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IESC
Infrastructure Equipment Skill Council

Participant Handbook

Sector
Infrastructure Equipment

Sub-Sector
Equipment Operations

Occupation
Operator

Reference ID: **IES/Q0101, Version 2.0**
NSQF Level 4

Backhoe Loader Operator

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> Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission.

Shri Narendra Modi
Prime Minister of India

Acknowledgements

About this book

With the renewed focus on infrastructure projects, the demand for construction equipment definitely gets better. The backhoe loader market will see an increased demand which in turn will lead to larger number of skilled operators being needed to operate these machines.

To address the future sector demand, this Participant Handbook is designed to enable training for the specific Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit(s).

Key Learning Objectives for the specific NOS mark the beginning of the Unit(s) for that NOS. The symbols used in this book are described below.

Symbols used


Key Learning Outcomes


Steps


Time


Tips


Notes


Unit Objectives

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1. Introduction

Unit 1.1 - About the programme
Unit 1.2 - About the product

Key Learning Outcomes

At the end of this module, you will be able to:

1. Understand and Know each other
2. Share program expectations
3. Understand the role of backhoe loaders
4. Identify the main external and internal parts of the backhoe loaders and their use
5. Identify the main backhoe loader and excavator controls and their use

UNIT 1.1: About the Programme

Unit Objectives

At the end of this unit, you will be able to:

1. Understand training curriculum design
2. Know one and all
3. List expectations from the training

1.1.1 Overview of the Book

The training curriculum will help you to:

1. **Carry out pre-operation checks.** General introduction to backhoe loader machine, basic working of engine, hydraulic and electrical systems, operational controls and instrument panel, preparing machine for operations

2. **Operate a backhoe loader.** Starting of backhoe loader moving to worksite and carrying out earth digging, load lifting and dumping; parking and shutting down the machine; post-operative checks

3. **Carry out troubleshooting and General maintenance.** General maintenance procedures and periodic service schedule of a backhoe loader; common faults and their diagnosis; reports and documents

4. **Comply with worksite health and safety guidelines.** Health, safety and environment policies; personal protective equipment, fire-fighting equipment, basic first aid for common injuries at work site

1.1.2 Knowing Each Other

Let's Know Each Other:

- Your name
- Your location
- Your hobby?

1.1.3 Expectation Mapping

My expectations from the training program are:

UNIT 1.2: About the Product

Unit Objectives

At the end of this unit, you will be able to:

1. Know history of backhoe loaders
2. Understand the basic features and use of backhoe loaders
3. Identify the various parts of backhoe loader and their use
4. Understand the safety features of backhoe loaders

1.2.1 Brief History of Backhoe Loaders

1. **1940s.** First backhoes are developed and tested

2. **1950s.** Hydraulic powered backhoe loaders enter the market

3. **1971.** First 'over center' backhoe is introduced offering a much more smooth ride and better maneuverability than older models.

4. **1980s.** Four-wheel drive backhoe loaders are introduced

Today backhoes are manufactured by many companies in India and abroad.

1.2.2 Brief Specs, Features and Performance

Backhoe loaders are actually very powerful and versatile tractors. They have large wheels for driving on all terrain and a rotating cab for the operator. Backhoe loaders can perform many tasks, like lifting and moving supplies or digging earth.

The three main parts in a backhoe loader are:

1. **Tractor**
2. **Loader,** is attached to the front of the tractor which is used for lift and move the earth or other material. There are many tools and attachments for the loader, including extensions so the loader can lift materials very high, and street sweeping brushes.
3. **Backhoe** is used for digging in rock and earth, or to lift heavy weights. There are 3 parts and 3 joints in the backhoe. There are also many tools that can be attached to the backhoe, such as hammers for breaking asphalt and grapples for pulling out tree stumps.

1.2.2.1 General Backhoe Loader Specifications

Engine		
Make	ABC	
Model	3054T	
Gross Power	88 hp	65.6 kw
Net Power	85 hp	63.4 kw
Displacement	244.1 cu in	4 L
Power Measured @	2200 rpm	
Number of Cylinders	4	
Operational		
Operating Weight 4wd	15763.1 lb	7150 kg
Fuel Capacity	33.8 gal	128 L
Turning Radius	17.6 ft in	5350 mm
Tire Size Front - 2wd / 4wd	11Lx16,12PR/12.5 / 80x18,10PR	
Rear Tires Size 2wd/4wd	19.5x24,10PR / 19.5L24,10PR	
Transmission		
Type	power shuttle	
Number of Forward Gears	4	
Number of Reverse Gears	4	
Max Speed - Forward	20.4 mph	32.8 km/h
Max Speed Reverse	20.4 mph	32.8 km/h
Backhoe		
Dig Depth - Std	14.4 ft in	4390 mm
Dig Depth - Ext	18.1 ft in	5510 mm
Reach From Swivel - Std	18.5 ft in	5650 mm
Reach From Swivel - Ext	21.9 ft in	6675 mm
Bucket Dig Force - Std	14712 lb	6673.3 kg
Bucket Dig Force - Ext	14586 lb	6616.1 kg
Load Height - Std	11.9 ft in	3613 mm
Load Height - Ext	13.7 ft in	4175 mm
Reach at Load Height - Std	2.8 ft in	862 mm
Reach at Load Height - Ext	2.5 ft in	751 mm

Table 1

1.2.2.1 Cont....

Loader		
Bucket Capacity	1.3 yd3	0.96 m3
Bucket Width	89.1 in	2262 mm
Bucket Breakout Force	10138.9 lb	45.1 kN
Lift Capacity at Full Height	6384.6 lb	2896 kg
Clearance at Max Dump Height	8.3 ft in	2544 mm
Reach at Max Dump Height	2.7 ft in	835 mm
Dig Depth	5.3 in	135 mm
Hydraulic		
Pump Type	LSPC, closed center	
Pump Flow Capacity	43.1 gal/min	163 L/min
Relief Valve Pressure	3300.2 psi	22754 kPa
Dimensions		
Transport Length	22.9 ft in	6974 mm
Transport Width	7.7 ft in	2352 mm
Transport Height	11.8 ft in	3585 mm
Height to Top of Cab	9.1 ft in	2770 mm
Wheelbase	6.9 ft in	2100 mm
Ground Clearance	0.97 ft in	297 mm

Table 1

1.2.3 Names of Parts & Controls, Panels

A backhoe loader has following different parts:

1. Loader arm
2. Cab
3. Hydraulic oil tank
4. Battery compartment
5. Boom
6. Fuel tank
7. Stablisers
8. Kingpost
9. Dipper

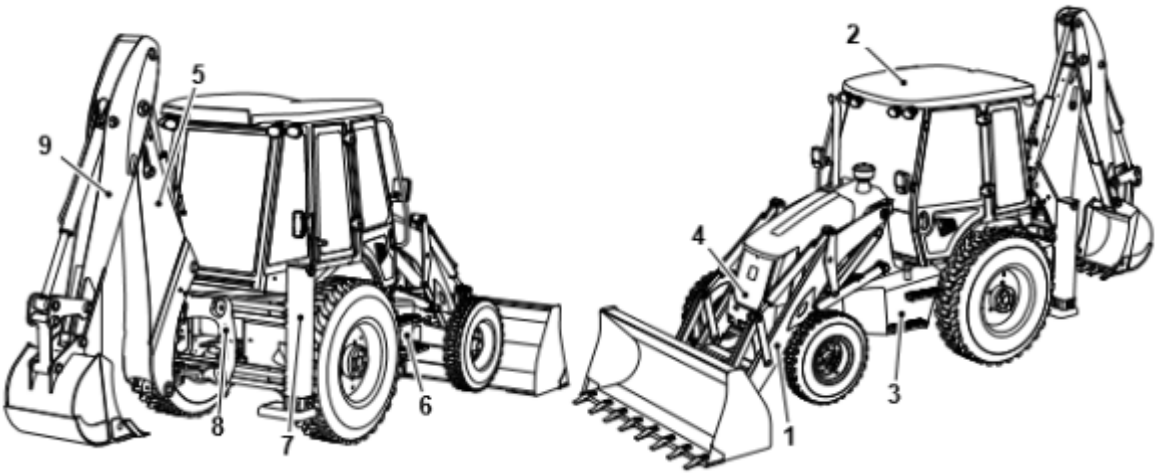


Fig 1

1.2.3.1 Seat Controls

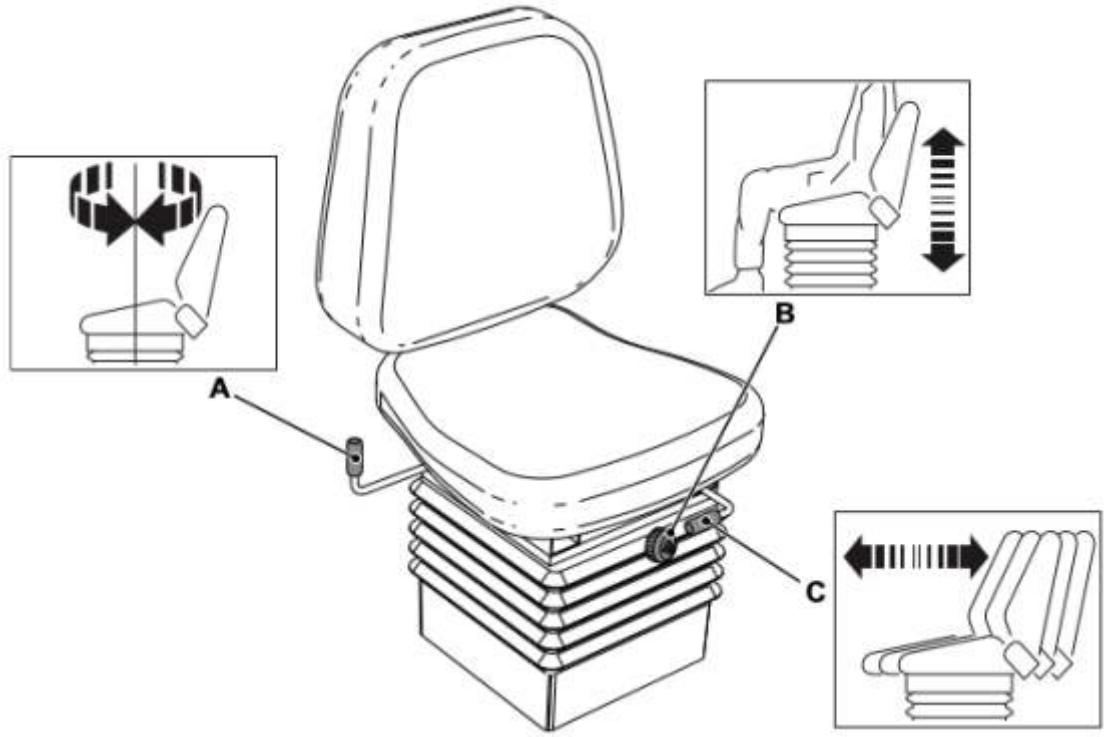


Fig 2

(A) To **swivel** pull the lever backwards, swivel the seat all the way around to face the opposite direction then release lever. Make sure the seat fully latches into the locked position.

(B) Whilst seated, turn the **weight** adjustment dial until your weight is shown in the scale just beside the knob. This will set the seat to the most suitable support for your weight. The dial is calibrated in kilograms (kg).

(C) To move the seat front and back, lift the lever and slide the seat to the position you are comfortable, release the lever to lock the seat. Make sure the seat is locked in position in order to avoid many accidents.

1.2.3.2 Drive Controls

Steering Wheel – Used to change driving direction

Accelerator Pedal – Used to increase / decrease engine speed

Hand Throttle Lever – Used to increase or decrease the engine speed as required when working with the excavator.

Foot Brake Pedals – Used to slow or stop the machine.

Park Brake Lever – Use it to engage the park brake before leaving the machine.

Transmission Lever (4-Speed Syncro Shuttle Transmission) – Used to put engine in forward (F), reverse (R) or neutral (N) mode. Before starting the engine, make sure the lever is in the neutral position.

Fig 3

Horn – The button is used to activate the horn and functions only when starter switch is set to on position.

Gear Lever (Syncro Shuttle Transmission) – Used for manual gear selection.

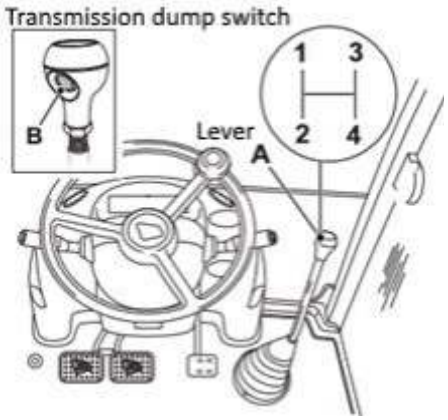


Fig 4

1.2.3.3 Switches

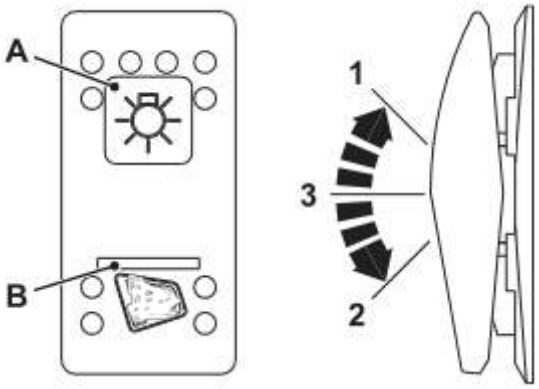


Fig 5 (three position rocker switch)

Side Lights and Headlights – Three position rocker switch with backlight. The switch functions operate when the starter switch is in the ON and OFF positions.

Position 1: OFF (Backlight OFF)

Position 3: Side Lights ON (Backlight ON)

Position 2 (starter switch in the ON position): Headlights ON (Backlight ON)

Position 2 (starter switch in the OFF position): Side Lights ON (Backlight ON)

Hazard Warning Lights – Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON and OFF positions.

Position 1: OFF (Backlight OFF).

Position 2: ON (Backlight ON). A light on the instrument panel flashes with the outside lights.

Beacon (if fitted) - Two position rocker switch. The switch functions operate when the starter switch is in the ON and OFF positions.

Position 1: OFF

Position 2: ON

1.2.3.3 Cont...

Four Wheel Drive Selector (4WD machine only) – Three position rocker switch. The switch functions operate when the starter switch is in the ON position.

Position 1: 2-wheel drive - Two wheel braking

Position 2: 4-wheel drive - All wheel braking

Position 3: 2-Wheel drive - All wheel braking

Front Work Lights – Two position rocker switch. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF

Position 2: Work Lights ON

Rear Work lights – Three position rocker switch. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF

Position 3: Outer Worklights ON

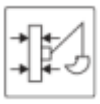
Position 2: Inner and Outer Worklights ON

Servo Control – Two position rocker switch, spring loaded to position 1. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF

Position 2: Servo Control ON

Kingpost Clamps – Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.



Position 1: OFF (Backlight OFF)

Position 2: ON (Backlight ON)

1.2.3.3 Cont...

Starter Switch – It is operated by the starter switch. It has four positions. Always set the switch to '0' while removing the key.

Multi-Purpose Steering Column Switch

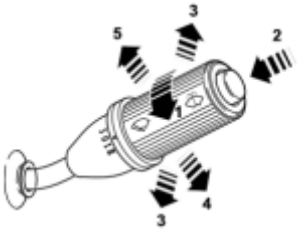
1 Windscreen Wiper

2 Push button: Not used

3 Direction Indicators

4 Headlights

5 Headlight flash



1.2.3.3 Cont...

Front Console

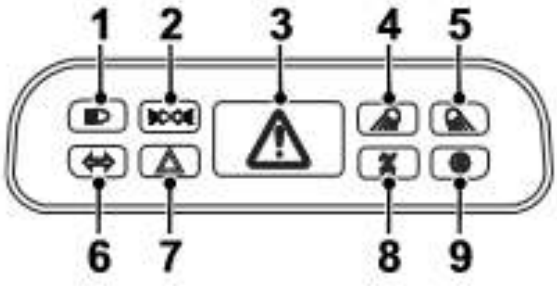


Fig 6

1 Main Beam

2 Side Light

3 Front Work Light

4 Master Warning Light

5 Rear Work Light

6 Direction Indicators

7 Hazard Warning Lights

8 Four Wheel Steer (optional)

Speedometer

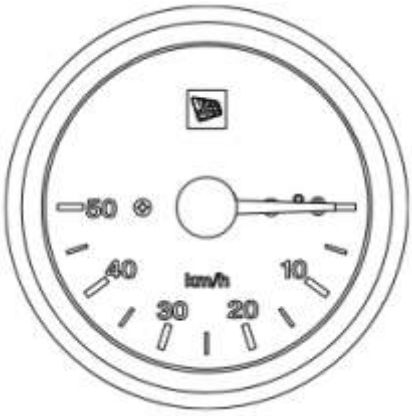


Fig 7

Indicates the road speed in Kilometres per hour (km/h).

1.2.3.3 Cont...

Side Console

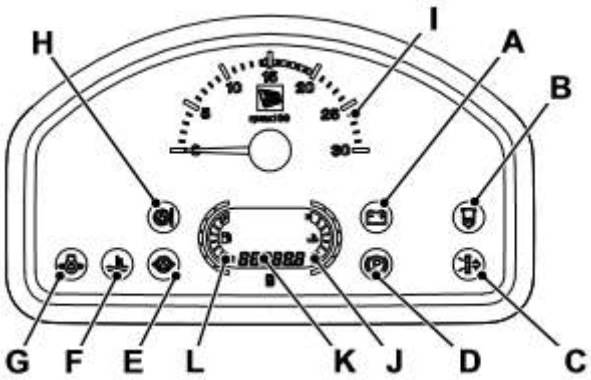


Fig 8

A No Charge

B Water in Fuel

C Air Filter Blocked

D Park Brake Engaged

E Transmission Oil Pressure Low

E Coolant Temperature

G Engine Oil Pressure Low

H Transmission Oil Temperature High

I Analog RPM Meter

J Coolant Temperature Gauge

L Fuel level Gauge

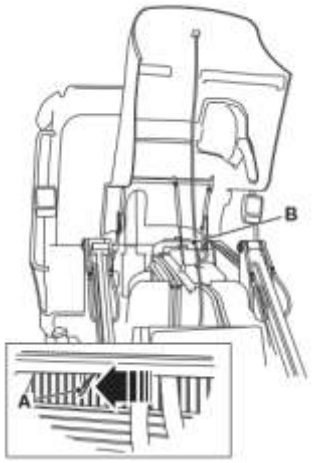
1.2.3.4 Access Panels

The access panels give you access to parts or areas of the machine that are not required during machine operation

Engine Cover

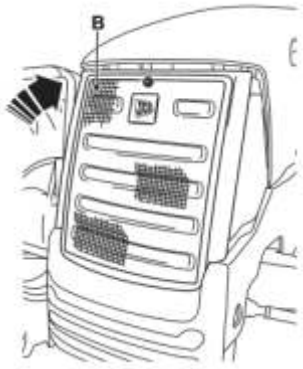
A Handle

B Cable



Front Grille

B Top of the Front Grille



Side Panels

F Bolts

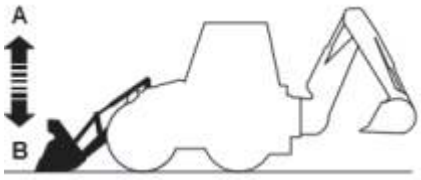
G Side Panel

H Front Chasis

J Grille Housing

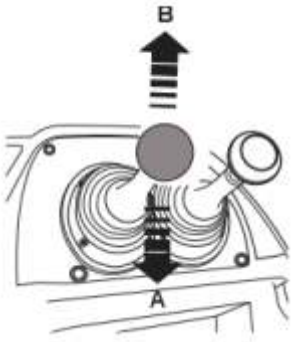
1.2.4 Layout of Systems and their Working

Loader Controls



1 Raise

To raise the shovel A, pull the lever straight back. As the shovel rises, it will stay at the same angle to the ground. This is due to the parallel linkages on the loader arms.

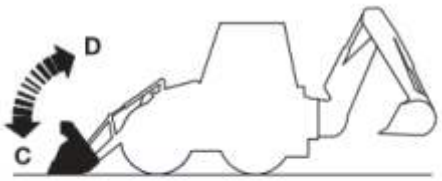


2 Lower

To lower the shovel B, push the lever forward. The shovel will stay at the same angle to the ground as described in Raise.

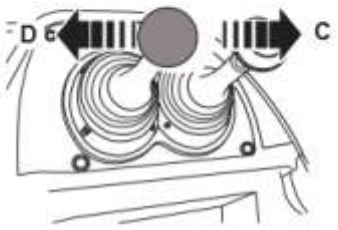
3 Roll Forward

To roll the bucket forward C, push the lever to the right.

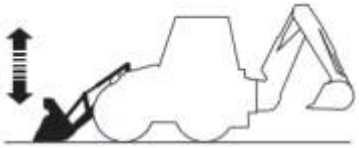


4 Roll Back

To roll the bucket back D, pull the lever to the left.



1.2.4 Layout of Systems and their Working



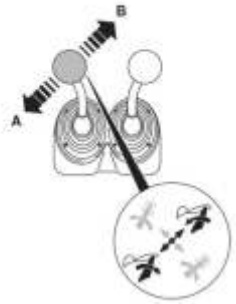
5 Float

To make the shovel 'float' across the ground, push the lever forwards as far as it will go and leave it there.

Excavator Controls

1 Raise Boom

To raise the boom A, pull the lever diagonally left and towards you. Before raising the boom check that it is clear overhead.



2 Lower Boom

To lower the boom B, push the lever diagonally right and away from you.

3 Slew Left

To slew the boom to your left C, push the lever diagonally left and away from you.

4 Slew Right

To slew the boom to your right D, pull the lever diagonally right and towards you.

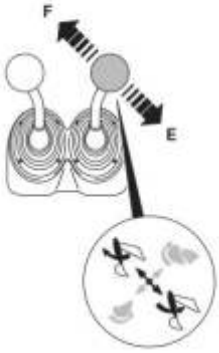
1.2.4 Layout of Systems and their Working

5 Dipper In

To bring the dipper in E, pull the lever diagonally right and towards you.

6 Dipper Out

To push the dipper out F, push the lever diagonally left and away from you. If the boom is already up, check that it is clear overhead before swinging the dipper out.



7 Close Bucket

To close the bucket G pull the lever diagonally to your left.

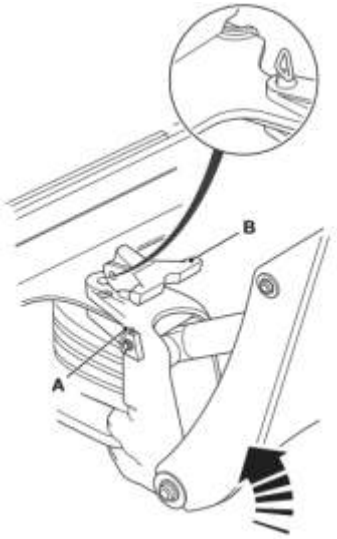
8 Open Bucket

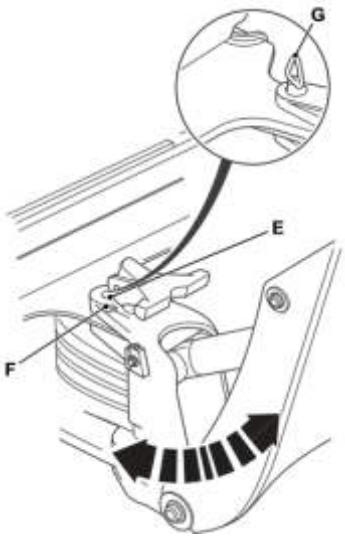
To open the bucket H push the lever diagonally to your right.

1.2.5 Safety Features

Boom and Slew Locks

For added safety to the use of backhoe loaders the boom lock and the slew lock are to be engaged before travelling on the road.





A Boom Stop

B Boom Lock

E Hole (in the kingpost), F Hole (in the mainframe)

G Slew Lock Pin

Beacon (if fitted)

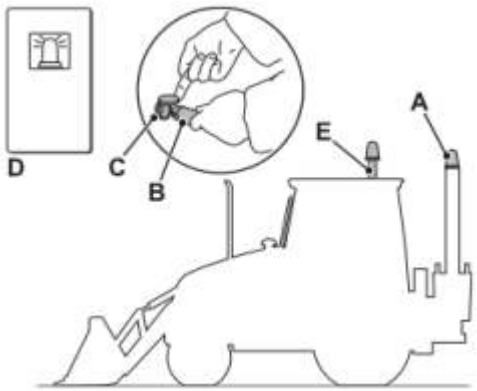
A Beacon

B Plug

C Cab Roof Socket

D Switch

E Beacon Extension Mount



Briefly answers the following questions.

Identify and label the parts of the backhoe loader in the below figure.

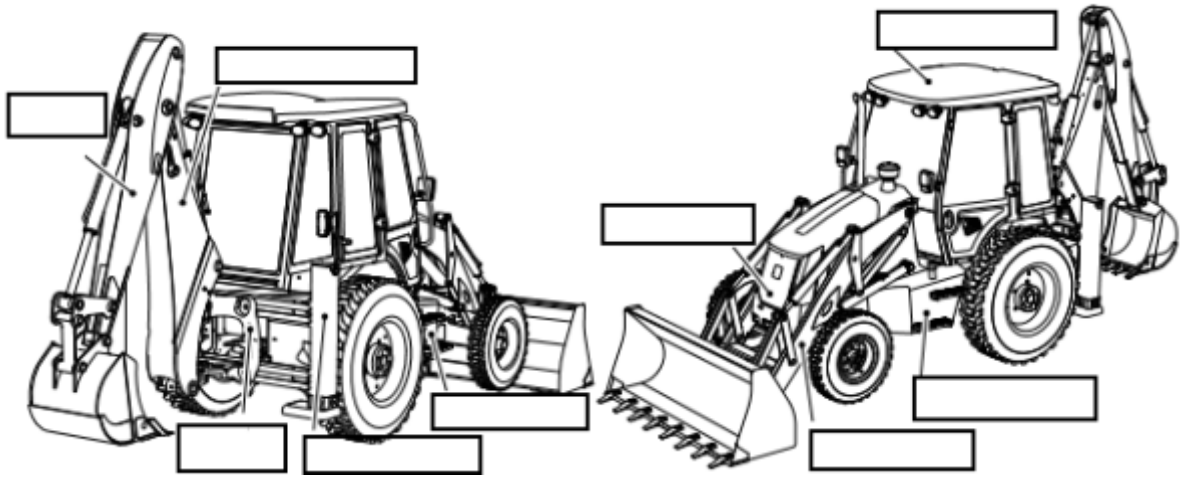


Fig 9

List some of the drive controls of backhoe loader

_____

_____

_____

_____

_____

What all parts does the multi-purpose steering column switch controls?

_____

_____

_____

_____

_____

List the various loader controls.

_____

_____

_____

_____

_____

Which two locks are used for safety while driving the backhoe loader?

_____

_____

_____

_____

_____

Tips

- Visit a construction site.
- Inspect the different backhoe loaders parked and their features

Notes

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2. Pre-ops Checks on Backhoe Loader

Unit 2.1 – Outside the machine & attachments
Unit 2.2 – Inside the engine compartment
Unit 2.3 – Inside the cabin
Unit 2.4 – Starting and stopping procedures

IES/N0101

Key Learning Outcomes

At the end of this module, you will be able to:

1. Physically check the backhoe loader for problems / defects from outside
2. Check the parts and controls inside of backhoe loader for signs of trouble
3. Start and stop the backhoe loader safely

UNIT 2.1: Outside the Machine & Attachments

Unit Objectives

At the end of this unit, you will be able to:

1. Check the backhoe loader for cleanliness
2. Visually inspect various parts of the backhoe loader

2.1.1 Check for Cleanliness

Step 1 - Clean the windows, light lenses and rear view mirrors.

Step 2 - Remove dirt and debris, especially from around the linkages, rams, pivot points and radiator.

Step 3 - Clean the cab steps and handhold and make sure that it is dry.

Step 4 - Clean all safety and instructional labels and assist in replacing any that are missing or cannot be read.

2.1.2 Do a Machine Inspection

Step 1 - Inspect the machine generally for damaged and missing parts.

Step 2 - Make sure that the attachment is secure and in good condition.

Step 3 - Make sure that all pivot pins are securely correctly in place.

Step 4 - Inspect the windows for cracks and damage. Glass splinters can blind.

Step 5 - Check for oil, fuel and coolant leakages underneath the machine.

Step 6 - Check for cut rubber and penetration by sharp objects.

Step 7 - Make sure that all of the access panels are closed and secure.

Step 8 - Make sure that all of the filler caps are installed correctly.

UNIT 2.2: Inside the Engine Compartment

Unit Objectives

At the end of this unit, you will be able to:

1. Inspect the engine parts as per the conditions.
2. Check fuel and coolant levels

2.2.1 Operating Environment

Operating in Low Temperatures

1. Use the correct viscosity engine lubricating oil.
2. Use the correct viscosity hydraulic oil.
3. If available use a low temperature diesel fuel.
4. Use the correct coolant mixture.
5. Check if the battery is at full charge.
6. Install a cold weather starting aid. In very low temperatures, -18°C and below, additional starting aids such fuel, oil and coolant heaters, may be needed.
7. Before starting the engine, check and remove the snow in the engine compartment in order to avoid the snow entering into the Air filter.

Operating in High Temperatures

1. Use the correct viscosity engine lubricating oil.
2. Use the correct coolant mixture.
3. Check the coolant system for any leaks.
4. Remove dirt and debris, if any, from the radiator/oil cooler and the engine.
5. Check the fan belt.
6. Check the air vents to and from the engine compartment for any blockage. Clean the vents if it is blocked.
7. Check the engine pre-cleaner (if fitted).
8. Check the battery electrolyte level.

Operating in Dusty or Sandy Areas

1. Securely tighten the hydraulic oil tank filler cap to prevent sand and dust from entering the hydraulic system.

UNIT 2.3: Inside the Cabin

Unit Objectives

At the end of this unit, you will be able to:

1. Enter and exit the cabin of backhoe loaders safely
2. Work with the door and cabin widows safely
3. Wear and adjust seat belts

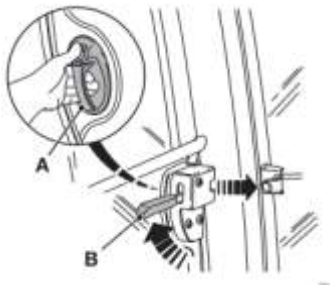
2.3.1 Entering and Exiting the Backhoe Cabin

- Maintain three-point contact and face the machine at all times when entering and exiting
- Do not use the steering wheel for entry or exit
- Never jump from the machine
- Never enter or exit a moving machine

Fig 10

2.3.2 Doors and Windows

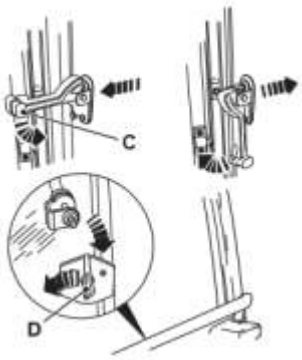
Opening & Closing Door



- To open a door from the outside, unlock it with the key and pull the handle A. The door is fitted with an assister which will spring it open and hold it open.
- Close the door from the inside by pulling it firmly; it will latch itself.
- To open the door from the inside, operate lever B.

  Note: Do not drive the machine with the door unlatched

Opening & Closing Side Windows



- To open a side window, unlock latch E. Pull lever C towards the operator seat, while pushing window outwards, until it latches down.
- To close the window, first pull the lever towards the front of the machine then pull the window inwards, lower the lever C and E to latch it.
- The window can be opened fully and secured to the door. Open the window then pull lever C forward a little way to unhook it from its pin on the frame.
- Swing the window right round to meet the outside of the door. The window will latch to the door.
- To close the window, move handle D, swing the window closed and set lever C back on its pin. Close the window as described above.

2.3.2 Cont...

Opening & Closing Rear Window

- To open the rear window, press locking levers A. Take a firm grip on the handrails, move the window towards the front of the machine and up as far as it will go.
- Secure the window in its open position by releasing locking levers A, make sure the window is locked in position.
- Make sure that rear window is closed before traveling.

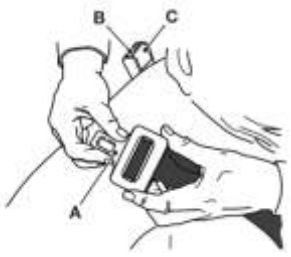
  Note: When closing the window, make sure that the window wiper lead does not get trapped.

2.3.3 Seating & Seat Belt

Adjust Seat

Adjust the operator seat such that operator can easily reach the machine controls. A correctly adjusted seat increases the comfort and reduce the fatigue. For driving the machine, adjust the seat so that you can depress the pedals fully with your back against the seat back.

Fasten Seat Belt



Push the male fitting A into the buckle B until it latches into position. Make sure the seat belt is not twisted and that it is over your hips not your stomach.

Release Seat Belt

Press button C and pull the male fitting A from the buckle B.

Adjust Seat Belt

To adjust the male fitting A:

Pull toggle D down the strap by the required distance.

1. To make the strap longer, pull end E as far as it will go.
2. To make the strap shorter, pull end F as far as it will go.

UNIT 2.4: Starting and Stopping Procedures

Unit Objectives

At the end of this unit, you will be able to:

1. Start and stop backhoe loaders with all safety precautions
2. Start backhoe loaders in cold weather

2.4.1 Starting the Backhoe Loader

Step 1–Put the Forward, Reverse lever in neutral. (The engine will not start unless the forward, reverse lever A is in neutral)

Step 2–Put the gear lever in neutral. Gear lever B is only fitted to machines equipped with Synchro Shuttle (manual) transmission

Step 3–Set the hand throttle lever to minimum. Make sure that hand throttle lever C is set at the minimum engine revolution position

Step 4–Slightly depress the accelerator pedal D. Turn the starter switch E to position III and hold it there until the engine starts

Step 5–Release the starter key as soon as the engine starts. The switch will return to `IGN' position I.

Step 6–Ease off on the accelerator pedal to reduce engine speed

Step 7–Once the engine has started, check that all the warning lights have gone off. Do not race the engine until the oil pressure low light has gone out.

Step 8–Operate the backhoe a few times to help warm up the hydraulic system. Do not operate attachments until the hydraulic oil has reached its normal working temperature

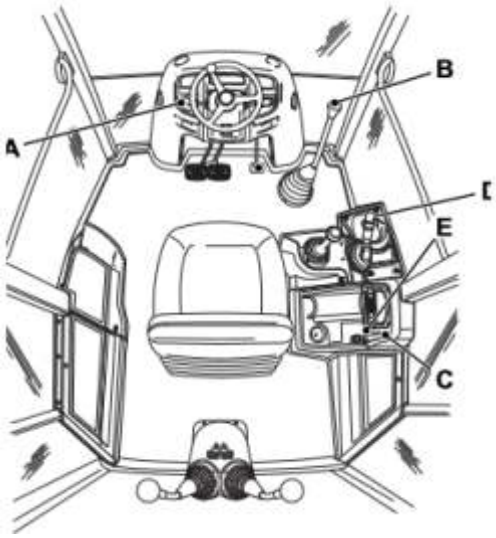


Fig 11

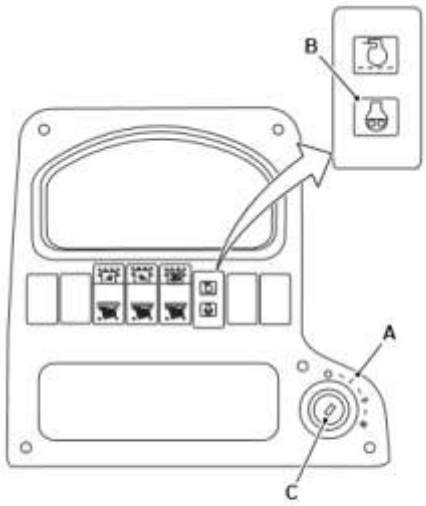
2.4.2 Starting in Cold Weather

Step 1–Turn the starter switch C to position I, the cold start inlet manifold he ater warning light will come ON

Step 2–Fully depress the accelerator pedal to the floor

Step 3–When the warning light goes OFF, turn the starter switch C to the 'start' position III and hold it there until the engine starts

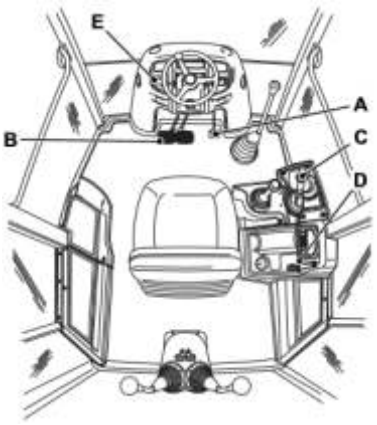
Note: Do not operate the starter motor for more than 10 seconds at a time; if engine does not start. If the engine fires but does not fully start, do not operate the starter motor for more than 40 seconds. Let the starter motor cool for at least two minutes between starts.



A Position I
B Heater Illumination ON-LED
C Starter Switch

Fig 12

2.4.3 Stopping the Engine



Step 1–Ease up on the accelerator pedal A and down on the brake pedals B to bring the machine to a smooth stop. Keep the foot brakes on until the park brake has been pulled on

Step 3–Pull the park brake lever C fully up. Make sure that the park brake indicator lights up. Release the foot brakes.

Step 4–Set the forward/reverse lever E to neutral. Make sure the lever is in its detent position.

Step 5–Lower the stabiliser legs safely until they just touch the ground.

Step 6–Lower the loader arms and backhoe assembly to the ground. It is recommended that the backhoe is positioned with the bucket fully open, boom and dipper fully extended.

Step 7–If you are leaving the machine, make sure that all switches are set to off. If necessary, leave the hazard warning and/or side lights switched on. Remove the starter key D.

Briefly anwer the following questions.

List the steps to inspect the backhoe loader before using it.

_____

_____

_____

_____

What engine precautions do you've to take in high temperatures.

_____

_____

_____

_____

List the steps to start the backhoe loader.

_____

_____

_____

_____

_____

_____

What are the precautions an operator to be taken while leaving the machine unattended ?

_____

_____

_____

_____

_____

_____

Tips

- Visit a construction site.
- Observe a backhoe loader in operation and talk to an operator

Notes

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

IESC
Infrastructure Equipment Skill Council

3. Operating the Backhoe Loader

Unit 3.1 – Starting and proceeding to worksite
Unit 3.2 – Inspection of worksite and safety
Unit 3.3 – Standard operations
Unit 3.4 – Stopping and parking
Unit 3.5 – Reporting & documentation

IES/N0102

Key Learning Outcomes

At the end of this module, you will be able to:

1. Start and move the backhoe loader to the worksite safely
2. Follow road safety while operating the backhoe
3. Inspect the worksite for safety
4. Know and understand symbols and signs for guiding the backhoe operator
5. Perform various backhoe and loader operations
6. Follow manufacturer's instructions for care and safe operation of the backhoe loader
7. Work carefully so as not to put the health and safety of self or others at risk
8. Maintain a checking/maintenance logbook to record all activities
9. Inform supervisor of problems that are beyond scope of his role
10. Understand importance of reporting
11. Identify, understand and backhoe loader report pre-use checklist
12. Identify, understand and backhoe loader report worksite inspection checklist

UNIT3.1: Starting and Proceeding to Worksite

Unit Objectives

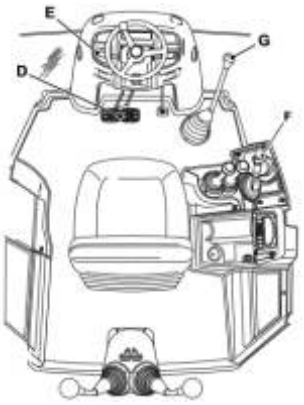
At the end of this unit, you will be able to:

1. Start and move the backhoe loader towards the worksite safely
2. Follow basic road rules and signage

3.1.1 Starting for the Worksite

Step 1–Be sure that the area around the backhoe loader is clear of bystanders and obstacles

Step 2–Using the multi-purpose joystick, raise the lift arm/attachment. Keep the attachment as near to the ground as possible for good stability and visibility.



Step 3– Adjust the seat properly and fasten the seat belt.

Step 4–Select 2 or 4 wheel drive

Step 5–Engage a gear using gear lever G

Step 6–Push the brake pedal(s) D hard down

Step 7–Lift the forward/reverse lever E from its detent position and select forward or reverse.

Step 8–Release the park brake F

Step 9–Make sure it is safe to move off, then release the brake pedals and push down on the accelerator pedal. The machine will move smoothly away

Step 10–While the machine is travelling slowly, check the steering and brakes. Do not drive the machine unless the steering and brakes are working correctly

3.1.2 Road Signs

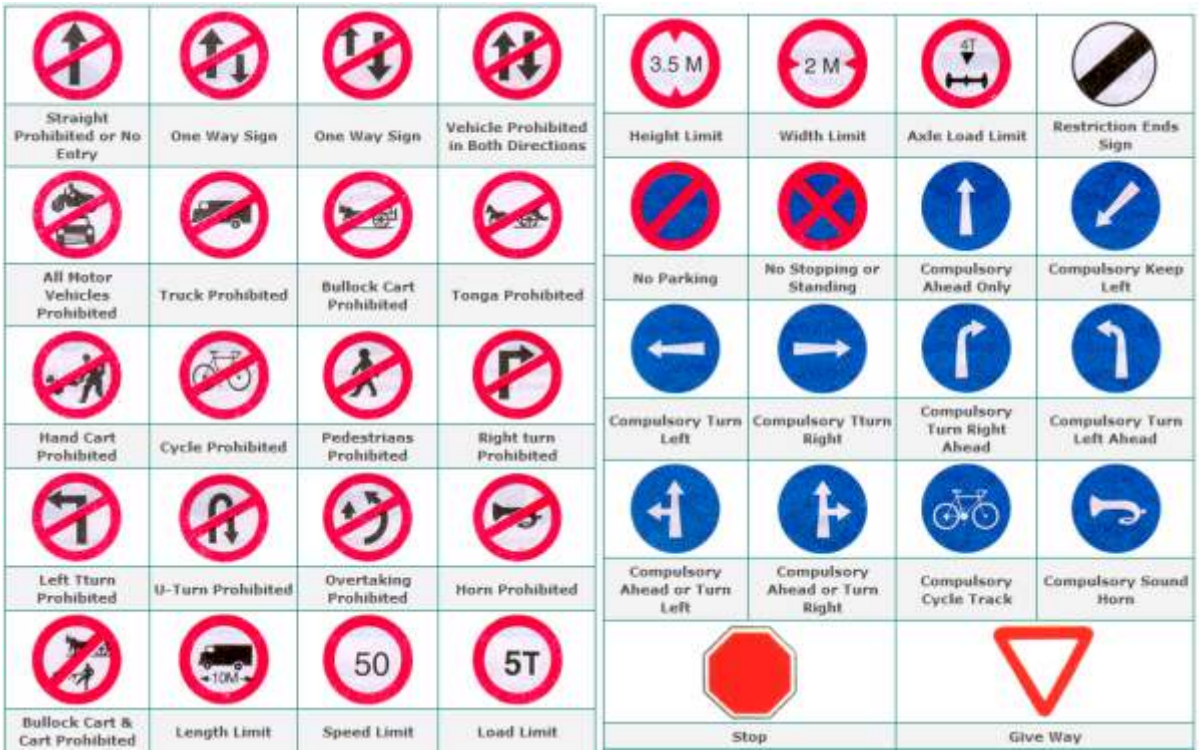


Fig 13

3.1.3 Basic Road Rules

1. Keep wearing your seat belt at all times.
2. Sound the horn twice or switch on the beacon light to alert all personnel in the area of the impending machine operation.
3. Drive on the rightmost side of the road while driving in public roads, where there less traffic mostly.
4. Avoid overtaking; but if required keep safe distance.
5. Reduce the travel speed and avoid road bumps, potholes, hard breaking and sudden steering maneuvers or attachment controls.
6. Do not drive with your headlights on.

UNIT3.2: Inspection of Worksite & Safety

Unit Objectives

At the end of this unit, you will be able to:

1. Inspect the worksite for safe operations
2. Know and understand the communication symbols used to guide the backhoe operator
3. Know the symbols used for site safety

3.2.1 Inspection of the Worksite

Following are the main points to be noted for worksite inspection:

- Backhoe Loader operator to call before starting the digging process as it may disrupt services due to damages to underground cables, pipelines, etc.
- Ground conditions like drop-offs, holes, obstructions, etc., have to be observed and noted.
- Overhead hazards, structures, etc., have to be observed and noted.
- We should inspect the worksite for unauthorised access to people, vehicles, equipment, etc., for safety.
- Safety Items fire extinguisher, PPE, eye wash, first aid kit, etc.
  Keep the backhoe loader at safe distance from plants, etc., to avoid any damages.

Fig 14

3.2.2 Signals to Guide a Backhoe Loader Operator

The signaler should stand in a secure position where he/she can see the load and can be seen clearly by the driver and should face the driver if possible. Each signal should be distinct and clear.

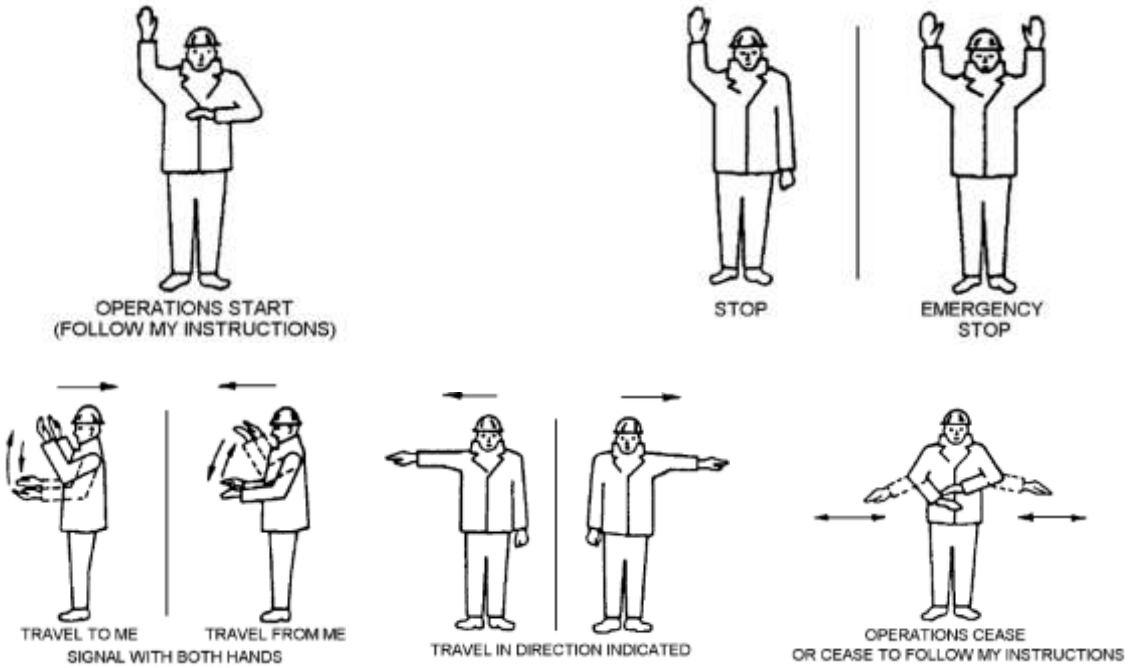


Fig 15

3.2.3 Sample Site Safety Notice

Fig 16

UNIT3.3: Standard Operations

Unit Objectives

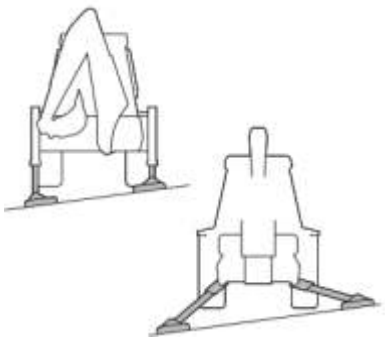
At the end of this unit, you will be able to:

1. Remove and install a bucket in the backhoe and dig
2. Fill the loader shovel
3. Perform the operations like backfilling, dozing, grading, loading, digging, grabbing and spreading.

3.3.1 Working with the Backhoe

Preparing to Use the Backhoe

When choosing a digging position, avoid digging downhill if possible. Whenever possible, dump the load on the uphill side of the excavation. Both these precautions will help to keep the machine stable.



Step 1–When the machine is in the desired position on the site, roll the shovel forward, then lower it to take the weight off the front tyres. If Smooth Ride System is fitted, switch OFF the system then lower the shovel in order to take the weight off the front tyres.

Step 2–Set the transmission to the neutral position. Make sure the lever is in its detent position.

Step 3–Engage the park brake.

Step 4–Turn the seat to face the backhoe. Make sure the seat locks in position.

Step 5–Then lower the stabilisers to raise the rear tyres just clear of the ground. Adjust the stabiliser positions until the machine is level. In soft ground, put heavy duty planks beneath the stabilisers. This will spread the weight and prevent sinking.

3.3.1 Cont...

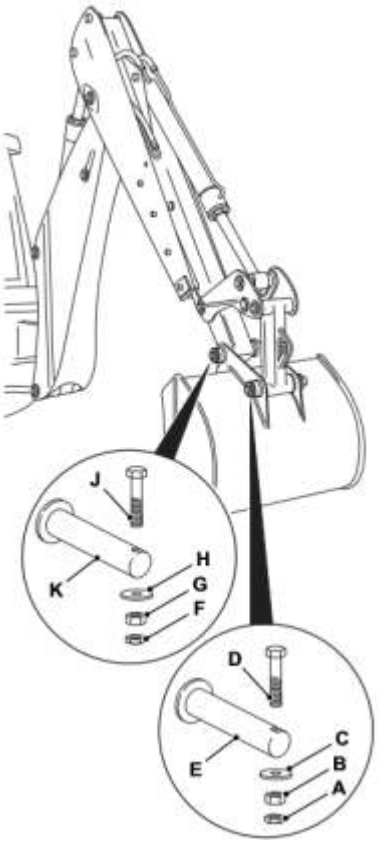
Removing a Bucket

Step 1–Set the backhoe straight behind the machine. Rest the bucket on level ground, with the bucket flat. Block the bucket to prevent its movement.

Step 2–Remove the lock nut A, nut B and spacer C. Remove the bolt D from the pivot pin. Then remove the pivot pin E.

Step 3–Remove the lock nut F, nut G and spacer H. Remove the bolt J from the pivot pin. Then remove the pivot pin K.

Step 4–Withdraw the dipper, using the controls, carefully lift the dipper clear of the bucket.



Installing a Bucket

Step 1–Position the bucket, set the bucket flat on level ground, using a suitable lifting device.

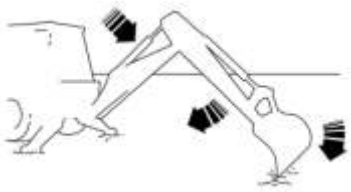
Step 2–Reverse the machine while aligning the dipper end with the bucket hinge area.

Step 3–Engage the dipper, carefully operate the controls to line up the holes in the dipper and tipping link with the holes in the bucket. Fit the pivot pin K. Insert the bolt J. Fit the spacer H, nut G and secure by tightening the lock nut F. After the dipper pivot pin has been locked in, fit the tipping link pivot pin E, bolt D, spacer C, nut B and lock nut A.

3.3.1 Cont...

Digging

Step 1–To start the dig, reach out with the boom and dipper and position the bucket.

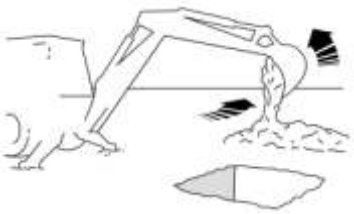


Step 2–Slowly close the bucket and at the same time bring the dipper in. Make sure the bucket stays at the same angle to the ground while it travels. If necessary, at the same time apply a downward pressure on the boom, to increase the digging force on the bucket.

Step 3– Once the bucket is full move the dipper out a little distance. this will avoid the soil building up under the machine.

Step 4–Swing the bucket towards the dump area. Start dumping as the bucket approaches the pile. Do not waste time by dumping too far from the excavation. Dump close to the start dig position. Swing the bucket back to the excavation and start the next dig.

Step 5–Backfill the excavation by loading the bucket with soil from the pile. Do not push the soil with the side of the bucket.



Moving the Machine while Digging Downhill

To move the machine when digging down a hill, raise the excavator stabilisers and shovel and carefully drive the machine to its next position in first gear.
Keep the attachments low to the ground.

3.3.2 Working with the Loader

Preparing to Use the Loader

- When working with the loader, set the backhoe straight behind the machine.
- Keep the shovel of the loader as low as possible to the ground. The increase the stability of the machine and visibility of the road
- Whenever possible, travel in reverse when you are carrying a loaded shovel downhill. Travel forward when you are going uphill. With heavily loaded shovels, do not travel faster than 8 km/h.
- Loader shovels without forks fitted, lugs A must not be used for lifting, towing or tie down points under any circumstances.

Filling the Loader Shovel

- On hard surfaces, select Float. As the shovel enters the pile, start rolling the shovel back while raising it at the same time. This will sweep the shovel up the pile, gathering material as it goes.
- When entering a stockpile, pressing the hydraulic flow rate selector switch to LO will give more tractive force to the loader.
- Press the transmission dump switch for more power and to speed up the operation. Fill the the shovel in one pass to reduce the work time. When moving the load, roll the shovel right back to prevent spillage.
- When you are loading from a pile of loose material, start at the bottom and follow up the face as shown. Approach the pile with the shovel level and skimming the ground.
  In tightly packed material, start at the top and work down.
- When removing material from a stockpile, start at a shovel's height from the base. Once the height of the stockpile has been reduced, begin loading from the base.

3.3.2.1 Backfilling

Step 1–When back filling on a slope, pile the material on the high side of the trench if possible.

Step 2–Set the shovel level to the ground.

Step 3–Select a shovel height and gear speed which will give maximum depth of cut without over loading the engine.

Step 4– Always work at right angles to the trench, so that shovel's width can be filled at a time.

Step 5–Leave any spillage until the trench is filled.

Step 6–Use the spillage to finish the job by driving the length of the trench with the shovel low to the ground.

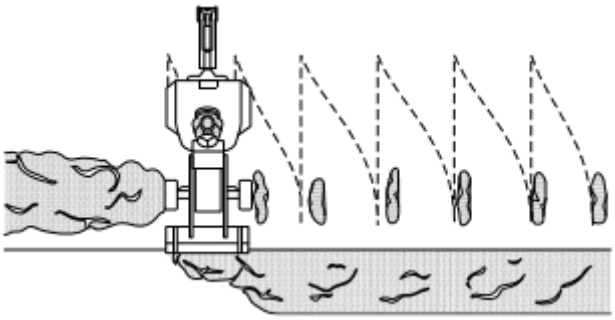


Fig 17

3.3.2.2 Dozing & Grading

To doze, open the clam and drive the machine forward

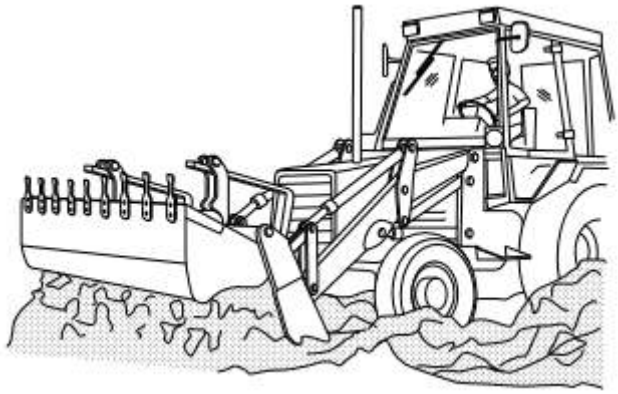


Fig 18

To grade , open the clam and drag the shovel backwards. When the shovel is full, roll it back and close the clam

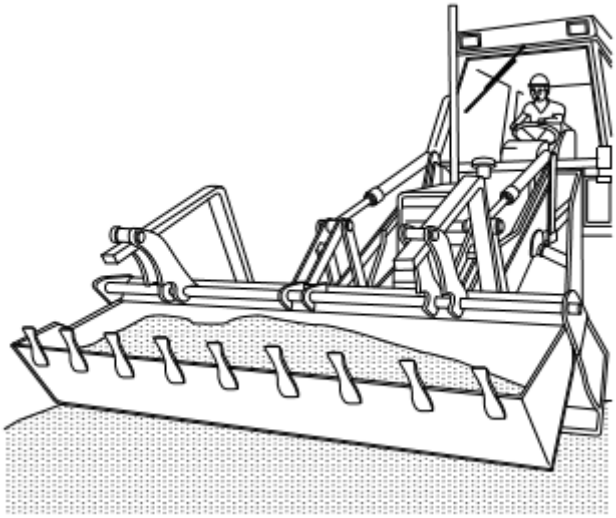


Fig 19

3.3.2.3 Loading and Digging

The 6 in 1 clam shovel allows you to load, dig, grab, grade, doze and spread without changing attachments. With the clam closed, the shovel can be used as a conventional shovel. For higher dumping, open the clam instead of rolling the shovel

Fig 20

3.3.2.4 Grabbing

Open the clam and set the shovel directly above the object to be grabbed. To grab the object, lower the shovel and close the clam

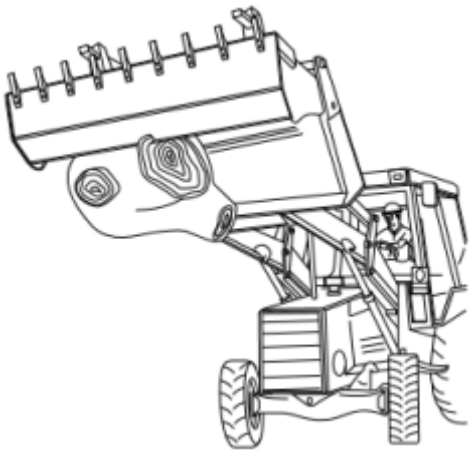


Fig 21

3.3.2.5 Spreading

Load the shovel with the material to be spread. The indicator A shows the clam opening in centim etres

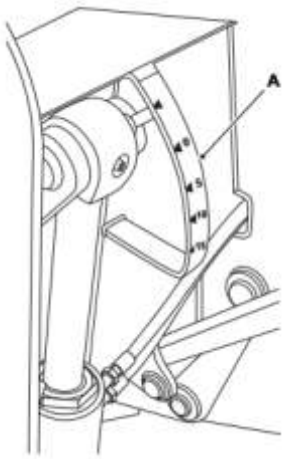


Fig 22

Set the clam opening to suit the size of material and rate of flow. Drag the shovel backwards, allowing it to discharge an even layer of material as it goes

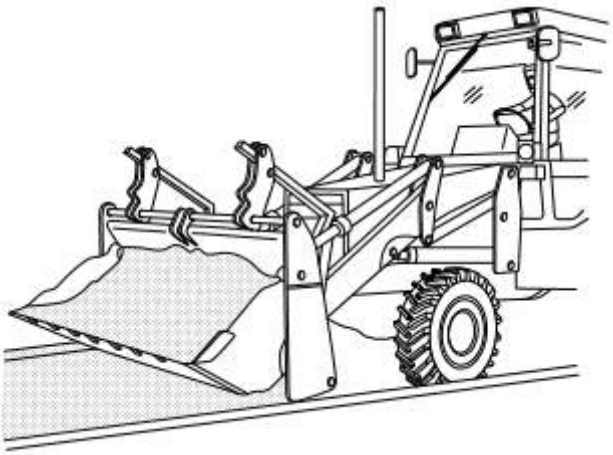


Fig 23

UNIT3.4: Stopping & Parking

Unit Objectives

At the end of this unit, you will be able to:

1. Stop and park the backhoe loader safely

3.4.1 How to Stop and Park the machinesafely?

Step 1–Bring the machine to a complete stop on a level surface. Avoid parking on an incline or Hill-side, but if this is not possible, park across the slope and block the tires

Step 2–Ease up on the accelerator pedal A and down on the brake pedals B to bring the machine to a smooth stop. Keep the foot brakes on until the park brake has been pulled on

Step 3–Pull the park brake lever C fully up. Make sure that the park brake indicator lights up. Release the foot brakes

Step 4–Set the forward/reverse lever E to neutral. Make sure the lever is in its detent position

Step 5–Lower the stabiliser legs until they just touch the ground

Step 6–Lower the backhoe loader arms and backhoe assembly to the ground. It is recommended that the backhoe is positioned with the bucket fully open, boom and dipper fully extended

Step 7–If you are leaving the machine, make sure that all switches are set to off. If necessary, leave the hazard warning and/or side lights switched on. Remove the starter key D

Step 8–Use the handholds and step when you climb down from the machine. If you are leaving the machine, close and latch all windows and lock both doors. Make sure that the filler cap is locked on

Step 9–At the end of a working cycle or if the machine is being left unattended, provided the lights are not required remove the battery isolator key (if fitted)

UNIT3.5: Report and Document Daily Activities

Unit Objectives

At the end of this unit, you will be able to:

1. Identify and understand backhoe loader pre-use checklist
2. Identify and understand backhoe loader worksite inspection checklist

3.5.1 Pre-Use Checklist

Pre-use Inspection Checklist – Loader Backhoe

Operator pre-use checklist – perform prior to each use

Note general vehicle condition. Clear away all collected debris and steam clean if necessary. Check for mechanical damage and loose or leaking components. Report faults to your supervisor or the maintenance department, whichever your company requires.

Before starting engine, check the following:

VISUAL INSPECTION	STATUS OK	NO	N/A	REMARKS
Walk-around inspection (warning decals, SMV sign, etc.)	☐	☐	☐	
Front end/back end (visual inspection)	☐	☐	☐	
Wheels, tires & lug nuts (condition, pressure)	☐	☐	☐	
Engine (check oil level & for leaks)	☐	☐	☐	
Transmission (check oil level & for leaks)	☐	☐	☐	
Engine belts (check for adjustment/wear)	☐	☐	☐	
Air cleaner (check indicator, clean or change A/R)	☐	☐	☐	
Fuel filter (service as required)	☐	☐	☐	
Radiator (check coolant level & for leaks)	☐	☐	☐	
Hydraulic tank (check oil level & for leaks)	☐	☐	☐	
Fuel tank (drain off moisture & sediment)	☐	☐	☐	
Lubricate chassis (as required, refer to lube chart)	☐	☐	☐	
ROPS/cab (check windows, step, doors)	☐	☐	☐	

After starting engine, check the following:

AFTER STARTING	STATUS OK	NO	N/A	REMARKS
Engine (does it sound normal?)	☐	☐	☐	
Instruments (check for normal readings)	☐	☐	☐	
Air intake system (check for leaks or damage)	☐	☐	☐	
Exhaust system (check for leaks and excessive smoke)	☐	☐	☐	
Wipers & lights (spotlights, turn signals, etc.)	☐	☐	☐	
Horn & back-up alarm	☐	☐	☐	
Controls (check for normal operation; loader & backhoe)	☐	☐	☐	
Transmission (direction & speed range)	☐	☐	☐	
Brakes (parking & service brakes)	☐	☐	☐	
Steering	☐	☐	☐	

Note anything abnormal or in need of repair: _____

_____

Operator Name: _____

Vehicle #: _____ Hour Meter Reading: _____ Date: _____

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3.5.2 Worksite Inspection Checklist

Workplace Inspection Checklist – Loader Backhoe

Before the loader backhoe is used, and during use, the operator shall check the area for possible hazards such as, but not limited to, the following:

VISUAL INSPECTION	STATUS			REMARKS
	OK	NO	N/A	
Underground utilities (see phone number below)	☐	☐	☐	
Overhead obstructions & high voltage conductors	☐	☐	☐	
Inadequate ground support for weight of machine	☐	☐	☐	
Drop-offs & holes	☐	☐	☐	
Debris	☐	☐	☐	
Presence of unauthorized persons	☐	☐	☐	
Presence of unauthorized vehicles/traffic	☐	☐	☐	
Other possible unsafe conditions:				
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	

Any problems or hazardous conditions that affect the safety of operations shall be reported and corrected prior to commencing work.

Phone number to call before digging: _____

Note anything abnormal or in need of repair: _____

_____

Operator Name: _____

Vehicle #: _____ Hour Meter Reading: _____ Date: _____

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Briefly anwer the following questions.

List steps to move the backhoe loaders.

What are road rules operator must follow.

What all do you inspect in a worksite?

List steps to remove the bucket from a backhoe.

Mention the meaning of these symbols against the box provided.

Fig 24

How do you dig while going downhill?

_____

_____

_____

_____

_____

_____

How do you fill the loader shovel?

_____

_____

_____

_____

_____

_____

How is the loader used for spreading?

_____

_____

_____

_____

_____

_____

What steps to be taken for parking the backhoe loader safely ?

_____

_____

_____

_____

_____

_____

Tips

Following are recommended tips:

- Do not drive the backhoe loader with the door unlatched
- If the engine cranks but does not start fully, ensure starter motor is not operated for more than 35 - 40 seconds at a time.
- Switch off the machine work lights while driving on the road. It can cause inconvenience to others and may lead to accident.

Notes

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4. Maintenance and Troubleshooting

Unit 4.1 – Maintenance schedule
Unit 4.2 – Basic troubleshooting
Unit 4.3 – Reporting & documentation

IES/N0103

Key Learning Outcomes

At the end of this module, you will be able to:

1. Understand the maintenance schedules

2. Do basic troubleshooting of the backhoe loader

3. Understand the importance of machine logs and reporting

UNIT4.1: Maintenance Schedule

Unit Objectives

At the end of this unit, you will be able to:

1. Read and understand a machine schedule

4.1.1 Sample Schedule

The following schedule calls for regular maintenance and lubrication jobs. The intervals (hourly) given in the schedules must not be exceeded. If the machine is operated under harsh and rugged conditions (i.e. Very high and low temperature, dust, water, snow etc.), decrease the time intervals.

Pre-start Cold Checks, Service Points and Fluid Levels

	Operation	10	50	100[1]	500	1000	2000	6000
ENGINE								
Coolant Quality and Level.	- Check	☐	☐	☐	☐	☐		
Cooling System.	- Drain / Refill						☐	☐
Oil level.	- Check	☐	☐	☐	☐	☐	☐	☐
Oil and Filter [2][3]	- Change				☐	☐	☐	☐
Air Cleaner Outer Element [4]	- Change					☐	☐	☐
Air Cleaner Inner Element [4].	- Change					☐	☐	☐
Water Separator and Engine Fuel Filter.	- Drain		☐	☐	☐	☐	☐	☐
Water Separator Fuel Filter.	- Change				☐	☐	☐	☐
Engine Fuel Filter[5].	- Change					☐	☐	☐
Front End Accessory Drive (FEAD) Belt Condition	- Check				☐	☐	☐	☐
Front End Accessory Drive (FEAD) Belt	- Change							☐
Engine Mounting Bolts for Tightness	- Check			☐	☐	☐	☐	☐
All Hoses - Condition	- Check			☐	☐	☐	☐	☐
Radiator[4]	- Clean				☐	☐	☐	☐
Breather Gauze	- Clean						☐	☐
Valve Clearances[5]	- Check / Adjust						☐	☐
Oil Filler and Dipstick Seals[5]	- Check / Adjust						☐	☐
Rocker Cover and Injector Seals[5]	- Change						☐	☐
Injectors[5]	- Change							☐
Injector(s) Leak Off Rail[5]	- Change							☐
High Pressure Fuel Lines[5]	- Inspect							☐
TRANSMISSION, AXLES AND STEERING								
Transmission Oil Level.	- Check	☐	☐	☐	☐	☐	☐	☐
Transmission Oil[6]	- Change			☐		☐	☐	☐
Transmission Filter	- Change			☐	☐	☐	☐	☐
Axle Oil Level (incl. Hubs when applicable) Front[7][8]	- Check			☐	☐			
Axle Oil (incl. Hubs when applicable) Rear [7][8]	- Change			☐		☐	☐	☐
Tyre Pressures and Condition	- Check	☐	☐	☐	☐	☐	☐	☐
Wheel Nut Security.	- Check	☐	☐	☐	☐	☐	☐	☐
Front Hub Bearings	- Check			☐	☐	☐	☐	☐

4.1.1 Cont...

	Operation	10	50	100[1]	500	1000	2000	6000
Transmission Strainer	- Clean			☐		☐	☐	☐
Steer Axle Movement and Shimming[3]	- Check			☐	☐	☐	☐	☐
Steer Axle Pivots and Linkages[3]	- Grease			☐	☐	☐	☐	☐
Drive Shafts[3]	- Security and Grease	☐	☐	☐	☐	☐	☐	☐
Front Axle Main Pivot	- Grease	☐	☐	☐	☐	☐	☐	☐
HYDRAULICS								
Oil Level[10]	- Check	☐	☐	☐	☐	☐		
Oil	- Sample, Change						☐	☐
Oil Filter	- Change			☐	☐	☐	☐	☐
Rams - Chrome Condition	- Check			☐	☐	☐	☐	☐
Hydraulic Oil Cooler	- Clean				☐	☐	☐	☐
Hydraulic Oil Strainer	- Clean						☐	☐
Hydraulic Tank Filler Cap (with integral filter)	- Check						☐	☐
Servo Joystick Lever Bush [5]	- Check/Grease				☐	☐	☐	☐
BRAKES								
Brake Fluids Level	- Check			☐	☐	☐	☐	☐
Brake Fluids Level	- Change						☐	☐
Park Brake	- Check / Adjust			☐	☐	☐	☐	☐
ELECTRICS								
Battery Electrolyte Level (if applicable)	- Check		☐	☐	☐	☐	☐	☐
Wiring for Chaffing/Routing	- Check		☐	☐	☐	☐	☐	☐
Battery Terminals for Condition and Tightness	- Check			☐	☐	☐	☐	☐
BODYWORK AND CAB								
All Pins and Bushes	- Check / Grease	☐	☐	☐	☐	☐	☐	☐
Door/Window Hinges	- Lubricate				☐	☐	☐	☐
All Cables	- Lubricate				☐	☐	☐	☐
Cab Heater Fresh Air Filter (if applicable)[4]	- Clean / Change				☐	☐	☐	☐
Air Conditioner Condensor [4]	- Clean					☐	☐	☐

4.1.1 Cont...

	Operation	10	50	100(1)	500	1000	2000	6000
Cab Air Conditioning Recirculation Filter (if fitted) (4).	- Clean/Change		☐		☐	☐	☐	☐
Kingpost clamp .	- Check / Adjust			☐	☐	☐	☐	☐
Door - Fit and Catches	- Check			☐	☐	☐	☐	☐
Cab Seat - Operation	- Check			☐	☐	☐	☐	☐
Windscreen Washer Fluid Level (if fitted)	- Check	☐	☐	☐	☐	☐	☐	☐
Condition of Paintwork	- Check			☐	☐	☐	☐	☐
Stabiliser Legs (Sideshift)	- Check / Adjust		☐	☐	☐	☐	☐	☐
Machine Generally	- Check / Clean	☐	☐	☐	☐	☐	☐	☐
Wear Pads (with Extended Dipper) (if fitted)	- Grease	☐	☐	☐	☐	☐	☐	☐

(1) First 100 Hours Service only, to be completed by your Distributor.
(2) If operating under arduous conditions, change the engine oil and filter every 250 hours.
(3) The oil service interval will be affected if there is a high sulphur content in the fuel. Refer to Fuel System for more information.
(4) If operating in dusty working environments, change more frequently. Change the inner element whenever the outer element is being changed.
(5) Jobs which should only be done by a specialist.
(6) After a major transmission repair, the new oil should be run to operating temperature and changed again to remove any contamination which entered during the repair. Change the oil and filter after a further 100 hours if the oil was heavily contaminated because of, or from the failure (e.g. water contamination).
(7) Check for leaks every 50 hours, check level if leaking.
(8) After a hub repair, the new oil should be run to operating temperature and changed again to remove any contamination which entered during the repair. Change the oil again after a further 100 hours to remove any bedding-in wear. This is particularly important if new brake plates have been fitted.
(9) The axles and driveshafts are factory greased with a high performance grease, if during service a standard grease is used, then the interval must be reduced to every 50 hours, contact your Distributor for advice.
(10) Check the hydraulic fluid level with the loader and backhoe in the travel position.

UNIT 42: Basic Troubleshooting Procedure

Unit Objectives

At the end of this unit, you will be able to:

1. Troubleshoot the backhoe loader for basic problems related to the engine, indicator lamp, seal and hose

4.2.1 Engine Troubleshooting

Troubleshoot helps to increase the efficiency of the backhoe leader and reduce the operating time. The person performing this operation must have lot of practice and good observation skill to rectify the defects which will help to take the corrective action.

Problem	Possible Causes	Corrective Action
Engine does not turn over	Drive direction switch in forward / reverse	Place drive direction switch in neutral
	Dead battery	Charge or replace battery
	Battery disconnect switch in open position or malfunctioning	Place battery disconnect switch into closed position—Repair or replace if necessary
Engine stops when operator leaves seat	Parking brake not applied or parking brake malfunction	Apply or repair parking brake
Engine turns over but will not start	Engine cranking speed too slow	Check battery and charge/replace as necessary—tighten battery terminals
	Fuel tank empty	Fill tank and vent fuel system if necessary
	Fuel line leakage	Tighten all threaded connections and clamps
	Fuel filter restricted	Replace filter
	Fuel pump malfunction	Contact dealer
Engine overheating	Air filter restricted	Replace filter(s)
	Low coolant level	Add coolant
	Loose fan belt	Tighten fan belt
	Dirty radiator	Clean radiator
Engine running but backhoe loader will not drive	Parking brake applied	Release parking brake
	Parking brake switch malfunction	Replace parking brake switch
	Operator not in seat	Sit in operator seat

Table 2

4.2.2 Indicator Lamp Troubleshooting

Indicator Activated	Possible Causes	Corrective Action
Engine oil pressure	Engine oil pressure too low	Stop engine immediately; check oil level and add oil if necessary; check oil pump
	Engine oil level too low	Add oil
	Oil pump malfunction	Contact dealer
Hydraulic oil temperature	Temperature is too hot	Check cooling system for debris in radiator
		Check hydraulic oil level
Water temperature	Air filter plugged	Replace air filter
	Coolant level too low	Add coolant
Battery voltage	Alternator not charging properly	Adjust v-belt tension; check alternator
Low fuel	Low fuel	Add fuel

Table 3

4.2.3 Seal and Hose Troubleshooting

Problem	Possible Causes	Corrective Action
Oil, coolant or fuel leakage	Loose hose connection(s)	Tighten hose connections
	Damaged seals or hoses	Change seals/hoses as necessary
Hydraulic fluid leakage	Loose fittings	Tighten hydraulic connections
	Seals, hoses or lines damaged	Change seals, hoses or lines as necessary

Table 4

UNIT4.3: Reporting & Documentation

Unit Objectives

At the end of this unit, you will be able to:

1. Maintain a checking/maintenance logbook to record all activities
2. Inform supervisor of problems that are beyond scope of his role

4.3.1 Maintaining Machine Logs

Machine log maintains the history of the entire machine. It acts as a guide in times of emergency when the backhoe loader goes out of order. The log helps the technician ascertain the condition of the machine, what parts consumables, etc., have been changed.

Date	Hours	Service Procedures

4.3.2 Informing Supervisor if Problem is Unresolved

Inform the supervisor if you are not able to resolve the problem that has occurred with the backhoe loader. The supervisor is effectively trained and well-versed to tackle the condition. In case he is unable to do so he will co-ordinate with the dealer for a solution or whatever he deems fit in such a situation.

Operator must inform the supervisor in the following cases:

- The machine is not functioning properly and the operator is unable to discover the problem
- Even after diagnosing the operator is unable to rectify the faults
- The required spares and or consumables are not available
- The operator is not trained to do a specific task

Briefly anwer the following questions.

How do you fix engine over-heating?

_____

_____

_____

_____

_____

_____

What are the possible causes of engine coolant leakage?

_____

_____

_____

_____

_____

_____

Explain the importance of maintaining machine logs?

_____

_____

_____

_____

_____

_____

Why should the operator inform the supervisor if he / she is unable to resolve issues with a backhoe loader?

_____

_____

_____

_____

_____

_____

Tips

Following are recommended tips:

- Visit a construction site and have a detailed look at the backhoe loader in the presence of the operator
- Always follow mandatory safety shutdown procedure
- Always follow recommended safety guidelines and warning signs by the manufacturer

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5. Worksite Health & Safety

Unit 5.1 – ESH policies and guidelines
Unit 5.2 – Types and uses of PPE
Unit 5.3 – Common hazards and preventive measures
Unit 5.4 – Segregation and disposal of waste
Unit 5.5 – Basic fire-fighting equipment and use
Unit 5.6 – Common injuries and appropriate first aid

IES/N7601

Key Learning Outcomes

At the end of this module, you will be able to:

1. Understand the safety guidelines and precautions a backhoe operator has to follow

2. Identify and understand the use of Personal Protective Equipment (PPE)

3. Understand measures that can help avoid site mishaps

4. Operate safely with waste at work

5. Administer first aid for common injuries on worksite

5.1: ESH Policies and Guidelines

Unit Objectives

At the end of this unit, you will be able to:

1. Understand the safety precautions that a backhoe loader needs to follow while at work

2. Understand the various Dos and Don'ts while working with the machine

5.1.1 Safety Precautions to be Taken

It is importance for both employee and employer involved in the machine operations and maintenance to safeguard themselves, learn safety procedures and encourage safe practices within their workplace. This prevents many accidents taking place due to carelessness and ignorance.

The **Backhoe Operator** too has a duty to:

1. Be responsible and careful to avoid himself or others life getting into risk.

2. The operator must co-operate with his employer or any other person to perform their duties in health and safety.
3. Do not hamper or handle roughly any safety device or equipment.

4. Not intentionally or recklessly interfere with anything provided in the interest of health, safety and welfare.

5. Follow the instructions provided by employer or manufacturer for safe operation of the machine.

6. Inform about the situation which is risk to the health and safety for himself or others immediately to the employer.

7. Immediately report any defects in plant and equipment which might endanger safety.

5.1.2 Do's and Don'ts During Operation

Do

- Comply fully with instructions given by site managers and supervisors
- Follow the manufacturer's instructions (operator manuals) for the specific backhoe loader you are operating
- Take safety precautions when using your machine prior to, during and after work
- Operate within the machine's capabilities.

Don't

- Operate any machine unless you have received appropriate training and are authorised to do so
- Ignore hazards
- Misuse, tamper or interfere with your machine and any associated safety equipment provided
- Endanger your own health and safety, or that of anyone else, by being negligent
- Allow anyone to hitch a ride in the cab
- Allow anyone to ride on the backhoe loader blade
- Change gears when you are travelling downhill
- Work or drive too close to banks or trenches where there is danger of collapse
- Indulge in games or horseplay
- Push material directly into a deep excavation: leave material at the edge and use the next load to push the first load over instead
- Run the engine in an enclosed area for long periods
- Leave the machine unattended with the engine running.

UNIT 5.2: Types and Uses of PPE

Unit Objectives

At the end of this unit, you will be able to:

1. Know about common personal protective equipment and their use

5.2.1 Personal Protective Equipment

PPE is equipment worn to minimise exposure to a variety of hazards. List of PPE equipment such as Safety gloves, Safety footwear, eye protection, protective hearing devices (earplugs, muffs) hard hats, Safety helmets, Respiratory protecting equipment, Safety harnesses and Full body suits.

Safety Helmets (Don'ts)

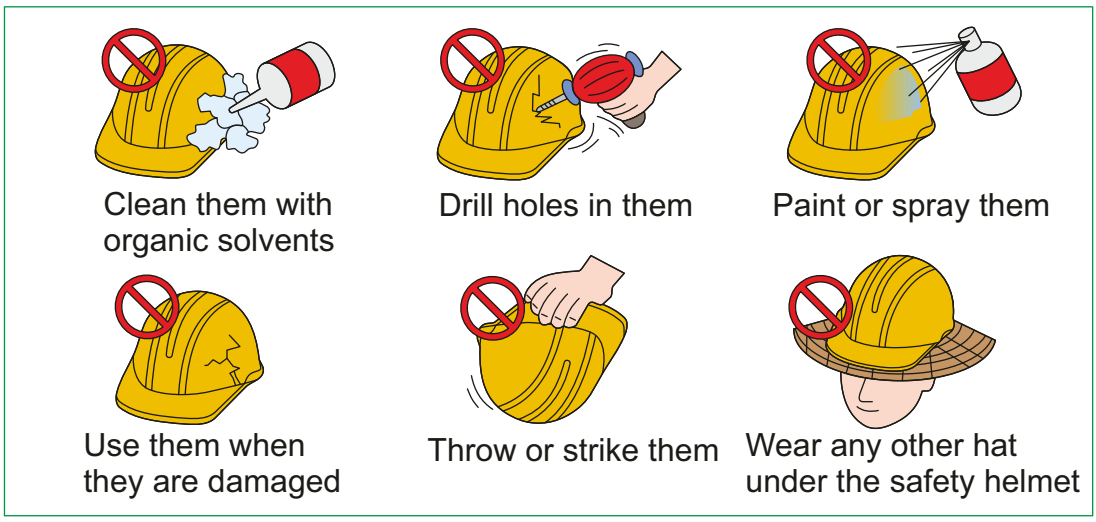

Fig 25

Eye Protectors

Fig 26

5.2.1 Cont...

Ear Protectors

Protective Gloves

Safety Footwear

Protective Clothing

Fig 26

5.3: Common Hazards & Preventive Measures

Unit Objectives

At the end of this unit, you will be able to:

1. Identify the common hazard at work site
2. Understand the necessary Dos and Don'ts that may help avoid accidents

5.3.1 Accident Prevention and Control Do's and Don'ts

Common accidents with backhoe loaders are overturns, falls, runovers and collide with other objects and fellow persons. Follow some basic Do's and Don'ts to prevent accidents

Do

- wear all protective clothing and personal safety equipment issued to you or required by your working conditions
- understand and follow safety procedures when working on site and using plant and work equipment
- ensure you are fully aware of the job requirements and how they need to be carried out know where to get help. Know the first aid and emergency procedures
- study the manufacturer's operator's manual for using your plant and equipment. If the manual is not provided, ask your supervisor or the suppliers of the plant / equipment to supply one
- Report faulty / unsafe plant or equipment and any dangerous incidents
- Safe use of plant equipments to avoid any effect on its stability.
- Watch out the consequences of your actions on others in the workplaces.
- Maintain a record of personal injuries in an accident record book or any equivalent record book. Make sure even a slight injury must be recorded.
- Attend all training courses being organized by your employer. It is possible to learn new techniques and safety practices at any age!!

Don't

- Use plant or work equipment that you have not been trained to use
- Overload any plant or work equipment either by lifting or loading
- Operate plant and work equipment unsafely or at unsafe speeds
- Throw or drop objects from plant or work equipment
- Attempt to carry out work on moving parts of plant or work equipment with the safety guards removed
- Indulge in horseplay on plant or work equipment
- Attempt to operate any type of plant or work equipment under the influence of drugs, alcohol or any other substance, which affects your health or judgment
- Ignore warning instructions or safety signs.

5.4: Segregation and Disposal of Waste

Unit Objectives

At the end of this unit, you will be able to:

1. Identify different types of waste and there segregation
2. Understand the procedure for correct disposal of waste

5.4.1 Waste Management

Waste Management is an approach that aims to reduce the waste, recycling and safe disposal of hazardous waste for environmental and economical beneficial. A backhoe loader operator needs to remember some basic waste management rules:

- Use ONLY authorised waste disposal sites
- Never store lubricants in open or unlabelled containers.
- Never pour used engine oil into sewers, drains or on the ground.
- Look out for the proper bin (black in case of general rubbish) in case of non-industrial waste at your worksite. Most bins clearly mention the waste that can go in it.

Fig 27

5.5: Basic Fire-Fighting Equipment and Use

Unit Objectives

At the end of this unit, you will be able to:

1. Identify different types of fire-fighting equipment
2. Understand the procedures of correct operations of these equipment

5.5.1 Fire Extinguisher

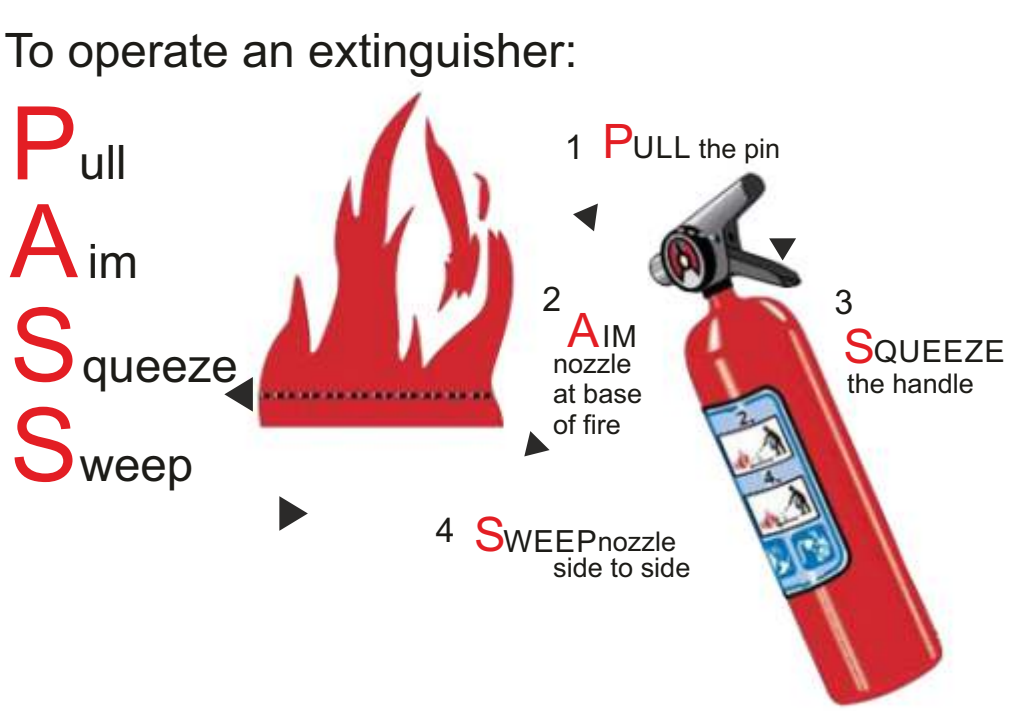

Fig 28

5.5.2 Sand Bucket

Fig 29

5.6: Common Injuries and Appropriate First Aid

Unit Objectives

At the end of this unit, you will be able to:

1. Identify the various items of the first aid kit
2. Administer first aid for common injuries

5.6.1 Basic First Aid Kit

A backhoe loader operator must have basic knowledge of emergency medicines that can be used as primary medical service for cuts, wounds, fever, etc.

Scissors

Glove

Tweezers

Anticeptic wipes

Roller Bandage

Thermometer

Alcohol

Antibiotic ointments packets(approx 1g)

Fig 30

5.6.2 Administer Aid

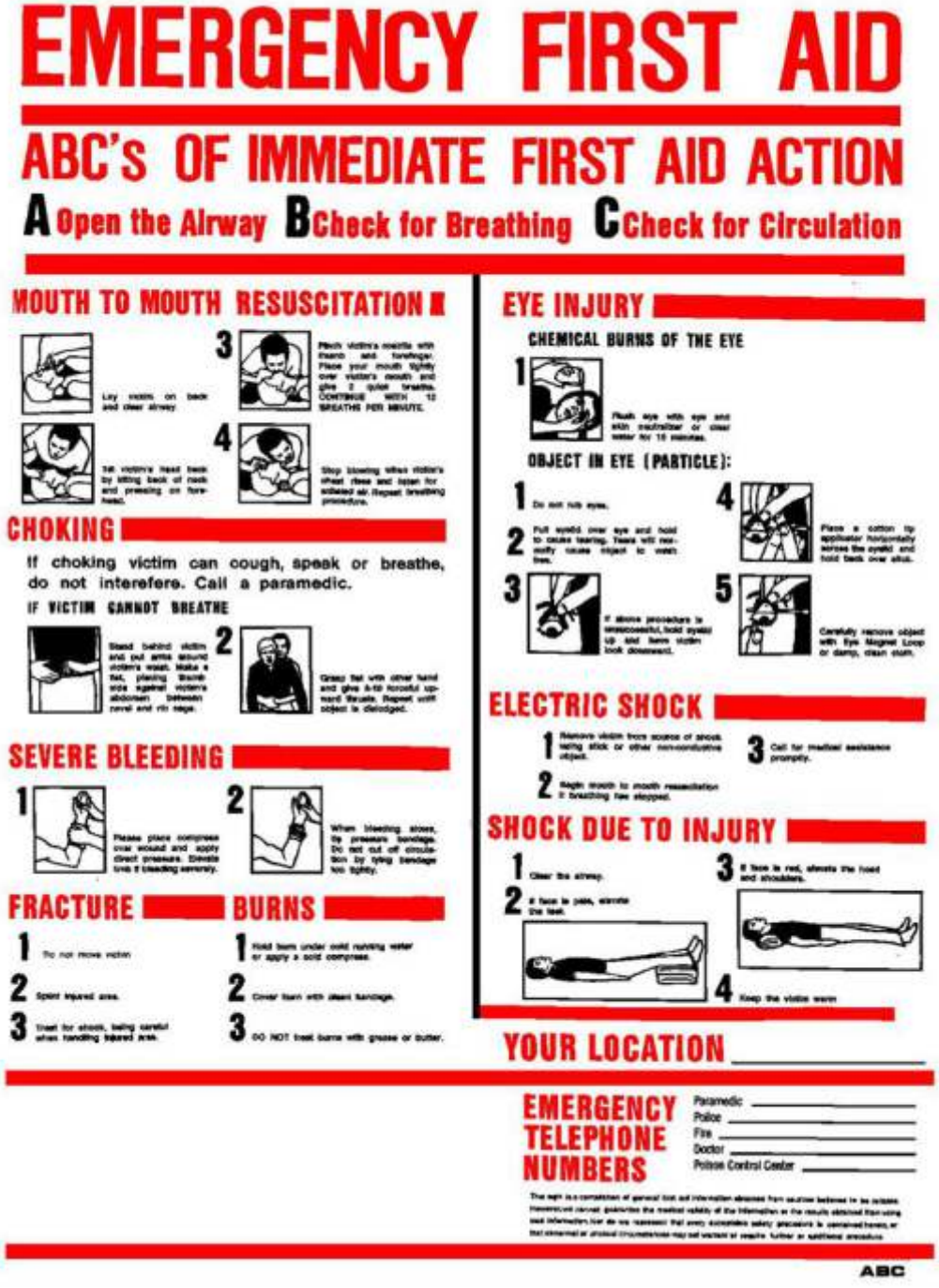

Fig 31

Briefly anwer the following questions.

List the steps to be taken by backhoe loader operator to create a safer work place?

List some common PPE?

What precautions a backhoe loader operator has to follow when dealing with waste?

What makes up a basic first aid kit?

Tips

Following are recommended tips:

Wash the skin exposed to oil in a warm soapy water. Do not use petrol, diesel fuel or paraffin to clean your skin

Notes

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