9	REAR WORKING LAMP LH1	F25	EXT ATTACHMENT FUSE 1	K10	HEAD LAMP RELAY LOW	MB3	FORWARD SOLENOID VALVE	SG4	COMBINATION SWITCH RH
	HAZARD DIODE	EA10	REAR WORKING LAMP RH2	F26	DIFFERENTIAL LOCK FUSE	K11	HEAD LAMP RELAYHIGH	MB4	REVERSE SOLENOID VALVE	SG5	PARKING BRAKE SWITCH
D9,D10	INDICATOR DIODE	EA11	REAR WORKING LAMP LH2	F27	EXT ATTACHMENT FUSE 3	K12	ENGINE OVER HEATING WARNING RELAY	MB5	4WD SOLENOID	SG6	POT
D13,D17	4WD DRIVE DIODE	EA12	NUMBER PLATE LAMP 1	F28	SUPPLY FUSE	K13	SELECTOR VALVE RELAYOR ROCK BREAKER RELAY	PH1	INSTUMENT CLUSTER	SJ1	REAR WIPER MOTOR SWITCH
D14	LOADER DUMP MODE DIODE	EA13	NUMBER PLATE LAMP 2	F29	AC ROTARY SW FUSE			PH2	FRONT CLUSTER	SJ2	HORN SWITCH FOR BACKHOE
D16	STARTER SOLENOID SAFETY DIODE	EA13	BEACON LIGHT	F30	AC COMPRESSOR FUSE	K14	4WD DRIVE RELAY	PJ1	HORN	SJ4	FRONT WORKING LAMP SWITCH
D18	PARKING BRAKE INPUT DIODE	EP1	HEATER COIL	F33	STARTER SOLENOID SAFETY FUSE	K15	LOADER DUMP MODE RELAY	PJ2	REVERSE BUZZER	SJ5	REAR WORKING LAMP SWITCH
D19	REAR WORKING LAMP 1 DIODE	F1	SUPPLY FUSE	F34	STARTER SOLENOID FUSE	K16	SIDE SHIFT LOCK RELAY	PJ3	WARNING BUZZER	SJ6	WINDSHIELD WIPER MOTOR SWITCH
D20	ALTERNATOR DIODE	F2	FWD, REV, NEU, FUEL LIFT	F35	IGNITION KEY, HOURMETER, ENGINE OVER HEATING FUSE	K26	EXT ATTACHMENT 1 RELAY	PJ4	ENGINE OVER HEATING BUZZER	SJ7	HAZARD SWITCH
EA1	CABIN LAMP	F3	CLUSTER SUPPLY FUSE			K27	EXT ATTACHMENT 2 RELAY	PJ5	SPEAKER IH	SJ8	4WD DRIVE SWITCH
EA2	HEAD LAMP LH	F4	SWITCH FUSE	F36	WIPER, HAZARD FUSE	K28	EXT ATTACHMENT 3 RELAY	PJ6	SPEAKER RH	SJ9	AUTO MODE SWITCH
EA3	HEAD LAMP RH	F5	FRONT WORKING LAMP FUSE	F38	RIGHT INDICATOR FUSE	K29	COLD START RELAY	PG1	SPEEDOMETER	SJ10	ECO MODE BYPASS SWITCH FOR BACKHOE
EA2	INDICATOR LAMP FRONT LH	F6	REAR WORKING LAMP 1 FUSE	F39	HOURMETER FUSE	K30	AC WIRING RELAY	PG2	HOUR METER	SJ11	LOADER DUMP MODE SWITCH
EA3	INDICATOR LAMP FRONT RH	F7	REAR WORKING LAMP 1 FUSE	F40	SPEEDOMETER FUSE	KE1	BULL INFOMATICS	Q1	SIDE SHIFT LOCK SOLENOID	SJ12	SIDE SHIFT LOCK SWITCH
EA2	PARKING LAMP FRONT LH	F8	FAN, CAB LIGHT, DVD PLAYER FUSE	F42	HAZARD FUSE	KE2	CAN COMMUNICATION PORT	Q2	LOADER DUMP MODE SOLENOID	SJ13	KICKDOWN JOYSTICK SWITCH
EA3	MOBILE CHARGER FUSE	F9	MOBILE CHARGER FUSE	F43	TCU MAIN FUSE	KE3	SERIAL COMMUNICATION PORT	Q3	DIFFERENTIAL LOCK SOLENOID	SJ14	COLD START SWITC
SJ15	WIPER WASHER SWITCH	SJ22	EXTATTACHMENTSWITCH1	F52	HEATEDMIRRORFUS	BG5	PROXIMITYSWITCH				
SJ16	AC MODE SWITCH	SJ23	EXTATTACHMENTSWITCH2	F55	RIDERCONTROLFUSE	Q13	DCVALVE				
SJ17	AC FAN SWITCH	T1	COLDSTARTKITTIMER	SJ25	HEATEDMIRRORSWITCH	K37	RIDERCONTROLRELAY				
SJ18	BEACON LIGHT SWITCH	TF1	MUSICPLAYER	SJ28	RIDERCONTROLSWITCH	D23	INDICATORDIOD				
SJ19	DECLUTCH SWITCH	TCU	TRANSMISSIONCONTROLUNIT	EP2	HEATEDMIRRORLH						
SJ20	DIFFERENTIAL LOCK SWITCH	XD1	MOBILECHARGER	EP3	HEATEDMIRRORRH						

HD 76HP & 96HP ELECTRICAL CIRCUIT



HD 76HP & 96HP ELECTRICAL CIRCUIT

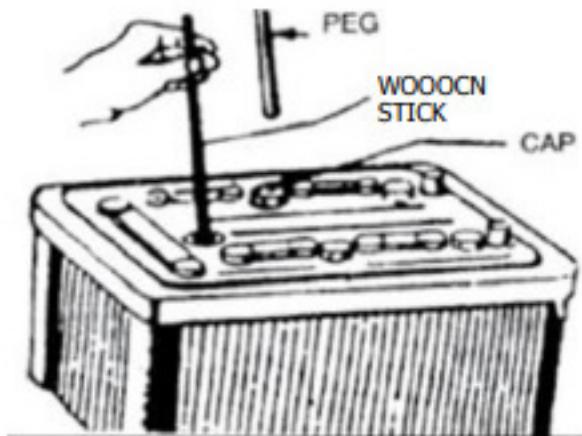
BD1	AIR CLOG SENSOR	EA4	BRAKE LAMP LH	F13	HEAD LAMP FUSE	K2	STARTER RELAY	MA7	BLOWER	SJ4	FRONT WORKING LAMP SWITCH
BL1	FUEL FLOAT SENSOR	EA5	BRAKE LAMP RH	F14	LEFT INDICATOR FUSE	K3	NEUTRAL START RELAY	MB1	STARTER SOLENOID	SJ5	REAR WORKING LAMP SWITCH
BP1	ENGINE OIL PRESSURE SENSOR	EA4	INDICATOR REAR RH	F15	HAZARD FUSE	K5	HOURMETER RELAY	MB2	COMPRESSOR	SJ6	WIPER MOTOR SWITCH
BP3	AC UNIT PRESSURE SWITCH	EA4	INDICATOR REAR LH	F16	BRAKE LIGHT FUSE	K6	RELAY FRONT WORKING LAMP	MB3	FORWARD SOLENOID VALVE	SJ7	HAZARD SWITCH
		EA4	REVERSE LAMP RH	F17	SELECTOR VALVE FUSE	K7	RELAY REAR WORKING LAMP 1	MB4	REVERSE SOLENOID VALVE	SJ8	4WD DRIVE SWITCH
BT1	ENGINE TEMP SWITCH	EA5	PARKING LAMP REAR LH	F18	4WD DRIVE FUSE	K8	RELAY REAR WORKING LAMP 2	MB5	4WD DRIVE SOLENOID	SJ10	ECO MODE BYPASS SWITCH FOR BACKHOE
BT3	GEAR OIL TEMP SENSOR	EA5	PARKING LAMP REAR RH	F19	LOADER DUMP MODE FUSE	K9	INDICATOR FLASHER	PH1	INSTUMENT CLUSTER	SJ11	LOADER DUMP MODE SWITCH
BG1	BRAKE SWITCH	EA6	FRONT WORKING LAMP RH	F22	SIDE SHIFT LOCK FUSE	K10	HEAD LAMP RELAY LOW	PH2	FRONT CLUSTER	SJ12	SIDE SHIFT LOCK SWITCH
BG2	HAND BRAKE SWITCH	EA7	FRONT WORKING LAMP LH	F23	HEATER FUSE	K11	HEAD LAMP RELAY HIGH	PJ1	HORN	SJ14	COLD START SWITCH
D1,D2	HOURMETER DIODE		REAR WORKING LAMP RH1	F24	HEATER COIL FUSE	K12	ENGINE OVER HEATING WARNING RELAY	PJ2	REVERSE BUZZER	SJ15	WIPER WASHER SWITCH
D5,D6	SPEEDOMETER DIODE		REAR WORKING LAMP RH1	F25	TIMER FUSE	K13	SELECTOR VALVE RELAY OR ROCK BREAKER RELAY	PJ4	ENGINE OVER HEATING BUZZER	SJ16	AC MODE SWITCH
D5,D6	HAZARD DIODE		REAR WORKING LAMP RH2	F26	EXT ATTACHMENT FUSE 1		4WD DRIVE RELAY	PJ5	SPEAKER LH	SJ17	AC FAN SWITCH
D9,D10	INDICATOR DIODE		REAR WORKING LAMP LH2	F27	DIFFERENTIAL LOCK FUSE	K14	LOADER DUMP MODE RELAY SIDE SHIFT LOCK RELAY	PJ6	SPEAKER RH	SJ18	BEACON LIGHT SWITCH
D13,D17	INDICATOR DIODE	EA12	NUMBER PLATE LAMP 1	F29	EXT ATTACHMENT FUSE 3	K15 K16	FORWARD RELAY	PG1	SPEEDOMETER	SJ20	DIFFERENTIAL LOCK SWITCH
D14	LOADER DUMP MODE DIODE	EA13	NUMBER PLATE LAMP 2	F30	SUPPLY FUSE		REVERSE RELAY	PG2	HOUR METER	SJ21	SELECTOR VALVE SWITCH
D16	LOADER DUMP MODE DIODE	EA14	BEACON LIGHT	F33	AC ROTARY SW FUSE	K18	EXT ATTACHMENT 1 RELAY	Q1	SIDE SHIFT LOCK SOLENOID	SJ22	EXT ATTACHMENT SWITCH 1
D18	PARKING BRAKE INPUT DIODE	EP1	HEATER COIL	F34	AC COMPRESSOR FUSE	K19	EXT ATTACHMENT 2 RELAY	Q2	LOADER DUMP MODE SOLENOID	T1	COLD START KIT TIMER
D19	REAR WORKING LAMP 1 DIODE	F1	SUPPLY FUSE	F35	STARTER SOLENOID SAFETY FUSE	K26	EXT ATTACHMENT 3 RELAY	Q3	EXT ATTACHMENT SOLENOID 1	TF1	MUSIC PLAYER
D20	ALTERNATOR DIODE	F2	FWD, REV, NEU, FUEL LIFT		STARTER SOLENOID FUSE	K27	COLD START RELAY	Q4	SELECTOR VALVE SOLENOID	XD1	MOBILE CHARGER
EA1	CABIN LAMP	F3	CLUSTER SUPPLY FUSE	F36	IGNITION KEY, HOURMETER, ENGINE OVER HEATING FUSE	K28	AC WIRING RELAY	Q7	WATER VALVE		
EA2	HEAD LAMP LH	F4	SWITCH FUSE	F38		K29	BULL INFOMATICS	Q8	DIFFERENTIAL LOCK SOLENOID		
EA3	HEAD LAMP RH	F5	FRONT WORKING LAMP FUSE	F39	WIPER, HAZARD FUSE	K30	STARTER MOTOR	SG1	KEY SWITCH		
EA2	INDICATOR LAMP FRONT LH	F6	REAR WORKING LAMP 1 FUSE	F40	RIGHT INDICATOR FUSE	KE1	WINDSHIELD WIPER MOTOR	SG2	BATTERY CUTOFF SWITCH		
EA3	INDICATOR LAMP FRONT RH	F7	REAR WORKING LAMP 2 FUSE	F42	HOURMETER FUSE	MA2	REAR WIPER MOTOR	SG3	COMBINATION SWITCH RH		
EA2	INDICATOR LAMP FRONT RH	F8	REAR WORKING LAMP 2 FUSE	F45	SPEEDOMETER FUSE	MA3	WINDSHIELD WASHER MOTOR	SG4	COMBINATION SWITCH LH		
EA3	PARKING LAMP FRONT RH	F9	MOBILE CHARGER FUSE	F47	HAZARD FUSE			SG6	POT		
EA4	TAIL LAMP LH	F10	HORN FUSE	GA1	BULL INFOMATIC FUSE			SJ1	REAR WIPER MOTOR SWITCH		
EA5	TAIL LAMP RH	F11	PARKING FUSE	GB1	ALTERNATOR	MA5	REAR WASHER MOTOR	SJ2	HORN SWITCH FOR BACKHOE		
EA4	BRAKE LAMP LH	F12	HEAD LAMP FUSE	K1	SUPPLY REALY	MA6	CABIN FAN	SJ3	JOYSTICK NEUTRAL SWITCH		

BATTERY

Checking the electrolyte level.

Maintenance free batteries used in normal temperature climate conditions need not be topped up. However in prolonged working conditions, and in tropical conditions, or if the alternator overcharges the electrolyte of battery need to be checked.

1. Park the machine on firm level ground. Apply parking brakes and put the transmission in neutral. Lower the backhoe to the ground and raise the loader arms and fix the safety strut (see safety strut on page: 84)
2. Turn the bonnet release knob in the cabin that is adjacent to the brake pedal.
3. The bonnet will automatically rise due to the pneumatic cylinders fitted to the bonnet.
4. Remove the battery cell covers. Look at the level in each cell. The electrolyte should be 6 mm above the plates. Top up with distilled water or de-ionized water if required.



⚠ WARNING

Batteries give off explosive gases. Keep flames, sparks or any hazardous materials away from the battery. Do not smoke while handling or working with batteries. Battery electrolyte contains sulphuric acid which can burn your skin or eyes. Wear goggles and handle the battery carefully to prevent spillage.

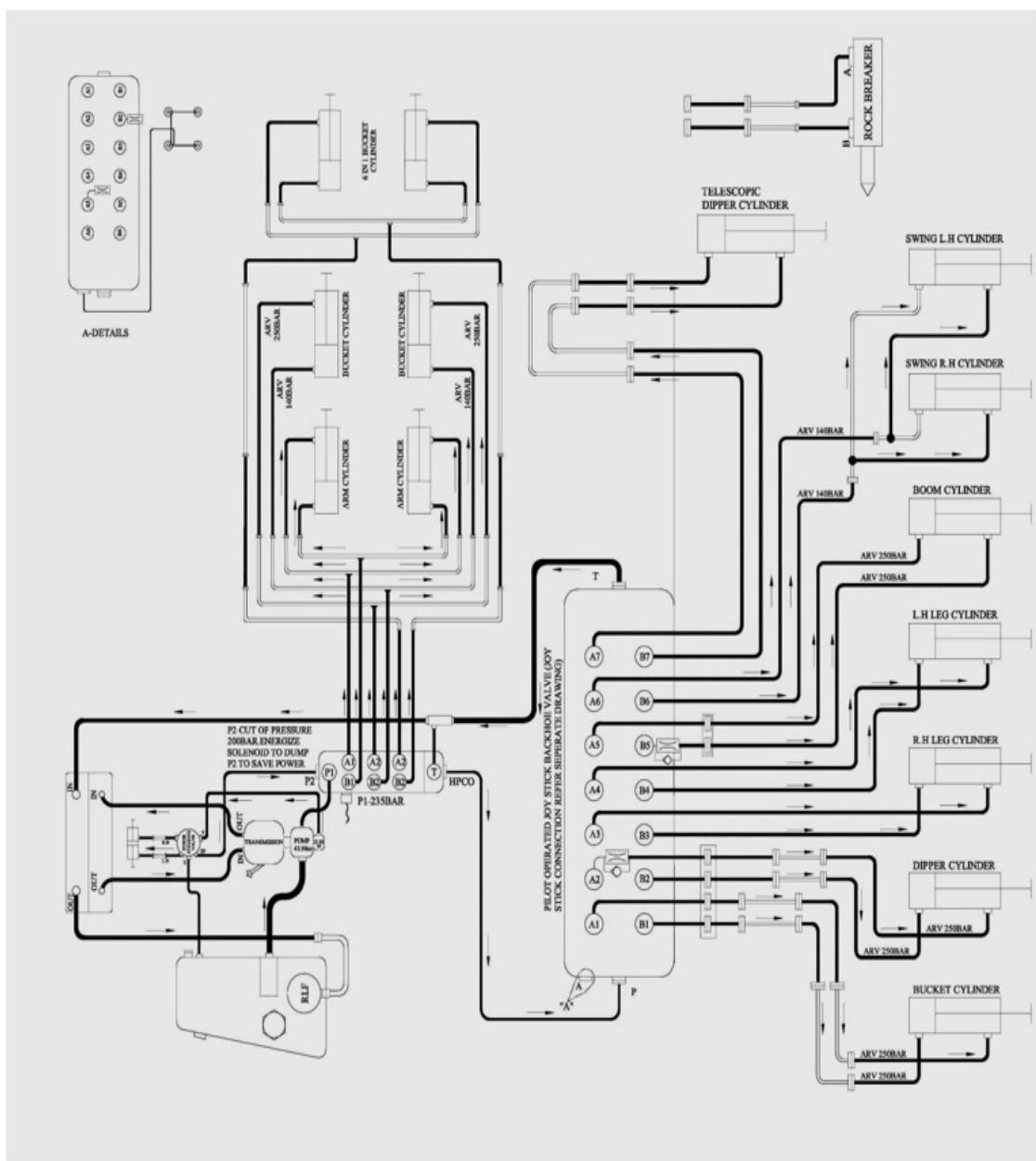
Keep metallic items such as watches, rings, zips etc away from the battery. They may cause a short circuit and burn you.

Switch off all switches before disconnecting the batteries. Take off the earth lead (-) first.

When reconnecting fit the positive lead (+) first.

Discharge the battery away from the machine in a well ventilated area. Switch off the charging circuit before connecting or disconnecting the batteries. When you have installed the battery in the machine, wait few minutes before connecting it up.

LOADER AND BACKHOE VALVE HOSE CIRCUIT

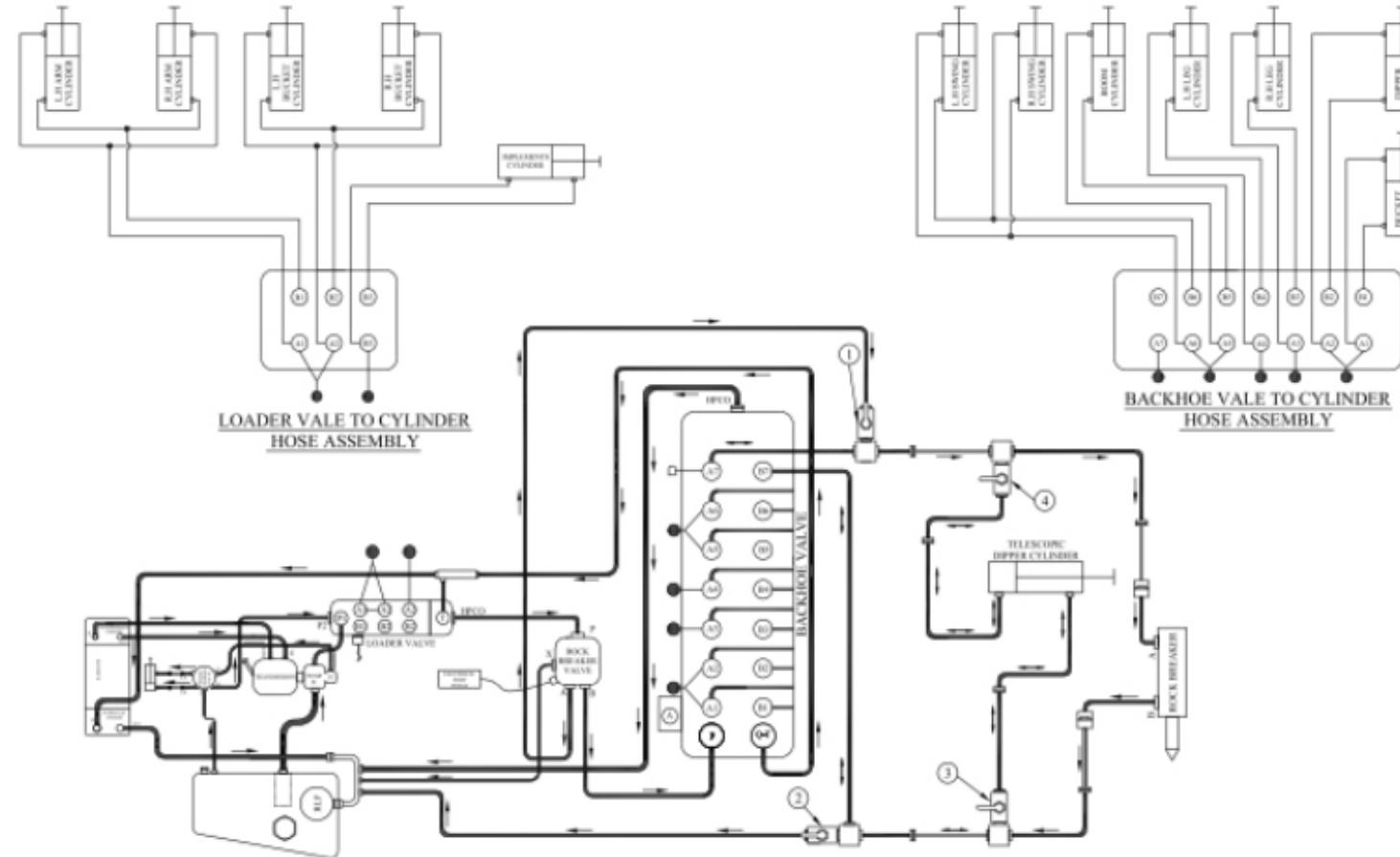


IMPORTANT NOTE:

SELECTOR VALVE COMES ONLY FOR

1. HDHV BUCKET
2. 14FT FRAME WITH HDHV BUCKET
3. SUGARCANE GRABBER
4. BOOSTER GRABBER BUCKET

BACKHOE LOADER TELESCOPIC WITH ROCK BREAKER HYDRAULIC CIRCUIT



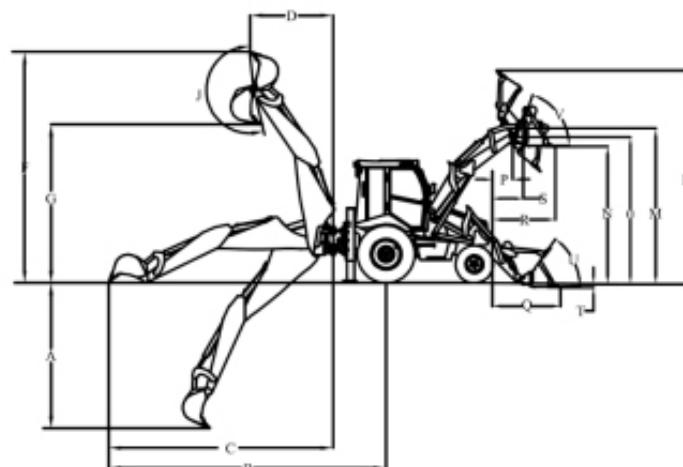
NOTE: BALL VALVE POSITION

BALL VALVENO	TELESCOPIC OPERATION	ROCK BREAKER OPTION
1	BALL VALVE C CLOSE	BALL VALVE OPEN
2	BALL VALVE C CLOSE	BALL VALVE OPEN
3	BALL VALVE OPEN	BALL VALVE C CLOSE
4	BALL VALVE OPEN	BALL VALVE C CLOSE

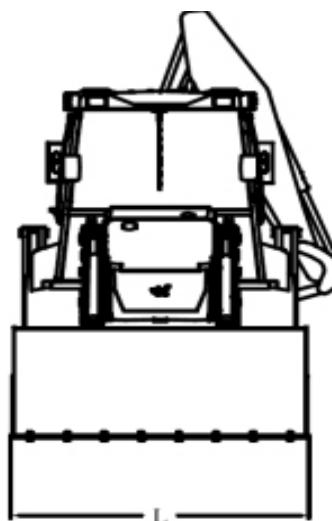
Note:

- 1) Electrical Foot Pedal for Rock Breaker Operation
- 2) Mechanical Foot for Telescopic Operation

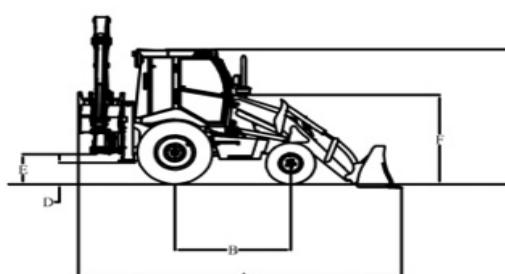
SPECIFICATIONS FOR BUTTERFLY LOADER & BACKHOE LOADER - ZF TANSMISSION

BULL HD 76,96,100HP BACKHOE LOADER WITH CURVE BUCKET SPECIFICATION


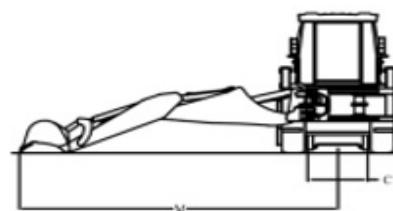
EXCAVATOR PERFORMANCE		STANDARD		EXTENSION (OPTION)	
		meters	ft-inch	meters	ft-inch
STANDARD BUCKET CAPACITY		0.27 cu.m (standard)			
A	MAXIMUM DIG DEPTH	4.6 m	15ft-1in	5.60 m	18ft-4in
B	REACH GROUND LEVEL TO REAR WHEEL CENTRE	6.81 m	22ft-4in	7.91 m	25ft-11in
C	REACH GROUND LEVEL TO SLEW CENTRE	5.50 m	18ft	6.60 m	21ft-7in
D	REACH AT FULL HEIGHT TO SLEW CENTRE	2.85 m	9ft-4in	3.56 m	11ft-8in
F	MAXIMUM WORKING HEIGHT	5.92 m	19ft-5in	6.77 m	22ft-2in
F	MAXIMUM LOAD OVER HEIGHT	4.14 m	13ft-6in	5.02 m	16ft-5in
G	BUCKET ROTATION-POWER	188°			
J	BUCKET TEAR OUT FORCE	6392kgf			
	DIPPER TEAR OUT FORCE	3316kgf			
	LIFT CAPACITY TO BUCKET PIVOT AT FULL REACH (NO BUCKET FITTED)	1400 kgs			



	LOADER - 6 IN 1 BUCKET SPECIFICATION	WITHOUT LINK BRACKET	
		Meters	Ft-Inch
	STANDARD BUCKET CAPACITY	1.0cu.m GP SHOVEL	
M	DUMP HEIGHT	3.68M	12ft-0.8in
N	LOAD OVER HEIGHT	3.36 m	11ft-0.24in
O	PIN HEIGHT	3.68 m	12ft-0.8
H	OVERALL HEIGHT	5.12 m	16ft-9.6in
P	PIN FORWARD REACH	0.53 m	1ft-8.8in
Q	REACH AT GROUND	1.52 m	4ft-11.8in
R	REACH AT FULL HEIGHT	1.34 m	4ft-47.7in
R	REACH AT FULL HEIGHT BKT DUMPED	0.68 m	2ft-2.8in
T	BELOW GROUND LEVEL DIG DEPTH	0.1 m	4m
U	ROLL BACK AT GROUND	47°	
V	DUMP ANGLE	45°TO90°	
	PAY LOAD	2000kgf	

BULL HD 76,96,100HP BACKHOE LOADER WITH CURVE BUCKET SPECIFICATION


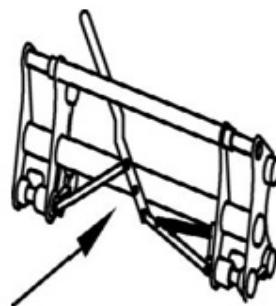
STATIC DIMENSIONS		meters	ft-inch
A	OVERALL LENGTH	6.04	19ft-9.82in
B	WHEELBASE	2.1 m	6ft-10.67in
C	KING POST TRAVEL	1.03 m	3ft-4.5in
D	MINIMUM GROUND CLEARANCE	0.48m	1ft-6.81in
E	SLEW GROUND CLEARANCE	0.65 m	2ft-1.6in
F	HEIGHT TO TOP OF BONNET	1.99 m	6ft-6.34in
G	HEIGHT TO TOP OF CABIN	3.00 m	9ft-10.46in
H	OVERALL HEIGHT	3.71 m	12ft-2.1in
J	TRACK WIDTH- REAR	1.70	5ft-6.92in
K	TRACK WIDTH- FRONT	1.93	6ft-3.98in
L	WIDTH OVER BUCKET	2.35 m	70-8.5in
M	SIDE REACH TO CENTER LINE OF MACHINE	6.08m	19ft-10in

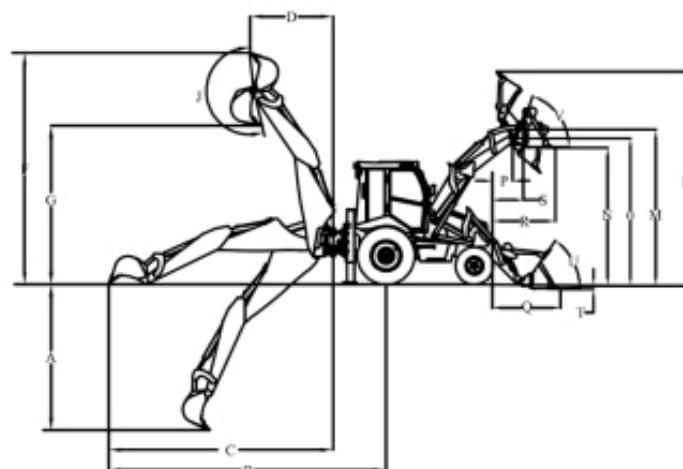


ENGINE	PERKINS 1104D-44TA, EU NRMM 97 / 68 I EC Stage 3A, Gross Power: 74.9Kw (100hp) @ 2200rpm. Torque: 412Nm @ 1400rpm	
TRANSMISSION	CARRARO Transmission	
STEERING	Power Steering	
TRANSMISSION	ZF Power Shift transmission with integral	
ELECTRICALS	12V battery system (180AH)	
TYRE	Front	4WD: 12.5 180 X 18 -12PR
	Back	Industrial Tyre :16.9X28 - 12PR
		Heavy Duty tyre :14.00X25 -20PR
SPEED	Forward max 37 Km/Hr Reverse max 22 Km/Hr	
HYDRAULICS	Smart Technology hydraulics : 3407 psi (235 bar) Pump flow: 145Lpm@2200 rpm	
WEIGHT	8060 Kgs with Standard bucket option	

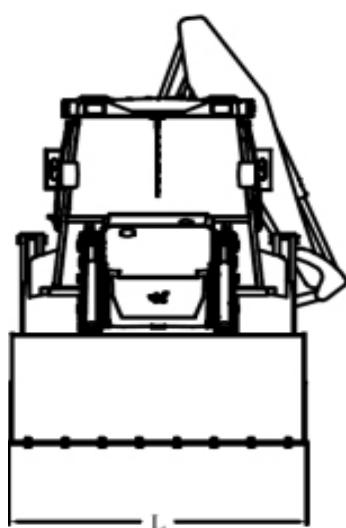
OPTIONAL FEATURES:

- * Heavy Duty Tyre
- * AC Cabin
- * Cold Starting Arrangement
- * Cabin Heater
- * Bucket quick hitch
- * Telescopic Dipper

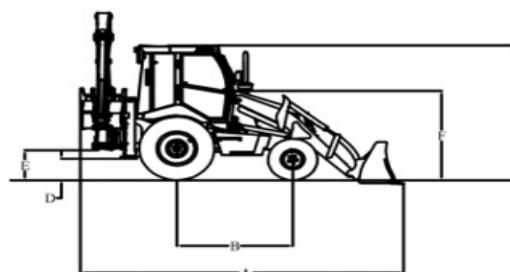


BULL HD 100 HP BACKHOE LOADER WITH 6 in 1 SPECIFICATION


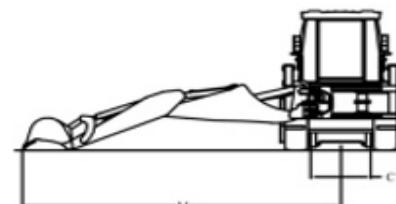
EXCAVATOR PERFORMANCE		STANDARD		EXTENSION (OPTION)	
		meters	ft-inch	meters	ft-inch
STANDARD BUCKET CAPACITY		0.27 cu.m (standard)			
A	MAXIMUM DIG DEPTH	4.6 m	15ft-1in	5.60 m	18ft-4in
B	REACH GROUND LEVEL TO REAR WHEEL CENTRE	6.81 m	22ft-4in	7.91 m	25ft-11in
C	REACH GROUND LEVEL TO SLEW CENTRE	5.50 m	18ft	6.60 m	21ft-7in
D	REACH AT FULL HEIGHT TO SLEW CENTRE	2.85 m	9ft-4in	3.56 m	11ft-8in
F	MAXIMUM WORKING HEIGHT	5.92 m	19ft-5in	6.77 m	22ft-2in
F	MAXIMUM LOAD OVER HEIGHT	4.14 m	13ft-6in	5.02 m	16ft-5in
G	BUCKET ROTATION-POWER	188°			
J	BUCKET TEAR OUT FORCE	6392kgf			
	DIPPER TEAR OUT FORCE	3316kgf			
	LIFT CAPACITY TO BUCKET PIVOT AT FULL REACH (NO BUCKET FITTED)	1400 kgs			



	LOADER - 6 IN 1 BUCKET SPECIFICATION	WITHOUT LINK BRACKET	
		Meters	Ft-Inch
STANDARD BUCKET CAPACITY		1.0cu.m GP SHOVEL	
M	DUMP HEIGHT	3.68M	12ft-0.8in
N	LOAD OVER HEIGHT	3.36 m	11ft-0.24in
O	PIN HEIGHT	3.68 m	12ft-0.8
H	OVERALL HEIGHT	5.12 m	16ft-9.6in
P	PIN FORWARD REACH	0.53 m	1ft-8.8in
Q	REACH AT GROUND	1.52 m	4ft-11.8in
R	REACH AT FULL HEIGHT	1.34 m	4ft-47.7in
R	REACH AT FULL HEIGHT BKT DUMPED	0.68 m	2ft-2.8in
T	BELOW GROUND LEVEL DIG DEPTH	0.1 m	4m
U	ROLL BACK AT GROUND	47°	
V	DUMP ANGLE	45°TO90°	
	PAY LOAD	2000kgf	

BULL HD 76,96,100HP BACKHOE LOADER WITH 6 IN 1 BUCKET SPECIFICATION


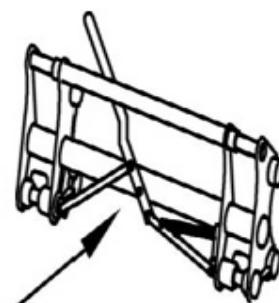
STATIC DIMENSIONS		meters	ft-inch
A	OVERALL LENGTH	6.04	19ft-9.82in
B	WHEELBASE	2.1 m	6ft-10.67in
C	KING POST TRAVEL	1.03 m	3ft-4.5in
D	MINIMUM GROUND CLEARANCE	0.48m	1ft-6.81in
E	SLEW GROUND CLEARANCE	0.65 m	2ft-1.6in
F	HEIGHT TO TOP OF BONNET	1.99 m	6ft-6.34in
G	HEIGHT TO TOP OF CAI3IN	3.00 m	9ft-10.46in
H	OVERALL HEIGHT	3.71 m	12ft-2.1in
J	TRACK WIDTH- REAR	1.70	5ft-6.92in
K	TRACK WIDTH- FRONT	1.93	6ft-3.98in
L	WIDTH OVER BUCKET	2.35 m	70-8.5in
M	SIDE REACH TO CENTER LINE OF MACHINE	6.08m	19ft-10in



ENGINE	PERKINS 1104D-44TA, EU NRMM 97 / 68 I EC Stage 3A, Gross Power: 74.9Kw (100hp) @ 2200rpm. Torque: 412Nm @ 1400rpm
TRANSMISSION	CARRARO Transmission
STEERING	Power Steering
TRANSMISSION	ZF Power Shift transmission with integral
ELECTRICALS	12V battery system (180AH)
TYRE	Front 4WD: 12.5 180 X 18 -12PR
	Back Industrial Tyre :16.9X28 - 12PR
	Heavy Duty tyre :14.00X25 -20PR
SPEED	Forward max 37 Km/Hr Reverse max 22 Km/Hr
HYDRAULICS	Smart Technology hydraulics : 3407 psi (235 bar) Pump flow: 145Lpm@2200 rpm
WEIGHT	8060 Kgs with Standard bucket option

OPTIONAL FEATURES:

- * Heavy Duty Tyre
- * AC Cabin
- * Cold Starting Arrangement
- * Cabin Heater
- * Bucket quick hitch
- * Telescopic Dipper



SPECIFICATIONS

ENGINE

PERKINS 1104D-44TA DIESEL ENGINE

No of Cylinders: 4.

TRANSMISSION

The gearbox is a 4 speed ZF Transmission with integral torque convertor and electrically operated Forward & Reverse shuttle. An electrically mounted reverse switch is present which can change the machine direction while allowing the operator to keep hands on the loader joystick to enable fast cycle times.

The pedal layout and conventional 4 gear lever with transmission disconnect switch adds to the ease of operation while changing gears on the move.

The torque convertor stall ratio is 2.64: 1.

AXLES

The rigidly mounted rear axle incorporates a Max-Trac torque proportioning differential, driven by a short propeller shaft from gear box.

Front Axle is centrally pivoted with the oscillation angle a 16°. Front axle for 4WD is Carraro make, oil immersed with power steering option

BRAKES

The brakes are Hydraulically activated, dual line, self adjusting, oil immersed, multi disc type on the rear axle. Well protected from dirt, water etc, and required no maintenance. Each wheel has an independent pedal that are linked together for normal use.

Two independently operable foot pedals enable the machine to maneuver in small and tight and spaces.

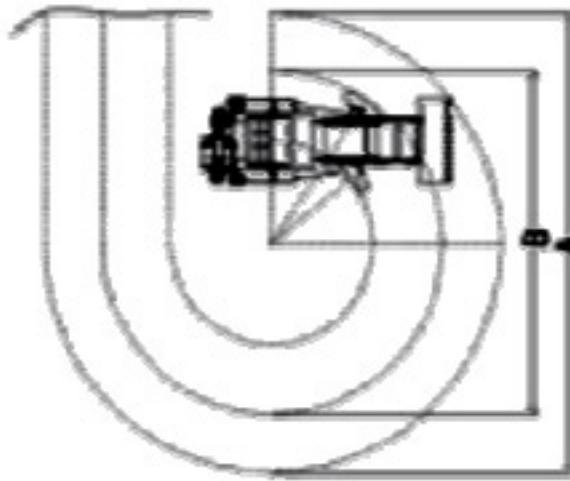
Parking: The parking brake is hand operated, oil immersed multi disc on the rear axle.

STEERING

The front wheel hydraulic power steering has a manual capability in the event of engine or hydraulic power failure. Hydraulic supply, from pump via a priority valve. Working pressure is 3407 psi (235 Bar).

ELECTRICALS

180 Ampere-hour 12 volts battery systems with alternator & full road lighting.



TURNING CIRCLE

Inner Wheels Braked

A*Outside Loader Bucket-8.8m

C-Outside Wheels-6.3m

Inner Wheels not Braked

A*Outside Loader Bucket-11.6m

B-Outside Wheels-8.9m

SPEED

GEAR	Forward Km/hr	Reverse Km/hr
1st	6.01	7.59
2nd	10.98	13.77
3rd	22.01	21.74
4th	41.00	Not recommended

HYDRAULICS

Smart technology hydraulics :3407 psi (235 bar) system, pump flow 145 Lpm at 2200rpm.

WEIGHT

Shipping : 8060kgs

CABIN

Curved cab glass provides excellent all round visibility. Operator safety is upto ROPS and FOPS standards. Plenty of legroom minimizes fatigue and allows the operator to work in the cabin without any interruptions for long hours.

A fully adjusted seat with safety seat belt, ergonomically positioned controls and soft touch steering wheels. Easy walk through, two door access other features include light, fan, front screen wiper, front and rear horn, hazard warning system and helper seat.

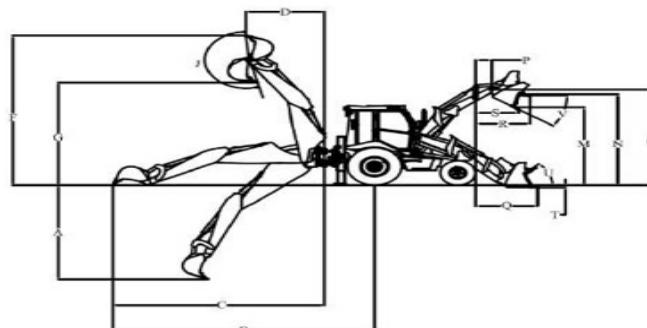
The instrumental panel positioned on the right hand side includes engine speed, engine hours, fuel level and water temperature. There are audible and visual fault warning system for alternator charge, coolant temperature, engine oil pressure and temperature, and hand brake on.

OPTIONS

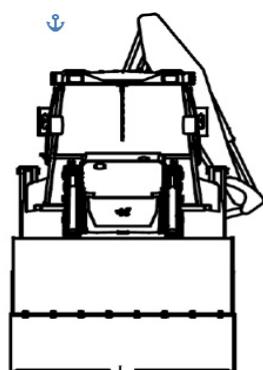
BACKHOE BUCKETS

Capacities: 0.14cu.m,0.19cu.m,0.23cu.m,0.27cu.m,0.22cu.m,0.25cu.m,0.31cu.m,0.33cu.m.

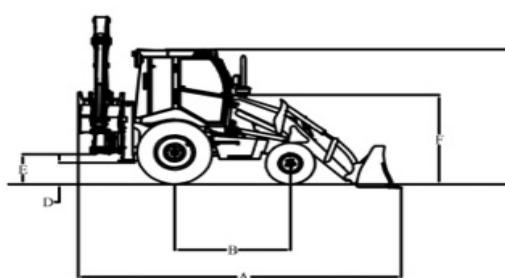
**SPECIFICATIONS FOR BUTTERFLY
LOADER & BACKHOE LOADER -
CARRARO TANSMISSION**

BULL HD 76,96,100HP BACKHOE LOADER WITH CURVE BUCKET SPECIFICATION


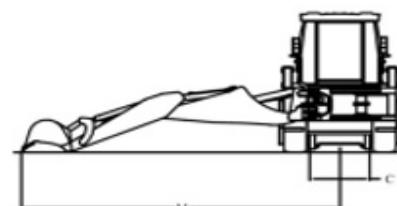
EXCAVATOR PERFORMANCE		STANDARD		EXTENSION (OPTION)	
		meters	ft-inch	meters	ft-inch
STANDARD BUCKET CAPACITY		0.27 cu.m (standard)			
A	MAXIMUM DIG DEPTH	4.6 m	15ft-1in	5.60 m	18ft-4in
B	REACH GROUND LEVEL TO REAR WHEEL CENTRE	6.81 m	22ft-4in	7.91 m	25ft-1in
C	REACH GROUND LEVEL TO SLEW CENTRE	5.50 m	18ft	6.60 m	21ft-7in
D	REACH AT FULL HEIGHT TO SLEW CENTRE	2.85 m	9ft-4in	3.56 m	11ft-8in
F	MAXIMUM WORKING HEIGHT	5.92 m	19ft-5in	6.77 m	2ft-2in
G	MAXIMUM LOAD OVER HEIGHT	4.14 m	13ft-6in	5.02 m	16ft-5in
J	BUCKET ROTATION- POWER	188°			
	BUCKET TEAR OUT FORCE	6392kgf			
	DIPPER TEAR OUT FORCE	3316kgf			
	LIFT CAPACITY TO BUCKET PIVOT AT FULL				
	RiIACI I (NO MICKEL FIT11:1))	1400 kgs			



C	LOADER - 6 IN 1 BUCKET SPECIFICATION	WITHOUT LINK BRACKET	
		meters	ft-inch
C	STANDARD BUCKET CAPACITY	1.0 cu.m G.P SHOWEL	
M	DUMP HEIGHT	3.68m	12ft-0.8in
N	LOAD OVER HEIGHT	3.36 m	11ft-0.24in
O	PIN HEIGHT	3.68 m	1/2ft-0.8in
H	OVERALL HEIGHT	5.12 m	16ft-9.6in
P	PIN FORWARD REACH	0.53 m	1ft-8.8in
Q	REACH AT GROUND	1.52 m	4ft-11.8in
R	REACH AT FULL HEIGHT	1.34m	4ft-4.7in
R	REACH AT FULL HEIGHT BKT DUMPED	0.68m	2ft-2.8in
T	BELOW GROUND LEVEL DIG DEPTH	0.1m	4in
U	ROLL BACK AT GROUND		47 °
V	DUMP ANGLE		45 °to90 °
	PAY LOAD		2000kgf

BULL HD 76,96,100HP BACKHOE LOADER WITH CURVE BUCKET SPECIFICATION


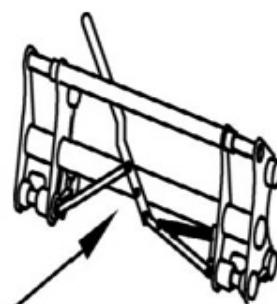
STATIC DIMENSIONS		meters	ft-inch
A	OVERALL LENGTH	6.04	19ft-9.82in
B	WHEELBASE	2.1 m	6ft-10.67in
C	KING POST TRAVEL	1.03 m	3ft-4.5in
D	MINIMUM GROUND CLEARANCE	0.48m	1ft-6.81in
E	SLEW GROUND CLEARANCE	0.65 m	2ft-1.6in
F	HEIGHT TO TOP OF BONNET	1.99 m	6ft-6.34in
G	HEIGHT TO TOP OF CAI3IN	3.00 m	9ft-10.46in
H	OVERALL HEIGHT	3.71 m	12ft-2.1in
J	TRACK WIDTH- REAR	1.70	5ft-6.92in
K	TRACK WIDTH- FRONT	1.93	6ft-3.98in
L	WIDTH OVER BUCKET	2.35 m	70-8.5in
M	SIDE REACH TO CENTER LINE OF MACHINE	6.08m	19ft-10in

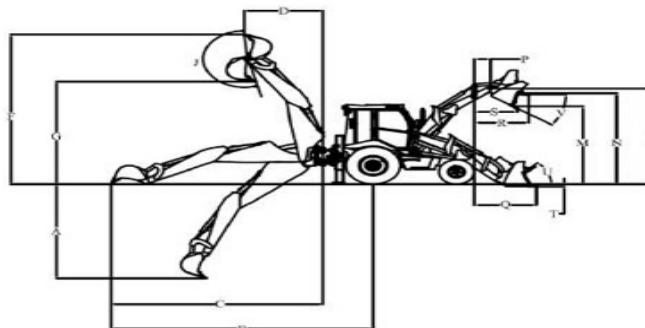


ENGINE	PERKINS 1104D-44TA, EU NRMM 97 / 68 I EC Stage 3A, Gross Power: 74.9Kw (100hp) @ 2200rpm. Torque: 412Nm @ 1400rpm	
TRANSMISSION	CARRARO Transmission	
STEERING	Power Steering	
TRANSMISSION	ZF Power Shift transmission with integral	
ELECTRICALS	12V battery system (180AH)	
TYRE	Front	4WD: 12.5 180 X 18 -12PR
	Back	Industrial Tyre :16.9X28 - 12PR
		Heavy Duty tyre :14.00X25 -20PR
SPEED	Forward max 37 Km/Hr Reverse max 22 Km/Hr	
HYDRAULICS	Smart Technology hydraulics : 3407 psi (235 bar) Pump flow: 145Lpm@2200 rpm	
WEIGHT	8060 Kgs with Standard bucket option	

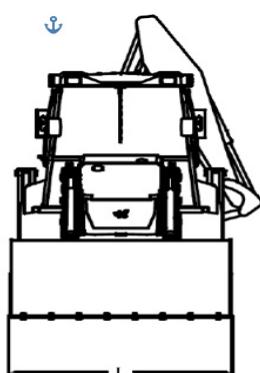
OPTIONAL FEATURES:

- * Heavy Duty Tyre
- * AC Cabin
- * Cold Starting Arrangement
- * Cabin Heater
- * Bucket quick hitch
- * Telescopic Dipper

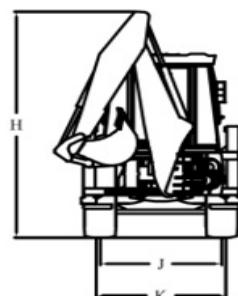
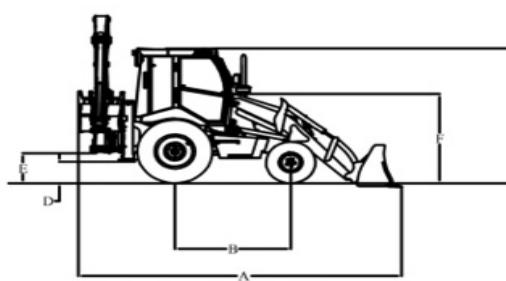


BULL HD 76,96,100HP BACKHOE LOADER WITH 6 in 1 BUCKET SPECIFICATION


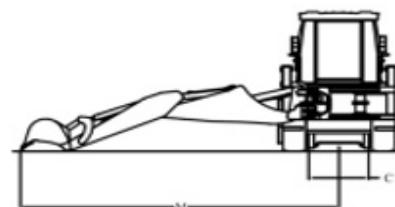
EXCAVATOR PERFORMANCE		STANDARD		EXTENSION (OPTION)	
		meters	ft-inch	meters	ft-inch
STANDARD BUCKET CAPACITY		0.27 cu.m (standard)			
A	MAXIMUM DIG DEPTH	4.6 m	15ft-1in	5.60 m	18ft-4in
B	REACH GROUND LEVEL TO REAR WHEEL CENTRE	6.81 m	22ft-4in	7.91 m	25ft-11in
C	REACH GROUND LEVEL TO SLEW CENTRE	5.50 m	18ft	6.60 m	21ft-7in
D	REACH AT FULL HEIGHT TO SLEW CENTRE	2.85 m	9ft-4in	3.56 m	11ft-8in
F	MAXIMUM WORKING HEIGHT	5.92 m	19ft-5in	6.77 m	2ft-2in
G	MAXIMUM LOAD OVER HEIGHT	4.14 m	13ft-6in	5.02 m	16ft-5in
J	BUCKET ROTATION- POWER	188°			
	BUCKET TEAR OUT FORCE	6392kgf			
	DIPPER TEAR OUT FORCE	3316kgf			
	LIFT CAPACITY TO BUCKET PIVOT AT FULL				
	RIIACI I (NO MICHEL FIT11:1))	1400 kgs			



	LOADER - 6 IN 1 BUCKET SPECIFICATION	WITHOUT LINK BRACKET	
		meters	ft-inch
	STANDARD BUCKET CAPACITY	1.0 cu.m G.P SHOWEL	
M	DUMP HEIGHT	3.68m	12ft-0.8in
N	LOAD OVER HEIGHT	3.36 m	11ft-0.24in
O	PIN HEIGHT	3.68 m	1/2ft-0.8in
H	OVERALL HEIGHT	5.12 m	16ft-9.6in
P	PIN FORWARD REACH	0.53 m	1ft-8.8in
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R	REACH AT FULL HEIGHT BKT DUMPED	0.68m	2ft-2.8in
T	BELOW GROUND LEVEL DIG DEPTH	0.1m	4in
U	ROLL BACK AT GROUND		47 °
V	DUMP ANGLE		45 °to90 °
	PAY LOAD		2000kgf

BULL HD 76,96,100HP BACKHOE LOADER WITH 6 in 1 BUCKET SPECIFICATION


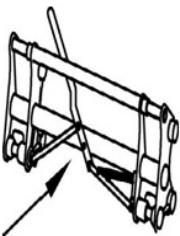
STATIC DIMENSIONS		meters	ft-inch
A	OVERALL LENGTH	6.04	19ft-9.82in
B	WHEELBASE	2.1 m	6ft-10.67in
C	KING POST TRAVEL	1.03 m	3ft-4.5in
D	MINIMUM GROUND CLEARANCE	0.48m	1ft-6.81in
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J	TRACK WIDTH- REAR	1.70	5ft-6.92in
K	TRACK WIDTH- FRONT	1.93	6ft-3.98in
L	WIDTH OVER BUCKET	2.35 m	70-8.5in
M	SIDE REACH TO CENTER LINE OF MACHINE	6.08m	19ft-10in



ENGINE	PERKINS 1104D-44TA, EU NRMM 97 / 68 I EC Stage 3A, Gross Power: 74.9Kw (100hp) @ 2200rpm. Torque: 412Nm @ 1400rpm
TRANSMISSION	CARRARO Transmission
STEERING	Power Steering
ELECTRICALS	12V battery system (180AH)
TYRE	4WD: 12.5 180 X 18 -12PR Front Industrial Tyre :16.9X28 - 12PR Back Heavy Duty tyre :14.00X25 -20PR
SPEED	Forward max 37 Km/Hr Reverse max 22 Km/Hr
HYDRAULICS	Smart Technology hydraulics : 3407 psi (235 bar) Pump flow: 145Lpm@2200 rpm
WEIGHT	8060 Kgs with Standard bucket option

OPTIONAL FEATURES:

- * Heavy Duty Tyre
- * AC Cabin
- *Cold Starting Arrangement
- * Cabin Heater
- * Bucket quick hitch
- * Telescopic Dipper



SPECIFICATIONS

ENGINE

PERKINS 1104D-44TA DIESEL ENGINE

No of Cylinders: 4.

TRANSMISSION

BULL 100HP comes with CARRARO synchroshuttle transmission that provides super drive power in all

conditions. It consists of a 4- speed fully synchromesh gear box with the integral torque converter and electrically operated forward and reversing shuttle.

The pedals layout and convectional 4 pattern gear lever with transmission disconnect switch adds to the

overall ease of operation. On the move gear changes are possible.

AXLES

The rigidly mounted rear axle incorporates a Max-Trac torque proportioning differential, driven by a short propeller shaft from gear box.

Front Axle is centrally pivoted with the oscillation angle a 16°. Front axle for 4WD is Carraro make, oil immersed with power steering option

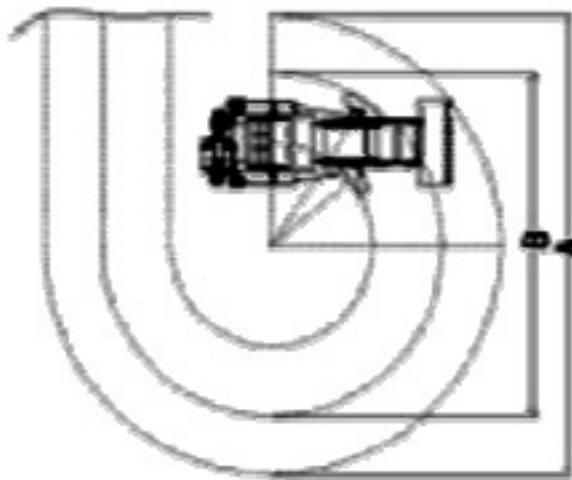
BRAKES

The brakes are Hydraulically activated, dual line, self adjusting, oil immersed, multi disc type on the rear axle. Well protected from dirt, water etc, and required no maintenance. Each wheel has an independent pedal that are linked together for normal use.

Two independently operable foot pedals enable the machine to maneuver in small and tight and spaces.

ELECTRICALS

180 Ampere-hour 12 volts battery systems with alternator & full road lighting.



TURNING CIRCLE

Inner Wheels Braked

A*Outside Loader Bucket-8.8m

C-Outside Wheels-6.3m

Inner Wheels not Braked

A*Outside Loader Bucket-11.6m

B-Outside Wheels-8.9m

SPEED

GEAR	Forward Km/hr	Reverse Km/hr
1st	6.01	7.59
2nd	10.98	13.77
3rd	22.01	21.74
4th	41.00	Not recommended

HYDRAULICS

Smart technology hydraulics :3407 psi (235 bar) system, pump flow 145 Lpm at 2200rpm.

WEIGHT

Shipping : 8060kgs

CABIN

Curved cab glass provides excellent all round visibility. Operator safety is upto ROPS and FOPS standards. Plenty of legroom minimizes fatigue and allows the operator to work in the cabin without any interruptions for long hours.

A fully adjusted seat with safety seat belt, ergonomically positioned controls and soft touch steering wheels. Easy walk through, two door access other features include light, fan, front screen wiper, front and rear horn, hazard warning system and helper seat.

The instrumental panel positioned on the right hand side includes engine speed, engine hours, fuel level and water temperature. There are audible and visual fault warning system for alternator charge, coolant temperature, engine oil pressure and temperature, and hand brake on.

OPTIONS

BACKHOE BUCKETS

Capacities: 0.14cu.m,0.19cu.m,0.23cu.m,0.27cu.m,0.22cu.m,0.25cu.m,0.31cu.m,0.33cu.m.

Ditch cleaning Bucket, Taper Ditching Bucket, Square hole Bucket. Rock Breaker. Ripper Tooth, Trench bucket, Loader booster bucket with 12ft inch dump height.

AC CABIN, TELESCOPIC BOOM

BULL 76HP,96HP,100HP EXPORT SERVICE SCHEDULE

Note: For getting best and trouble free performance of the machine, follow the service periodically as per service schedules given below			EVERY 10 HOURS	EVERY 250 HOURS	EVERY 750 HOURS	100 HOURS (OR) 1 MONTH	HOURS (OR) 3 MONTHS	1000 HOURS (OR) 6 MONTHS	1500 HOURS (OR) 9 MONTHS	2000 HOURS (OR) 12 MONTHS	2500 HOURS (OR) 15 MONTHS	3000 HOURS (OR) 18 MONTHS	3500 HOURS (OR) 21 MONTHS	3500 HOURS (OR) 21 MONTHS										
ENGINE	60HP	KIRLOSKAR-K OIL PREMIUM-SAE-15W40=10 LITERS	ENGINE OIL LEVEL	C	R	R	R	R	R	R	R	R												
	76HP & 96HP	* KIRLOSKAR-COLD START KIT-SAE-5W30=10 LITERS																						
	100HP	KIRLOSKAR-K OIL PREMIUM-SAE-15W40=12 LITERS																						
	100HP	PERKINS- API CI-4/SAE 15W40 (FOR TEMPERATURE -10°C TO +50°C) = 10 LITERS																						
	COOLANT LEVEL & COMPENSATION TANK																							
	60HP,76HP,96HP - K-COOL SUPER PLUS -15 LITERS																							
	DRY TYPE PRE CLEANER CL																							
	AIR CLEANER OUTER ELEMENT					R																		
	AIR CLEANER INNER ELEMENT					R																		
	RADIATOR FINS						C	C	C	C	C	C	C	C										
	FUEL FILTER CARTDRIGE		C																					
	FAN BELT TENSION (CHECK & ADJUST)						CL	CL	CL	CL	CL	CL	CL	CL										
	FUEL TANK SEDIMENTS (DRAIN & CLEAN)						R	R	R	R	R	R	R	R										
	CONDITION OF HOSES		C/A																					
	WATER SEPARATOR																							
	FASTENERS TIGHTENING (ENGINE MOUNT BOLT)										C/R			C/R										
	CHOCK INDICATOR (CLEAR AIRFILTER IF IN RED)								C		C		C											
* FOLLOW WITH ENGINE MANUAL FOR OTHER CHECKING POINTS																								

TRANSMISSION,AXLE & POWER STEERING	TRANSMISSION OIL (EXCON MOBIL - FLUID 424- 16 LITERS)			C			R		R		R		R	
	TRANSMISSION FILTER						R	R	R	R	R	R	R	R
	REAR AXLE OIL (EXCON MOBIL - FLUID 424- 17 LITERS)								CL		CL		CL	
	REAR AXLE OIL (EXCON MOBIL - FLUID 424- 17 LITERS)		C			R		R		R		R		R
	TYRE PRESSURE	76HP,96HP,100HP												
	FRONT HUB BEARING & GREASING (2WD)	C				R		R		R		R		R
	DRIVE SHAFT (GREASE)	C/A												
	STEER AXLE PIVOTS & LINKS (GREASE)	C/A												
	FRONT AXLE PIVOTS & STOPPER PLATE						C	C	C	C	C	C	C	C
	FRONT AXLE STUB AXLE PIN & HUB GREASING (EVERY 100 HOURS)					R	R	R	R	R	R	R	R	R
	FRONT AXLE TAPER ROLLER BEARING LOAD SETTING						C	C	C	C	C	C	C	C
	FASTENERS REAR AXLE						C		C		C		C	
	STUB AXLE PIN FREEPLAY (CHECK & REALIGN)								C/R			C/R		
	4WD FRONT AXLE (EXCON MOBIL - FLUID 424- 8 LITERS)	C/L				R		R		R		R		R

BULL 76HP,96HP,100HP EXPORT SERVICE SCHEDULE

BULL 76HP,96HP,100HP EXPORT SERVICE SCHEDULE														
Note: For getting best and trouble free performance of the machine, follow the service periodically as per service schedules given below			EVERY 10 HOURS	EVERY 250 HOURS	EVERY 750 HOURS	100 HOURS (OR) 1 MONTH	HOURS (OR) 3 MONTHS	1000 HOURS (OR) 6 MONTHS	1500 HOURS (OR) 9 MONTHS	2000 HOURS (OR) 12 MONTHS	2500 HOURS (OR) 15 MONTHS	3000 HOURS (OR) 18 MONTHS	3500 HOURS (OR) 21 MONTHS	3500 HOURS (OR) 21 MONTHS
HYDRAULICS	HYDRAULIC OIL	BHL = 100 LITERS	WITH OUT COLD START KIT- HYDROL-68						R					
		FEL = 90 LITERS	#WITH COLD START KIT - SHELL TELLUS S2M46						R					
	HYDRAULIC OIL (WITH ROCK BREAKER OPTION)	BHL = 100 LITERS	WITH OUT COLD START KIT- HYDROL-68			R								
		FEL = 90 LITERS	#WITH COLD START KIT - SHELL TELLUS S2M46			R								
	SUCTION STRAINER													
	RETURN LINE FILTER ELEMENT						R	R	R	R	R	R	R	
	RETURN LINE FILTER ELEMENT(WITH ROCK BREAKER OPTION)				R									
	HYDRAULIC PRESSURE CHECK (P1 & P2)						C	C	C	C	C	C	C	
BRAKES	ALL HYDRAULIC HOSES TIGHTNESS			C										
	HYDRAULIC OIL COOLER						CL	CL	CL	CL	CL	CL	CL	
	BREATHER (EVERY 500 HOURS)						R	R	R	R	R	R	R	
	VIBRATORY ROLLER (GEAR OIL EP-140 - 1.5LTRS, GREASE)			C/A										
ELECTRICALS	BRAKE DISC									C/R			C/R	
	PARKING BRAKE, FOOT BRAKE OIL LUBRICATION							C		C		C	C	
	BATTERY ELECTROLYTE LEVEL			C										
BODY WORK,CABIN	WIRING ROUTING						C	C	C	C	C	C	C	
	CONDITION OF TERMINALS & TIGHTNESS						C	C	C	C	C	C	C	
	FUNCTIONING OF HOUR METER			C										
	BATTERY VENT HOLE CLEANING			C/L										
	ALL PINS & BUSHES (GREASE)			C/A										
GAS	DOOR/WINDOW HINGES OIL LUBRICATION & FRONT DOOR BELT						C	C	C	C	C	C	C	
	ALL CABLES (GREASE) (ENGINE,HAND,FOOT)						C/A	C/A	C/A	C/A	C/A	C/A	C/A	
	BUTTON LEVER (SIDE SHIFT)			C										
	STABILIZER PAD						C/R	C/R	C/R	C/R	C/R	C/R	C/R	
CONDENSOR	STABILIZER LEGS & INNER TUBE WATER CLEANING			CL										
	FRONT & REAR TYRE WHEEL NUT TIGHTNESS			C										
	WATER WASH EXCEPT INSIDE CABIN			CL										
GAS PREESURE CHECK & FILLING (R134A)									C/R			C/R		
CONDENSOR			C/L											
NOTE : C - CHECK, C/D- CHECK & DRAIN, CL - CLEAN, R - REPLACE, C/R - CHECK & REPLACE C/A - CHECK & APPLY														
For detailed service schedules Refer Page 82-85 in BULL SMART OPERATION AND MAINTENANCE manual														
*#- WILL BE SUPPLIED ONLY BASED ON THE COUNTRY														

REGIONAL OFFICE ADDRESSES & CONTACT NUMBERS

LOCATION	ADDRESS	CONTACT NUMBERS
CORPORATE OFFICE	BULL MACHINES PRIVATE LIMITED S.F.NO. 5/1-A, TRICHY ROAD, NEAR L&T RYF PASS JUNCTION, COIMBATORE-641 103, INDIA.	Tel : +91-422-6525753, 6586655, 6586677 +91-98426 70184 Mnh : +91-98422 87770 E-mail: sales@bullmachine.com HELP LINE: +91-422 -392 2222
CUSTOMER CARE DIVISION	BULL MACHINES PRIVATE LIMITED S.F.NO. 4/2A, TRICHY ROAD, NEAR L&T BYE PASS JUNCTION, OPP.HINDUSTHAN PETROL PUMP, ODDARPALAYMAR VILLAGE, COIMBATORE-641 103, INDIA.	Tel : 0422 - 3922222 FAX:0422 - 3922299 E-mail: service@bullmachine.com
MARKETING HEAD QUARTERS (DELHI)	BULL MACHINES PRIVATE LIMITED H-101,SECTOR - 63, NOIDA -201 301, UTTAR PRADESH, INDIA	Tel : +91-120-4751 333 (7 lines) , 3256 574 Telefax : +91-120-2427 165 E-mail: dro@bullmachine.com
REGIONAL OFFICE KOLKATA	BULL MACHINES PRIVATE LIMITED DOLI SAHA , BLOCK BB 91,374, RAJDANGA MAIN ROAD, SARAT PARK,KOLKATA - 700 107, P S KASBA ,BORO 12 WEST BENGAL, INDIA	Tel : +91- 33-32465599 Telefax : +91-33-22375182



" Bull reserves the right to change / alter / add / delete any specification or information specified in the manual based on the ongoing design changes and without prior information. "

BULL RANGE OF CE PRODUCTS**HD76** 4wd**HD96** 4wd**HD100** 4wd

WORLDCLASS NEW BACKHOE LOADER PLANT



FINAL ASSEMBLY LINE

**BULL MACHINES PVT. LTD.**

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