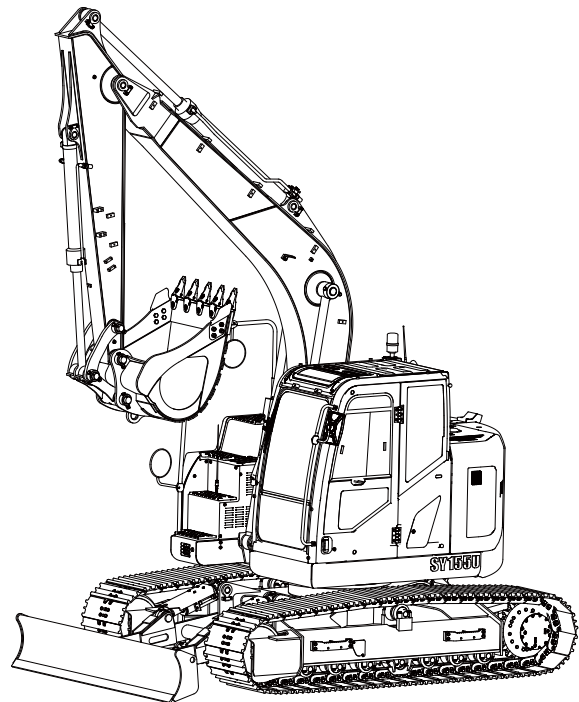




Quality Changes the World

Crawler Hydraulic Excavator

SY155U



Operation and Maintenance Manual



SY155U Hydraulic Excavator

Operation and Maintenance Manual

 WARNING

Please read and follow the safety precautions and instructions in this manual and on the machine nameplate. Otherwise, severe injuries, deaths or property loss may occur. Please keep this manual together with the machine for future reference.

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Responsibility Division

Important statements

The crawler hydraulic excavator is a multipurpose machine for earthwork construction, intended for earth excavation and loading, land leveling, slope finishing, hoisting, crushing, demolition, ditching, and widely applied in highway and railway construction, bridge construction, urban construction, and construction of airports, ports and water conservancy. The machine has the features of bulldozers, loaders and cranes, and can replace them during operation. The machine is not intended for other purposes than those designated. We do not accept any responsibility for any consequence of use for purposes other than those designated.

We do not accept any responsibility for the following:

- Consequences of failure to correctly use the machine according to the instructions in the manual.
- Consequences of unauthorized retrofitting or modification of the machine.
- Equipment damage or accidents caused by failure to use genuine accessories or use of untested or unauthorized accessories or tools.
- Machine faults or damage because of nature disasters (earthquakes, typhoons, etc.), wars and other force majeure.

We cannot foresee all risks that may occur at the working site; therefore, the machine operators and customers shall pay high attention to safety issues.

The regions where the machine is used and their local governments may have more strict operating provisions which shall be observed if they conflict with these rules for safe operation.

Responsibilities of our manufacturer

- Ensure that the machine quality is acceptable and accompanying documents are accurate.
- Fulfill the after-sales service commitment, and document all the maintenance and repair work performed by after-sales service personnel.
- Provide trainings to the equipment operators and maintenance staff as required.

Responsibilities of customers or other authorized personnel concerned

- Personnel concerned shall be well trained and fully acquainted with the Parts Catalogue and the Operation and Maintenance Manual before operating and maintaining the machine.
- Make sure that personnel operating and maintaining the machine are competent and aware of their respective responsibilities.
- Regularly inspect the safety awareness of personnel concerned in working.
- Immediately stop the machine in the event of any fault influencing safety.

- Our service personnel have the right to carry out the relevant safety check on the machine when necessary.
- Besides checks specified by Sany, carry out the relevant inspection according to the related regulations by the country or region where the machine is used.
- Make sure that the machine is timely maintained and repaired.
- Make a use planning carefully and consciously.

Responsibilities of all the operation personnel

- In the event of any abnormalities that may cause abnormal operation of the machine or pose a potential risk, timely report to the supervisor, and rectify in time if possible.
- All staff working around the machine must obey all the warning signals and caution for safety of themselves and others.
- All the operation personnel shall be acquainted with the content and procedures of work activities.
- Observe whether there are dangerous situations such as high voltage wires, irrelevant personnel, poor ground condition, and timely warn the operators and signalmen of them.

Responsibilities of management

Make sure that only operators that are well trained, fully understand the content of this manual, enjoy good health and possess the operation certificate can operate the machine.

- Make sure that only operators with good judgment, cooperation consciousness and psychological quality can operate or maintain the machine.
- Make sure that signalmen have good visual and audible judgment, know well standard commanding signals and send clear and accurate signals, and possess rich experience in hazard identification and instruct operators to avoid in time.
- Make sure that assistants can correctly determine the machine model and working condition, and choose an appropriate machine.
- Assign the corresponding safety responsibility to each operation personnel and ask them to timely report unsafe factors to the supervisor.

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SANY

Foreword

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 **WARNING**

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this machine and before operation or maintaining it. Failure to do this could result in death or serious injury.

1. Foreword

1.1 General

This manual is a guide for correct use of the machine and mainly provides technical and safety information required in operation. Please be sure to read each part of it carefully.

Only qualified and experienced operators with an official license (according to local laws) can operate the machine.

Make sure that the relevant laws and regulations of the state, a province, an autonomous region or a municipality are always observed in operation of the machine, and the operation safety information and instructions contained herein are only provided as suggestions and cautions.

We cannot foresee all situations in operation and maintenance that may pose risks. Therefore, the safety information in this manual and on the machine do not contain all the possible safety measures. When methods or actions other than those specifically recommended or allowed in this manual are used or taken, you are obliged to take necessary measures to ensure safety.

Unauthorized retrofitting or abuse of the machine may influence the performance or even cause greater safety hazard, for instance, settings more than the specified fuel quantity may overload the machine. Please drive and use the machine carefully, as faulty operation and misuse may also cause damage, and we do not accept any responsibility for the loss thus caused.

The machine referred to in this manual is used for various operations under normal conditions; please do not use it in an inflammable and explosive place or an area with asbestic dust.

This machine is subject to the electromagnetism and capacitance test according to EN13309-2000. Therefore, all the unapproved electronic auxiliary devices such as communication apparatus shall be tested before installation and use to ensure that they will not produce electromagnetic interference to the machine.

All data, charts and specifications in this manual are the latest product information available at the time of publication. We reserve the right to alter the above information without notice. Please contact us or our authorized dealer for the latest product information or the problems related to the information covered in this manual.

Scope of application of machine of normal series: altitude below 2000 m, atmospheric temperature: -20°C ~ 40°C.

⚠ CAUTION

Before operation and maintenance, the operators and maintenance personnel must do the following:

- Be sure to read through and understand this manual.
- Read and fully understand the safety notices in the manual and safety labels on the machine.
- Shall in no circumstances use the machine for applications or operations forbidden in the manual.
- If fuel amount, particulate size or latitude exceeds the upper limit specified for the model and application, it may result in injuries and is not covered by the warranty.
- Always keep the manual in the cab for reference at anytime.
- Immediately contact our authorized dealer for reissue or replacement if this manual is lost or stained and thus unreadable.
- This manual shall be deemed as a permanent part of the machine, so please be sure to hand it over to a new user together with the machine if you resell it.
- Hydraulic excavators that provided by Sany Heavy Machinery Co., Ltd. to the country of purchase meet all applicable regulations and standards. Purchasing from another country or a person of another country may deprive you of some safety devices and specifications necessary for use in your country. If you have any questions about hydraulic excavator's compliance with national standards and regulations for use, contact your Sany Heavy Machinery Co., Ltd. authorized distributor before using it.

1.2 Safety information




For safe use of the machine, this manual contains and explains the safety precautions and labels attached to the machine, to provide a description of potential hazards involved and methods to avoid them.

Before operation and maintenance, users and after-sales service personnel must get familiar with the warning signs and symbols on the machine, strictly observe the safety rules and recommendations in this manual, and actively take safety precautions and countermeasures to minimize the risks of personal injuries, machine damage due to improper repair or the risks due to unsafe factors.


1. Safety warning

A safety warning comprises an attention symbol and signal words, used as a reminder of potential hazards that may cause personal injuries or damage. Safety warnings can be classified by signal words according to the severity of hazardous situations.

Three types of signal words are used in this manual: DANGER, WARNING and CAUTION, each representing the following:

-  Existing dangers that, if not evaded, will cause deaths or severe injuries.
-  Potential dangers that, if not evaded, may cause deaths or severe injuries.
-  Potential dangers that, if not evaded, may cause light or moderate injuries. The word “caution” can also be used in some occasions as a reminder of unsafe operations that may cause personal injuries, damage to the machine and environment.

Examples of safety warnings

 WARNING
<ul style="list-style-type: none"> • Before standing up from the driver seat, make sure to set the control lever to the LOCK position. • Severe injuries or deaths can occur if the control lever is not locked and touched by accident.

2. Safety decals

A safety decal is attached to the machine to remind the operators or maintenance personnel of potential hazards during operation or maintenance.

The “literal safety decals” and “graphic safety decals” are used on the machine to represent safety measures.

a. Examples of literal safety decals



Fig.1-1

b. Examples of graphic safety decals

Safety icons are graphic representations of the severity of hazards, equivalent to the literal statement. Graphics are used in these safety icons to keep operators or maintenance personnel informed of the type and severity of hazards.

In the figure on the right, the safety icon above represents the type of hazard and the icon below indicates the method to avoid it.

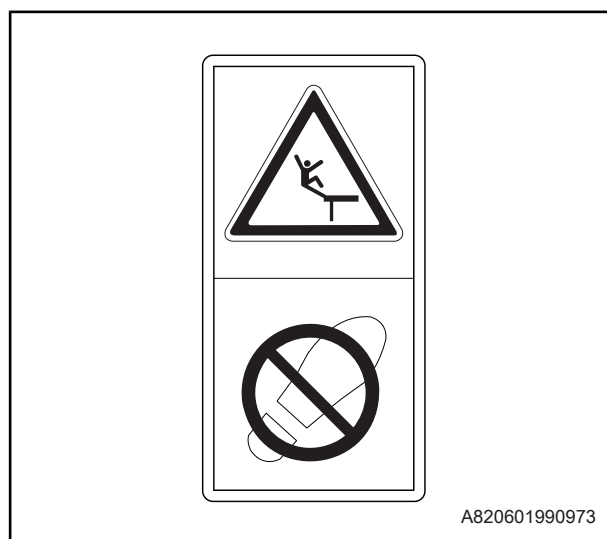
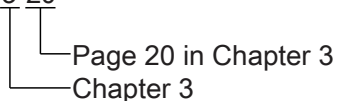


Fig.1-2

1.3 Page description

For the purpose of this manual, the page is numbered by chapter. Example: 3-20

Example: 3-20



1.4 Introduction

1.4.1 General

Sany hydraulic excavator is designed for:

Excavation

Leveling

Ditching

Loading

Demolition

Please refer to the relevant part of this manual in detail.

Numbers in illustrations are corresponding to those in 【 】 in the text. (Example: 1→【1】)

The international system of units (SI) is used in this manual.

1.4.2 Directions of the machine

In this manual, the front, back, left and right are directions of travel when seen from the cab with the cab facing forward and the driving wheel behind the machine.

- 【A】 Front
- 【B】 Back
- 【C】 Left
- 【D】 Right
- 【E】 Driver seat
- 【F】 Driving wheel

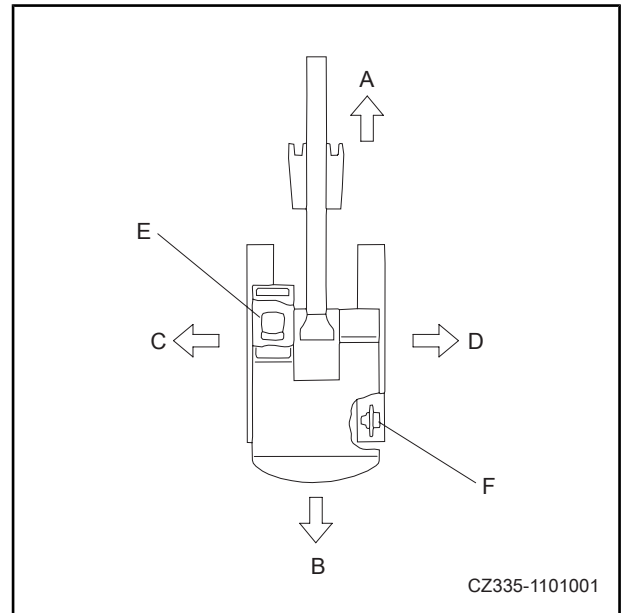


Fig.1-3

1.4.3 Running-in of new machines

Our machines are fully commissioned and tested before delivery. However, keeping machines at full load before running-in process will seriously affect the performance and shorten the useful life.

Be sure to carry out running-in within the initial 100 h (according to the indication of working hours on the display).

Be sure that you are fully aware of the content of this manual and note the following during the running-in process:

After start-up, keeping the machine idling for 3 ~ 5 min. During this time, do not operate the control lever or fuel control knob, and then slowly set the engine to 1500 rpm until the coolant temperature reaches about 60°C.

Avoid high-speed operation at heavy load.

1.5 Product information

1.5.1 General

To maintain, order or replace components, please inform our authorized dealer of the following:

1.5.2 Machine data plate

The machine data plate is at lower right of the cab (as shown below).

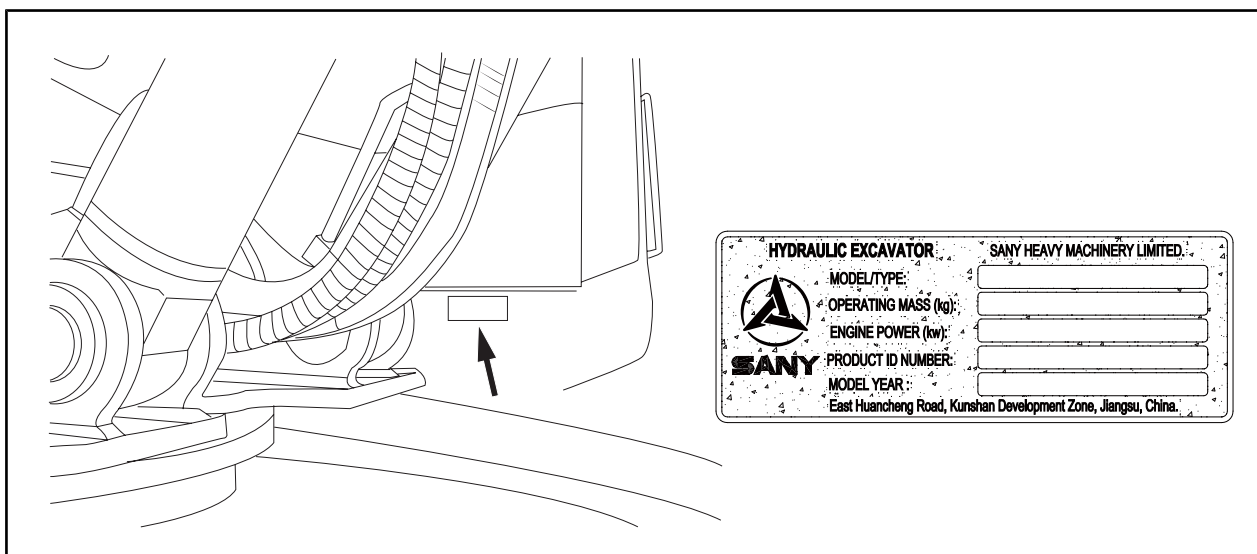


Fig.1-4

1.5.3 Engine data plate

The engine data plate is located as shown below. The location of the engine data plate may vary with the engine type.

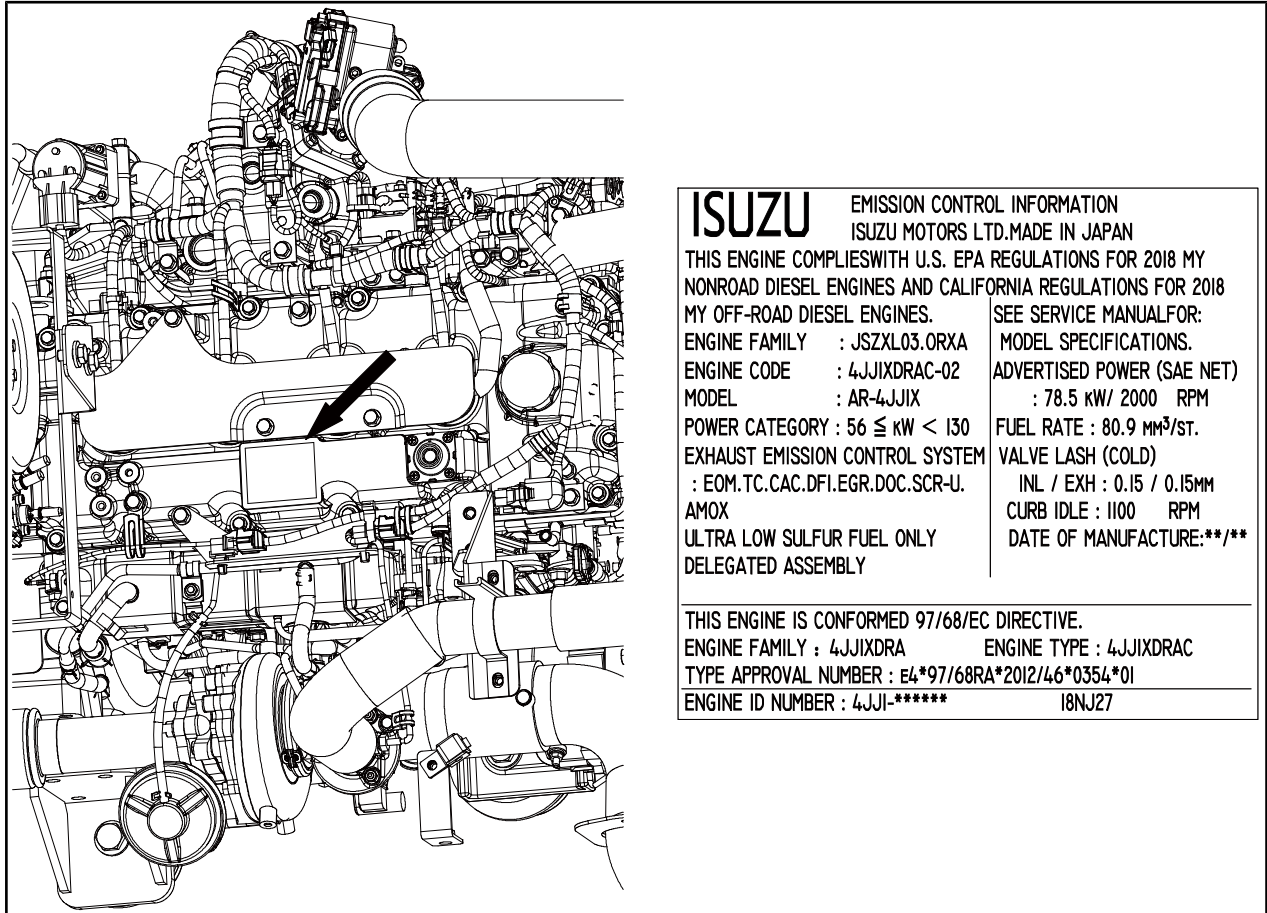


Fig.1-5

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SANY

Safety

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 **WARNING**

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this machine and before operation or maintaining it. Failure to do this could result in death or serious injury.

2.Safety

2.1 Safety decals

2.1.1 General

This machine uses the following warning and safety decals.

- Make sure to know clearly the location and content of the decals.
- Please keep the decals in the right positions and clean to ensure their readability. Do not clean the decals with organic solvent or gasoline, which may peel off the decal paint.
- Treat other decals in the same way as warning and safety decals.
- When the decals are damaged, lost or unreadable, please replace them. As for detail of decal part number, please see this manual or the actual decals.

2.1.2 Location

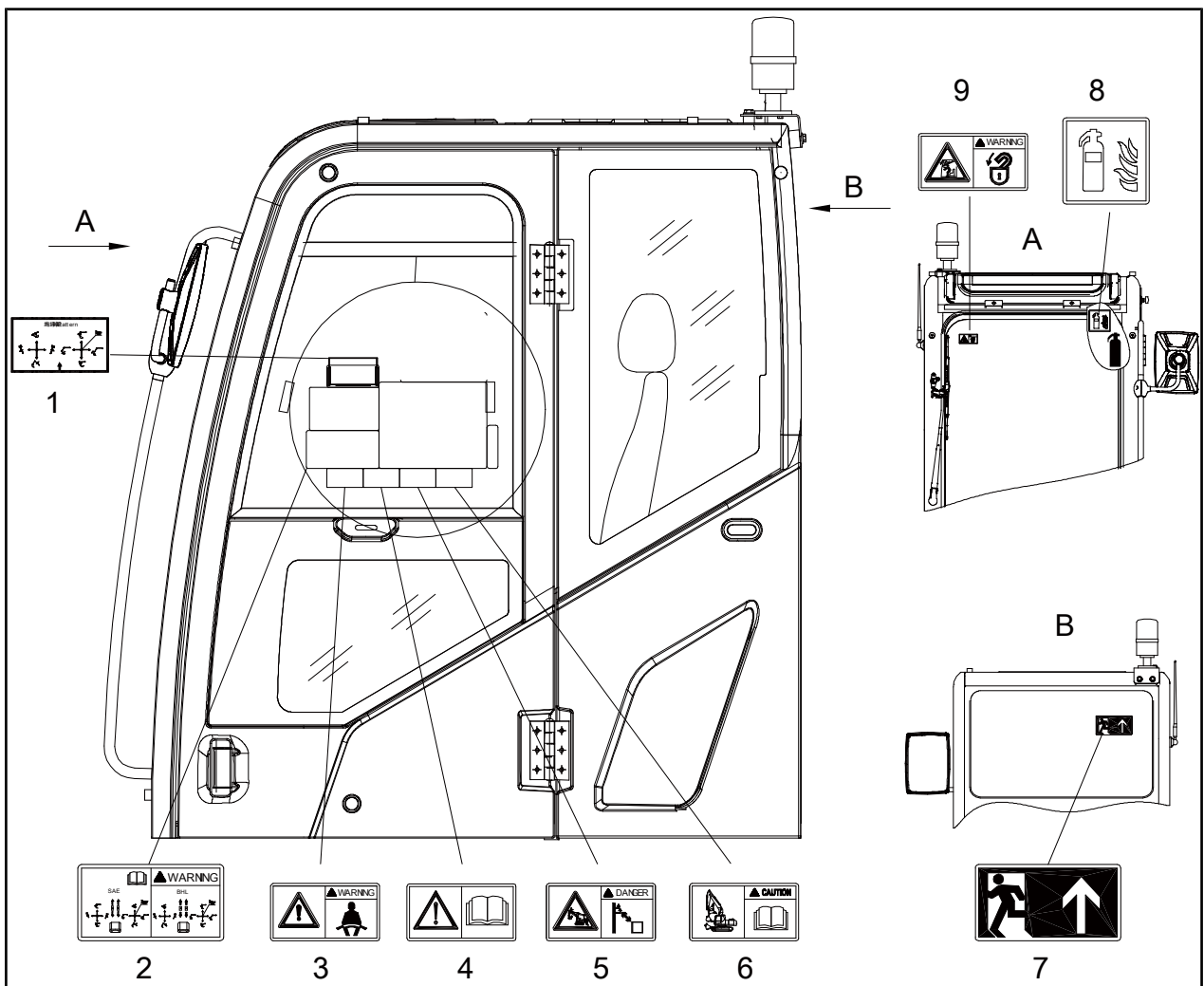


Fig.2-1

- [1] Mode switch card
- [2] Double mode operation instruction decal
- [3] Seat belt warning decal
- [4] Read manual warning decal
- [5] High voltage warning decal
- [6] Preventing bucket impact caution decal
- [7] Emergency exit decal
- [8] Fire extinguisher decal
- [9] Front window lockout warning decal

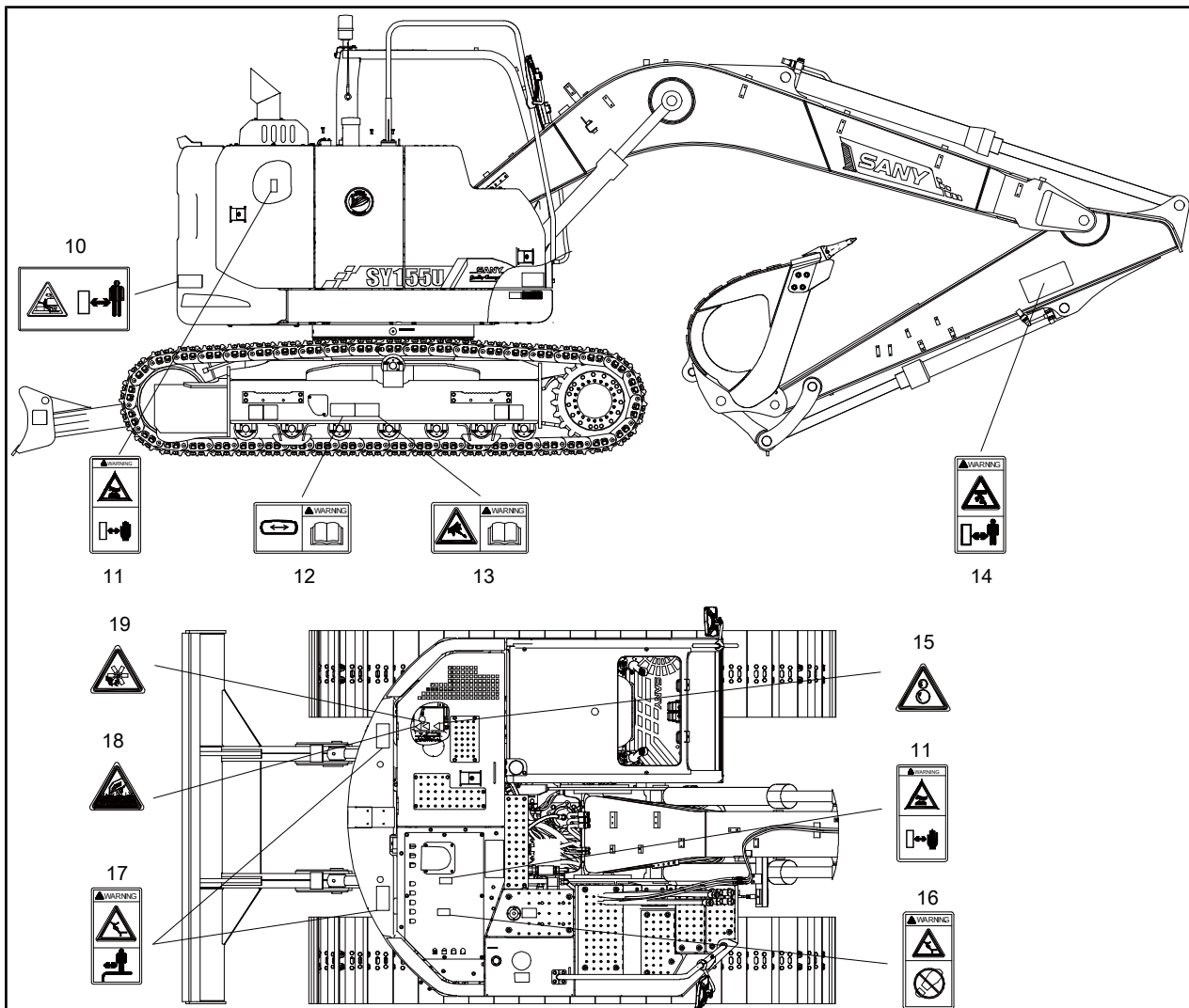


Fig.2-2

- [10] "No entry" warning decal
- [11] Anti-ironing warning decal
- [12] Track tensioning warning decal
- [13] Anti-spray warning decal
- [14] Work equipment warning decal
- [15] Rotating rollers caution decal
- [16] "No Standing" warning decal
- [17] Fall warning warning decal
- [18] High temperature steam warning decal
- [19] "Injury by fan" warning decal

2.1.3 Description

1. [1] Mode switch card

- When the machine is in different operating modes, please face the corresponding mode of the card towards the operator to avoid misoperation damage.

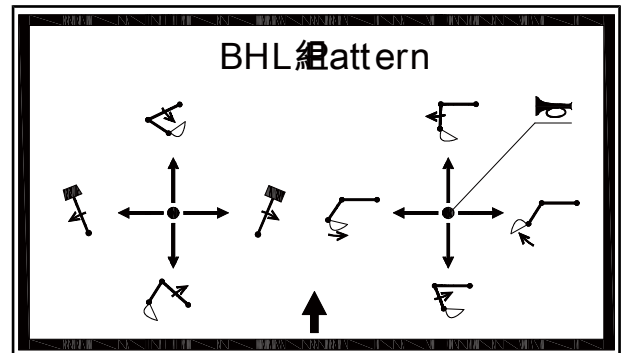


Fig.2-3

[2] Double mode operation instruction decal

- The same control handle in different operation mode, the control action is different, please choose according to the operation habit.
- Select the corresponding operation mode through the mode switching valve and place the corresponding operation mode card in the cab to prevent misoperation.

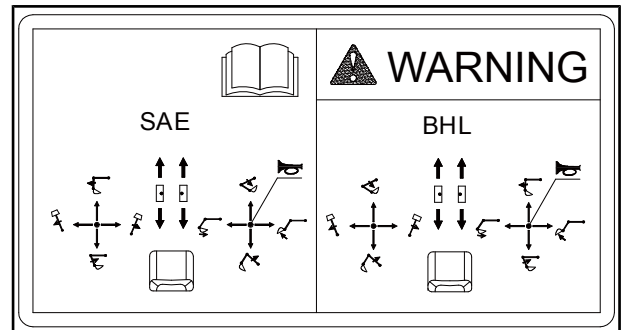


Fig.2-4

[3] Seat belt warning decal

- Warns to fasten the seat belt before operating the machine.



Fig.2-5

[4] Read manual warning decal

- Please read this manual before operation, maintenance, disassembly, assembly and transportation of the machine.

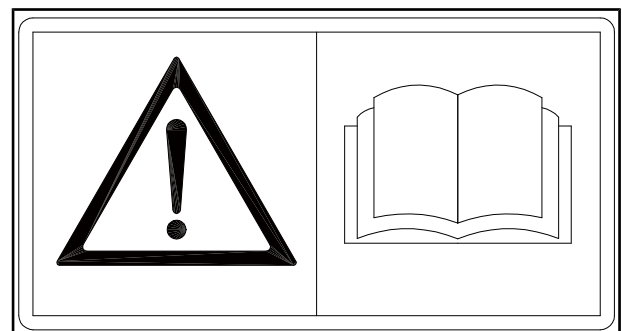


Fig.2-6

[5] High voltage warning decal

- This decal indicates if the machine is too close to the power transmission line, there will be the danger of electric shock.
- Keep the safety distance from the power transmission line

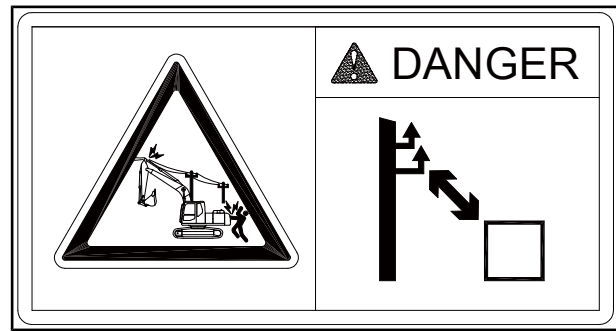


Fig.2-7

[6] Preventing bucket impact caution decal

- During operation of the bucket near the machine, take care to prevent the bucket and machine itself collision damage.

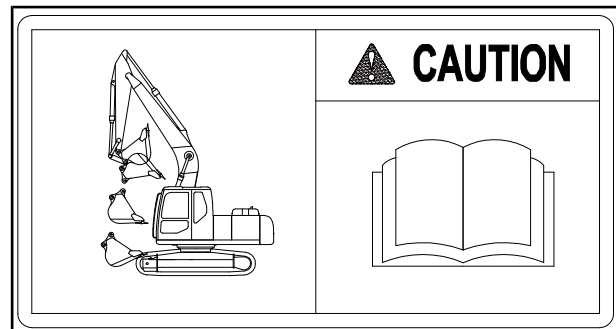


Fig.2-8

[7] Emergency exit decal

- Exit indication sign in case of emergency.

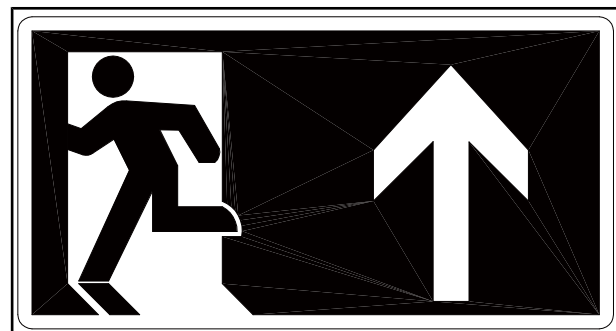


Fig.2-9

[8] Fire extinguisher decal

- Shows the location of the fire extinguisher on the machine.



Fig.2-10

[9] Front window lockout warning decal

- This decal indicates the danger of the front window falling down.
- After raising the front window, please lock it with the lock pin



Fig.2-11

[10] "No entry" warning decal

- The decal indicates there is the danger of being collided by the machine, please don't enter the turning circle of the machine.
- Keep away from the machine when it is operating

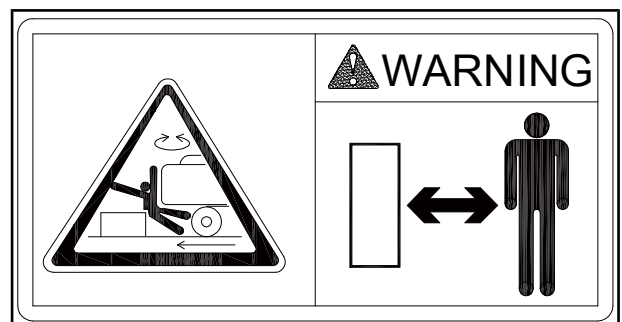


Fig.2-12

[11] Anti-ironing warning decal

- Please don't touch the hot surface to avoid scald.

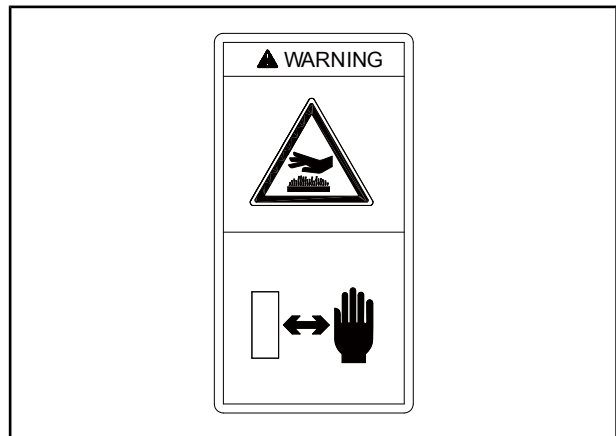


Fig.2-13

[12] Track tensioning warning decal

- Shows the location of the track tensioning point.
- Warns to read the appropriate section of this manual.

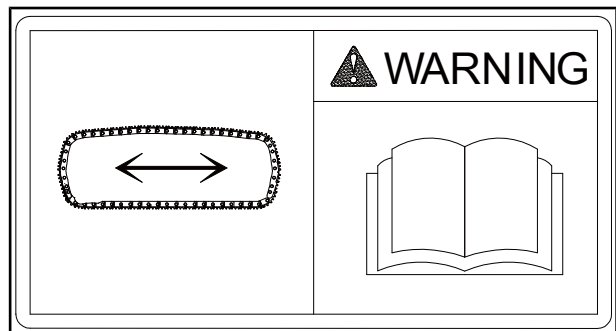


Fig.2-14

[13] Anti-spray warning decal

- Warns about grease spraying out under pressure from the track tensioner.
- Warns to read the appropriate section of this manual.



Fig.2-15

[14] Work equipment warning decal

- The decal indicates there is the danger of being collided by the work equipment.
- Keep away from the machine when it is operating.



Fig.2-16

[15] Rotating rollers caution decal

- This decal indicates the danger of the rotating parts.
- Please wait for the rotating parts to stop after maintenance.



Fig.2-17

[16] "No Standing" warning decal

- Stand clear of the area as there may be the danger of falling.

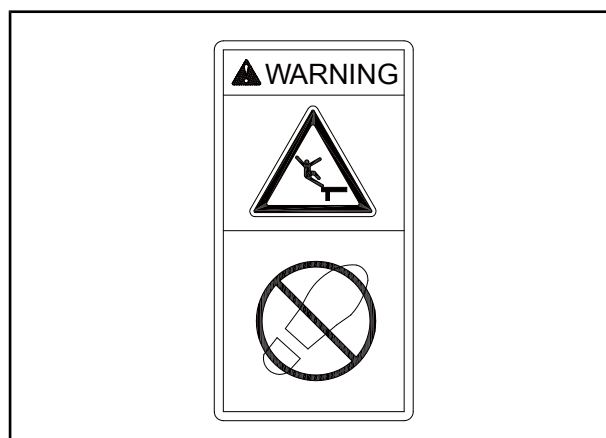


Fig.2-18

[17] Fall warning warning decal

- There may be the danger of falling.
- Don't stay close to the edge of the machine.



Fig.2-19

[18] High temperature steam warning decal

- Please release the tank pressure before opening the tank cover like fuel tank cover, and open the cover slowly to avoid spraying.



Fig.2-20

[19] "Injury by fan" warning decal

- Warns about the rotating components. Keep hands clear of the fan and all rotating components.



Fig.2-21

2.2 Safety information

2.2.1 Safety rules

- Only trained workers can be assigned to operate and maintain the machine.
- Please abide by all safety rules, precautions and instructions when operating and maintaining the machine.
- Alcohol and medicine will severely reduce/weaken workers' ability to operate or maintain the machine in a safe manner, endangering himself/herself and other people on the site.
- When working with another operator or a commander, please keep all informed of all adopted hand signals.

2.2.2 Handling of abnormalities

When any abnormalities (noise, vibration, odor, incorrect instrument display, smoke, oil leakage and etc. or any abnormal display in the warning device or monitor) are discovered in the process of operation and maintenance, please report to the supervisor and take necessary measures. Don't operate the machine before removing all faults.

2.2.3 Personal protective equipment

Wear tights or work clothes and protective equipment required by working conditions. You may need:

- Helmet
- Safety shoes
- Safety glasses, goggles or face shield
- Protective gloves
- Earplug
- Reflective protective clothing
- Anti-dust mask

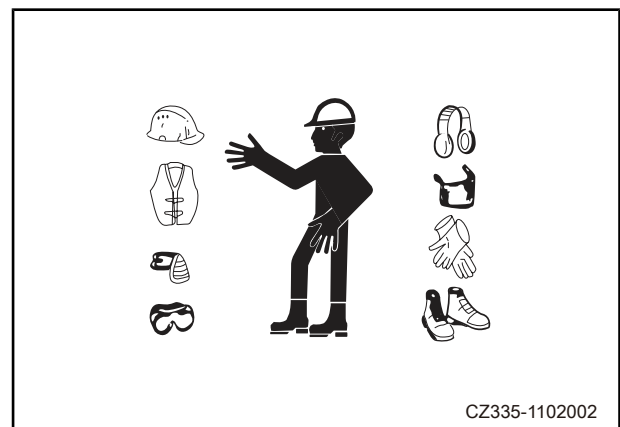


Fig.2-22

Wear necessary safety protection equipment and the equipment required by the employer, the public service management department, and the government, as well as laws and regulations. Don't take chances to avoid unnecessary danger.

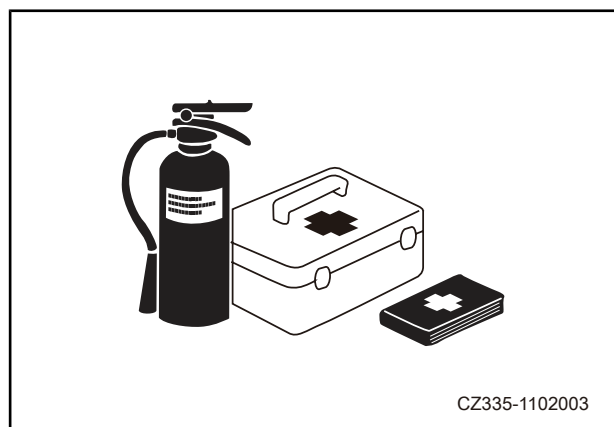
CAUTION

- Don't wear accessories and loose clothes. There will be the danger of hooking the control lever or other protruding components.
- If the hair is too long and exposed out of the helmet, there will be the danger of intertwining in the machine.
- Wear the helmet and safety shoes all the time. If necessary, please wear safety glasses, mask, gloves, earplug and safety belt when operating or maintain the machine.
- Please check that all protective equipment function normally before use.

2.2.4 Fire extinguisher and first-aid kit

To prevent injury or fire, please observe the following precautions:

- Prepare first-aid kit and fire extinguisher nearby.
- Please read the instruction attached on the fire extinguisher carefully to ensure proper use of the fire extinguisher.
- Please check and maintain the fire extinguisher regularly to ensure it's available at any time.
- Please check the first-aid kit regularly and add medicine if necessary.
- Establish emergency plan to deal with fire and accident.



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Fig.2-23

2.2.5 Safety equipment

To protect you and the people around, your machine can be equipped with the following safety equipment. Please ensure each one is fixed in the right position and in the working condition.

- Falling object protective structures
- Protective guard
- Guard board
- Lamps
- Safety decals
- Horn
- Travel warning
- Mirror
- Fire extinguisher
- First-aid kit
- Wiper blade

Please ensure all equipment above is available. You are forbidden to take down or disconnect any safety equipment.

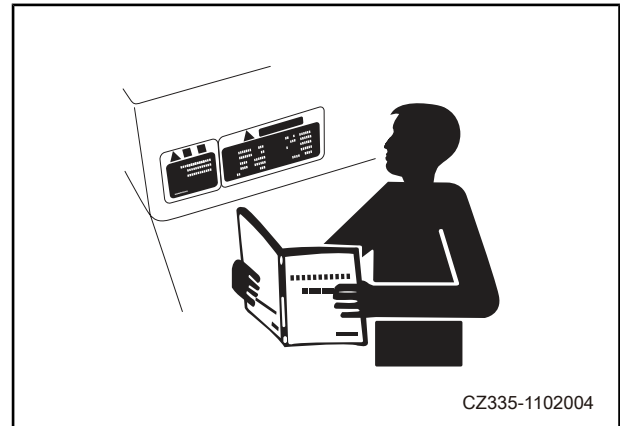


Fig.2-24

⚠ CAUTION

- Ensure all protective covers and caps are in their proper positions. If covers and caps are damaged, repair them at once.
- Understand how to use safety equipment and use it correctly.
- Don't take down the cab protective guard without authorization (except machine maintenance).

2.2.6 Keeping the machine clean

- Clean the wiper, mirror and lamps. Clean away grass, snow, ice or mud in operation area, steps and handles in time. Remove the mud on shoes before entering the machine.
- Checking and maintaining the machine with mud or greasy dirt will cause the danger of slipping, falling or dirt entering eyes. Keep the machine clean all the time.
- If water enters the electrical system, don't hurry to start the power or the engine, which could cause machine failure, computer mainboard damage or other malfunctions. Don't wash the electrical system (sensor, connector etc.) by water or vapor.

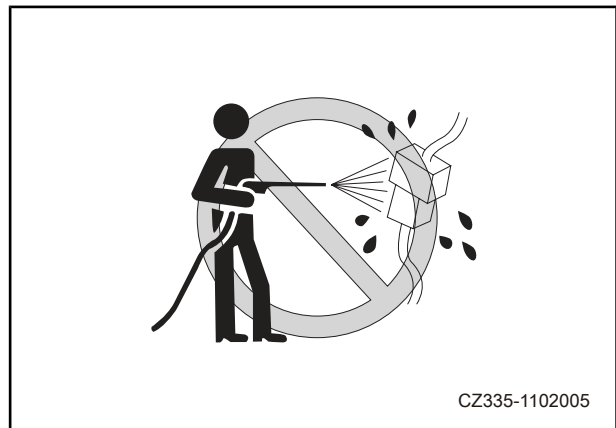


Fig.2-25

2.2.7 Keeping the cab clean

- Please remove the mud and grease on shoes before entering the cab, or there will be severe accident caused by slip when treading the pedal.
- Store scattered objects in the toolbox, and don't put them in the cab casually.
- Don't use mobile phone when operating or driving the machine.
- Don't bring dangerous objects such as inflammable and explosive materials into the cab.

2.2.8 Locking of safety lock control lever

- Before standing up from the seat (for purposes such as opening or closing the front window and skylight, removing or installing bottom window, or adjusting the seat), please lower down the work equipment fully to the ground, firmly turn the safety lock control lever to the lock position and shut down the engine. If the control lever or the pedal isn't locked, the machine may move suddenly and lead to serious personal injury or machine damage.
- Before leaving the machine, make sure to lower down the work equipment fully to the ground, firmly turn the safety lock control lever to the lock position and shut down the engine. Lock all equipment with the key, take off the key and put it in the specified place.

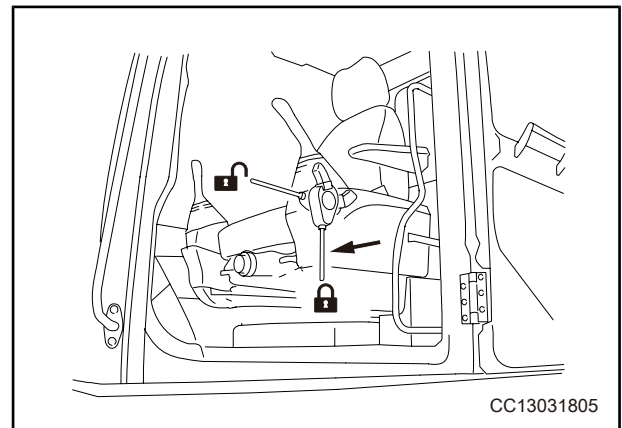


Fig.2-26

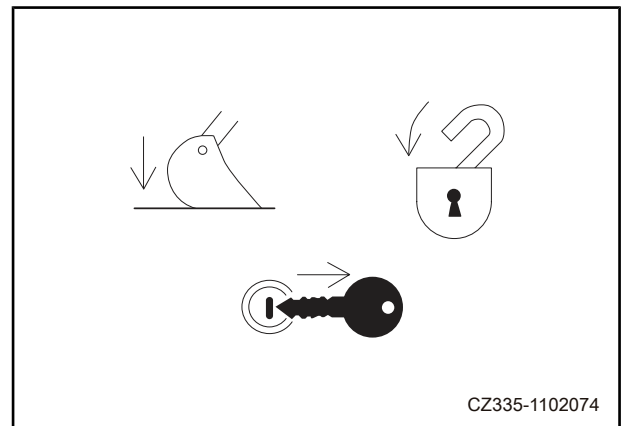


Fig.2-27

2.2.9 Armrest and ladder

CAUTION

- Face the machine all the time when entering and leaving the machine.
- Don't jump up to or down from the machine, don't climb it when it travels, and don't jump up to it to try to stop it.
- Before entering and leaving the cab, be sure to check that it is in the front position.

To prevent personal injury due to slipping or falling down from the machine, please comply with the following:

- Check the armrest and ladder (including the track shoe) before entering and leaving the machine. If there is oil, grease or mud on the armrest or ladder (including the track shoe), please clean it away at once and keep all these parts clean; if these parts are damaged, please repair them and tighten the loose bolts.
- Please use the arrow marked armrests and ladder shown on the right when entering and leaving the machine.
- To ensure safety, please face the machine and keep three body parts (two feet and one hand or two hands and one foot) touch the armrests and ladder (including the track shoe) to support the body.
- Don't grasp or hold the control lever or lock lever.
- Don't enter or leave the machine with tool in the hand.
- Don't climb the engine head or cap without anti-skid mat.

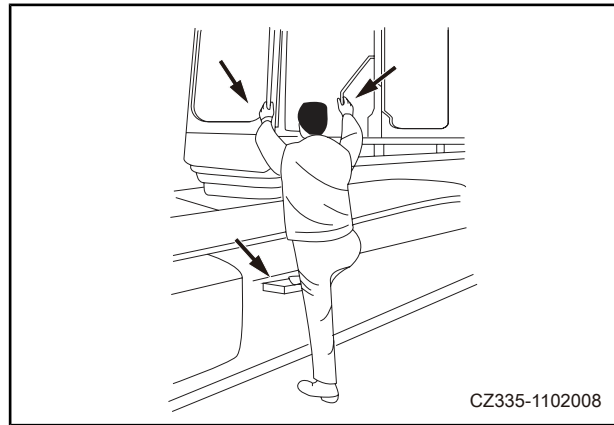


Fig.2-28

2.2.10 Precautions for working at heights

When working at heights, please use stepladder or other brackets to ensure safe operation.

2.2.11 Keeping clear of the accessory

Don't allow anyone to sit on the work equipment or other accessories because there will be the danger of falling and severe injury.

2.2.12 Don't get stuck in the articulation section

The interspace around the work equipment will change with the movement of the link.

Getting stuck in it will lead to severe injury. Don't allow anyone to approach the rotating or stretching part.

2.2.13 Preventing scald

2.2.13.1 Hot coolant

- To prevent scald caused by squirt of hot coolant or vapor, please wait for full cooling of the coolant before checking or draining the hot coolant.
- Don't open the radiator cap before the engine cools down. Even the coolant is cold, be sure to slowly loosen the radiator cap before removing it to release the internal pressure of the radiator and prevent severe scald.

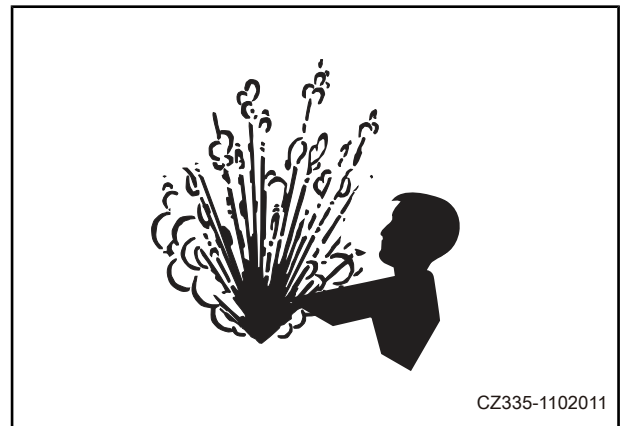


Fig.2-29

2.2.13.2 Hot oil

To prevent scald caused by squirt of hot oil, please wait for full cooling of coolant before checking or draining the oil. Even the oil is cold, be sure to slowly loosen the cap or the screw plug before removing it to release the internal pressure.



Fig.2-30

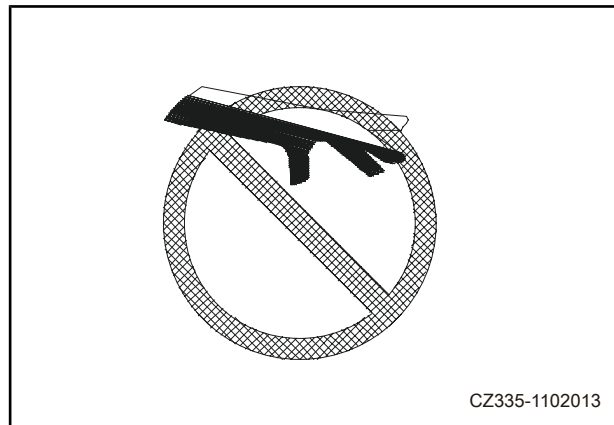


Fig.2-31

2.2.14 Fire and explosion prevention

2.2.14.1 Fire caused by fuel or engine oil

- Fuel and engine oil shall be stored in the specified place. Don't approach it without permission.
- Forbid smoking or open fire near fuel and engine oil.
- Check if the pipe clamp is lost or slack, the hose is twisty or knotting, hose and pipeline rub each other, oil cooler is damaged, the flange bolt of the oil cooler is slack, to prevent fuel/oil leakage; and tighten, repair or replace any lost, slack or damaged clamp, pipeline, hose, oil cooler and its flange bolt.
- Add or store fuel and engine oil in a well-ventilated place.
- Shut down the engine before refilling.
- Don't leave the machine when refilling it with fuel and engine oil.
- Don't spill the fuel to the overheated surface or electrical system component.
- Wipe off spilled fuel or engine oil in time after refilling with fuel or engine oil.
- Place the cleaning cloth with oil or other inflammable materials into the safety container to ensure the safety of the work site.
- Firmly tighten the fuel and engine oil tank covers.
- If required, please rinse the components with nonflammable oil. Do not rinse components with diesel or gasoline as it is inflammable.
- Before conducting grinding or welding operation on the chassis, make sure to move all inflammable materials to a safe place.
- Don't weld the pipeline containing inflammable liquid or cut it through the cutting torch.



Fig.2-32



Fig.2-33

2.2.14.2 Fire caused by inflammable materials

- Eliminate dry leaves, wood chips, paper scraps, dust and other inflammable objects stacking or sticking around the engine, exhaust manifold, silencer and battery or inside the hood.

2.2.14.3 Fire caused by electrical wire

The short circuit of the electrical system will lead to fire.

- Keep the connector of the electrical wire clean and fix it firmly.
- After operation for 8~10 h, check if the cable or electrical wire is slack, twisty or knotting, hard or broken; and check if the connector end cap is lost or damaged at the same time.
- When the cable or wire is slack, twisty or knotting, firmly tighten the slack connector or wire clamp, straighten out the routing, and repair or replace damaged electrical wire.

2.2.14.4 Fire caused by hydraulic circuit

- Check if all clamps, caps and cushions of hoses and pipeline are fixed in the right places.
- If any is loose, it will vibrate and rub with other components, leading to hose damage, high pressure oil squirt, which will cause fire hazard or severe injury.

2.2.14.5 Fire caused by lighting equipment

- Make sure to use explosion proof lighting equipment when checking fuel, engine oil, battery acid, window cleaning solution or coolant. Otherwise, there will be the danger of explosion, leading to severe injury.
- When using the electric power of the machine as the lighting, please follow the regulations in this manual.

2.2.14.6 Fire caused by heat shield

- Lost or damaged heat shield will cause fire.
- If any abnormalities are discovered, please repair or install a new heat shield before operation.

2.2.15 Actions in case of a fire

If there is a fire, please leave the machine quickly as per the following requirements.

- Turn the starter switch to OFF position to shut down the engine.
- Leave the machine by the armrest and ladder.

2.2.16 Windshield cleaning solution

Please use ethanol-based cleaning solution instead of methanol-based cleaning solution as the later one can hurt eyes.

2.2.17 Preventing flying components

The grease in the track tensioning regulating device is under high pressure, therefore if the following precautions aren't observed, accidents of severe injury, blindness or death may occur:

- Don't remove grease nozzle or valve components because they may fly off. Please keep the body and face away from the valve.
- Pressure exists inside the travel drive assembly.
- Gear oil is hot, so make sure to wait for cooling of gear oil before gradually loosening the air exhaust plug to release pressure. Because parts may fly off, please keep the body and face away from the air exhaust plug to avoid injury.

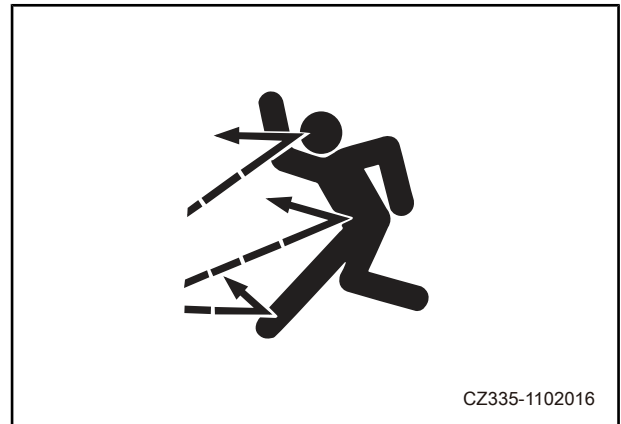


Fig.2-34

2.2.18 Prevent falling, flying and invading objects

On the dangerous work site where falling, flying and invading objects would hit or enter the cab, install necessary protection shield to protect the operator according to the operation conditions.

- When conducting removal or breaking operation, install front protection shield and paste transparent cellophane on the front window.
- When operating in a mine or quarry with the risk of rock falling, install FOPS (Falling Object Protective Structures) and front protection shield, and paste transparent cellophane on the front window; and

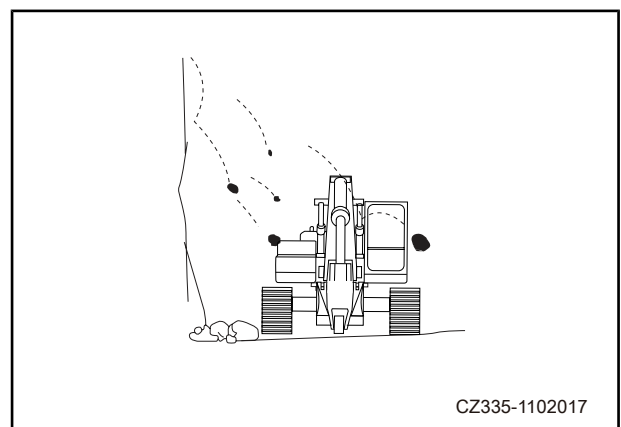


Fig.2-35

operator shall wear helmet and protective glasses.

- When conducting the above operation, please close the front window. In addition, ensure that other workers keep proper safety distance from the falling hazard zone.
- The conditions described above are typical working conditions, and there may be other protective shields required to install based on the site conditions. Please contact the agents authorized by Sany Heavy Machinery Co., Ltd. in advance.

2.2.19 Accessory installation

- Issues of safety or legal restraint are existing for installation of options or accessories. Therefore, please contact the agents authorized by Sany Heavy Machinery Co., Ltd.
- For any injury, accidents or product malfunction caused by use of unapproved accessory or part, Sany Heavy Machinery Co., Ltd takes no responsibility.
- When installing and using purchased accessory, please read the instruction manual of related accessory and the general instruction of related accessory in this manual.

2.2.20 Accessory combination

Different types or combinations of work equipment may lead to the danger of colliding with the cab or other parts of the machine. Before using unfamiliar work equipment, please check if there is the danger of collision and be careful to operate.

2.2.21 Cab window glass

- If the cab window glass near the side of the work equipment is damaged or broken, there will be the danger of the work equipment touching the operator's body. In that case, please stop operation at once and change glass.
- If the skylight is damaged and fails, please replace it with new glass.

2.2.22 Unauthorized retrofit

Machine retrofit, unauthorized by Sany Heavy Machinery Co., Ltd, may lead to safety issues and personal injury. Retrofit will have severe influence on the strength and view of the machine. Before any retrofit, please contact the agents authorized by Sany Heavy Machinery Co., Ltd. For any

accident, malfunction or damage caused by unauthorized retrofit, Sany Heavy Machinery Co., Ltd will take no responsibility.

2.2.23 Site survey in advance

- During operation near such inflammable materials as grass roof, dry leaves or dry grass, there will be the danger of fire, so please be careful during operation.
- Check the terrain and ground conditions of the work site and determine the safest operation methods. Don't operate the machine in dangerous zones of landslide or rock fall.
- During operation in dangerous areas such as near-ditch area or road shoulder, please reinforce the ground based on the actual need and keep the safety distance from the machine to the near-ditch area or road shoulder. Assign a signalman to command when necessary to prevent casualty.
- If there are pipelines such as water pipe, gas pipe, cable or high voltage electrical wire buried under the ground, please contact related public administration departments and mark the positions before operation and pay attention not to breaking or damaging any pipeline.
- Take necessary measures to prevent anyone without access permission from entering the operation area. During operation on the road, please assign a signalman to install a retaining plate to ensure smooth traffic and pedestrian safety.
- During operation on the frozen ground, please be cautious, because the increasing environment temperature will make the foundation soft, wet and slippery.
- When the machine travels or is operated in shallow water or soft ground, please check the type and conditions of the bedrock as well as the depth and flow rate of water.

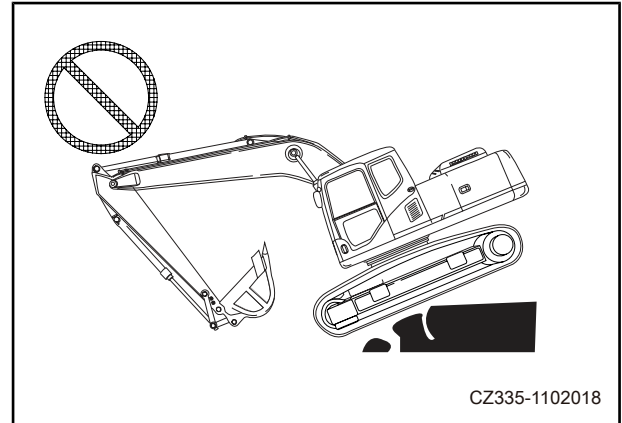


Fig.2-36

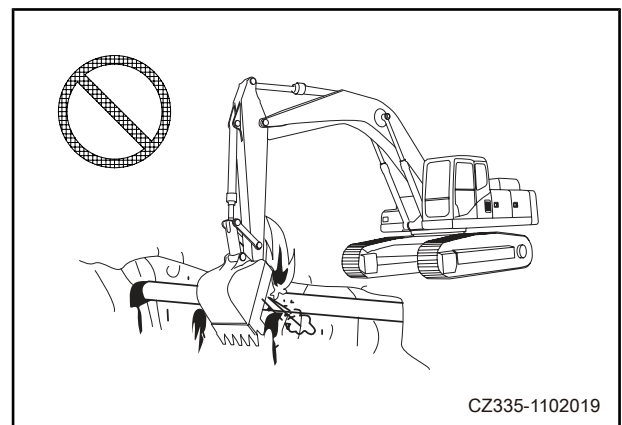


Fig.2-37

2.2.24 Operation on loose ground

- Avoid the traveling and operation of the machine near the cliff, on the road shoulder and deep ditch. In these areas with soft ground, there is the danger of the machine falling or rollover because of the weight of the machine and vibration. Please notice that the ground will be much softer after heavy rain, blasting or earthquake.
- During operation on the dam or near the digging ditch, there is the danger of ground subsidence because of the weight of the machine and vibration. Before operation, please take measures to ensure ground safety and prevent machine rollover or falling.

2.2.25 Don't approach high voltage cable

Don't operate the machine or control it to travel near the cable, as there may be the danger of electric shock, which will lead to equipment damage or casualty. Please operate the machine as per the following steps in the work site near the cable:

- Before operation in the work site near the cable, please inform the local electric power company and ask the company to take necessary measures.
- There is high possibility of electric shock if the machine stays close to the cable, which leads to severe burn and even death. Please keep the safety distance from the machine to the cable (see the right table). Before operation, please consult with the local electric power company about measures of safety operation.
- If the machine stays close to the cable, a signalman shall be assigned to command.
- Don't allow anyone to approach the machine during operation near the high voltage cable.
- When the machine stays close to the cable or touches the cable, the operator shall not leave the cab before verifying the cable is cut off to avoid electric shock. In addition, don't allow anyone to approach the machine.
- To prevent accidents, please wear rubber shoes and gloves before operation. Cover a layer of rubber pad on the seat and pay attention to ensuring that exposed parts of the body will not touch the lower part of the machine.

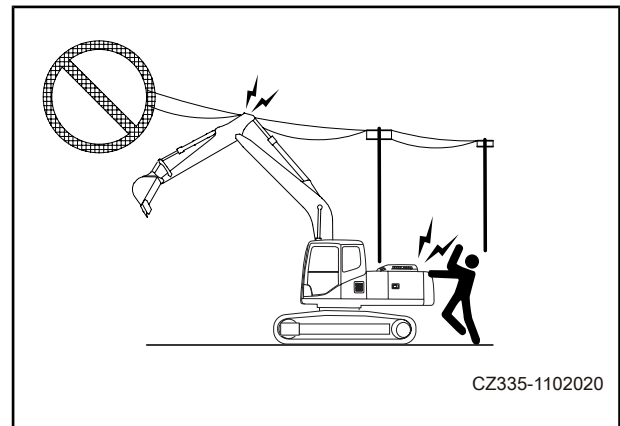


Fig.2-38

Cable Voltage	Safety Distance
100V-200V	More than 2 m (7 ft)
6,600V	More than 2 m (7 ft)
22,000V	More than 3 m (10 ft)
66,000V	More than 4 m (14 ft)
154,000V	More than 5 m (17 ft)
187,000V	More than 6 m (20 ft)
275,000V	More than 7 m (23 ft)
500,000V	More than 12 m (36 ft)

2.2.26 Ensuring favorable view

This machine is equipped with a rearview mirror to improve the view; but even with it, also there are places unseen from the seat. Therefore, be cautious during operation.

Before operating the machine in a place with bad view, make sure to verify the conditions of the work site or the obstacles around the machine; otherwise machine damage or personal injury may occur. Please strictly observe the following precautions when operating the machine in a place with bad view:

- Before operation every day, please check the rearview mirror. Clean it and adjust the view range to ensure favorable view.
- During operation in dim places, turn on the work light and the front lamp of the machine and install auxiliary lighting in the working region if necessary.
- Stop operation if favorable view can't be guaranteed, such as days of fog, snow, rain or sand wind.
- Install signs on the road shoulder or soft ground. When the view is bad, assign a signalman if necessary. Operator shall pay great attention to the signs and follow signalman's command.
- Ensure all workers understand all signals and gestures before operation.

2.2.27 Ventilation of working environment

- Exhaust gases from the engine can be deadly, therefore if it is necessary to start the engine, or deal with fuel, cleaning oil or paint in a closed zone, the door and window shall be open to ensure sufficient ventilation for preventing gas poisoning.
- Do not operate the machine in the environment of toxic gas or underground; if necessary, please wear gas mask and ensure ventilation.



Fig.2-39

2.2.28 Prevention of asbestos dust

Inhaling asbestos dust from the air would lead to lung cancer. There is the danger of inhaling asbestos when workers are engaged in removal operation or handling industrial waste. Please observe the following rules:

- During cleaning, reduce dust by spraying water, and don't clean by compressed air.
- If there is asbestos dust in the air, please operate the machine in the windward position. Every worker shall wear dust mask.
- Don't allow anyone to approach the machine during operation.
- Please observe the local regulations, rules and environment standards.

WARNING

- This machine uses no asbestos, but counterfeit parts may contain asbestos. Vastly inhaling asbestos may harm lung or lead to death. Therefore, please use genuine parts of Sany Heavy Machinery Co., Ltd.

2.2.29 Cab emergency exit

- If the cab door can't be opened for some reason, use the safety hammer to break the window, creating an emergency exit.
- For escape, remove all glass fragments in the window frame firstly and be careful not to be hurt by glass. Also, be careful not to slip because of glass fragments.



Fig.2-40

2.3 Safe machine operation

2.3.1 Start

2.3.1.1 Boarding the machine safely

When you come into and leave the machine:

- Face the machine and keep three body parts (two feet and one hand or two hands and one foot) touch the machine.
- Don't jump up to and down from the machine, and don't climb it when it runs.
- Don't take any control levers as the armrest.
- Mud, greasy dirt and water on all pedals, armrests and shoes shall be cleaned away at any time.
- Before entering and leaving the cab, it must be in the front position.

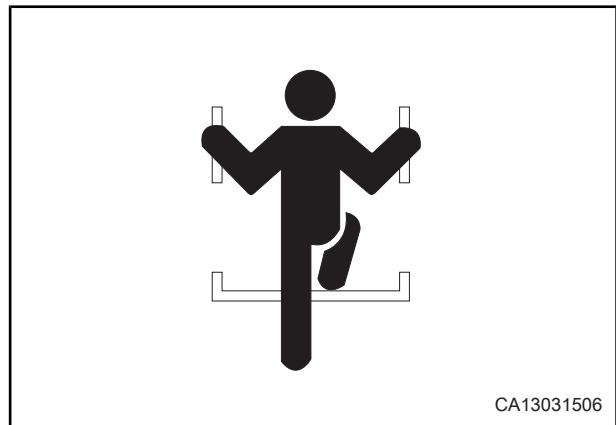


Fig.2-41

2.3.1.2 Adjusting the seat

Uncomfortable seat position may easily make the operator tired, leading to wrong operation. Every time the machine operator changes, the operator shall readjust the seat position. When the operator backs against the backrest, he/she shall be able to step on the pedal to the floor and correctly operate the joysticks. Otherwise, move the seat forward and backward to readjust it.

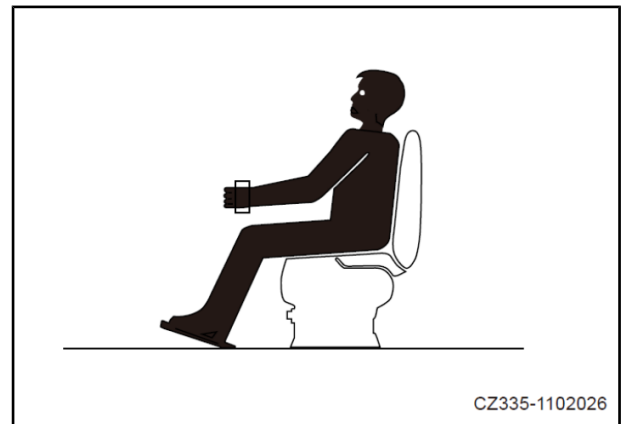


Fig.2-42

2.3.1.3 Fastening safety belt

When rollover accident occurs, operator may be hurt or thrown out of the cab, or likely to be squashed by the machine, leading to severe casualty accident. Before operation, please check the safety belt, buckle and fixture carefully. The safety belt or its components, if damaged or worn, shall be replaced before operation. Please sit on the seat and fasten the safety belt during the running process of the machine to avoid accident.

It's best to replace the safety belt once three years regardless of its service condition.

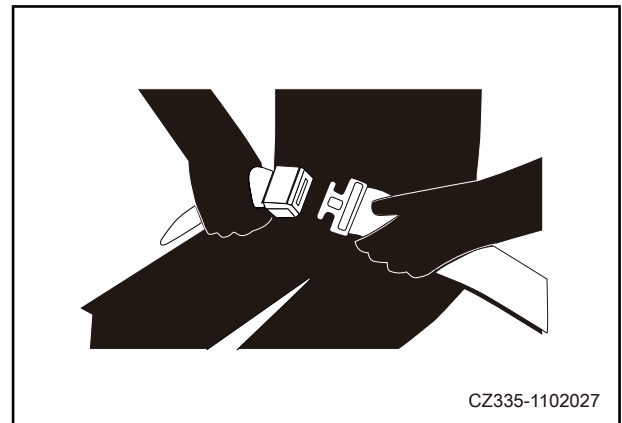


Fig.2-43

2.3.1.4 Check before starting the engine

Before starting the daily work, please check the followings before starting the engine:

- Wipe off dust on the window glass surface to ensure favorable view.
- Wipe off dust on the lens surfaces of the front lamp and work light and check if the work light works well.
- Check the engine coolant level, fuel and engine oil level.
- Check if the air cleaner is blocked.
- Check if the electrical wire is damaged.

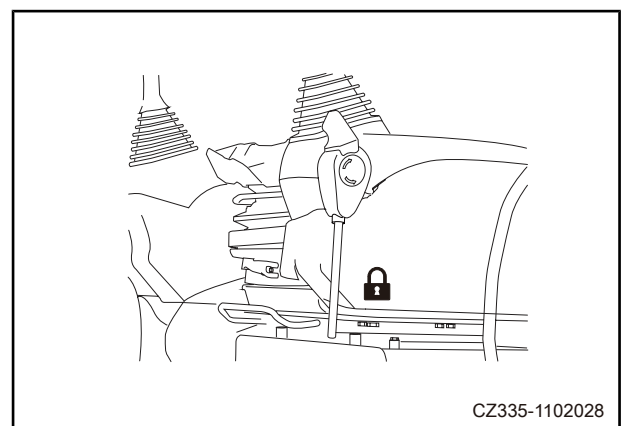


Fig.2-44

- Adjust the seat to the position which is easy for operation and check if the seat belt and fixture are damaged or worn.
- Check if the instruments work well, check the angle of the work light and check if all control levers are in the neutral position.
- Check if the safety lock control lever is in the lock position.
- Adjust the rearview mirror so as to clearly see the rear of the machine from the cab seat.

2.3.1.5 Starting the machine safely

For the correct start steps, see the instruction about starting machine in the Section Operation.

- Before starting the machine, ensure no people stays on, below and around the machine and press the horn button to give the start warning.
- Sit on the driver's seat and adjust it until you feel comfortable to operate all control devices.
- Be familiar with all warning devices, instruments and operational control devices.
- Set all control devices to the neutral /parking position.
- Don't allow anyone to stay on the machine except for the operator.
- Please strictly observe the instruction of the Section Operation in this manual to start the engine. Don't follow the way that will cause the motor short circuit to start the engine.

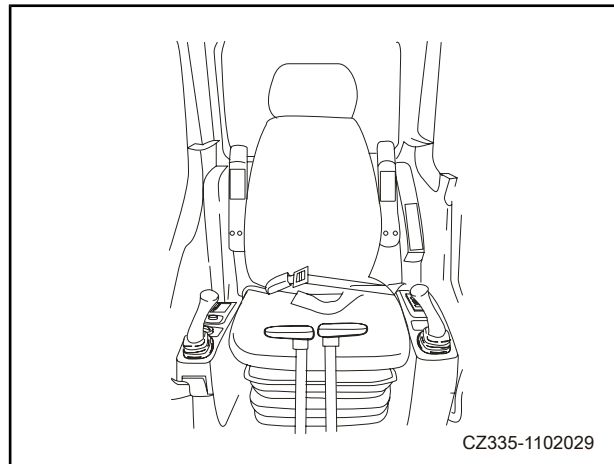


Fig.2-45

⚠ WARNING

- When it is necessary to start the engine or operate the machine in a closed environment, please ensure sufficient ventilation. Inhaling too much tail gas could lead to death.
- If you cannot shut down the machine, please do not start it.

2.3.1.6 Engine start in cold weather

- Warm up the engine fully. If the engine isn't fully warmed up, operation of joysticks will be responded slowly by the machine, leading to accidents.
- Check if the battery acid is frozen or leaks before starting. If the battery acid is frozen, don't charge the battery or start the engine by different electric power. In that case, please melt the battery acid firstly, otherwise the battery may be on fire.

2.3.1.7 Required auxiliary equipment for start

Please follow the instruction in the operation manual when starting the engine by connecting auxiliary cable. Incorrect operation will lead to battery explosion or the machine out of control, and cause casualties. It is forbidden to start the engine by auxiliary cable without permission. Please contact the agents authorized by Sany Heavy Machinery Co., Ltd. if necessary.

- 2 persons are needed to cooperate to start the engine by auxiliary cable (one sits on the driver's seat and the other operates the battery).
- Please wear goggles and rubber gloves before starting the engine by auxiliary cable.
- When connecting the normal machine with the machine with malfunction by auxiliary cable, the battery voltage of the former shall be the same as that of latter. Meanwhile, please pay attention not to making two machines contact each other.
- Turn the ignition switches of the normal machine and the machine with malfunction to OFF position when connecting auxiliary cable. Otherwise when the power is on, the machines may move and pose a risk.
- Please make sure to connect the positive pole (+) at first, when connecting the auxiliary cable. Please disconnect the grounding or the negative (-) cable (grounding side) when removing the auxiliary cable.
- When removing the auxiliary cable, be careful not to make the auxiliary cable clamps contact each other or the cable clamps contact the machine. As diethyl ether cold starting fluid is extremely inflammable and explosive, please read the instructions on the container before use. Don't use diethyl ether when the engine is equipped with glow plug preheater or other types of preheater.

2.3.1.8 After starting the engine

After the engine is started, idle it for 3~5 min, and observe the system parameters displayed in the instruments to ensure the instruments function well and each reading is in normal operational range.

2.3.2 Operation

2.3.2.1 Check before operation

- Move the machine to a wide zone without obstacle, slowly operate it and allow no one to approach during the check.
- Please fasten the seat belt.
- Check if the instruments and equipment are working properly and check if the bucket, arm, boom, travel system, swing system and steering system function well.
- Check if the sound, vibration, heating, odor or instruments of the machine are normal, and check if there is leakage of engine oil or fuel.
- Test the engine speed control device with the travel control lever placed in the neutral position; operate the control lever of every device to check that each device functions well and know the control mode of the work equipment.
- If any abnormalities are discovered, don't continue to operate the machine but repair it at once.

CAUTION

- Observe and carefully listen to the machine to check for any abnormality. If any, stop the machine at once. Before further operation, please resolve the malfunction at once and report to the superior.

2.3.2.2 Precautions before operation

To prevent severe personal injury or death, please pay attention to the followings before operation:

- The turning circle of a 12 m radius is the working area (hazard zone) of the machine. Please press the horn button to warn the workers in this area before operation.
- No one shall be on, near the machine or in the turning circle.
- To ensure the view in the travel direction, please turn the cab if necessary.
- Please assign a signalman in the place with bad view.

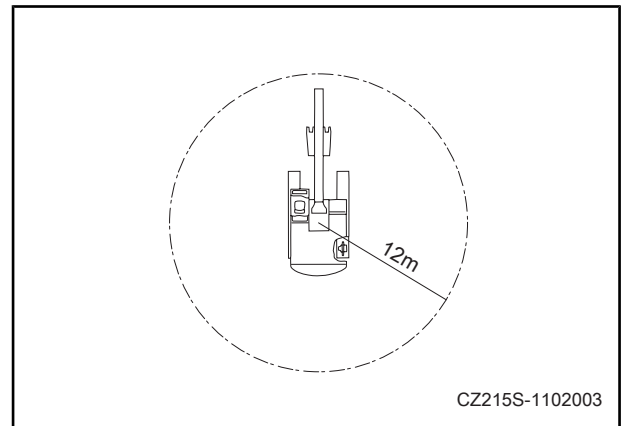


Fig.2-46

2.3.2.3 Verifying the travel direction

- Verify the position of the lower structure relative to the operator before driving the machine.
- Pushing the joystick forward/stepping on the pedal should move the machine forward, when the guide wheel is under the front of the cab.
- Pushing the joystick forward/stepping on the pedal should move the machine backward, when the travel motor is under the front of the cab.

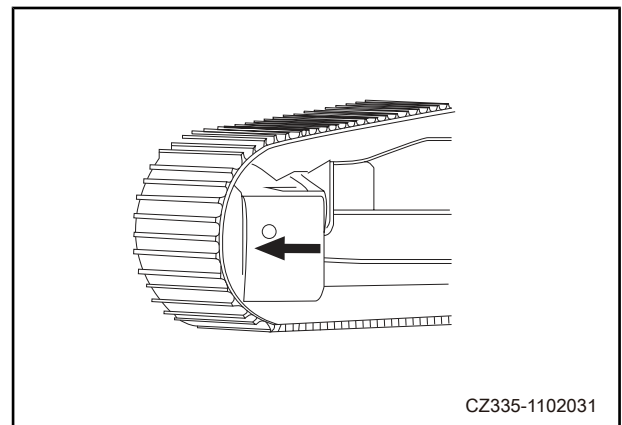


Fig.2-47

There is a travel direction sign inside the lower structure. When the operator pushes the joystick forward/steps on the pedal, the arrow on the sign points to the actual travel direction of the machine.

NOTE :

In this manual, front, rear, left and right refer to the direction seen from the cab when the cab faces the front while the driving wheel is in the rear of the machine.

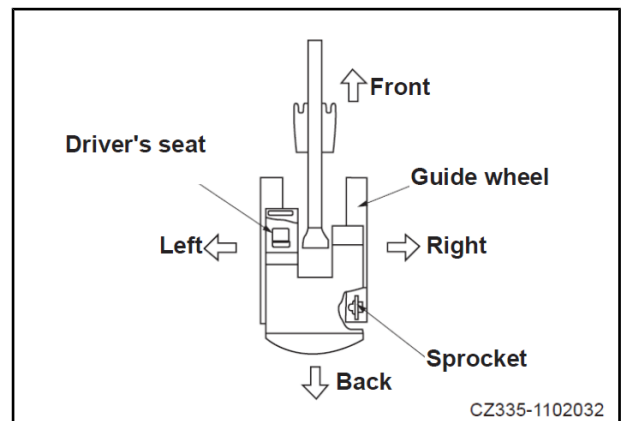


Fig.2-48

⚠ WARNING

- Wrong operation of travel control lever/pedal may lead to severe accident.

2.3.2.4 Safety rules for changing the machine direction

- Operate the machine only when you are seated.
- Don't allow anyone on the machine except for the operator.
- Check if the travel warning device functions well.
- The door and window of the cab shall be locked in the opening/closing position. At the work site where there is the danger of falling or flying objects entering the cab, please check if the door and window are closed tightly.
- Check that there is no one or obstacle in the working area and press the horn button to give warning before reversing or swing.
- Be cautious to check if anyone enters the working area of the machine. Pay greater attention not to contacting other machine or person when the machine makes a turn or swings.

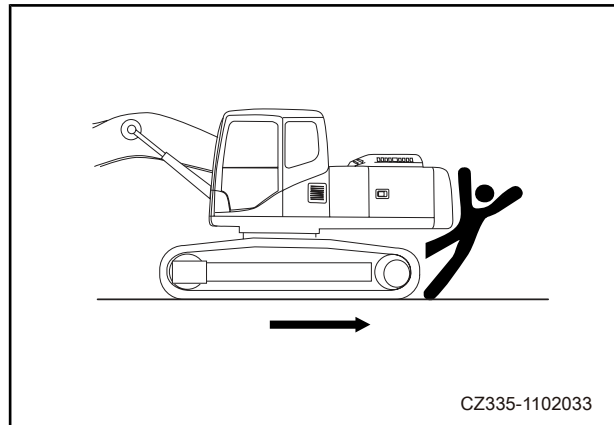


Fig.2-49

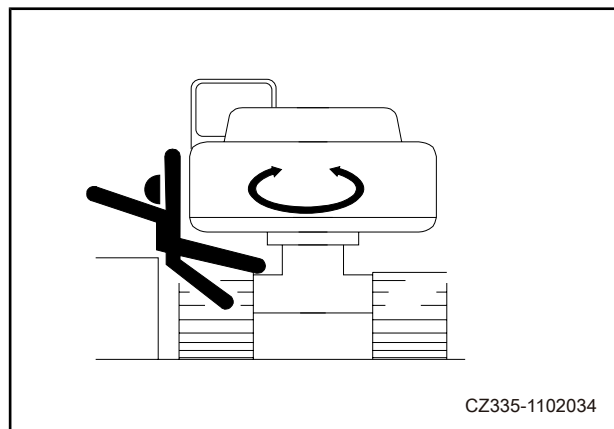


Fig.2-50

- Adjust the machine before traveling to place the driving wheel in back of the driver's seat. When the driving wheel is in the front of the cab, the machine will move in the opposite direction of the operation of the joystick (i. e. forward and backward operation for backward and forward travel, and rightward and leftward operation for left and right turn). Please pay greater attention in case of that.

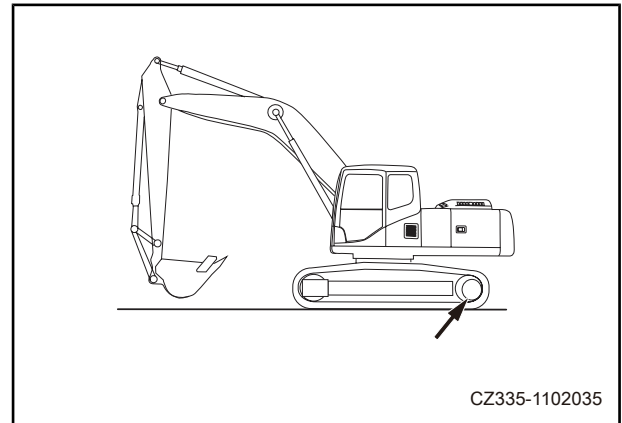


Fig.2-51

- Please assign a signalman to command and keep the signalman in the view, when your view is hindered during reversing;
- When a signalman is required under specific working conditions, please adopt hand signals in accordance with local regulations;
- Only when both the signalman and the operator know well the signals can the machine be moved;
- Understand the meaning of all flags, signals and marks in work and confirm who is in charge of signaling;
- Keep the window, rearview mirror and work light clean and in good condition;
- Dust, heavy rain, fog and etc. will reduce visibility. Please slow down and use proper lighting when the visibility reduces.



Fig.2-52

WARNING

- If someone is near the machine during reversing or swing of upper structure, he/she may be knocked down or squashed by the machine, leading to severe accident.

2.3.2.5 Travel safety rules

- To prevent engine stall because of overload and work equipment damage during operation, don't exceed the maximum allowable load or performance parameters of the machine.
- Please keep the safety distance from people, buildings and other machines to prevent collision during traveling or operation.
- Please contact relevant departments and follow their guidance when traveling on the road.
- When the machine travels on a flat ground, make sure to retract the work equipment and keep a 20~30 cm (8~12 in) height above the ground.
- The machine shall travel at a low speed on the rough ground and not make a turn suddenly, otherwise the machine may roll over. If the work equipment hits the ground, the machine will lose balance and be damaged.
- For traveling on the rough ground or steep slope, if the machine has a function of automatic idling, turn off the automatic idling switch (cancel the function); if the switch is turned on, the engine speed will reduce and travel speed will slow down abruptly.
- Avoid traveling on the obstacle as far as possible; if it's necessary, lower down the work equipment to approach the ground and move the machine at a low speed.
- Before passing over a bridge or structure, check if the structure strength is able to support the machine weight firstly.
- During operation in areas with limited height such as in tunnel, under bridge and under electrical wire, slowly operate the machine and pay greater attention not to making the work equipment contact any other objects.

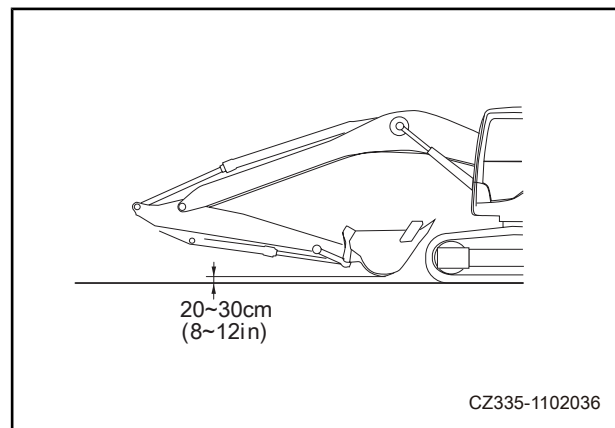


Fig.2-53

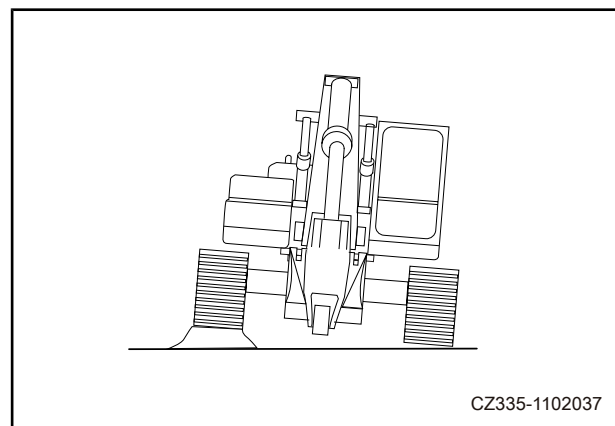


Fig.2-54

2.3.2.6 Driving the machine safely

- Verify the guide wheel is under the front of the cab and clearly know how to move the joystick or step on the pedal before driving the machine.
- Step on the forepart of the travel pedal or push forward the travel control lever to move the machine towards the guide wheel.
- When traveling on a slope, please keep the work equipment 20~30 cm (8~12in) above the ground. In case of emergency, lower down the work equipment to the ground rapidly to help stop the machine.

⚠ WARNING

- Traveling on a slope may lead to slip or rollover, causing severe accident.
- For uphill traveling, adjust the cab to make it face the uphill direction; for downhill traveling, adjust the cab to make it face the downhill direction.
- Please check the hardness of the ground in front of the machine before traveling.
- When running up a steep slope, extend the work equipment forward for keeping balance and keep it 20~30cm (8~12in) above the ground, and move the machine at a low speed.
- When running down a slope, reduce the engine speed, keep the travel control lever near the neutral position and move the machine at a low speed.

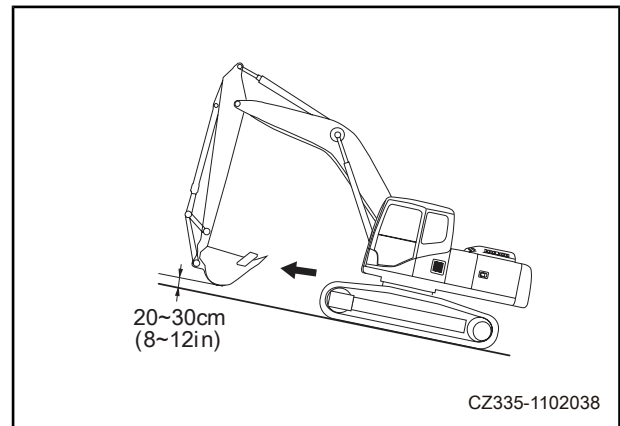


Fig.2-55

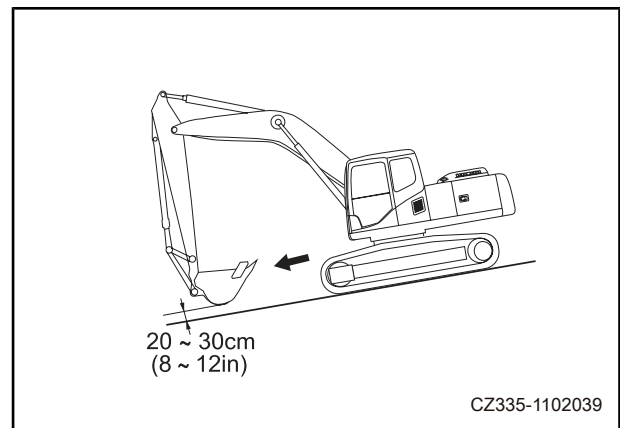


Fig.2-56

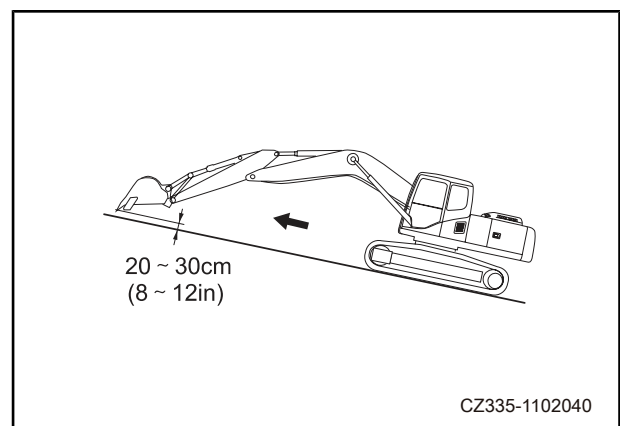


Fig.2-57

- Straightly travel uphill and downhill, because it's extremely dangerous to make a turn on the slope or cross the slope.

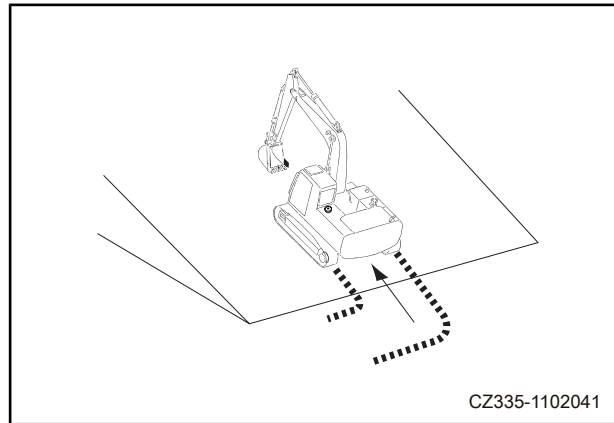


Fig.2-58

- Don't make a turn on the slope or cross the slope. Make sure to move the machine down to a flat ground, change the machine position, and then drive the machine uphill.
- Travel at a low speed on ground with grass, fallen leaves or wet steel plate. There may be the danger of slip even on a gentle slope.
- If the engine stops when the machine travels on a slope, please move the joystick to the neutral position immediately and restart the engine.

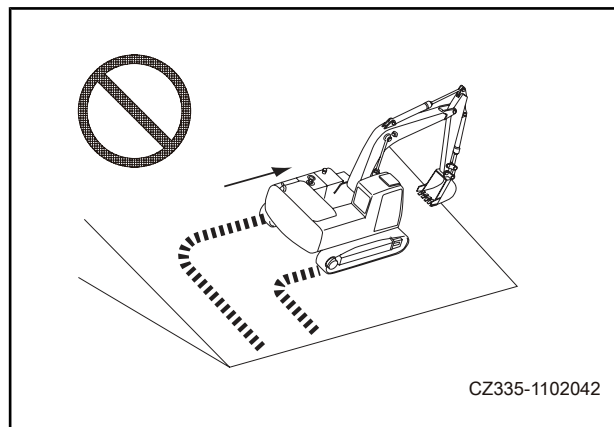


Fig.2-59

2.3.2.7 Operation on slope

During operation of the upper structure or work equipment of the machine on a slope, there will be the danger of losing balance and rollover, which may lead to severe injury or equipment damage. These operations shall be done on a flat work platform and with care.

- When the bucket is fully loaded, don't swing the work equipment from the uphill side to the downhill side. This operation is dangerous and may lead to machine rollover.
- When the machine must be used on a slope, please build a work platform with soil to keep the machine horizontal as far as possible.

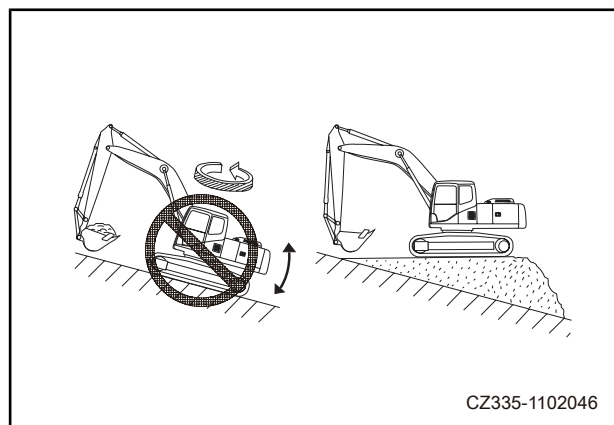


Fig.2-60

2.3.2.8 Operation in snowy weather

- During traveling or operation on a highly slippery snow-covered and frozen ground, please do not operate the control lever abruptly; pay greater attention especially during operation on a slope, because the machine may slip even on a gentle slope.
- For frozen ground, it will be soft after the temperature rises up, leading to machine rollover.
- When the machine travels over deep snow, there will be the danger of rollover and being buried in snow. Pay attention not to leaving the road shoulder and getting stuck in snow.
- When cleaning the snow, it's hard to see the road shoulder and objects near the road buried in snow. There will be the danger of rollover and colliding with buried objects. Therefore, be careful to operate the machine in that case.

2.3.2.9 Forbidden operation

- Don't excavate the working surface under the suspending part. Otherwise, there will be the danger of rock falling, even leading to collapse of the suspending part and severe accident.

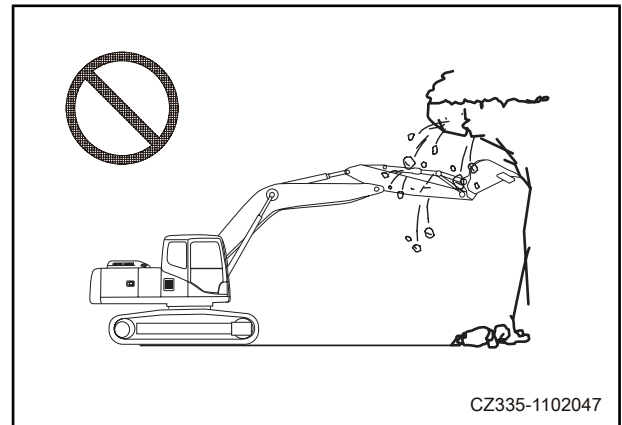


Fig.2-61

- Don't excavate the front area under the machine too deep. Otherwise, after the underneath part is hollowed out, the ground will collapse and lead to accident.

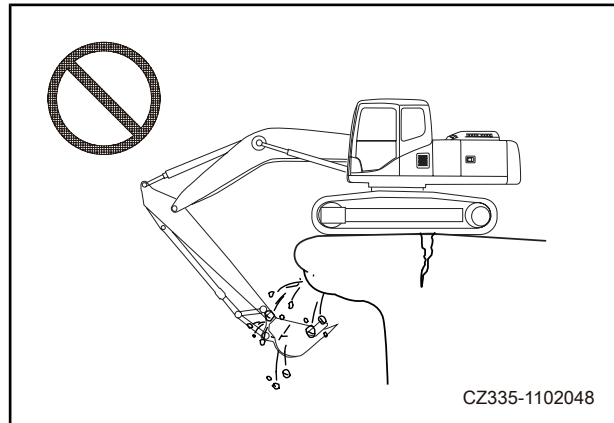


Fig.2-62

- Don't conduct removal operation under the machine, which makes the machine unstable and face the danger of rollover.
- Before operation over the buildings or other structures, please check the structure strength to prevent casualty due to collapse of structure.

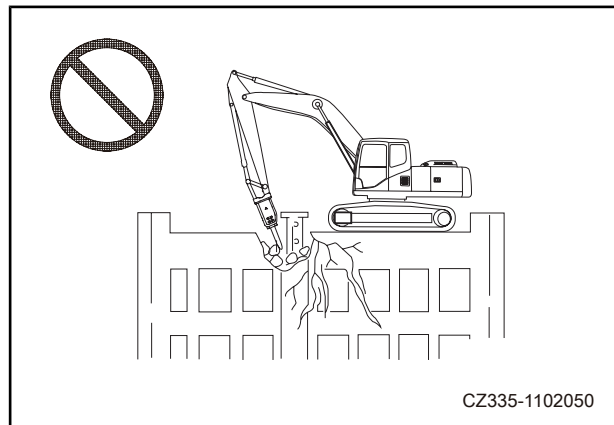


Fig.2-63

- When conducting removal operation, don't remove the part immediately above. Fragment falling down and structure collapse will lead to machine damage and casualties.

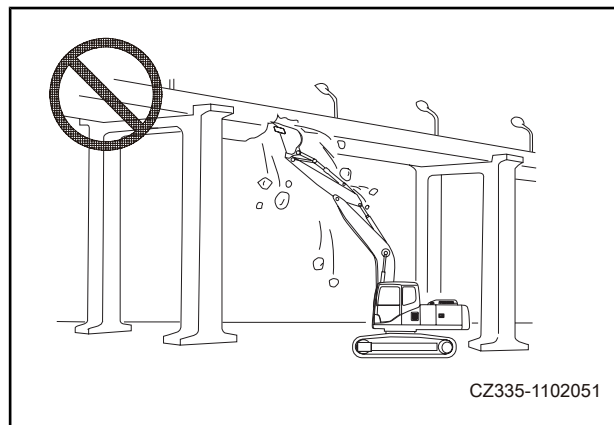


Fig.2-64

- Don't break the target by the impact force of the work equipment; otherwise scattering fragment material may hurt people and damage the work equipment, and also the impact reaction may lead to machine rollover.
- Generally speaking, the work equipment on the side of the machine is easier to turn over than the one in the front or the back.

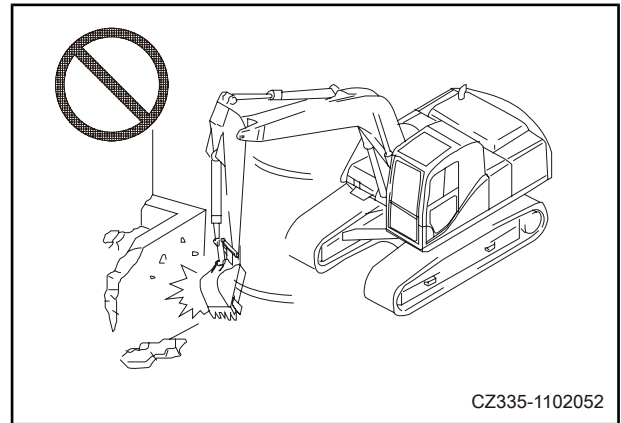


Fig.2-65

- Lifting, moving or swing of the bucket must not pass above anyone or the truck cab. If the materials in the bucket fall down or the bucket hits something, personal injury or machine damage may occur.
- Never lift or transport people with the machine, which may lead to casualty.
- The machine with breaker or other heavy work equipment has the danger of losing balance and rollover.
- Don't suddenly lower down, swing or stop the work equipment.
- Don't suddenly extend or retract the boom cylinder; otherwise, there will be the danger of rollover because of the impact force.

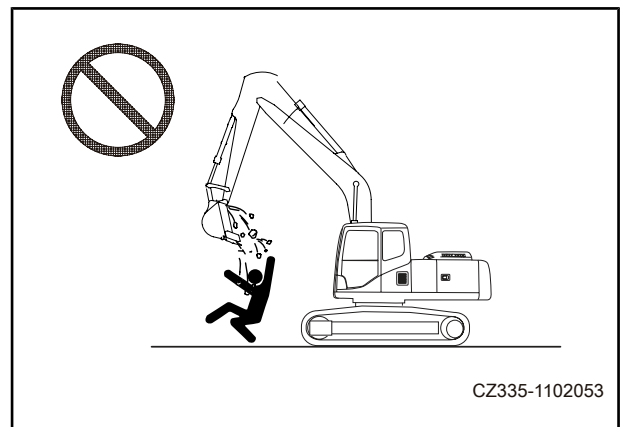


Fig.2-66

2.3.3 Parking

2.3.3.1 Choosing parking lot

- Park the machine on a solid and flat ground.
- Choose a safe region without risk of falling rock and collapse etc to park the machine. For low-lying area, park the machine at the place without flood risk.

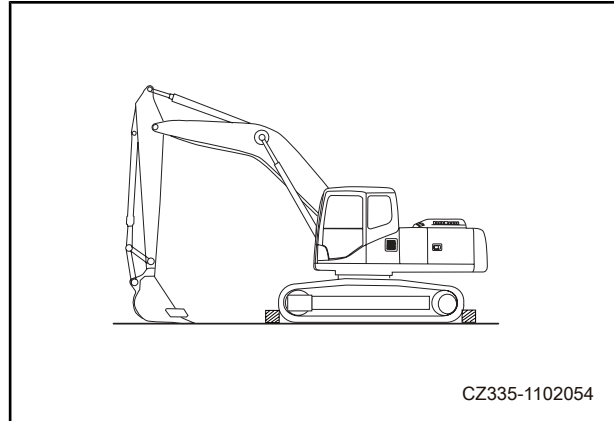


Fig.2-67

- Park the machine on a level ground as far as possible. If it's necessary to park it on a slope, following rules must be observed:
- Adjust the bucket to make it face the downhill side and insert the bucket tooth into the ground.
- Place a cushion block under the track to prevent machine movement.

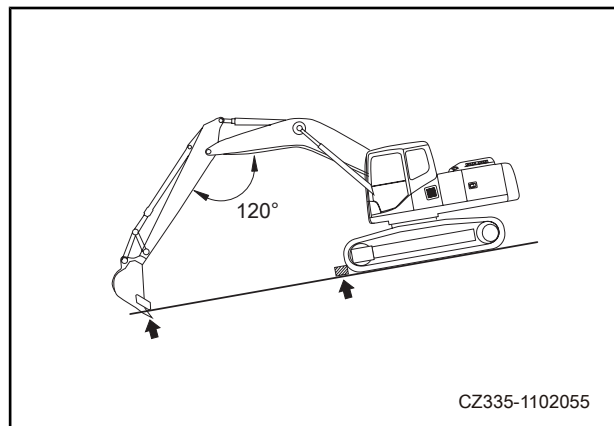


Fig.2-68

- Don't park the machine on a construction road. If it's necessary, please comply with local rules to remind other people or vehicles by flag in the daytime and signal lamp at night.

2.3.3.2 Machine shutdown

See the Section Operation of this Manual for detailed machine shut down steps. General shutdown procedure is as follow:

- Stop the running machine.
- Adjust the body.
- Lower the work equipment to the ground or place it at fixed position.
- Slow down the engine and run it at a low idle speed for 5 min.
- Turn the ignition switch to [OFF] position to stop the engine.
- Pull the safety control lever to the lock position.
- Take out the ignition key.
- Close the window, skylight and cab door.
- Lock all access doors and boxes.

NOTE :

- When you leave the machine, please keep three-point contact and face the machine, and don't jump down from the machine.
- When leaving the machine, be careful of the smooth track, steps and handles.

2.3.4 Transportation

2.3.4.1 Transportation

When transporting the machine, pay attention to the followings:

- Know the overall length, width and height of the transport vehicle and the machine and avoid contacting the obstacles at a high place and narrow channel.
- Before passing the bridge, please check if the bridge is able to support the weight in advance; when driving on road, please follow traffic laws and traffic police's command.

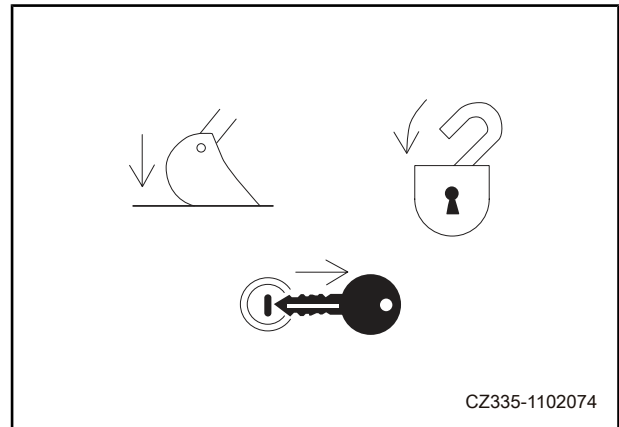


Fig.2-69

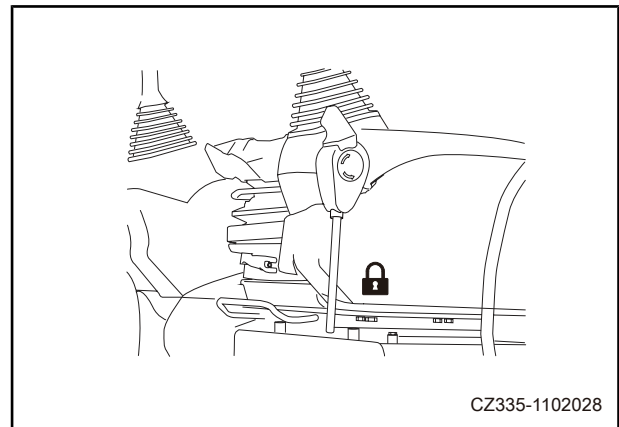


Fig.2-70

2.3.4.2 Loading and unloading

During loading and unloading, wrong operation will lead to machine rollover and falling down, therefore pay attention to the followings:

- Load and unload the machine on a solid and flat ground only; keep a safe distance from the edge of the road or cliff.
- Access board with sufficient strength must be used. Ensure that the access board is wide, long and thick enough to form a safe loading and unloading slope ($\leq 15^\circ$).
- Ensure the access board surface is clean and without grease, oil, water and scattered materials and clean dirt on the machine track. During loading and unloading in rainy or snowy weather, please be careful of the wet and slippery access board surface.
- Don't load or unload the machine by the work equipment; otherwise machine falling down or rollover may occur.
- Cancel the function of automatic idling, run the engine at a low speed and slowly drive the machine.
- Don't operate any joysticks except for the travel control lever on the access board.
- Don't correct the direction on the access board. If necessary, drive the machine away from the access board, correct the direction, and then drive the machine to the board again.
- At the connection between the access board and trailer, the machine center of gravity will change suddenly, making the machine liable to lose balance. Therefore, move the machine slowly when passing this part.
- For loading and unloading on an embankment or platform, ensure the embankment

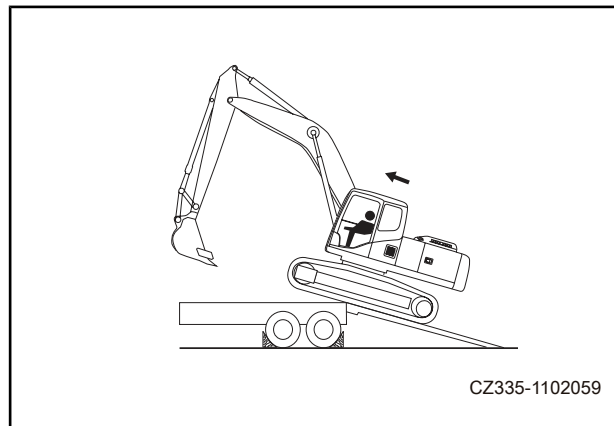


Fig.2-71

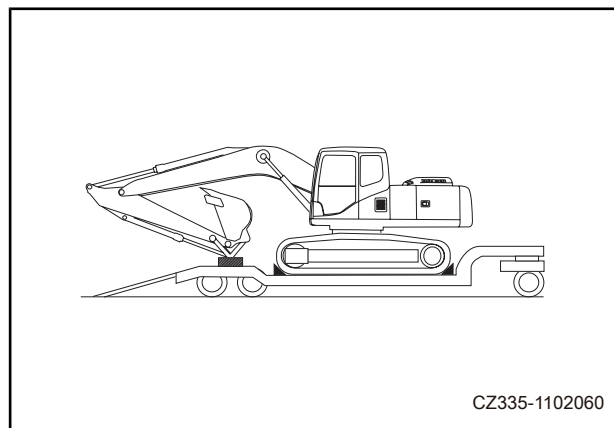


Fig.2-72

or platform has sufficient width, strength and gradient.

- The trailer where the upper structure is swung will be instable, therefore, retract the work equipment and slowly swing the structure.
- After loading the machine, please lock the cab door. Otherwise the cab door may open suddenly during transport.
- Fix the machine by chain and cushion block. Fix all work equipment, lower down the bucket, boom and arm, and place them in the transport position.

2.3.5 Battery

Preventing the danger caused by battery

Battery acid comprises sulfuric acid and is able to generate flammable and explosive hydrogen. Wrong operation will lead to injury or fire. Therefore, it is important to observe the following rules:

- No smoking or open flame near the battery.
- Turn the ignition switch to OFF position before checking or handling the battery.
- Please wear safety glasses and rubber gloves when handling the battery.
- Battery acid is highly corrosive. If battery acid splashes on clothes and skin, flush with plenty of water at once. If it enters your eyes, there will be the danger of blindness, therefore make sure to flush with plenty of water at once and seek for medical care.

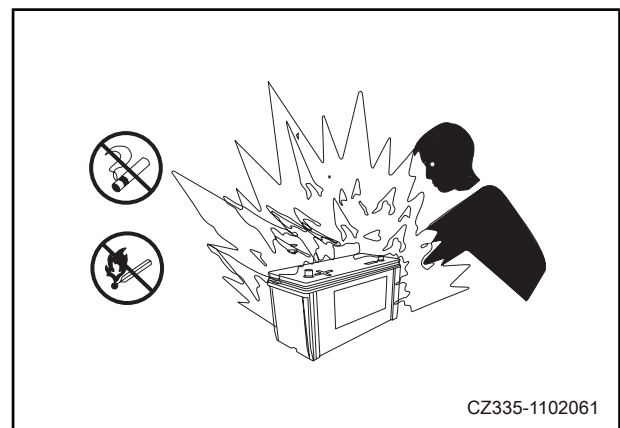


Fig.2-73

To avoid battery explosion, please observe the following precautions during operation:

- Don't allow tool or other metal objects to contact battery terminal; don't allow tool or other metal objects to be placed near the battery.
- For disconnecting the battery, 1 min after the engine is shut down, disconnect the negative (-) terminal firstly, and then the positive (+) terminal; For connecting, connect the positive (+) terminal firstly, and then the negative (-) terminal. Ensure all terminals connect well.
- During charging process, when battery temperature exceeds 45°C, stop charging and lower the temperature to the room temperature; then half the charging current before continuing to charge the battery.
- When battery is charging, it will generate inflammable hydrogen. Therefore, before charging, dismantle the battery from the superstructure, place it in a well-ventilated place and dismantle the battery cover.
- If acid sprays out of the battery exhaust hole during charging, please stop charging at once.
- Never smoke or keep off any fire source during charging.
- When the battery electrical eye becomes green, it indicates completion of charging. In that case, stop charging.
- After charging, screw up the battery cover tightly.
- Install the battery to specified position tightly.

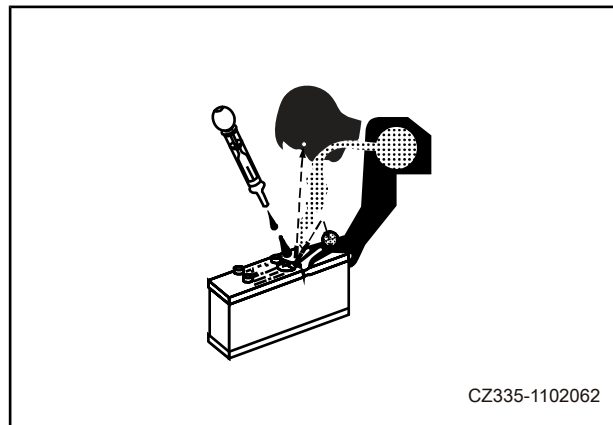


Fig.2-74

2.3.6 Towing

For towing of a damaged machine, incorrect operation method or choosing nonconforming wire rope will lead to severe accident:

- Don't tow the machine on a slope.
- Wear protective gloves and helmet when using wire rope.
- Check that the wire rope is of adequate strength that it can bear the weight of towed machine.
- Don't use wire rope having such problems as broken strand [A], reduced diameter [B] and twisting [C]. These wire rope may break off during towing.
- Don't stand between the towing machine and the towed machine during towing.
- Slowly operate the machine and pay attention not to loading the wire rope suddenly.

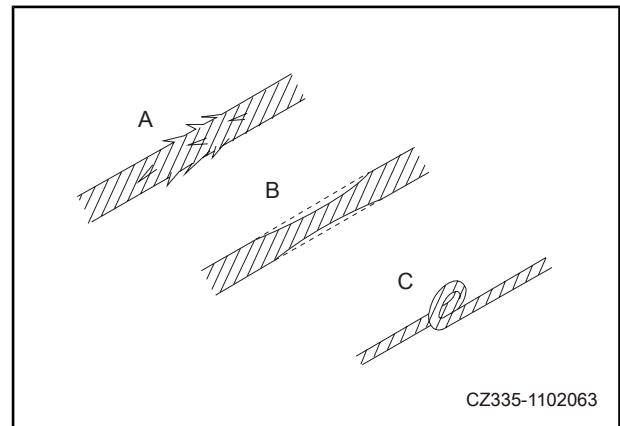


Fig.2-75

2.3.7 Lifting by excavator

- Allow no one to enter the working area.
- Before operation, determine all possible signals used in operation and assign a signalman.
- To prevent rollover or falling down, operate the machine on a flat ground.
- Before lifting, please know the lifting capacity of the machine, and don't exceed the specified lifting load.
- Don't use damaged chain, wire rope, lifting eye and brace.
- Hang the lifting sling on the lifting point specified by the manufacturer. Never hang lifting eye or rope on the bucket teeth. Otherwise, the bucket teeth may fall off, leading to falling down of lifted object.
- Don't leave driver's seat during lifting.
- To prevent the lifted objects from contacting people or construction, check if the surrounding area is safe before swinging or operating the work equipment.
- Don't suddenly swing or operate the work equipment. This will lead to the swing of the lifted objects, and even machine rollover. Use a tow rope to strengthen control if necessary.
- Don't tow the load in any directions by the work equipment or by rotation. Once the lifting hook breaks and load separates from it, the work equipment will move suddenly and cause injury.

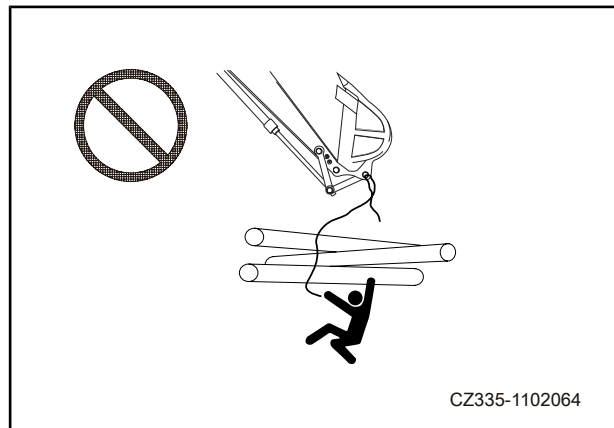


Fig.2-76

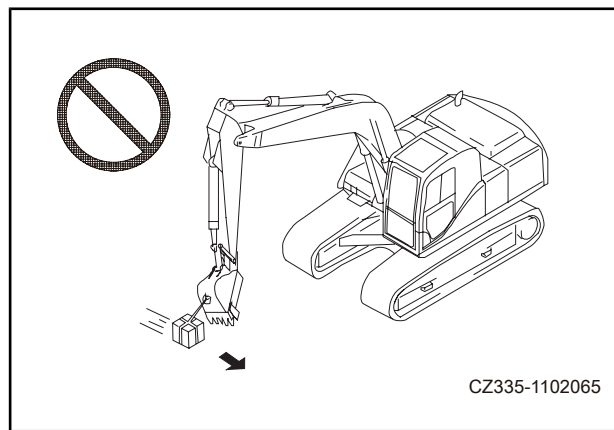


Fig.2-77

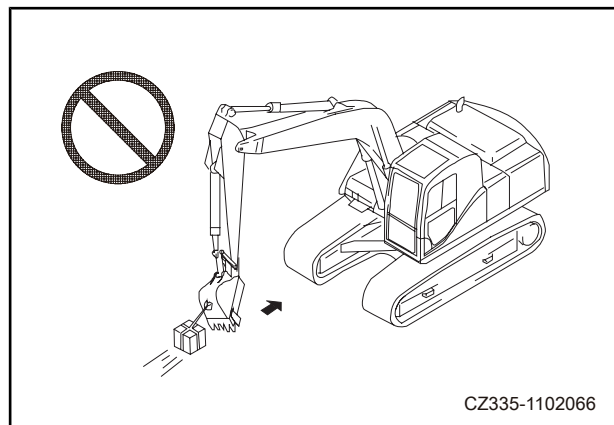


Fig.2-78

2.4 Safe maintenance instruction

2.4.1 Precautions before maintenance

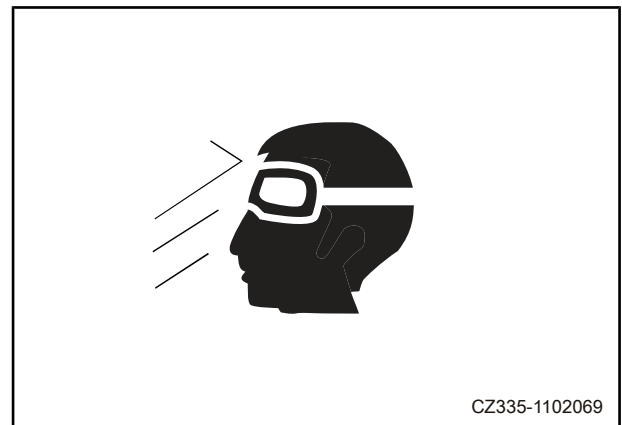
To prevent accidents:

- Understand the maintenance procedure before operation.
- Keep the work region clean and dry.
- Don't spray water or vapor in the cab.
- Never do refueling, lubrication and other maintenance work while the machine moves.
- Keep your hands, feet and clothes off the rotary parts.

2.4.2 Self-preparation

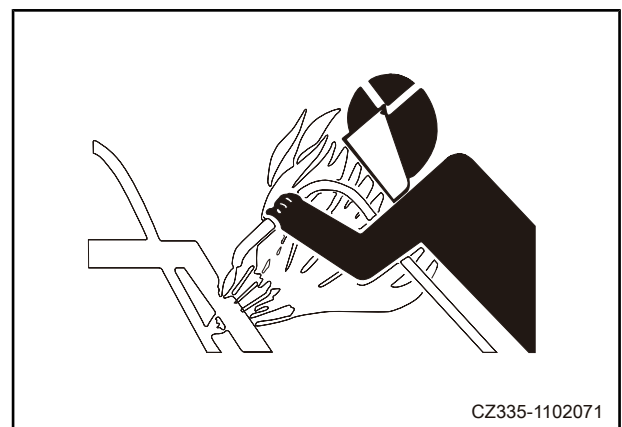
The machine can be maintained or repaired by approved workers only. An observer could be assigned if necessary.

- Wear protection suit and safety shoes required by the work.
- When you remove spring, flexible components or add acid to the battery, please wear face shield. Wear helmets and eye protection when you weld or cut something.
- During cleaning with compressed air, flying granules may cause personal injury. Therefore please wear goggles, dust mask, gloves and other protective equipment.
- When knocking hard metal part with a hammer, such as pin, bucket teeth, cutting edge or bearing, parts and metal fragments flying off will lead to injury. Therefore please wear goggles and gloves and keep anyone off the surrounding area.
- Don't conduct grinding, flame cutting or welding if breather or ventilation equipment is not available. If it is necessary to perform welding on the hydraulic excavator, refer to relevant manual for correct procedures.



CZ335-1102069

Fig.2-79



CZ335-1102071

Fig.2-80

- If the machine creates too much noise, it may lead to temporary or permanent hearing problem. When maintaining the engine, please wear ear muff or plug before working in the noise for a long time.
- Please wear rubber apron and rubber gloves when contacting corrosive materials. Please wear protective gloves when handling wooden materials, wire ropes or metal with sharp edge.

2.4.3 Preparation of working area

- Select a working area with enough space, sufficient light, good ventilation, clean and flat ground for maintenance.
- Clean the working ground, wipe off fuel, lubricant and water, and cover the slippery ground with sand or other adsorptive materials.
- Don't leave hammer or other tools in the working area.
- If you fail to keep the working area clean and tidy, there will be the danger of stumble, slip and fall, leading to personal injury.

2.4.4 Steps of engine shutdown before maintenance

Before maintaining the machine:

- Park the machine on a solid and flat ground.
- Lower down the bucket to the ground.
- Place cushion blocks under the track to prevent the machine from moving.
- Turn the accelerator control knob to "1" position to run the engine at a low idle speed and under no load for 5 min.
- Turn the ignition switch to [OFF] position to stop the engine.
- Turn the switch to [ON] position and move the control lever to the front, back, left and right twice and three times respectively to release pressure in the hydraulic system.
- Take off the key from the ignition switch.
- Turn the safety lock control lever to "LOCK" position.

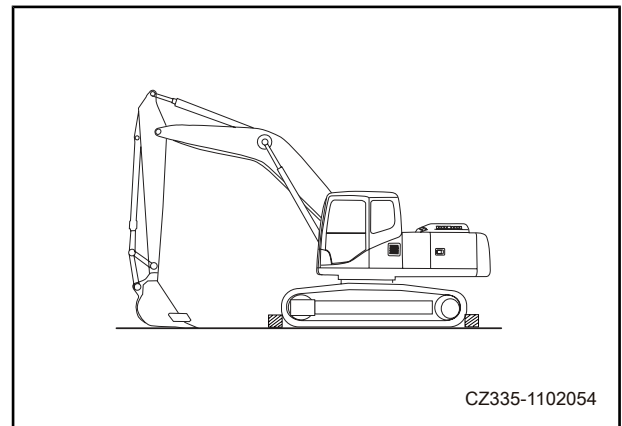


Fig.2-81

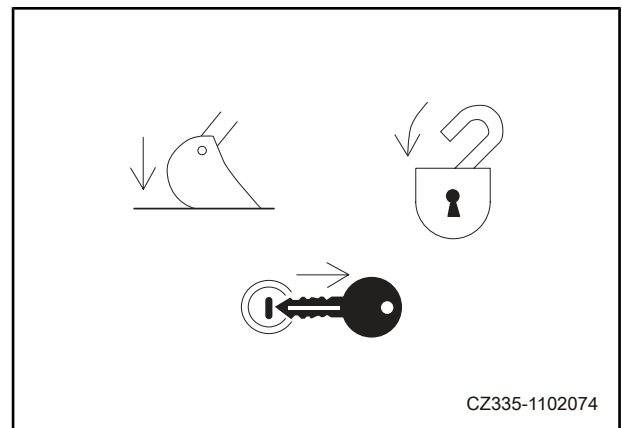


Fig.2-82

2.4.5 Warning decal

- Hang up “No Operation” decal or similar warning decal on the ignition switch or direction control device before maintenance to warn others that the machine is under maintenance.
If necessary, an additional warning decal can be attached around the hydraulic excavator.
- If someone starts the engine, contacts and operates the control lever or pedal during maintenance, it will lead to severe accident.

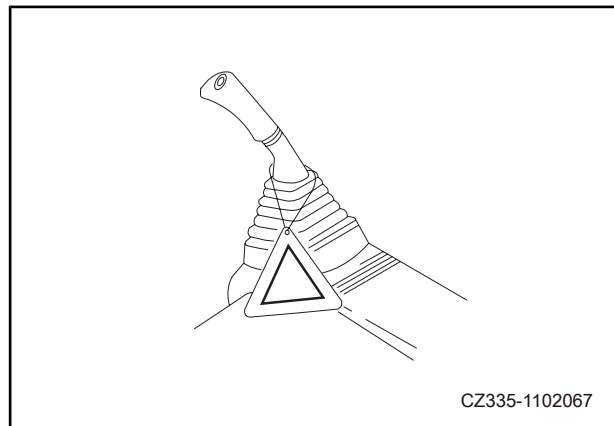


Fig.2-83

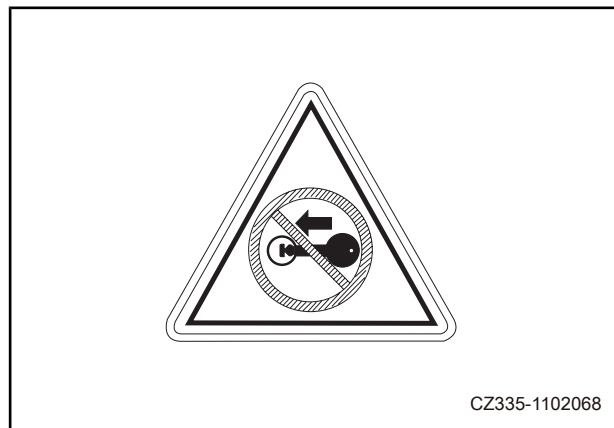


Fig.2-84

2.4.6 Proper tools

- Only proper tools can be selected for maintenance and they shall be used correctly; using damaged, bad, defective and temporary tools or incorrectly using tools will lead to severe accident.

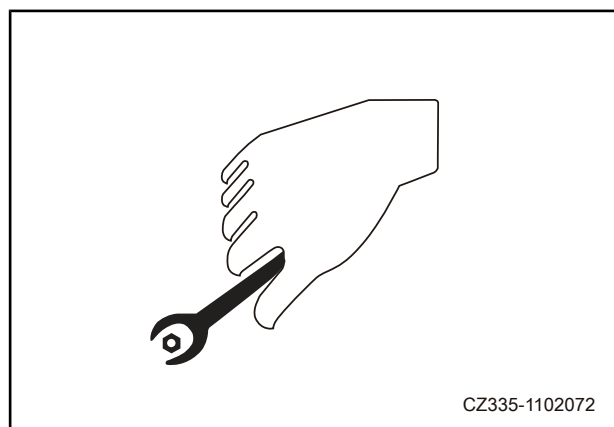
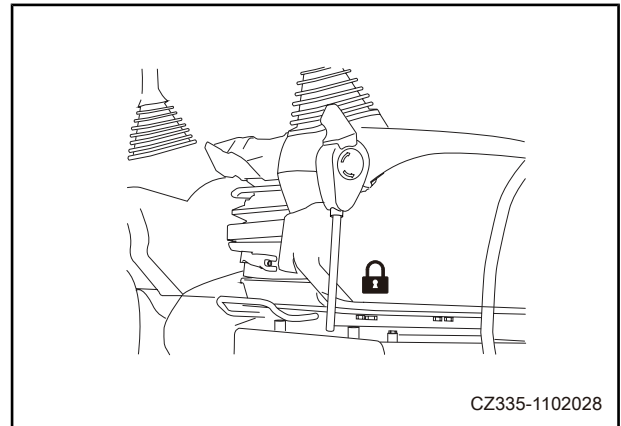


Fig.2-85

2.4.7 Maintenance during engine running

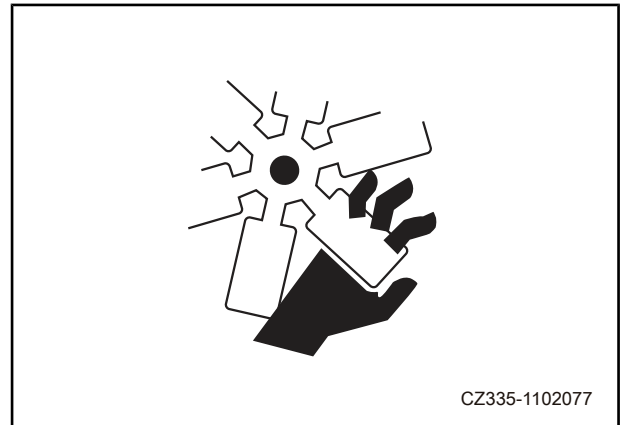
Don't maintain the machine when the engine runs to prevent injury. If necessary, the maintenance during engine running requires at least 2 workers and shall be conducted as the followings:

- One worker must sit in the driver's seat all the time and be ready to shut down the engine at any time. All workers must keep in touch.
- Turn the safety lock control lever to "LOCK" position to prevent the work equipment from moving unexpectedly.
- Operation near the fan, fan belt or other rotary components will cause the danger of being rolled by the components. Please pay greater attention to it.
- Tools or other objects shall not fall into fan or fan belt, otherwise, parts will be broken or fly off.
- Don't touch any control levers. If necessary, please signal others and warn them to move to a safe place.
- In case the high pressure common rail pipe is leaky, never do maintenance on the excavator when it is operating; or during normal operation, never remove or install any high pressure components.



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Fig.2-86



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Fig.2-87

2.4.8 Operation under the machine

- Don't maintain the machine before well supporting it.
- Lower down the work equipment to the ground before maintenance.
- If the machine or the work equipment must be lifted for maintenance, support it firmly with cushion block or bracket of sufficient strength, rather than slag brick, cord tyre or shelf; don't support the machine by a single jack.
- If the track shoe leaves the ground while the machine is only supported by the work equipment, it's very dangerous to operate under the machine. If the hydraulic pipeline is damaged or the control lever is contacted by accident, the work equipment or machine may fall down suddenly, causing casualty. Therefore never work under the hydraulic excavator if it is not firmly supported by the cushion blocks or brackets.



Fig.2-88

2.4.9 Track maintenance

- Due to dry friction, the track pin and track bushing are very hot. To prevent scald, please wear safety protective gloves.
- Keep proper track tension. During operation on mud and snow ground, mud and snow will stick to the track parts, making the track too tight. In that case, please adjust track tension according to the operation manual of the product.
- Check if the track shoe is loose or broken, and if the track pin and the track bushing are worn or damaged, and check the track roller and the carrier roller.

⚠ CAUTION

- Don't knock the track tension springs, as they may bear huge pressure and break suddenly, leading to injury. Don't remove springs under compression condition. Tension spring should not be compressed.
- Follow the track maintenance guidance provided by the manufacturer.

2.4.10 Safety precautions for track tension adjustment

- Grease is pressed into the track tension adjustment system under a high pressure condition.
- To loosen track tension, slowly loosen the grease drain plug and don't unscrew it for more than one turn.

⚠ WARNING

- Failure to follow the specified maintenance process during adjustment will cause flying off of the grease drain plug, leading to severe injury or damage.
- Keep your face, hands, feet or other parts of the body off the drain hole of the grease drain plug.

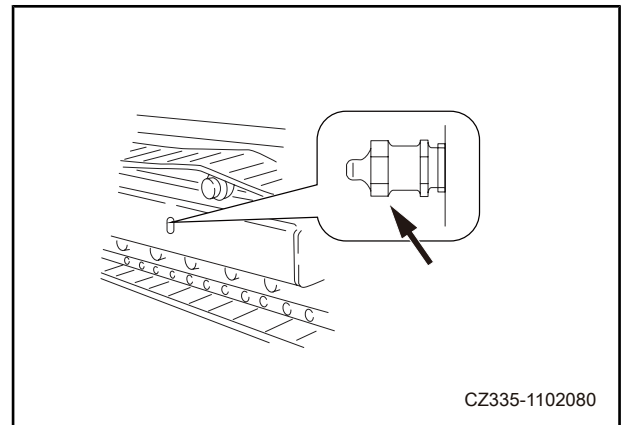


Fig.2-89

2.4.11 Don't remove the buffer spring

Buffer spring assembly is used for reducing the impact force of the guide wheel. It comprises a high pressure spring, which, if incorrectly removed, will cause flying off of the spring, leading to severe casualty. If the buffer spring assembly must be removed, please contact the agents authorized by Sany Heavy Machinery Co., Ltd. to conduct this operation.

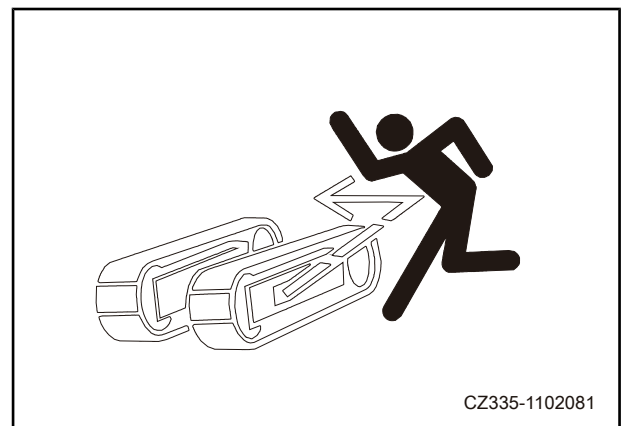


Fig.2-90

2.4.12 Be careful of hot cooling system

As temperature of engine increases, pressure in cooling system builds up. Stop the engine to allow the system to cool down before removal of radiator cap. You should not remove it until the coolant cools down.

⚠ WARNING
<ul style="list-style-type: none">• Contacting hot high pressure coolant will cause severe injury.



Fig.2-91

2.4.13 Safe operation of high pressure hose

If leakage is found in the high-pressure hose, it may cause an operational failure and even lead to a fire. If bolts on the hose come loose, stop working and tighten the bolts to specified torque. If any damage is discovered in the hose, please stop operation at once and contact the agents authorized by Sany Heavy Machinery Co., Ltd.

Replace the hose at once when the following problems are discovered:

- Hydraulic tube connectors are damaged or leak.
- The covering is worn or broken, or steel wire of the reinforcement layer is exposed.
- Some parts of the covering swell.
- There are impurities inside the covering.
- Removable parts are twisty or squashed.

2.4.14 Be careful of high pressure liquid

Pressure always exists in the hydraulic system. When you check or replace the hose, always check if pressure in the hydraulic oil line has been relieved. If there is remaining pressure in the hydraulic oil line, serious accidents will occur. Therefore, it is important to observe following rules:

- Release system pressure before maintaining the hydraulic system;
 1. Screw off the butterfly nut of the breather valve, and press the exhaust button to release the internal pressure in the hydraulic tank.
 2. Release pressure in pilot lines group. In 15 seconds after shutdown, turn the ignition switch to ON position, set the safety lock control lever to "UNLOCK" position, and move the travel control lever and the left and right joysticks to all directions to release pressure in the accumulator.
- Keep the hydraulic system off any open flame, and eliminate splashing hydraulic oil, if any, at once.
- Diesel or hydraulic fluid under pressure is able to penetrate skin or eyes, leading to severe injury, blindness or death. It is difficult to check if the pressurized hydraulic oil leaks with naked eyes. You need to find leakage with a piece of cardboard or wood chip instead of touching leaked oil directly. Wear a face mask or protective goggles to protect your eyes. If oil penetrates your skin, rinse it with water and seek medical attention as soon as possible.
- When the engine is running, high pressure will arise inside the fuel pipeline. Before

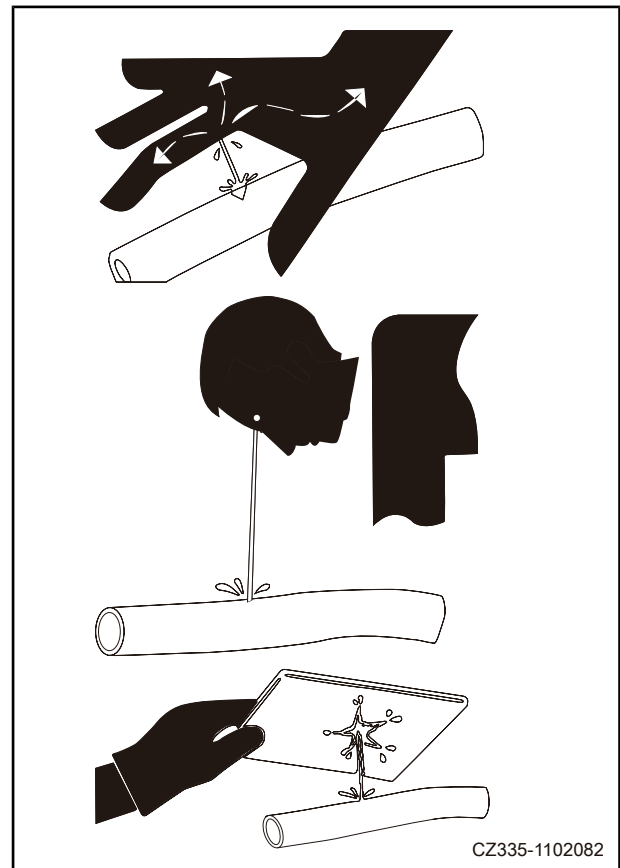


Fig.2-92

checking or maintaining the fuel pipeline system, wait at least 30 seconds after the engine is shut down, to allow the internal pressure of the system to reduce.

2.4.15 Welding operation

There is a risk of fire or electric shock during welding, therefore, welding must be carried out by qualified welders with appropriate equipment. Unqualified personnel are not allowed for welding.

⚠ CAUTION
<ul style="list-style-type: none"> Before welding, disconnect the negative breaker and the connection of the platform grounding point (as shown on the right) at the same time; during welding, make the ground of the welder grounded near the welding point.



Fig.2-93

2.4.16 Safe maintenance of HVAC group

⚠ WARNING
<ul style="list-style-type: none"> R134a refrigerant is a non-toxic gas at room temperature, but it turns into a highly toxic gas when it exposes to fire.

- Keep the HVAC group away from fire source during maintenance.
- Please use the refrigerant correctly according to the instruction on the refrigerant container when maintaining the HVAC group. Use R134a as the refrigerant. Don't use other refrigerants. Otherwise, the HVAC group will be damaged.
- If the refrigerant enters eyes, it may cause blindness; if it splashes on skin, it will cause cold injury.
- It is strictly forbidden to discharge the refrigerant directly into the atmosphere, instead,



Fig.2-94

a refrigerant circulation system should be used.

2.4.17 Precautions related to high voltage

- When the engine is running or was just shut down, high pressure will arise in the injector terminal and inside the engine controller, causing the danger of electric shock. Therefore, please don't contact the injector or the inside of the engine controller.
- If it's necessary to contact the injector terminal or the inside of the engine controller, please contact the agents authorized by Sany Heavy Machinery Co., Ltd.



Fig.2-95

2.4.18 Accumulator

The accumulator is filled with high-pressure nitrogen, thus improper operation to the accumulator may cause an explosion, which may lead to serious accidents. Therefore please comply with the following precautions:

- Don't disassemble the accumulator.
- Keep the accumulator off fire source or do not expose it to fire.
- Don't punch, weld or cut by torch the accumulator.
- Don't collide with or roll the accumulator, or make it suffer any impact.
- Deflation is required for handling of the accumulator. Please contact the agents authorized by Sany Heavy Machinery Co., Ltd to conduct this operation.



Fig.2-96

2.4.19 Preventing the danger of fire and explosion

WARNING

- Don't **smoke when handling fuel or maintaining the fuel system, as fuel vapor in the empty fuel tank is highly liable to explode. Don't conduct cutting and welding operation on the fuel pipe, fuel tank or other fuel containers. Otherwise fire and explosion may occur, leading to casualties.**
- Please shut down the engine and turn off the electrical equipment when refueling the tank. Be extremely cautious when refueling the hot engine. Avoid any spark around the grounding fuel nozzle.
- Please handle all solvents and dry chemicals according to the steps marked on the containers in a well-ventilated place.
- Clean away dust and residues on the machine, and don't place greasy cleaning cloth or other inflammable materials on it.
- Please clean parts with non-inflammable solvent rather than gasoline, diesel or other inflammable liquid.
- Store inflammable liquid and materials in proper containers according to safety regulations.
- Check if fire extinguisher, fire extinguishing system and fire detectors (if equipped) are ready for use.

2.4.20 Regular replacement of safety related parts

- To ensure long-term safe operation of the machine, parts related to safety such as hose, seat belt must be replaced regularly.
- Exceeding the specified replacement interval may cause aging problem of part materials. Over-use will lead to abrasion and damage, causing machine malfunction and personal injury. At the same time, it's hard to identify how long these parts can work well only through visual inspection or touch. Therefore regular replacement is necessary.
- Safety related parts, if defective, shall be replaced or repaired even before the specified replacement interval.

2.4.21 Maintenance operation

- Check all components and parts and replace worn, broken and damaged ones during repair. Excessively worn and damaged components and parts will be inoperative during the operation of the machine, causing casualties. Replace damaged or illegible signal marks.
- Screw down all fasteners and connectors to specified torque.
- Install all guards, covers and shields after maintenance. Damaged guard boards shall be replaced or repaired. The system shall be refilled with the hydraulic fluid approved or suggested by Sany Heavy Machinery Co., Ltd only.

- Start the engine and check leakage condition (check the hydraulic system); then operate all control devices to confirm all functions of the machine are in well condition. Conduct road test if necessary. After test, shut down the engine and do self-check (check if there are lost cotter pins, washers and nuts etc). Make sure to check all hydraulic fluid levels again before operating the machine.

2.4.22 Proper waste treatment

Improper disposal for waste may lead to environmental and ecological perils. Consult your local environmental collection center or Sany Heavy Machinery Co., Ltd. authorized distributor about collection or disposal methods.

- Potential harmful waste from the equipment of Sany Heavy Machinery Co., Ltd includes hydraulic fluid, fuel, coolant, refrigerant, filter, battery and etc.
- Please store the drained liquid with a leak-proof container instead of a food or drink container, as the latter may cause mistaken drinking.
- Don't pour waste liquid onto the ground, into the sewer or any other water sources directly.
- Leakage of refrigerant will damage the earth atmosphere. Please recycle or regenerate the refrigerant according to relevant laws and regulations.

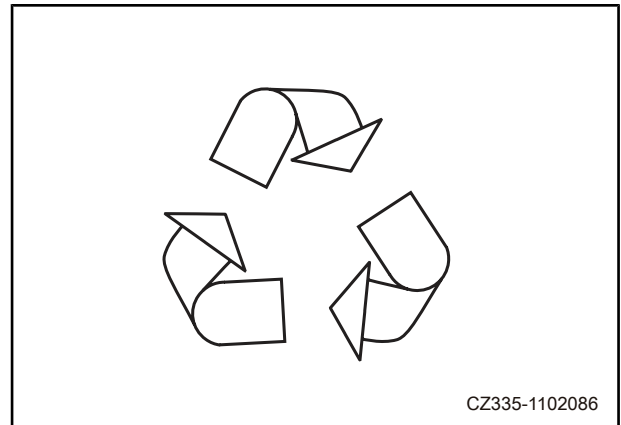


Fig.2-97

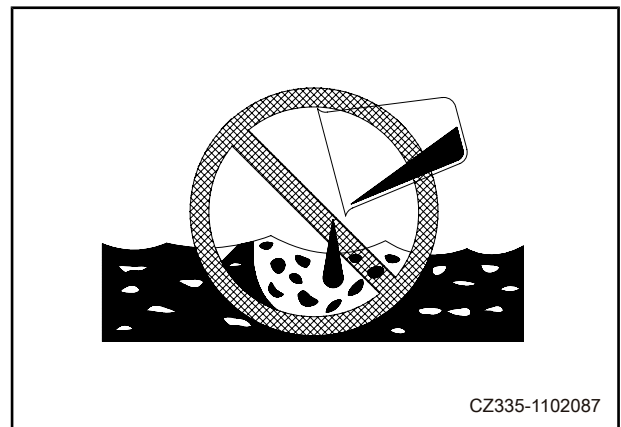


Fig.2-98

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SANY

Technical Specifications

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 **WARNING**

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this machine and before operation or maintaining it. Failure to do this could result in death or serious injury.

3. Technical Specifications

3.1 Overall dimensions

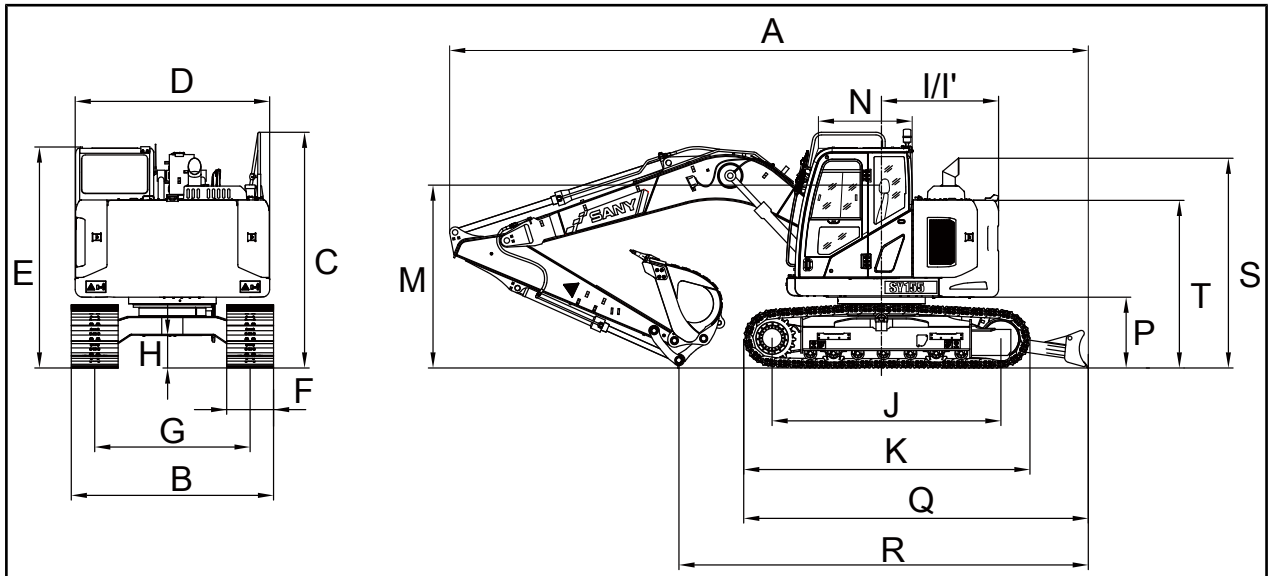


Fig.3-1

Unit: mm

Item		SY155U
A	Overall length (for transportation)	8178
B	Overall width	2590
C	Overall height (for transportation)	3022
D	Overall width of upperstructure	2490
E	Overall height of the cab	2820
F	Standard track shoe width	600
G	Track gauge	1990
H	Min. ground clearance	425
I	Tail length	1500
I'	Tail swing radius	1500
J	Distance between tumblers	2930
K	Track length	3665
M	Cab sight height	2330
N	Cab top length	1200
P	Ground clearance of upper structure	909
Q	Overall length without equipment	4412
R	Overall length on ground (transport)	5242
S	Overall height of diffuser	2692
T	Machine tail height	2155

3.2 Working range

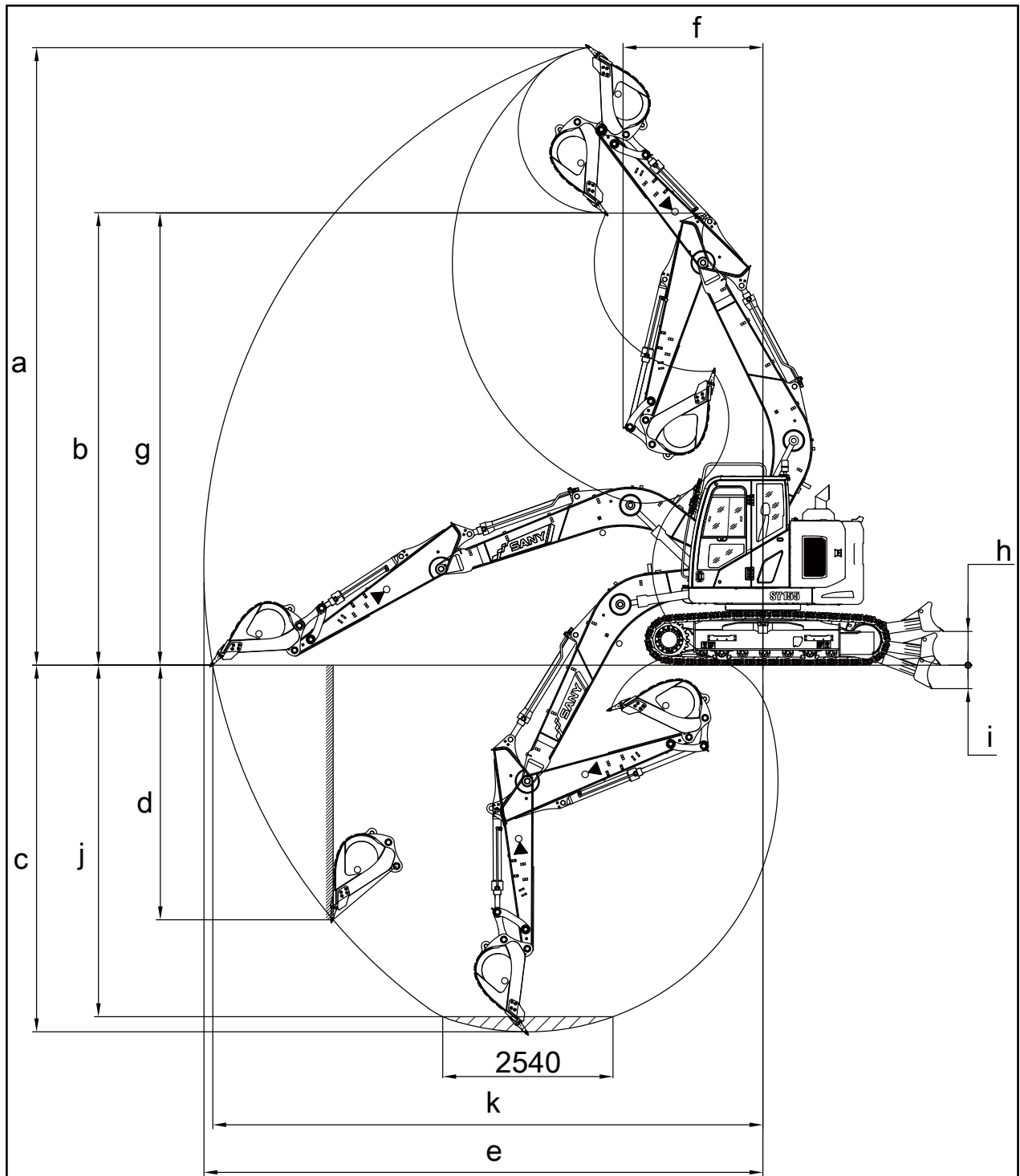


Fig.3-2

Unit: mm

Name		SY155U
a	Max. digging height	9218
b	Max. dumping height	6756
c	Max. digging depth	5468
d	Max. vertical wall digging depth	3796
e	Max. digging reach	8338
f	Min. front swing radius	2086
g	Max. height at min. front swing radius	6749
h	Blade left height	504
l	Blade digging depth	350
j	Maximum digging depth for 2.5m level bottom	2542
k	Max. digging reach on ground	8206

3.3 Technical parameters

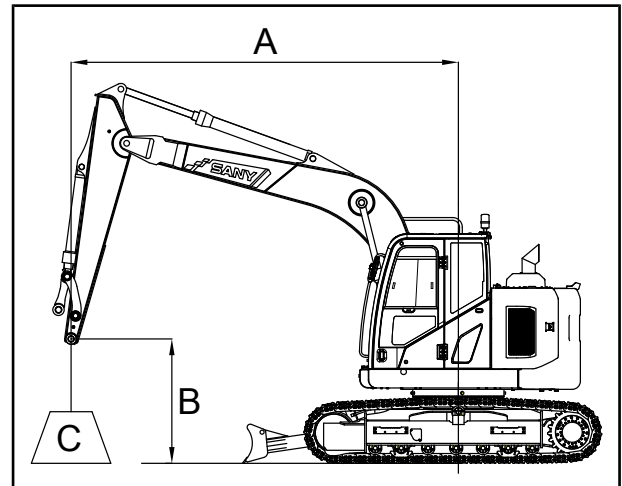
Item	Unit	SY155U
Overall weight	kg	16000
Bucket capacity	m ³	0.6
Engine model		AR-4JJ1XASC
Engine power	kW/rpm	78.5/2000
Traveling speed (high/low)	km/h	5.3/3.1
Swing speed	rpm	12.5
Blade width and height	mm	2590 x 480
Grade ability	°	35

3.4 Lifting capacities

NOTICE

1. Ratings are based on ISO 10567.
2. Lifting capacity does not exceed 75% of tipping load with the machine on firm, level ground or 87% full hydraulic capacity.
3. The load point is the center-line of the bucket pivot mounting pin on the arm.
4. *Indicates load limited by hydraulic capacity.
5. 0 m = Ground.

For lifting capacities, subtract bucket and quick hitch weight from lifting capacities without bucket.

















A: Load radius

B: Load point height















C: Lifting capacity

Fig.3-3

SY155U BLADE (ABOVE GROUND)  Rating over-front  Rating over-side **Unit : kg**

C- on- di- tio- ns	Lo- ad po- int he- igh- t	Load radius														
		2m,6.6ft		3m,9.8ft		4m,13.1- ft		5m,16.4- ft		6m,19.7- ft		7m,23ft		At Max. Reach		M- ax. ra- di- us
																
Bo- m 4.6 0 m (15 .09 ft) Ar- m 2.5 0 m (8. 2 ft) Co- un- ter wei- ght 3 72 0 kg (82 01 lb) Tri- ple gro- use r	7m 23ft					*33 55 *73 97	*33 55 *73 97							*25 37 *55 93	*25 37 *55 93	4.3 m 14. 15ft
	6m 19.7ft					*40 55 *89 40	36 13 79 65	*33 12 *73 02	26 74 58 95					*22 18 *48 90	*22 18 *48 90	5.4 m 17. 7ft
	5m 16.4ft					*42 07 *92 75	35 75 78 82	35 74 78 79	26 71 58 89	*25 92 *57 14	20 52 45 24			*20 75 *45 75	19 85 43 76	6.1 m 20. 08ft
	4m 13.1ft			*47 38 *10 44 6	*47 38 *10 44 6	45 98 10 13 7	34 69 76 48	35 18 77 56	26 15 57 65	27 91 61 53	20 39 44 95			*20 18 *44 49	17 56 38 71	6.3 m 20. 75ft
	3m 9.8ft			60 88 13 42 2	45 84 10 10 6	44 37 97 82	33 09 72 95	34 28 75 57	25 26 55 69	27 44 60 49	19 92 43 92			*20 21 *44 56	16 19 35 69	6.9 m 22. 72ft
	2m 6.6ft			57 23 12 61 7	42 19 93 01	42 54 93 78	31 26 68 92	33 24 73 28	24 22 53 40	26 85 59 19	19 32 42 59	22 12 48 77	15 68 34 57	*20 75 *45 75	15 42 34 00	7.1 m 23. 22ft
	1m 3.3ft			54 67	39 62	40 96	29 68	32 27	23 25	26 26	18 74	21 84	15 39	21 52	15 15	7.1 m

SY155U BLADE (ABOVE GROUND)  Rating over-front  Rating over-side Unit : kg















C- on- di- tio- ns	Lo- ad po- si- ti- on he- ig- ht	Load radius														M- ax. ra- di- us
		2m,6.6ft		3m,9.8ft		4m,13.1- ft		5m,16.4- ft		6m,19.7- ft		7m,23ft		At Max. Reach		
																
sho es 60 0 m m				12 05 3	87 35	90 30	65 43	711 4	51 26	57 89	41 31	48 15	33 93	47 44	33 40	23. 24f t
	0m 0ft			53 57 118 10	38 53 84 94	39 93 88 03	28 65 63 16	31 54 69 53	22 51 49 63	25 79 56 86	18 27 40 28			21 84 48 15	15 34 33 82	6.9 m 22. 77f t
	-1 m -3. 3ft	*46 88 *10 33 5	*46 88 *10 33 5	53 28 117 46	38 24 84 30	39 43 86 93	28 15 62 06	311 2 68 61	22 10 48 72	25 99 57 30	18 47 40 72			22 86 50 40	16 07 35 43	6.6 m 21. 8ft
	-2 m -6. 6ft	*72 13 *15 90 2	59 73 13 16 8	53 44 117 82	38 39 84 64	39 37 86 80	28 08 61 91	31 04 68 43	22 01 48 52	25 58 56 39	18 06 39 82			24 88 54 85	17 57 38 74	6.2 m 20. 23f t
	-3 m -9. 8ft	*75 04 *16 54 3	60 62 13 36 4	53 98 119 01	38 94 85 85	39 70 87 52	28 42 62 66	31 36 69 14	22 34 49 25					28 69 63 25	20 42 45 02	5.5 m 17. 92f t
	-4 m -1 3.1 ft			*38 92 *85 80	*38 92 *85 80	*29 68 *65 43	29 36 64 73								*23 82 *52 51	*23 82 *52 51

**SY155U BLADE
(ON GROUND)**

 **Rating over-
front**

 **Rating
over-side**

**U-
nit
:
kg**















C- on- di- tio- ns	Lo- ad po- si- tio- n h- e- i- g- h- t	Load radius														
		2m,6.6ft		3m,9.8ft		4m,13.1- ft		5m,16.4- ft		6m,19.7- ft		7m,23ft		At Max. Reach		M- ax. ra- di- us
																
Bo- m 4.6 0 m (15 .09 ft) Ar- m 2.5 0 m (8. 2 ft) Co- un- ter wei- ght 3 72 0 kg (82 01 lb) Tri- ple	7m 23f t					*33 55 *73 97	*33 55 *73 97							*25 37 *55 93	*25 37 *55 93	
	6m 19. 7ft					*40 55 *89 40	36 13 79 65	*33 12 *73 02	26 74 58 95					*22 18 *48 90	*22 18 *48 90	5.4 m 17. 7ft
	5m 16. 4ft					*42 07 *92 75	35 75 78 82	*39 49 *87 06	26 71 58 89	*25 20 *57 14	20 52 45 24			*20 75 *45 75	19 85 43 76	6.1 m 20. 08f t
	4m 13. 1ft			*47 38 *10 44 6	*47 38 *10 44 6	*46 48 *10 24 7	34 69 76 48	*41 52 *91 54	26 15 57 65	*38 28 *84 39	20 39 44 95			*20 18 *44 49	17 56 38 71	6.3 m 20. 75f t
	3m 9.8 ft			*68 66 *15 13 7	45 84 10 10 6	*53 21 *11 73 1	33 09 72 95	*44 91 *99 01	25 26 55 69	*39 74 *87 61	19 92 43 92			*20 21 *44 56	16 19 35 69	6.9 m 22. 72f t
2m 6.6 ft			*83 83 *18 48 1	42 19 93 01	*60 41 *13 31 8	31 26 68 92	*48 64 *10 72 3	24 22 53 40	*41 52 *91 54	19 32 42 59	*25 51 *56 24	15 68 34 57	*20 75 *45 75	15 42 34 00	7.1 m 23. 22f t	

**SY155U BLADE
(ON GROUND)**

 **Rating over-
front**

 **Rating
over-side**

**U-
nit
:
kg**

C- on- di- tio- ns	Lo- ad po- si- ti- on he- ig- ht	Load radius														
		2m,6.6ft		3m,9.8ft		4m,13.1- ft		5m,16.4- ft		6m,19.7- ft		7m,23ft		At Max. Reach		M- ax. ra- di- us
																
gro use r sho es 60 0 m m	1m 3.3 ft			*66 52 *14 66 5	39 62 87 35	*65 58 *14 45 8	29 68 65 43	*51 54 *11 36 3	23 25 51 26	*42 86 *94 41 49	18 74 41 31	*27 50 *60 63	15 39 33 93	*21 85 *48 17	15 15 33 40	7.1 m 23. 24f t
	0m 0ft			*68 14 *15 02 2	38 53 84 94	*67 16 *14 80 6	28 65 63 16	*52 64 *11 60 5	22 51 49 63	*43 03 *94 86	18 27 40 28			*23 68 *52 21	15 34 33 82	6.9 m 22. 77f t
	-1 m -3. 3ft	*46 88 *10 33 5	*46 88 *10 33 5	*85 03 *18 74 6	38 24 84 30	*64 98 *14 32 6	28 15 62 06	*51 26 1 *11 30	22 10 48 72	*41 73 *92 00	18 47 40 72			*26 61 *58 67	16 07 35 43	6.6 m 21. 8ft
	-2 m -6. 6ft	*72 13 *15 90 2	59 73 13 16 8	*75 29 *16 59 9	38 39 84 64	*59 06 *13 02 1	28 08 61 91	*46 70 *10 29 6	22 01 48 52	*35 68 *78 66	18 06 39 82			*31 53 *69 51	17 57 38 74	6.2 m 20. 23f t
	-3 m -9. 8ft	*75 04 *16 54 3	60 62 13 36 4	*60 87 *13 42 0	38 94 85 85	*48 56 *10 70 6	28 42 62 66	*37 08 *81 75	22 34 49 25					*30 58 *67 42	20 42 45 02	5.5 m 17. 92f t
	-4 m -1 3.1 ft			*38 92 *85 80	*38 92 *85 80	*29 68 *65 43	29 36 64 73							*23 82 *52 51	*23 82 *52 51	4.4 m 14. 48f t

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Operation

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 **WARNING**

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this machine and before operation or maintaining it. Failure to do this could result in death or serious injury.

4.Operation

4.1 General drawing of machine

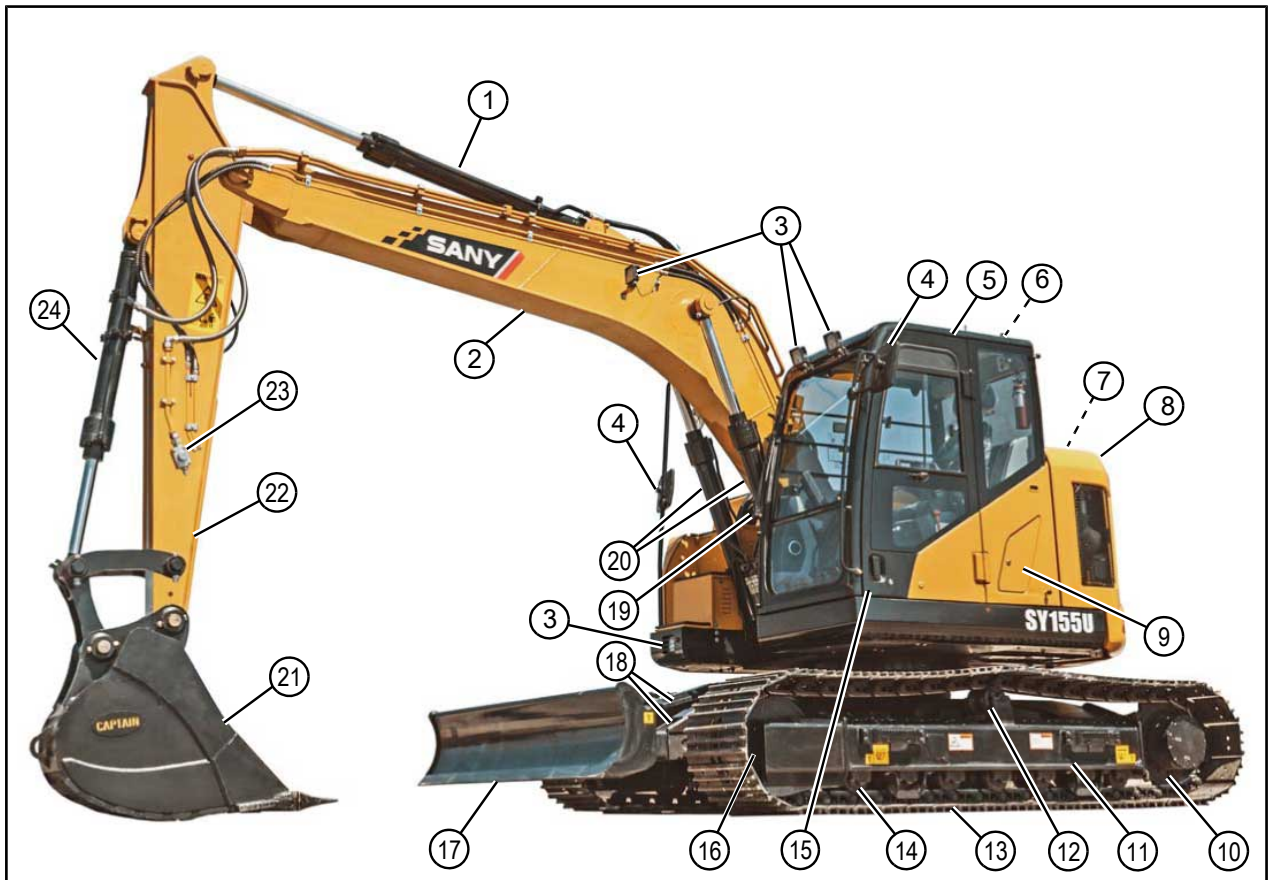


Fig.4-1

- | | |
|----------------------------------|----------------------------|
| [1] Arm cylinder | [13] Track |
| [2] Boom | [14] Track roller |
| [3] Work lights | [15] Door |
| [4] Mirrors | [16] Idler |
| [5] Cab | [17] Dozer blade |
| [6] Beacon light | [18] Dozer blade cylinders |
| [7] Top engine compartment cover | [19] Windshield wiper |
| [8] Left rear access door | [20] Boom cylinders |
| [9] Fresh-air filter access door | [21] Bucket |
| [10] Sprocket | [22] Arm |
| [11] Track frame | [23] Stop valve |
| [12] Carrier roller | [24] Bucket cylinder |

4.2 Description of controls and instruments

4.2.1 Display

⚠ CAUTION

- When the alarm indicator lamp comes on, stop the operation immediately and check and repair relevant parts.
- The display can't **display the whole working status of the machine.**
- Do not rely on the display completely in case of maintenance and inspection of the machine.

Monitor's information includes input/output signals, analog signals, engine information and part of the control function.

Display appearance

There are three parts in the main page after turning on the machine:

A: State of machine

B: Back view camera

C: Function key symbol

Home Screen

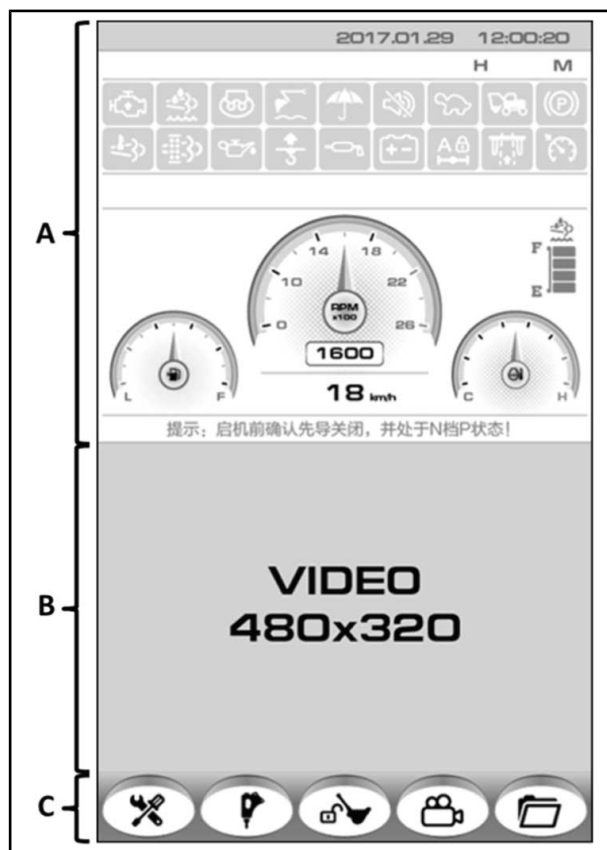


Fig.4-2



Fig.4-3

Item	Home Screen Display	Function	Description
1	Date and time	Displays the current date and time.	Date (YY/MM/DD) and Time (HH/MM/SS)
2	Operating hours	Displays the total number of machine operating hours.	
3	Function icons	Displays information for machine systems.	
4	DEF fluid level	Indicates the level of DEF in the tank.	Green = 10%–100% Yellow = 5%–10% Red = < 2.5%
5	Engine coolant temperature gauge	Indicates the engine coolant temperature.	122°F–230°F (50°C–110°C)
6	Engine rpm gauge	This gauge indicates the number of revolutions per minute (rpm) that the engine is running.	
7	Engine rpm indication	Digital rpm display.	
8	Engine load rate(%)	indicate hydraulic Load percentage to the engine.	
9	Fuel level gauge	Indicates the level of diesel fuel in the tank.	
10	Work mode indication	Indicates the current work mode by letter designation.	L = Light duty S = Standard duty H = Heavy duty B = Breaker
11	Throttle dial indication	Indicates the current throttle dial position (number).	1 = Lowest throttle 10 = Highest throttle

Function Icons

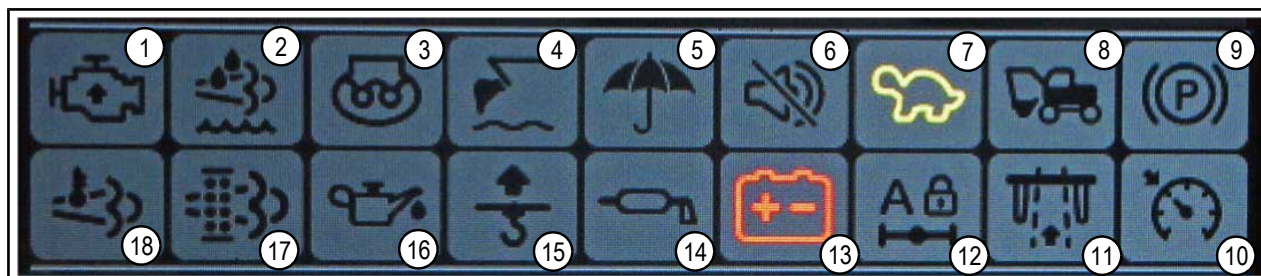


Fig.4-4

Item	Icon – Function	LED Color – Status	Indication
1	Engine icon	Green Red	Engine escape mode active. Engine power is limited.
2	Regeneration icon	Green Yellow – flashing* Yellow – steady Red – steady Red – slow flash Red – fast flash	Auto regeneration. Manual regeneration request. * Manual regeneration on. Engine power notice. Engine power early warning. Engine power final warning.
3	Preheat icon – illuminates when the engine is in the preheating mode.	Red	Engine preheat is on.
4	Floating boom function – (not equipped)	Green	Invalid for SY155U.
5	Maintenance prompt icon – illuminates if any scheduled maintenance is due.	Yellow Green	Fault code exists. Internal circulation.
6	Alarm silence icon – illuminates when the audible alarm is off.	Red	Alarm is silenced.
7	High/low speed icon – the monitor will display a rabbit icon in high speed mode, and it will display a turtle icon in low speed mode.	Yellow Red	Low speed mode. High speed mode.
8	Travelling/working mode switching	Green	Invalid for SY155U
9	Park brake icon – (not equipped)	Green	Invalid for SY155U
10	Cruise control icon – (not equipped)	Green	Invalid for SY155U
11	Upper and lower alignment tips – (not equipped)	Green	Invalid for SY155U
12	Working state of balance cylinder	Green	Invalid for SY155U
13	Battery charge icon – illuminates when the battery is discharging.	Red	Battery is not charging.
14	Automatic lubrication system – (not equipped).	Green yellow Red	Invalid for SY155U
15	Overload alarm icon – (optional)	Yellow Red	Over Load Early Warning Over Load Final Warning
16	Engine oil pressure icon – illuminates when the oil pressure is low or an oil change is required.	Yellow Red	Engine oil change required. Engine oil pressure low.

Item	Icon – Function	LED Color – Status	Indication
17	Manual regeneration icon	Yellow – flashing Yellow – steady Red	Manual regeneration requested. Manual regeneration on. Diesel Particulate Filter (DPF) change required.
18	High exhaust system temperature (HEST) icon	Yellow	Exhaust temperature is high.

Tips: *When the machine requests a manual regeneration (MR), Operator should first warm the engine, move the machine to a safety place, keep engine RPM below 1400 and open the pilot valve. After the entire above are done, Press the SCR button on the Keypad to initiate the engine manual regeneration process. During the MR process the engine will run in AUTO mode. When it is finished successfully, the SCR symbol on the display will disappear, if the SCR symbol still exists which means the MR runs failure. During the MR procedure, Operate the throttle to raise engine speed above 1400rpm will stop the MR process.

Home Screen Functions

NOTE: Icons are displayed above the function buttons □ F1 – F5 and change when a menu option is selected..

Home screen icons and function buttons:

- F1 button – not functional on this screen. Icon for this button displays either a fan (shown), indicating the climate control system is in ventilation-only mode, or a snowflake icon, indicating the climate control system is on.
- F2 button – opens the Tool Select screen. The icon for this button displays the current work tool selection (bucket, breaker, shear, or quick coupler).
- F3 button – opens the Quick Coupler screen. The icon for this button displays the current status of the quick coupler.
- F4 button – displays the output from the rearview camera.
- F5 button – opens the Main Menu screen.

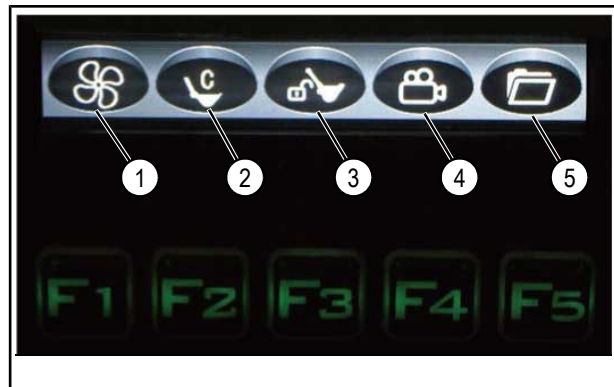


Fig.4-5

Work Accessory Selection Tool Select Screen

Press F2 from the home screen to display the Tool Select screen with the following options:

- Bucket
- Breaker
- Shear
- Quick coupler

Press the F1 button below the down arrow icon (1) to scroll through tool options.

Press the F3 button below the check mark icon (2) to select the tool to operate.

Press the F5 button below the return arrow icon (3) to return to the previous screen.

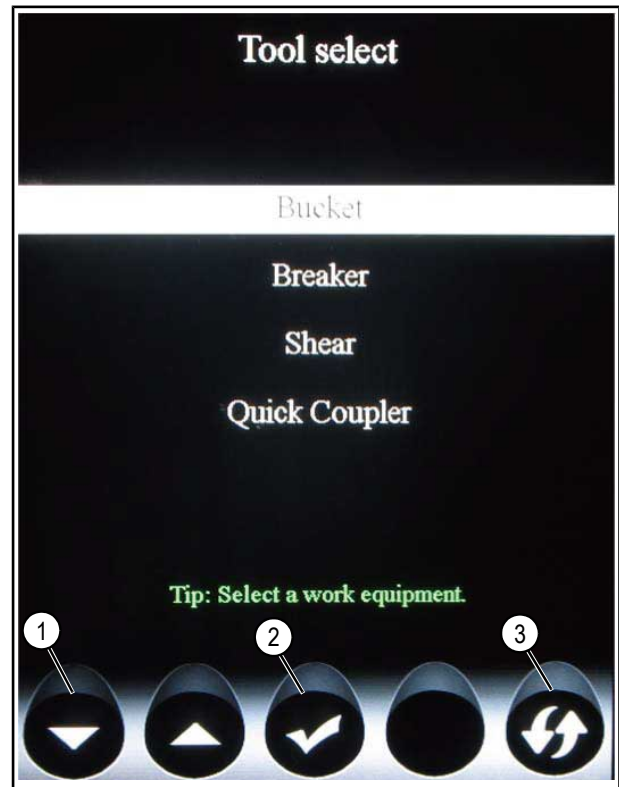


Fig.4-6

On the home screen, the selected tool icon is displayed above the F2 button.

You can also access the Tool Select screen from the Main Menu. See [""](#) on page 4-16 Main Menu Screen

Quick Coupler Operation Quick Coupler Screen

1. Press the F3 button from the home screen to display the three quick coupler operations:

- Activate/Deactivate
- Unlock
- Lock

2. Press the F1 button below the Active quick coupler icon (1) to activate the quick coupler function. The Active quick coupler status will be highlighted and the audible alarm will sound.

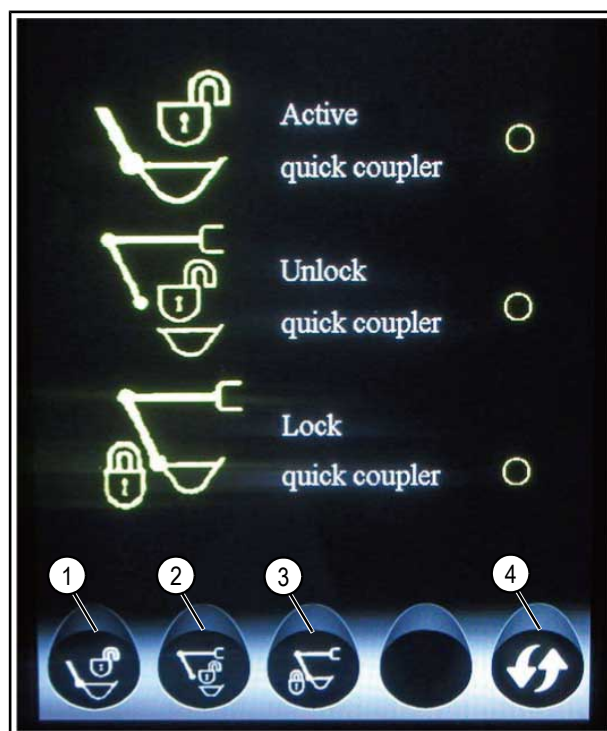


Fig.4-7

The activate quick coupler function must be selected before the unlock and lock functions can be selected.

3. Press the F2 button below the Unlock quick coupler icon (2) and then press and hold quick-coupler button on the left joystick to unlock quick coupler.

4. Move the machine arm to the work equipment to be attached and align quick coupler with the work equipment.

5. Press the F3 button below the Lock quick coupler icon (3) to lock the quick coupler.

6. Press the F1 button below the Active quick coupler icon (1) to deactivate the quick coupler function.

7. Press the F5 button below the return arrow icon (4) to return to the home screen.

Rearview Camera Screen



Fig.4-8

The rearview camera output on the home screen is displayed when the key switch is in the ON position.

Press the F4 button from the home screen to display the rearview camera screen.

Main Menu Screen

Press the F5 button from the home screen to display the Main Menu screen. The Main Menu screen consists of the following six options:

- Work Parameters
- Maint. Information
- Fault Information
- System Setting
- Machine Configuration
- Tool Select



Fig.4-9

Work Parameter Screen

1. Press the F1 button below the up/down arrow icon (1) from the Main Menu screen to highlight the Work Para. (Parameter) icon, then press the F3 button below the check mark icon (2) to accept the selection.

2. Press the F1 button below the up/down arrow icon to scroll through the work parameter screens to display the following signal screens:

- Engine and throttle signals
- Input switch signals
- Output switch signals
- Pilot pressure signals
- Main pump signals

3. Press the F5 button below the return arrow icon (3) to return to the Main Menu screen.

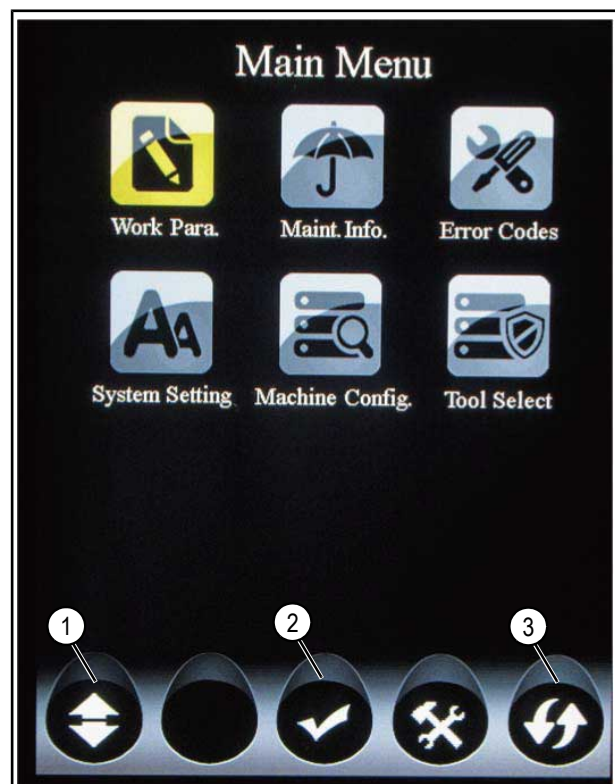


Fig.4-10

Engine and Throttle Signals Screen

The Engine & Throttle Signals screen displays important engine parameters that can aid in troubleshooting.

Press the F1 button below the up/down arrow icon (1) to scroll to the next screen, or press the F5 button below the return arrow icon (2) to return to the Main Menu screen.



Fig.4-11

Input Switch Signals Screen

The Input Switch Signals screen shows the inputs that are currently active. This screen can be used to check for faulty switch inputs by a service technician.

Press the F1 button below the up/down arrow icon (1) to scroll to the next screen, or press the F5 button below the return arrow icon (2) to return to the Main Menu screen.

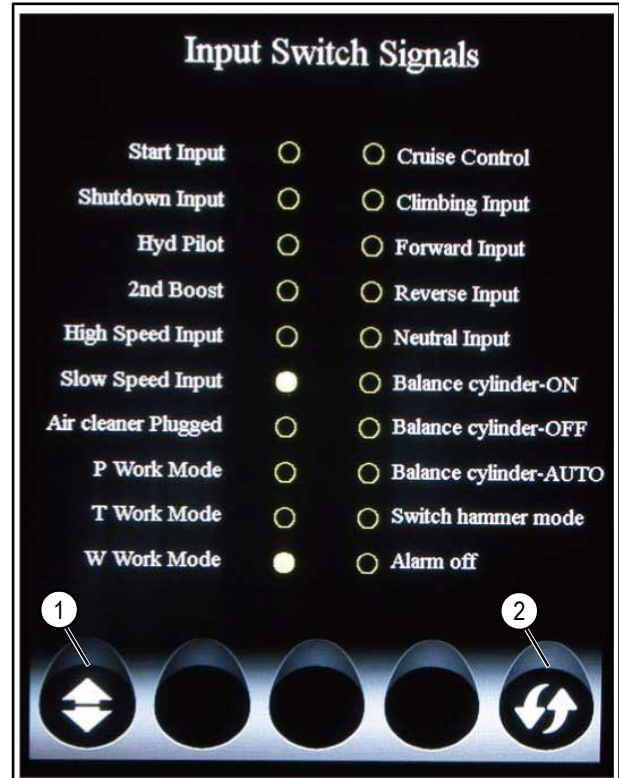


Fig.4-12

Output Switch Signals Screen

The Output Switch Signals screen shows the switch outputs that are currently active. This screen can be used to check for faulty switches by a service technician.

Press the F1 button below the up/down arrow icon (1) to scroll to the next screen, or press the F5 button below return arrow icon (2) to return to the Main Menu screen.

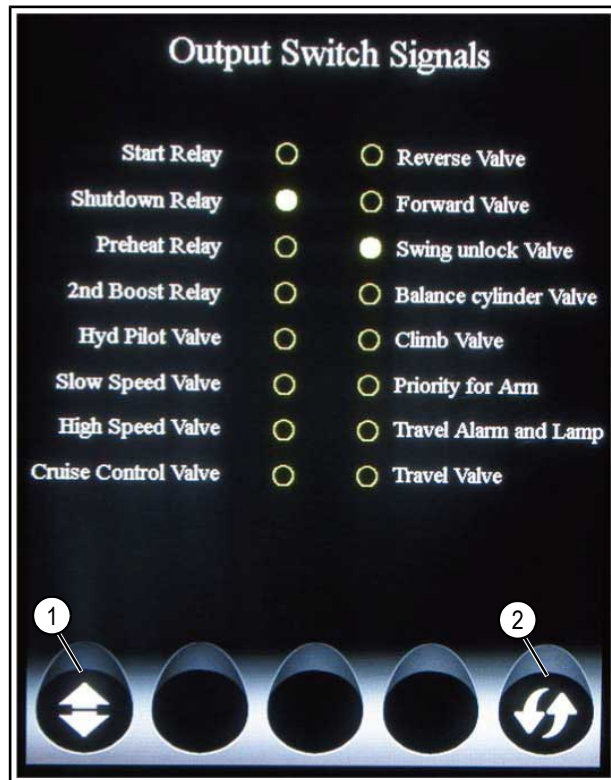


Fig.4-13

Pilot Pressure Signals Screen

The Pilot Pressure Signals screen shows the hydraulic pressures at hydraulic pilot lines on the main control valve. This screen can be used to check for faulty hydraulic circuits by a service technician.

Press the F1 button below the up/down arrow icon (1) to scroll to the next screen, or press the F5 button below the return arrow icon (2) to return to the Main Menu screen.

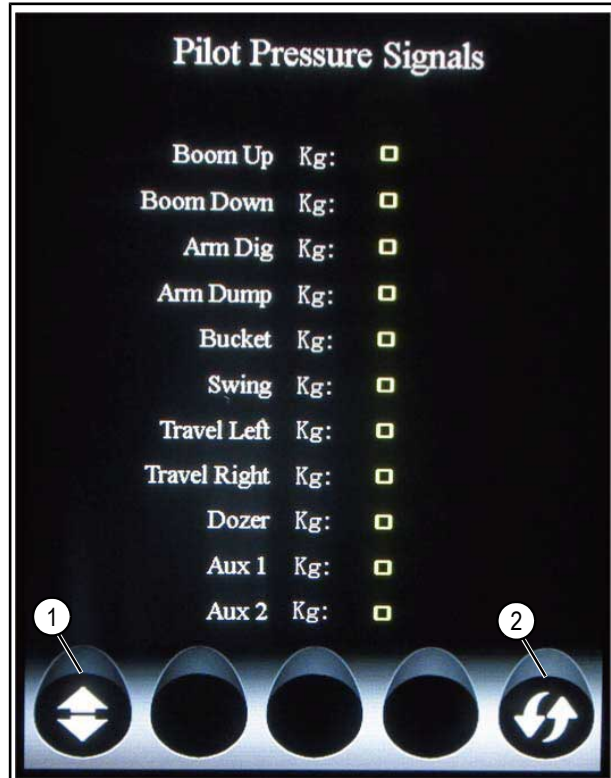


Fig.4-14

Main Pump Signals Screen

The Main Pump Signals screen displays pressures and electrical control valve currents at the hydraulic pumps. A service technician can use these signals to diagnose hydraulic pump problems

Press the F1 button below the up/down arrow icon (1) to scroll to the next screen, or press the F5 button below the return arrow icon (2) to return to the Main Menu screen.



Fig.4-15

Maintenance Information Screen

The Maintenance Information Screen is accessed through the Main Menu Screen.



Fig.4-16

The Maintenance Information Screen (Maint. Info. screen) is for SANY technician use only and requires a password.

Fault Information Screen

The Fault Information Screens is accessed through the Main Menu Screen. Follow the steps below to access the information.

1. Press the F1 button below the up/down arrow icon (1) from the Main Menu screen to highlight Error Codes.

2. Press the F3 button below the check mark icon (2) to display the Fault Information screens.



Fig.4-17

Three Fault Information screens display electrical, engine, and hydraulic error code information.

1.

1. Press the F1 button below the up/down arrow icon (1) to scroll to the next screen.

2. Press the F5 button below the return arrow icon (3) to return to the Main Menu screen.



Fig.4-18

Contact a SANY dealer for information about clearing fault codes.

System Setting Screen

The System Setting Screens are accessed through the Main Menu Screen. Follow the steps below to access the menu.

1. Press the F1 button below the up/down arrow icon (1) from the Main Menu screen to highlight System Setting.

2. Press the F3 button below the check mark icon (2) to open the System Setting screen.



Fig.4-19

2.

The System Setting screen displays the following setting options that can be changed:

- Date/Time Setting
- Backlight Setting
- Data Unit Setting
- Time Format Setting
- Language Selection

1. Press the F1 button below the up/down arrow icon to highlight the setting to change.

2. Press the F3 button below the check mark icon to accept the selection.

3. After selecting the setting to be changed, press the F1 button below the up/down arrow icon to change values, or press the F4 button below the left/right arrow icon (not shown) to scroll to the next value to change. Press the F1 button below the up/down arrow icon to change the value.

4. Press the F3 button below the check mark icon to accept the values entered.

5. Press the F5 button below the return arrows icon (3) to return to the Main Menu screen.

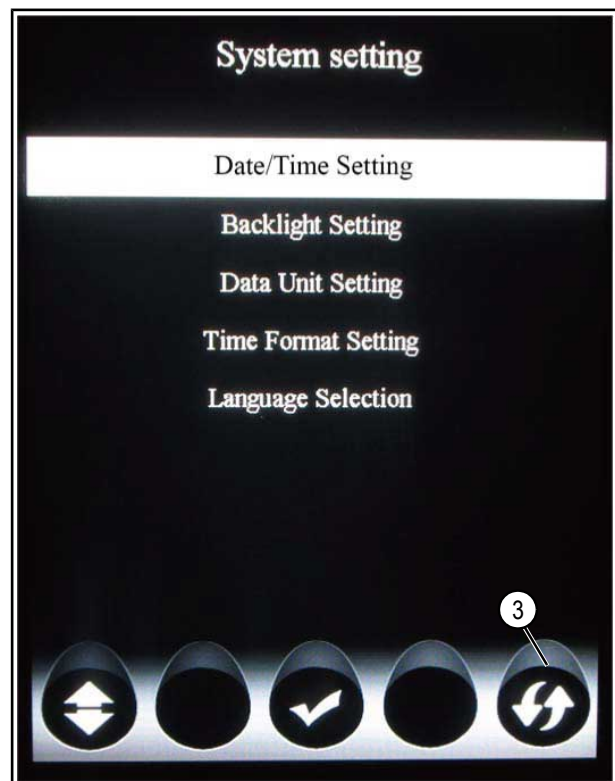


Fig.4-20

Machine Configuration Screen

The Machine Configuration Screen are accessed through the Main Menu Screen. Follow the steps below to access the menu.

1. Press the F1 button below the up/down arrow icon (1) from the Main Menu screen to highlight Machine Config.

2. Press the F3 button below the check mark icon (2) to open the Machine Config. screen.



Fig.4-21

3.

The Machine config. (configuration) screen displays the machine configuration information for installed operating systems.

You may need to provide this information when requesting vehicle information or talking with a service technician.

Press the F5 button below the return arrow icon (3) to return to the Main Menu screen.

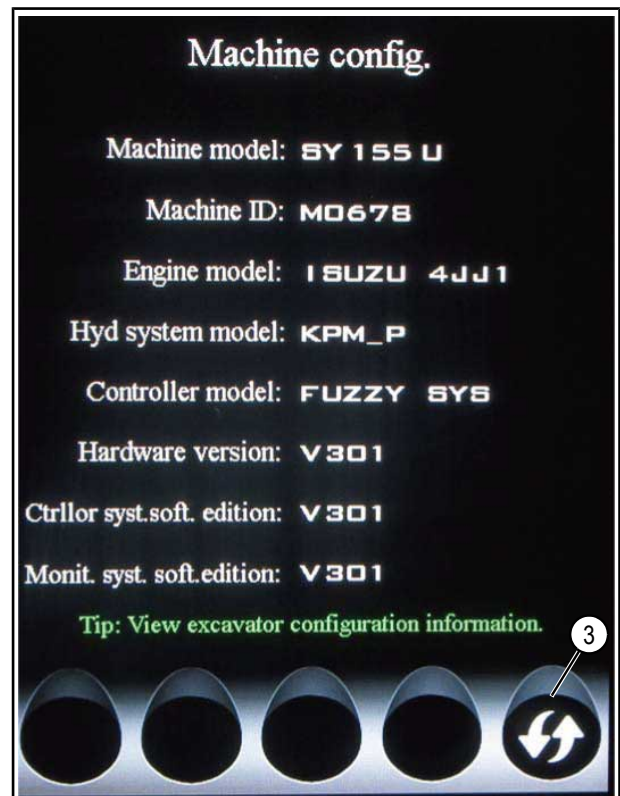


Fig.4-22

Tool Select Screen

The Tool Select Screen is accessed through the Main Menu Screen. Follow the steps below to access the menu.

1. Press the F1 button below the up/down arrow icon (1) from the Main Menu screen to highlight Tool Select.
2. Press the F3 button below the check mark icon (2) to open the Tool Select screen.



Fig.4-23

4.
 1. Press the F1 button below the down arrow icon to select the tool to operate, then press the F3 button below the check mark icon to accept it.
 2. Press the F5 button below the return arrow icon (3) to complete the change and return to the Main Menu screen.

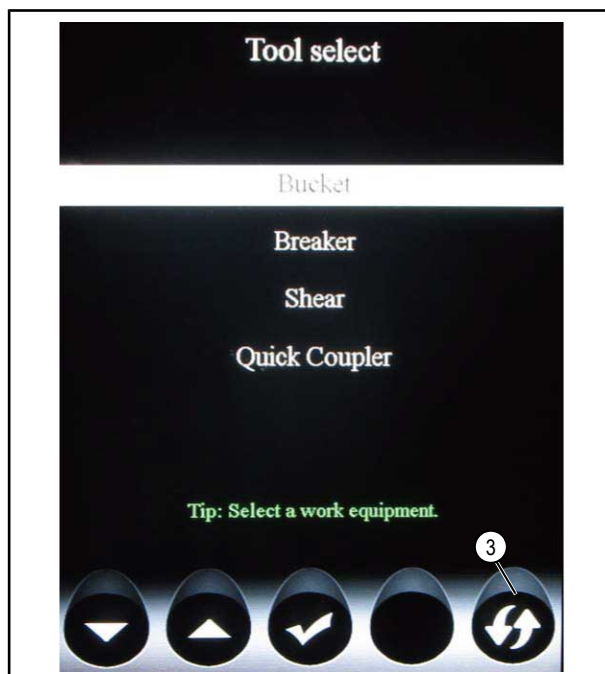


Fig.4-24

The Tool Select screen can also be accessed from the Home screen.

4.2.2 Switch

4.2.2.1 General

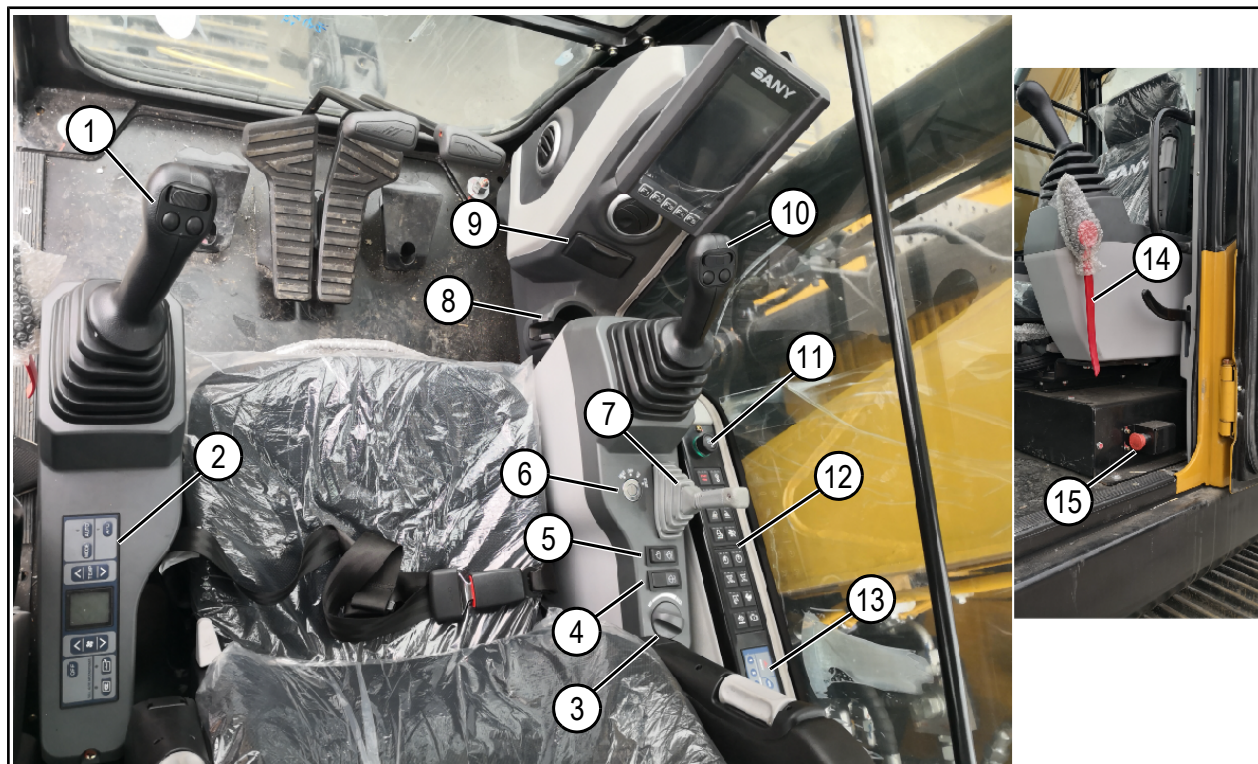


Fig.4-25

[1] Left joystick switches

[2] Climate control panel

[3] Throttle control knob

[4] Windshield washer switch

[5] Windshield wiper switch

[6] Ignition switch

[7] Dozer blade control lever

[8] Cup holder

[9] Ashtray

[10] Right joystick switches

[11] Cigar lighter and auxiliary power supply (12V)

[12] Switch Console

[13] Radio

[14] Safety lock control lever

[15] Emergency stop switch

4.2.2.2 Left joystick switches

1.

⚠ WARNING

Prevent unexpected movement of the machine. Know the positions and functions of the joysticks before performing any machine operations. Failure to follow this warning could result in death or serious injury.

- The toggle switch (1), located on the top of the left joystick, controls optional attachments that have a rotational hydraulic circuit by moving the switch to the left for counter-clockwise operation, and to the right for clockwise operation.
- The bottom right button (2), located on the top right side of left joystick, is not used on this machine.
- The left accessory button (3), located on the top left side of left joystick, controls the accessory function.

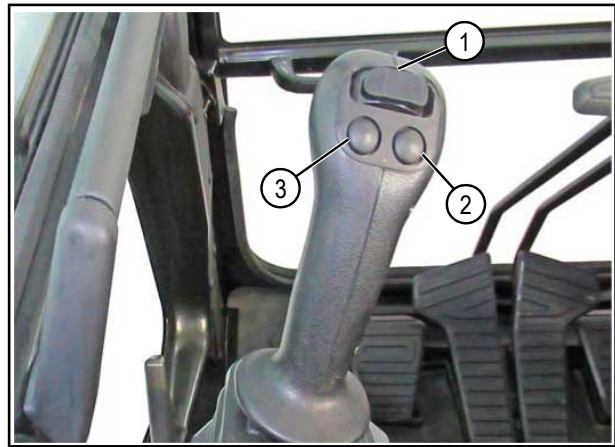


Fig.4-26

4.2.2.3 Throttle control knob

The throttle knob can be used adjust the engine speed and output power. Rotate it clockwise to increase the engine speed, and rotate it counterclockwise to reduce the engine speed.

Leftmost position [MIN]: Low idle speed

Rightmost position [MAX]: Full speed

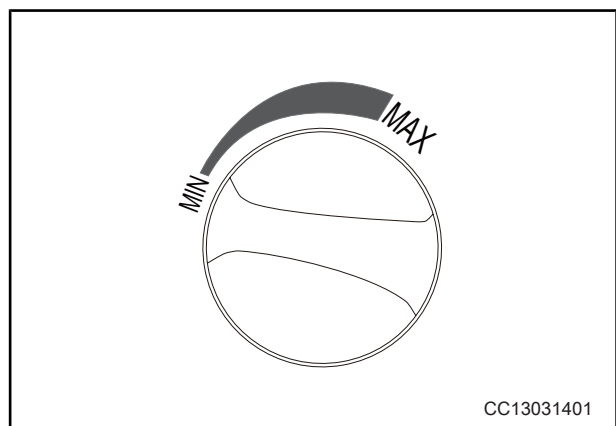


Fig.4-27

4.2.2.4 Windshield washer switch

⚠ CAUTION

- Before pressing down the switch, it is necessary to confirm that the front windshield of the cab is closed.

Press the windshield washer switch to spray washer fluid onto the windshield to clean it.

Press and hold the switch to continue spraying washer fluid as needed.

The switch returns automatically to the off position when released, and the spray of washer fluid stops.

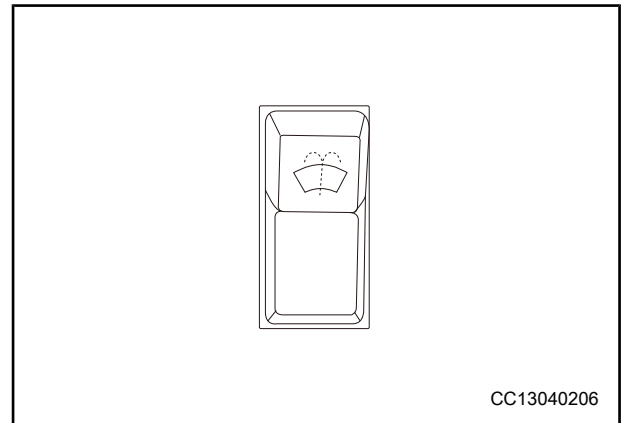
4.2.2.5 Windshield wiper switch

⚠ CAUTION

- Before cleaning a dry windshield, press the windshield washer switch to spray washer fluid on the windshield to prevent damage to the wiper blade or windshield.

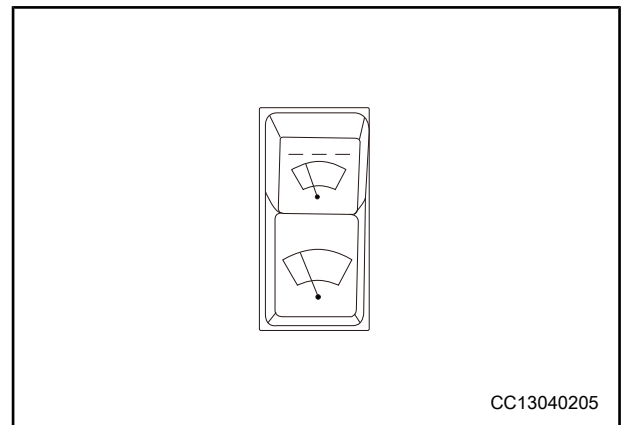
When it is raining, or if the front windshield is dirty, press the windshield wiper switch to activate the windshield wiper.

The windshield wiper switch has two operating positions. In the center position, the windshield wiper operates at low speed. To the right, the windshield wiper operates at high speed. Press the switch to the left to turn the windshield wiper off.



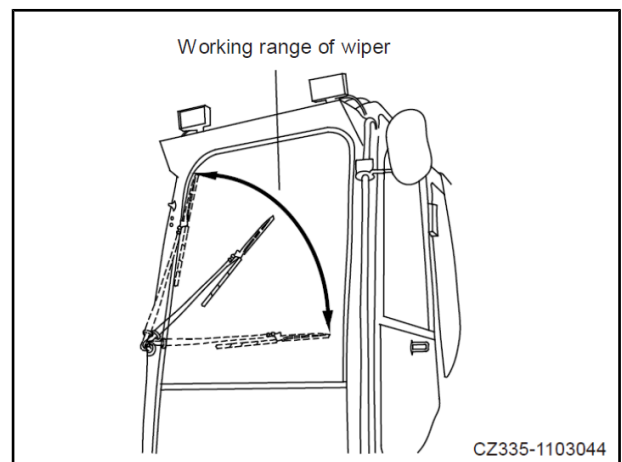
CC13040206

Fig.4-28



CC13040205

Fig.4-29



CZ335-1103044

Fig.4-30

4.2.2.6 Ignition switch

The ignition switch is used to turn on the vehicle electrical system, preheat the engine, and start or stop the engine. There are four positions on the start switch:

OFF position

When the key switch is turned to OFF, the engine is shut down, power to the electrical system is shut off, and the key can be removed or inserted.

ON position

When the key switch is turned to ON, the electrical system is energized. When the engine is running, the ignition switch key will remain in this position.

START position

When the key switch is turned to START, the starter motor will turn on and engage the engine flywheel. Release the key after the engine has started and the key switch will return to ON, allowing the engine to run and maintain power to the electrical systems.

HEAT position

The [HEAT] position of ignition switch for SY155U is invalid. For SY155U, when the temperature is lower than 0°C, the engine will automatically warm up after starting.

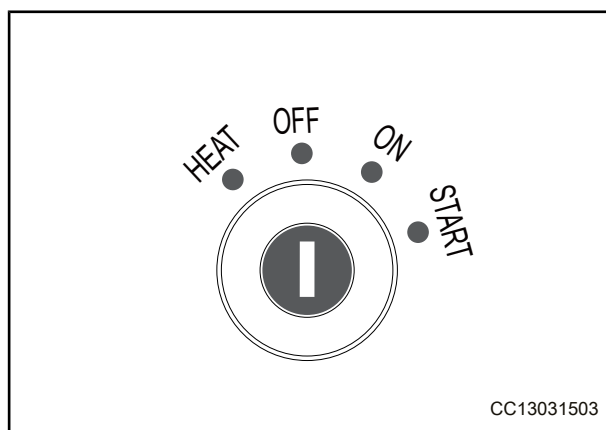


Fig.4-31

4.2.2.7 Ashtray

- This ashtray (1) is on the left of the cup holder.
- When cigarette is put in the ashtray, it shall be put out. Close the ashtray when it is placed in.



Fig.4-32

4.2.2.8 Right joystick switches

⚠ WARNING

Prevent unexpected movement of the machine. Know the positions and functions of the joysticks before performing any machine operations. Failure to follow this warning could result in death or serious injury.

- The toggle switch (1), located on the top of the right joystick, is used for optional attachments with one-way or two-way hydraulic flow.
- The joystick button (2), located on the top of the right joystick, is not used on this machine.
- The horn button (3), located on the top of the right joystick, is used to sound the horn.



Fig.4-33

4.2.2.9 Cigar lighter and auxiliary power supply

Press the cigarette lighter in to activate. The lighter will pop out when ready.

With the lighter removed, the power outlet (12 volts) can be used to charge or operate 12-volt electronic devices.

NOTE :

Please do not use electric equipment with power over 72W (12 V×6 A) at this connection.

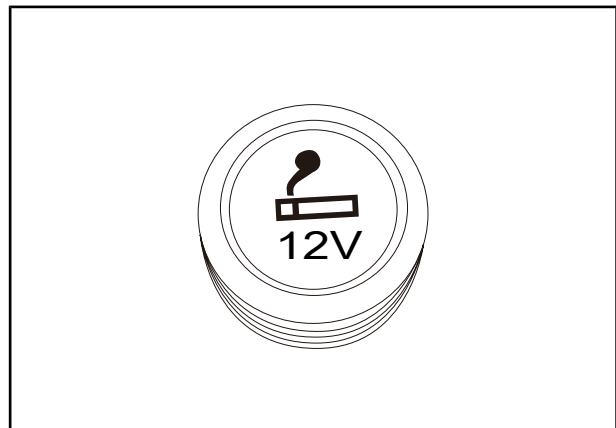


Fig.4-34

4.2.2.10 Emergency stop switch

1. If an emergency stop and quick shutdown is required, or the engine cannot be stopped normally, push the emergency stop switch (1).

Turn the switch clockwise, as indicated on the switch face, to reset the switch.

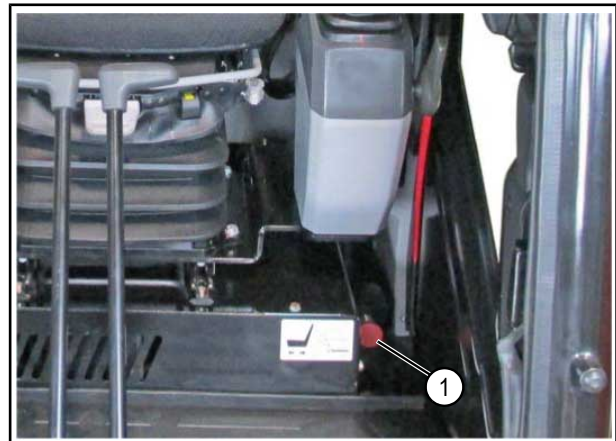


Fig.4-35

4.2.3 Battery disconnect switch

⚠ WARNING

- Never turn the battery disconnect switch to OFF while the engine is running.
 - After the machine is shut down, wait at least 1 minute, in order to recover the urea from the engine Exhaust After Treatment (EAT) system complete before turning the battery disconnect switch to OFF.
- Failure to follow this notice could damage the machine or cause improper operation.

The machine is equipped with a battery disconnect switch (1). When the switch is moved to the OFF position, electrical power is disconnected from all machine systems. Turn the power off when securing the machine for the day, or as needed when performing service

To disconnect the battery power from the machine:

1. Move the key switch to OFF. Wait for all systems to shut down.
2. Open the left rear access door.
3. Turn the battery disconnect switch (1) to the OFF position.
4. Close the left rear access door.

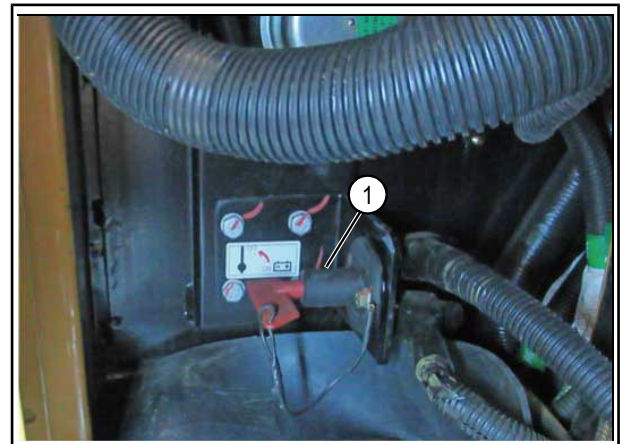


Fig.4-36

4.2.4 Cup holder

There is a cup holder (1) in the cab to facilitate the driver to place cup (kettle).

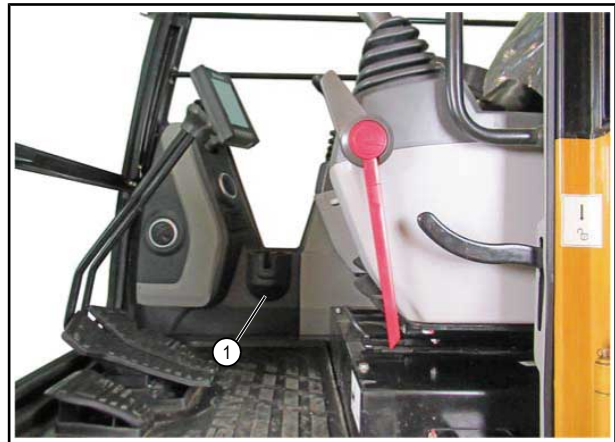


Fig.4-37

4.2.5 Switch console

4.2.5.1 Switch console panel

The switch console consists of 16 switches with LED status lights to indicate the operating mode

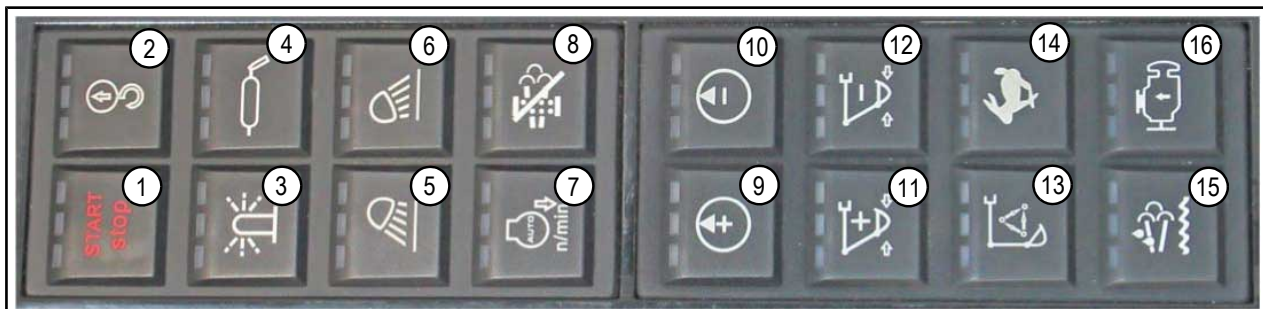


Fig.4-38

- | | |
|--|---------------------------------------|
| 1 Start-Stop switch | 9 AUX flow rate (+) switch |
| 2 Overload alarm switch (optional) | 10 AUX flow rate (-) switch |
| 3 Alarm switch | 11 AUX pressure (+) switch |
| 4 Lubrication system switch (not equipped) | 12 AUX pressure (-) switch |
| 5 Front work lights switch | 13 Work mode switch |
| 6 Rear work light switch (not equipped) | 14 Hydraulic travel motor mode switch |
| 7 Auto-deceleration switch | 15 Manual regeneration switch |
| 8 Regeneration inhibit switch | 16 Engine escape mode switch |

4.2.5.2 Switch icons and status indication

Item	LED Indication	LED Color – Status	Indication
1	○ ○ ○	None	No action
	● ● ●	Red	Start-stop (Press and hold 3s to start or stop engine)
2	○ ○ ○	None	Overload Alarm Disable
	● ● ●	Red	Overload alarm enable
	▣ ▣ ▣	Red	Overload alarm is triggered
	○ ▣ ○	Red – fast flashing	Error of overload sensor
3	○ ○ ○	None	No action
	● ● ●	Red	Travel acoustic & illuminant alarm enable
4	● ○ ○	Red	Lubrication System will start up with 1h interval (Not equipped)
	● ● ○	Red	Lubrication System will start up with 2h interval (Not equipped)
	● ● ●	Red	Lubrication System will start up with 3h interval (Not equipped)
	● ● ●	Red	Manual Operation or lubrication System is Running (Not equipped)
	▣ ▣ ▣	Red – fast flashing	Error of lubrication system (Not equipped)
5	○ ○ ○	None	Front working lights off
	● ● ○	Red	Front working lights on
	○ ○ ●	Red	Long press to activate Auto working light function
6	○ ○ ○	None	Back working lights off (Not equipped)
	● ● ●	Red	Back working lights on (Not equipped)
7	○ ○ ○	None	Auto Idle Disable
	● ● ●	Red	Auto Idle Enable
	▣ ▣ ▣	Red	Auto Idle Active
8	○ ○ ○	None	Regeneration will be initiated when needed
	● ● ●	Red	Automatic regeneration inhibited
9	○ ○ ○	None	No action
	● ● ●	Red	Flow rate of AUX (++)
	▣ ▣ ○	Red – flashing	AUX 2 (+) flow rate control valve error
	○ ▣ ▣	Red – flashing	AUX 2 (-) valve error
10	○ ○ ○	None	No action

Item	LED Indication	LED Color – Status	Indication
	● ● ●	Red	Flow rate of AUX (– –)
	▣ ▣ ○	Red – flashing	AUX 1 (+) valve error
	○ ▣ ▣	Red – flashing	AUX 1 (–) valve error
11	○ ○ ○	None	No action
	● ● ●	Red	Maximum pressure of AUX (++) (Not equipped)
12	○ ○ ○	None	No action
	● ● ●	Red	Maximum pressure of AUX (– –) (Not equipped)
13	● ● ●	Red	Heavy duty work mode (H)
	● ● ○	Red	Standard duty work mode (S)
	● ○ ○	Red	Light duty work mode (L)
	▣ ○ ▣	Red – left and right alternate flashing	Breaker work mode (B)
14	○ ○ ○	None	Slow travel mode
	● ● ●	Red	Fast travel mode
15	○ ○ ○	None	No action
	● ● ●	Red	Manual regeneration on
	▣ ▣ ▣	Red – flashing	SCR system error
16	○ ○ ○	None	No action
	● ● ●	Red	Selective Catalytic Reduction (SCR) mode
	▣ ▣ ▣	Red – flashing	Torque limited due to low engine oil pressure, high engine coolant temperature, or engine air filter blockage.
	○ ▣ ○	Red – flashing	SCR inlet temperature sensor error, which will affect the fan speed.

NOTICE

No LED indicator lights illuminated = the system or component is disabled or off unless otherwise noted.

4.2.5.3 Start-Stop switch

Use the start-stop switch (1) to start and stop the engine in addition to the key switch.

To start the machine with the start-stop switch:

1. Turn the key switch to ON.
2. Press and hold the start-stop switch until the engine starts, then release the switch.
- 3.

To stop the machine with the start-stop switch:

1. Press and hold the start-stop switch to stop the engine, then release the switch.
2. Turn the key switch to OFF.

4.2.5.4 Overload alarm switch

The overload alarm switch button (2) has the following four states (different indicator state marks):

- **All three indicator lights are on (red light):** Overload Alarm Enable(if equipped).
- **All three indicator lights:** Overload alarm is triggered. When overload alarm is available, if the lifting load (or the weight of the material inside the bucket) at the end of arm exceeds the allowable value, the button indicator automatically switches to this state, and the overload alarm icon (17) on the display will be on, and the buzzer in the cab will sound synchronously, and at this time, press the button, the overload alarm icon on the display goes out, the buzzer stops, and the button indicator goes out.
- **Only the middle indicator flashens:** Error of overload sensor. If the overload alarm sensor is broken, the button indicator will automatically switch to this state, please check the alarm sensor.
- **All three indicator lights off:** Overload alarm disable. Any state other than this



Fig.4-39

state, press the button (2), will turn to this state, this state shields all overload alarm related information.

The overload alarm sensor detects the pressure of boom cylinder without rod cavity. If the pressure of boom cylinder without rod cavity exceeds the set allowable value (such as: boom cylinder without rod cavity holding pressure), the alarm message will appear.

4.2.5.5 Alarm switch

The alarm switch (3) turns the beacon (18) light and alarm on and off. The LED switch status lights illuminate when the switch is on, when travelling or operating the machine, the beacon (18) will be on and give an audible beep. Turn on the travel alarm whenever the machine is being operated to increase jobsite safety.

Press the alarm switch, the button LED lights will switch back and forth in the fully off and fully on state. When it is fully off, the beacon (18) will not work, and there will be no alarm when travelling or operating the machine.

4.2.5.6 Front work lights switch

The front work lights switch (5) turns the four front work lights on and off (the switch LED lights are on).

Long press working light button will activate auto working light function, when the working light has been operated during specific time period (4PM to 8PM), and the auto working light function is active, the working light will turn on automatically.

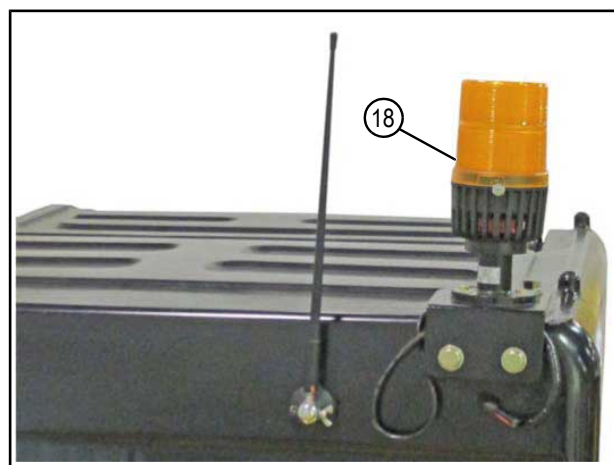


Fig.4-40

Working lamp position

a. Boom working light—1

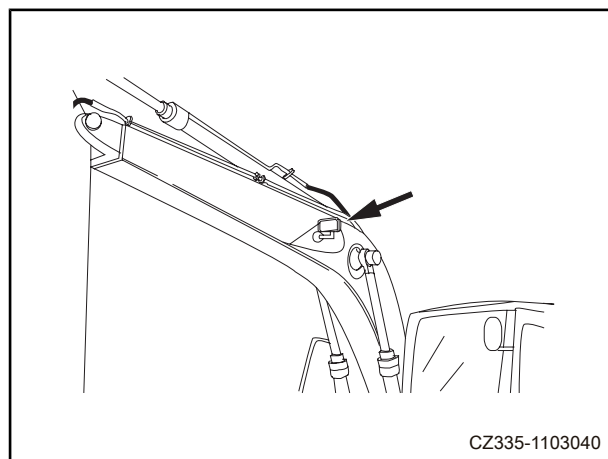


Fig.4-41

b. Right platform working light—1

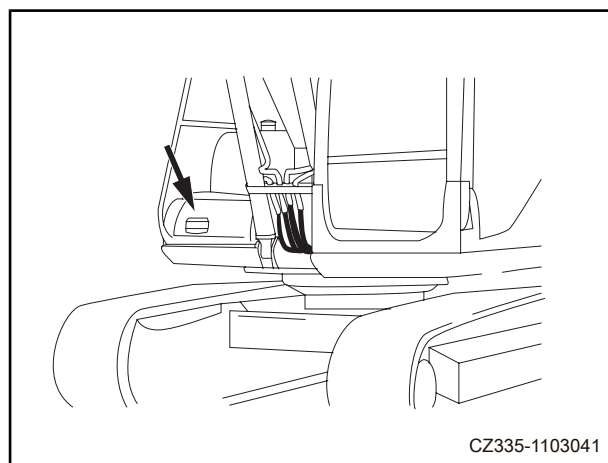


Fig.4-42

c. Upper forward cab light—2

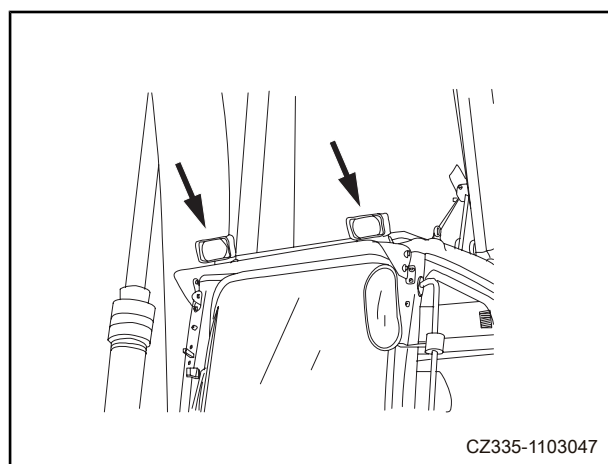


Fig.4-43

4.2.5.7 Auto-deceleration switch

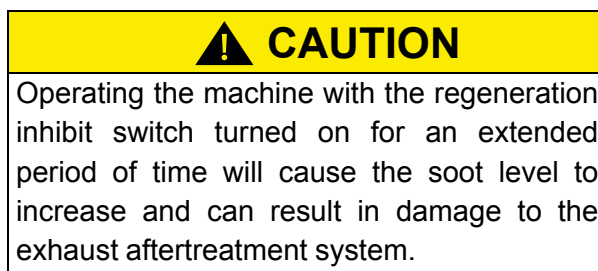
The auto-deceleration switch (7) enables or disables the auto-deceleration function. The auto-deceleration switch LED lights are on or off to indicate system status:

LED lights off = auto-deceleration disabled.

LED lights on = auto-deceleration enabled.

Enable auto-deceleration when using the machine with long pauses in work operations. Auto-deceleration reduces engine speed when the machine is not being operated. This reduces fuel consumption by 5% to 10% and reduces engine wear.

4.2.5.8 Regeneration inhibit switch



Use the regeneration inhibit switch (8) to deactivate automatic regeneration. The LED status lights on the switch will illuminate while automatic regeneration is inhibited.


The regeneration inhibit switch should be used when the machine is operating in an environment not suitable for regeneration, such as in confined areas, near flammable materials, or other areas that could create a safety hazard. The operator should turn off the regeneration inhibit switch as soon as possible to avoid soot buildup. If the operator inhibits automatic regeneration for an extended period of time, the DPF system will become clogged, causing the machine to operate in a de-rate mode where engine rpm and power will be reduced and the machine will require a stationary regeneration.

When the switch is off, all three LED status lights on the regeneration inhibit switch are off and the engine will perform a regeneration automatically when needed.

4.2.5.9 Auxiliary flow rate and pressure switches

The auxiliary flow rate and pressure switches control the hydraulic flow (measured in gallons per minute [GPM] or liters per minute [LPM], and pressure going to optional attachments.

- Flow GPM/LPM = attachment speed.
- Pressure = attachment working force.

 CAUTION
Auxiliary flow rate and pressure adjustments need to be made by a service technician when installing an optional attachment. Access to the password protected maintenance and service screen is required for flow rate and pressure displays.

The attachment operating manual will provide these settings. The following switches adjust the auxiliary flow rate and pressure and are only to be used by a service technician:

- Switch (9) increases the hydraulic flow rate.
- Switch (10) decreases the hydraulic flow rate.
- Switch (11) increases the hydraulic pressure (not available).
- Switch (12) decreases the hydraulic pressure (not available).

Flow rate adjust button can be used for auxiliary pipe setting, which will affect the recently controlled auxiliary circuit. If specific auxiliary circuit need to be adjusted, operator should move the relative joystick firstly to select this auxiliary circuit and direction, then these two flow rate adjust button can be used for specific adjustment.

4.2.5.10 Work mode switch

Use the work mode switch (13) to switch between light duty work mode (L), breaker work mode (B), standard duty work mode (S), and heavy duty work mode (H). The selected work mode letter L, B, S, or H (19) will appear on the display monitor as well.

The number (20) to the right of the work mode on the display monitor is the throttle dial position indicator, and reads from 1–10 (H mode reads from 1–11).

LED status lights on the work mode switch will illuminate to indicate the mode selected as follows:

- One LED indicator light = light duty work mode (L).
- Two LED indicator lights = standard duty work mode (S).
- All three LED indicator lights = heavy duty work mode (H).
- Two LED indicator lights and flashing = breaker work mode (B).

4.2.5.11 Hydraulic travel motor mode switch

Use the hydraulic travel motor mode switch (14) to select the fast travel mode. When selected, the LED status lights on the hydraulic travel motor mode switch are illuminated.

When the hydraulic travel motor mode switch is off, the machine is in the slow travel mode and all three LED status lights on the switch are off.

Use fast travel mode when moving the machine long distances between work areas.



Fig.4-44

4.2.5.12 Manual regeneration switch

Typically, regeneration occurs automatically with no operator interaction required. However, if for some reason the automatic regeneration process is interrupted or the regeneration inhibit switch is activated for an extended period of time, soot will build up and increase exhaust back pressure. Eventually, the DPF system will become clogged and the regeneration indicator (21) will flash yellow, indicating that a manual regeneration must be initiated. Use the stationary regeneration switch (15) to initiate a stationary regeneration.

A regeneration does not have to be performed immediately after the regeneration icon flashes yellow, but ignoring the warning will change the regeneration indicator to a red status, where immediate stationary regeneration is required.

Unlike automatic regenerations, stationary regenerations require that the machine be parked with engine running and equipment not operated until the entire regeneration process is completed.

4.2.5.13 Engine escape mode switch

When certain engine conditions occur, such as an exhaust malfunction or a regeneration process is required and not performed, the engine may operate in a de-rate mode where engine rpm and power are reduced.


 CAUTION
<p>Only use the engine escape mode switch for emergencies or moving the machine for servicing. Damage to the machine may occur if the fault causing the engine power to de-rate is not corrected.</p>



Fig.4-45



Fig.4-46

The engine icon (22) on the monitor will be illuminated red when the engine is operating in a de-rate power mode. Under emergency situations, or moving the machine for servicing, you can temporarily disable the engine power restrictions using the engine escape mode switch (16). When the escape mode is activated, the engine icon (22) will change from red to green.

4.2.6 Radio

4.2.6.1 Control panel

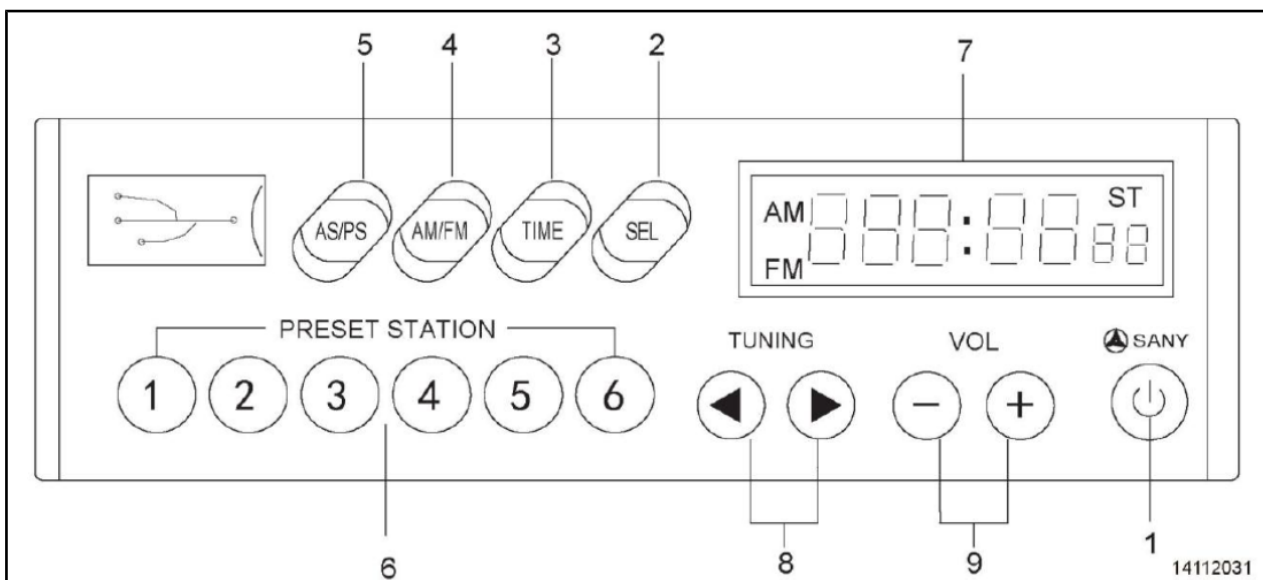


Fig.4-47


- | | |
|----------------------------|------------------------------|
| [1] Power switch key | [6] Preset station key (1~6) |
| [2] Audio conversion key | [7] LCD |
| [3] Time display key | [8] Tuning key |
| [4] FM / AM conversion key | [9] Volume adjustment key |
| [5] AS/PS key | |

4.2.6.2 Control key and LCD

- [1] Power switch key

Press down the power switch ☺ to power on the radio. The frequency will be displayed on the display [7]. Press down this switch again to power it off.


[2] Audio conversion key

After pressing down the audio conversion key , the audio status will be displayed as follows: VOL→BAS →TRE→BAL.

The host will return to the frequency display interface if there is no operation within 5 s.


The audio status will be displayed on the display [7].

[3] Time display key

Press down the time display key  when the frequency is displayed, and the current time will be displayed on the display for 5 s. The display will automatically recover to the frequency display 5 s later.



If pressing down and holding the key [3] for more than 5 s, the national area: ASA: EU (Asia: Europe) will be displayed.

[4] FM / AM conversion key


Press down the FM/AM conversion key  to select the required band. After this key is pressed down each time, the band will be switched between FM→AM→FM.

[5] AS/PS (automatic search and preset station) key

The function of the AS/PS key is to: Automatically search and save the station and browse and play the preset station. Automatically search and save the station:

In the radio status, press down the AS/PS key  to scan each preset station in turn, and it will stop at each preset station for 10 s, and the characters of the scanned preset position will flash on the display. If you need to listen to a station, press down the  again to stay at this station.

Browse and play the preset station:

In the radio status, press down the AS/PS key  and wait for more than 2 s, and it will begin to automatically search the current band station, save 6 stations with the strongest signal in 1-6 memories in order, and finally lock the station and begin playing.

[6] Preset station key (PRESETSTATION)

If the preset station keys (1~6) are used to determine which stations are preset, you can select the required station with the key.

[7] LCD

The receiving band, frequency, preset number and time will be displayed on the display.

[8] Tuning key (TUNING)

Press down the tuning key ◀ and ▶ to change frequency.

◀key: Move frequency downwards

▶key: Move frequency upwards

[9] Time adjustment key (TIMEADJ)

Press down the ⊕key in the keys to increase the volume in turn to 40.

Press down the ⊖key to reduce the volume in turn to 0.

It will return to the frequency display interface if there is no operation within 5 s.

4.2.6.3 Radio operation

Method of setting with preset key

1. Press down the power switch [1]. In this case, the frequency will be displayed on the display [7].

2. Adjust it to the required frequency with the upward and downward search key [8]. There are two tuning methods including automatic tuning and manual tuning.

3. When the required frequency is displayed on the display [7], the received sound will disappear after at least 1.5 s after the preset number required is pressed down and held. But when the preset operation (saving in memory) is completed, the sound will appear again, and the preset number and frequency will be displayed on the display to indicate that the preset operation has been completed. When the preset is completed, press down the radio preset station key [6] and release it within 1.5 s, so as to receive the preset band of the key.

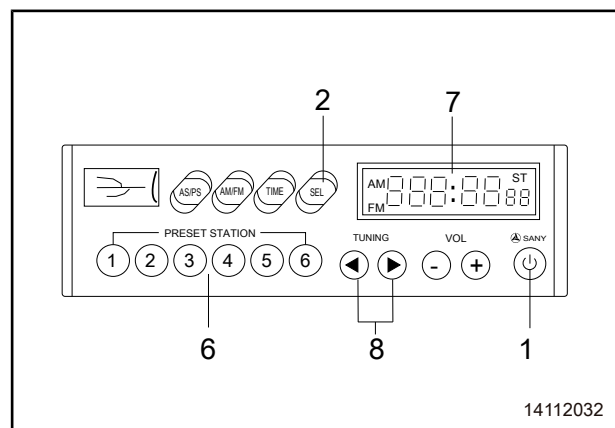


Fig.4-48

14112032

NOTE :

The automatic storage key can be used to save it to the preset key.

Station search method

1. Press down the power switch [1]. In this case, the frequency will be displayed on the display [7].

2. Adjust it to the required frequency with the tuning key [8]. There are two tuning methods including automatic tuning and manual tuning.

- Manual tuning

Press down the tuning key [8] until the frequency is displayed on the display [7].


When the frequency reaches the top or bottom frequency, it will automatically continue in the order of top→bottom or bottom→top.



- Automatic tuning

Press down and hold the tuning key [8] to automatically search the station up or down. When a station is received, the tuning will stop automatically. In order to search for the next station, just press down and hold the tuning key [8].

If this key is pressed down during the automatic tuning, the automatic tuning will be canceled. The setting will recover it to the frequency used before this key is pressed down.

Audio adjustment

- VOL adjustment (VOL): Press down the ⊕ key to increase the volume in turn to 40; press down the ⊖ key to reduce the volume in turn to 0;
- BAS adjustment (BAS): Firstly press down the  key to switch the audio to the BAS mode, and then press down the ⊕ or ⊖ key within 5 s to change the BAS loudness within the range of +7~-7.

- TRE adjustment (TRE): Firstly press down the  key to switch the audio to the TRE mode, and then press down the ⊕ or ⊖ key within 5 s to change the TRE loudness within the range of +7~-7.
- BAL adjustment (BAL): Firstly press down the  key to switch the audio to the BAL mode, and then press down the ⊕ or ⊖ key within 5 s to change balance of the left and right sound tracks within the range of L9-R9. BAL.0 represents balance between left and right sound tracks.

NOTE :

For all modes, if there is no operation within 5 s, the LED display will be automatically recovered to the original setting.

Antenna

Before moving the machine to the inside of the building, the antenna shall be retracted to prevent any interference. Retract the antenna as follows:

1. Loosen the mounting bolts of the antenna [1], and place the antenna in the position [A].
2. After retracting the antenna, tighten the bolt [1].

Use the radio carefully

- In order to ensure safety, the volume shall be kept at the level where the external noise can be heard during operation.
- If water flows into the loudspeaker box or radio, it will cause an accident, so be careful not to get the water on the device.
- Do not use benzene, diluent or other solvent to wipe off the control panel or key. Wipe it off with a piece of soft cloth. If the device is too dirty, wipe it off with a piece of cloth dipped with alcohol.

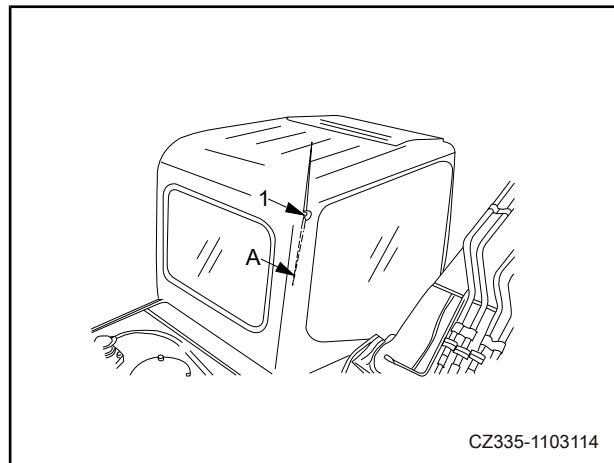


Fig.4-49

- When the battery is disconnected or replaced, the setting of the preset key and the clock will be cleared, so all settings shall be reset.

4.2.7 HVAC group

4.2.7.1 Control panel

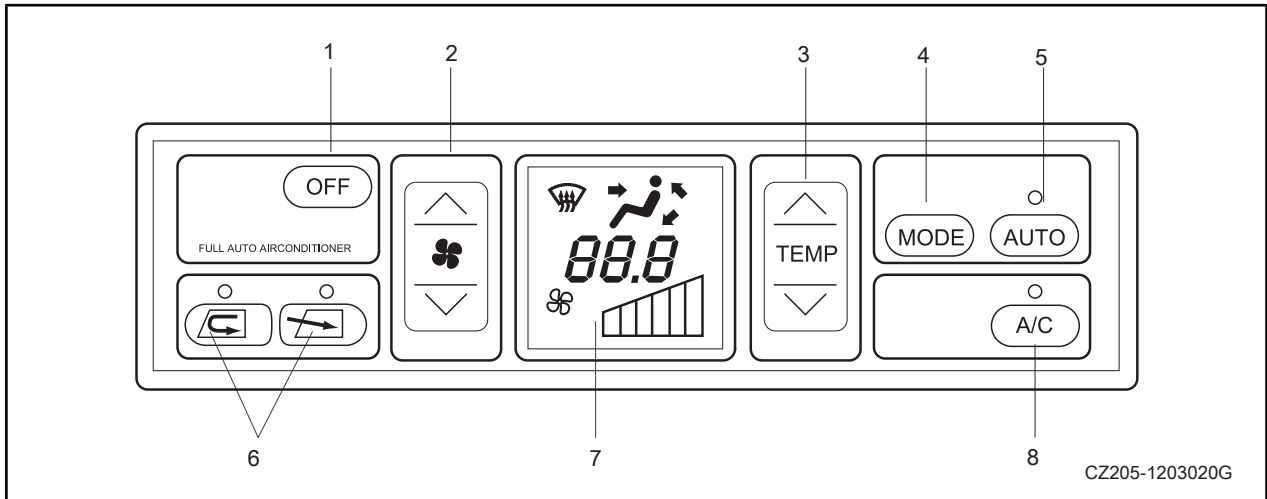


Fig.4-50

- | | |
|----------------------------------|---|
| [1] OFF switch | [5] Automatic mode setting switch |
| [2] Fan speed setting switch | [6] Internal/external circulation selector switch |
| [3] Temperature setting switch | [7] LCD |
| [4] Air vent mode setting switch | [8] HVAC switch |

4.2.7.2 Control switch and LCD

1. OFF switch

This switch can be used to turn off fan and HVAC.

Press down the OFF switch [1], and indication of the setting temperature and air volume of the LCD will disappear, the upper lamp of the automatic mode switch [5] and the HVAC switch [8] will be off, and running will be stopped.

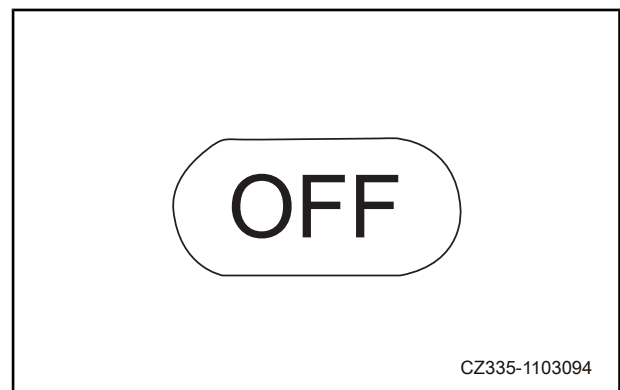








Fig.4-51

2. Fan speed setting switch

This switch is used to adjust the air volume and can set the air volume to six levels from weak to strong. The air volume will be displayed on the LCD.

- Press down the \wedge switch to increase the air volume.
- Press down the \vee switch to reduce the air volume.
- The air volume will be automatically switched during operation under the automatic mode.

LCD display and air volume

LCD	Air volume
	Weak
	Medium 1
	Medium 2
	Medium 3
	Medium 4
	Strong

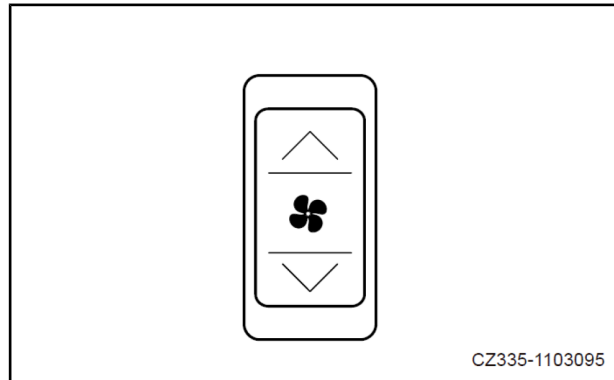


Fig.4-52

3. Temperature setting switch

This switch is used to set the cab temperature. Temperature setting range: 18~32° C (64.4~89.6°F)

- Press down the \wedge switch to increase the set temperature.
- Press down the \vee switch to reduce the set temperature.
- The operation temperature is generally 25° C (77°F).

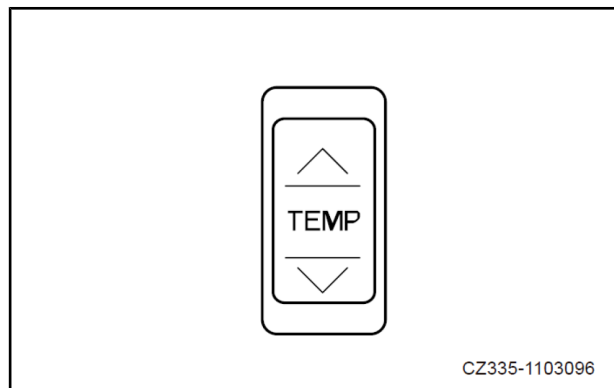


Fig.4-53

LCD display and function

LCD	Set temperature
18.0°C	Maximum refrigerating
18.5~31.5°C	Adjust the temperature to make the cab reach the set temperature
32.0°C	Maximum heating

4. Air vent mode setting switch

This switch can be used to select the air vent.

- Press down the switch [4], and the LCD display mode will be changed, and the air will be supplied from the air vent under the displayed mode.
- The air vent mode will be automatically switched under the automatic operation mode.

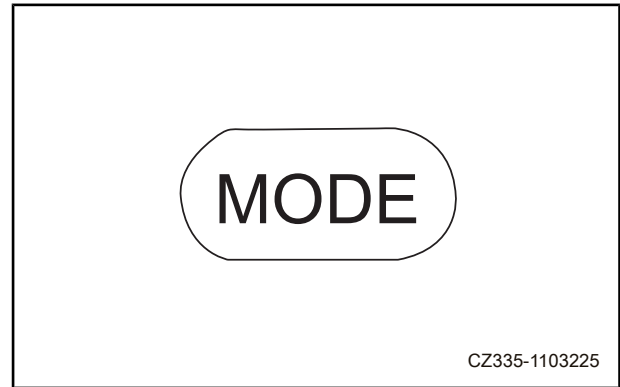


Fig.4-54

Description of air vent mode

LCD	Air vent	Air vent				Remarks
		A	B	C	D	
	Front face air vent		○			It can't be selected under the automatic operation mode
	Front/back face air vent	○	○			
	Front/back face and foot air vent	○	○		○	
	Foot air vent				○	
	Foot and defrosting air vent			○	○	It can't be selected under the automatic operation mode
	Defrosting air vent			○		It can't be selected under the automatic operation mode

NOTE :

Air will be supplied from the air vent marked with ○.

Air vent of HVAC

[A]: Rear air vent: It is generally located at the back of the cab.

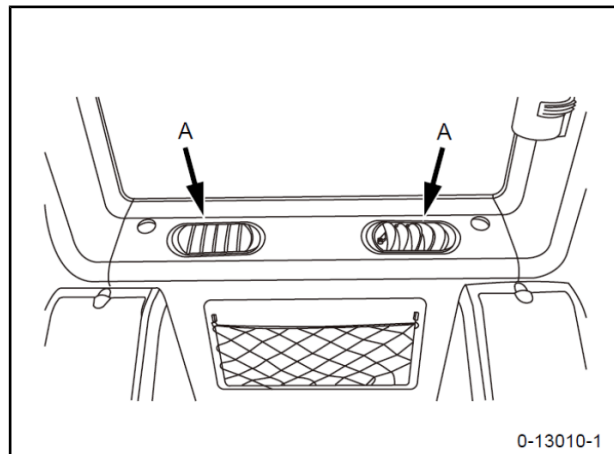


Fig.4-55

[B]: Face air vent

[C]: Defroster port

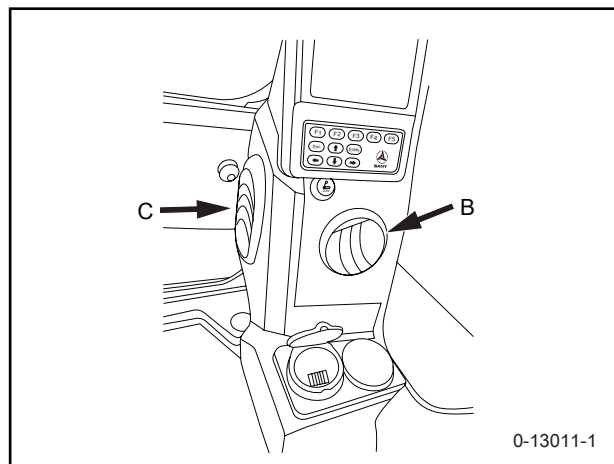


Fig.4-56

[D]: Foot air vent: It is located below the cab.

NOTE :

- The appearance and quantity of air vent of HVAC may vary slightly depending on machine model.
- The direction of the face air vent, defroster port and rear air vent can be adjusted, but the foot air vent can't be adjusted.

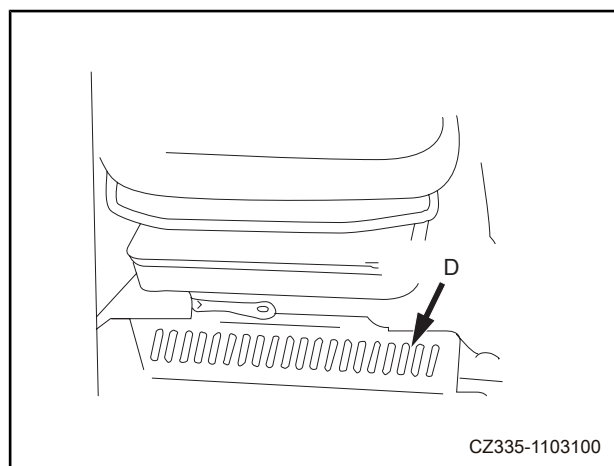


Fig.4-57

5. Automatic mode setting switch

This switch is used to automatically set the air volume, air vent and inside and outside air switching according to the set temperature.

- Press down the automatic mode setting switch [5], and the indicator lamp on the top of the switch will be on.
- Generally, press down this switch and set to the proper temperature with the temperature setting switch [3], and the HVAC will run automatically.
- When switching from automatic mode to manual mode, just reset the air volume, air vent and inside and outside air switching mode with the switches. In this case, the indicator lamp on the top of the switch will be off.

NOTE :

When the automatic mode is selected, if the temperature is set to 18°C (64.4°F) or 32°C (89.6°F) and the air flow always keeps at HIGH, this is not a fault.

6. Internal/external circulation mode setting switch

This switch is used to switch internal circulation and external circulation.

- Press down one of the switches [6], and the indicator lamp on the top of the switch will be on.
- The external circulation mode and the internal circulation mode will be automatically switched during operation under the automatic mode.

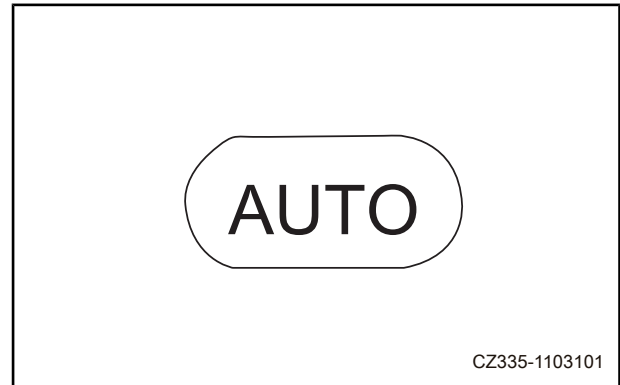


Fig.4-58

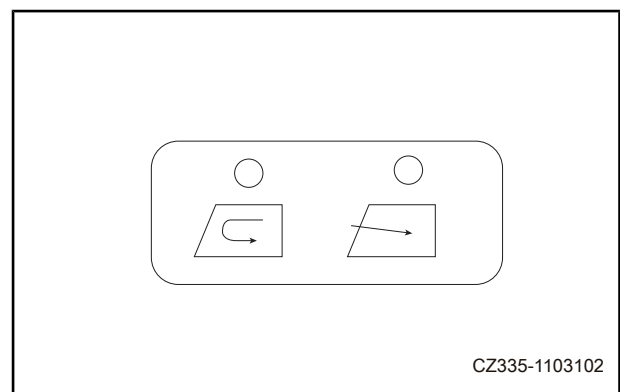


Fig.4-59

Internal circulation	The external circulation is closed, only the internal circulation mode is activated
	It is suitable for internal fast cooling and heating or when the external air is dirty
External circulation	A mode the external air is introduced into the inside
	It is suitable for clean air introduction and defogging

7. LCD

The LCD [7] is used to display the setting temperature [a], air volume [b] and air vent status [c] during running.

- Press down the OFF switch [1], and indication of the setting temperature, air volume and air vent status will disappear, and running will be stopped.

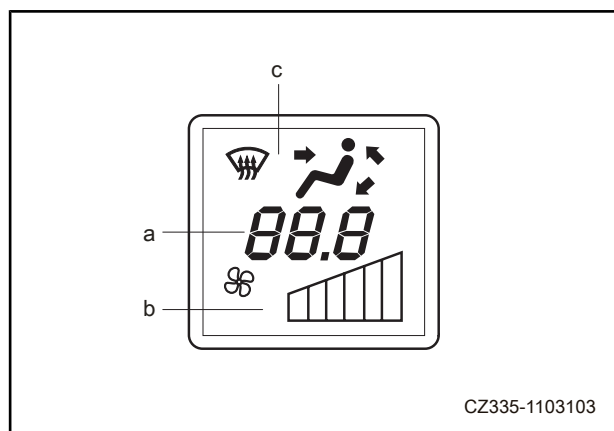


Fig.4-60

8. HVAC switch

This switch is used to control start and stop of actions (refrigeration, dehumidification and heating) of HVAC.

- When the fan is working ([b] is displayed on the LCD), press down the HVAC switch [8], and the HVAC will be turned on and the indicator lamp on the top of the switch will be on; press it down again, the HVAC will be turned off, and the indicator lamp will be off.
- When the fan is turned off (no air supply status is displayed on the LCD), the HVAC can't be turned on.

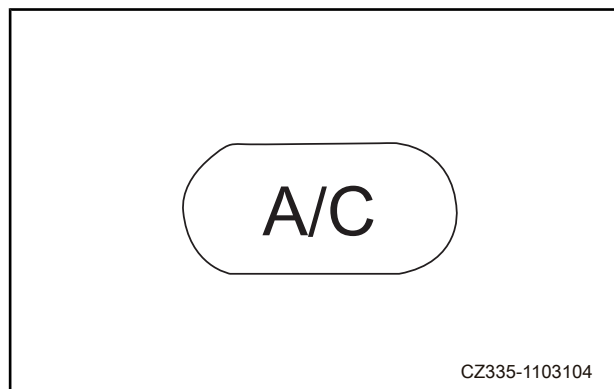


Fig.4-61



4.2.7.3 Operation of HVAC


The HVAC can be controlled automatically or manually. Select the control mode as required.

Automatic operation

1. Turn on the automatic mode setting switch



In this case, the temperature [a] and air volume [b] will be displayed on the LCD, and the lamp on the top of the automatic switch  and the HVAC switch  will be on.

2. Adjust the temperature switch , and set the comfortable temperature.

Set the temperature accordingly, and the HVAC will automatically switch the air volume, the air vent and the inside and outside air to provide the set temperature.

NOTE :

When the air vent mode [c] displays [d] or [e] status and the engine coolant temperature is lower, the air volume will be automatically restricted to prevent blowing air cool air.

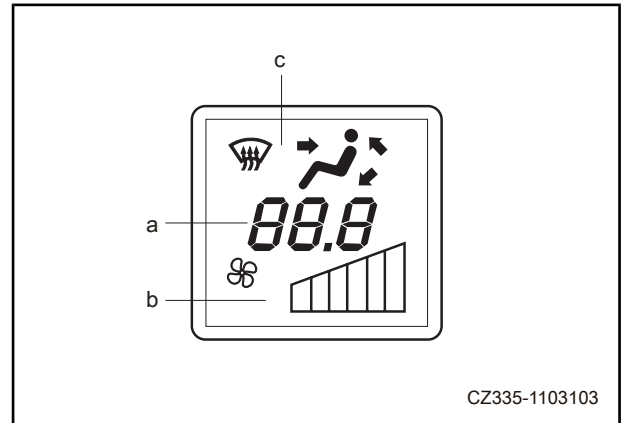


Fig.4-62

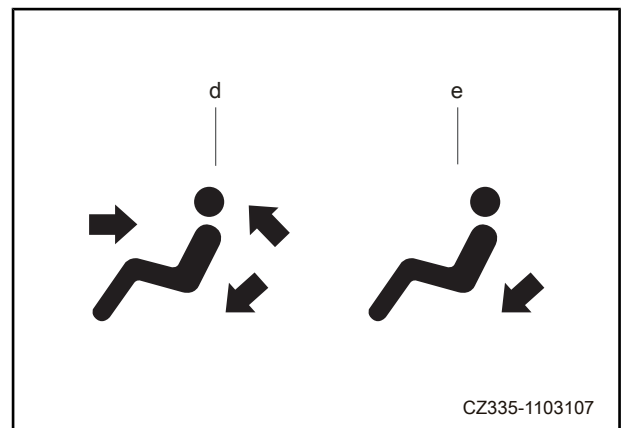



Fig.4-63


Stop automatic operation


Press down the switch , and automatic operation will be stopped.



Manual operation

1. Press down the fan speed setting switch  to adjust air volume. In this case, check the temperature [a] and air volume [b] displayed on the LCD.


2. Turn on the HVAC switch .

3. Press down the temperature adjustment switch  to set the cab temperature.

4. Press down the air vent mode setting switch  to set the required mode. In this case, the display of the [c] on the LCD will be changed according to selections.


5. Press down the inside/outside air change-over switch  or , and select the cab inside air circulation or outside air guidance mode.


Stop manual operation

Press down the  switch, and manual operation will be stopped.

Bi-Level mode

To blow cool air to face and hot air to foot, make setting with the following methods:

1. Press down the fan speed setting switch  to adjust air volume. In this case, check the temperature [a] and air volume [b] displayed on the LCD.

2. Press down the air vent mode setting switch , and display the air vent mode on the LCD as the status as shown in the right Figure.

3. Turn on the HVAC switch .

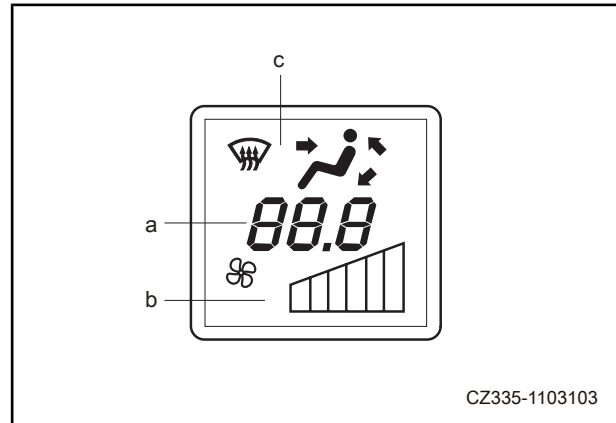


Fig.4-64

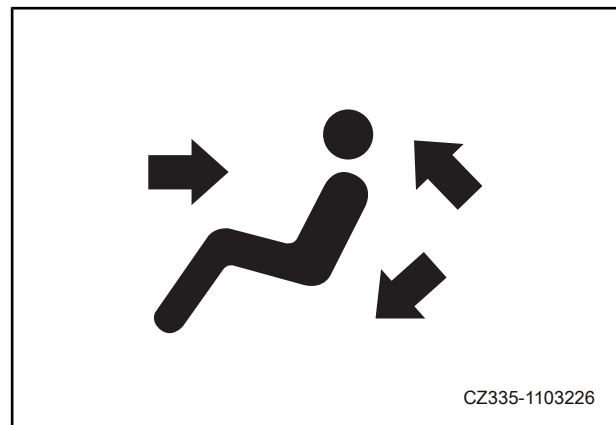







Fig.4-65

4. Adjust the fan speed setting switch  temperature setting switch  and inside/outside air mode setting switch  or  to the required position.

Defrosting

1. Press down the fan switch  to adjust air volume. In this case, check the temperature [a] and air volume [b] displayed on the LCD.

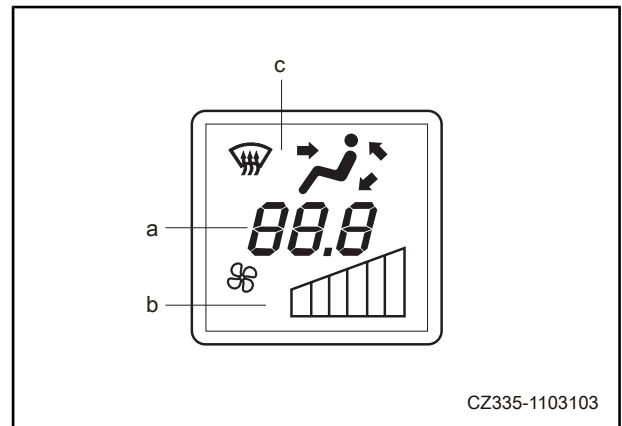






Fig.4-66

2. Press down the air vent mode setting switch , and display the air vent mode on the LCD as the [f] or [g] as shown in the right Figure.

3. Press down the inside/outside air change-over switch  or , and set it to the outside air guidance mode.

4. Press down the temperature setting switch , and set the temperature on the LCD to the hottest (32°C).

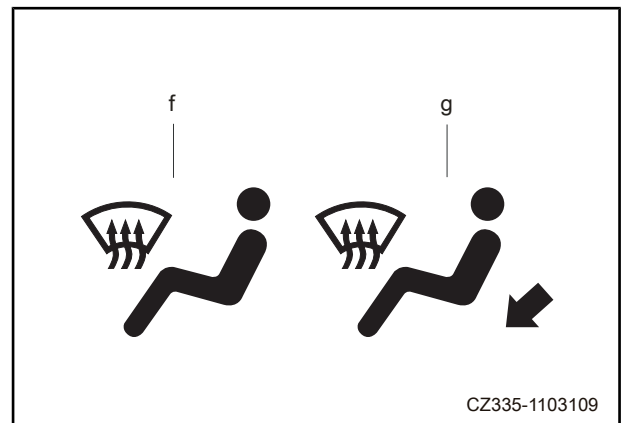



Fig.4-67

- During operation in the rainy season or de-fogging or dehumidification of the window, turn on the HVAC switch  for dehumidification.

4.2.7.4 Use HVAC carefully

- When operating HVAC, be sure to start it when the engine is running at low speed. Do not turn on the HVAC when the engine is running at high speed. Otherwise, it will cause HVAC fault.
- If the water enters the control panel or the daylight sensor, it will cause an accident fault. Be careful not to get water on these parts. In addition, do not make open fire close to these parts.
- For normal operation of automatic function of the HVAC, be sure to keep the daylight sensor clean, and do not place anything around the daylight sensor, otherwise it will affect the function of the sensor.

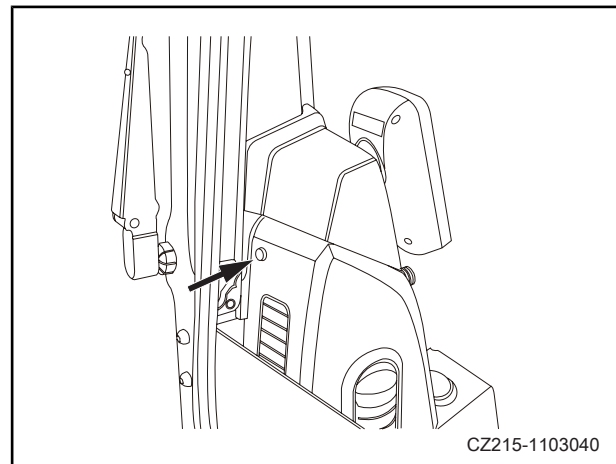


Fig.4-68

Ventilation

- When the HVAC is running for a long time, the “Inside and Outside Air Mode” shall be changed to the “Outside Air Guidance” mode every 1 h for ventilation.
- In case of smoking when the HVAC is turned on, the smoke will hurt your eyes, therefore, the “Inside and Outside Air Mode” shall be changed to the “Outside Air Guidance” mode to ensure that smoke can be removed in continuous cooling.

Temperature control

- When the cooler works, set the temperature to a value (5 or 6°C(9 or 10.8°F) lower than outdoor temperature) slightly lower than that when entering the cab. The temperature difference is considered to be the most suitable for health.

Inspection and maintenance of machine with HVAC

- The inspection and maintenance of machine with HVAC shall be carried out

according to charts. For details, see the “Inspection and Maintenance of HVAC” on page 5-27.

- When the HVAC is not used for a long time, it is necessary to operate the engine at a low speed to prevent the loss of the oil film on each part, and perform refrigeration, dehumidification and heating for a few minutes.
- If the cab temperature is lower than the outdoor temperature, the HVAC will not work. In this case, the circulation of fresh air will heat up the cab, and the HVAC will work when the HVAC switch is turned on again.
- If any device or sensor on the HVAC has any fault, please contact the authorized agent of SANY Heavy Machinery for inspection and repair.

4.2.8 Control lever and pedal

4.2.8.1 General

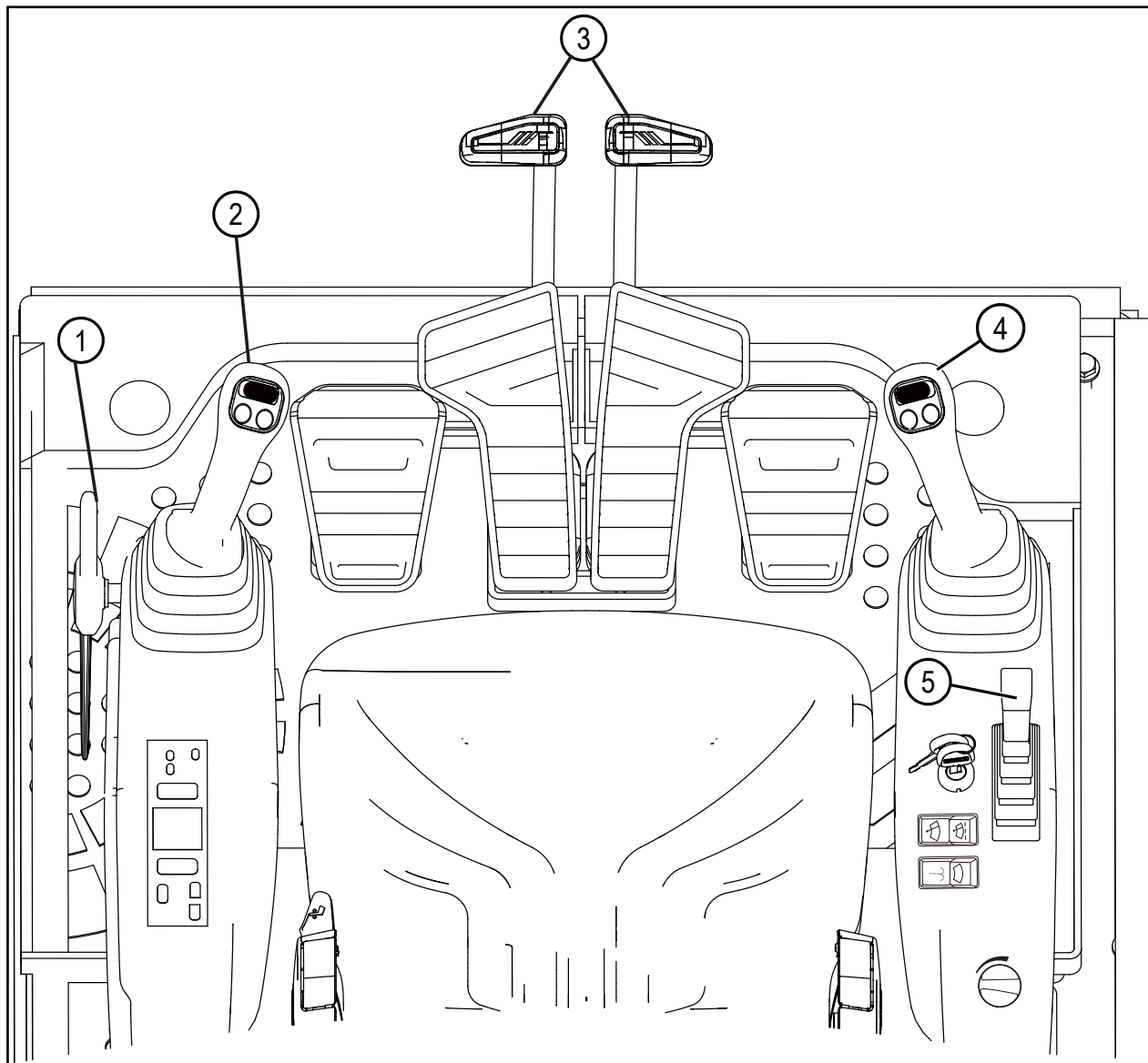


Fig.4-69

[1] Safety lock control lever

[2] Left control lever

[3] Traveling control mechanism

[4] Right control lever



[5] Dozer bladecontrol lever

4.2.8.2 Safety lock control lever

WARNING

- When leaving the cab, the safety lock control lever shall be firmly located at the locking position. If the safety lock control lever is not at the “LOCK” position, accidental touching of the joystick can cause serious casualties.
- If the safety lock control lever is not at the “LOCK” position, the joystick may move, thus causing serious accidents. The inspection of the joystick is as shown in the figure.
- When pulling or pushing the safety lock control lever, do not touch the left control lever.

A safety lock control lever is a device that locks the work equipment, swing, travel and accessory (if equipped) control levers.

-  LOCK position: Push the safety lock control lever downwards and apply the locking. The machine will not move even if the control lever is operated.
-  UNLOCK position: The machine will move according to operation of the joystick.

The lever is a hydraulic locking lever. Therefore, when it is locked, the joystick or the control pedal will move, but the machine will not move.

When all the controllers are in the neutral position and the safety lock control lever is pushed to the unlocking position, if any part of the machine (has movement tendency) moves, it indicates that the machine has fault. In this case, immediately pull the safety lock control lever back to the LOCK position and stop the engine. And then contact SANY Heavy Machinery or its authorized agent.

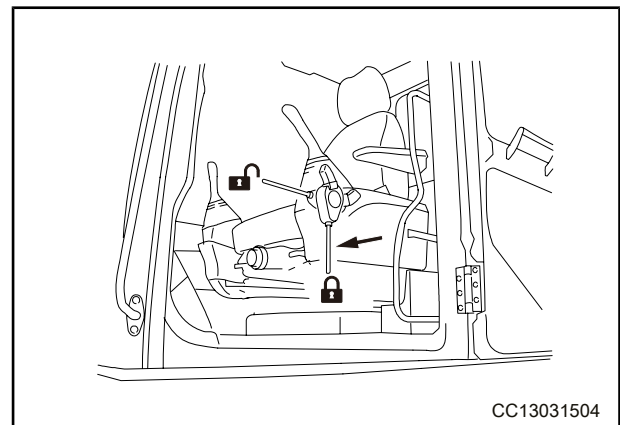


Fig.4-70

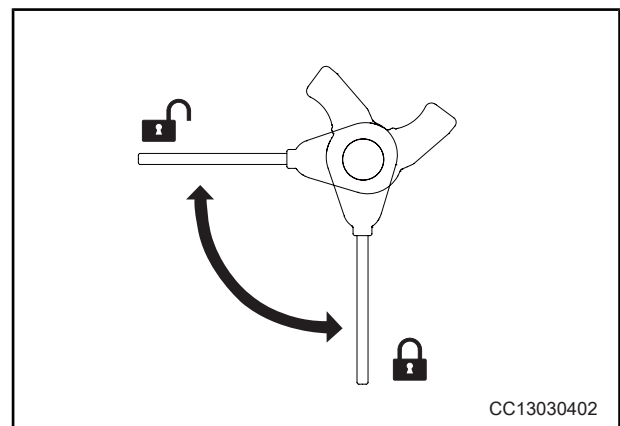


Fig.4-71

4.2.8.3 Dozer blade control lever

The dozer blade control lever (1) is on the right side of the operator seat.

- Move the lever forward (2) to lower the dozer blade.
- Move the lever backward (3) to raise the dozer blade.

When the dozer blade control lever is released, it will return to the neutral position and dozer function will stop.

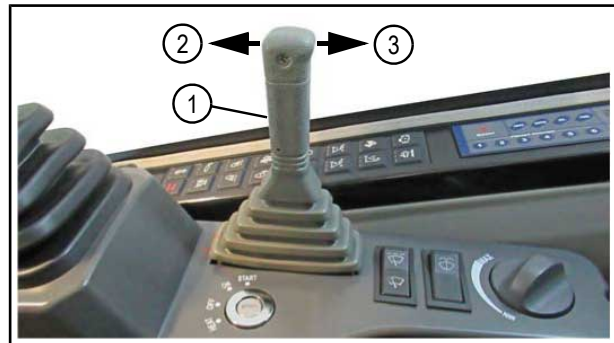


Fig.4-72

4.2.8.4 Traveling control mechanism

⚠ WARNING

- Do not put your feet on the pedal while operating. If the pedal is stepped down accidentally, the machine will suddenly move and cause a serious accident.
- Please be cautious when using a pedal for traveling or steering. Do not put your feet on the pedal when you do not use the pedal.

The travel lever and traveling control pedal (as shown in the right Figure) are used to control machine traveling and change traveling direction of the machine.

[a] Forward:

Push the travel lever forwards (or step down front part of pedal)

[b] Reverse:

Pull the travel lever backwards (or step down rear part of pedal)

[N] Stop the machine (return the travel lever and pedal to the neutral position)

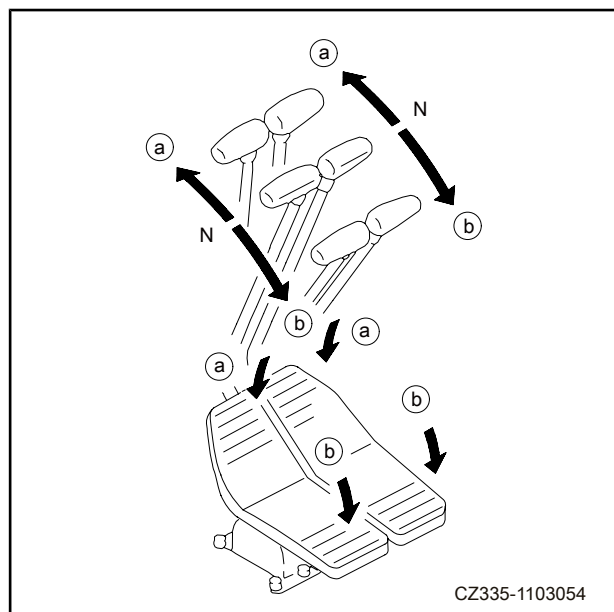


Fig.4-73

NOTE :

Confirm the sprocket position before operating the travel lever or pedal. Ensure that the sprocket is at the back of the machine. If the sprocket is in front of the machine and the travel lever is pushed forwards, the machine will move backwards.

4.2.8.5 Control levers **WARNING**

- Do not extend any part of your body out of the window. If you knock into the boom control lever accidentally or for other reasons, you may be hit by the boom. If the window is lost or damaged, it shall be repaired or replaced immediately.
- Before operation, be familiar with the position and function of each control lever to prevent injury caused by accidental movement of the machine.

The following is an example of the SAE mode. For details, see the [“Control and operation of work equipment”](#) on page 4-107.

Left control lever

Action of the left control lever		
1	Front	Arm dumping
2	Back	Arm digging
3	Left	Left swing
4	Right	Right swing

- The diagonal movement of the control lever can realize two functions and can perform compound action.

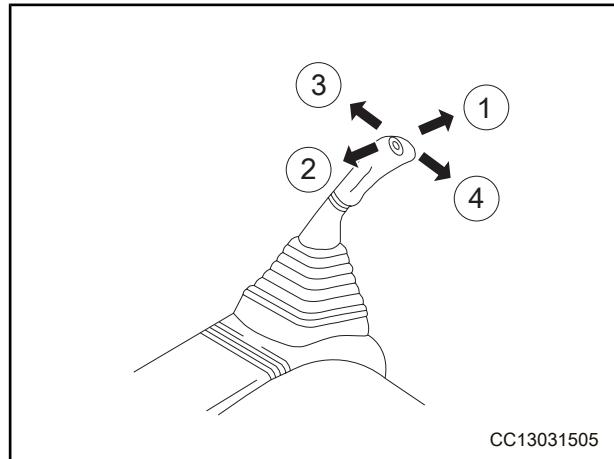


Fig.4-74

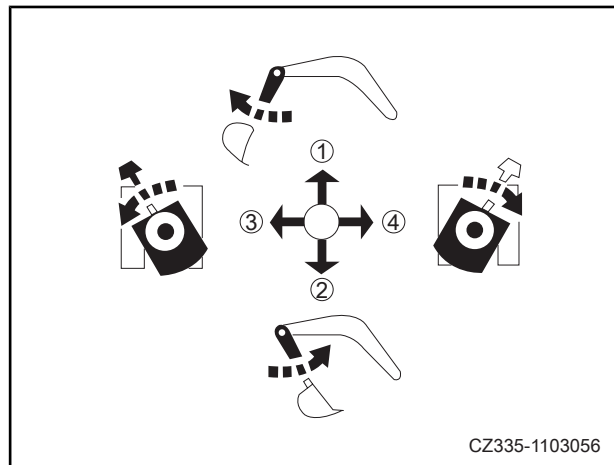


Fig.4-75

Right control lever

Action of the right control lever		
5	Front	Boom lowering
6	Back	Boom lifting
7	Left	Bucket digging
8	Right	Bucket dumping

- The diagonal movement of the control lever can realize two functions and can perform compound action.

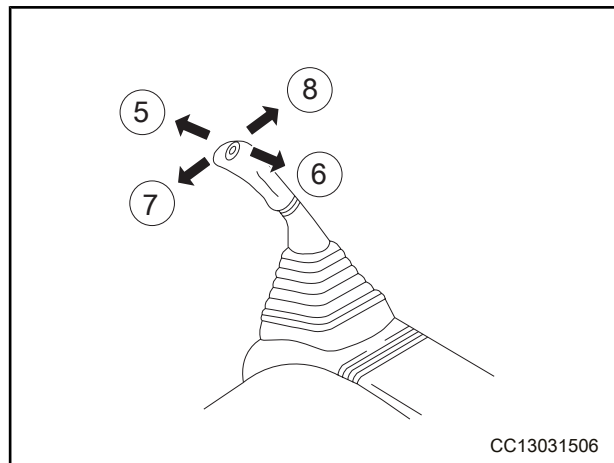


Fig.4-76

NOTE :

- When the travel levers and the joysticks are at neutral position, as long as the accelerator rotary switch is at the position for a speed higher than the auto idle speed, operating either control lever will increase the engine speed to the speed set by the accelerator rotary switch.
- If the travel lever and control lever are in the neutral position, the engine speed will drop automatically to the set speed (about 1,100 rpm) after about 3.5 s.
- When the travel lever and the control lever are released, it will automatically return to the neutral position and the machine function will be disabled.

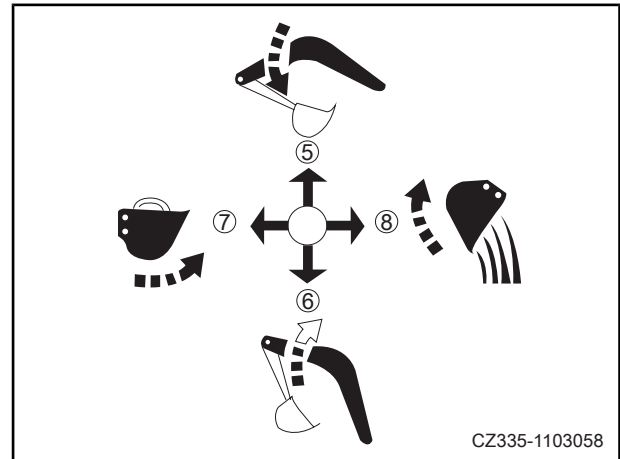


Fig.4-77

4.2.9 Lock cap**4.2.9.1 General**

Open/close lock on the cap and cover with the ignition switch key.

For details of the lock cap and cover, see the "Locking" on page 4-98.

Insert the key to the shoulder [A].

NOTE :

Turning the key when it is not inserted at the bottom may cause breakage.

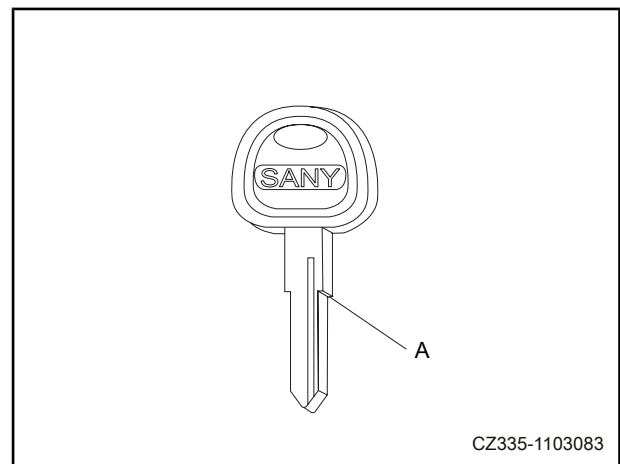


Fig.4-78

4.2.9.2 Open and close the lock cap

⚠ CAUTION

- After removing the key, be sure to rotate the cap [1] to cover the keyhole. Otherwise, foreign matters in the cap lock will make the switch inflexible or even disabled.
- When the lock cap is tightened, the stroke is larger. Ensure that the lock cap is rotated properly, and then turn the key to lock the lock cap. If the key is removed when rotation is not completed, the latch bolt will touch on the inner wall of the filler to damage the lock cylinder.
- It is necessary to ensure the cleanness of the sealing ring in the lock cap. If the sealing ring is stained with impurities including iron chips and stones, it will be easily damaged during tightening, causing improper sealing of the lock cap.

Open the cap

1. Unscrew the keyhole cap [1].
2. Insert the key into the key slot.
3. Rotate the key clockwise to align the key slot at the mark [A] on the cap, and then open the cap [2].

Position [A]: Open

Position [B]: Locked

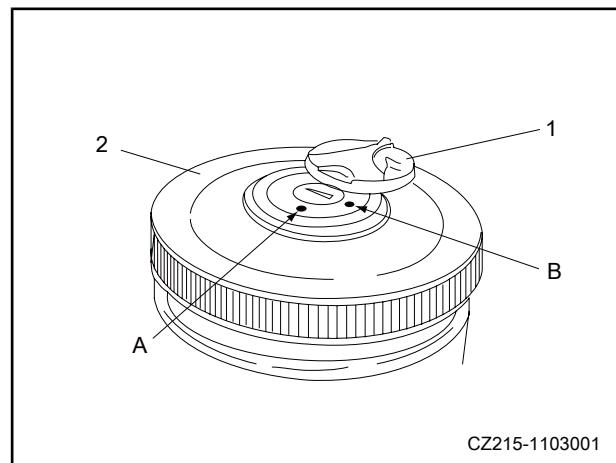


Fig.4-79

Lock the cap

1. Tighten the cap [2] and insert the key into the key slot.
2. Rotate the ignition switch key to the "LOCK" position [B], and remove the key.
3. Rotate the cap [1] to cover the keyhole.

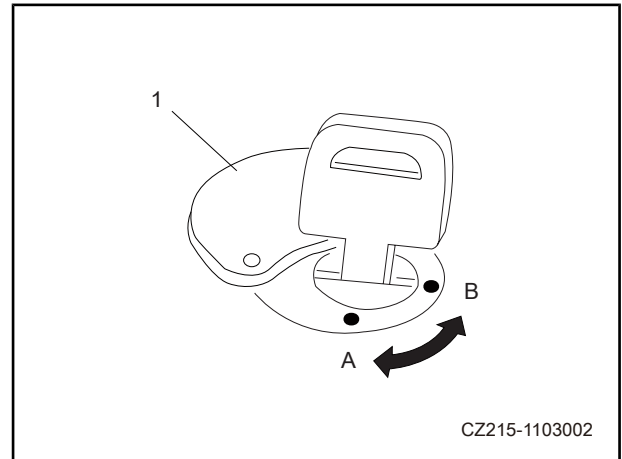


Fig.4-80

4.2.9.3 Open and close the lock cover**Open the cover (locked cover)**

1. Insert the key into the key slot.
2. Rotate the key counterclockwise and open the cover through its handle.

Position [A]: Open

Position [B]: Locked

Lock the cover

1. Close the cover, and insert the key into the key slot.
2. Rotate the key clockwise and remove it.

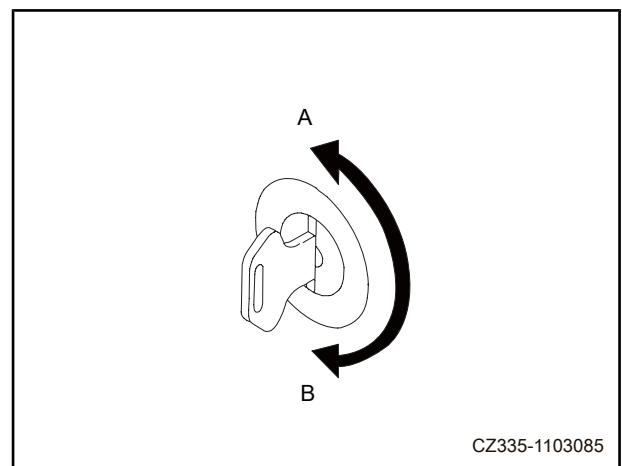


Fig.4-81

4.2.10 Door lock**⚠ CAUTION**

- Stop the machine on the level ground before releasing the door lock.
- Do not release the door lock on the slope. The door may be closed suddenly and damaged.
- Do not extend your body or hand out of the door before you release the door lock. Do not put your hand on the door frame. The door may be suddenly closed and damaged.

1. Push the cab door to the latch bolt [1] direction to lock it.

2. When closing the door, press down the handle [2] on the left side of the driver's seat to release the latch bolt [1].

When the door is opened, lock the door firmly to the latch bolt [1].

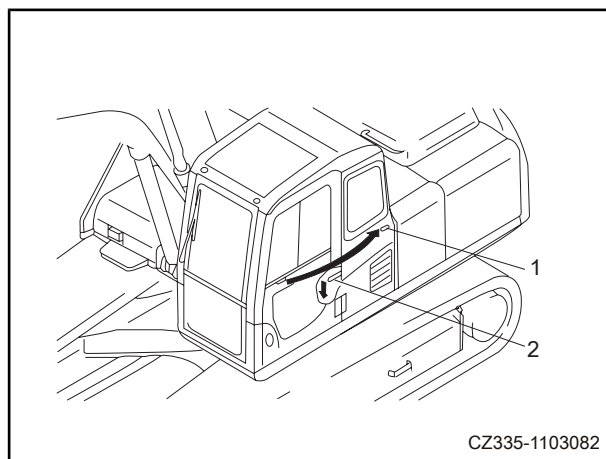


Fig.4-82

4.2.11 Indoor lamp switch

The indoor lamp is installed inside the cab, and the indoor lamp switch can be pressed down to "Turn On" or "Turn Off" the indoor lamp of cab.

Position [a]: The lamp is turned on

Position [b]: The lamp is turned off

NOTE :

Even though the ignition switch is in the OFF position, the indoor lamp can be turned on.

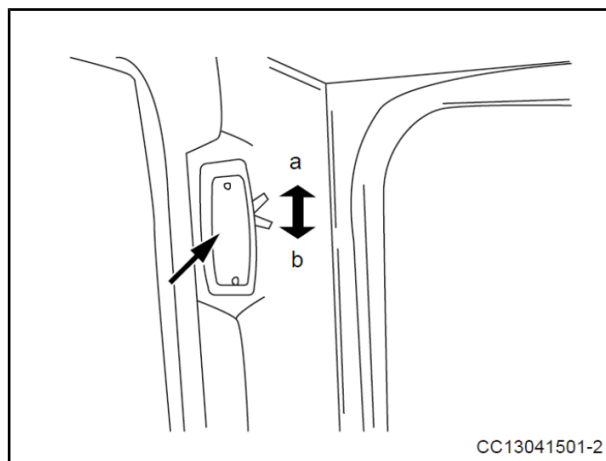


Fig.4-83

4.2.12 Roof

⚠ WARNING

- When leaving the driver's seat, the safety lock control lever shall be firmly located at the locking position. If the safety lock control lever is in the unlocking position, accidental touching of the travel lever or pedal can cause serious accident.

ON

1. Turn the safety lock control lever to the "LOCK" position.

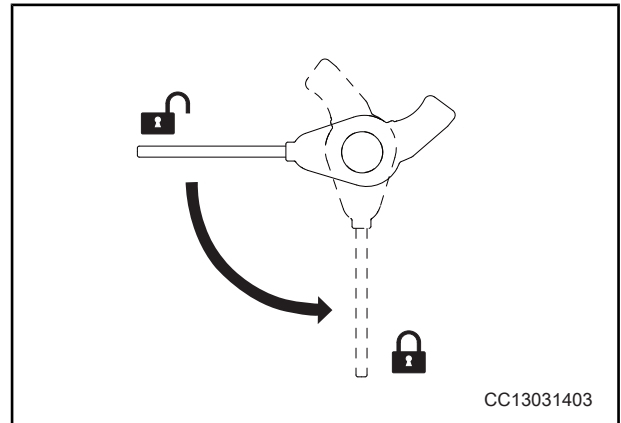


Fig.4-84

2. Push the lock [B] on both sides of the roof handle [A] upwards, and then hold the handle [A] and push the roof upwards.

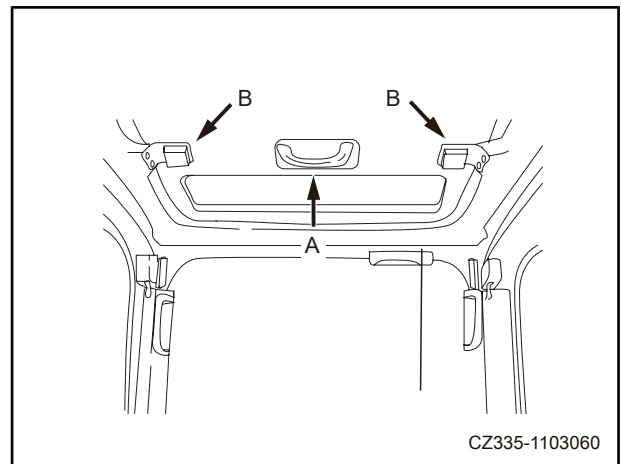


Fig.4-85

OFF

Hold the handle [A] to pull the roof downwards, and the lock [B] will be automatically applied. If the lock can't be properly engaged, open the roof and try to lock it.

4.2.13 Windshield

- The front windshield can be retracted (pulled) to the top of the cab.
- Before opening or closing the front windshield, stop the machine on the level ground, completely drop the work equipment to the ground, stop the engine, and then operate it.
- When opening the front windshield, hold the handle and pull it upwards with both

hands, and do not loosen hands until the automatic latch bolt is locked.

- When the front windshield is closed, the window will move quickly under its own deadweight. When it is closed, hold the handle with both hands.

WARNING

- Turn the safety lock control lever to the locking position when the front windshield, bottom window or door are opened or closed.
- If the safety lock control lever is in the unlocking position, accidental touching of the travel lever or control pedal can cause serious accident.

ON

1. Stop the machine on the level ground, completely drop the work equipment to the ground, and then stop the engine.

2. Turn the safety lock control lever to the "LOCK" position.

3. Check the wiper blade and place it in the right support.

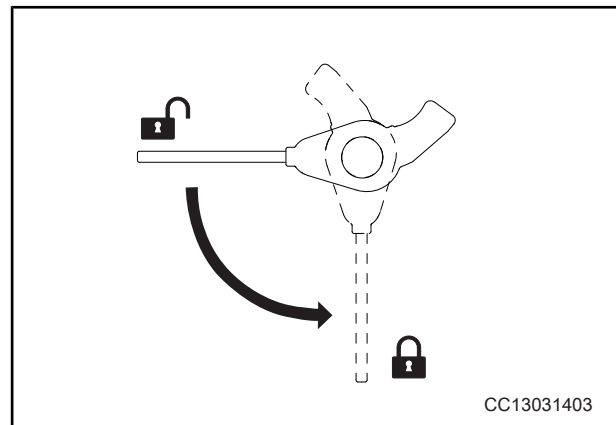


Fig.4-86

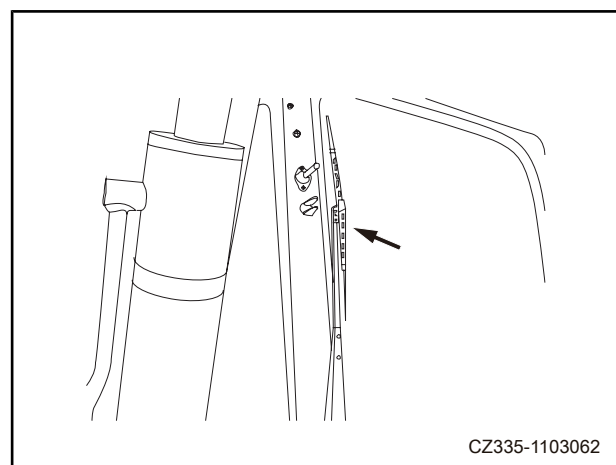


Fig.4-87

4. Hold the left and right handle [A] on the top of the front windshield and pull two handles [B] to release the lock on the top of the front windshield. The top of the front windshield will be released.

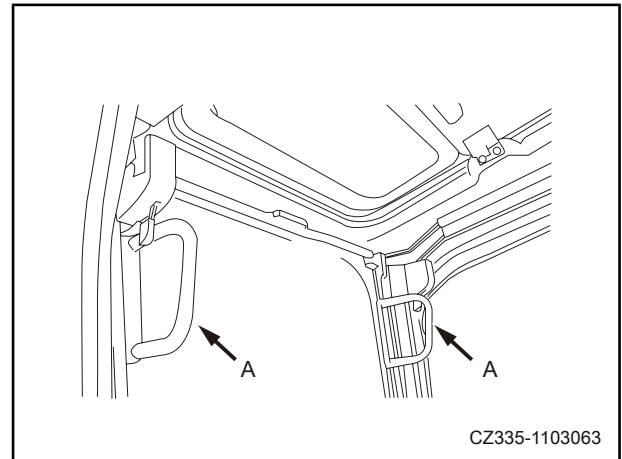


Fig.4-88

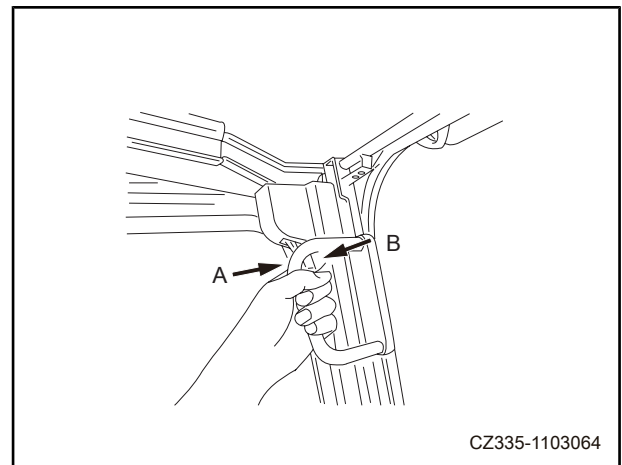


Fig.4-89

5. Hold the bottom handle [C] with left hand and hold the top handle [D] with right hand in the cab, and pull it upwards. In addition, push the latch bolt [E] towards the back of the cab to firmly lock the front windshield.

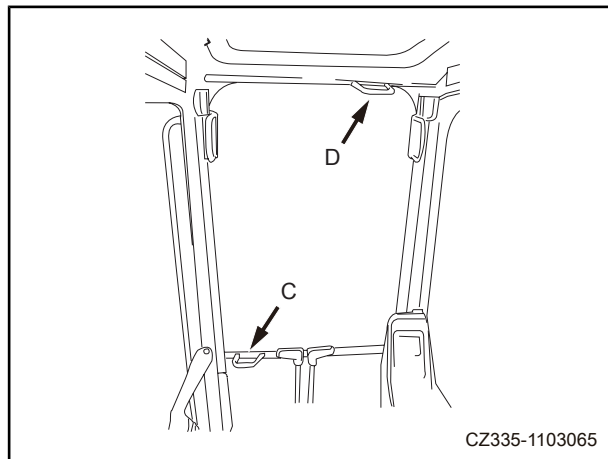


Fig.4-90

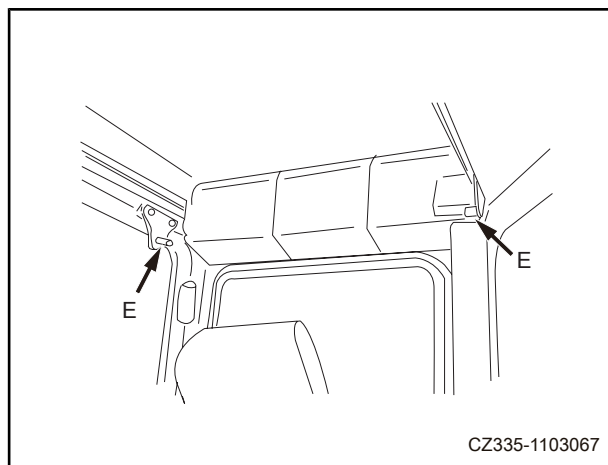


Fig.4-91

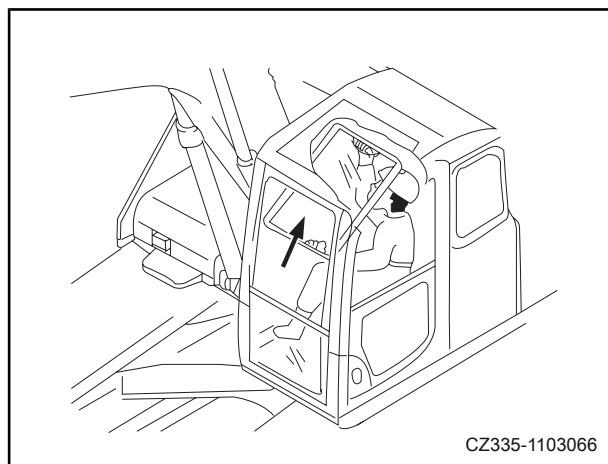


Fig.4-92

6. Check whether the handle [B] is firmly located in the “LOCK” position.

- Check whether the arrow on the lock shell [F] is aligned with the arrow on the handle [B], if yes, the lock will be engaged.
- If the arrow on the lock shell [F] is not aligned with the arrow on the handle [B], the lock will not be engaged. Please repeat operations in the step 5 to engage the lock.

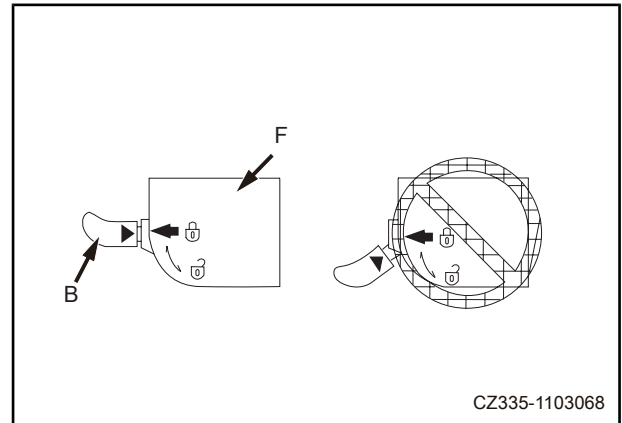


Fig.4-93

OFF

⚠ CAUTION

- When closing the front windshield, slowly lower it down and be careful not to get stuck.

1. Stop the machine on the level ground, completely drop the work equipment to the ground, and then stop the engine.

2. Turn the safety lock control lever to the “LOCK” position.

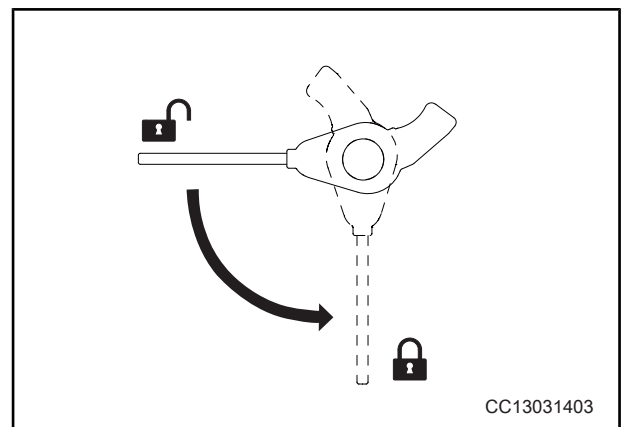


Fig.4-94

3. Hold the left and right handle [A] and pull the handle [B] downwards to release the lock.

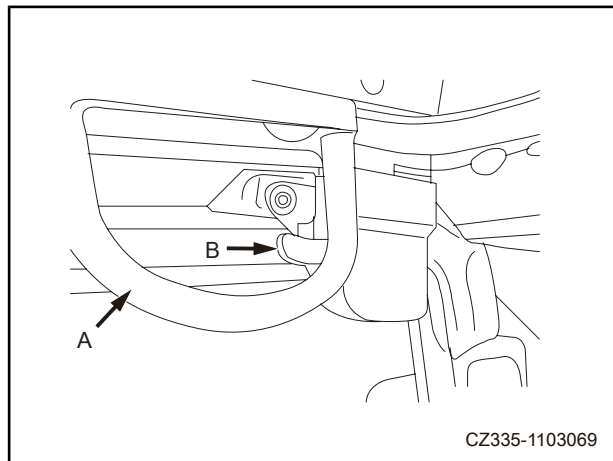


Fig.4-95

4. Hold the handle [C] at the bottom of the front windshield with left hand, hold the handle [D] on the top of the front windshield with right hand, push it forwards, and then slowly lower it down.

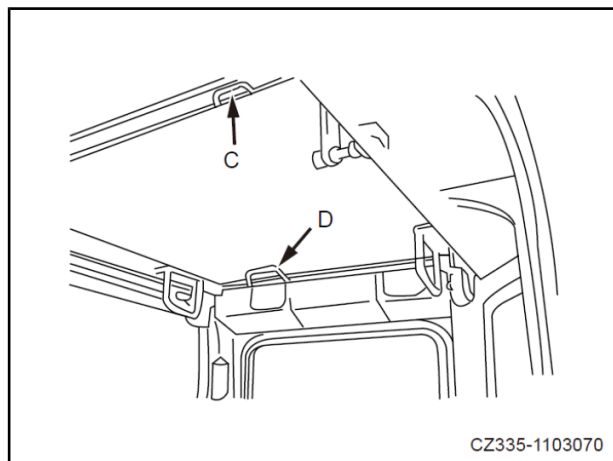


Fig.4-96

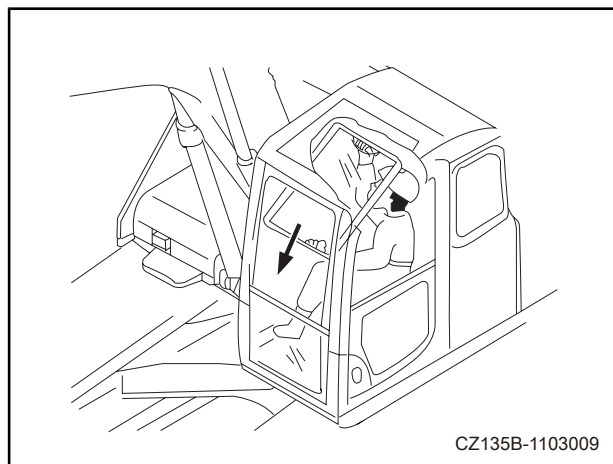


Fig.4-97

5. When the bottom of the front windshield reaches the top of the bottom window, push the top of the front windshield forwards to push it to the left and right latch bolt [G] and engage the lock.

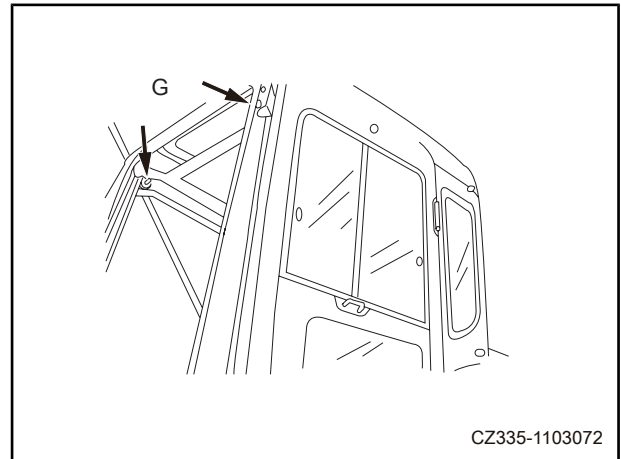


Fig.4-98

6. Check whether the handle [B] is firmly located in the “LOCK” position.

- Check whether the arrow on the lock shell [F] is aligned with the arrow on the handle [B], if yes, the lock will be engaged.
- If the arrow on the lock shell [F] is not aligned with the arrow on the handle [B], the lock will not be engaged. Please repeat operations in the step 5 to engage the lock.

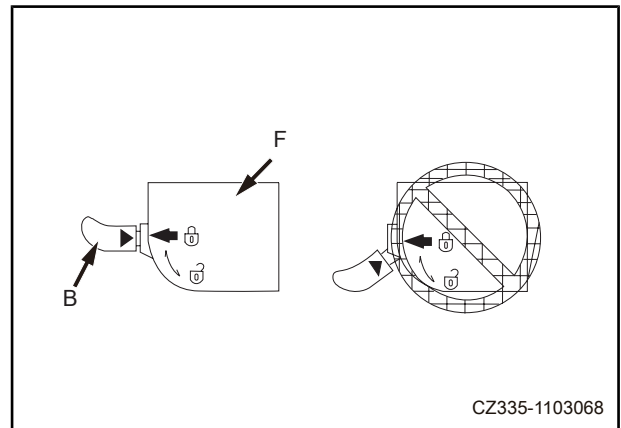


Fig.4-99

Remove the lower windshield

Open the front windshield, and then hold the left and right handles and pull them upwards, and remove the lower windshield.

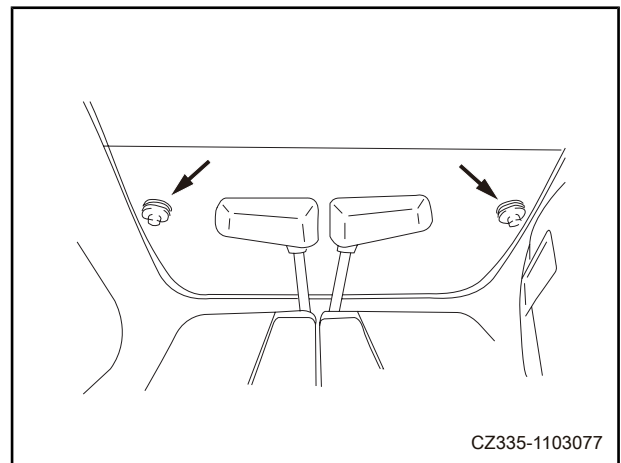


Fig.4-100

If the bottom of the front windshield has accumulated sand or dust, it will be difficult to remove the front windshield. In addition, when the front windshield is retracted, the sticky sand and dust will be brought into the cab. To prevent this condition, clean the [A] area before removal.

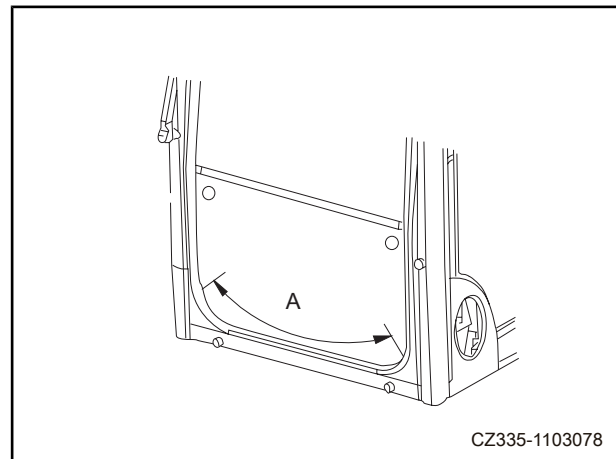


Fig.4-101

4.2.14 Doors and windows of cab

ON

1. Press down the latch when opening the window of the cab door.
2. Slide the front windshield backwards and (or) slide the rear window forwards.

OFF

1. Slide the front windshield forwards and (or) slide the rear window backwards.
2. Close the doors and windows and ensure that the latch is completely locked.

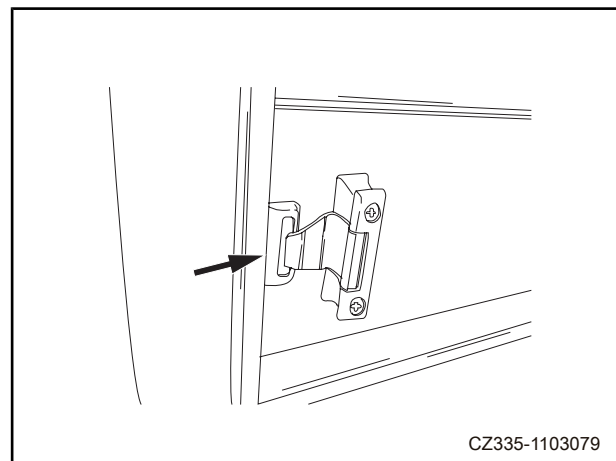


Fig.4-102

4.2.15 Information pack

- The information pack is located on the back of the driver's seat back. The right Figure is the effect when the seat back is completely lowered down.
- The "Operation and Maintenance Manual" is placed in this pack, which can be read when necessary.

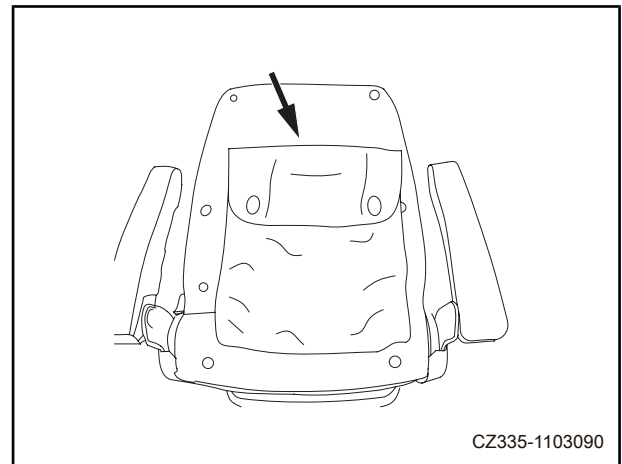


Fig.4-103

4.2.16 Drink box

- The drink box is located on the left side of the back of the driver's seat. It can keep the beverage warm and cool in the winter and summer.
- It can blow hot or cool air to the drink box according to the setting of HVAC.

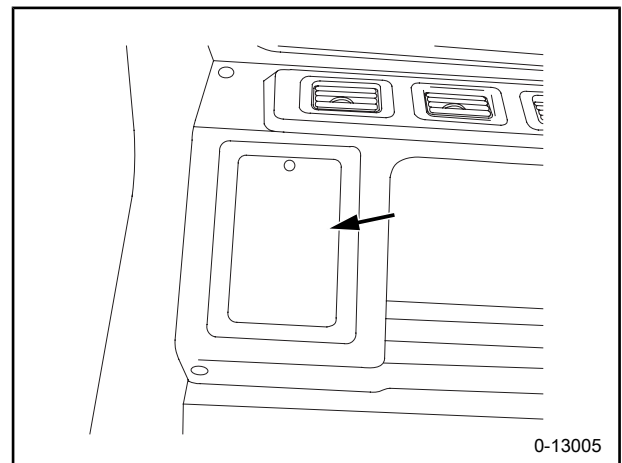


Fig.4-104

4.2.17 Emergency exit

If the door and window of the cab can't be opened in case of emergency, the rear window can be used as an emergency exit.

- For a cab with a safety hammer, the safety hammer can be used to break the rear window. The safety hammer is located on the left side of the rear window of the cab.

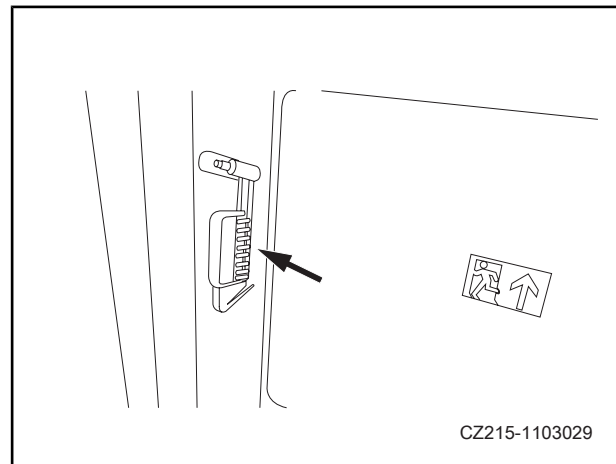


Fig.4-105

- For the pull ring rear window, pull the pull ring, remove the rubber core from the window frame rubber, and then push the glass corner to remove the glass from the window.

NOTE :

The rear window can be used as an escape exit only in case of emergency. Do not use it at any time.

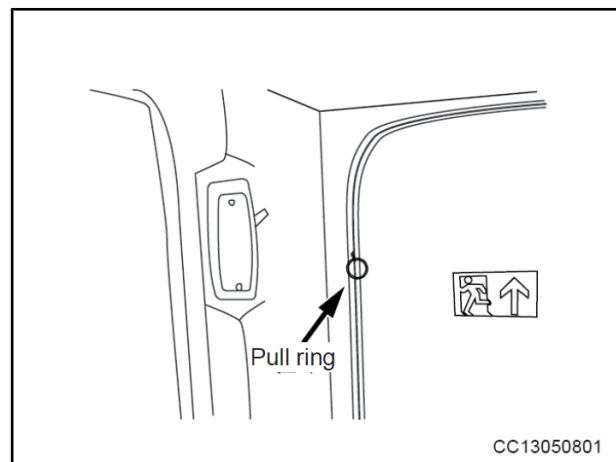


Fig.4-106

4.2.18 Fire Extinguisher

CAUTION

- Be sure to prepare a fire extinguisher and read the label, and be familiar with the operation method in case of emergency.
- Regularly check the fire extinguisher and ensure that it is in the warranty period.
- If the fire extinguisher has expired, it shall be replaced timely.

The fire extinguisher shall be kept in the rear part of the cab.

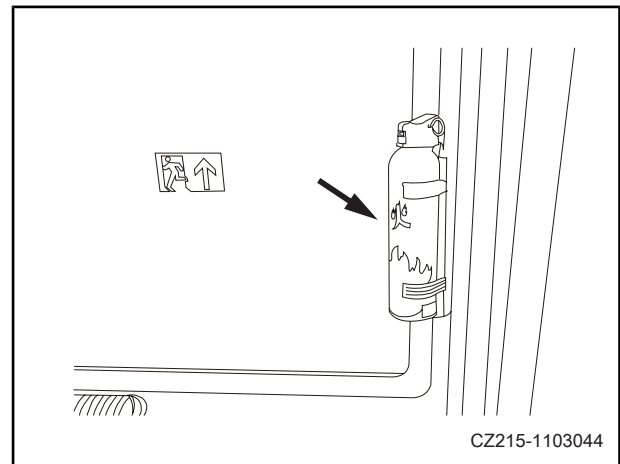


Fig.4-107

4.2.19 Controller

Be careful not to get water, mud or other liquid onto the controller. This will cause a fault.

If the controller has any fault, please do not disassemble it without permission, and contact the authorized agent of SANY Heavy Machinery for repair.

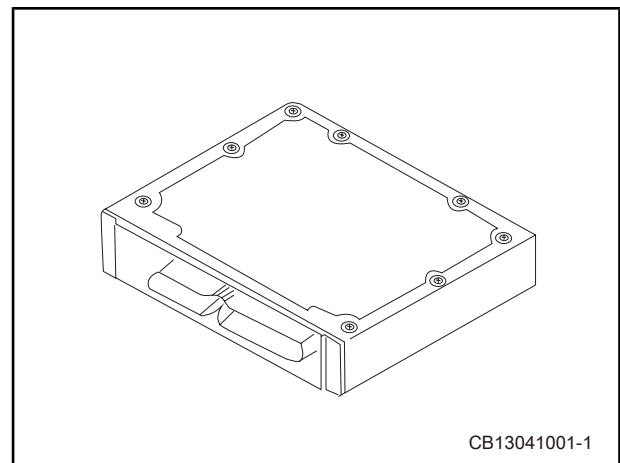


Fig.4-108

4.2.20 Fuse link

When the ignition switch is turned to the [ON] position, if the starting motor can't be started, the fuse link may have an open circuit. The fuse box is located in the electrical control box at the back of the cab. Check for fuse burnout, and replace the fuse if necessary.

NOTE :

- The fuse link (as shown in the Figure) refers to the fuse installed on the circuit to prevent burning electric parts and wires.
- The fuse link has specifications including 5 A, 10 A, 15 A, 20 A and 30 A, which is distinguished with different colors. Replace the old fuse link with the one with the same capacity.
- Always turn off the ignition switch before replacing the fuse link.

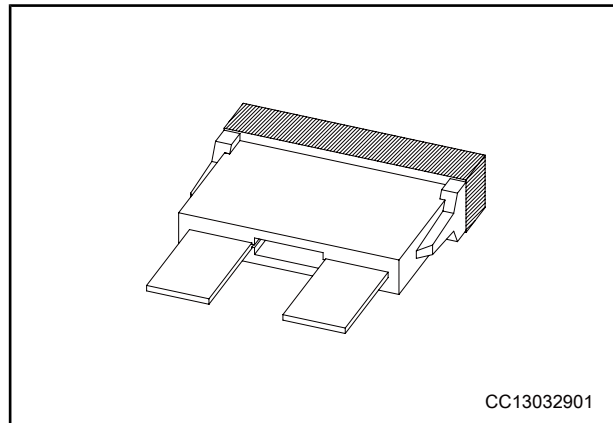


Fig.4-109

4.2.21 Integrated fuse box

Fuses protect electrical circuits from excessive power draws. When a fuse is blown, it indicates the circuit's current draw has exceeded the fuse's amperage rating. Excessive current draw may be due to a temporary power surge in a circuit, or it may be due to a short or faulty electrical component. If a fuse repeatedly blows, the wiring harness must be inspected for broken or damaged wire insulation or a component placing a high electrical load on the system. Repair as necessary or contact a SANY dealer.



Fig.4-110

⚠ WARNING

- If fuses frequently fail, there may be a short circuit in the cables or component placing a high electrical load on the circuit. Determine the cause, and repair the problem.
- A fuse should be replaced if it is blown, corroded, or becomes loose in the fuse block.
- Before replacing a fuse, make sure the key switch is in the OFF position and the batteries are disconnected.
- Always replace a fuse with one of the same rating. Using a higher amperage fuse on a circuit rated for a lower current can cause a fire or damage the electrical circuit's components in case of a short or excessive power draw.

The fuse box is on the left side of the cab behind the seat. Remove the fusebox cover (1) to access the integrated fuse box panel (2).

Remove the integrated fuse box panel (2) and inspect for blown fuses. Replace a blown fuse with a fuse of the same amperage rating

Fuse Locations, Circuits, and Amperages		
Fuse Number	Circuit	Amperage
F1	Key Switch	30A
F2	Engine Control Unit (ECU) Power	30A
F3	Dosing Control Unit (DCU) Power	20A
F4	Power ON	10A
F5	Air Conditioner	5A
F6	NOx Sensor	15A
F7	Fuel Pump	20A
F8	Seat Heater	20A
F9	Conditioner Fan	20A
F10	Compressor	10A
F11	Horn, Cab Lamp	10A
F12	Working Lights	10A
F13	Windshield Wiper and Washer, Radio	15A
F14	Monitor	20A
F15	Travel Alarm	10A
F16	Power Converter	15A
F17	Spare	-
F18	Spare	-
F19	Spare	-
F20	Spare	-

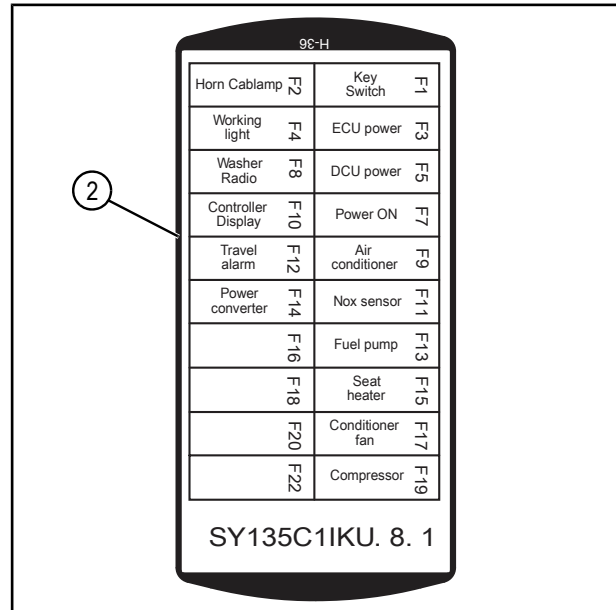


Fig.4-111

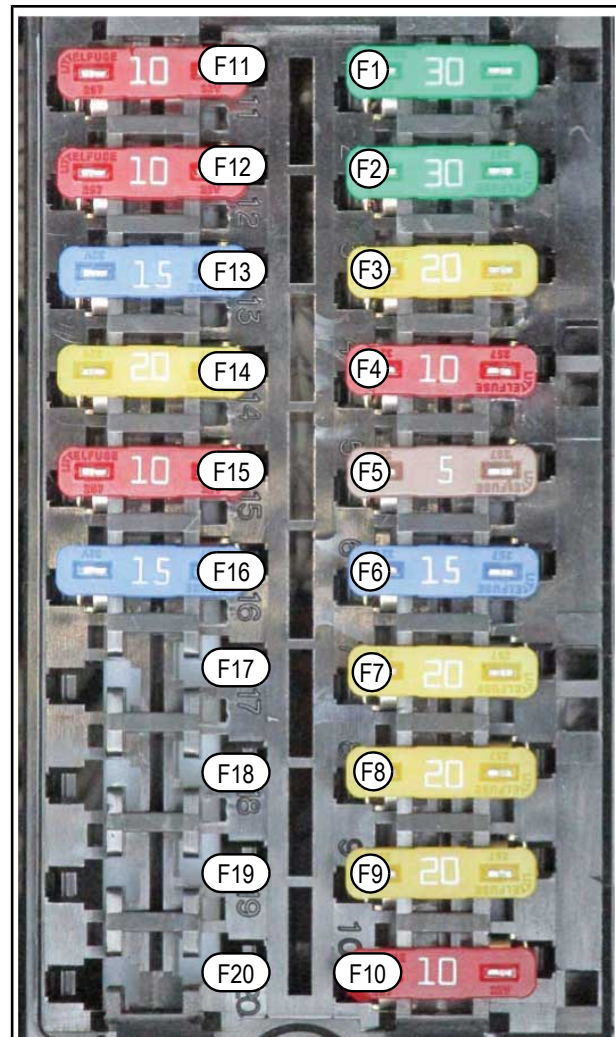


Fig.4-112

⚠ WARNING

If fuses fail frequently, the wiring harness must be inspected for broken or damaged wire insulation or a component placing a high electrical load on the system, and repaired as necessary. Contact a SANY dealer for additional information. Failure to follow this notice could damage the machine or cause improper machine operation.

4.2.22 Lubricating grease pump rack (if assembled)

The lubricating grease pump rack is installed in the access door at the left rear part of the machine. Hook the lubricating grease pump on this rack when it is not used.

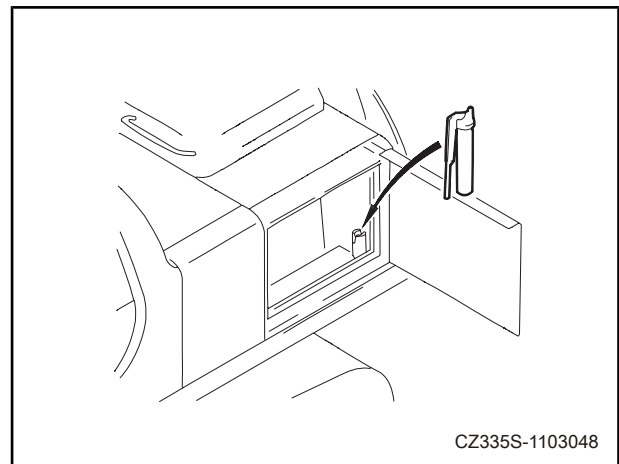


Fig.4-113

4.3 Operation and control of machine

4.3.1 Before engine start

4.3.1.1 Routing inspection

Before starting the engine, check the machine and the part below it. Check whether bolts or nuts are loose, whether there is oil, fuel or coolant leakage, and check conditions of the work equipment and hydraulic system. In addition, check whether the wires near the high temperature area are loose, and there are clearance and dust accumulation.

⚠ CAUTION

- Remove the combustible materials around the battery, engine, muffler, turbocharger or other high temperature parts, otherwise, it may cause fire.
- The leakage of fuel or oil will cause the machine burning.

The following inspection and cleaning shall be performed before starting the engine every day:

1. Check whether the work equipment, cylinder, hose, etc. have cracks and excessive wear or looseness, and check whether the bucket and arm connections are damaged. If any problem is discovered, it shall be repaired or replaced.
2. Remove the dirt and debris around the engine, battery and radiator. Check whether there are dirt around the engine and radiator. In addition, check whether there are combustible materials (dry leaves, twigs, etc.) around the battery, engine muffler, turbocharger, or other high temperature parts. If dirt or combustibles are discovered, remove them.
For a method to remove dirt from the radiator, see [“Cleaning and inspecting radiator and cooler fins” on page 5-52.](#)
3. Check for leakage of coolant and oil around the engine.
Check whether the engine has oil leakage and the cooling system has coolant leakage. If any problem is discovered, repair it.
4. Check whether the hydraulic device, hydraulic tank, hose and adapter have oil leakage.
Check for oil leakage. If any problem is discovered, repair the leaky oil part.
5. Check whether the lower body (track, sprocket, guide wheel, guard board) is damaged and worn, and whether bolts are loose or roller has oil leakage.
If any problem is discovered, repair it.
6. Check whether the handrail and step are defective, and whether bolts are loose.
If any problem is discovered, repair it. Tighten loose bolts.
7. Check whether the instrument and monitor are defective. Check whether the instrument and monitor inside the cab are defective.
If any problem is discovered, replace the parts. Remove dirt from the surface.
8. Clean and check the rearview mirror.
Check whether the rearview mirror is damaged. If damaged, repair it. Clean the surface of the mirror and adjust the angle, so as to ensure that the rear area can be seen while sitting on the driver's seat.
9. Check seat belt and fixing clamp.
Check whether the seat belt and fixing clamp are damaged or worn. If damaged, replace the part with a new one.
10. Check whether the bucket with hook (if equipped) is damaged.
Check whether the hook, guide plate, and hook seat are damaged. If any fault is discovered, please contact the authorized agent of SANY Heavy Machinery for repair.

4.3.1.2 Inspection before start

Always check the items in this section before starting the engine every day.

Drain water and sediment from the fuel tank.

1. Open the access door on the right side of the machine.
2. Place a container at the outlet of the drain hose [1] to hold discharged fuel.
3. Open the drain valve [2] to make all sediments and water accumulated at the bottom flow out with the fuel.
4. Close the drain valve [2] when there is a clean fuel flow.
5. Close the access door.

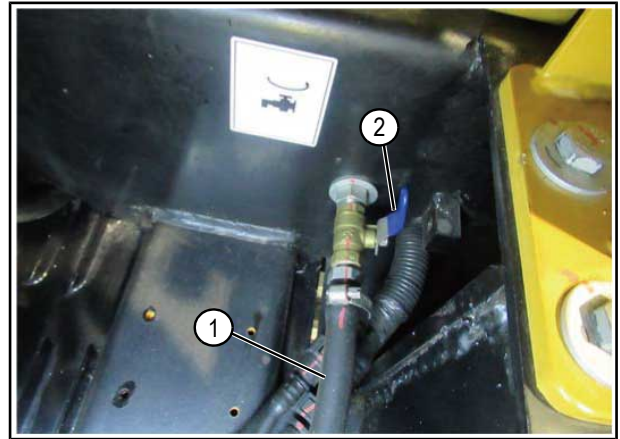


Fig.4-114

Check and drain out water and sediment in water separator

1. Open the access door on the right side of the machine.
2. Observe it through the transparent shell (1) to judge the water level and the amount of sediment. If there is water or sediment accumulation at the bottom, place a container under the drain hose (4) to hold discharged water.
3. Turn the fuel shutoff valve (2) 1/4 turn clockwise to the ON position.
4. Release the drain valve (3) for drainage.
5. Tighten the drain valve (3) immediately when the fuel begins to flow from the drain hose (4).

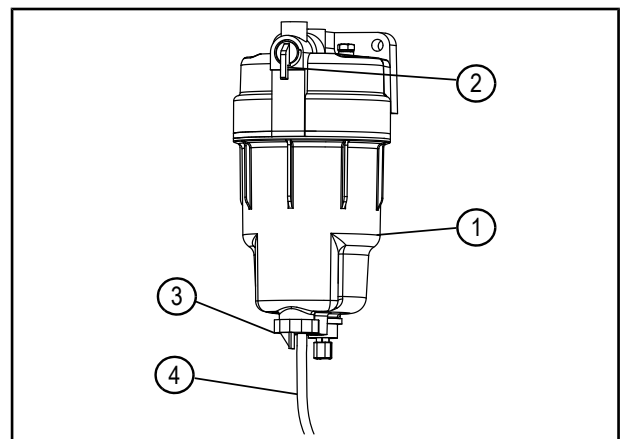


Fig.4-115

NOTE :

- If transparent shell (1) is too dirty or when it is difficult to see inside, clean the transparent shell during replacement of the filter element.
- If drain valve (3) is removed during cleaning, apply grease to the O-ring (5) and tighten it until it contacts the bottom.

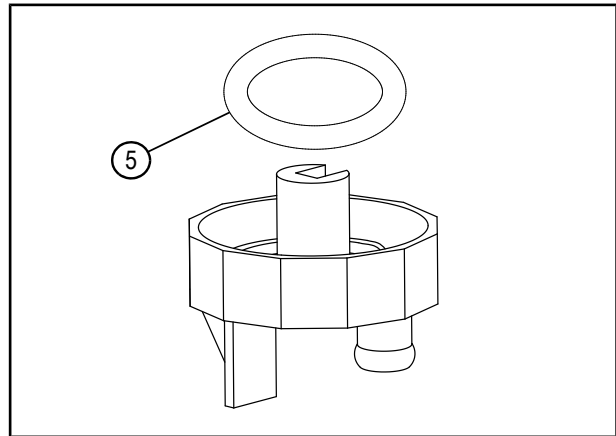


Fig.4-116

Check oil level of the hydraulic tank

⚠ WARNING

- When the engine is stopped, the parts and oil are still very hot, which may cause scalding. Start operation after they are cooled down.
- When the filler cap is removed, slowly rotate it to release the internal pressure and then remove it.

1. Adjust the work equipment to the position as shown in the right Figure, and then stop the engine.

2. Move the work equipment travel lever and travel lever in all directions during the whole trip within 15 s after the engine is stopped to release the internal pressure.

3. Check the oil level gauge (1) in the cab through the right window glass or standing on the upper step (2) in the engine compartment. Before operation, it is located between H and L

(Oil temperature: 10 ~ 30°C (50 ~ 86°F))

Normal operation: It is near H

(Oil temperature: 50 ~ 80°C (122 ~ 176°F))

4. If the oil level is lower than the L line, remove the four fasteners and washers (3) and remove the breather (4) from the machine.

5. Add hydraulic oil as needed. Install the breather, securing it to the hydraulic tank with four fasteners.

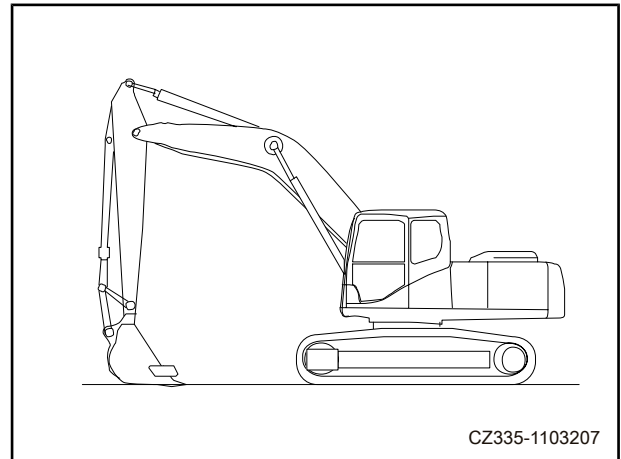


Fig.4-117

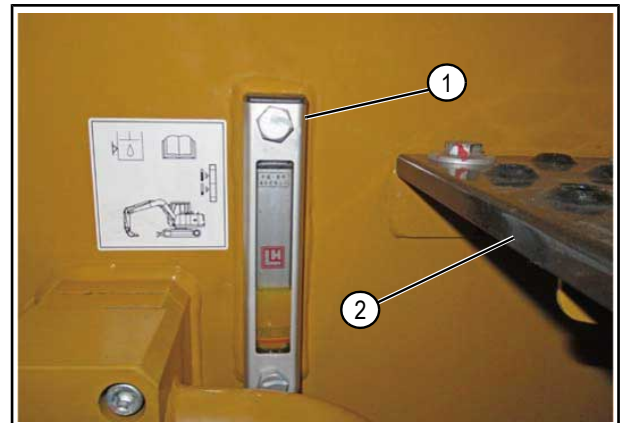


Fig.4-118

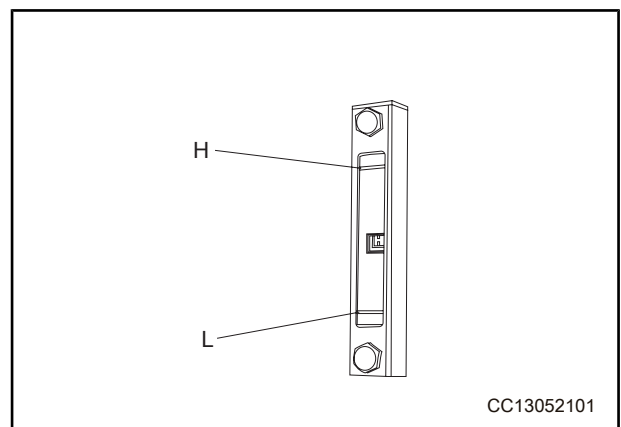


Fig.4-119

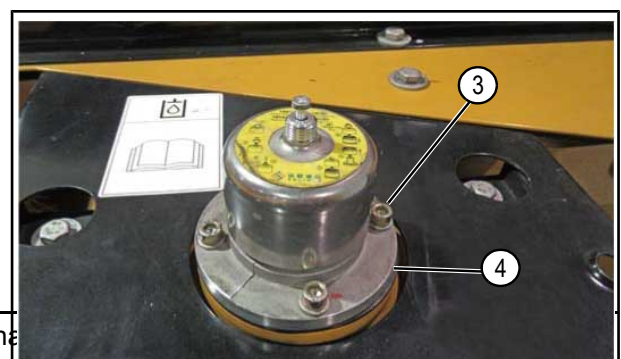


Fig.4-120

NOTE :

Stop oil filling when it reaches the H line. This will damage the hydraulic device and cause oil spraying. If oil level is higher than the H line, stop the engine. After oil is cooled down, place an oil container below the drain plug [P] at the bottom of the hydraulic tank, and then drain the excessive oil from the drain plug.

Check the coolant level**⚠ WARNING**

- After the engine is stopped, the coolant will be very hot and the radiator will have a high pressure status. If the radiator cap (1) is removed and the coolant level is checked at this time, there will be a scalding hazard. Therefore, remove the cap (1) after it is cooled down. After that, slowly rotate the cap to release the internal pressure.

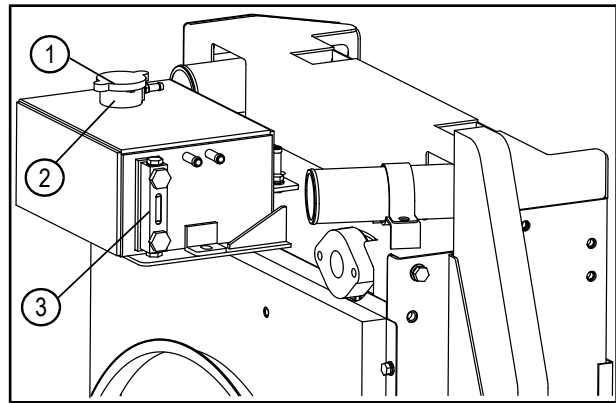


Fig.4-121

1. When the engine is cold, the coolant level must be above the internal partition of the expansion tank. If the coolant level is lower than the internal partition of the expansion tank, add new engine coolant into the engine coolant expansion tank filler neck (2) until the engine coolant level is between the low and high marks on the sight glass (3).

2. Tighten the pressure cap after adding the coolant.

3. If the expansion tank is empty, coolant leakage may occur. After inspection, repair it immediately. If there is no fault, add the antifreeze until the level is above the internal partition of the expansion tank.

Check oil level of engine oil pan

⚠ WARNING

- When the engine is stopped, the parts and oil are still very hot, which may cause scalding. Relevant operation can be carried out after they are cooled down.

1. Open the engine hood.
2. Remove the oil dipstick (1) and wipe off oil on it with a piece of cloth.
3. Insert the oil dipstick (1) completely and then remove it.

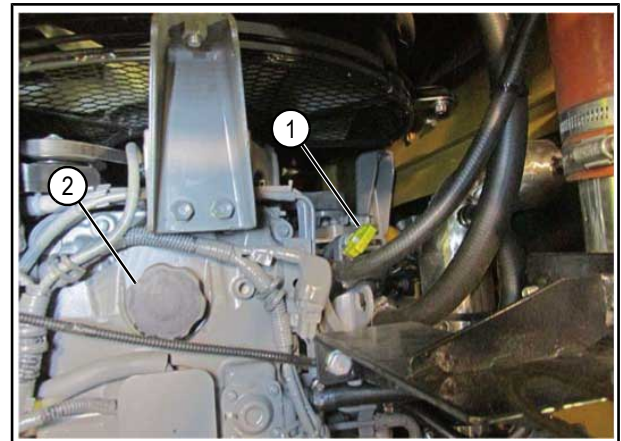


Fig.4-122

4. The oil level shall be located between the H and L marks on the oil dipstick (1). If the oil level is lower than the L mark, fill oil through the engine oil filler (2).

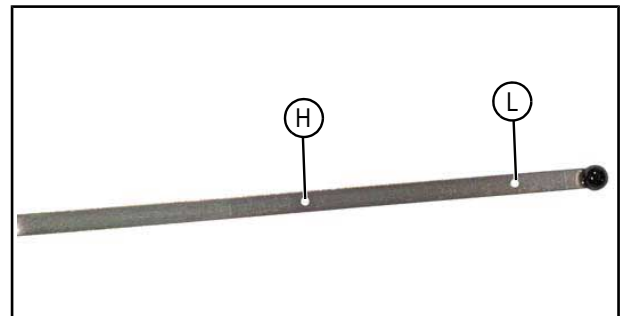


Fig.4-123

5. If the oil level is above the H mark, place an appropriately sized container under the engine oil drain valve (3) and remove the drain valve cap (4). Attach a drain hose (5) to the drain valve. Open the drain valve by turning the valve counterclockwise until oil begins to flow through the drain tube, drain the excessive oil, and then check the oil level.

6. If the oil level is proper, tighten the engine oil filler cap firmly and close the engine hood.

NOTE :

- Before checking oil level after engine operation, wait at least 15 minutes after the engine stop.
- Keep the machine level before the inspection.

Check wires

⚠ CAUTION

- If the fuse has been burnt frequently or if there is a short circuit in the wire, please contact the authorized agent of SANY Heavy Machinery to find the cause and repair it.
- Keep the upper surface of the battery clean, and check the air vent on the battery cap. If the battery cap is blocked by dirt or dust, flush it to clean the air vent.

Check whether the fuse is damaged, whether the specified capacity fuse is used, whether the wire has trace of open circuit or short circuit, or whether the cable cladding is damaged.

Check whether the terminal is loose. If loose, tighten them.

In addition, pay special attention to wires when checking batteries, motors, starting motors and alternators. Be sure to check whether

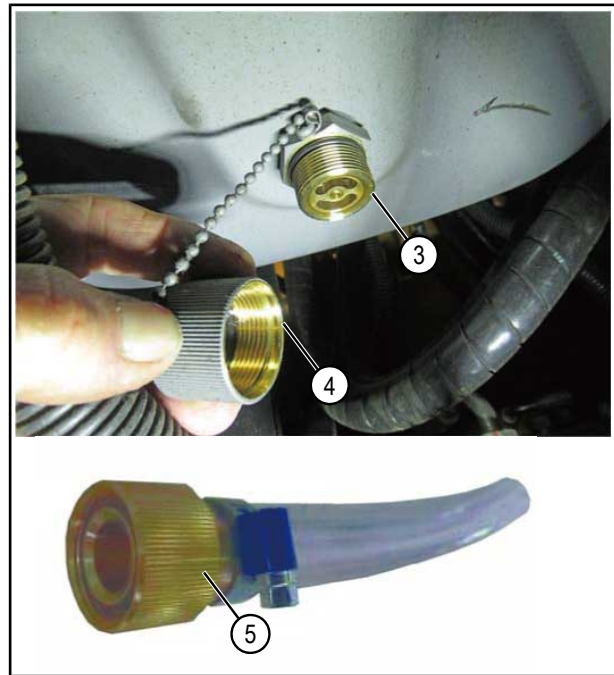


Fig.4-124

there is a flammable accumulation around the battery. If flammable material is discovered, remove it immediately.

Check the fuel level

⚠ WARNING

- When filling fuel, do not spill or overflow the fuel. This will cause a fire.
- Fuel is flammable. Do not make open fire close to fuel.
- If the fuel is spilled, clean it thoroughly. If the fuel flows to the ground or sand, remove it.

1. Turn the ignition switch to the [ON] position, and check the fuel level display (1) on the monitor system home screen. After inspection, turn the switch back to [OFF] position.

2. If the fuel level is low, remove the fuel tank cap (2) on the fuel tank.

- Add fuel as needed until the tank is full. The fuel float gauge (3) will rise when the tank is nearly full, and then tighten the filler cap (2).
- When the fuel amount is less than 10%, the display will send an alarm.



Fig.4-125

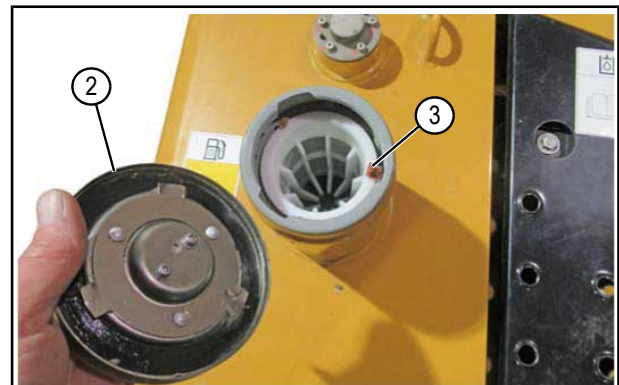


Fig.4-126

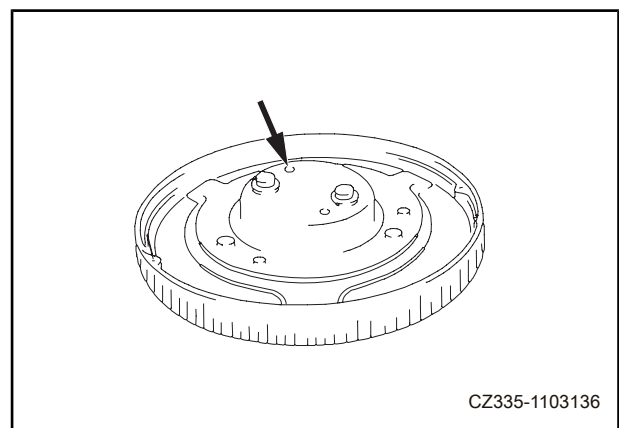


Fig.4-127

CZ335-1103136

NOTE :

- If the air vent on the cap is blocked, the pressure in the tank will drop and the fuel will not flow. Clean the air vent frequently.
- When the lock cap is tightened, the stroke is larger. Ensure that the lock cap is rotated properly, and then turn the key to lock the lock cap. If the key is removed when rotation is not completed, the latch bolt will touch on the inner wall of the filler to damage the lock cylinder.
- It is necessary to ensure the cleanness of the sealing ring in the lock cap. If the sealing ring is stained with impurities including iron chips and stones, it will be easily damaged during tightening, causing improper sealing of the lock cap.

Check the Diesel Exhaust Fluid (DEF) Level

Turn the key switch to the ON position and check the DEF level display (1) on the system monitor.

If the DEF level is low, please add it as follow:

1. Prepare the machine for checks and inspections.
2. Open the appropriate access covers or compartment doors.
3. Turn the battery disconnect switch to OFF.
4. Remove the DEF tank cap (2) and add DEF until full.
5. Install the DEF tank cap and close the compartment door.



Fig.4-128

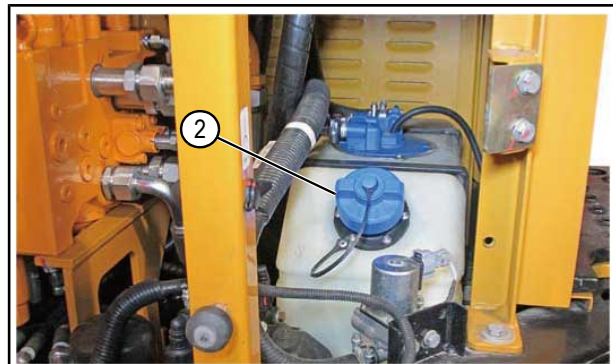


Fig.4-129

Check the working lamp switch

Check whether the working lamp can be normally turned on.

Check for dirt or damage.

If the lamp can't be turned on, the bulb may be burnt out or broken, please contact the authorized agent of SANY Heavy Machinery for repair.

1. Turn the ignition switch to the [ON] position.
2. Turn on the working lamp switch to check whether the working lamp is turned on.

Check the horn

1. Turn the ignition switch to the [ON] position.
2. Check whether the horn makes a sound immediately after the horn switch is pressed on, and confirm whether the sound is normal. If the horn doesn't make a sound or its sound is abnormal, please contact the authorized agent of SANY Heavy Machinery for repair.



Fig.4-130



Fig.4-131

4.3.1.3 Adjustment before operation

Driver's seat

Before starting operation or after changing the driver, adjust the seat position to ensure that the driver can operate the travel lever, pedal and switch freely and easily when sitting in the seat.

[A] Depth adjustment of seat

Pull up the pull rod [1] to move the seat to the required position, and then release it.

Adjustment distance: 200 mm (10 mm per grade)

[B] Overall dept adjustment of seat

Pull up the pull rod [2] to adjust it to the required position, and then release it. In this case, the driver's seat, left and right armrest boxes and the pilot lock rod will slide together.

[C] Adjustment of suspension (if equipped)

Turn the shifter lever [3] to the left, and the suspension will become harder to suit the heavier driver. Turn the shifter lever [3] to the right, and the suspension will become softer to suit the lighter driver.

NOTE :

In order to achieve the best adjustment, adjust the reading (kg) of dial [4] to the position corresponding to the driver's weight.

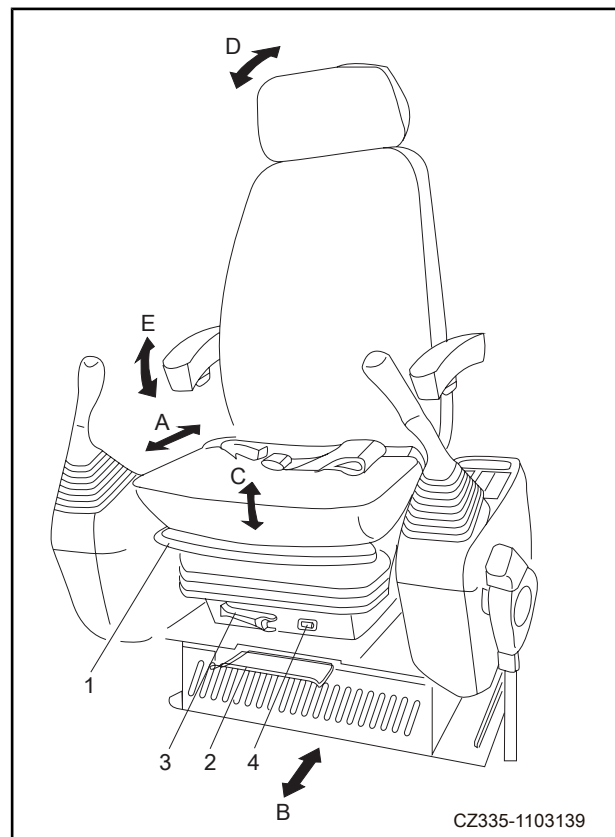


Fig.4-132

[D] Adjustment of rear seatback

Pull up the handle [5], place the seatback back to the best position for easy operation, and then release the handle.

NOTE :

When adjusting the inclination of the seatback, be careful not to interfere with the rear HVAC panel, and be careful not to make the handrail contact with the operation lever.

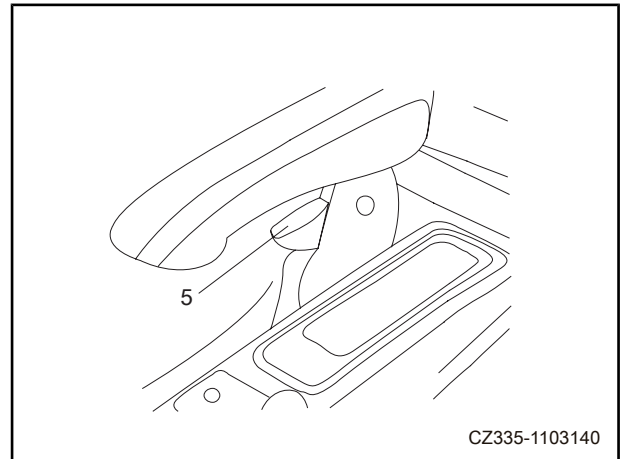


Fig.4-133

[E] Adjustment of handrail angle

Rotate the adjustment dial [7] at the bottom of the armrest [6] to adjust the angle of the armrest to the required position.

Lift the armrest to the vertical position to ensure that the driver can leave the seat.

Armrest adjustment angle range: 40°

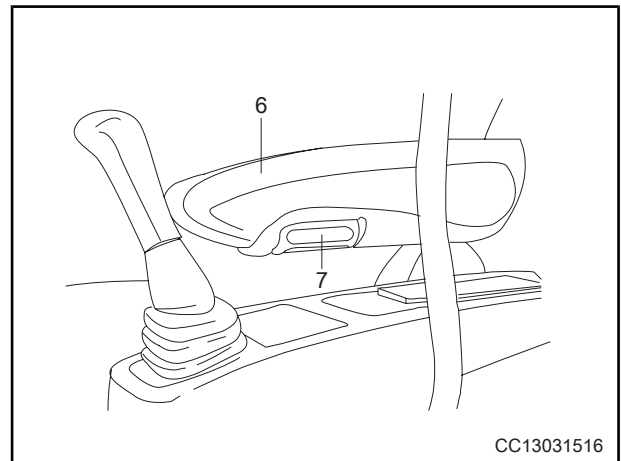


Fig.4-134

Rearview mirror

⚠ WARNING

- Be sure to adjust the rearview mirror before start. If no correct adjustment is made, the sight line can't be guaranteed, and personal injury may be caused.

The installation position of the rearview mirror is as shown in the Figure.

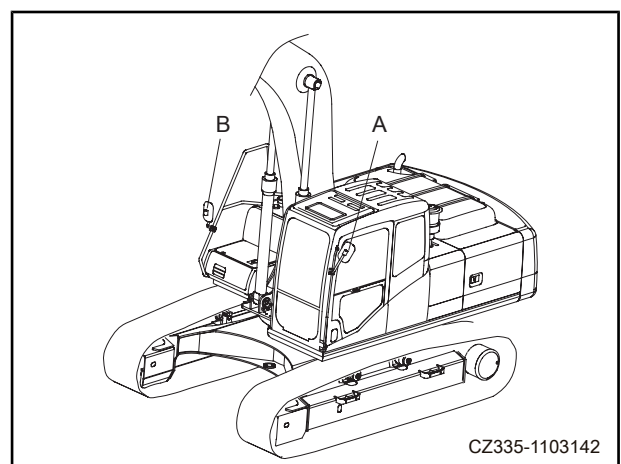


Fig.4-135

Rearview mirror [A]

Adjust installation of the rearview mirror [A] to ensure the personnel at the left rear side of the machine can be seen.

- Install the rearview mirror [A] in the position as shown in the right Figure.
- Rotate the fixing rod [1] around the lever [4] to a proper position, and fix the fixing rod [1].
- If the mirror can't move smoothly when adjusting the angle, release the fixing bolt [2] and the fastening lever bolt [3] of mirror.
Tightening torque of bolt [2]x: 4.0~5.4N·m (0.41~0.55kgf·m)
- When adjusting the angle of the rearview mirror, the sight line entering the mirror on the side of the machine shall prevail, as shown in the right Figure.

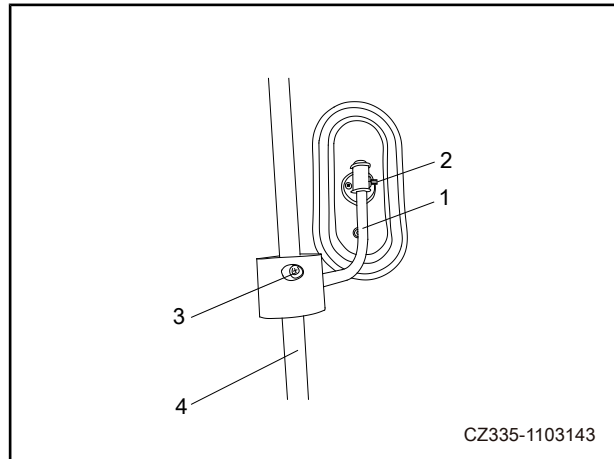


Fig.4-136

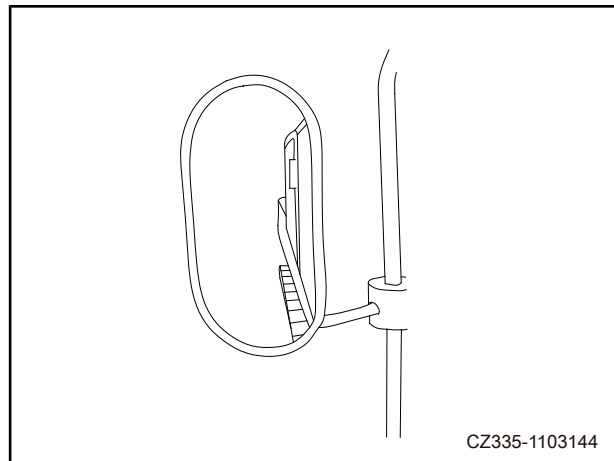


Fig.4-137

Rearview mirror [B]

Adjust installation of the rearview mirror [B] to ensure the personnel at the right rear side of the machine can be seen.

- Install the rearview mirror [B] in the position as shown in the right Figure.
M : 120mm
- If the mirror can't move smoothly when adjusting the angle, release the fixing bolt [5] and the fastening lever bolt [6] of mirror.
Tightening torque of bolt [5]x: 4.0~5.4N·m (0.41~0.55kgf·m)

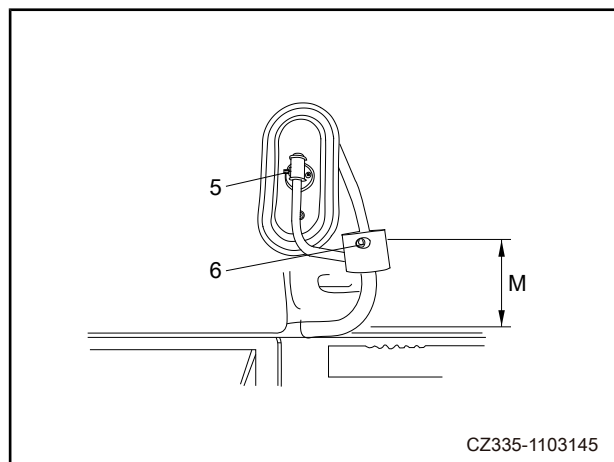


Fig.4-138

- When adjusting the angle of the rearview mirror, the sight line entering the mirror on the side of the machine shall prevail, as shown in the right Figure.

Seat belt

WARNING

- Before using the seat belt, check whether the seat belt and its mounting seat are defective, and replace them if worn or damaged.
- Even if the seat belt looks normal, it shall be replaced every 3 years. The production date of the seat belt is marked on its back.
- Wear seat belt during operation.
- The seat belt can't be twisted when it is fastened.

NOTE :

The seat belt is supplied with a winding device, so it is unnecessary to adjust the length.

1. Fasten the seat belt.

Hold the seat belt clamp [2] and pull the seat belt out from the winding device [1]. Ensure that the seat belt is not twisted, and then insert the latch bolt [3] into the latch [4].

Pull the seat belt gently to ensure that it is fastened.

2. Release the seat belt

Press down the red part on the latch [4], and the latch bolt [3] will automatically pop up from the lock [4].

The seat belt will be automatically involved in the winding device [1]. Hold the seat belt clamp [2] to slowly wind the seat belt into the winding device [1].

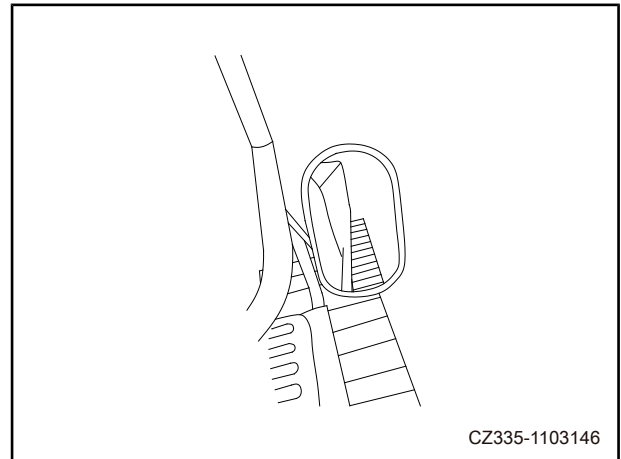


Fig.4-139

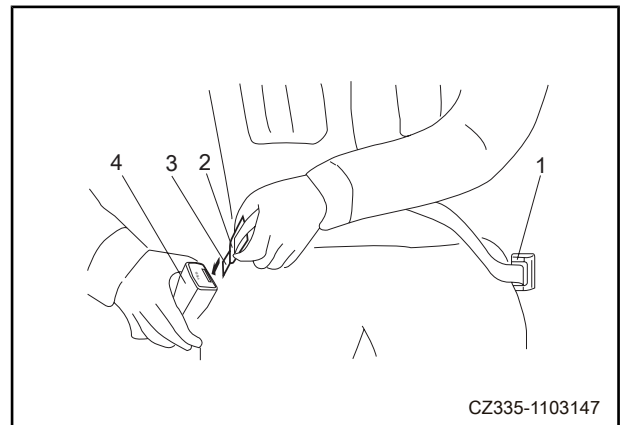


Fig.4-140

4.3.1.4 Operation before engine start

WARNING

- Before engine start, check whether the safety lock control lever is firmly located at the locking position.
- If the safety lock control lever is not firmly locked and it knocks with the travel lever or pedal during engine start, the machine will move accidentally and cause serious accidents.
- When standing from the driver's seat, be sure to set the safety lock control lever to the locking position regardless of whether the engine is running.

1. Check whether the safety lock control lever is located at the "LOCK" position.

2. Check whether the travel lever and pedal are in the "Neutral" position. If there is no contact with the travel lever or pedal, they shall be located in the "Neutral" position.

3. Turn the key to the [ON] position.

4. Monitor the status of the machine through the main page of the display. For details of the display, see the "Display Screen" section.

- If there is any fault, the alarm lamp will be on.
- In this case, if the fault code is displayed, the corresponding item of the fault code shall be checked immediately.
- If there is no fault code, the fault cause may be: too high engine coolant temperature; too high or low engine oil pressure.

Fig.4-141

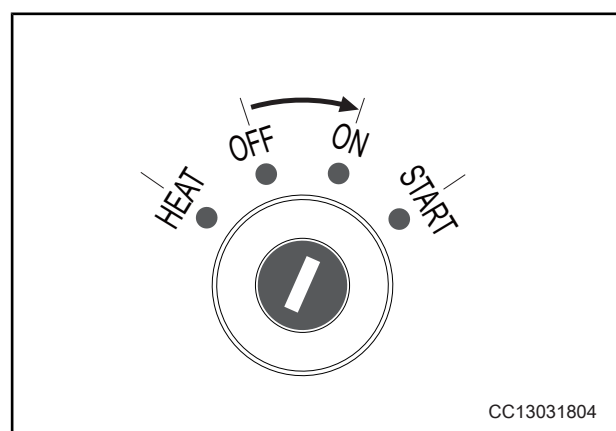
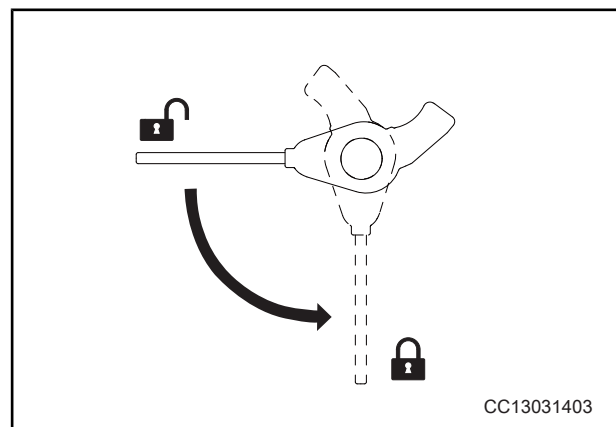


Fig.4-142

4.3.2 Engine start

⚠ WARNING

- Start the engine only when sitting in the driver's seat.
 - Do not start the engine by short circuiting the engine. This can cause serious personal injury or fire.
 - Ensure that there are no personnel or obstacles in the surrounding area, and then make the horn sound and start the engine.
 - Do not use start-assisted liquid, because it will cause explosions.
 - The exhaust gas is poisonous. When starting the engine in enclosed space, special attention shall be paid to ensure good ventilation.
- Before starting the engine, check whether the fuel control knob is located at a low idle speed [MIN] position. If the fuel control knob is located at the full speed [MAX] position, the engine start will suddenly accelerate and damage the engine parts.
 - The ignition switch key can't be kept at the [START] position for more than 10 s consecutively.
 - If the engine is not started, wait for at least 1 minute before restart.
 - After the engine is started, it can be operated after the engine oil pressure value is within the normal range. When the engine oil pressure is abnormal, do not operate the travel lever or pedal, and stop the machine immediately for inspection.

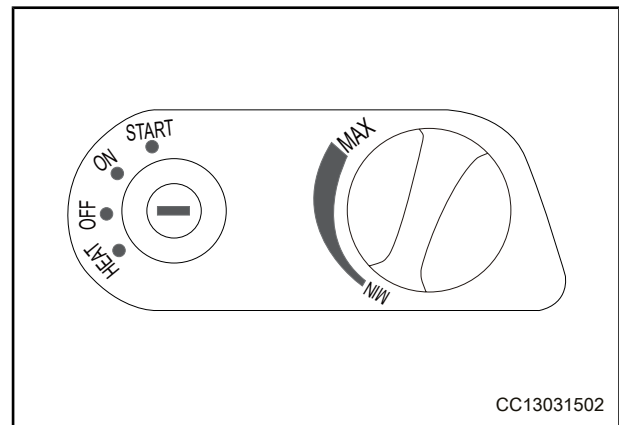


Fig.4-143

1. Check whether the safety lock control lever is located at the “LOCK” position. If the safety lock control lever is in the “Unlocking” position, the engine can’t be started.

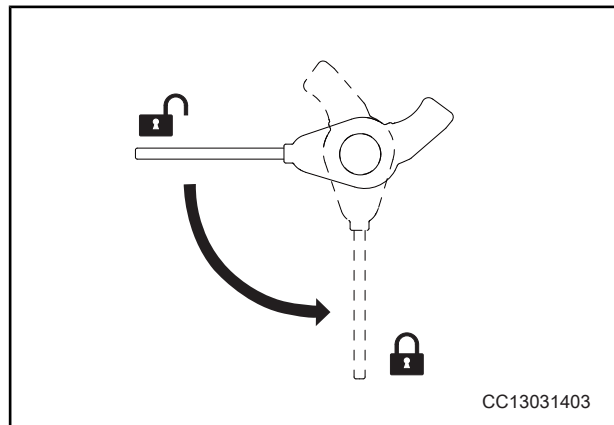


Fig.4-144

2. Set the fuel control knob to a low idle speed [MIN] position.

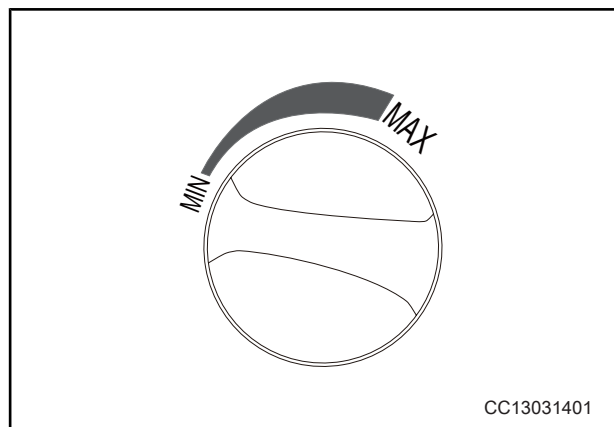


Fig.4-145

3. Turn the ignition switch key to the [ON] position.

NOTE :

When the ambient temperature is lower than 10°C or when required, the engine shall be preheated before start.

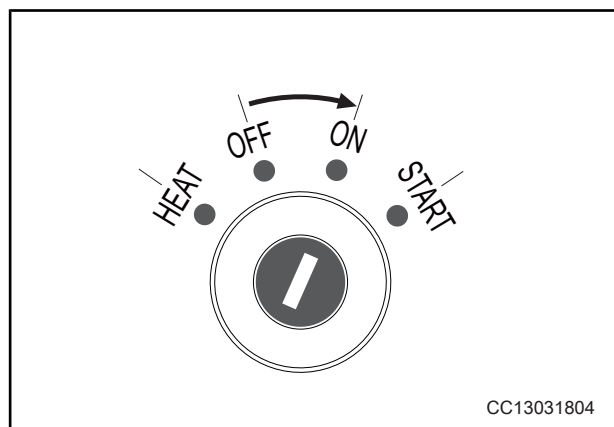


Fig.4-146

4. Turn the ignition switch to the [START] position to start the engine.

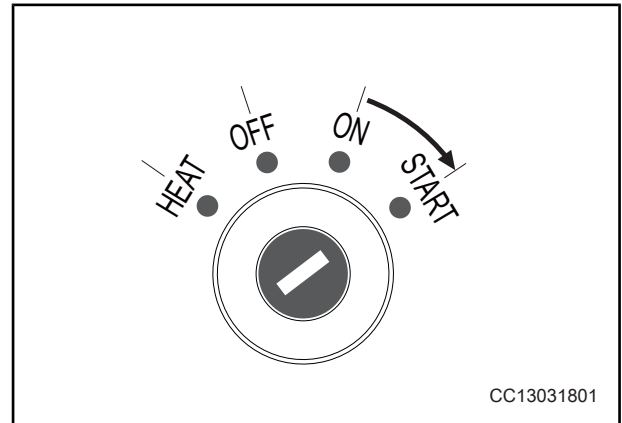


Fig.4-147

5. After the engine starts, release the ignition switch key, and the key will automatically return to the [ON] position.

NOTE :

If the ambient temperature is low, the engine can't be started after the ignition switch key remains in the [ON] position for 10 s. If this condition occurs, wait for at least 1 minute before restart.

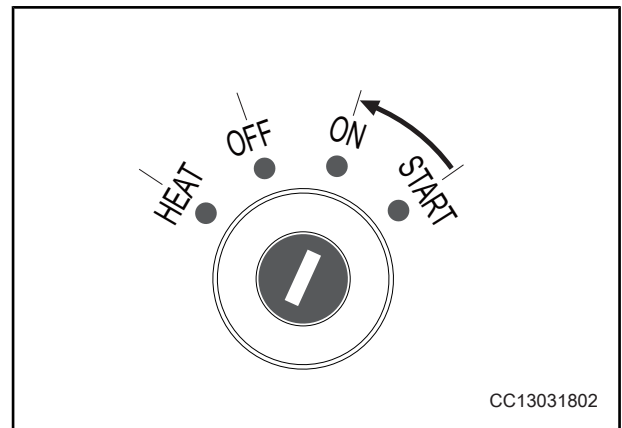


Fig.4-148

6. Even the engine is started, wait for the engine oil pressure alarm release. When the engine oil pressure is abnormal, do not touch the travel lever or pedal.

NOTE :

If the engine oil pressure is still abnormal after 4~5 s, the engine shall be stopped immediately to check the oil level and oil leakage, and take necessary measures.

4.3.3 Engine preheating

- Turn the accelerator rotary switch to [MIN] position, and turn the ignition switch to [ON] position. At this time, the engine will be warmed up automatically. After warm-up, the engine can be started.

- After warm-up, turn the ignition switch to [START] position to start the engine.
- If the engine is not started, wait for at least 1 minute before next warm-up and start attempt.

4.3.4 Warm-up operation

WARNING

- Turn the ignition switch to the OFF position to stop the engine when there is an emergency or the engine works abnormally or it has other faults.
- When the hydraulic oil temperature is low, do not operate the travel lever or pedal suddenly. Be sure to carry out warm-up operation until the hydraulic oil temperature reaches the proper temperature.
- If no complete warm-up operation is carried out, the machine will have no reaction or sudden and quick action during operation, resulting in serious accidents. The complete warm-up shall be carried out especially in the cold region.
- Before warm-up operation is completed, do not make the engine suddenly accelerate. Do not run the engine at low speed or high speed for more than 20 minutes. This will cause oil leakage of oil supply pipe of the turbocharger, which may lead to a fire hazard. If the engine shall be operated at idle speed, the load shall be always applied to run the engine at medium speed.

After starting the engine, do not start the operation immediately, first carry out the following operations and inspection:

1. Adjust the accelerator rotary switch to run the engine at a low idle speed (about 850 rpm) for about 5 minutes.
2. Adjust the throttle knob to make the engine run at medium speed (about 1100 rpm), and then slowly operate the bucket back and forth for 5 minutes.
3. Adjust the throttle knob to make the engine run at high speed, and then operate the boom, arm and bucket for 5~10 minutes.
4. Complete the operation of the actions of the excavator for several times, and its warm-up will be completed.
5. Check whether displays of the instrument are normal after the warm-up operation. If coolant temperature (see the display) and hydraulic oil temperature (50~80°C) fail to reach the normal value, continue to carryout warm-up operation.
6. Check whether the color, noise, or vibration of the exhaust is abnormal. If abnormal, repair it.

4.3.5 Stop the engine

⚠ CAUTION

- If the engine is not stopped under the idle status, its service life will be shortened. In case of emergency, do not emergently stop the engine at high speed. Otherwise, the cylinder head will have fatigue crack and the supercharger bearing will be burnt.

1. Operate the engine at a low idle speed for about 5 minutes to gradually cool it down.
2. Turn the ignition switch to the [OFF] position, stop the engine, and remove the key from the ignition switch.

NOTE :

If the engine is too hot, do not suddenly stop it, but run it at low idle speed to cool it down and then stop it.

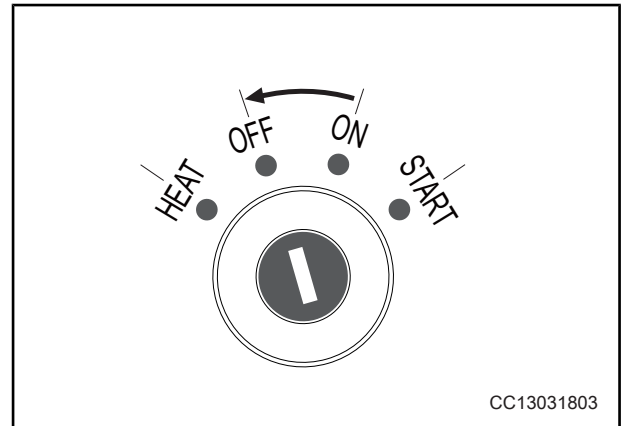


Fig.4-149

4.3.6 Machine operation

4.3.6.1 General

⚠ WARNING

- Before moving the machine, check whether the area around the machine is safety and sound the horn.
- No one is allowed to enter the area around the machine.
- Remove any obstacles on the traveling path.
- There is a blind spot at the back of the machine, so pay special attention to it during reverse traveling.

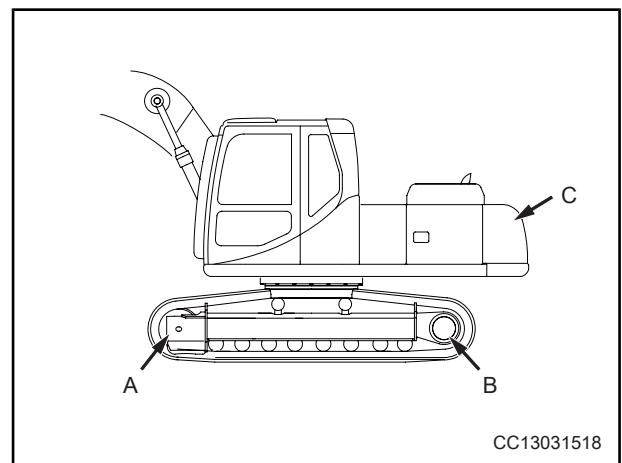


Fig.4-150

Before operating the travel lever or traveling pedal, it is necessary to confirm that the guide wheel [A] is in front of the machine and the

sprocket [B] is at the end of the machine [C]. If the sprocket is located in front of the machine, the driving direction of the machine will be opposite to the operation direction of the travel lever or the traveling pedal. (The front and rear traveling directions are opposite, and the left and right steering directions are also opposite)

4.3.6.2 Preparation of moving machine

1. Turn the fuel control knob to the MAX position to the required throttle position to increase the engine speed.

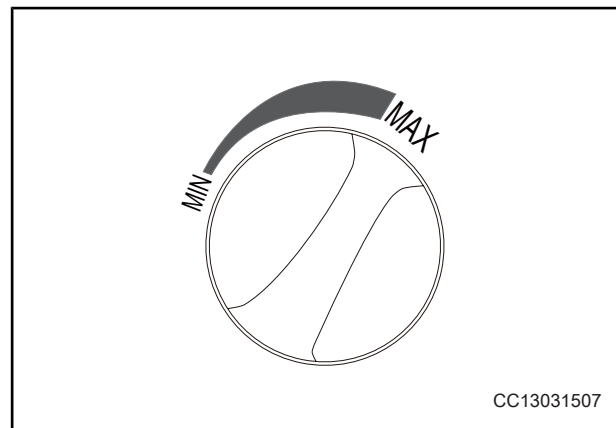


Fig.4-151

2. Turn the safety lock control lever to the “Unlocking” position, and retract the work equipment and lift it up to 40~50cm from the ground. As shown on the right Figure.

NOTE :

If the sight line on the right side is poor, lift the boom to ensure a better sight line.

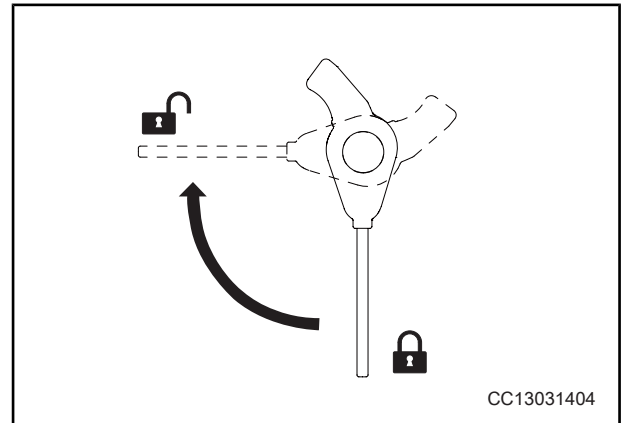


Fig.4-152

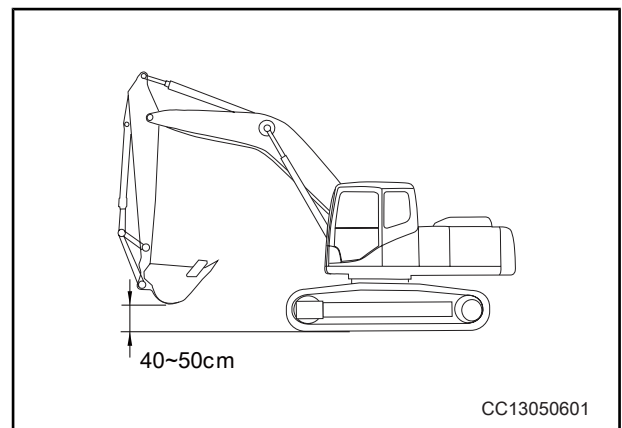


Fig.4-153

4.3.6.3 Move machine

Forward

- Push the left and right travel levers forwards or step down the front part of the left and right pedals at the same time to move the machine forwards.

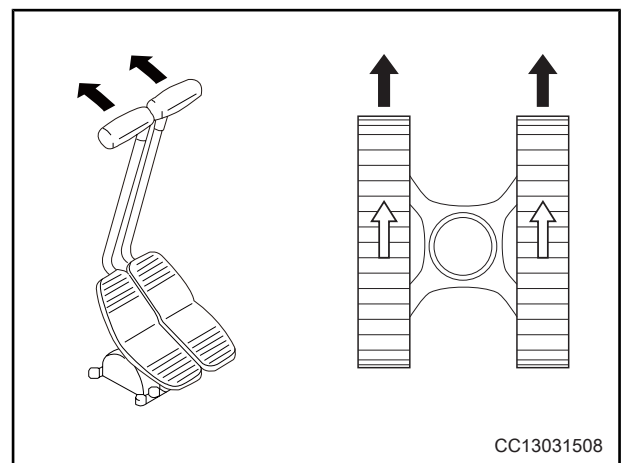


Fig.4-154

Reverse

- Pull the left and right travel levers backwards or step down the rear part of the left and right pedals at the same time to move the machine backwards.

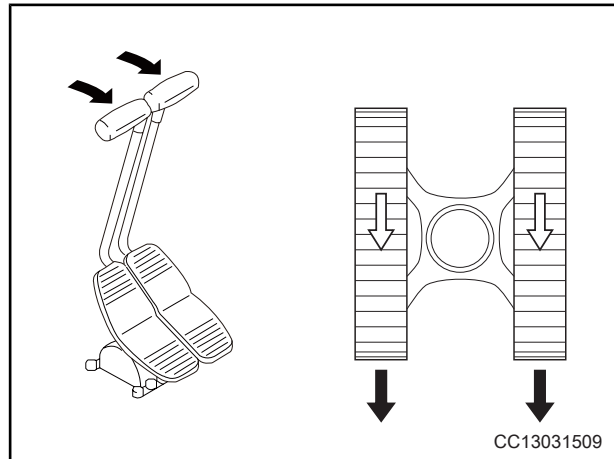


Fig.4-155

NOTE :

- If the sprocket is located in front of the machine, when operating the travel lever or the pedal, the driving direction of the machine will be opposite to the operation direction of the travel lever or the traveling pedal.
- Operate the travel pedal or pedal in the same direction and in the same range to ensure that the machine runs in a straight line.
- If the traveling speed of the machine is abnormal at low temperature, carry out complete warm-up operation. In addition, if the undercarriage traveling body is blocked by mud and the traveling speed of the machine is abnormal, remove the dirt.

4.3.6.4 Stop machine**⚠ CAUTION**

- Avoid stopping the machine suddenly.
- When stopping the machine, reserve enough space to leave the machine.

Release the left and right travel levers or pedals at the same time to stop the machine.

The travel lever or pedal will automatically return to the neutral [N] position after release.

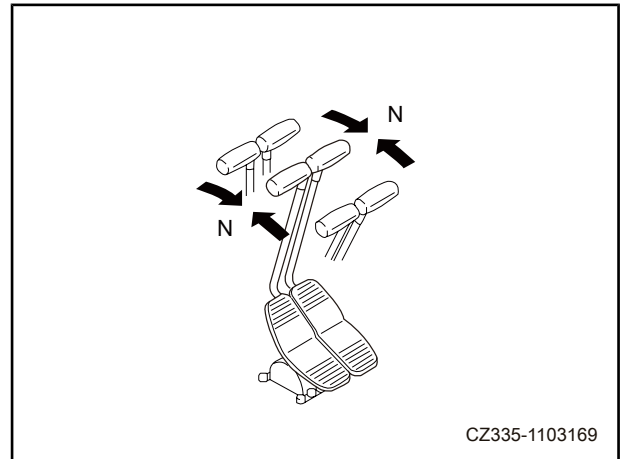


Fig.4-156

4.3.7 Machine steering

4.3.7.1 General

Check the sprocket position before operating the travel lever or traveling pedal. If the sprocket is located in front part, the operation direction of the travel lever or pedal will be opposite to the movement direction of the machine.

Try to avoid sudden change of direction. In particular, stop the machine before steering in case of reverse rotation (in-situ steering).

4.3.7.2 Turn the machine when it stops

Left turn

Push the right travel lever forwards, and the right track will travel forwards, and the machine will turn to left;

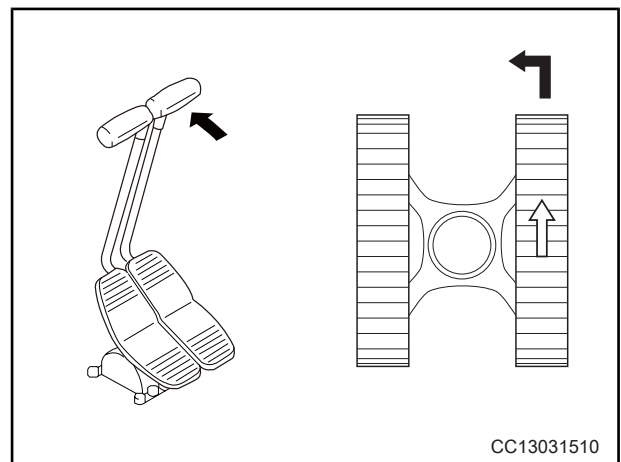


Fig.4-157

Pull the left travel lever backwards, and the left track will travel backwards, and the machine will turn to left.

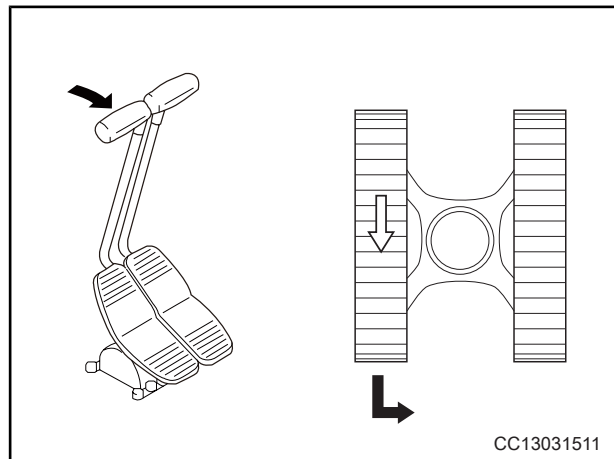


Fig.4-158

Right turn

Push the left travel lever forwards, and the left track will travel forwards, and the machine will turn to right;

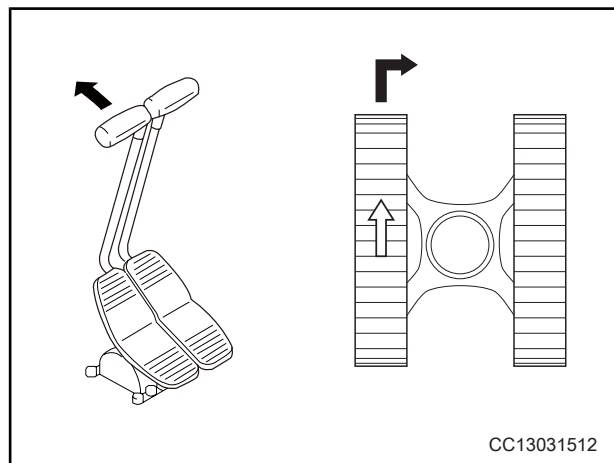


Fig.4-159

Pull the right travel lever backwards, and the right track will travel backwards, and the machine will turn to right.

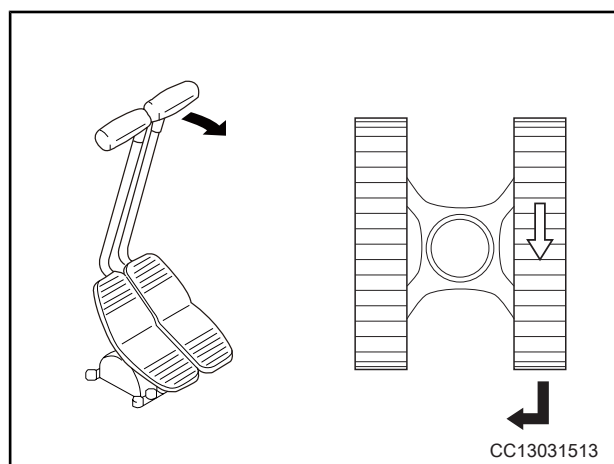


Fig.4-160

4.3.7.3 In-situ steering

In-situ left turn

- Push the right travel lever forwards, and pull back the left travel lever.

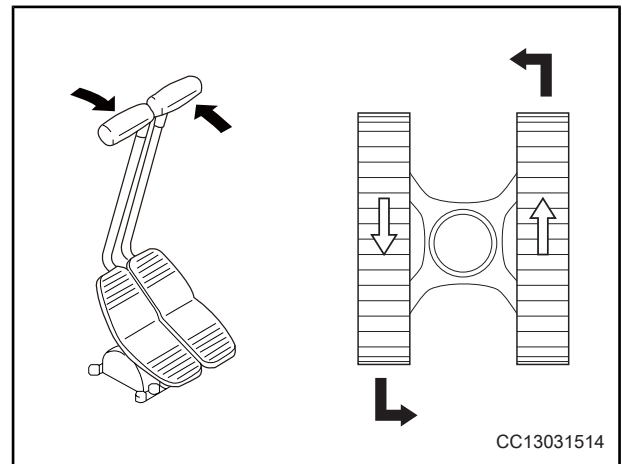


Fig.4-161

In-situ right turn

- Push the left travel lever forwards, and pull back the right travel lever.

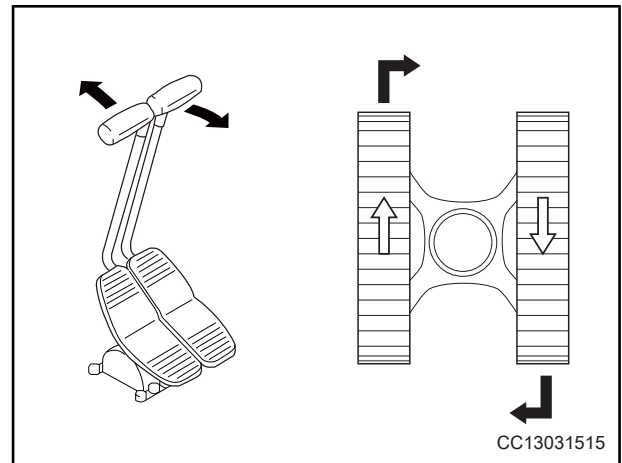


Fig.4-162

4.3.8 Control and operation of work equipment

Pattern Change (SAE/BHL) Valve Operation

CAUTION

- When the engine speed has been reduced by the automatic idle speed function, if the travel lever is operated, the engine speed will suddenly rise, therefore, the travel lever shall be operated carefully.

The pattern change (SAE/BHL) valve changes control of the boom and arm from one joystick to the other.

- In SAE mode, the arm is controlled using the left joystick, and the boom is controlled using the right joystick.
- In BHL (Backhoe Loader) mode, the arm is controlled using the right joystick, and the boom is controlled using the left joystick.

⚠ WARNING

Shut down the engine and relieve hydraulic system pressure before adjusting the pattern change (SAE/BHL) valve. Failure to follow this notice could result in damage to the environment, damage to the machine, or cause the machine to operate improperly.

The pattern change valve (1) is located inside the right front access door.

The pattern change valve changes the control patterns of the left and right joysticks.

To switch the pattern change valve from SAE to BHL, loosen the fastener (2) and rotate the valve handle (3) 90°. Install and tighten the fastener to lock the pattern change valve in the desired position.

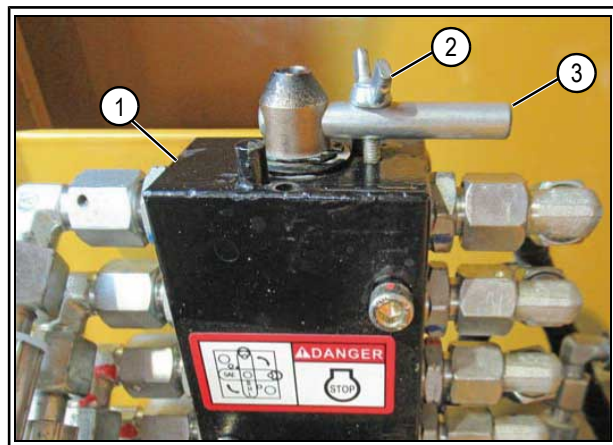


Fig.4-163 SAE Mode

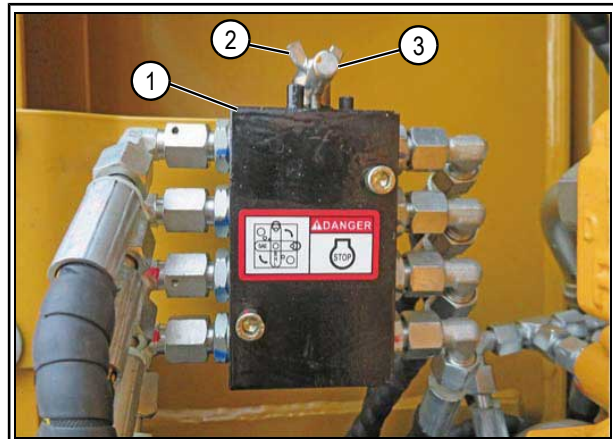


Fig.4-164 BHL Mode

Arm control – SAE Mode

To extend the arm push the left joystick.

To retract the arm pull the left joystick.

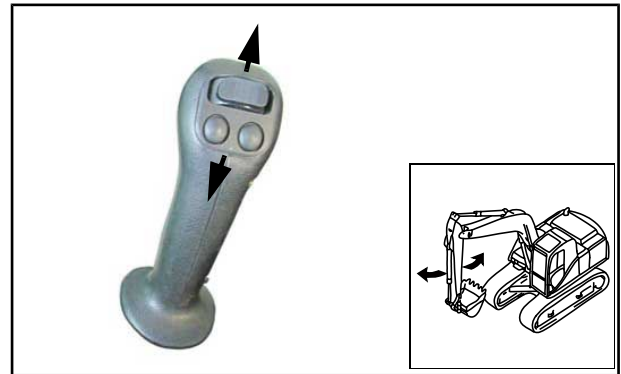


Fig.4-165

Arm control – BHL Mode

To extend the arm push the right joystick.

To retract the arm pull the right joystick.



Fig.4-166

Boom control – SAE Mode

To raise the boom pull the right joystick.

To lower the boom push the right joystick.



Fig.4-167

Boom control – BHL Mode

To raise the boom pull the left joystick.

To lower the boom push the left joystick.



Fig.4-168

Bucket control – SAE/BHL Mode

To uncurl the bucket move the right joystick to the right.

To curl the bucket move the right joystick to the left.

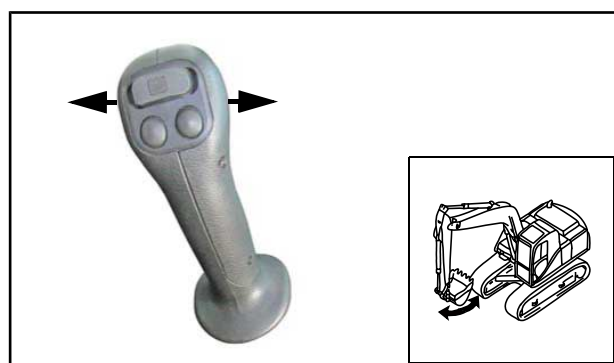


Fig.4-169

Swing control – SAE/BHL Mode

To swing the machine to the right move the left joystick to the right.

To swing the machine to the left move the left joystick to left.

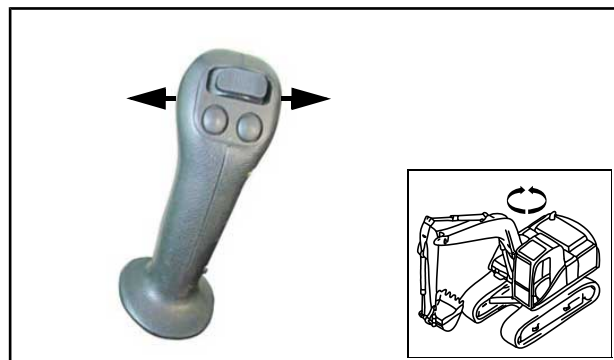


Fig.4-170

Dozer Blade Control Lever

To raise to the dozer blade pull the dozer blade control lever.

To lower the dozer blade push the dozer blade control lever.

When the work equipment travel lever returns back to the neutral position, even the fuel control knob is set to the full speed position within 5 s after the operation stops, the automatic



Fig.4-171

idle speed mechanism will act and reduce the engine speed to idle speed.

NOTE :

The control oil circuit of the machine is equipped with an accumulator. If the starting switch key is turned to the [ON] position and the safety lock control lever is turned to the "Unlocking" position within 15 s after engine stop, even though the engine is stopped, the travel lever can be operated to lower down the work equipment to the ground.

This step can also be used to release the residual pressure in oil circuit of the hydraulic cylinder or to remove boom after the machine loaded onto the trailer.

4.3.9 Prohibited operation**⚠ CAUTION**

- When the machine is traveling, if it is necessary to operate travel lever of the work equipment, stop the machine and then operate the travel lever.
- If any travel lever shall be operated at the automatic idle speed, the engine speed will suddenly rise.

The operation with slewing force is prohibited

Do not compress the ground or break objects with slewing force. This will be dangerous, and will dramatically shorten the service life of the machine.

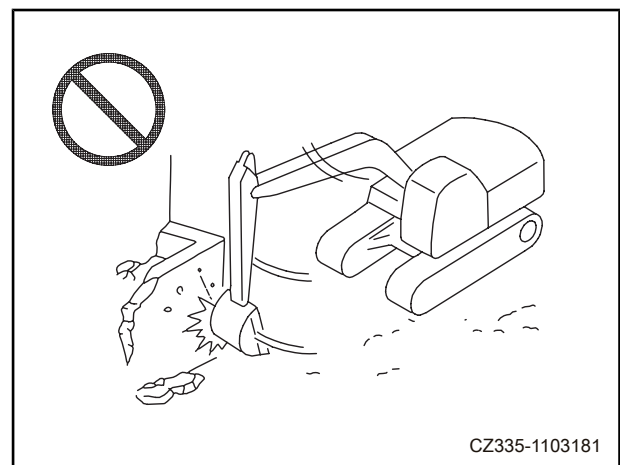


Fig.4-172

The operation with traveling force is prohibited

Do not insert the bucket into the ground and use the traveling force for digging. This will damage the machine or the work equipment.

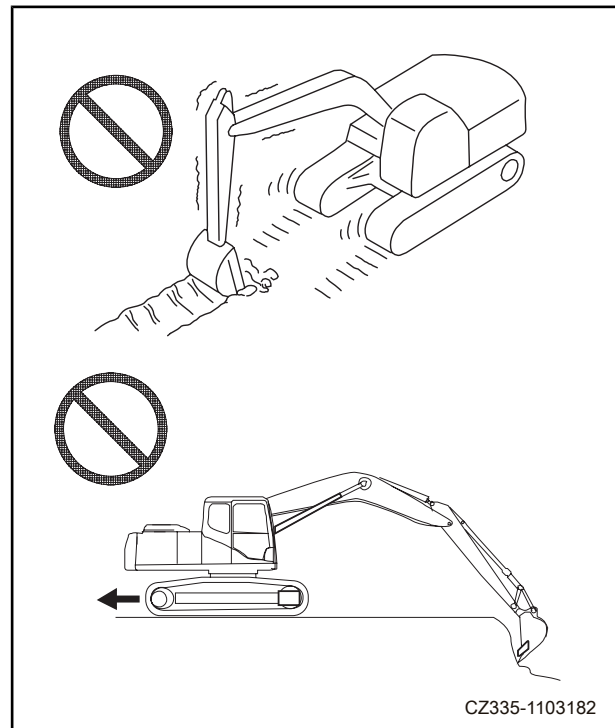


Fig.4-173

The operation when the hydraulic cylinder reaches the end of the stroke is prohibited

If the cylinder piston rod is operated to the end of its stroke, the use of the work equipment and the impact of some external force will damage the hydraulic cylinder and cause personal injury. Avoid operation when the hydraulic cylinder is fully retracted or fully extended.

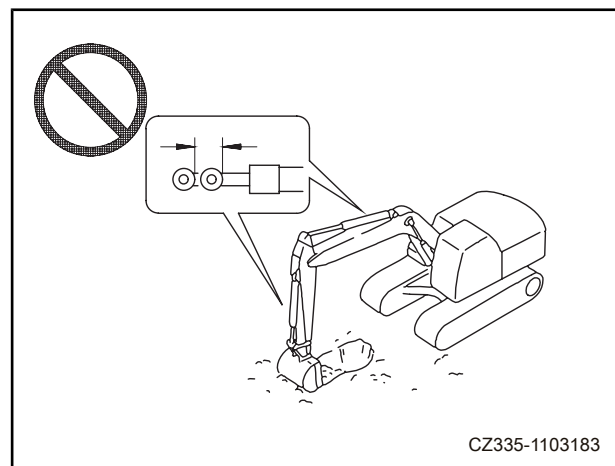


Fig.4-174

The operation with the bucket drop force is prohibited

1. Do not use the drop force of the bucket for digging, crushing or piling. This will dramatically shorten the service life of the machine.
2. To avoid damage to the hydraulic cylinder, do not hit the ground with a bucket or tamp it with a shovel when the bucket oil cylinder is fully extended (the bucket is fully retracted).

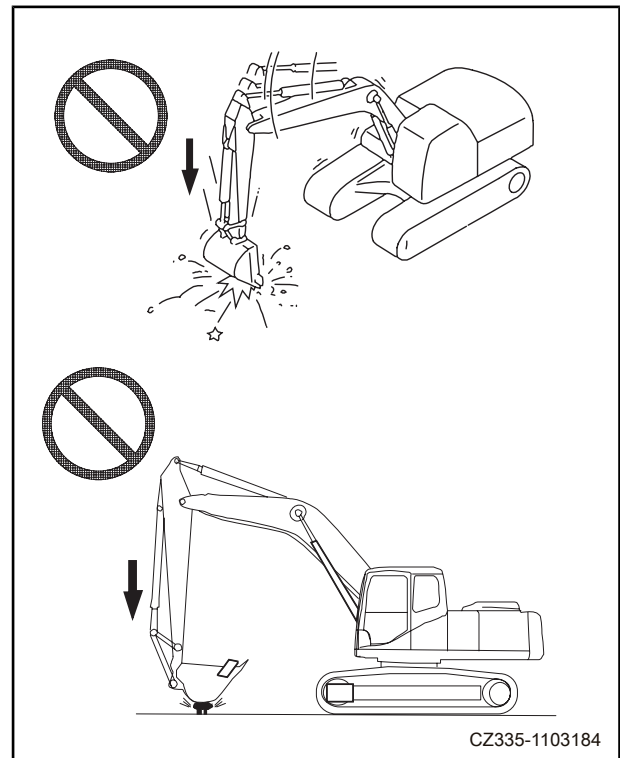


Fig.4-175

It is forbidden to dig hard rock ground

Do not try to dig the hard rock ground directly, and it is recommended to break it in other ways before digging. This will not only reduce the damage to the machine, but also be economical.

The operation with the deadweight of the machine is prohibited

Do not dig with the force arising from deadweight of the machine.

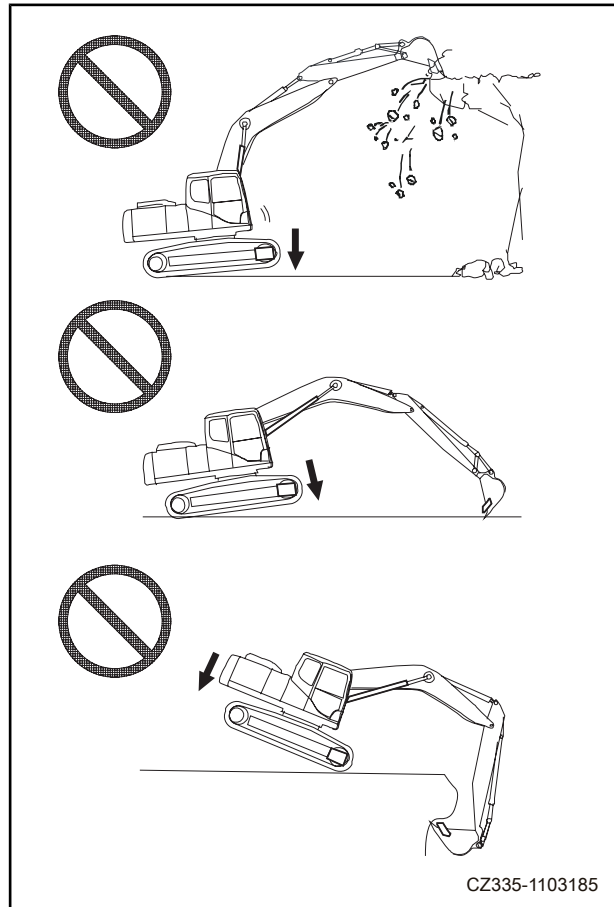


Fig.4-176

It is not allowed to suddenly switch the travel lever or pedal during traveling at high speed

1. Do not operate the travel lever or pedal suddenly to make the machine move quickly.
2. Do not suddenly switch the travel lever or pedal to the reverse [B] from forward [A] (or from reverse [B] to forward [A]).
3. Do not to suddenly release the travel lever or pedal during traveling at high speed to stop the machine.

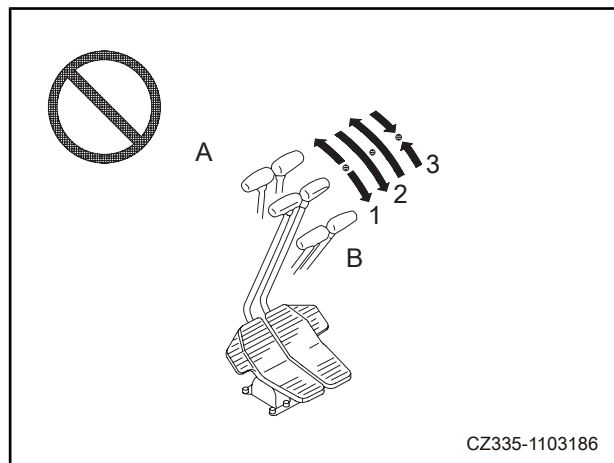


Fig.4-177

4.3.10 Allowed water depth

When the machine is driven out from the water, if the slope angle is larger than 15° , the rear part of the upper slewing platform will fall into the water, the engine fan will touch the water, and the fan will be damaged.

Be careful when driving the machine out from the water.

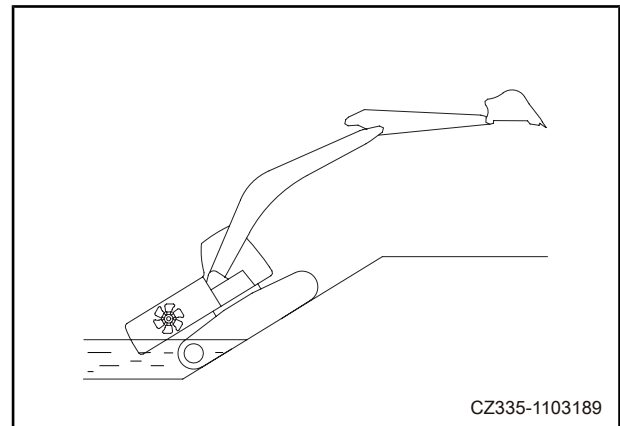


Fig.4-178

- Do not drive the machine into the water deeper than the center of the sprocket [1].
- Apply lubricating grease to the parts that have been immersed in water for a long time until the old lubricating grease is completely extruded from the bearing (especially around the bucket pin).
- The machine can be operated in water only when the work foundation of the machine has sufficient strength to avoid water depth higher than center of the sprocket in case of sinking of the machine.
- If the slewing support, the slewing gear and the center swivel joint are immersed in water, remove the drain plug to remove the muddy water, sweep the slewing area and install the plug. Lubricate the internal slewing mesh gear and slewing bearing.

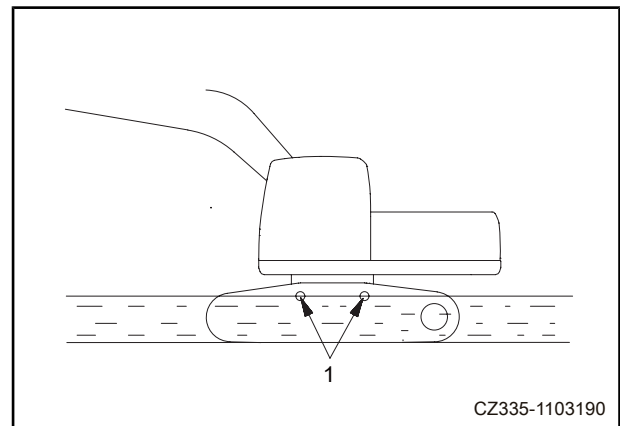


Fig.4-179

4.3.11 Operation on the slope

4.3.11.1 General

Be sure to operate or drive the machine in the following correct ways, the machine can be stopped safely even when the machine is slipping or becoming unstable.

⚠ WARNING

- When working on a slope, turning or operation of the work equipment will make the machine unbalanced and tilting, so this operation shall be avoided.
- It is very dangerous to slew the loaded bucket downhill. If this operation is required, a platform shall be built on the slope with soil to make the machine remain horizontal during operation.
- Do not drive the machine on a steep slope or downhill, it may turn over.
- Do not turn the machine on a slope or drive it across a slope. Be sure to carry out these operations on a flat ground. It may be a little bit further, but it will be safe.
- When driving the machine uphill, if the track shoe slips or only the force of the track is available, the machine can't be driven uphill. Do not use the pull of the arm to help drive the machine uphill.
- When the slope angle is larger than 30°, the engine lubrication will be insufficient.

1. When driving down the steep slope, use the travel lever and fuel control knob to keep the low traveling speed. When driving down the steep slope with an angle larger than 15°, adjust the work equipment to the position as shown in the right Figure and reduce the engine speed.

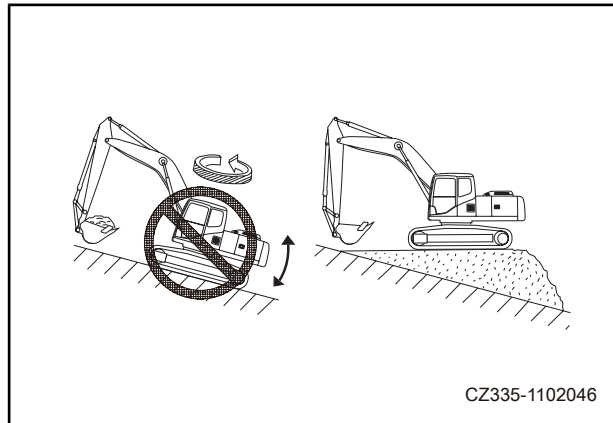


Fig.4-180

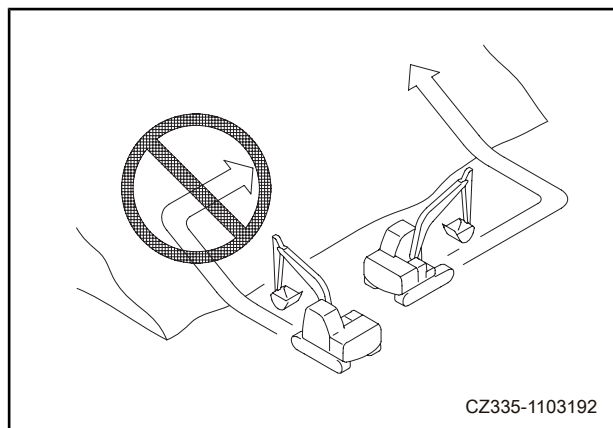


Fig.4-181

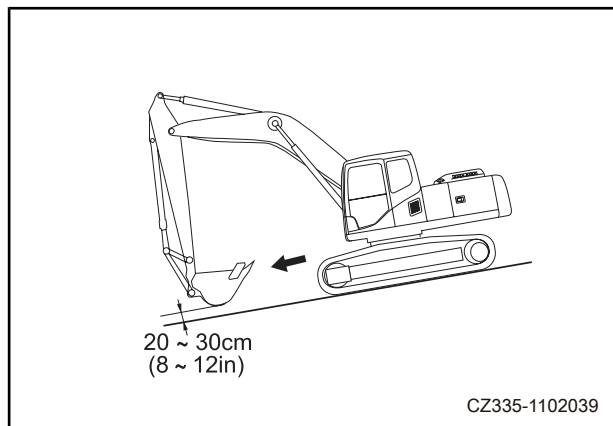


Fig.4-182

2. When driving up the steep slope, extend the work equipment to the front part to ensure balance. Keep the work equipment about 20~30 cm higher than the ground and ensure traveling at low speed.

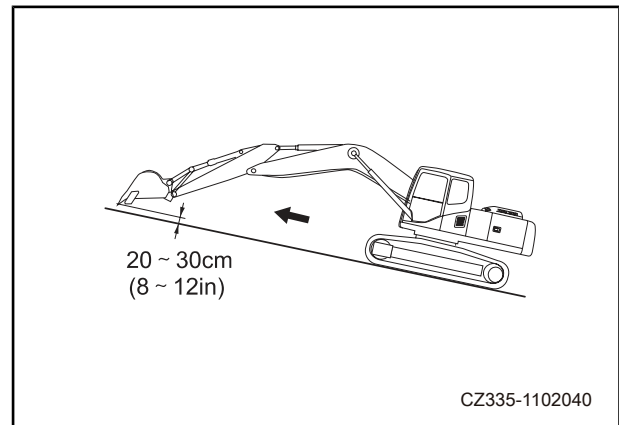


Fig.4-183

4.3.11.2 Downhill traveling

- Turn the travel lever to the neutral position to ensure that the brake can work automatically.

4.3.11.3 Engine flameout on the slope

- If the engine is stopped during the uphill traveling, turn the travel lever to the neutral position, lower down the bucket to the ground, stop the machine, and then restart the engine.

4.3.11.4 Cab door on the slope

- If the engine is stopped when the machine is on the slope, do not use travel lever of the left work equipment for slewing. The upper slewing platform will be rotated under its own deadweight.
- When the machine is on the slope, do not open or close the cab door, which will change the machine stress suddenly. Be sure to keep the cab door open or closed.

4.3.12 Drive the machine out of the mud

4.3.12.1 General

Be careful to avoid getting stuck in the mud. If the machine is stuck in the mud, drive the machine out with the following methods.

4.3.12.2 Track on one side gets stuck in the mud

Ensure that the bottom of the bucket is in contact with the ground when the machine is jacked up with the boom or the arm. The angle between the boom and arm shall be 90° ~ 110° .

It also applies when using reverse mounted bucket.

When only track on one side gets stuck in the mud, jack up the track with a bucket, and then pave a board or log on it and drive out the machine.

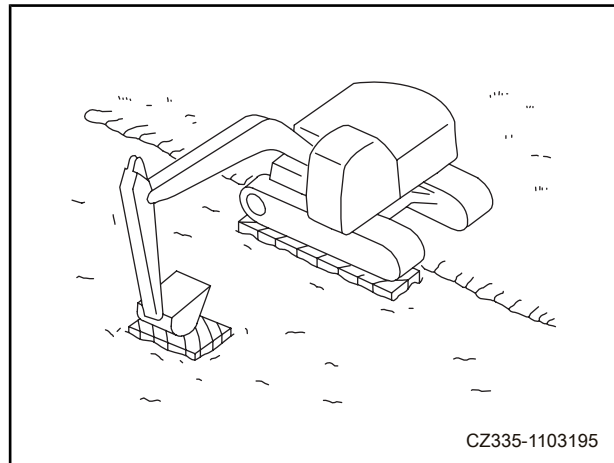


Fig.4-184

4.3.12.3 Tracks on both sides get stuck in the mud

When tracks on both sides get stuck in the mud and slip and the machine can't move, pave the board with the above method, and dig the bucket into the ground ahead. After that, retract the arm and turn the travel lever to the "Forward" position with the normal digging operation methods, and drive out the machine.

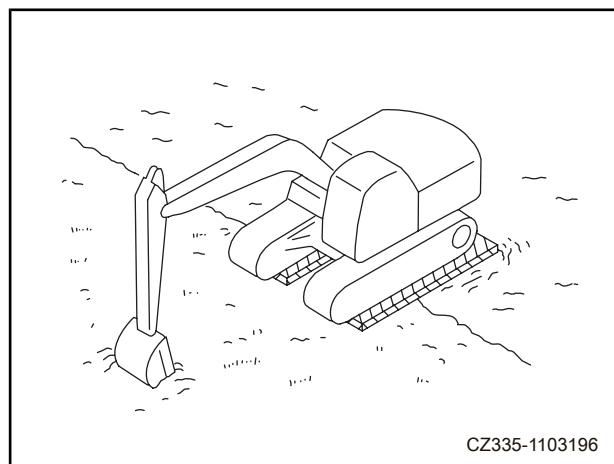


Fig.4-185

4.3.13 Recommended purpose

4.3.13.1 General

In addition to the following purposes, the operation range can be increased with the accessories.

4.3.13.2 Backhoe operation

The backhoe is suitable for digging of area below the machine.

When the machine is in the status shown in the right figure (namely, both the angle between the bucket cylinder and link and the angle between the arm cylinder and arm are 90°), the maximum digging strength can be obtained from the cylinder thrust.

When effectively using this angle during digging, the work efficiency can be fully played.

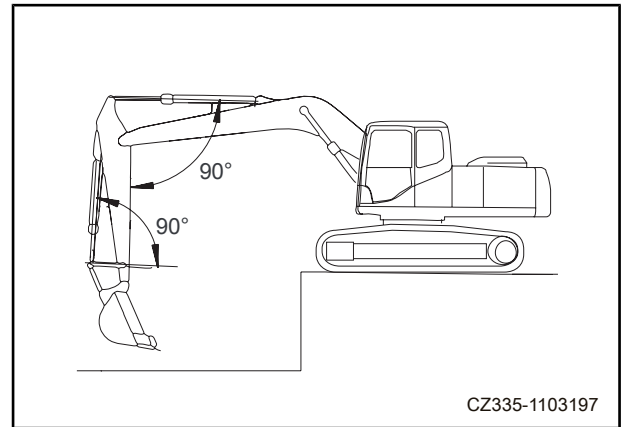


Fig.4-186

The arm digging range includes the area between 45° away from the machine and 30° close to the machine.

Depending on the digging depth, the above range may be slightly different, but it shall be kept in the above range as much as possible, and do not operate the cylinder to the end of its stroke.

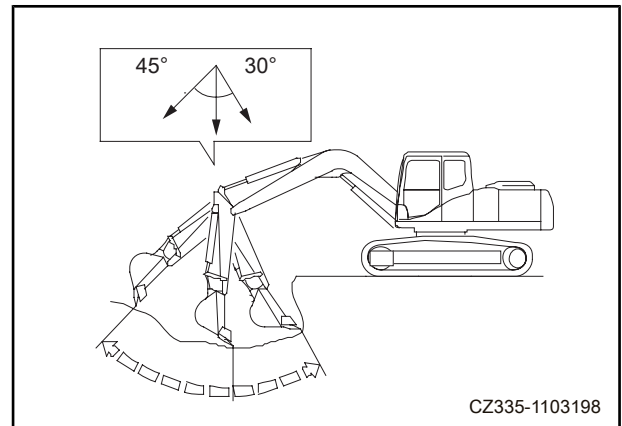


Fig.4-187

4.3.13.3 Ditching work

- The ditching operation can be carried out effectively by installing a bucket that matches with the digging operation and adjusting the track to be parallel with the line of the trench to be dug.
- When digging a wide trench, both sides shall be dug, and then the central part shall be cleared.
- When digging in the longitudinal direction, the travel motor shall be placed in the rear part to ensure that the stability and lifting capacity of the machine is the maximum.
- During digging operation, adjust the track to be vertical to the shoulder or cliff and locate the sprocket at the back of the cab, so as to ensure that the machine can be easily evacuated when abnormality occurs

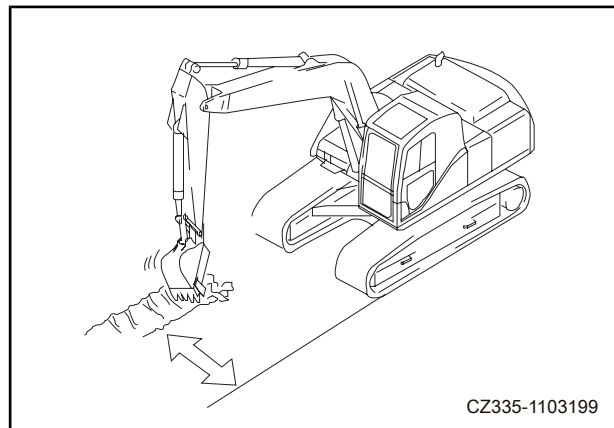


Fig.4-188

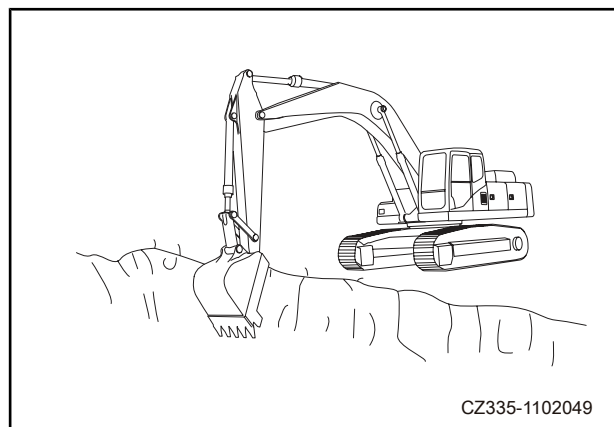


Fig.4-189

4.3.13.4 Loading operation

When the slewing angle is smaller, park the dump truck in a place visible to the driver to improve work efficiency.

It is more convenient to start loading from the rear part of the dump truck than from the side, and the loading capacity is higher.

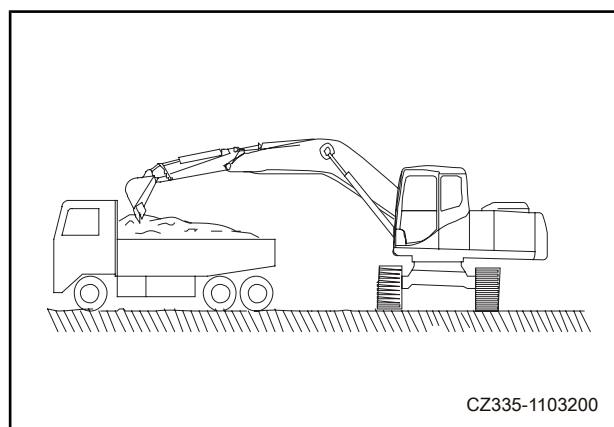


Fig.4-190

4.3.14 Parking

WARNING

- If accidentally touching the travel lever, the machine will suddenly move, which may cause serious accidents.
- Before leaving the cab, be sure to turn the safety lock control lever to the “LOCK” position.

When parking the machine, choose a flat, solid ground and avoid dangerous places. If the machine shall be parked on the slope, place a cushion block under the track shoe (as shown in the Figure). The bucket can be inserted into the ground as an auxiliary safety measure.

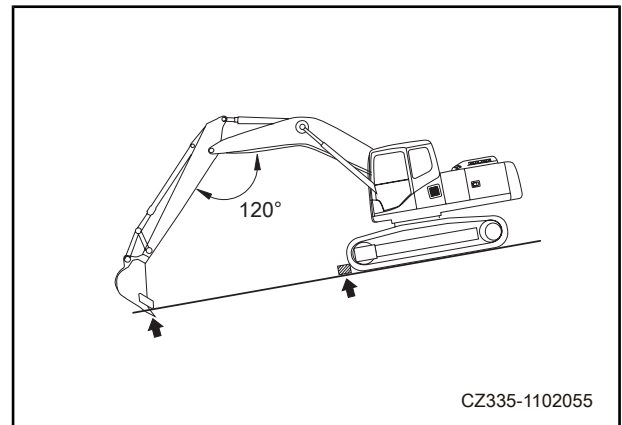


Fig.4-191

1. Turn the left and right travel levers to the neutral [N] position to stop the machine.

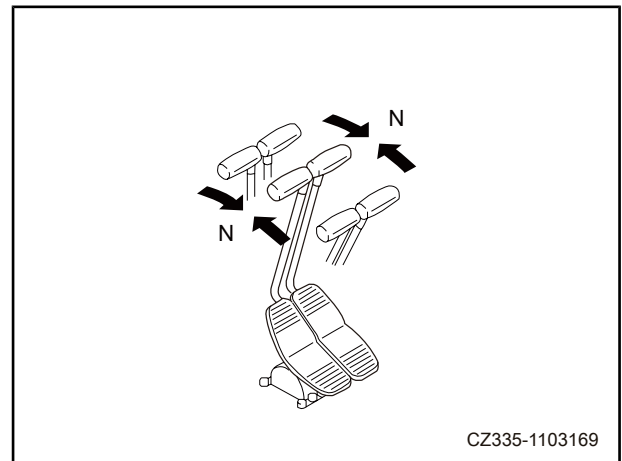


Fig.4-192

2. Turn the fuel control knob to a low idle speed [MIN] position to reduce the engine speed.

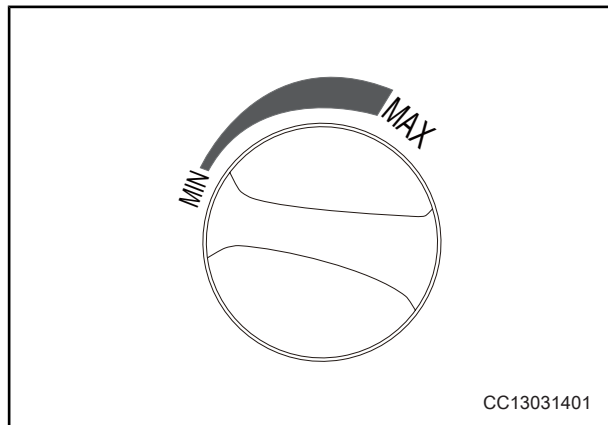


Fig.4-193

3. Lower down the bucket horizontally until its bottom reaches the ground.

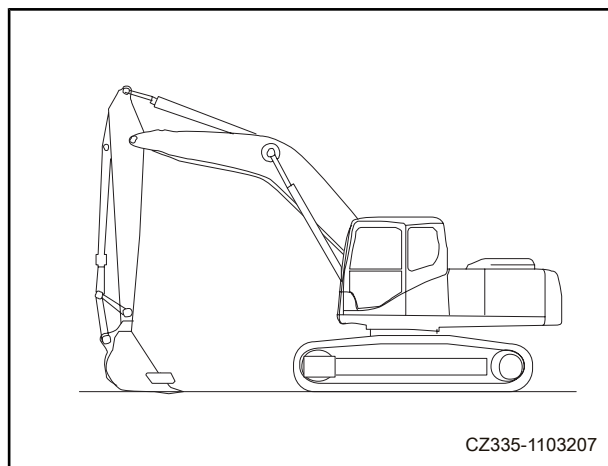


Fig.4-194

4. Turn the safety lock control lever to the "LOCK" position.

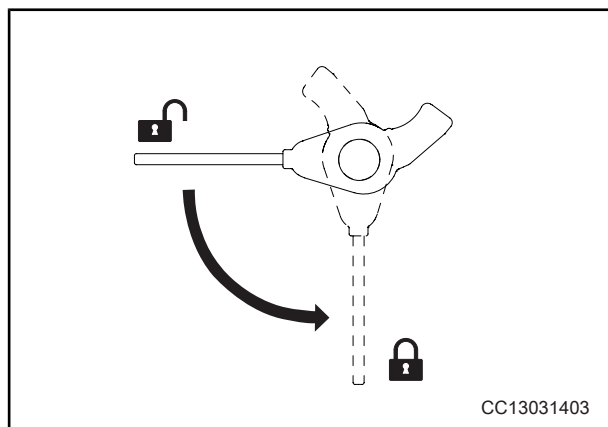


Fig.4-195

5. Check the engine coolant temperature (as shown in the Figure) and the engine oil pressure through the display.

- If the coolant thermometer is in the red range, cool down the coolant until the needle reaches the yellow range, and then stop the engine.
- If the alarm prompt is displayed on the display and abnormal engine oil pressure is determined, stop the engine immediately.

6. Stop the engine.

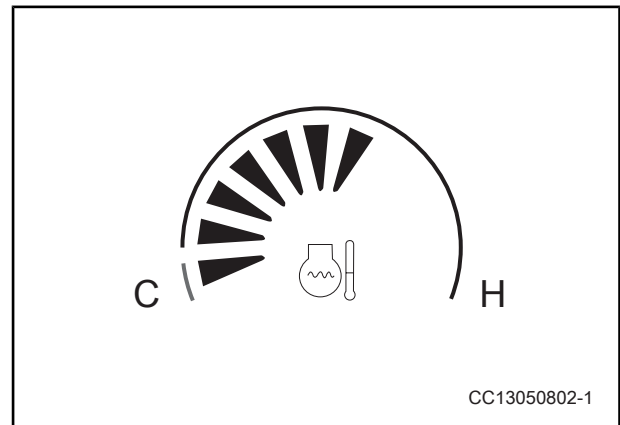


Fig.4-196

4.3.15 Machine inspection after daily work

1. Check the machine and the work equipment, outside and lower body for leakage of oil or coolant. If any problem is discovered, repair it.

2. Fill up the fuel tank.

3. Check whether there are paper or other impurities in the engine room. Remove paper or other impurities to avoid fire hazard.

4. Remove dirt from the lower body.

5. If the ambient temperature is lower than -35°C , be sure to drain coolant in the radiator and engine (the freezing point of antifreeze used for SANY Heavy Machinery is -35°C).

4.3.16 Locking

Be sure to lock the following positions

1. Cab door
Close windows properly
2. Fuel tank filler
3. Engine hood
4. Tool box cover
5. Left door of the machine
6. Right door of the machine
7. HVAC "Fresh Air" inlet

NOTE :

Lock and unlock these positions with the ignition switch key.

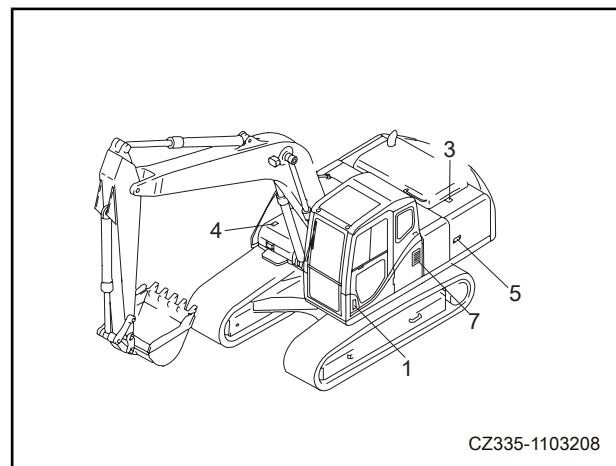


Fig.4-197

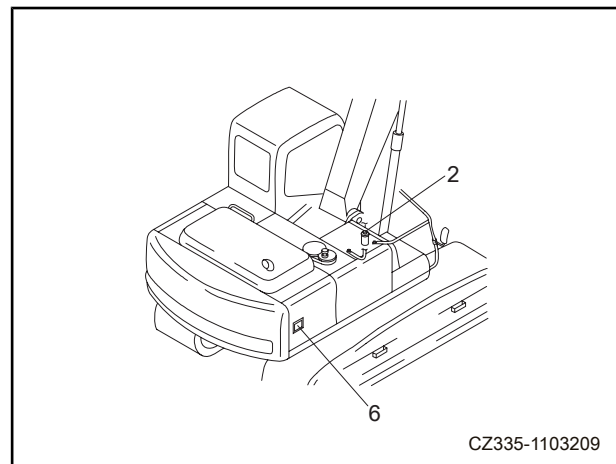


Fig.4-198

4.3.17 Operation in cold season

4.3.17.1 Description of operation in cold weather

The engine will not be able to start and the coolant may be frozen in a low temperature environment, so it shall be operated according to the following content.

Fuel and lubricating oil

All the parts shall be applied with low viscosity fuel and lubricating oil.

For details of viscosity provisions, see the "Recommended Fuel, Coolant and Lubricating Oil" on page 5-9.

Coolant of cooling system

WARNING

- The antifreeze is poisonous. Be careful not to get it on your eyes or skin. If your eyes or skin are stained with it, rinse with plenty of water and see the doctor immediately.
- When replacing coolant or processing coolant containing antifreeze during radiator repair, please contact the authorized agent of SANY Heavy Machinery or professional company for processing. The antifreeze is toxic, and do not drain it into the sewer or spill it on the ground.
- The antifreeze is flammable. Do not get close to open fire. Do not smoke when dealing with antifreeze.

NOTE :

Please use SANY pure TEEC-L35 antifreeze as coolant. In principle, we do not recommend using any other coolant other than the pure full-effect antifreeze of SANY Heavy Machinery.

For details on the mixing ratio of the antifreeze during coolant replacement, see the “Coolant of Cooling System” on page 5-6.

Battery

When the ambient temperature drops, the battery capacity will also be reduced. Keep the battery capacity as close to 100% as possible. Do not keep the storage at a low temperature for a long time to avoid difficult start of the machine.

Because the battery capacity will drop at low temperature, it is necessary to cover the battery, or remove it from the machine, store it in a warmer site, and then reinstall the battery when using the machine.

4.3.17.2 After daily work

In order to prevent movement failure of the machine on the next day due to frozen mud and water on the lower body, the following precautions shall be observed:

- Remove all mud and water from the body. In particular, the hydraulic cylinder piston rod shall be cleaned to prevent mud, dirt or water on the piston rod from entering the seal and damaging it.
- The machine shall be parked on a hard, dry ground. If possible, park the machine on the board and prevent the track from freezing.

on the ground to ensure that the machine can be moved on the next day.

- Turn on the drain valve to drain water accumulated in the fuel system to prevent freezing.
- Fill up the fuel tank. This can minimize moisture condensation in the tank when the temperature drops.
- After operation in the water or in the mud, remove the water on the lower body according to the following instructions to extend the service life of the lower body.

1. When the engine runs at idle speed, rotate the upper structure by 90° to locate the work equipment in the side of the track.

2. As shown in the Figure, lift the machine and lift the track slightly off the ground and idly run the track. Repeat this operation on both left and right tracks.

! WARNING

- It is dangerous when the track is running idly, and the personnel shall keep a certain distance from the track.

4.3.17.3 After the cold season

When the seasons change and it becomes warmer, operate according to the following content:

- Replace fuel and lubricant with specified viscosity oil.

For details, see the “Recommended Fuel, Coolant and Lubricating Oil” on page 5-9.

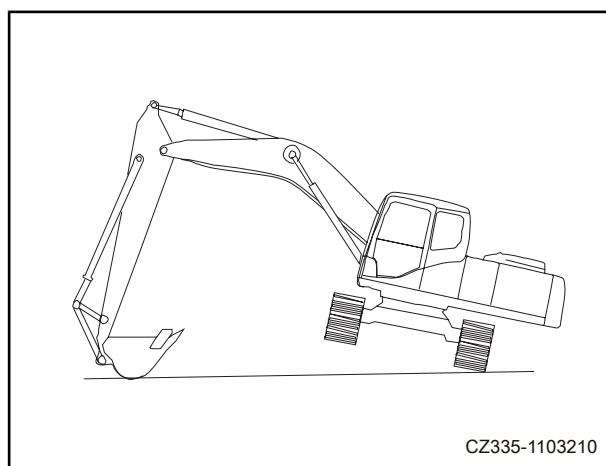


Fig.4-199

4.3.18 Long-term storage

4.3.18.1 Before storage

When the machine is stored (for more than 1 month), it shall be changed to the position as shown in the right Figure to protect the cylinder piston rod and prevent it from rusting.

When the machine is stored for a long time (for more than 1 month), operate according to the following content:

- Clean and flush all the parts, and then store the machine indoors. If the machine has to be stored outdoors, choose a flat ground and cover the machine with canvas.
- Fill up the fuel tank to prevent moisture accumulation.
- Before storage, lubricate and replace oil.
- Apply lubricating grease to the exposed part of the piston rod of the hydraulic cylinder.
- Turn the negative breaker to OFF. Disconnect the negative terminal of the battery and cover it, or remove the battery from the machine and store it separately.
- For machines equipped with accessories, the accessory control pedal shall be turned to a locking position.
- To prevent rust, fill the coolant recommended by SANY Heavy Machinery.

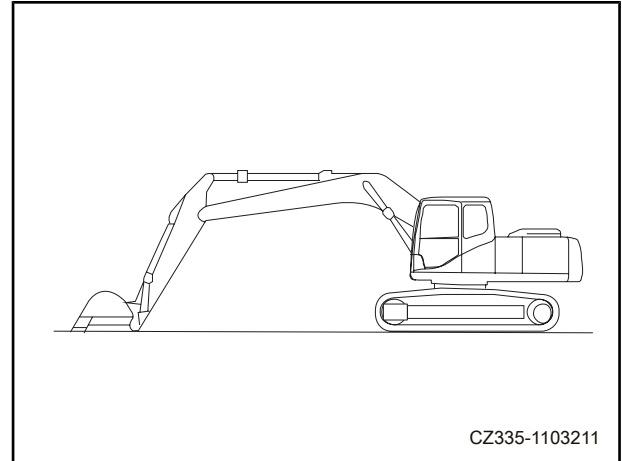


Fig.4-200

4.3.18.2 During storage

⚠ WARNING

- When the machine is indoors and it needs to anti-rust operation, open doors and windows to improve ventilation and prevent gas poisoning.
- During storage, the machine shall be operated once a month and shall be driven in a short distance, and the parts shall be

coated with a new oil film. In addition, the battery shall be charged.

- Wipe off all lubricating grease on the piston rod of the hydraulic cylinder prior to the work equipment operation.
- If the machine is equipped with HVAC, operate the HVAC for 3-5 minutes every month to lubricate all parts of the HVAC compressor. The engine shall be operate at a low idle speed when the HVAC is operated. In addition, the refrigerant shall be checked twice a year.

4.3.18.3 After storage

If the machine is stored for a long time, but it is not subject to anti-rust operation every month, please contact the authorized agent of SANY Heavy Machinery before reuse. When reusing the machine after long-term storage, please observe the following content before use:

- Wipe off lubricating grease of the piston rod of the hydraulic cylinder.
- Fill all lubricating parts with oil and lubricating grease.
- Turn the battery disconnect switch (1) to Off.
- When the machine is stored for a long time, the moisture in the air will be mixed with oil. Check the oil before and after starting the engine. If there is water in the oil, drain the water completely and timely.

4.3.18.4 Start the engine after long-term storage

When the engine is started after long-term storage, it shall be fully warmed up.

For details, see the “Warm-up Operation” on page 4-76.

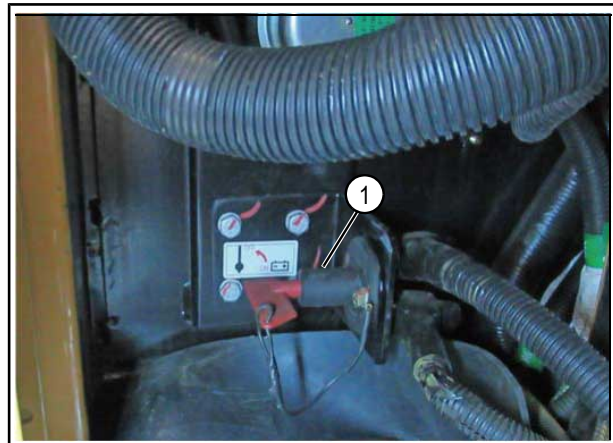


Fig.4-201

4.4 Transportation

4.4.1 General

- When transporting machines, comply with all relevant laws and regulations, and pay attention to safety.

4.4.2 Transportation method

- Select a transportation method that matches the weight and size provided in the “Technical Specification” section.
- The weight and size provided in the “Technical Specification” may vary depending on the type of track shoe, bucket or other accessories.
- For details of transportation of machines equipped with the cab protection cover, please contact the authorized agent of SANY Heavy Machinery.

4.4.3 Machine loading and unloading machine with trailer

4.4.3.1 General

Be sure to observe the following items of the access board and trailer platform:

- Use access board with sufficient width, length, thickness and strength and with a maximum slope of 15° for loading and unloading.
- When using the accumulated soil, it is necessary to fully compact the accumulated soil to prevent the slope from collapsing.
- To prevent the machine from slipping on the access board, clean the track and access board of the machine before loading and unloading.
- If there is water, snow, lubricating grease, oil or ice on the surface of access board, the machine may slip.

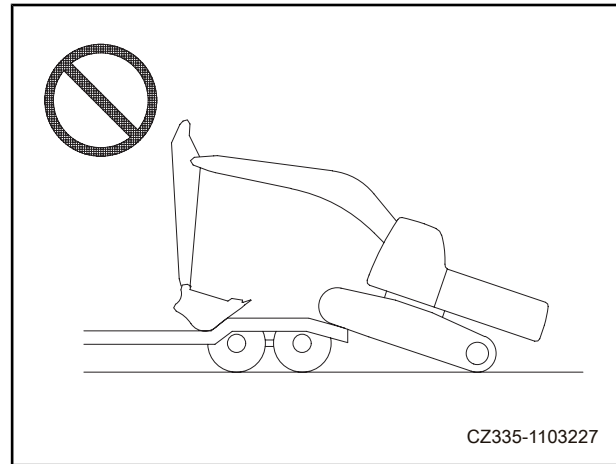


Fig.4-202

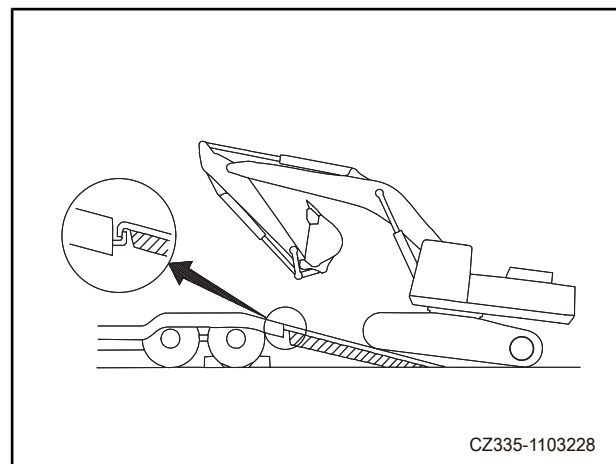


Fig.4-203

4.4.3.2 Loading

1. It can only be loaded and unloaded on a solid and flat ground. Keep a safe distance from the roadside.

2. Apply a brake to the trailer and place a cushion block [1] under the tyre to prevent the trailer from moving.

- Place the left and right access boards [2] to make them parallel to each other and equal to the left and right spacing of the trailer center [3]. The maximum installation Angle [4] will be 15°. If the access board is bent significantly under the weight of the machine, place a cushion block under the access board to prevent the access board from bending.

3. Switch the traveling speed to the low speed status by pressing down the function key of the display, and disable the automatic idle speed.

4. Turn the fuel control knob to the [MIN] position, and set the engine speed to low idle speed.

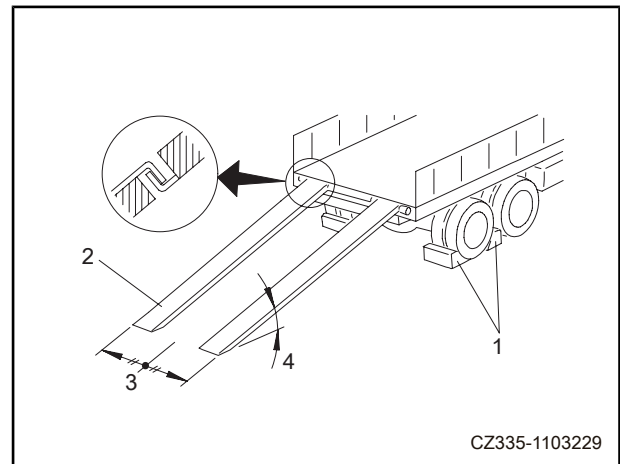


Fig.4-204

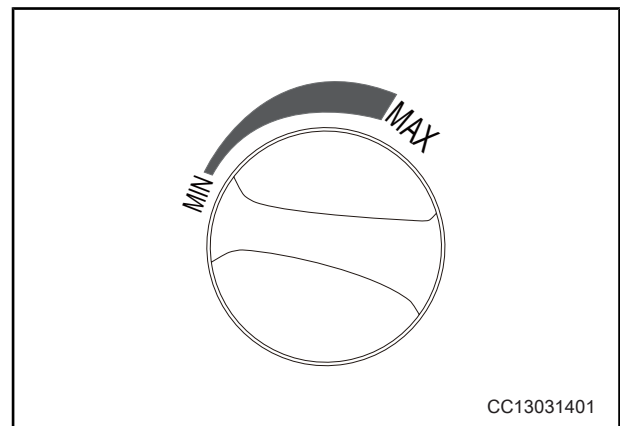


Fig.4-205

⚠ WARNING

- When driving the machine up or down the trailer, the automatic idle function shall be canceled. If the automatic idle speed function is enabled, the speed of the engine will change dramatically.
- When driving the machine up or down the trailer, the traveling speed shall be kept in the "Low Speed" mode. Do not switch the traveling speed randomly.

5. If the machine is equipped with the work equipment, place the work equipment in the front part, and drive the machine forwards to the access board. If there is no work equipment, drive the machine backwards to the access board.

Support the bucket onto the trailer immediately after the machine is driven on the access board.

Especially in case of backward traveling, be sure to follow the instructions and signals of the commander.

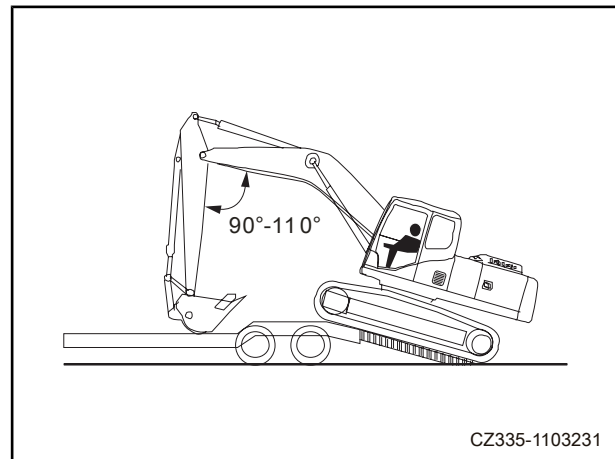


Fig.4-206

⚠ WARNING
<ul style="list-style-type: none"> • Do not adjust direction on the access board, otherwise, the machine will turn over. • Do not operate any control lever other than the travel lever on the access board. • If needed, drive the machine to the ground away from the access board or back to the trailer before direction adjustment.

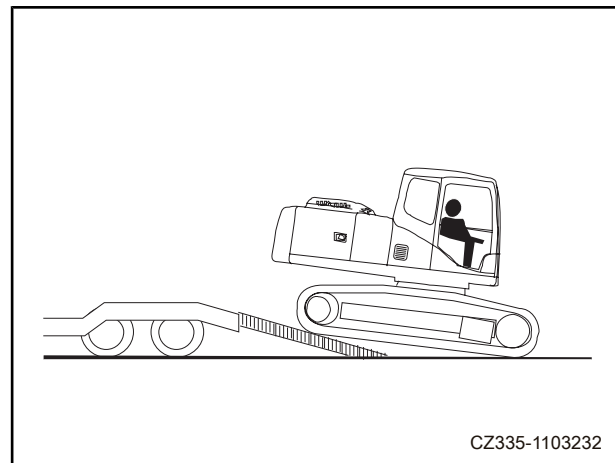


Fig.4-207

6. Ensure that the machine is in a straight line with the access board and the centerline of the machine corresponds to that of the trailer before the machine is driven on the access board.

Slowly drive the machine in the direction of the access board.

Lower down the work equipment as much as possible provided no impact is made.

7. Drive the machine slowly forwards until all the tracks are located on the trailer and firmly contact with the flat plate.

8. When the machine is passing the rear wheel of the trailer, the machine will lean forward. Be slow and careful, and do not make the work equipment touch the trailer body.

9. Slightly lift the bucket, retract the arm and keep it in the lower part, and then slowly rotate the upper structure by 180°.

10. Fully extend the bucket cylinder and arm cylinder, and then slowly lower down the boom.

11. Place a wooden cushion block on one end of the bucket cylinder to prevent it from touching the baseplate and damaging the cylinder.

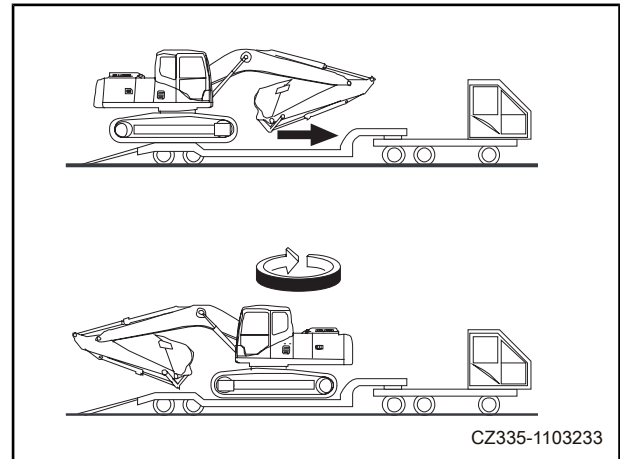


Fig.4-208

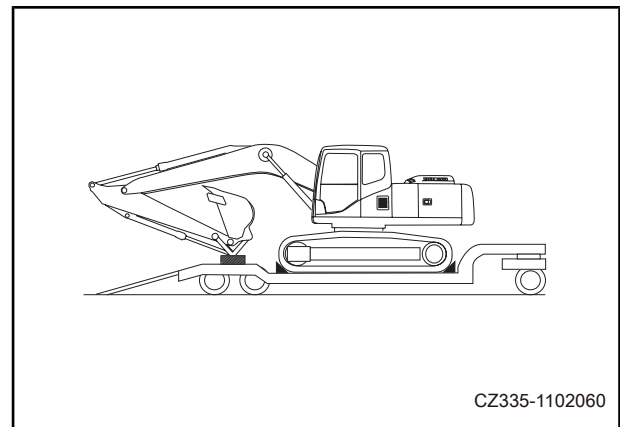


Fig.4-209

4.4.3.3 Secure the machine

- In order to protect the bucket cylinder during transportation, place the wood under the top end of the bucket link to prevent damage to the bucket cylinder and work equipment due to direct contact of the bucket cylinder with the trailer flatbed and ship deck.
- Check whether the engine hood latch is locked. If the engine hood is not locked, it will be opened during transportation.

Fix the machine on the trailer with following method:

1. Fully extend the bucket and arm cylinder, and then slowly lower down the boom.

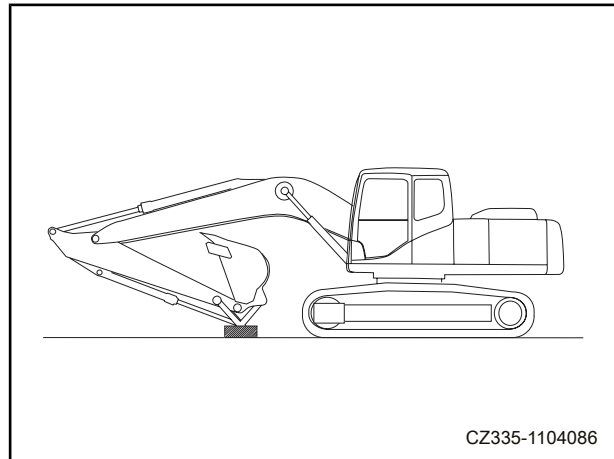


Fig.4-210

2. Turn the safety lock control lever to the “LOCK” position.

3. Stop the engine, and then remove the key from the ignition switch.

4. Close all the doors, windows and covers. Lock the cover, cap and door with locks.

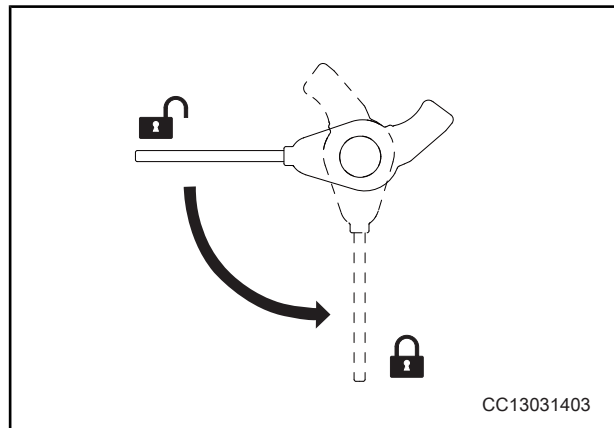


Fig.4-211

5. Place the cushion block on both ends of the track to prevent the machine from moving during transportation, and fix the machine with iron chains or wire ropes with proper strength.

In particular, fix the machine in a proper position to ensure that it will not slip to the side.

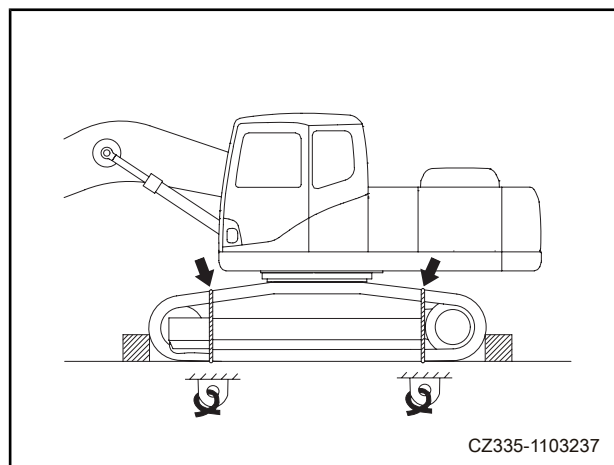


Fig.4-212

Rearview mirror

The rearview mirror is located in the position as shown in the right Figure.

If the rearview mirror is damaged or it shall be reinstalled after removal for transportation, the following method shall be adopted.

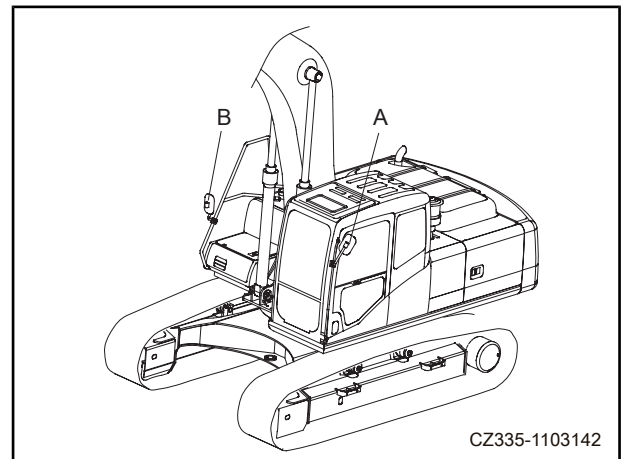


Fig.4-213

Removal

1. Release the mounting bolt [2], and then remove the rearview mirror [1] from the support [3].

2. Release the bolt [4], and remove the support [3] and clamp [5] from the handrail.

Installation

1. Install the support [3] and clamp [5] onto the handrail, and then tighten the bolt [4].

2. Install the rearview mirror [1] onto the support [3], and then tighten the mounting bolt [2].

- Make adjustment after installing the rearview mirror. For details, see the "Rearview Mirror" on page 4-69.

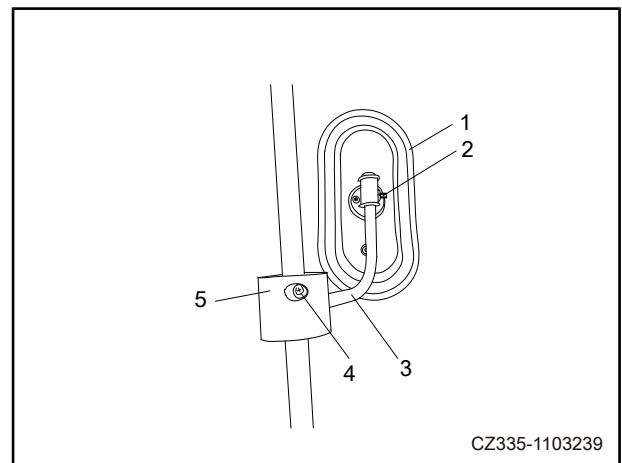


Fig.4-214

4.4.3.4 Unloading

1. The machine can only be loaded and unloaded on a solid and flat ground. Keep a safe distance from the roadside.

2. Apply a brake to the trailer and place a cushion block [1] under the tyre to prevent the trailer from moving.

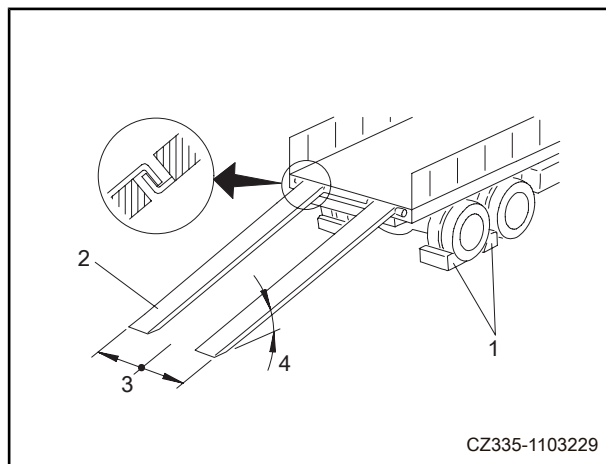
- Place the left and right access boards [2] to make them parallel to each other and equal to the left and right spacing of the trailer center [3]. The maximum installation Angle [4] will be 15° . If the access board is bent significantly under the weight of the machine, place a cushion block under the access board.

3. Remove iron chains and wire ropes for fastening the machine.

4. Start the engine, and fully warm it up.

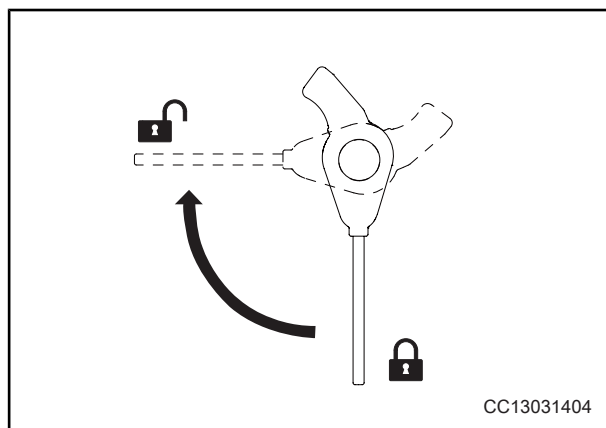
5. Turn the safety lock control lever to the "UNLOCK" position.

6. Switch the traveling speed to the low speed status by pressing down the function key of the display, and disable the automatic idle speed.



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Fig.4-215



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Fig.4-216

⚠ WARNING

- When driving the machine up or down the trailer, the automatic idle function shall be canceled. If the automatic idle speed function is enabled, the speed of the engine will change dramatically.
- When driving the machine up or down the trailer, the traveling speed shall be kept in the "Low Speed" mode. Do not switch the traveling speed randomly.

7. Turn the fuel control knob to the [MIN] position, and set the engine speed to low idle speed.

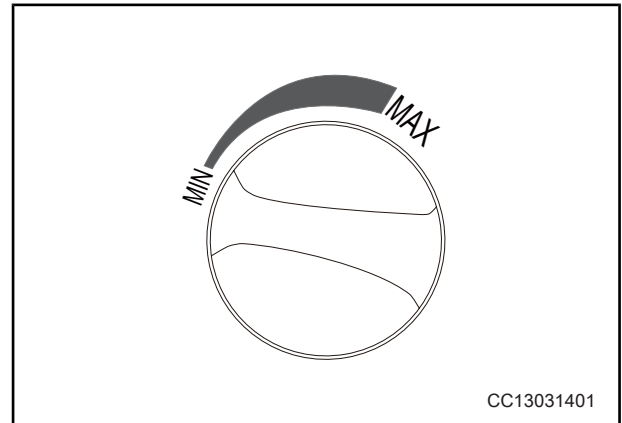


Fig.4-217

8. Lift the work equipment, retract the arm back to the lower part of the boom, and slowly start the machine.

9. When driving the machine to the top of the rear wheel of the trailer, stop it.

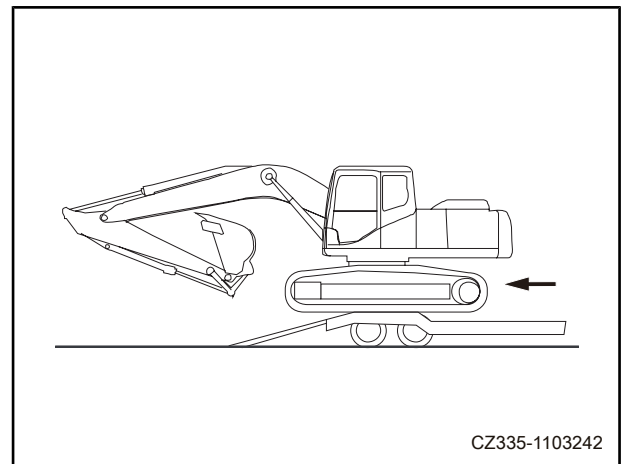


Fig.4-218

NOTE :

- When unloading machine, the angle between the arm and the boom shall be 90~110°.
- The machine will be damaged if it is unloaded when the bucket is retracted.
- Do not insert the bucket into the ground and the machine is driven onto the access board. This will damage the hydraulic cylinder.

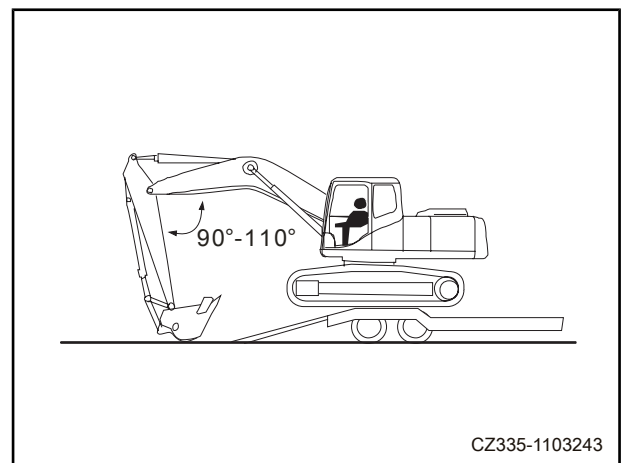


Fig.4-219

10. When driving the machine onto the access board, adjust the angle between the arm and the boom to 90~110 °, lower down the bucket to the ground, and slowly move the machine.

11. When driving the machine away from the access board, slowly operate the boom and the bucket, and drive down carefully until the machine is completely away from the access board.

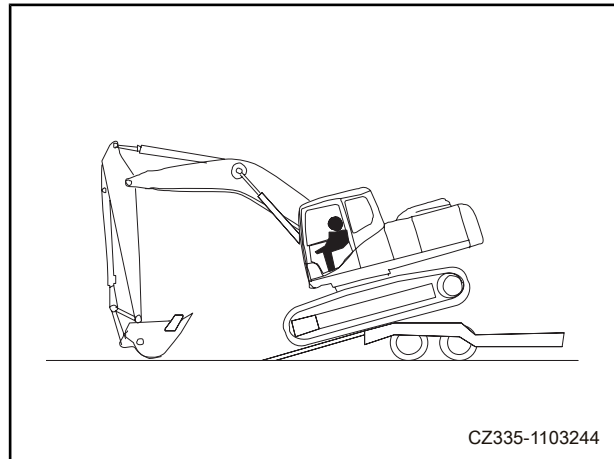


Fig.4-220

4.5 Lifting

⚠ WARNING

- Only the qualified and experienced operator holding official licensee (according to local law) can operate the crane.
- Do not lift a machine when someone stands on the machine.
- Do not allow anyone to enter the lower or surrounding area of the lifted machine.
- Ensure that the wire rope used for lifting is strong enough to bear the weight of the machine. Do not use damaged or aged cables or lifting tools.
- Do not lift the machine when the upper body turns to the side of the machine. Before lifting, rotate the work equipment to one end of the sprocket and make the undercarriage parallel to the longitudinal centerline of the upper structure.
- The safety lock control lever shall be turned to the locking position before lifting to prevent the machine from accidentally moving.
- Keep the machine level during lifting.
- Do not lift the machine quickly. Otherwise, the lifting cable or lifting tool will be overloaded, which may lead to fracture.
- Do not lift the machine with any other position except that provided in the following steps, or use any of the lifting equipment except that provided in the following steps. Otherwise, the machine will lose its balance.

Wire rope selection

- The lifting procedure is applicable to the standard technical specification machine. For details of machine weight, see the “Technical Specification” section of this manual.
- Select the suitable wire rope according to the weight of the excavator. Refer to the following table.

Wire rope
(Ungalvanized standard “Z” twisted rope)

Nominal diameter of wire rope	Allowed load	
	mm	Allowed load
mm	kN	Ton
10	8.8	0.9
12	12.7	1.3
14	17.3	1.7
16	22.6	2.3
18	28.6	2.9
20	35.3	3.6
25	55.3	5.6
30	79.6	8.1
40	141.6	14.4
50	221.6	22.6
60	318.3	32.4

NOTE :

The allowed load value will be estimated by 1/6 or 1/7 of the fracture strength of the cable used.

NOTE :

The lifting method will be different according to the actual accessories and options on the machine. For proper lifting method, please contact the authorized agent of SANY Heavy Machinery.

Lift the machine on the flat ground through the following methods

Standard specification machine

1. Start the engine, and then swing the upper structure to locate the work equipment on the side of the sprocket [1].

2. Fully extend the bucket cylinder and arm cylinder, and then lower down the work equipment to the ground with the boom cylinder, as shown in the right Figure.

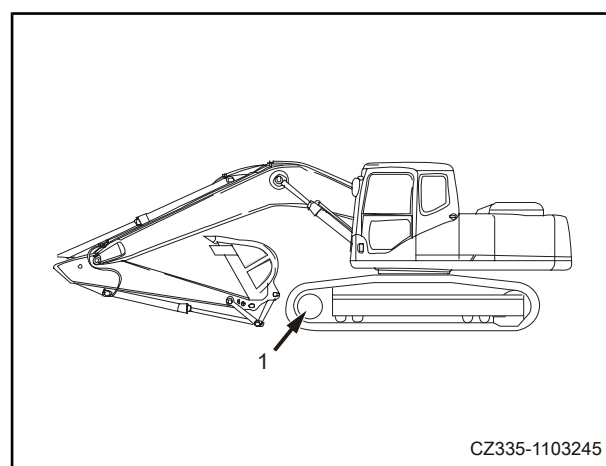


Fig.4-221

3. Turn the safety lock control lever to the "LOCK" position.

4. Stop the engine, check whether there are obstacles around the cab, and then leave the machine. Close doors and windows of cab.

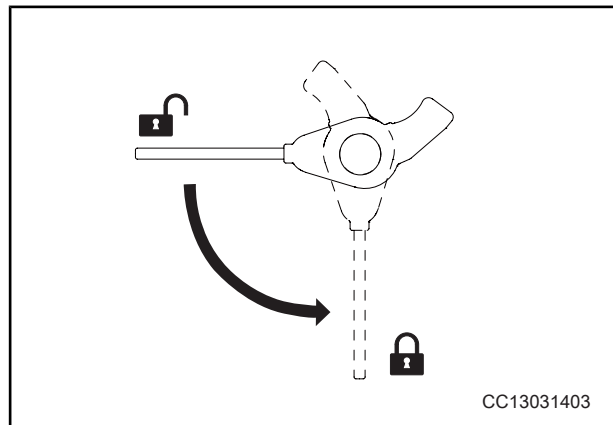


Fig.4-222

5. Make the wire rope cross through the part between the first and second front supporting wheels and between the first and second rear supporting wheels. The wire rope of the machine equipped with a roller guard shall cross through the wire rope under the track.

6. Adjust the lifting angle of wire rope [A] to 30~40°, and then slowly lift the machine.

7. After the machine is lifted off the ground, confirm that the hook condition and lifting condition are normal, and then slowly lift the machine.

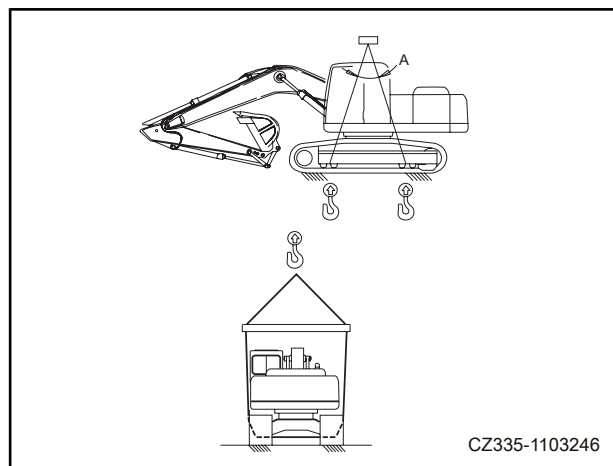


Fig.4-223

WARNING

- If the cable is too close to the hook, it will slip off the hook and cause a serious accident. The middle part of the hook has the maximum strength.
- Do not lift heavy objects when the suspension angle between the cable and the hook is large. If the heavy object is lifted with two or more cables, the strength of each cable will be increased along with the increase of the suspension angle.
- If lifting with a single wire rope, the load may rotate during lifting, and the wire rope may be released or slip from the winding position and cause a dangerous accident.

SANY

Maintenance

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 **WARNING**

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this machine and before operation or maintaining it. Failure to do this could result in death or serious injury.

5.Maintenance

5.1 Maintenance Guideline

Do not perform any inspection and maintenance not described in this manual.

Hour meter reading

Check the hour meter reading daily to determine whether maintenance must be performed.

Sany Heavy Machinery Co., Ltd. original wear parts

Use Sany Heavy Machinery Co., Ltd. original parts specified in the parts manual for replacement.

Sany Heavy Machinery Co., Ltd. original lubricating oil

Use Sany Heavy Machinery Co., Ltd. original engine oil and grease. Select the appropriate engine oil and grease according to the ambient temperature.

Windshield washer fluid

When using the windshield washer fluid, pay attention not to allowing any dirt to enter the washer fluid for fear of blockage of the nozzle and system.

Clean engine and lubricating oil

Use clean engine oil and grease. Keep the oil and grease containers clean and prevent foreign matters from getting into such oil and grease.

Check drained oil and used filter element

After changing the oil or the filter element, check the used oil and filter element for metal chips and foreign matters. If you find a lot of metal chips and foreign matters, report this to your supervisor and take appropriate measures.

Fuel filter screen

If a fuel filter screen is provided at the fuel filler, do not remove the filter screen upon fueling.

Warning sign plate

Before maintaining the machine, hang a "Do Not Operate" sign or a similar warning sign on the ignition switch or direction control to warn others that the machine is under maintenance. If necessary, an additional warning decal can be attached around the hydraulic excavator.

Welding instructions

- Turn off the ignition switch for about one minute and then disconnect the negative (-) terminal of the battery.
- Connect the grounding cable at more than 1 m away from the welding position. If the grounding cable is connected to instruments, connectors, or other accessories, such meters will malfunction. If there is a seal or bearing between the welding position and the grounding point, the grounding point shall be changed to keep away from such parts.
- Do not select the grounding point in the area around the work equipment pins or hydraulic cylinders.
- Do not use voltages greater than 200 V continuously.

Prevent items from falling into the machine

- When opening the inspection hatch or the fuel tank filler for inspection, take care to prevent nuts, bolts, or tools from falling into the machine. If they falls into the machine, they will damage the machine and cause malfunctions and accidents. Therefore, such items shall be taken out immediately after they falls into the machine.
- The items necessary for inspection can be put into your pockets only.

Dusty sites

When working in dusty sites, you shall follow these steps:

- When checking the machine or replacing the oil, stop the machine in a dust-free place to prevent dust from entering the oil.
- Clean the filter element in a timely manner when the blocking alarm on the air filter gives an alarm.
- Clean the radiator fins and other parts of the heat exchanger devices frequently and be careful not to block such fins.
- Clean and replace the fuel filter frequently.
- Clean the electrical components, especially motors and alternators, to prevent dust accumulation.

Avoid mixing lubricating oil

Do not mix different brands or grades of oil. If you need to add different brands or grades of oil, drain the old oil and then replace it with new oil.

Lock inspection cover

When opening the inspection cover for maintenance, use the locking lever to firmly lock the cover on the designated position. If the inspection or maintenance is performed without locking such cover, the cover may suddenly close due to wind and cause personal injuries.

Hydraulic system bleeding

When the hydraulic equipment is repaired or replaced, or the hydraulic lines are disassembled and installed, the air in the oil lines must be discharged.

Installation of hydraulic hoses

- When removing parts at the positions sealed with O-rings or gaskets, clean the mounting surface and replace them with new ones. Be careful not to forget to install O-rings and gaskets.
- Do not twist or bend the hoses during installation. This will damage the hoses and significantly shorten their service lives.

Inspection after inspection and maintenance

If the inspection is not performed after inspection and maintenance, an unexpected malfunction may occur, resulting in serious injuries or damages. Be sure to follow the steps below:

- Check when operating the engine
- For details on checking when operating the engine, see [“Maintenance during engine running” on page 2-55](#), and be careful to ensure your safety.
- Check whether the inspected and maintained items are working properly.
- Check for oil leakage when the engine speed rises and the load is applied on the oil.
- Check after operation (with the engine turned off)
- Check whether you have forgotten any inspection or maintenance position.
- Check whether you have finished all inspection and maintenance items correctly.
- Check whether there is any tool or part that has fallen into the machine. It is very dangerous if the part falls into the machine and snaps into the linkage mechanism.
- Check whether water or oil leakage occurs and whether all bolts are tightened.

Close engine hood tightly

When closing the engine hood after inspection and maintenance, hold the handle and lift the hood slightly to check whether the lock tongue is firmly locked. If the engine hood is not locked, it may open, thus causing dangers.

5.2 Treatment of Oil, Fuel and Coolant

5.2.1 Oil

- The oil in the engine and hydraulic equipment will continuously deteriorate in use due to extremely harsh working conditions (high temperature and pressure).
- Be sure to use the oil recommended in this manual and matching the highest and lowest ambient temperatures.
- The oil shall be changed within the specified oil change interval even if it is not dirty.

- As the blood in the human body, lubricating oil shall be treated with care to prevent foreign matters (water, metal particles or dust) from entering.
- Most of the machine's failures are caused by the ingress of foreign matters. During storing or filling oil, special care shall be taken to prevent any foreign matter from getting into the oil.
- The oil shall be filled according to the specified amount of oil, otherwise it will cause abnormality.
- Do not mix different grades or brands of oil.
- If the oil in the work equipment is not clean, there is water in the oil, or the air gets into the oil lines, contact your Sany Heavy Machinery Co., Ltd. authorized dealer.
- In order to check the condition of the machine, it is recommended that oil analysis shall be performed regularly. If you need this service, please contact your Sany Heavy Machinery Co., Ltd. authorized dealer.
- During oil change, be sure to replace related filter elements. When replacing the oil filter element, remember to add the oil of the given specification to the new filter element before installation.
- Please use the oil recommended by our company. Do not use unrecommended hydraulic oil because it may block the filter element once you use it.
- When changing the hydraulic oil, drain the residual oil in the lines and the cylinder as far as possible. It is allowed to mix a small amount of two types of oil.

5.2.2 Fuel

- Be sure to fill the fuel tank after the completion of daily work in order to prevent the condensation of moisture in the air and the formation of water in the tank.
- The fuel injection pump is a precision part and it will not work properly if the fuel being used contains any water or dirt.
- Drain the sediment and water from the fuel tank before starting the engine or 10 minutes after refueling.
- Flush the fuel tank and the fuel system if there is any foreign matter in the fuel tank.
- If the engine has run out of fuel, or if the filter element has been replaced, the air in the lines must be vented.
- Be sure to use the fuel specified in the "Operation and Maintenance Manual". The fuel will solidify when it is used below the specified temperature (especially at temperatures below -15°C (5°F)). When the fuel is used above the specified temperature, its viscosity will decrease and the output power will drop.
- When storing the fuel or refueling, care shall be taken to prevent foreign matters from getting into the fuel.

NOTICE

- Use diesel as the fuel.
- To ensure good fuel consumption and exhaust characteristics, the engine mounted on the machine uses a mechanically controlled high-pressure fuel injection device. This device requires high-precision parts and lubrication, so its durability will be significantly reduced if you use low-viscosity fuel with low lubricating capacity.
- Sulfur in the fuel will produce sulfur oxides during burning and react with water to become dilute sulfuric acid, causing the engine damage. To prevent such failures, be sure to use the fuel containing less than 0.2% of sulfur.

5.2.3 Coolant in the cooling system

- Coolant has important anti-corrosion and anti-freeze features. Even in areas not requiring anti-freeze measures, it is essential to use antifreeze coolant.
Sany Heavy Machinery Co., Ltd. recommends the use of TEEC-L35 antifreeze with a concentration of 50% and without dilution. With excellent anti-corrosion, anti-freeze and cooling characteristics, TEEC-L35 antifreeze can be used continuously for 1 year or 2000 hours.
- Sany Heavy Machinery Co., Ltd. does not recommend using any coolant other than TEEC-L35 antifreeze. If you use other coolant, it may cause serious problems such as corrosion of the engine and cooling system parts made of light metals including aluminum.
If you use commercially available antifreeze as the coolant, be sure to keep its concentration fall between 30% and 68% to ensure its corrosion resistance characteristic.
The mixing ratio of antifreeze and water is determined by the lowest ambient temperature, as shown in the mixing table below.

Mixing ratio of water and antifreeze

Minimum atmospheric temperature	°C	-10	-15	-20	-25	-30	-35	-40
	°F	14	5	-4	-13	-22	-31	-40
Antifreeze volume ratio (%)		30	36	41	46	50	54	58

NOTE :

- Use distilled or tap water (soft water) when diluting the anti-freeze coolant.
- Natural water, such as river and well water (hard water), contains a lot of minerals (calcium and magnesium), which are easy to form fouling inside the engine and the radiator. The fouling formed inside the engine or the radiator will be difficult to be removed. Poor heat exchange may also cause overheating.

5.2.4 Grease

- Grease is used to prevent twisting at the connections and noise.

- Fill grease if any part becomes inflexible or produces noise after used for a long time.
- Be sure to use the recommended grease, and select grease in accordance with the replacement cycle and ambient temperature recommended in this manual.
- When filling grease, wipe away the old grease that has been squeezed out. Be sure to wipe away the old grease that has been stained with sand and dirt, otherwise it will cause wear of the rotating parts.

5.2.5 Storage of engine oil and fuel

- Place them indoors to prevent water, dust, or other debris from getting into them.
- When storing the oil drums for a long time, place the drums side so that the fillers of the drums are on the side (to prevent inhalation of moisture). If the oil drums have to be placed outdoors, cover them with tarpaulins or take other protective measures.
- In order to prevent the oil or fuel from deteriorating during long-term storage, it must be used in the order of first-in and first-out (namely the lubricating oil or fuel stored for longer time is used first).

5.2.6 Filter element

- The filter element is an extremely important safety component that prevents foreign matters in the oil and air lines from getting into important devices and causing malfunctions. Replace all filter elements regularly. When used under harsh conditions, the filter element shall be replaced within a short period based on the sulfur content in all lubricating oil and fuel.
- Do not reuse cleaned filter element but replace it with a new one.
- Check whether metal particles are adsorbed on the old filter element when replacing it. If you found metal particles, please contact your Sany Heavy Machinery Co., Ltd. authorized dealer.
- Do not unpack the spare filter elements before use.
- Use Sany Heavy Machinery Co., Ltd. original filter elements.

5.3 Electrical System Maintenance

- Wet electrical equipment or damaged wire claddings will cause electrical short circuits and machine malfunctions. Do not flush the cab with water. When rinsing the machine, take care to prevent water from getting into the electrical components.
- Electrical system maintenance includes checking the fan belt tension and checking the fan belt for damage and wear.
- Do not install any electrical component other than those specified by Sany Heavy Machinery Co., Ltd.
- External electromagnetic interference may cause malfunction of the controller in the control system. Contact your Sany Heavy Machinery Co., Ltd. authorized dealer when you install radio receivers or other wireless devices.
- When working on a beach, carefully clean the electrical system to prevent corrosion.

- When installing the electrical equipment, connect it to a dedicated power connector. Do not connect the optional power supply to the fuse, starter switch or battery relay.

5.4 Wear Parts

- Wear parts (such as filter elements, and bucket teeth) shall be replaced during regular maintenance or before reaching their wear limits.
- In order to use the machine economically, wear parts shall be replaced correctly.
- High-quality Sany Heavy Machinery Co., Ltd. original parts shall be used for replacement.
- When ordering such parts, check the part numbers in the part manual.

Table of Wear Parts

Item	Part No.	Part name	Quantity	Replacement Interval
Engine oil filter element	B222100000494	Filter element	1	Every 500 h
Fuel coarse filter	60307173	Filter element	1	Every 500 h, but first 50 h
Fuel fine filter	60282117	Filter element	1	Every 500 h
Air filter element	B222100000501	Safety filter element	1	Every 3 times when replacing the primary filter element or 1 year
	B222100000500	Primary filter element	1	Every 1000 h or 1 year
Pilot filter element	A222100000119	Filter element	1	Every 1000 h
Breather valve filter element	60174894	Filter element	1	Every 500 h
Hydraulic oil filter	60167852	Oil suction filter element	1	Every 1000 h
	60167851	Return filter element	1	
Air conditioning filter	60250669	Fresh air filter	1	Clean every 500 h and replace every half a year
	60088111	Recirculation filter	1	
5-tooth bucket (optional)	60154445	Bucket teeth	5	—
	60154443	Pin as-bucket tooth	5	
	A229900007131	Left side teeth	1	
	A229900007130	Right side teeth	1	
	A210111000301	Bolt	8	
	60012073	Nut	8	
	A210609000352	O ring	1	

5.5 Recommended Fuel, Coolant and Lubricating Oil

- Unless otherwise specified, the machine is filled with the oil and coolant listed in the table below when it is shipped from the factory.

Item	Model
Engine oil pan	Diesel engine oil Caltex CJ-4 15W-40
Swing mechanism box	Gear oil 85W/140
Final gearbox	
Hydraulic oil system	Caltex anti-wear hydraulic oil HDZ46
Radiator	TEEC-L35 Antifreeze
DEF tank	DIN 70700 or ISO 2224101

- In order to keep the best condition of the machine for a long time, it is essential to follow the oil operation and maintenance instructions in this manual. Failure to do so may result in excessive wear of the engine, drive system, cooling system, and other parts, thus shortening their service lives.
- Commercially available lubricating oil additives may cause damage to the machine. Sany Heavy Machinery Co., Ltd. does not recommend any lubricating oil additive.
- The specified capacity means the total amount of oil in the tank and lines. The adding capacity means the amount of oil that needs to be added to the system during inspection and maintenance.
- When starting the engine at temperatures below 0°C (32°F), be sure to use the recommended multi-grade oil even if the ambient temperature is high in the daytime.
- Use the recommended oil according to the ambient temperature in the table below.

Contain-er	Fluid type	Environmental temperature										Recom-mended oil fluid	
		-22	-4	-14	32	50	68	86	104	12-2°F			
		-30	-20	-10	0	10	20	30	40	5-0°C			
Engine oil pan	Engine oil												SAE 5W-30
													SAE 5W-40
													SAE 10W-30
													SAE 15W-40 *

CAUTION

- Use low sulfur fuel with a cloud point of at least 10°C below the minimum desired fuel temperature. Cloud point means the temperature at which the waxy crystals in the diesel begin to form.
- Commercially available grades of diesel used shall have the sulfur content of less than 15ppm.
- Keep the fuel clean and free of moisture or foreign matters when refueling.

3. Hydraulic oil

The hydraulic system uses Caltex anti-wear hydraulic oil HDZ46 (code: B420106000036).

CAUTION

When operating at low ambient temperatures below 0°C, the following temperature-raising operations must be performed to ensure the safety of the hydraulic system:

- Start the engine and let it idle for 7 to 10 minutes and then increase the speed to 1000 to 1200 r/min. Do not perform any operation on the excavator, and allow it to run for 30 to 40 minutes or more under no load in order to increase the hydraulic oil temperature to 20 °C or more.
- After the above temperature-raising operations are completed, normal construction works can be performed, and the temperature-raising time shall be appropriately adjusted according to the ambient temperature. When normal construction works start, the handle and the foot valve shall be slowly operated, and close attention shall be paid to the operation conditions of the system. Working at the hydraulic oil temperature below 20 °C may damage the hydraulic components.
- Select the appropriate hydraulic oil according to the working area where the machine is located. Before the machine leaves the factory, our company is responsible for filling the appropriate brand of hydraulic oil. After the machine leaves the factory, the user is responsible for changing the oil. The user may consult our company's **after-sales service personnel to obtain the correct hydraulic oil specifications and brands.**

Capacity table

Specified capacity		Engine oil pan	Swing mechanism box	Final gearbox	Hydraulic system	Cooling system	Fuel tank	DEF tank
SY155U	L	15	1.8	2×2.2	110	16	210	20
	US gal	3.96	0.48	2×0.58	29.06	4.23	55.48	5.28

5.6 Tightening Torque

CAUTION

- If the nuts, bolts, or other parts are not tightened to the specified torques, the tightened parts may become loose or damaged, causing the machine faults or problems during operation.
- Be careful when tightening the parts.

Unless otherwise specified, the metric nuts and bolts shall be tightened to the torques shown in the table below.

If the bolts or nuts need to be replaced, they shall be replaced with the same sizes of Sany Heavy Machinery Co., Ltd. original parts.

Table of Tightening Torques

No.	Bolt Specification	Torque (N·m)	
		Grade 10.9	Grade 12.9
1	M6	13.2±1.4	16.2±1.6
2	M8	31±3	38.7±4
3	M10	66±7	78±7
4	M12	113±10	137±10
5	M14	177±19	210±20
6	M16	279±30	339±30
7	M18	382±39	450±40
8	M20	549±59	664±59
9	M22	697±70	864±85
10	M24	927±103	1100±100
11	M27	1320±140	1683±150
12	M30	1785±170	2200±200
13	M33	2295±200	2900±280
14	M42	4700±450	5985±590
15	M48	7140±650	9100±900

- Use the following table for hydraulic hoses

Hose			
Nut	Torque (N·m)	Joint	Torque (N·m)
M14	24.5±5	M14	34.3±5
M18	51±8	M16	54±5
M22	74±14	M18	70±10
M26	105±20	M20	93±10
M30	135±20	M22	125±10
M36	166±26	M24	142±20
M42	240±30	M26	180±20
(Pipe) Joint			
Metric	Torque (N·m)	British	Torque (N·m)
M14	24.5±5	G1/8"	16.7±2
M16	45±7	G1/4"	36.7±2.5
M18	51±8	G3/8"	73.5±5
M20	58±8	G1/2"	107.8±7.8
M22	74±14	G3/4"	161.7±14.7
M24	74±14	G1"	220±25
M26	105±20		
Plug			
Metric	Torque (N·m)	British	Torque (N·m)
M20	49±5	G3/8	68.6±20
M24	68.6±10		
Nozzle			
British	Torque (N·m)		
G3/4 (A)	161.7±14.7		

5.7 Safety Critical Parts

When operating or driving the machine, the user must regularly maintain the machine in order to always ensure safety. In addition, in order to further improve safety, the user shall periodically replace the parts listed in the table. These parts are closely related to safety and fire protection.

As the materials of safety critical parts will become aged or deteriorated over time, it is difficult to judge if such parts are normal through regular maintenance and visual inspection. Therefore, they shall be replaced regardless of their conditions once the specified time expires. This can effectively guarantee the functions of these parts.

The safety critical parts, if have any abnormality before the end of their replacement cycles, must be repaired or replaced immediately.

If the hoses clips are deteriorated (such as deformation or cracks), they shall be replaced together with the hoses.

O-rings, gaskets, and other similar parts must be replaced while you replace the hoses.

Contact your Sany Heavy Machinery Co., Ltd. authorized dealer to replace the safety critical parts.

List of Safety Critical Parts

No.	Regular Replacement of Safety Critical Parts	Quantity	Replacement Cycle
1	Fuel hose (fuel tank - water separator)	1	Every 2 years or 4000 hours (whichever occurs first)
2	Fuel hoses (water separator - fuel transfer pump)	1	
3	Fuel hoses (fuel transfer pump - fuel primary filter)	1	
4	Fuel hoses (fuel primary filter - engine)	1	
5	Fuel hoses (engine - fuel radiator)	1	
6	Fuel hoses (fuel radiator - fuel tank)	1	
7	Pump outlet hoses (pump - control valve)	2	
8	Work equipment hoses (boom cylinder inlet)	4	
9	Work equipment hoses (bucket cylinder line - boom root)	2	
10	Work equipment hoses (bucket cylinder inlet)	2	
11	Work equipment hoses (arm cylinder line - boom root)	2	
12	Work equipment hoses (arm cylinder inlet)	2	
13	Swing line hoses (swing motor inlet)	2	
14	Main suction hoses	1	
15	Travel line hoses (control valve - swivel joint)	4	
16	Travel line hoses (swivel joint - travel motor)	4	
17	Dozer hoses (swivel joint - dozer cylinder)	4	
18	Pump pressure hoses	1	
19	Accumulator (for oil line control)	1	
20	High pressure line clamp	1	
21	Seat belt	1	Every 3 years

5.8 Maintenance Schedule

The standard calendar time or operation time is used as inspection and maintenance time, whichever occurs first.

If the machine is equipped with a hydraulic breaker, the maintenance schedule for some parts may vary. See [“Replacement of hydraulic fluid and hydraulic tank filter”](#) on page 7-13 for details.

Maintenance Schedule

Initial 50-hour maintenance (after the first 50 hours only)	5-21
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Checking and tightening track shoe bolts	5-21
Checking and adjusting track tension	5-22
Replacement of bucket	5-25
Replacing bucket teeth (horizontal pin type).....	5-27
Adjusting bucket clearance	5-29
Checking and maintaining air conditioning	5-31
Checking air springs.....	5-33
Checks before startup	5-35
Maintenance after every 100 h	
Lubricating work equipment.....	5-35
Maintenance after every 250 h	
Checking, cleaning and replacing air filter element	5-38
.....	
Checking and adjusting belt tension of HVAC compressor	5-41
Lubricating swing bearing	5-42
Checking whether pipe clamps and collars of the hydraulic system are abnormal	5-43
Maintenance after every 500 h	
General	5-44
Checking the level of grease in swing pinion and add grease.....	5-44
Replacing the oil in engine oil pan, and replace the oil filter element	5-45
Replacing fuel primary filter element	5-47
Replacing fuel secondary filter and fine filter element	5-49
Cleaning and inspecting radiator and cooler fins.....	5-52
Cleaning the ventilation/circulation filter of HVAC	5-53
Checking the oil level in swing gearbox and refilling	5-55
Checking the oil level of travel gearbox and refilling.....	5-56
Replacing hydraulic tank breather filter element	5-57
Maintenance after every 1000 h	
General	5-58
Replacing hydraulic oil filter element	5-58
Replacing the oil in swing gearbox	5-60
Checking the cab door lock and the front window lock for fastening	5-62

Checking the lubricating oil of cab door hinge and front window slide guide and refill.....	5-63
Checking the rocker nut of wiper for looseness.....	5-64
Checking all fastening parts of the engine exhaust pipe clamp.....	5-64
Checking the fan belt tension and replace the fan belt.....	5-64
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Replacing the oil in hydraulic tank	5-70
Replacing the engine coolant and cleaning the inside of cooling system	5-72
Checking alternator.....	5-74
Checking and adjusting engine valve clearance	5-74
Maintenance after every 4000 h	
General	5-74
Checking water pump	5-74
Checking starter motor.....	5-74
Replacing accumulator	5-75
Checking the high pressure pipe clamp for looseness, and the rubber for hardening	5-76
Checking the operation of compressor.....	5-76
Maintenance after every 8000 h	
General	5-76
Replacing high pressure pipe clamp.....	5-77
Maintenance after every 10000 h	5-77
Maintenance of machines placed for a long time	5-77

5.9 Maintenance Procedures

5.9.1 Initial 50-hour maintenance (after the first 50 hours only)

- Replace the engine oil and the oil filter element. For details on the replacement or maintenance method, see the “Maintenance after Every 500 Hours” section.

5.9.2 Maintenance as demanded

5.9.2.1 Checking and tightening track shoe bolts

If the machine is used with the loose track shoe bolts [1], you must tighten the loose bolts immediately because they will break.

Tighten

Three-rib track shoes

1. Tighten them to the torque of 800-900 N.m firstly.
2. Then check if the nuts and track shoes are in close contact with the link faces.
3. After inspection, tighten them by 45° again.
4. Finally tighten them to the torque of 1320-1418N.m.

Tightening sequence

Tighten the bolts in the order shown on the right figure. After tightening, check whether the mating surfaces between the nuts and the track shoes and the links are in close contact.

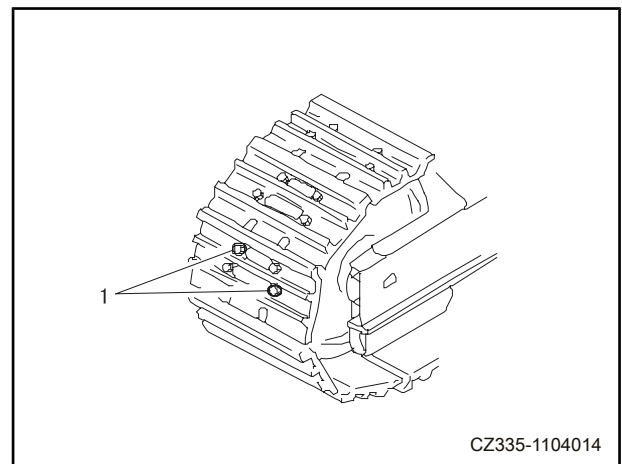


Fig.5-1

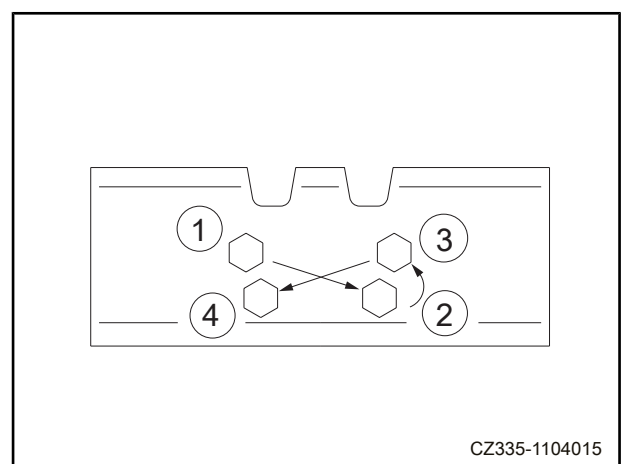


Fig.5-2

5.9.2.2 Checking and adjusting track tension

The wear of the pins and their bushings on the lower body part varies with the work conditions and soil types. Therefore, the track tension shall always be checked to maintain the standard tension.

Stop the machine on a flat, solid ground to check and adjust the track shoes.

Inspection

1. Start the engine and operate it at an idle speed and then move the machine forward a distance. This distance is equivalent to the length of the tracks on the ground. Then stop the machine slowly.

2. Select a straight stick and place it over the track shoes above the idler [1] and the carrier roller [2] (see the right figure).

3. Measure the maximum distance "a" (sag) between the upper surface of the track and the bottom surface of the stick.

The standard value of "a" should be: 10 to 30 mm (0.4 to 1.2 in)

Adjustment

If the track tension is not standard, adjust it as follows.

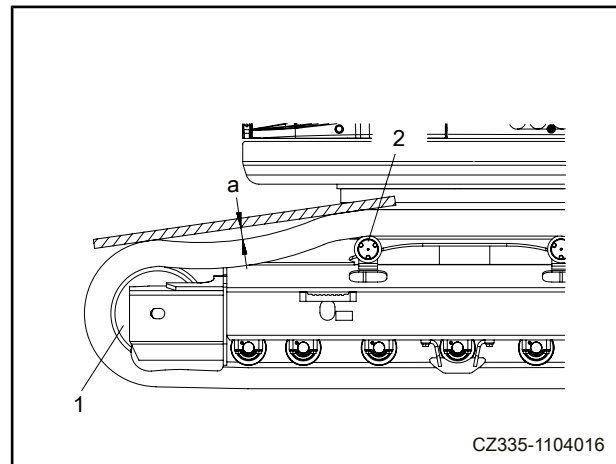


Fig.5-3

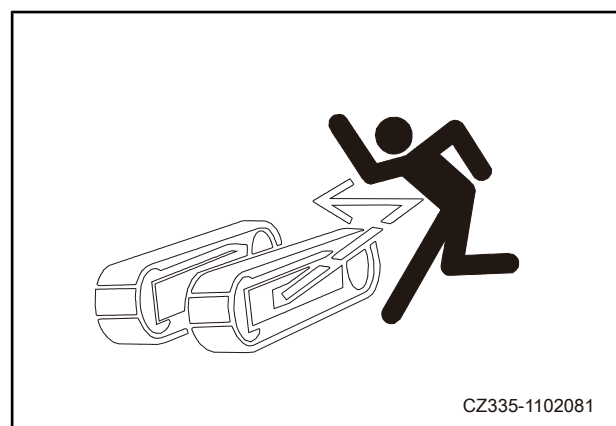


Fig.5-4

⚠ WARNING

- If the specified maintenance procedures are not followed during the adjustment of the track tension, the grease drain plug may fly off, causing serious injuries or even deaths.
- When adjusting the track tension, keep your face, hands, feet, or other parts of your body away from the front of the grease drain plug.

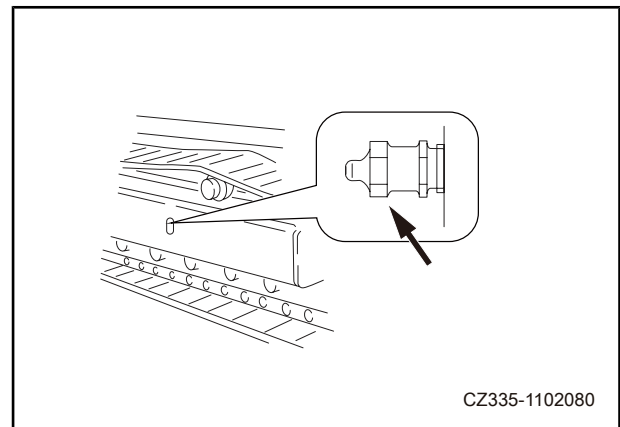
Increase track tension

⚠ WARNING

- Never loosen the grease drain plug when you increase the track tension. Otherwise, this may cause serious injuries or deaths.

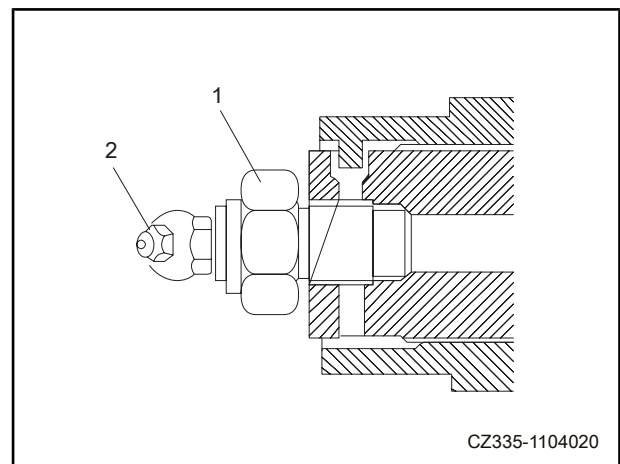
Prepare a grease gun when increasing the tension.

1. Use the grease gun to fill grease through the grease fitting [2]. (The grease fitting [2] is combined with the grease drain plug [1].)
2. To check if the track tension is proper, slowly move the machine 7 to 8m (23ft-26ft 3in) forward and then stop it slowly.
3. Check the track tension again. Readjust it if the tension is inappropriate.



CZ335-1102080

Fig.5-5



CZ335-1104020

Fig.5-6

4. Continue to fill grease until the size [S] is zero. If the tension is still loose, this shows the pins and their bushings are worn excessively. You must reverse or replace them. Contact your Sany Heavy Machinery Co., Ltd. authorized dealer for repairs.

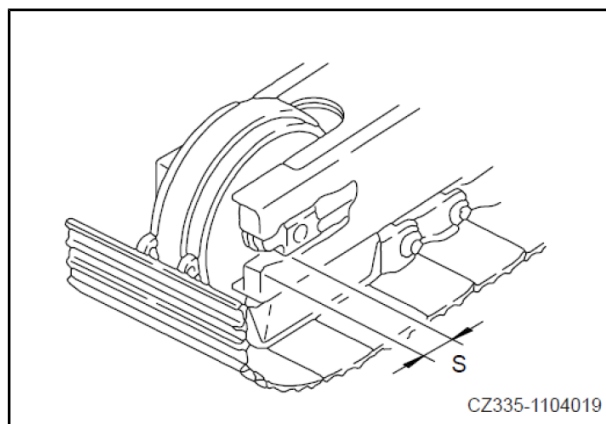


Fig.5-7

Loose track tension

⚠ WARNING

- Do not loosen the grease drain plug more than one turn because it may fly off under high pressure conditions.
- Do not loosen any part other than the grease drain plug.

Prepare a long socket wrench when loosening the tension.

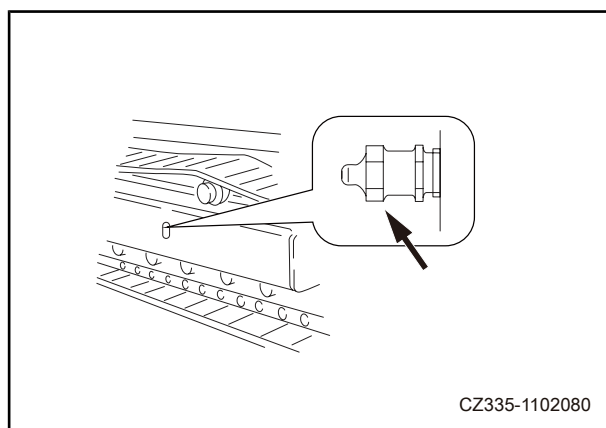


Fig.5-8

1. Use the long socket wrench to slowly rotate the grease drain plug [1] counterclockwise to release grease. The grease will be discharged from the grease fitting [2].

You can only loosen the plug [1] one turn at most.

2. If the grease cannot be drained smoothly, you may move the machine a short distance forward and backward.

3. After obtaining a proper track sag, tighten the plug [1] clockwise.

To check if the tension is appropriate, run the engine at an idle speed, slowly move the machine forward (the distance is equivalent to the length of the track shoe on the ground) and then stop it.

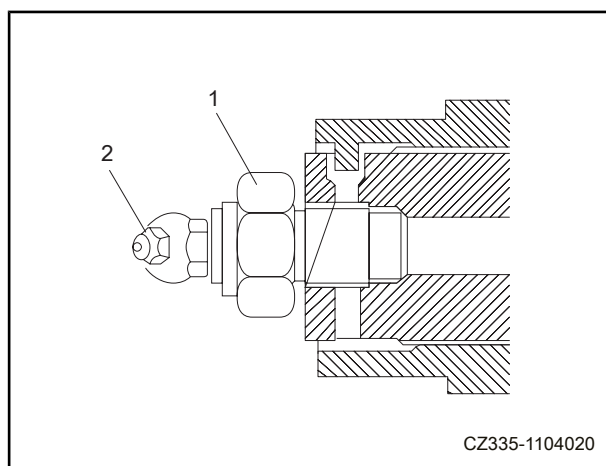


Fig.5-9

4. Check the track tension again. Readjust it if the tension is inappropriate.

NOTE :

- Gravel or soil between the chain wheels and the track chains shall be removed before loosening of the tracks.
- If the track tension cannot be loosened as described above, contact your Sany Heavy Machinery Co., Ltd. authorized dealer for repairs.

5.9.2.3 Replacement of bucket

⚠ CAUTION

- When you knock on the pins with a hammer, metal fragments may fly off and cause serious injuries. You must wear goggles, safety helmets, protective gloves, and other protective equipment when performing such operation.
- The pins, if knocked forcedly, may fly off and injure people surrounding them. Before starting such operation, make sure that there are no other persons in the surrounding area.
- Do not stand behind the bucket when disassembling the pins. Be careful not to place your feet under the bucket when working at one side.
- When removing or installing the pins, be careful not to get your fingers caught.
- When aligning the pin holes, do not insert your fingers into the holes.

1. Stop the machine on a solid, level ground. Gently lower the bucket to a position just in contact with the ground.

If you lower the bucket to the ground with excessive force, the resistance will increase at the pins, which will not be easily removed.

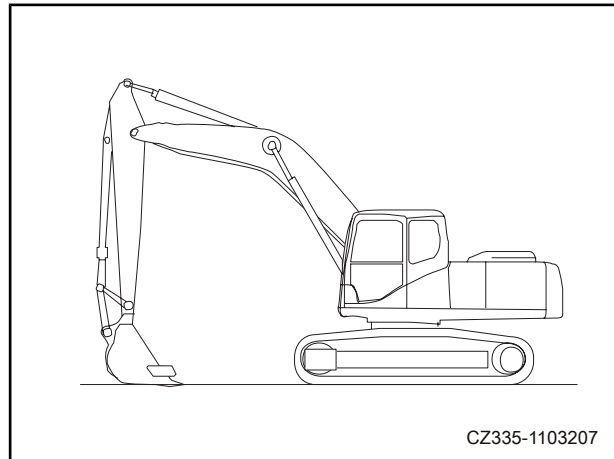


Fig.5-10

2. Remove the double nuts on the arm pin [A] and the link pin [B], remove the bolts, pull out the arm pin [A] and the link pin [B], and finally remove the bucket.

NOTE :

- After removing the pins, make sure not to get mud or sand on the pins.
- Take care not to damage the dust seals and wear rings installed on both ends of the bushings.

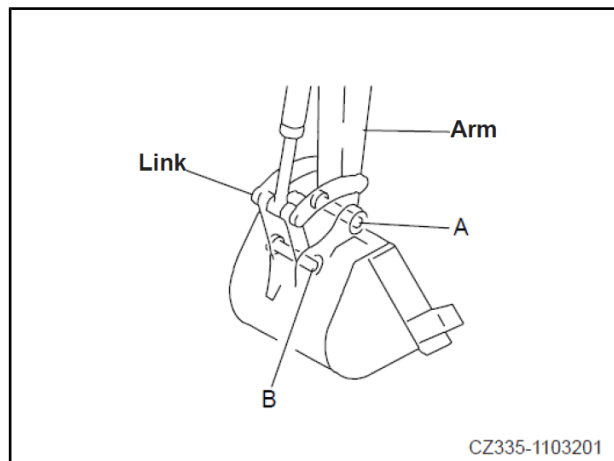



Fig.5-11

3. Align the arm with the hole [1] of the replaced bucket and the link with the hole [2]. Then insert the greased pins [A] and [B] into the holes [1] and [2] respectively.

 WARNING
<ul style="list-style-type: none"> • When performing connection works, appoint a commander and follow his commands and instructions.

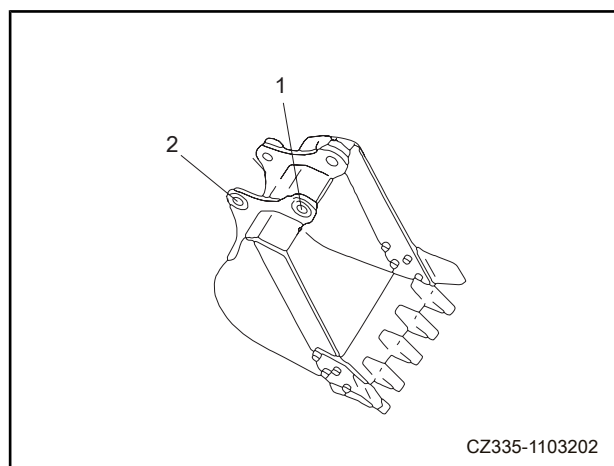


Fig.5-12

NOTE :

When installing the bucket, for the arm pin position [A], put the bucket O-ring [3] into the position shown in the right figure. After inserting the pins, install them into standard slots.

4. Install the retaining plate bolts and nuts for all pins and then fill grease to such pins.

NOTE :

- Lubricate them thoroughly with grease until grease is squeezed out of the end faces.
- The dust seals, if damaged, shall be replaced while you replace the bucket. If the damaged seals are used, sand or dust may enter the pins, causing their abnormal wear.

5.9.2.4 Replacing bucket teeth (horizontal pin type)

Replace the bucket teeth before the bucket teeth base is worn.

⚠ WARNING

- Before replacing the bucket teeth, keep the work equipment in a stable state, turn off the engine and lock all travel levers securely. Otherwise, this may cause danger due to misoperation.
- If you knock out the lock pin with excessive force, there is a danger that the pin will fly off. Check and make sure that there is no person in the surrounding area.
- You must wear safety glasses, gloves and other protective equipment because fragments may fly off during replacement.

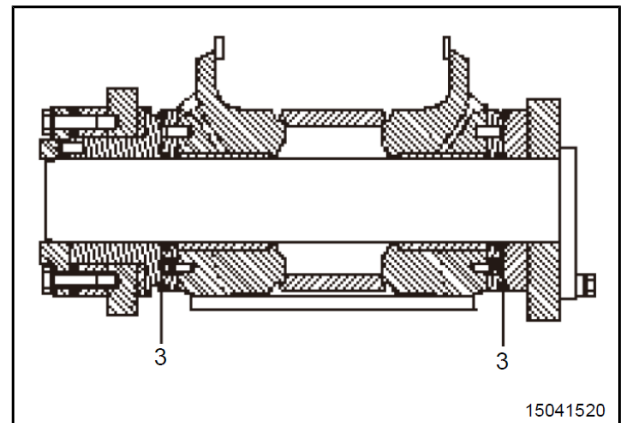


Fig.5-13

1. Place a block at the bottom of the bucket (as shown on the right figure) to remove the bucket teeth pins and keep the bottom of the bucket level.

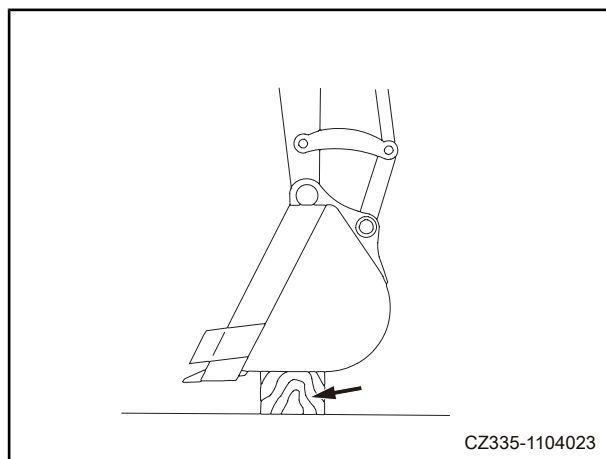


Fig.5-14

2. Check and make sure that the work equipment is in a stable state and then place the safety lock lever on the “lock” position.

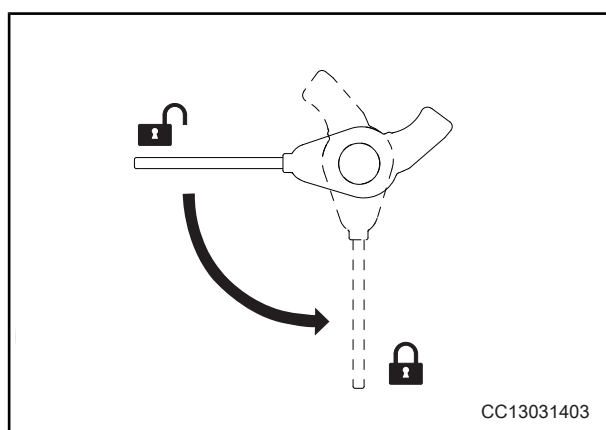


Fig.5-15

3. Place a metal rod on the top of the pin [1], knock the rod with a hammer to knock the pin [1] out and remove the bucket teeth [2].

NOTE :

- Use a metal rod slightly smaller in diameter than the pin.
- If you cannot safely remove the bucket teeth with this method, contact your Sany Heavy Machinery Co., Ltd. authorized dealer for replacement.

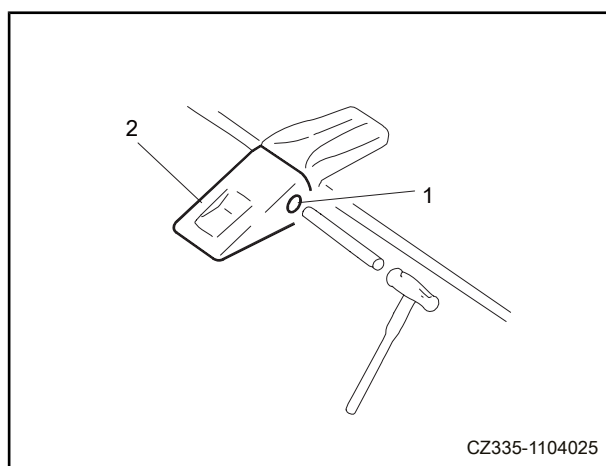


Fig.5-16

4. Remove the tooth bushings and check the lock pin for any damage. Replace it if necessary. Worn lock pins and bucket teeth must be replaced with new ones.

5. Clean the mounting surface, put the clip spring into the mounting hole of the tooth base and then put the new bucket teeth [2] into the tooth base, push the pin [1] into the part by hand, and then use a hammer to knock in the pin to lock the bucket teeth onto the tooth base.

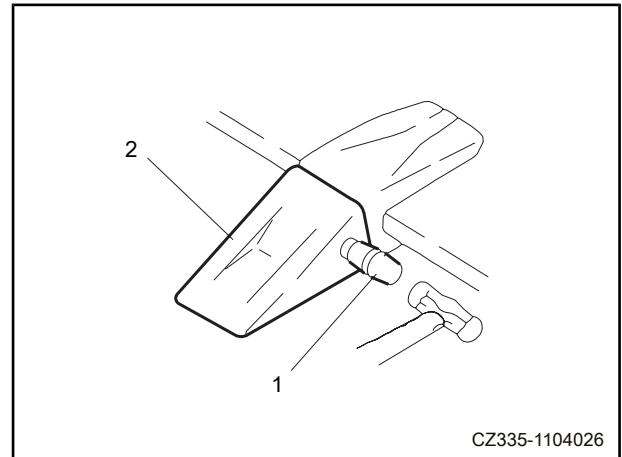


Fig.5-17

5.9.2.5 Adjusting bucket clearance

⚠ WARNING

- When adjusting the clearance, keep the work equipment in a stable state, turn off the engine and lock all travel levers securely. Otherwise, this may cause danger due to misoperation.

After the machine is used for a period of time, the connection clearance of the bucket must be properly adjusted. When the connection clearance is too large or too small, you need to install or remove the adjusting shims.

1. Stop the machine on a level ground. Lower the bucket to the ground. The location where the work equipment is placed is shown in the right figure.

2. Run the engine at an idle speed. Secure the bucket on the ground and slowly rotate it counterclockwise until the left inner end of the bucket is in close contact with the left end face of the arm.

3. Turn off the engine and pull the safety lock lever to the “lock” position.

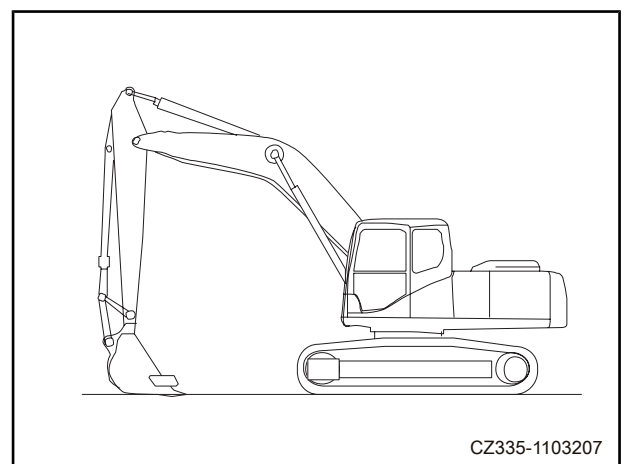


Fig.5-18

4. Move the O-ring [1] and accurately measure the clearance "a" with a feeler gauge.

5. Unscrew the 2 bolts [3], washers [4] and the pressure plates [2] and knock out the pin [5] to disconnect the bucket [6] and the arm [8].

6. Add the washers [7] based on actual wear conditions so that the clearance is less than the thickness of one washer.

7. Knock the pin [5] back to its original position, and then install the pressure plates [2], the washers [4] and the bolts [3] to their original positions.

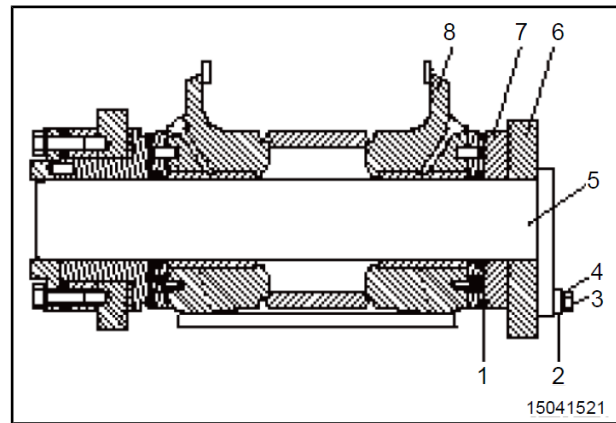


Fig.5-19

5.9.2.6 Checking window washer fluid level and filling washer fluid

During each routine maintenance of the machine, check and fill the washer fluid and check the working condition of the washer by turning on its switch.

When the washer fluid is insufficient, the ejected washer fluid will contain bubbles. When this occurs, check the fluid level in the reservoir (located in the access door on the left side of the machine). Fill the washer fluid if needed.

1. Open the access door on the left side of the machine and then you can see the reservoir;

2. Open the cover of the reservoir, fill the washer fluid, and then close the cover tightly;

3. Turn on the washer switch to check if the spray is normal.

NOTE :

When filling the washer fluid, be careful to prevent dust from getting into the fluid.

Mixing ratio of pure washer fluid to water

Select the mixing ratio according to the ambient temperature. Before filling, dilute the

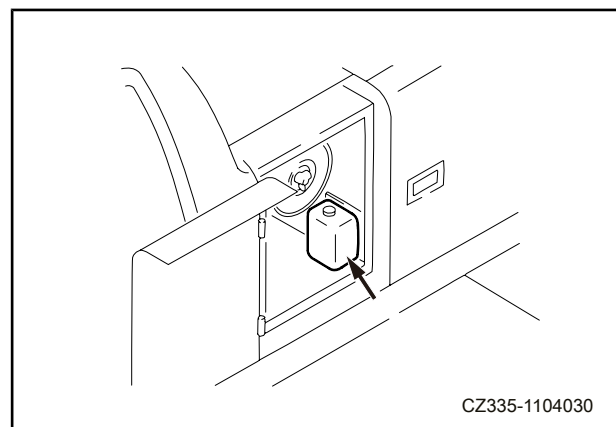


Fig.5-20

washer fluid with water at the ratio shown in the table below.


Operating Area	Mixing Ratio of Washer Fluid to Water	Anti-freeze Temperature
General	1:2	- 10°C (14 °F)
Winters in cold areas	1:1	- 20°C (- 4 °F)
Winters in extremely cold areas	Pure washer fluid	- 30°C (- 22 °F)

NOTE :

There are two kinds of washer fluid used at -10°C (14°F) (common) and -30°C (-22°F) (in cold areas), depending on the operation areas and seasons.

5.9.2.7 Checking and maintaining air conditioning

Check the refrigerant (gas) level

 WARNING
<ul style="list-style-type: none"> • Do not touch the refrigerant because it will cause blindness or frostbite after getting into your eyes or dipping on your hands. Do not loosen any part of the refrigerant line. • Keep any open fire away from the position where the refrigerant gas leaks.

The refrigeration performance of the air conditioner will be poor if the refrigerant (R134a) is not sufficient. When the air conditioner is operated with insufficient refrigerant, the compressor may be damaged.

When the engine idles at a high speed and the air conditioner is in a state of maximum refrigeration, observe the inspection window [2] on the condenser reservoir [1] and check the situation of the refrigerant flowing into the refrigerant lines.

- The refrigerant flows and there is no bubble: it is appropriate
- The refrigerant flows and there are bubbles (continuous passage of bubbles): it is insufficient
- The lines are colorless and transparent: there is no refrigerant

NOTE :

In the case of insufficient refrigerant, contact your Sany Heavy Machinery Co., Ltd. authorized dealer to fill the refrigerant.

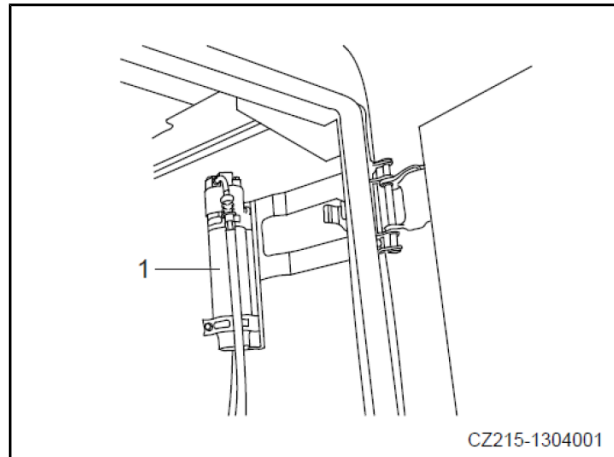


Fig.5-21

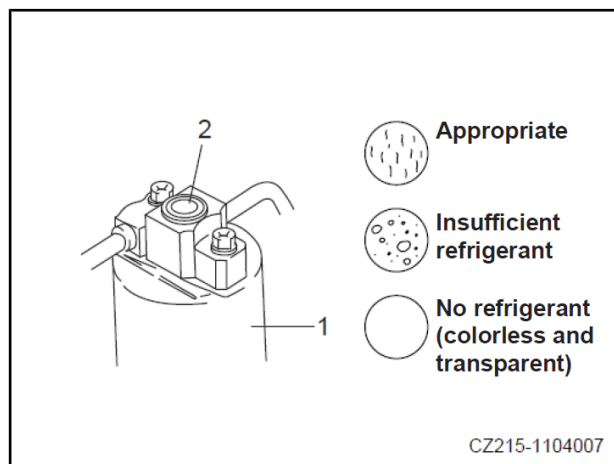


Fig.5-22

Inspection under unused circumstance

When the machine is not used for a long time, it is necessary to operate the air conditioner for 3 to 5 minutes once every month and lubricate various parts of the compressor.

Table of Inspection and Maintenance Items of Air Conditioning Equipment

Inspection and Maintenance Item	Content	Maintenance Period
Refrigerant (gas)	Filling amount	Twice a year, in spring and autumn respectively
	Leakage at the line connections and inside the parts	Daily
Condenser	Clogging of radiator fin	Every 500 h
Compressor	Function	Every 4000 h
V-type belt	Loosing and bending	Every 250 h

	Deterioration, wear, scratch and crack	Every 250 h
	Noise, odor, or abnormal heating	When necessary
Fan motor and fan	Function (check for abnormal noise)	When necessary
Air conditioning volume switch	Air volume switch control and switching function	Daily
Control mechanism	Function (check whether the function is normal)	When necessary
Connecting bolt	Loosening at the connections, and loosening or falling off of nuts or bolts	Half a year
Connecting line	Installation situation, whether the connection positions are loose and whether there is any leakage or damage	When necessary
Receiver-drier temperature difference	The temperature difference indicates that the dryer is clogged	One year

5.9.2.8 Checking air springs

⚠ WARNING

- The air springs are filled with high-pressure nitrogen. Improper operation may cause explosion, resulting in damage to the machine and personal casualties.
- Keep away from fire.
- Do not punch or weld them.
- Do not knock them to avoid any impact.

The air springs are located on the top of the cab (at the left and right).

In the following cases, contact your Sany Heavy Machinery Co., Ltd. authorized dealer for inspection, repair and replacement.

- When the top window of the cab cannot be easily opened.
- When the top window of the cab cannot be kept open.
- When oil or gas leakage of the air springs is found.

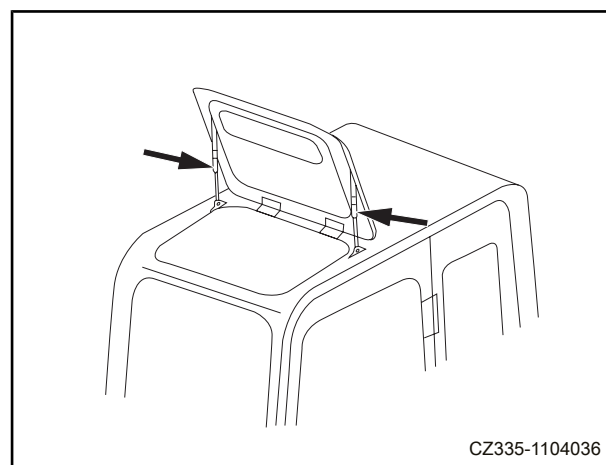


Fig.5-23

The method for release of internal pressure of hydraulic oil lines

⚠ WARNING

- When checking or replacing the fittings or the hoses, release the pressure in the hydraulic oil lines because they are always under pressure. If the pressure is not released, high pressure oil will be ejected and cause serious personal injuries.
- After the engine is turned off, the parts and oil are still at high temperatures, which may cause burns. Be sure to wait for cooling down and then start the operation.
- When the filler cap is removed, the oil will be ejected. Therefore, you shall slowly turn the cap to release the internal pressure before removing the cap.

1. Stop the machine on a level and solid ground.

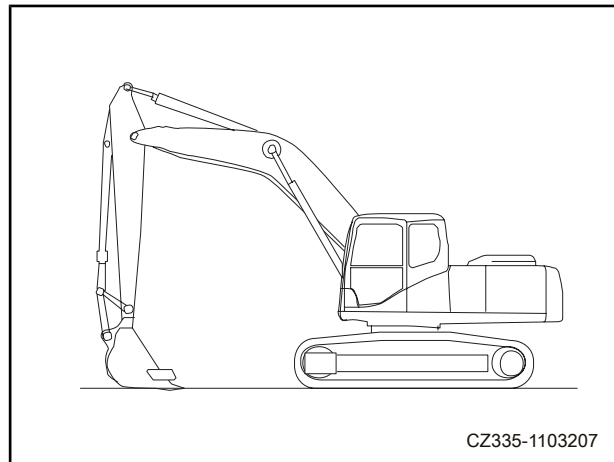


Fig.5-24

2. Within 15 seconds after stopping, turn the ignition switch to the [ON] position, pull up the safety lock lever to the "UNLOCK" position, and fully operate the travel lever and the operating handle in all directions to release the pressure of the pilot oil lines.

3. Unscrew the butterfly nut [1] of the breather valve on the hydraulic oil tank, and then press the exhaust button to release the internal pressure of the hydraulic oil tank.

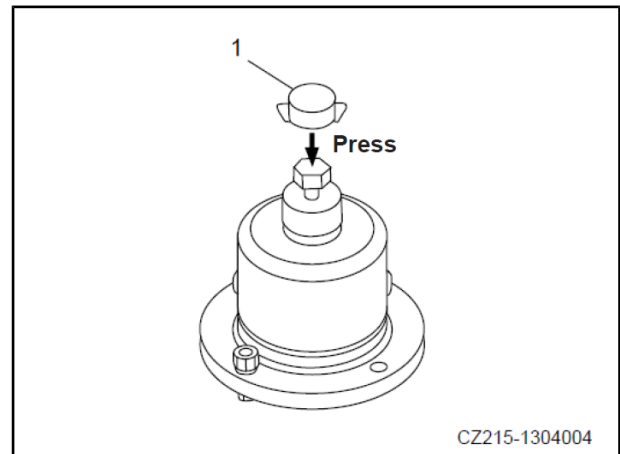


Fig.5-25

5.9.3 Checks before startup

For details on the following items, see "Checks before startup" in the operation manual.

- Drain water and sediments from the fuel tank
- Check the oil-water separator for water and sediments and drain water
- Check the level of oil in the hydraulic oil tank and fill oil
- Check the coolant level and fill the coolant
- Check the level of oil in the engine oil pan and fill oil
- Check the wires
- Check the fuel level and refuel
- Check the work light switch
- Check the function of the horn
- Check and keep the exhaust pipe under the engine smooth (under soil working conditions, check it at any time during working)

5.9.4 Maintenance after every 100 h

5.9.4.1 Lubricating work equipment

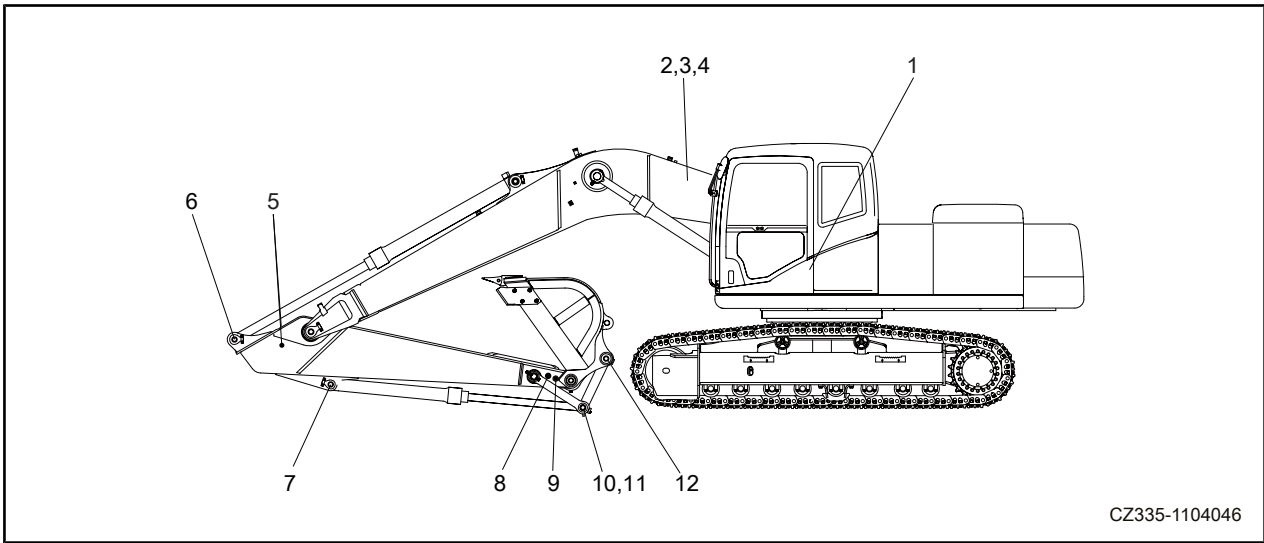
CAUTION

- If there is abnormal noise at the lubrication positions, perform other lubrication in addition to the lubrication during maintenance period.
- After excavating in water, lubricate the pins that are immersed in water.

1. Set the work equipment to the lubrication positions shown in the figure below, and then lower the work equipment to the ground and shut off the engine.

2. Use a grease gun to fill grease through the lubrication positions shown in the figure below.

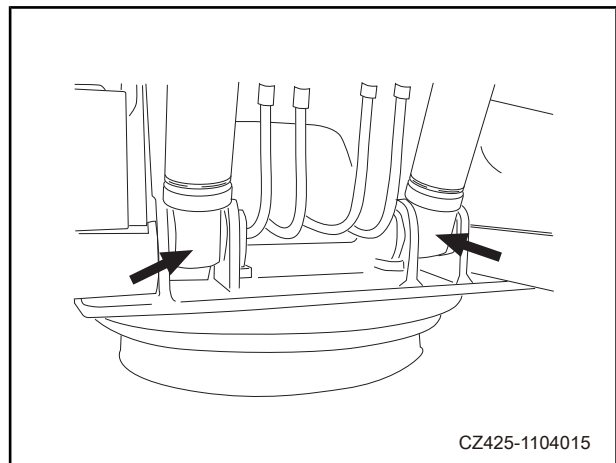
3. After filling the grease, wipe off the old grease that has been squeezed out.



CZ335-1104046

Fig.5-26

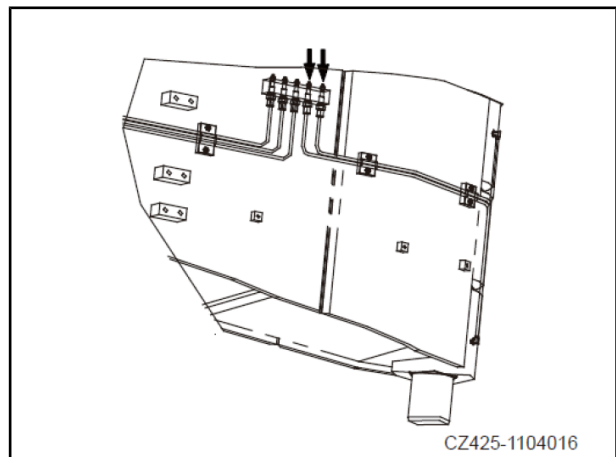
1. Boom cylinder root pins (2 positions)



CZ425-1104015

Fig.5-27

2. Boom foot pins (2 positions)



CZ425-1104016

Fig.5-28

- 3. Boom cylinder piston rod end (2 positions)
- 4. Arm cylinder root pin (1 position)

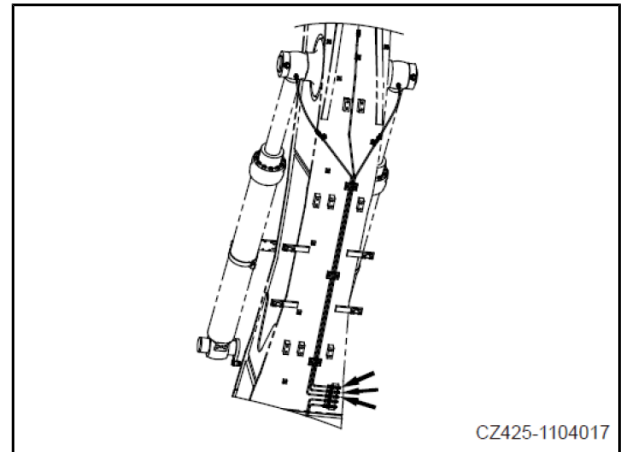


Fig.5-29

- 5. Boom-arm connecting pin (1 position)
- 6. Arm cylinder piston rod end (1 position)
- 7. Bucket cylinder root pin (1 position)

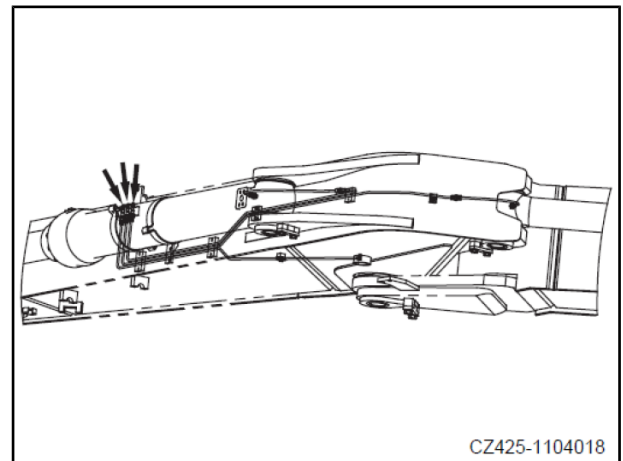


Fig.5-30

- 8. Arm-link connecting pin (1 position)
- 9. Arm-bucket connecting pins (2 positions)

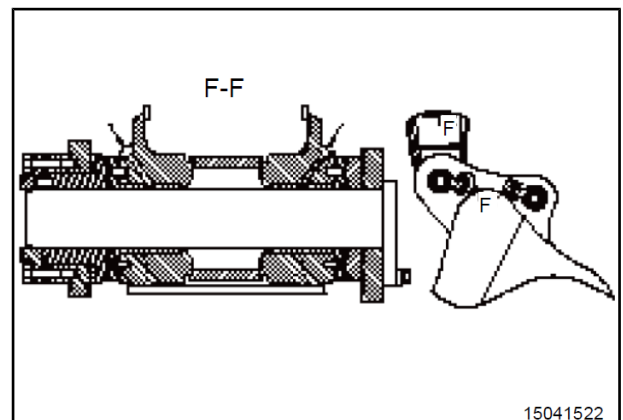


Fig.5-31

- 10.Link connecting pins (2 positions)
- 11.Bucket cylinder piston rod end (1 position)
- 12.Bucket-link connecting pin (1 position)

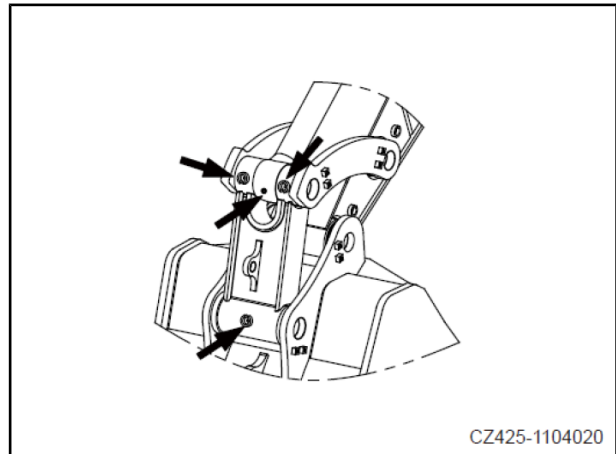


Fig.5-32

5.9.5 Maintenance after every 250 h

5.9.5.1 Checking, cleaning and replacing air filter element

CAUTION

- If you carry out checking, cleaning or replacement while the engine is running, dust may get into the engine and cause damage to it. Be sure to shut off the engine before performing these operations.
- Be sure to keep close matching between the sealing rubber of the end cover and the filter.
- Never take out the inner filter element for cleaning. This will get dust in and cause the engine failures.
- The inner and outer filter elements must be replaced at the same time.
- Wear goggles, dust masks or other protective devices when cleaning with compressed air.
- Do not forcibly pull out the outer filter element. When working at a high place or a place where footholds are unstable, be careful not to drop the outer filter element under the reaction force when pulling it out.

Cleaning and replacement of outer filter element

- Cleaning: when hearing the air filter blocking alarm or every 250 h.
- Replacement: cleaning for 6 times or every 1 year (whichever comes first).

1. Open the door at the radiator side (left rear) of the machine, remove the clip (or clamp) [1], and then remove the cover [2].

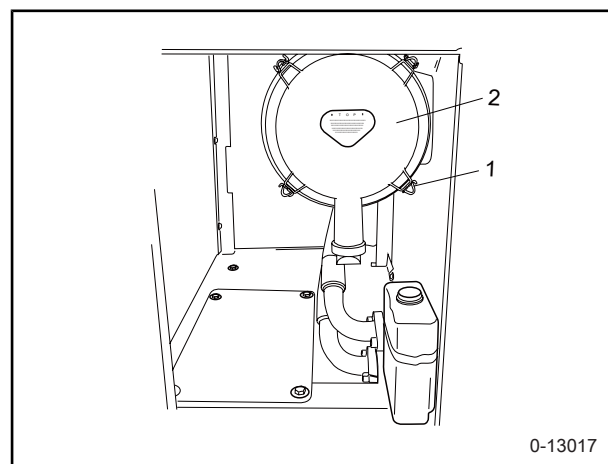


Fig.5-33

2. Hold the outer filter element [3], gently shake it up and down and left and right, and turn the filter element left and right to pull it out.

3. Check if the inner filter element [4] is shifted or tilted. If it is tilted, put it correctly by hand.

4. Use a clean cloth to cover the inner filter element [4] to prevent dust from getting into.

5. Clean the dust on the cover and inside the air filter housing [5].

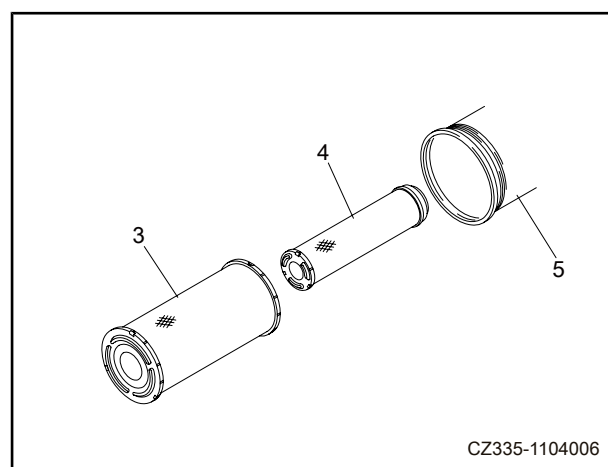


Fig.5-34

6. Purge with compressed air of 0.2 MPa or less along the wrinkles at the inner and outer sides of the primary element. Never blow with compressed air from outside to inside.

NOTE :

- Do not knock the filter element with any object when cleaning it.
- The filter paper, filter element, and seal ring, if damaged, cannot be used.
- If you have used the filter element or O-ring for one year, do not use them again after cleaning them because their reuse will cause malfunctions.

7. When the filter element is illuminated with a lamp after cleaning, the element must be replaced if small holes or thin portions are found on it.

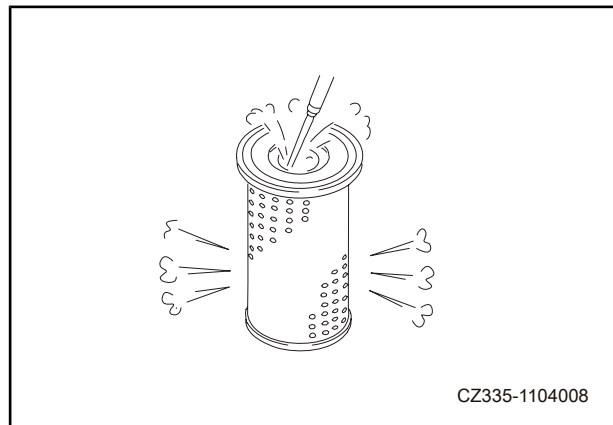


Fig.5-35

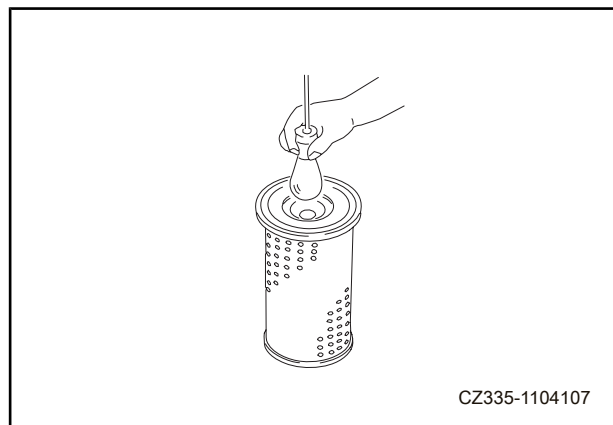


Fig.5-36

Replacement of inner filter element

1. Remove the outer filter element [3] and then remove the inner filter element [4].
2. Cover the air connector side with a clean cloth to prevent dust from falling in it.
3. Clean the inside of the filter body and then remove the covered cloth.
4. Install a new inner filter element [4] on the connector.
5. Install the outer filter element [3] and straightly push it into by hand. Hold the outer filter element gently and shake it up and down

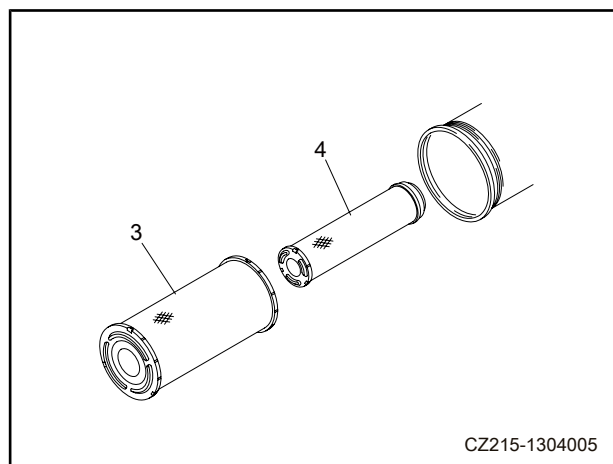


Fig.5-37

and left and right in order to easily insert the filter element.

6. Install the cover [2] correctly with the arrow mark facing up and then buckle the clip (or clamp) [1]. Check the gap between the air filter housing and the cover. Reinstall it if the gap is too big.

NOTE :

- The inner filter element must not be used again after being cleaned. Replace the inner filter element while replacing the outer filter element.
- If the inner filter element is not properly installed, but the outer filter element and the cover have been installed, this will put the outer filter element at risk of damage.
- Do not use counterfeit parts because they may allow dust to enter due to insufficient precision and cause damage to the engine.

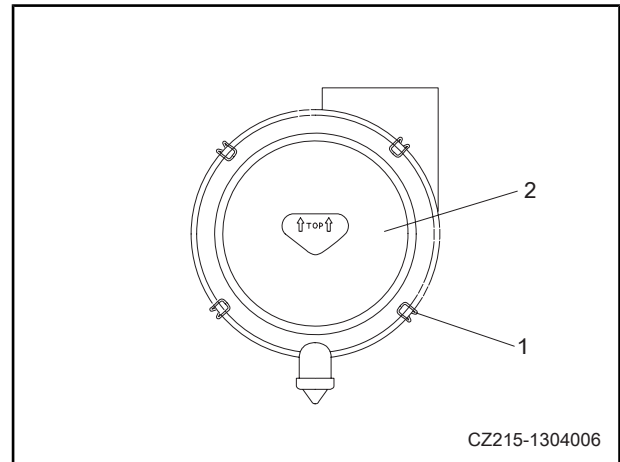


Fig.5-38

5.9.5.2 Checking and adjusting belt tension of HVAC compressor

Inspection

With the finger force of approximately 58.8 N (6 kgf), press the belt in the middle between the drive pulley and the compressor pulley and check that the deflection [A] should be 5-8 mm (0.20 in-0.31 in).

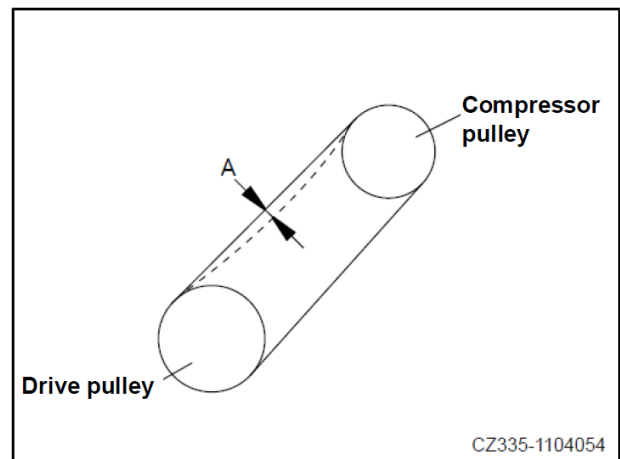


Fig.5-39

Adjustment

- Loosen the bolts [1] and [2].
- Move the compressor [3] and the bracket [4] together to adjust the belt tension.
- Position the compressor [3]. And then tighten the bolts [1] and [2].
- Check the belt tension again after adjustment.

NOTE :

- 1) Check whether each pulley is damaged, and check whether the V groove and V belt are worn. In particular, ensure that the V belt does not contact the bottom of the V groove.
- 2) If any of the following occurs, please contact the dealer authorized by SANY in your region to replace your belt.
 - The fan belt is already extended, with little margin for adjustment.
 - Any cutting or crack is found on the belt.
 - Abnormal slipping occurs or a squeaking sound is heard.
- 3) After installing a new V-type belt, readjust it after being used for 1 h.

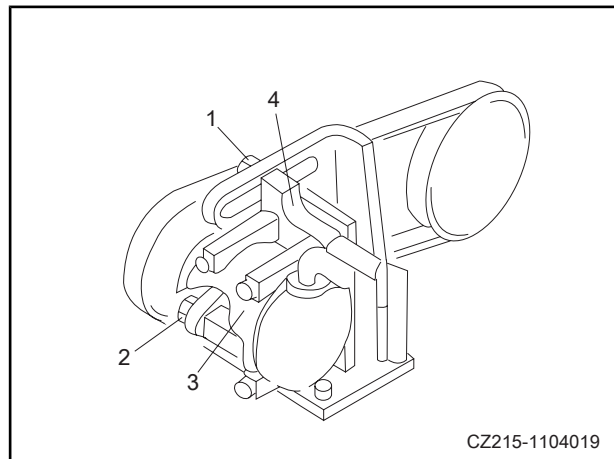


Fig.5-40

5.9.5.3 Lubricating swing bearing

WARNING

- It is dangerous to fill grease on the gear ring of the swing bearing. It is strictly prohibited to fill grease while it is rotating.

1. Lower the work equipment to the ground, shut off the engine and then pull the safety lock lever to the “lock” position.
2. Fill grease to both grease fittings while the machine is in a stable state.
3. Start the engine, pull the safety lock lever to the “unlock” position, lift the bucket 20 to 30 mm above the ground, turn the machine 90°, and fill grease by following the steps 1 and 2.
4. Repeat the operation for 2 times according to the step 3 to finish grease filling.

NOTE :

- Grease is used to prevent twisting at the connections and noise.
- Fill grease if any part becomes inflexible or produces noise after used for a long time.
- When filling grease, wipe away the old grease that has been squeezed out.
- Special care shall be taken to wipe away the old grease at all positions, and sand or dust getting into the grease may cause wear of the rotating parts.

5.9.5.4 Checking whether pipe clamps and collars of the hydraulic system are abnormal

- Check whether the pipe clamps of the hydraulic system are lost or deformed, or whether the bolts are loosened. Any pipe clamp, if lost or deformed, shall be replaced. Any bolt, if loosened, shall be tightened to the standard torque.
- Check whether the clamps at the oil return rubber hoses of the hydraulic system and the T-shaped clamps at the suction rubber hoses of the main pump are loosened. Tighten them to the standard torques if they

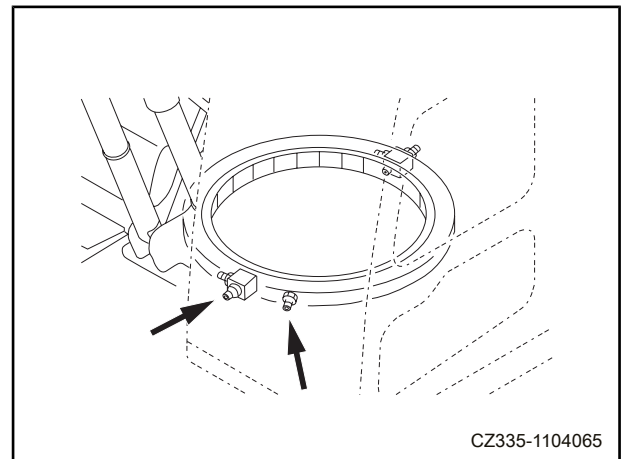


Fig.5-41

CZ335-1104065

are loosened. Replace them immediately if they are deformed or damaged.

5.9.6 Maintenance after every 500 h

5.9.6.1 General

Maintenance task scheduled for every 100 and 250 hours should be carried out simultaneously.

5.9.6.2 Checking the level of grease in swing pinion and add grease

- Prepare a dipstick.

1. Remove the bolts [1] (2) on the upper part of swing frame, then remove the lower cover [2].

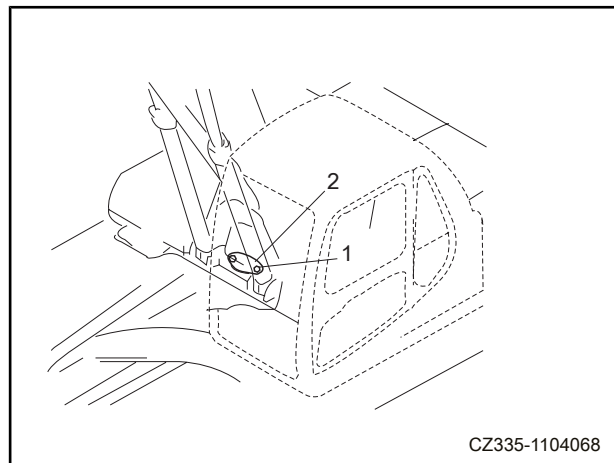


Fig.5-42

2. Insert the dipstick [3] into the grease through the inspection and adjustment holes, and check whether the grease level [S] of the part where the pinion passes is at least 14mm (0.6 in). Add grease if it is less than such value.

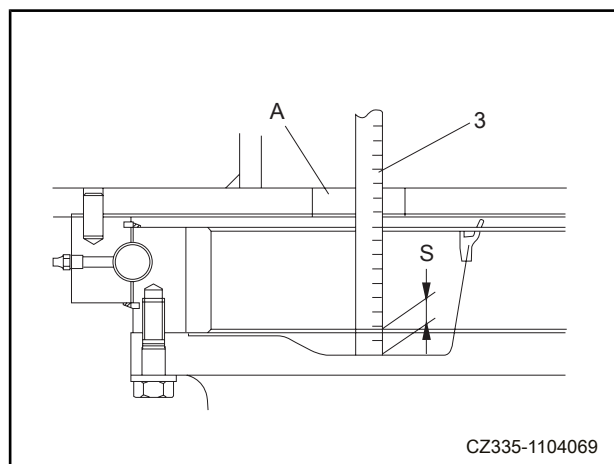


Fig.5-43

3. Check whether the grease is opalescent. If so, it has been contaminated. Please contact your Sany Heavy Machinery authorized dealer for replacement.

Total grease amount: 35L (9.24US gal)

4. Install the cover [2] with bolts [1].

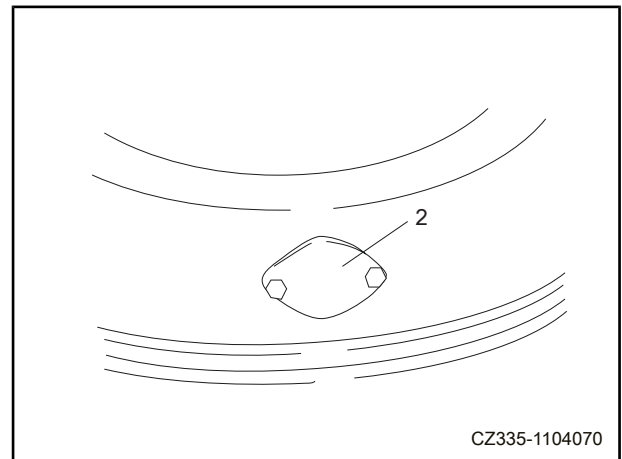


Fig.5-44

5.9.6.3 Replacing the oil in engine oil pan, and replace the oil filter element

WARNING

- When the engine has just stopped, the hot parts and oil may cause burns. Be sure to wait for cooling down and then start the operation.

- Oil pan capacity: see Capacity Table on the page 5-11.
- Prepare a filter element wrench

1. Remove the bottom cover plate from the bottom of the machine, then place an oil container under the drain valve [P] to allow oil to flow into the container through a clean cloth.

2. Open the drain valve on the bottom of the engine oil pan by the drain cock in the accessories box in order to drain the oil. After draining, screw off the drain cock and put it away.

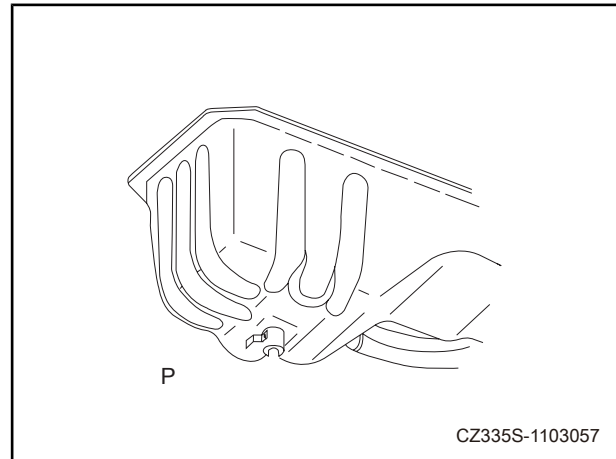


Fig.5-45

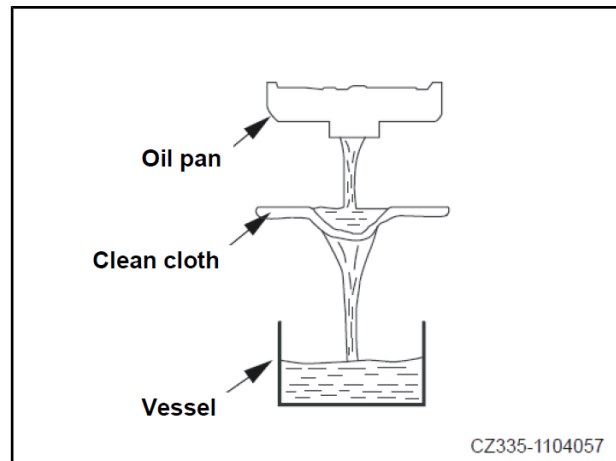


Fig.5-46

3. Open the access door on the right side of the machine, then turn the filter element [1] to the left with filter element wrench to remove it.

4. Clean the filter element base [2], fill the new filter element with clean oil through the outer ring hole, apply oil (or a thin layer of grease) to the sealing surface and thread of the filter element, and then install the filter element on the filter element base.

NOTE :

Check whether there is old seal on the filter element base [2], for fear of leakage.

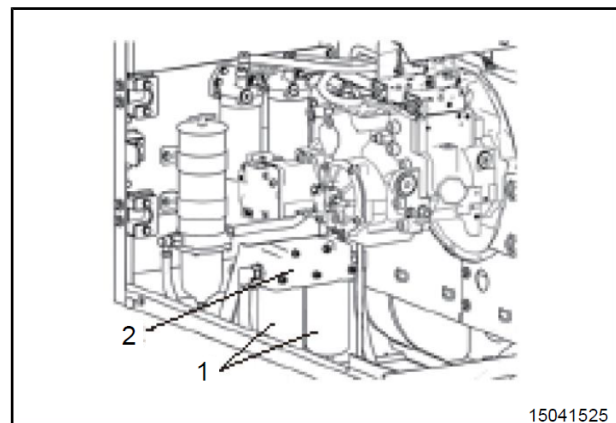


Fig.5-47

5. When installing, contact the sealing surface with the sealing surface of filter element base [2], and then tighten 3/4-1 turn.

6. After replacing the filter element, open the engine hood and add oil through filler to the level between H and L on the dipstick.

7. Turn off the engine after a short time of idle running. Check the oil level again to ensure it is between L and H.

For details, see "Check the oil level in oil pan" on the page 4-63.

8. Install the bottom cover.

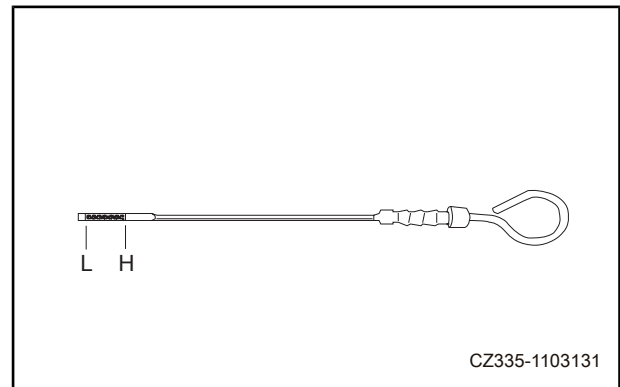


Fig.5-48

CAUTION

- Please purchase original oil from the Sany authorized dealer so that the oil quality can realize replacement cycle of 500 hours.

5.9.6.4 Replacing fuel primary filter element

WARNING

- After the engine is shut down, all parts are hot. Do not replace the filter until these parts are cooled.
- When the engine is running, high pressure will be generated in the fuel piping system.
- Replace the filter at least 30 seconds after the engine is shut down when the internal pressure has been reduced.
- Keep away from fire.

NOTE :

- The original Sany fuel filter element is a special filter with efficient filtration capacity. Therefore, when replacing the filter element, it is necessary to use original part.
- Use of other parts may cause dust or dirt contamination, resulting in faulted injection system. Therefore, alternative parts are not recommended.
- It is even more important to protect the fuel system against dirt during inspection or maintenance. If there is dust on the part, it should be rinsed with oil.
- Prepare a container to hold fuel discharged
- Prepare a filter wrench

1. Open the access door on the right side of the machine.

2. Put an appropriate container under the fuel pre-filter to catch the fuel discharged. Close the cut-off valve [F] in fuel line to prevent leakage during the replacement of filter element.

3. Loosen the drain valve [1] to remove all the water and sediment in transparent housing [2], as well as the fuel in filter element.

4. Unscrew the upper cover [3], lift the filter element, and replace the new filter element and the corresponding O-ring.

5. After replacing the O-ring of upper cover, tighten the upper cover. When installing, apply oil on the sealing surface, contact the sealing surface with the sealing surface of filter base closely, then tighten 1/4-1/2 turn.

NOTE :

If the upper cover is tightened excessively, the O-ring will be damaged, resulting in leakage. If it is not tightened sufficiently, fuel will leak from the gap of O-ring. To prevent such problems, it must be tightened to the specified angle.

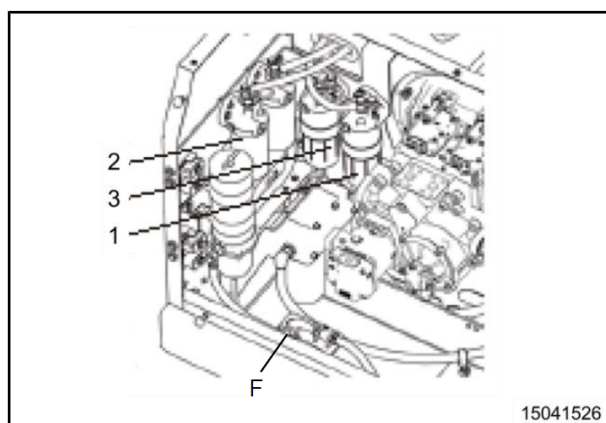


Fig.5-49

6. Check whether the drain valve [1] is firmly tightened.

7. Discharge air after the filter element [3] is replaced. For discharging method, see "Replace fuel fine filter element".

8. After replacing the filter element, start the engine and let it run for 10 minutes at low idle speed.

Check the sealing surface of filter base and the position where the upper cover is installed for any leakage. If so, check whether the filter element is properly tightened.

If oil still leaks, repeat steps 1-5 and remove the filter element. If the sealing surface shows any damage or foreign matter, replace with a new one.

5.9.6.5 Replacing fuel secondary filter and fine filter element

WARNING

- After the engine is shut down, all parts are hot. Do not replace the filter until these parts are cooled.
 - When the engine is running, high pressure will be generated in the fuel piping system.
 - Replace the filter at least 30 seconds after the engine is shut down when the internal pressure has been reduced.
 - Keep away from fire.
-
- The original Sany fuel filter element is a special filter with efficient filtration capacity. Therefore, when replacing the filter element, it is necessary to use original part.
 - Use of other parts may cause dust or dirt contamination, resulting in faulted injection system. Therefore, alternative parts are not recommended.
 - It is even more important to protect the fuel system against dirt during inspection or

maintenance. If there is dust on the part, it should be rinsed with diesel.

Prepare a container to hold fuel discharged.

Prepare a filter element wrench.

1. Open the right access door.
2. Put the fuel container under the filter element.
3. Loosen the drain valve [1] to remove all the water and sediment in transparent housing [3], as well as the fuel in filter element. Then tighten the drain valve [1].
4. Turn the filter cylinder clockwise with filter element wrench [2] to remove it.
5. Clean the filter element base, apply a thin layer of oil on the sealing surface of the new filter cylinder, rotate it counterclockwise to the sealing surface, and tighten 3/4 turn.

NOTE :

Do not add fuel to the fine filter cylinder.

6. Loosen the transparent housing [3] clockwise with filter wrench.
7. Replace the paper filter element.
8. Rotate the transparent housing counterclockwise to the sealing surface and tighten 1/4-1/2 turn.

NOTE :

- Do not add fuel to the transparent housing or the filter element.

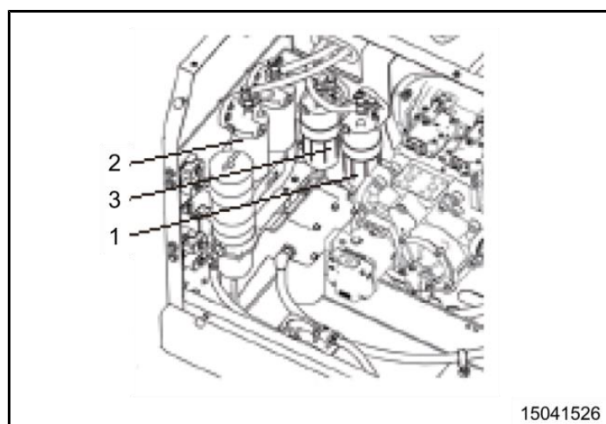


Fig.5-50

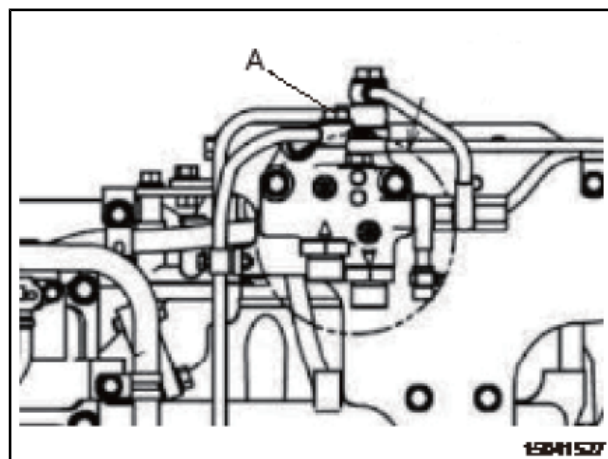


Fig.5-51

9. After replacing the filter element, check whether all drain valves are properly tightened, then exhaust.

Follow the steps below to exhaust.

10. Fill the fuel tank with fuel to facilitate exhaust; insufficient fuel will result in prolonged exhaust.

11. Open the cut-off valve on coarse filter inlet pipe.

12. Loosen the top screw plug [A] of the fuel fine filter mount on the engine, to connect the fine filter outlet. The arrow points to the upper hinge bolt.

13. Turn on the electromagnetic pump switch [B] to start pumping fuel. Stop pumping fuel until the pumped fuel converges into a stream and is ejected forcibly after bubbles are drained.

14. Tighten the bleed screw [A] to the torque of 34 Nm, turn off the electromagnetic pump switch [B] and close the rain cap [C].

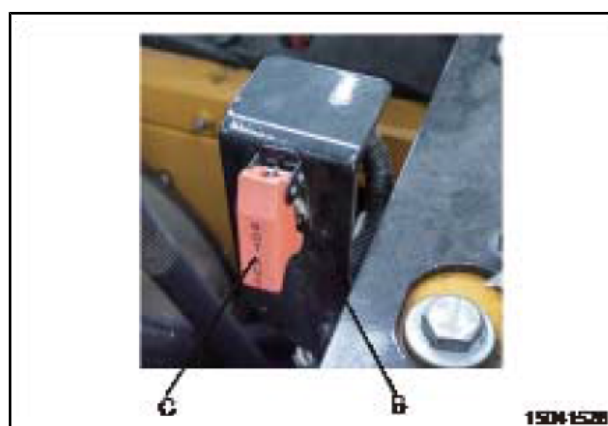


Fig.5-52

NOTE :

- If the fuel with bubbles is continuously ejected for a long time (about 10 minutes) during bleeding, check the joint surface of the first two seals for air leakage.
- Do not operate the electromagnetic pump when the engine is in normal operation, otherwise it may cause damage to the pump.
- After the engine is running out of oil, operate the electromagnetic pump or manual oil pump in the same method to exhaust.

15. After replacing the fine filter cylinder, start the engine and let it run for 10 minutes at low idle speed. Check the sealing surface of the cylinder for leaks. If oil leaks, check whether the filter cylinder is properly tightened; if leakage still exists, remove the cylinder in steps 1, 2, and 4. If the sealing surface shows any sign of damage or impurities, replace with new filter cylinder and install in Step 5.

5.9.6.6 Cleaning and inspecting radiator and cooler fins**⚠ WARNING**

- If the compressed air, high pressure water, vapor is directed towards the body or is used to remove dust or dirt, there is a risk of personal injury. Be sure to wear goggles, dust covers or other protective equipment.

⚠ CAUTION

- When the compressed air is used for cleaning, a certain distance shall be maintained to avoid damaging the radiator fins.
- In dusty workplaces, inspect the radiator fins daily irrespective of maintenance period.

1. Open the access door on the left side of the machine.

2. Check the radiator and intercooler. If there is dirt, dust and leaves, remove with compressed air or high pressure water in the opposite direction of air flow.

NOTE :

For high pressure water, the hydraulic giant shall have lower spraying pressure and set to mist at a distance of about 30 cm from the radiator fins. Otherwise, they may be deformed, causing premature clogging and cracking.

CAUTION

- Do not use hard objects to remove dirt during cleaning to avoid damaging the radiator fins.

3. After cleaning, check the radiator fins for deformation, holes and cracks. If yes, make an immediate adjustment and replacement. Check the rubber hose for cracks or aging, if any, replace with a new one; check and tighten the hose clamp.

4. Remove the cover plate [5] under the radiator and clear the soil, dirt and leaves that have been swept to the outside.

5. Install the cover plate [5], lock the engine hood and access door at the left of the machine.

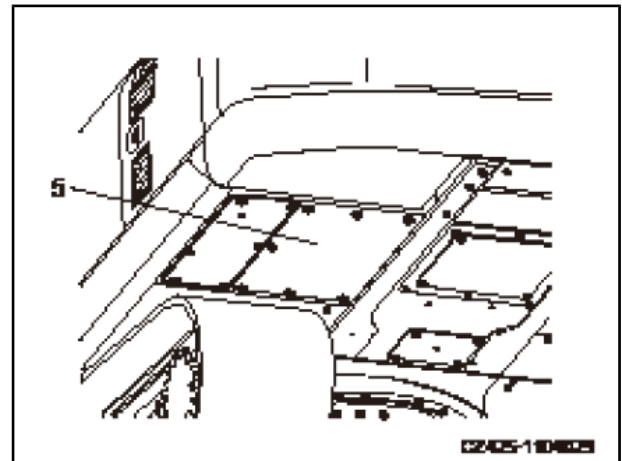


Fig.5-53

5.9.6.7 Cleaning the ventilation/circulation filter of HVAC

WARNING

- When compressed air is used, the flying dust may cause personal injury. Therefore, be sure to wear goggles, dust covers or other protective equipment.

The filter shall be cleaned once every 500 hours, or more frequently in dusty workplace.

If the filter is blocked, the air volume will be decreased and the air conditioning unit will make an abnormal noise.

Clean the internal air filter of HVAC

1. Remove the cab floor mat (1).
2. Remove the four fasteners (2) and the cover (3).
3. Remove the recirculation air filter (4).
4. Clean the filter (4) with compressed air. If the filter is oily or dirty, flush it with neutral medium. After rinsing with water, make it dry thoroughly prior to use. Replace the filter with a new one each year. If the blocked filter cannot be cleaned with air or water, replace with a new one.

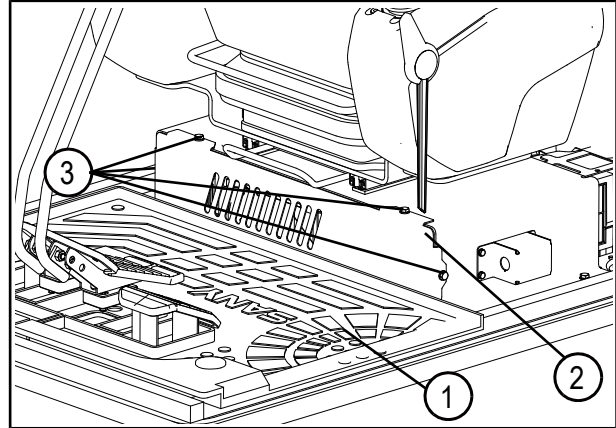


Fig.5-54

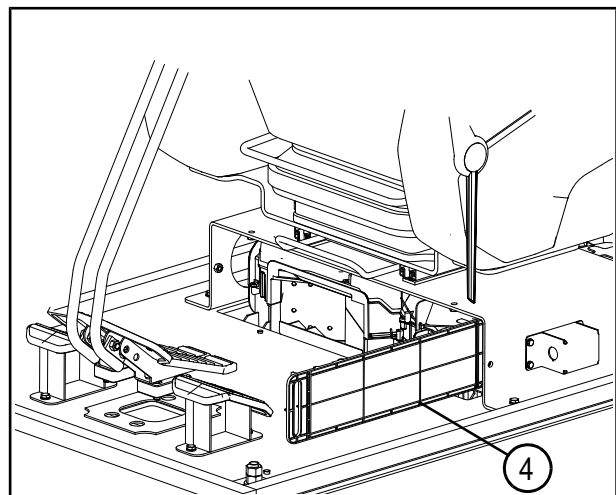


Fig.5-55

Clean the external air filter

1. Open the appropriate access cover (1).
2. Remove two fasteners (2) and the retaining plate (3) that secure the fresh air filter (4).
3. Remove the fresh air filter (4).
4. Clean the filter with compressed air. If the filter is oily or dirty, flush it with neutral medium. After rinsing with water, make it dry thoroughly prior to use. Replace the filter with a

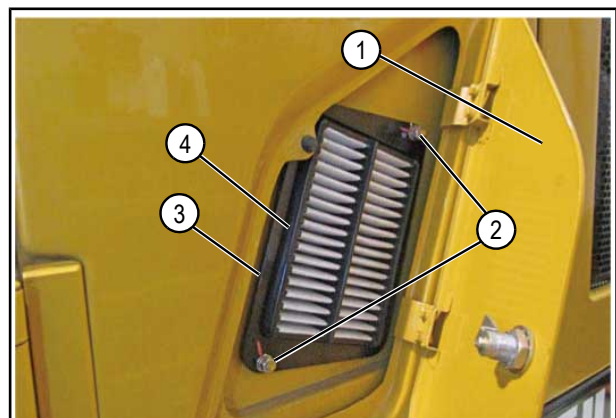


Fig.5-56

new one each year. If the blocked filter cannot be cleaned with air or water, replace with a new one.

5. After cleaning, put the filter (4) in place, tighten the nut (2), and close the cover (1). Lock the cover with the key to the ignition switch, then remove the key.

NOTE :

The external air filter must be installed in the correct direction. When installing, insert the long [L] end of the filter (4) into the filter box. If the short [S] end is installed first, the cover (1) will not be closed.

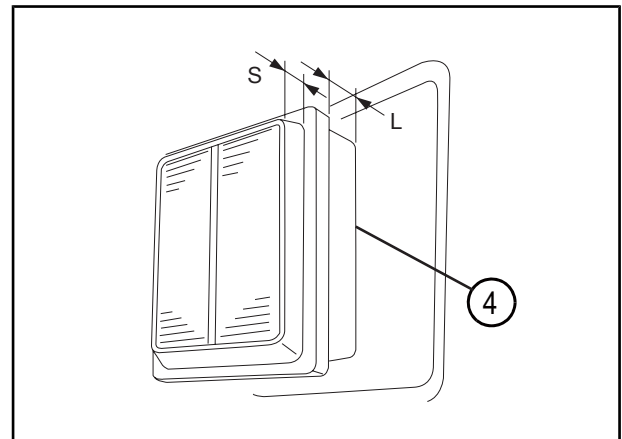


Fig.5-57

5.9.6.8 Checking the oil level in swing gearbox and refilling

⚠ WARNING

- When the engine has just shut off, the hot parts and oil may cause burns. Do not operate until they are cooled.

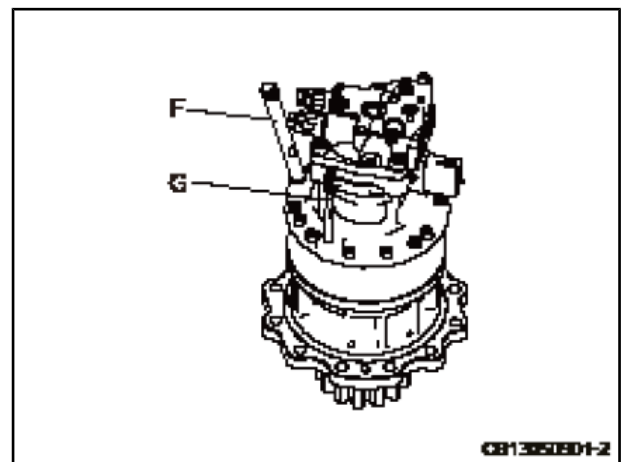


Fig.5-58

1. Pull out the dipstick [G] and wipe the oil with a cloth.
2. Insert the dipstick [G] completely into the filter pipe.

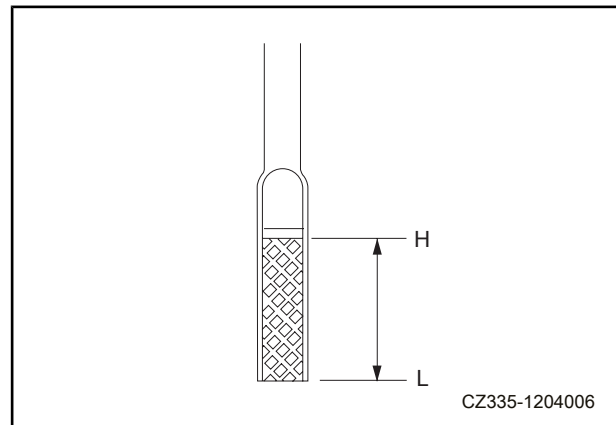


Fig.5-59

3. Pull out the oil dipstick [G] and check whether the oil level is between [H] and [L].
4. If the oil level is not at [L] on the dipstick [G], remove the cap of filler [F] and refill.

5. If the oil level exceeds [H] on the dipstick [G], loosen the drain valve [P] and drain the excess oil.

- If the oil level is too high, hydraulic oil may leak. Please contact your Sany Heavy Machinery authorized dealer for inspection.
- Before draining oil, place a container under the drain valve.

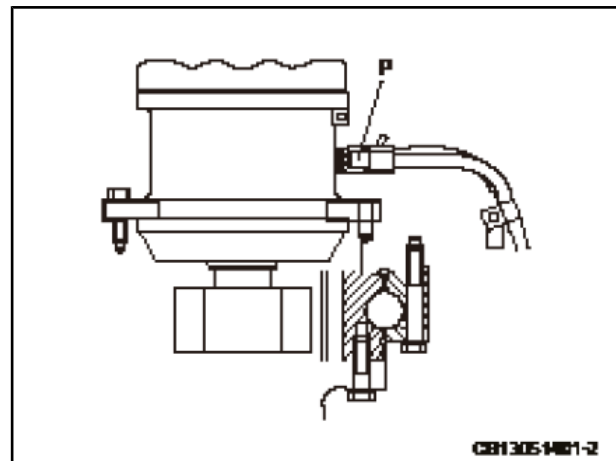


Fig.5-60

6. After checking the oil level or refilling, insert the dipstick [G] into the hole and install the cap of filler [F].

5.9.6.9 Checking the oil level of travel gearbox and refilling

⚠ WARNING

- When the engine has just shut off, the hot oil may cause burns. Do not operate until it is cooled.
- If there is residual pressure in the box, the oil or plug will burst out. Slowly loosen the plug to release pressure.
- When loosening the plug, do not stand in front of it.

1. During checking, place the machine on flat ground with the oil drain plug [D] downwards. Then turn off the engine and set the safety lock level in "LOCK" position.

2. Remove the dust in hexagon socket head plug with a suitable screwdriver to avoid damage.

3. Remove the oil level plug [L] with wrench, then check the quantity of oil and contamination. When the oil surface reaches the oil level plug port, there is appropriate quantity of oil. If insufficient, add specified quantity of oil through oil level plug.

4. Before installing, clean the oil level plug [L] with diesel.

5. Check the travel gearbox on the other side in the same way.

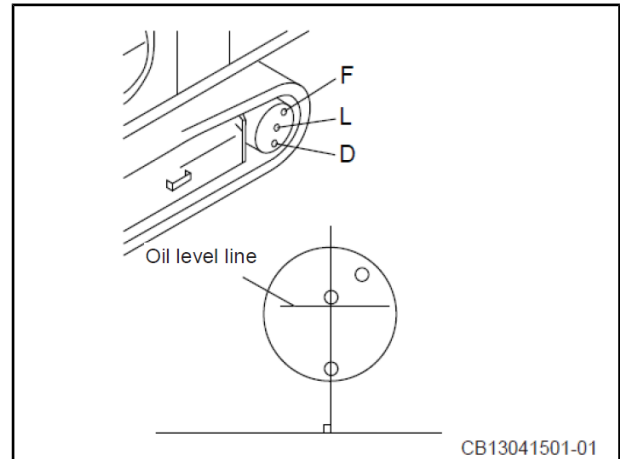


Fig.5-61

5.9.6.10 Replacing hydraulic tank breather filter element

⚠ WARNING

- Before replacing the breather valve filter element, shut off the engine.
- The hot parts and oil may cause burns. Do not operate until they are cooled.

1. Before disassembly, clean the top cover of the hydraulic tank, especially the contaminants around the breather valve (as shown in the figure). Remove the bolt [1] and the breather valve protective cover [2]. The site shall be kept away from fire and dust.

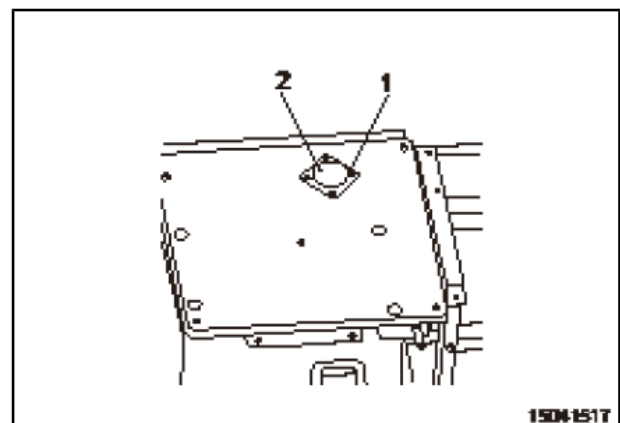


Fig.5-62

2. Unscrew the butterfly nut [3] of breather valve, then pressure the exhaust valve to release the internal pressure.

3. Remove the fixing nut [4] and filter element cover [5], then remove the filter element [6].

4. If the filter cover [5] has too many internal contaminants, clean it with a soft brush, and then replace the filter with a new one.

5. Install the filter element cover [5] and tighten the fixing nut [4].

NOTE :

- Tighten the fixing nut [4] to the specified torque (10 to 14 N·m). It is forbidden to tighten with brute force for sealing.

5.9.7 Maintenance after every 1000 h

5.9.7.1 General

Maintenance task scheduled for every 100, 250 and 500 hours should be carried out simultaneously.

5.9.7.2 Replacing hydraulic oil filter element

⚠ WARNING

- When the engine is shut off, the hot parts and oil may cause burns. Do not operate until they are cooled.

If the machine is equipped with hydraulic hammer, the hydraulic oil will deteriorate faster than the normal bucket operation. For maintenance, see "Replace the hydraulic oil and replace the hydraulic tank filter" on the page 7-13.

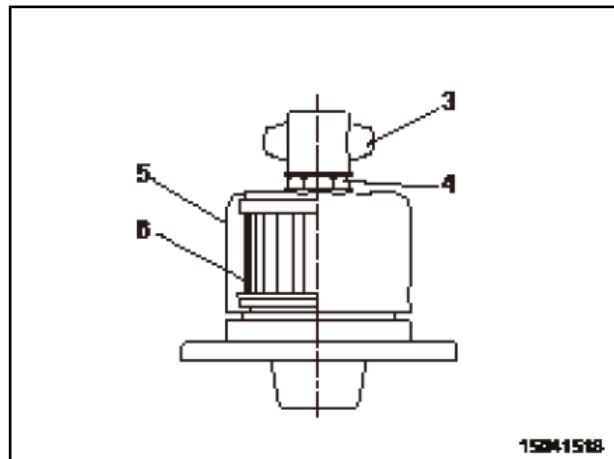


Fig.5-63

1. Place the machine on solid and flat ground, with the work equipment placed as shown in the figure. Lower the work equipment to the ground and shut off the engine.

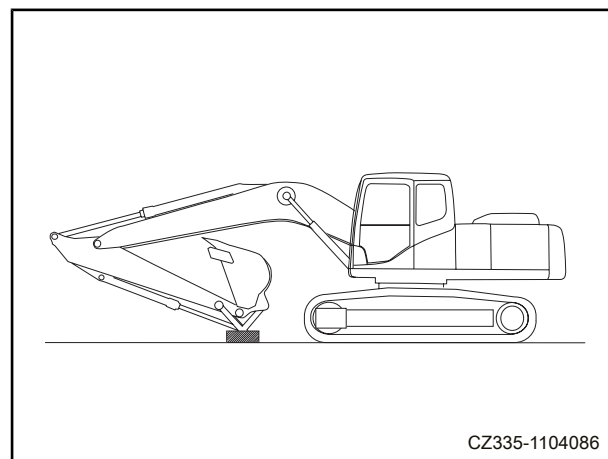


Fig.5-64

2. Unscrew the butterfly nut [1] of the breather valve on the hydraulic tank, press the exhaust button to release the pressure in tank.

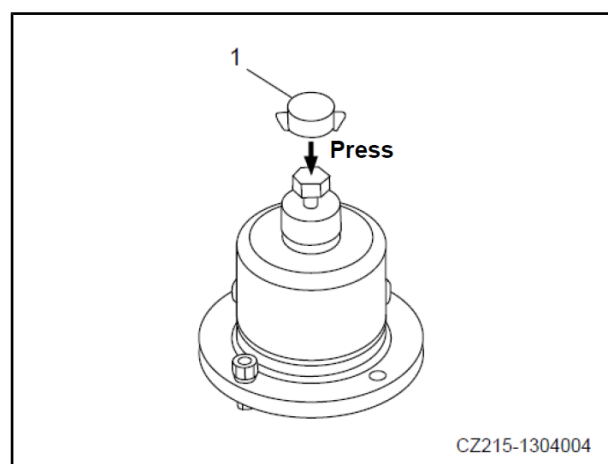


Fig.5-65

3. Loosen 4 bolts and remove the lower cover [2]. During disassembly, the cover will burst out due to the action of spring [3]. Press and hold the cover when removing the bolts.

4. Remove the spring [3] and valve [4], then remove the filter element [5].

- **Check the bottom of the filter tank and remove the dirt if any. Be careful not to let any dirt fall into the hydraulic tank.**

5. Clean the removed parts with cleaning oil.

6. Install new filter element.

7. Install valve [4] and spring [3].

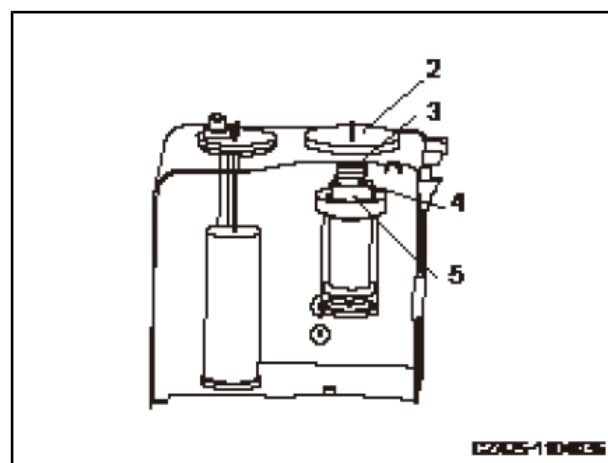


Fig.5-66

8. Install the cover [2] in place, press and hold the cover, then tighten the bolts to install the cover.

9. Replace the drain filter element [6] on the side of the hydraulic tank as described in steps 3-8.

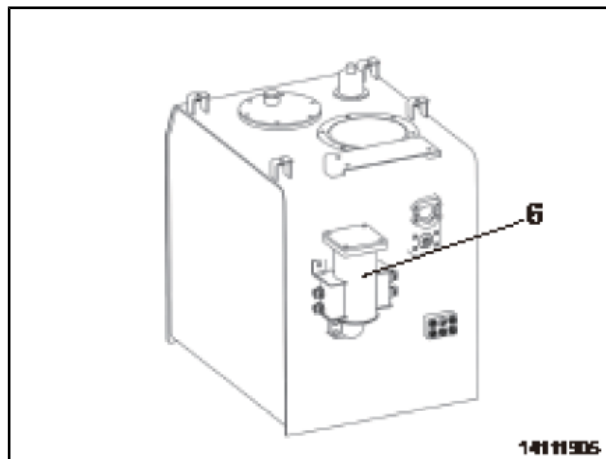


Fig.5-67

10. Replace the pilot filter [7].

11. To exhaust air, start the exhaust and let it run for 10 minutes at low idle speed.

12. Stop the engine.

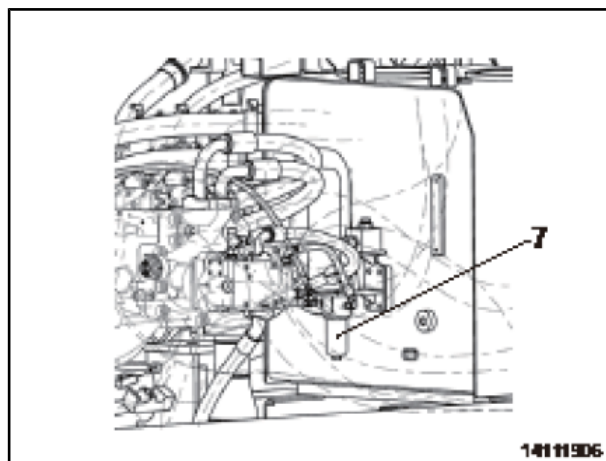


Fig.5-68

5.9.7.3 Replacing the oil in swing gearbox

WARNING

- When the engine has just shut off, the hot parts and oil may cause burns. Do not operate until they are cooled.

- Oil filling quantity: 10.5 L

1. Place a suitable container under the drain valve [P] below the machine to hold the drained gear oil.

2. Loosen the drain valve [P] to discharge gear oil completely. Then tighten the valve.

NOTE :

- If the gear oil flows out in fine thread, stop discharging.
- Prior to discharging oil under low temperature, rotate the work equipment to slightly increase the oil temperature. Do not rotate the work equipment during discharging to avoid to damage.

3. Remove the cap of filler [F] and add a specific quantity of oil through the filler.

4. Check the oil level. For details, see “Check the oil level in slewing mechanism case and refuel” on the page 5-54.

5. After confirming that the filler cap is not blocked, apply sealant to the thread of breather valve, then install and tighten the cap.

Tightening torque: 2.7 N·m

NOTE :

Incorrect installation of the oil filler cap may lead to the leakage of rotary reducer gear oil.

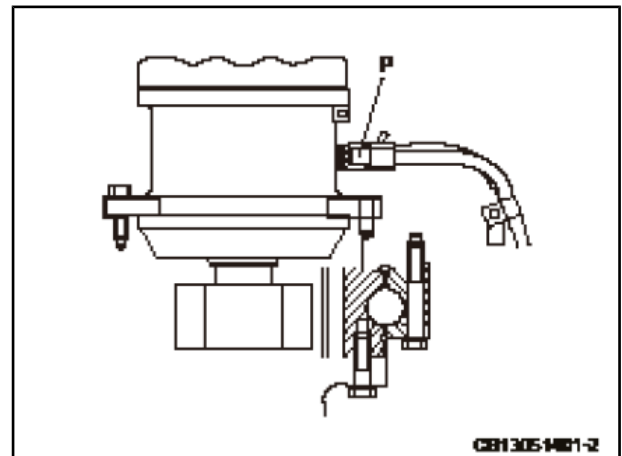


Fig.5-69

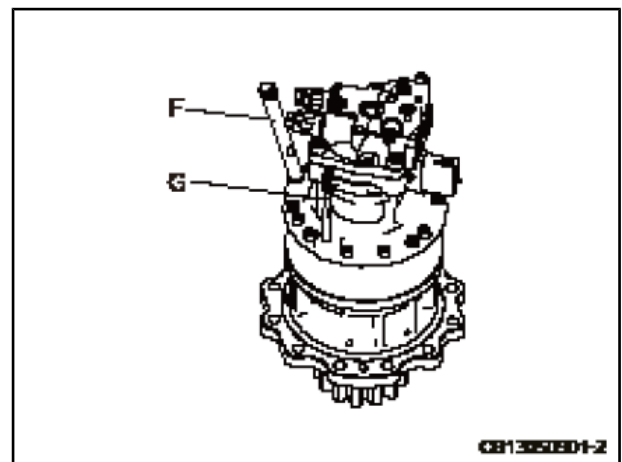


Fig.5-70

5.9.7.4 Checking the cab door lock and the front window lock for fastening

1. Check the cab door lock body

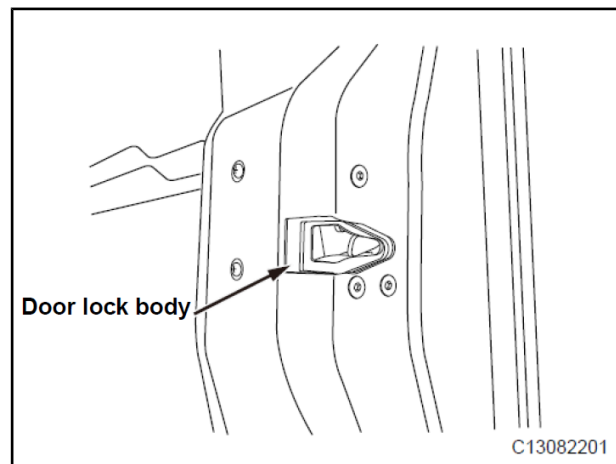


Fig.5-71

2. Door lock latch

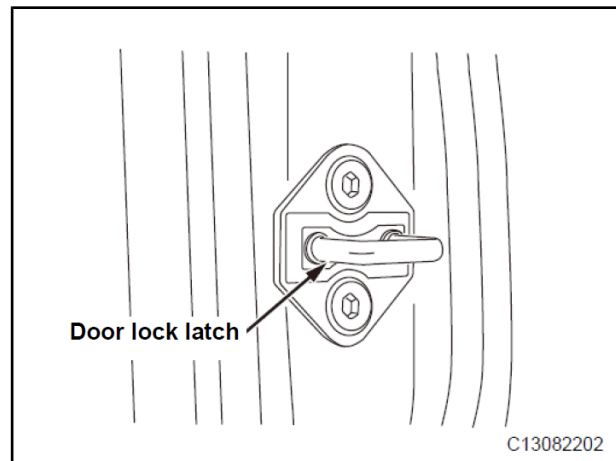


Fig.5-72

3. Cab windshield lock latches (each at the left and right)

If it is found that the above parts are loose, tighten in time to ensure the normal opening and closing of cab doors and windows.

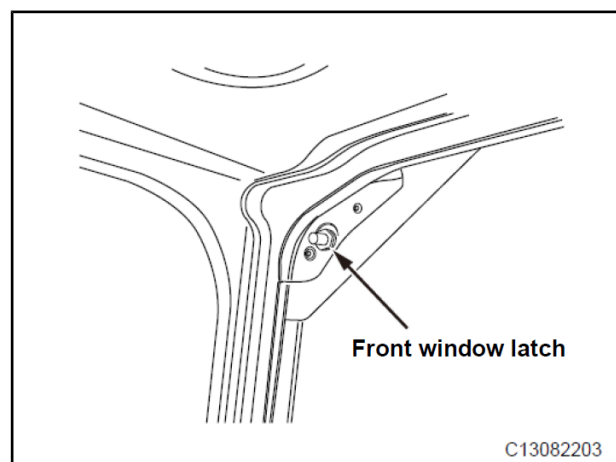


Fig.5-73

5.9.7.5 Checking the lubricating oil of cab door hinge and front window slide guide and refill

Add grease through door hinge grease fitting till it overflows.

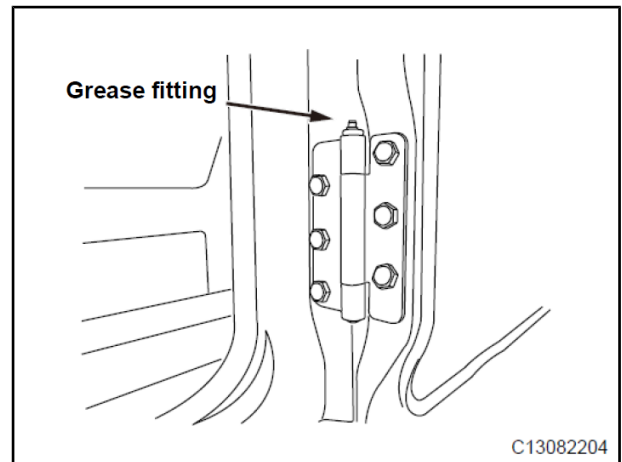


Fig.5-74

Apply grease to the left and right slide guide grooves of the front window.

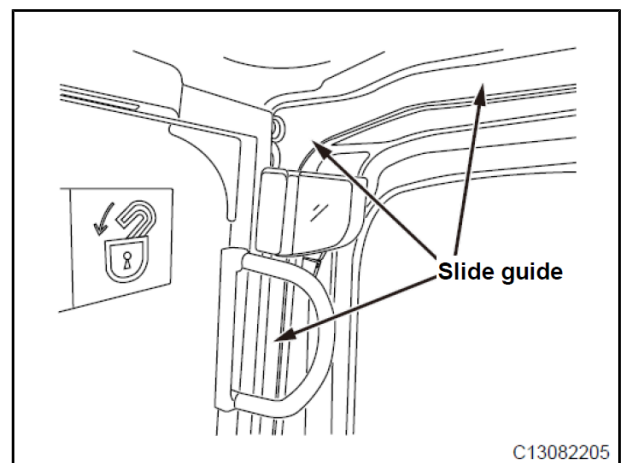


Fig.5-75

5.9.7.6 Checking the rocker nut of wiper for looseness

Check the wiper nut during each routine maintenance of the machine. Tighten the loose nut if any to ensure the normal operation of the wiper.

Pull up the protective cover at the bottom end of the wiper arm to check for any loose nut; if any, tighten it with torque wrench (35 to 40 N·m) or conventional wrench.

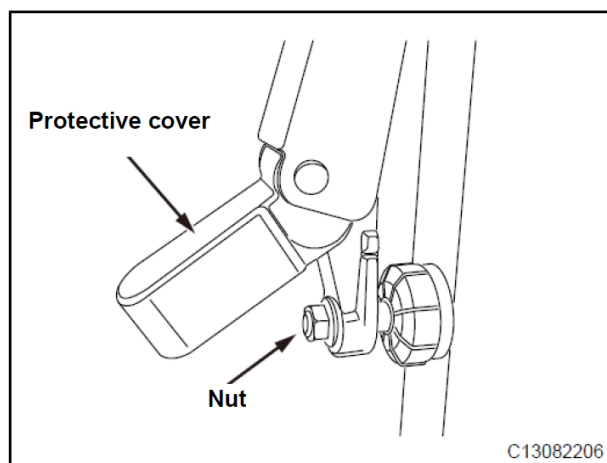


Fig.5-76

5.9.7.7 Checking all fastening parts of the engine exhaust pipe clamp

Contact your Sany Heavy Machinery authorized dealer to check the pipe clamp between air cleaner-turbocharger-aftercooler-engine for looseness.

5.9.7.8 Checking the fan belt tension and replace the fan belt

Check the fan belt tension. If the belt is cracked or damaged, replace with a new one. If you have any question, please contact your Sany Heavy Machinery authorized dealer.

5.9.7.9 Checking the nitrogen pressure in accumulator (for hammer)

Check the accumulator and the special tool for nitrogen filling. Please contact your Sany Heavy Machinery authorized dealer for inspection and nitrogen filling.

5.9.7.10 Adding grease into swing reducer

1. Turn off the engine and pull the safety lock control lever to LOCK position.
2. Add grease through the grease fitting of swing drive assembly until it overflows.

NOTE :

- Remove the old grease squeezed out during greasing.
- The grease fittings for some models are connected with rubber hoses where grease can be added.

5.9.8 Maintenance after every 2000 h

5.9.8.1 General

1. Maintenance task scheduled for every 100, 500 and 1,000 hours should be carried out simultaneously.

5.9.8.2 Replacing the oil in final drive case

⚠ WARNING

- When the engine is shut off, the hot oil and parts may cause burns. Do not operate until they are cooled.
- If there is pressure in the case, oil or plug will burst out and cause injury. Be sure to loosen the plug slowly to release pressure and do not stand in front of it.

Make-up capacity:

See "Capacity Table" on the page 5-11.

1. Place the machine on flat ground with the oil drain plug [D] downwards,. Then turn off the engine and set the safety lock level in "LOCK" position.

2. Remove the dust in hexagon socket head plug with a suitable screwdriver to avoid damage.

3. Put an oil container under the oil drain plug [D], slowly loosen the oil level plug [L] and oil drain plug [D] to drain oil.

4. After the gear oil is completely discharged, clean the oil drain plug [D] with diesel and install it.

5. Unscrew the filler plug [F] and add the specified quantity of gear oil through filler until the oil flows out of the plug hole [L].

6. Before installing, clean the plug with diesel.

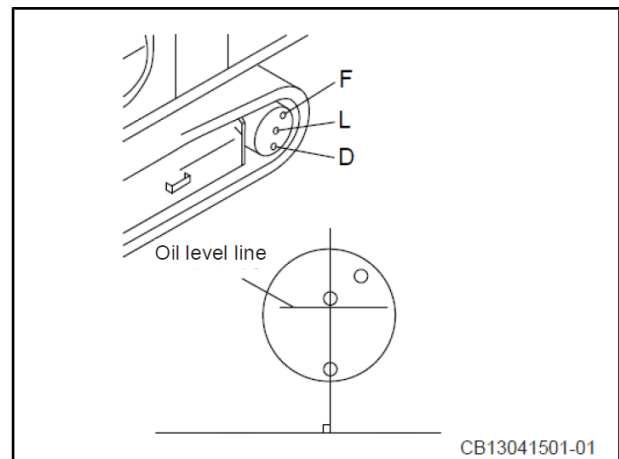


Fig.5-77

NOTE :

Check the O-ring of the plug. In case of damage, replace it with a new one.

5.9.8.3 Cleaning hydraulic tank strainer

⚠ WARNING

- When the engine is shut off, the hot oil and parts may cause burns. Do not operate until they are cooled.

1. Unscrew the butterfly nut [1] of the breather valve on the hydraulic tank, press the exhaust button to release the pressure in tank.

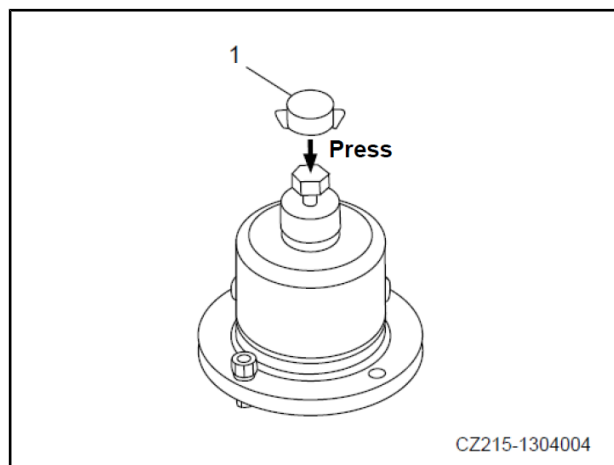


Fig.5-78

2. Loosen 4 bolts and remove the cover [2]. Then the cover will burst out under the action of spring [3]. Press and hold the cover when removing bolts.

3. Hold and lift the top of the rod [4], then remove the spring [3] and strainer [5].

4. Remove all dirt on strainer [5], then rinse with cleaning oil. If the strainer is damaged, replace it with a new one.

5. During installation, fix the strainer [5] on the projection [6] of the tank and assemble it.

6. When assembling, fix the spring [3] with the convex part at the bottom of the cover [2], then tighten with bolt.

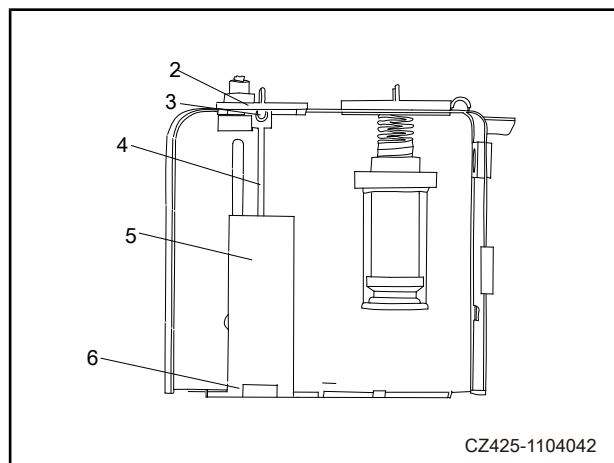


Fig.5-79

5.9.8.4 Checking the nitrogen pressure in accumulator

WARNING

- As the accumulator is filled with HP nitrogen, improper operation will cause explosion, resulting in mechanical damage and personal injury.
- Keep away from fire. Do not collide or roll the accumulator to avoid any shock.
- The gas in the accumulator must be released completely during handling. Please contact your Sany Heavy Machinery authorized dealer for doing this.

NOTE :

If the accumulator is filled with nitrogen at low pressure continuously, it is difficult to release the residual pressure in hydraulic circuit in case of mechanical failure.

Functions of accumulator

The accumulator stores the pressure in control oil circuit. The control oil circuit works properly to complete the following actions even if the engine is turned off:

- The work equipment can be lowered under the effect of self-weight by joystick.
- The pressure in hydraulic circuit can be released.

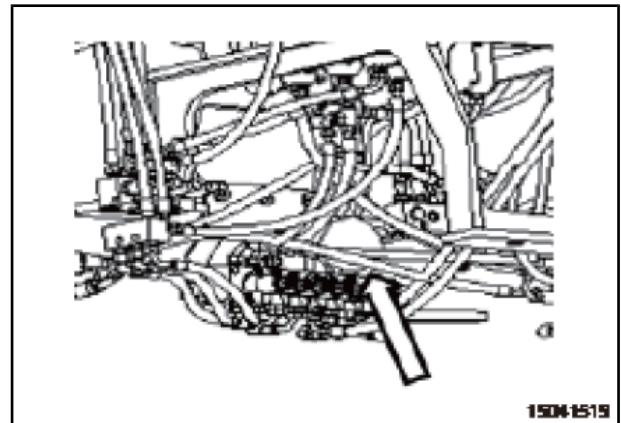


Fig.5-80

Check the functions of accumulator

CAUTION

- First check whether there is any person or obstruction in the surrounding area.

Check the nitrogen filling pressure according to the following steps:

1. Place the machine on a solid and flat ground.
2. Keep the work equipment 1.5m (4 ft 11 in) from the ground, i.e. the maximum working radius, with arm fully extended, bucket completely turned over.

Complete steps 3 to 5 within 15 seconds.

As the pressure in accumulator gradually drops when the engine is shut off, the check must be done immediately after the engine is shut off.

3. Keep the work equipment at the maximum working radius, then turn the ignition switch to [OFF] and turn off the engine.

4. Turn the ignition switch to the [ON] position.

5. Set the safety lock control lever to "unlock" position, and lower the work equipment to ground by joystick.

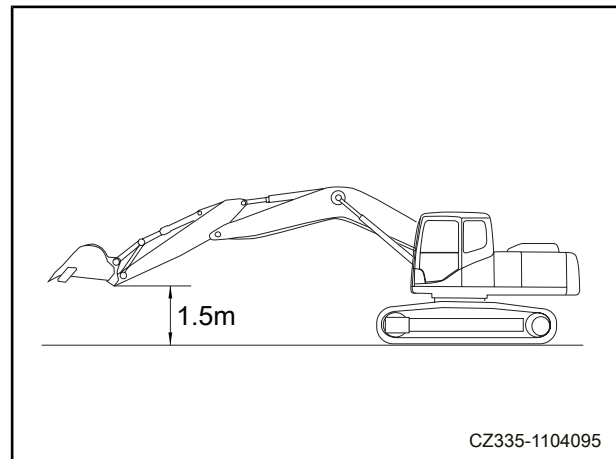


Fig.5-81

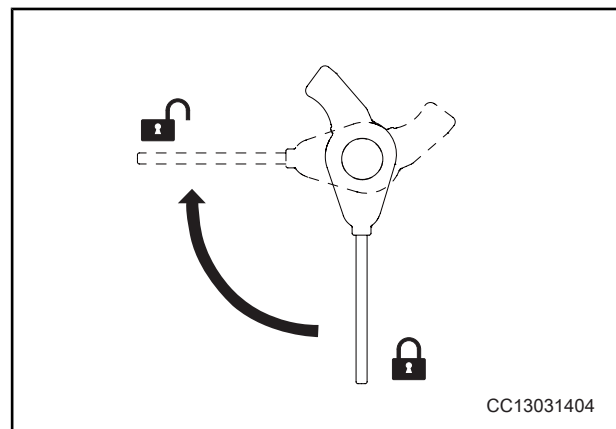


Fig.5-82

6. If the work equipment is lowered to the ground under the effect of self-weight, the accumulator is normal.

If the work equipment cannot be lowered or suspended, the pressure in hydraulic circuit accumulator may have dropped. Please contact your Sany Heavy Machinery authorized dealer for inspection.

7. After following the above steps, set the safety lock control lever to the "LOCK" position and turn the ignition switch to [OFF] position.

Method for releasing pressure in control oil circuit

1. Lower the work equipment to the ground.
2. Turn the safety lock control lever to the "LOCK" position.

Complete steps 4 to 6 within 15 seconds.

The pressure in accumulator gradually drops when the engine is shut off. Therefore, the pressure must be released as soon as the engine is turned off.

3. Stop the engine.
4. Turn the ignition switch to [ON] position.

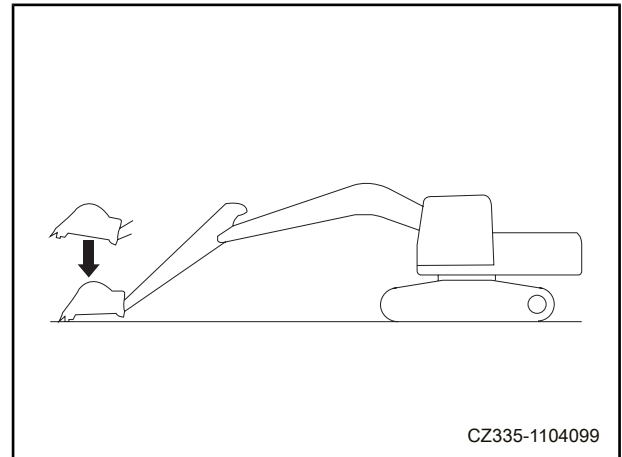


Fig.5-83

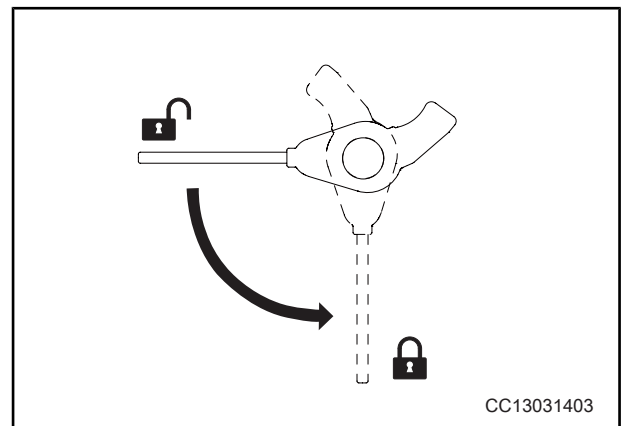


Fig.5-84

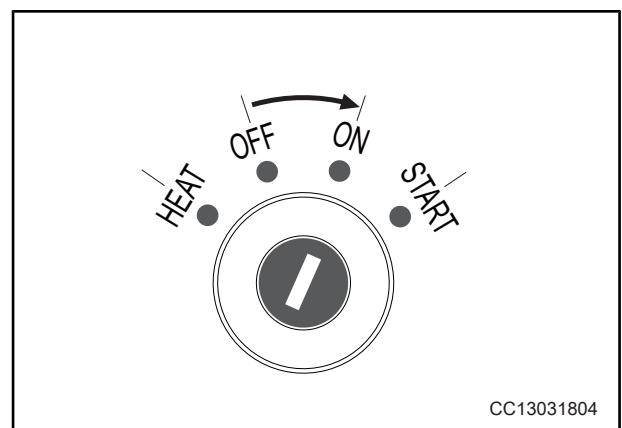


Fig.5-85

5. Set the safety lock control lever on the “unlock” position, then operate the work equipment joystick forward, backward, left and right to release the pressure in control oil circuit.

6. Set the safety lock control lever on the “lock” position and turn the ignition switch to OFF position.

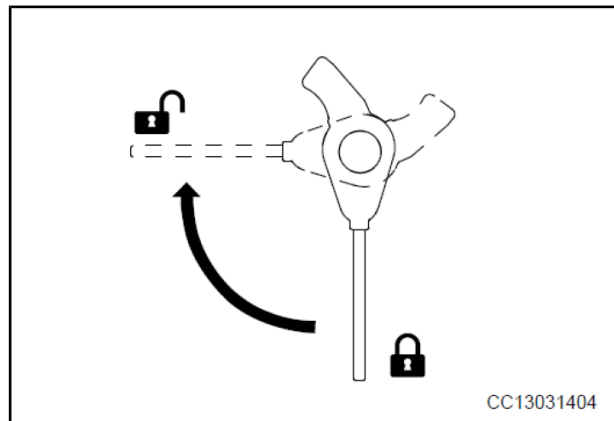


Fig.5-86

5.9.8.5 Replacing the oil in hydraulic tank

WARNING

- When the engine is shut off, the hot oil and parts may cause burns. Do not operate until they are cooled.
- When removing the oil suction cap, press the exhaust button of breather valve to release the internal pressure.

If the machine is equipped with hydraulic hammer, the hydraulic oil will deteriorate faster than the bucket operation. For maintenance, see “Replace the hydraulic oil and replace the hydraulic tank filter” on the page 7-13.

Refilling quantity: See “Capacity Table” on the page 5-11. Prepare a handle (for 36 mm socket wrench).

1. Remove the bolts on the bottom cover plate, and then remove the bottom cover plate.

2. Rotate the upper mechanism so that the drain plug at the bottom of the hydraulic tank is located in the middle of the tracks on both sides.

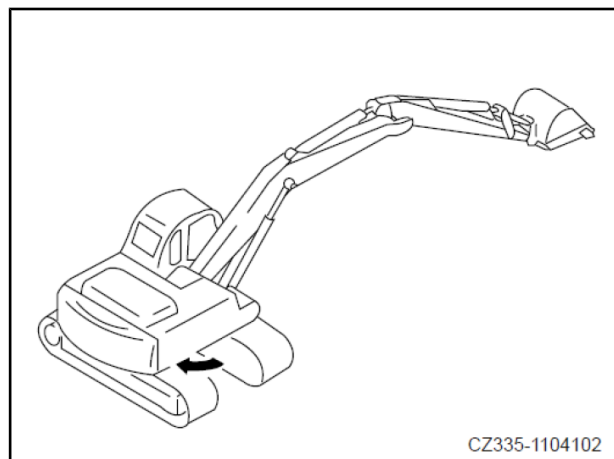


Fig.5-87

3. Retract the arm and bucket cylinder, then lower the swing arm so that the bucket teeth are in contact with the ground.

4. Place the safety lock control lever on "lock" position and shut off the engine.

5. Remove the suction port cap [F] on the upper part of the hydraulic tank.

6. Place an oil container below the drain plug and use handle to remove the drain plug [P]. Check the O-ring on drain plug [P]. Replace the damaged O-ring if any. After draining all oil, tighten the drain plug [P].

NOTE :

Be careful not to splash the oil on yourself when removing the drain plug [P].

7. Add a specified quantity of hydraulic oil through oil suction port [F]. Check whether the level is between H and L of the dipstick.

- For details on applicable hydraulic oil, see "Recommended fuel, coolant and lubricating oil" on the page 5-9.
- For details on check for oil level, see "Check the oil level in hydraulic tank" on the page 4-61.

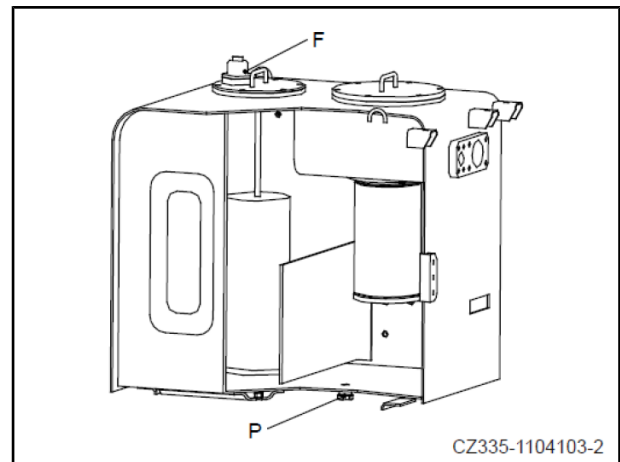


Fig.5-88

5.9.8.6 Replacing the engine coolant and cleaning the inside of cooling system

WARNING

- When the engine is just turned off, the high-pressure hot coolant in radiator may cause burns if the radiator cover is removed for discharging. After it is cooled, slowly turn the cover to release pressure.
- When starting the engine for cleaning, set the lock lever to the lock position to prevent the machine from moving.
- The coolant is flammable and shall be kept away from open flames.
- Be careful not to splash the coolant on your body. If splashed into eyes, flush with plenty of water and see a doctor immediately.
- It is strictly forbidden to discharge the coolant to sewers or the surface of the earth. When replacing the coolant, please contact your Sany Heavy Machinery authorized dealer.

Clean the inside of water radiator fins and replace coolant

1. Place the machine on flat ground, then turn the ignition switch to [OFF] position to shut down the engine.

2. When the cooling water is so cooled that the radiator cover can be touched by hand, slowly turn the radiator cap [1] until it contacts with the stopper to release pressure, then remove it.

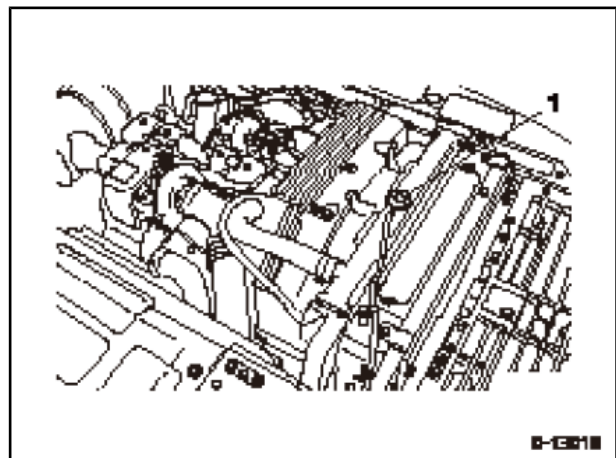


Fig.5-89

3. Remove the bottom cover plate under the radiator, then place a container under the drain valve [2] to hold coolant.

Open drain valve [2] at the bottom of the radiator to drain coolant.

4. After draining the coolant, close drain valve [2] and add running water and radiator cleaning agent. When the radiator is filled, start the engine and let it run at low speed until the temperature rises to at least 90°C (194 °F), then keep running for about 10 minutes.

5. Shut off the engine and open the drain valve [2] to drain water. Then flush the cooling system with clean water until the discharged water is clean to help remove rust and deposits.

6. Close the drain valve [2], slowly add specified quantity of coolant until it overflows from filling port.

7. Let the engine run for about 5 minutes at low speed followed by 5 minutes at high speed to drain the air in coolant. (At this time, the radiator cap shall be opened)

8. Check the coolant level again. Appropriate supplements may be made when necessary.

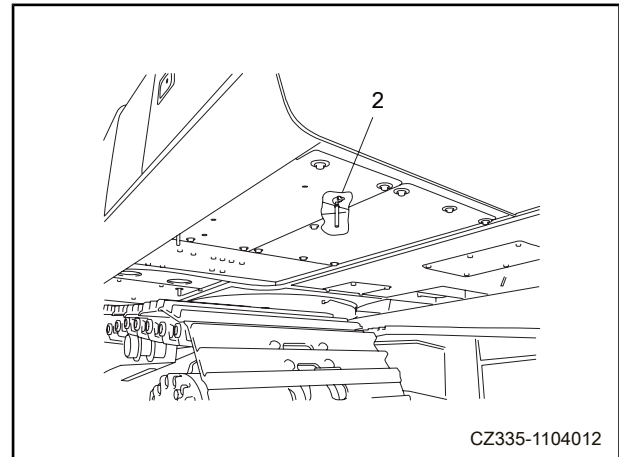
9. Turn off the engine, add water to the filling port after about 3 minutes, and then tighten the radiator cap.

10. Install the bottom cover plate.

Cleaning the hydraulic oil radiator fin internally

1. Remove the hydraulic oil radiator fin before cleaning and rinse on clean rinsing table.

2. Use the same brand of hydraulic oil, aviation kerosene, gasoline, and diesel for cleaning, then blow with air pump.



CZ335-1104012

Fig.5-90

3. Do not use cotton, linen and chemical fiber after cleaning to prevent the system from being polluted by the falling fiber.

NOTE :

- The radiator shall be internally clean during the whole rinsing process.
- The recommended cleaning medium are the same brand of hydraulic oil, aviation kerosene, gasoline, and diesel successively.

5.9.8.7 Checking alternator

Please contact your Sany Heavy Machinery authorized dealer to inspect alternator.

If the engine is started frequently, check the alternator every 1,000 hours.

5.9.8.8 Checking and adjusting engine valve clearance

Special tools are required for inspection and maintenance. For this, please contact the authorized dealer of Sany.

5.9.9 Maintenance after every 4000 h**5.9.9.1 General**

Maintenance task scheduled for every 100, 250, 500, 1,000 and 2,000 hours should be carried out simultaneously.

5.9.9.2 Checking water pump

Check whether there is water or oil leakage around the water pump. If you have any problem found, contact your Sany Heavy Machinery authorized dealer for disassembly, repairing, or replacement.

5.9.9.3 Checking starter motor

Contact your Sany Heavy Machinery authorized dealer to check the starter motor.

If the engine is started frequently, check the starter motor every 1,000 hours.

5.9.9.4 Replacing accumulator

Replace the accumulator every 2 years or 4,000 hours, whichever comes first.

WARNING

- As the accumulator is filled with HP nitrogen, improper operation will cause explosion, resulting in mechanical damage and personal injury.
- Keep away from fire. Do not collide or roll the accumulator to avoid any shock.
- The gas in the accumulator must be released completely during handling. Please contact your Sany Heavy Machinery authorized dealer for doing this.

If the operation continues when the accumulator is degraded, the pressure in hydraulic circuit will not be released in case of mechanical failure. Please contact your Sany Heavy Machinery authorized dealer to replace accumulator.

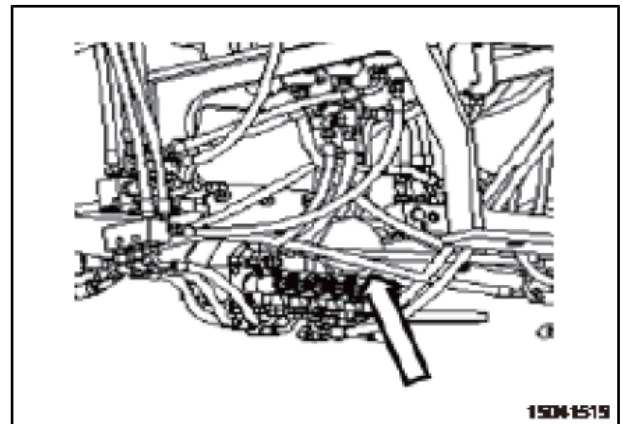


Fig.5-91

5.9.9.5 Checking the high pressure pipe clamp for looseness, and the rubber for hardening

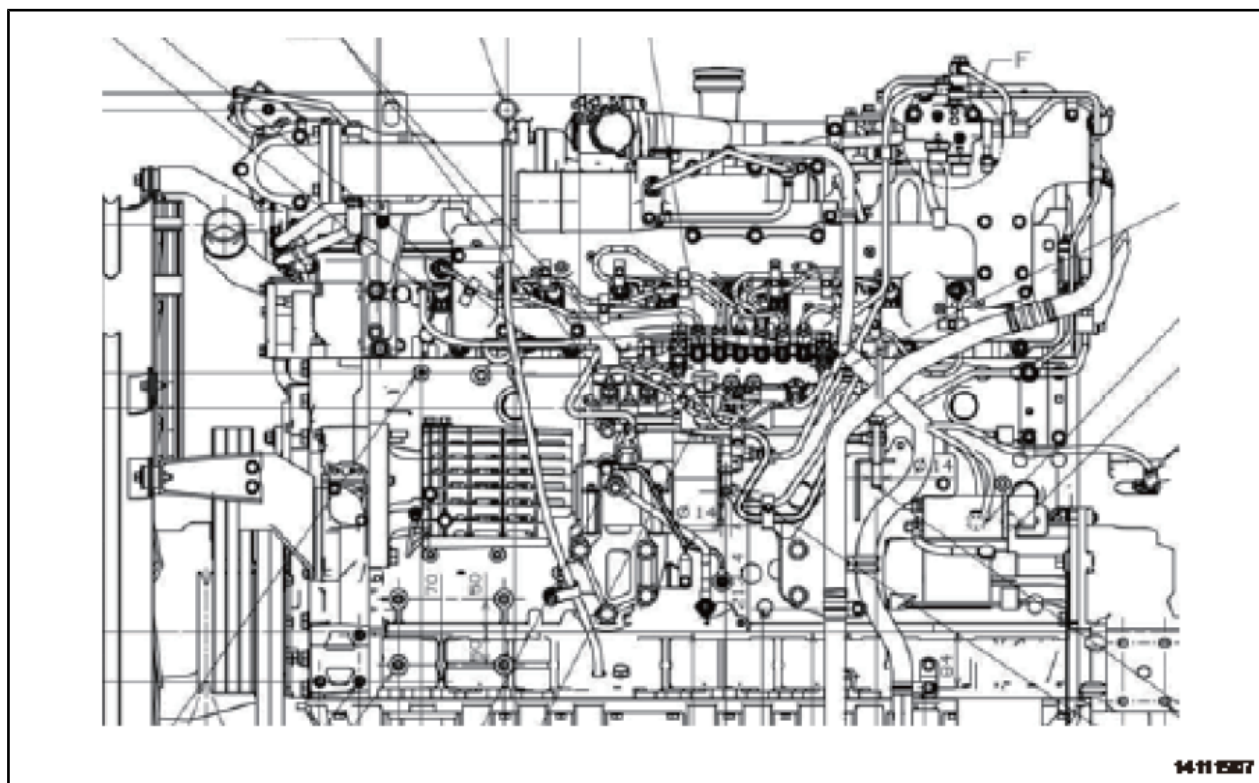


Fig.5-92

Check whether there is loose bolt on the high pressure pipe clamps (5) between supply pump and fuel spray nozzle through observation and touching. If you have any problem, please contact your Sany Heavy Machinery authorized dealer to replace parts.

5.9.9.6 Checking the operation of compressor

Check the following two items:

1. Whether the compressor and magnetic clutch are opened/closed when the HVAC switch is turned on/off.
 2. Whether the clutch or compressor makes abnormal noise.
- If you have any problem, contact your Sany Heavy Machinery authorized dealer for disassembly, repairing, or replacement.

5.9.10 Maintenance after every 8000 h

5.9.10.1 General

Maintenance task scheduled for every 100, 250, 500, 1,000, 2,000 and 4,000 hours should be carried out simultaneously.

5.9.10.2 Replacing high pressure pipe clamp

Please contact your Sany Heavy Machinery authorized dealer to replace the engine high pressure pipe clamp.

5.9.11 Maintenance after every 10000 h

If the machine runs up to 10,000 hours cumulatively, please contact your Sany Heavy Machinery authorized dealer for maintaining the whole machine.

5.9.12 Maintenance of machines placed for a long time

The stock time of the excavator is long, some parts will deteriorate. In order to ensure the quality of the excavator, please carry out regular maintenance according to the following table:

Item	6 months — 1 year (excluding 1 year)	1 year — 2 years (excluding 2 years)	More than 2 years	Remarks
Grease the pin shaft of the working device	○	○	○	Grease spillage must be removed
Drain fuel tank	○	○	○	
Change engine oil		○	○	
Replace engine oil filter element		○	○	
Replace the fuel filter elements		○	○	
confirmation and supplement of air conditioning refrigerant		○	○	
Peplace the hydraulic oil return filter element		○	○	
Change antifreeze			○	

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SANY

Troubleshooting

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 **WARNING**

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this machine and before operation or maintaining it. Failure to do this could result in death or serious injury.

6.Troubleshooting

6.1 Special Instructions

Situations described below, if occurred during operation, are normal and in line with industry standard, and thus please feel relieved to use.

1. You misunderstand an unavailable function as a fault due to unfamiliarity with the features of the machine (For example, the product is not applicable to a altitude higher than 4km)

2. Stalling or black smoke occurs but the engine is proved by the field test in the normal operating range, i.e. the FSNs at instantaneous load and steady load are not greater than 4.5RP and 1.5RP respectively at an ambient temperature below 30°C.

3. Excessive consumption of engine oil and fuel occurs but turn out in the normal range specified by the manufacturer in the field test.

4. Poor operation stability, grade ability, offset travel and slow movement occurs due to your unskilled operation and unfamiliarity with working condition, but all the parameters are proved by the field test in the normal range specified by the manufacturer. (e.g., the tail of the counterweight is up, grade ability is greater than 35°, etc.)

5. Unusual noise comes up in process of oil return of the hydraulic system (such as unusual noise in oil return and from pipelines), but it is checked that the hydraulic system is normal and the return oil filter is free of without impurities as iron chips, cooper chips and aluminum

chips such that no affect will be exerted to the normal operation of the device.

6. Common phenomena in the industry, such as discoloration or blackening of piston rod, reverse or automatic movement of cylinder, and start difficulty of engine in chilly winter days.

6.2 Preparations before Troubleshooting

6.2.1 Inspections before Troubleshooting

	Inspection Item	Judgment Standard	Measures
Lubricating oil, coolant	1. Confirm fuel level and type	—	Refuel
	2. Check the fuel for foreign matters	—	Clean and drain
	3. Check the hydraulic oil level	—	Refuel
	4. Check the hydraulic oil filter screen	—	Clean and drain
	5. Check oil level of upper structure	—	Refuel
	6. Check the engine oil level (oil pan oil level)	—	Refuel
	7. Check the coolant level	—	Add coolant
	8. Check blockage of air cleaner	—	Clean or replace
	9. Check the hydraulic oil filter element	—	Replacement
	10. Check oil level of the final drive case	—	Refuel
Electric equipment	1. Check the looseness and corrosion of battery terminals and wires	—	Tighten or replace
	2. Check the looseness and corrosion of alternator terminals and wires	—	Tighten or replace
	3. Check the looseness and corrosion of starter motor terminals and wires	—	Tighten or replace
Hydraulic devices	1. Check for abnormal noises and odors	—	Repair it
	2. Check for oil leakage	—	Repair it
	3. Exhaust air inside	—	Exhaust
Electricity and electric	1. Check the battery voltage (with engine shut down)	20-30V	Replacement
	2. Check the battery electrolyte level	—	Refill or replace it

Inspection Item		Judgment Standard	Measures
equipment	3. Check for discolored, burnt or peeled wires	—	Replacement
	4. Check for falling clamps or hanging wires	—	Repair it
	5. Check whether the wire is wet (check connectors or terminals carefully)	—	Remove the connector and blow it dry
	6. Check whether the fuse is fused or corroded	—	Replacement
	7. Check the alternator voltage (with the engine running under the condition over half throttle)	After running for a few minutes:27.5~29.5V	Replacement
	8. Check the working noise of battery relay (turn the switch between ON/OFF)	—	Replacement

6.2.2 Precautions during Troubleshooting

CAUTION

- Park the machine on the horizontal ground, and confirm the function of safety pin, cushion block and parking brake.
- During the collaborative operation, the signal shall be strictly unified and no irrelevant personnel can be allowed to be close to it.
- If the radiator cap is removed when the engine is hot, hot water will be sprayed and cause burning, so maintenance shall be carried out after the engine is cooled down.
- Do not touch any hot parts or hold any rotary parts
- Always dismantle the negative terminal [-] first.
- When removing the internal oil pressure, water pressure or air pressure plug or cap, release the internal pressure first.
- When installing the measuring equipment, ensure that the connection is correct.

- The purpose of fault diagnosis is to accurately determine the root cause of the faults and expeditiously fix them and prevent their recurrence.
- During the fault diagnosis, to know the structure and function is of great importance.
- In order to conduct effective fault diagnosis, turning to operators to get a general knowledge of the possible fault causes is also one of the shortcut for fault diagnosis.

1. Do not disassemble parts immediately during fault diagnosis. If parts are disassembled immediately, it may cause:

- The parts that are disassembled are irrelevant to the fault, or the parts have been disassembled unnecessarily.

- The fault cause cannot be found out.
This will waste labor, parts, or oil and grease, while losing the user or operator's trust in the product.
Therefore, during fault diagnosis, it is necessary to check in advance and make fault diagnosis according to the specified procedures.
2. Issues to be asked from users or operators:
- Are there any other unreported problems?
 - Was there any abnormality before the fault appeared?
 - Did the fault come up suddenly or following some signs?
 - Under which circumstance the fault occurs?
 - Was the machine repaired before the fault occurred?
 - When was the machine repaired?
 - Did this fault once appear?
3. Check other inspection items.
- Check the engine oil level.
 - Check whether the oil leaks from the pipes or the hydraulic devices.
 - Check the lever travel.
 - Check the spool travel of the control valve.
 - Other daily maintenance items can be inspected from the appearance, so only those deemed necessary can be checked.
4. Confirm the fault
- Confirm the fault, and determine whether it is a true fault, whether there are problems in use and operation, etc.
 - When the machine is operated and the fault phenomenon reoccurs, no inspection or measurement which will make the problem more serious shall be carried out.
5. Troubleshooting
- Conduct the inspections and tests according to item 2~4 to narrow the scope of fault causes, then identify the faulty point according to the fault diagnosis flow chart.
 - The basic process of fault diagnosis is as follows:
 - 1) Start with the easy problem
 - 2) Start with the possible problem
 - 3) Check other relevant content.
6. Method of eliminating root cause of fault
- Even if the troubleshooting is done but the root cause is not eliminated, the same fault will occur again. Therefore, it is necessary to find out the cause of the fault and eliminate the root cause.

6.2.3 Precautions in Circuit Troubleshooting

1. Always turn off the power before disconnecting or connecting the connector.
2. Check if all related connectors are correctly inserted plugged before fault diagnosis.
 - Disconnect or connect the related connectors for several times for checking.
3. Always connect all the disconnected connectors before transferring to next step of operation.
 - When the power is turned on with connectors disconnected, undesired abnormal indication will occur.
4. When circuit fault diagnosis (measurement of voltage, resistance, connectivity or current) is undergoing, related wires and connectors should be moved for several times and the meters readings checked to be unchanged.
 - If the readings change, contact failure may exist in the circuit.

6.2.4 Precautions for Handling Hydraulic Components

The most common fault cause is the sludge (foreign matter) in the hydraulic circuit due to the pressure increase and accuracy improvement of hydraulic components. Special care must be taken when adding hydraulic oil or disassembling or assembling hydraulic components.

1. Working environment

Avoid adding hydraulic oil, replacing the filter or repairing the machine in the rain or strong wind or a dusty place.

2. On-site disassembling and maintenance operations

On-site disassembly and maintenance of hydraulic components may cause ingress of dust. It is also difficult to check the performance after repair, so you'd better replace with an assembly unit. Disassembly and maintenance of hydraulic components shall be carried out in a specially prepared dust-proof workshop, and the performance shall be checked by special test equipment.

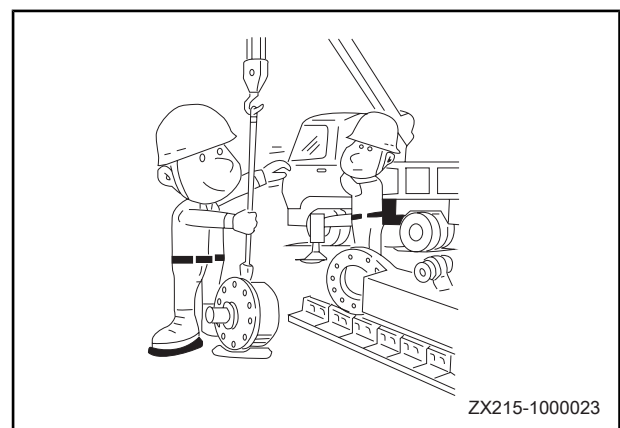


Fig.6-1

3. Adding hydraulic oil

When filling the hydraulic oil, do not let oil sludge or dust mix in. Always keep the filter elements and their surrounding areas clean with the use of sanitary pumps and oil containers. The use of oil cleaning device is a more effective way to filter the oil sludge accumulated during storage.

4. Change the hydraulic oil under high temperature

Hydraulic oil or other oil is easy to move when kept warm. Besides, sediments may be easily expelled from the oil circuit together with oil. Therefore, it is best to replace the oil while hot. During replacement, drain the used hydraulic oil as much as possible. (Drain from hydraulic oil tank; and drain from the filter and the drain plug in the oil circuit.) The impurities and sediments in the used oil, if any, will be mixed with the new oil and thereby shorten the useful life of hydraulic oil.

5. Flushing

When disassembling and reassembling the device or changing the oil, remove the impurities, sediments and old oil in hydraulic lines. Normally, twice flush is needed: use flushing oil for primary flushing, and designated hydraulic oil for secondary flushing.

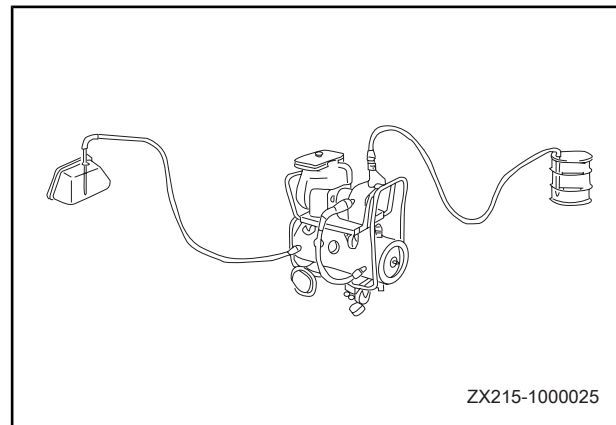


Fig.6-2

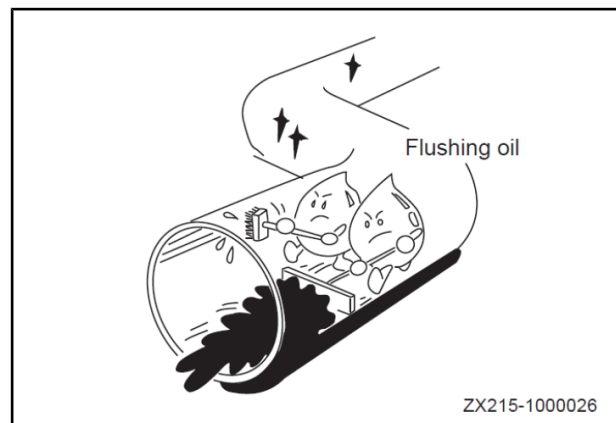


Fig.6-3

6. Cleaning

The sediments and impurities in the hydraulic lines need to be cleaned after repairing the hydraulic components (pump, control valve, etc.) or during the operation of the machine. Oil cleaning device can clear up fine particles (about 3 μ), and can effectively clean the oil lines without dismantling the built-in filter of the hydraulic components.

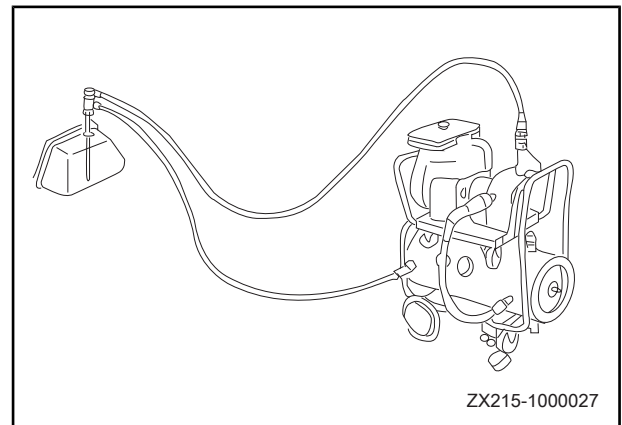


Fig.6-4

6.2.5 Towing

⚠ WARNING

- Always check whether the rope for traction have enough strength to tow the machine, otherwise accidents may happen.
- In the process of towing, do not use rope with breakage [A], decreased diameter [B] or twist [C], in case the rope would be broken.
- Always wear protective gloves to handle the rope.
- Don't tow the machine on a slope.
- In the process of towing, do not stand between the towing machine and the towed machine.
- Operate the machine slowly, and do not apply load suddenly to the rope.

Make sure to tow the machine under the maximum capacity.

- If the excavator is trapped in the mud and cannot be driven out by its own power, or if the excavator is used for towing other heavy object, it is allowed to use the rope as the right picture shows.
- Put wooden blocks or other protective materials under the contact site of the rope and the machine to prevent abrasion for both.
- Keep the rope horizontal and in the same direction with the track frame.
- Tow machine be to the desired repairing place with a speed less than 1 km/h. Prevent long-distance towing.
- Never tow the machine except in emergency.

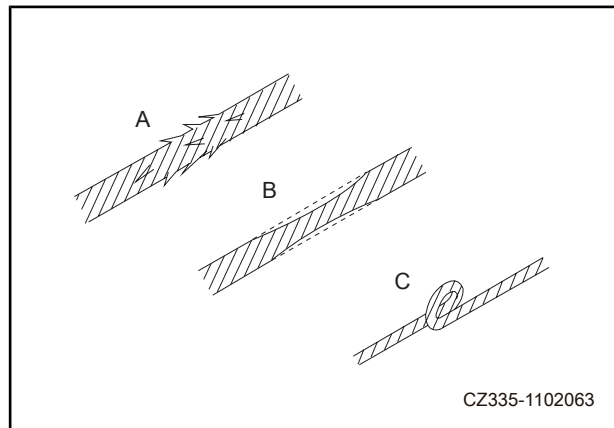


Fig.6-5

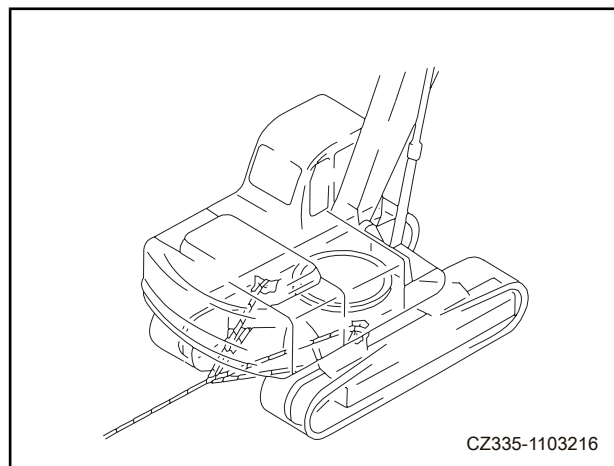


Fig.6-6

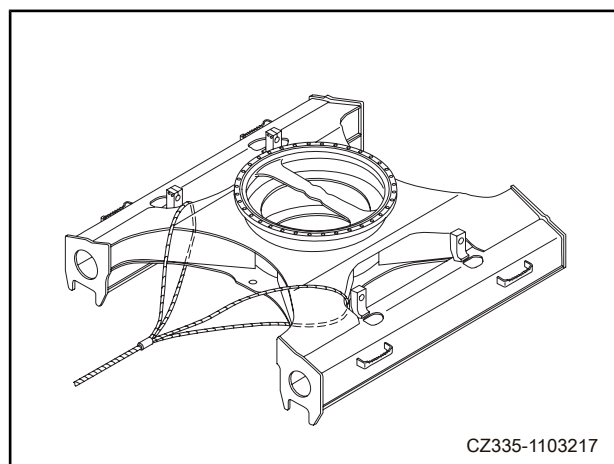


Fig.6-7

6.3 Engine Faults

6.3.1 Faults Diagnosis Table for Engine

When a fault occurs, please conduct inspections according to the table below, and contact Sany authorized dealer to carry out repairs.

Fault content		Fault Analysis	Measures
Engine start failure	The starter fails to fire or rotate with difficulty	<ul style="list-style-type: none"> ● Power run-out of battery ● Disconnection, looseness and corrosion of battery cables ● Fuse short-circuit ● Failure of the ignition switch or starting relay ● Failure of the starter motor ● High viscosity of engine oil 	<ul style="list-style-type: none"> ● Please charge or change the battery ● Please clean the corroded place ● Please replace the fuse ● Please replace the ignition switch or starting relay ● Please repair or replace the starter motor ● Please replace the engine oil with proper viscosity
	The starter starts properly	<ul style="list-style-type: none"> ● Fuel run-out ● Low starting pressure of fuel injector ● Wrong starting operation ● Air mixed into the fuel system ● Fuel filter occlusion ● Air cleaner occlusion ● Clutch slip ● Looseness of clamps for fixing air suction rubber hose to the turbocharger ● Cracking of air suction rubber hose of the turbocharger 	<ul style="list-style-type: none"> ● Please refuel and eliminate air ● Please adjust or replace the fuel injector ● Please operate following the correct starting steps ● Please discharge the air in the fuel system ● Please replace the element or cartridge of the fuel filter ● Please clean or replace the element of the air cleaner ● Please repair or replace the clutch ● Please fasten the clamp ● Please replace the air suction rubber hose
Engine stop after starting		● The idle speed is too low	● Power run-out of battery
		● Fuel filter occlusion	● Please replace the element or cartridge of the fuel filter

	<ul style="list-style-type: none"> ● Air cleaner occlusion 	<ul style="list-style-type: none"> ● Please clean or replace the element of the air cleaner
Unstable low idle speed	<ul style="list-style-type: none"> ● Failure of low idle speed control system 	<ul style="list-style-type: none"> ● Please repair or replace the low idle speed control system
	<ul style="list-style-type: none"> ● Leakage or clogging of fuel system 	<ul style="list-style-type: none"> ● Please overhaul the fuel system
	<ul style="list-style-type: none"> ● Air in fuel system 	<ul style="list-style-type: none"> ● Please discharge the air in the fuel system
	<ul style="list-style-type: none"> ● Water in fuel system 	<ul style="list-style-type: none"> ● Please replace the fuel
	<ul style="list-style-type: none"> ● Fuel filter element occlusion 	<ul style="list-style-type: none"> ● Please replace the element or cartridge of the fuel filter
	<ul style="list-style-type: none"> ● Failure of fuel injection pump 	<ul style="list-style-type: none"> ● Please repair or replace the related parts of the fuel injection pump
	<ul style="list-style-type: none"> ● Improper adjustment of valve clearance 	<ul style="list-style-type: none"> ● Please adjust the valve clearance
	<ul style="list-style-type: none"> ● Leakage at cylinder gasket, wear of cylinder liner, piston ring sticking or cracking, improper alignment of valve and valve seat 	<ul style="list-style-type: none"> ● Please replace the related parts
Underpower	<ul style="list-style-type: none"> ● Fuel filter occlusion 	<ul style="list-style-type: none"> ● Please replace the element or cartridge of the fuel filter
	<ul style="list-style-type: none"> ● Water in the fuel 	<ul style="list-style-type: none"> ● Please replace the fuel
	<ul style="list-style-type: none"> ● Air cleaner occlusion 	<ul style="list-style-type: none"> ● Please clean or replace the element of the air cleaner
	<ul style="list-style-type: none"> ● Failure of fuel transfer pump 	<ul style="list-style-type: none"> ● Please repair or replace the fuel transfer pump
	<ul style="list-style-type: none"> ● Low starting pressure of fuel injector, and poor injection effect 	<ul style="list-style-type: none"> ● Please adjust or replace the fuel injector
	<ul style="list-style-type: none"> ● Failure of fuel injection pump 	<ul style="list-style-type: none"> ● Please repair or replace the related parts of the fuel injection pump
	<ul style="list-style-type: none"> ● Exhaust gas leaking from the exhaust system 	<ul style="list-style-type: none"> ● Please repair or replace the related parts
	<ul style="list-style-type: none"> ● Air leaking from the intake system 	<ul style="list-style-type: none"> ● Please replace the turbocharger assembly
	<ul style="list-style-type: none"> ● Turbocharger assembly damaged 	<ul style="list-style-type: none"> ● Please replace the turbocharger assembly
	<ul style="list-style-type: none"> ● Exhaust pipe blocked 	<ul style="list-style-type: none"> ● Please clean the exhaust pipe

	<ul style="list-style-type: none"> ● Improper adjustment of valve clearance ● Weakening or breakage of valve spring ● Leakage at cylinder gasket, wear of cylinder liner, piston ring sticking or cracking, improper alignment of valve and valve seat 	<ul style="list-style-type: none"> ● Please adjust the valve clearance ● Please replace the valve spring ● Please replace the related parts
Engine overheating	<ul style="list-style-type: none"> ● Insufficient coolant ● Slippage of fan belt due to looseness or cracking ● Cooler damaged or cooler core blocked ● Water pump damaged ● Coolant leakage due to damage of cylinder head or/and cylinder block seal cover ● Thermostat damage ● Cooling system blocked by foreign matters ● Improper adjustment of fuel injection timing 	<ul style="list-style-type: none"> ● Please add coolant ● Please replace fan belt ● Please replace cooler cover or clean the cooler core ● Please repair or replace the water pump ● Please repair or replace the seal cover ● Please replace the thermostat ● Please remove the foreign matters in the cooling system ● Please adjust the fuel injection timing
White smoke	<ul style="list-style-type: none"> ● Water in the fuel ● Fuel injection timing delay ● Leakage at cylinder gasket, wear of cylinder liner, piston ring sticking or cracking, improper alignment of valve and valve seat ● Turbocharger assembly failure ● Failure of oil seal, damage of valve stem and valve guide ● Wear, breakage or improper setting of piston ring ● Cylinder liner scratched or worn 	<ul style="list-style-type: none"> ● Please replace the fuel ● Please adjust the fuel injection timing ● Please replace the related parts ● Please repair or replace ● Please replace the valve oil seal, valve and valve guide ● Please replace the piston or reposition it properly ● Please replace the cylinder liner
Black smoke	<ul style="list-style-type: none"> ● Air cleaner occlusion 	<ul style="list-style-type: none"> ● Please clean or replace the element of the air cleaner

	<ul style="list-style-type: none"> ● Low starting pressure of fuel injector, and poor injection effect ● Improper adjustment of fuel injection timing ● Fuel dripping due to damaged outlet valve of fuel injection pump ● Excessive injection of the fuel injection pump 	<ul style="list-style-type: none"> ● Please adjust or replace the fuel injector ● Please adjust the fuel injection timing ● Please replace the outlet valve ● Adjust the amount of fuel injection
<p>High fuel consumption</p>	<ul style="list-style-type: none"> ● Fuel leakage ● Air cleaner occlusion ● Improper adjustment of low idle speed ● Low starting pressure of fuel injector, and poor injection effect ● Improper adjustment of fuel injection timing ● Fuel dripping due to damaged outlet valve of fuel injection ● Air leaking from the intake-side of the turbocharger ● Turbocharger assembly damaged ● Improper adjustment of valve clearance ● Weakening or breakage of valve spring ● Leakage at cylinder gasket, wear of cylinder liner, piston ring sticking or cracking, improper alignment of valve and valve seat 	<ul style="list-style-type: none"> ● Please repair or replace the related parts of the fuel system ● Please clean or replace the element of the air cleaner ● Please adjust the low idle speed ● Please adjust or replace the fuel injector ● Please adjust the fuel injection timing ● Please replace the outlet valve ● Please repair the intake-side of the turbocharger ● Please replace the turbocharger assembly ● Please adjust the valve clearance ● Please replace the valve spring ● Please replace the related parts
<p>High oil consumption</p>	<ul style="list-style-type: none"> ● Unsuitable engine oil ● Engine oil excess ● Engine oil leaking from oil seal and/or gasket 	<ul style="list-style-type: none"> ● Please replace with suitable engine oil ● Please adjust the amount of engine oil ● Please replace the oil seal and/or gasket

		<ul style="list-style-type: none"> • No preheating operation • Failure of oil seal, and wear of valve stem and valve guide • Wear, breakage or improper setting of piston ring • Cylinder liner scratched or worn 	<ul style="list-style-type: none"> • Please follow the correct steps in operation • Please replace the related parts • Please replace the piston or reposition it properly • Please replace the cylinder liner
Low engine oil pressure		<ul style="list-style-type: none"> • Low engine oil level • Improper viscosity of engine oil • Engine oil leaking from oil seal and/or gasket • Fuel filter element occlusion • Relief valve sticking and/or by-pass valve spring weakening • Strainer of oil pump blocked • Relevant parts of oil pump abrasion 	<ul style="list-style-type: none"> • Please refill engine oil • Please use lubricant of proper viscosity • Please replace the oil seal and/or gasket • Please replace the element or cylinder of the fuel filter • Please replace the spring of safety valve and/or by-pass valve • Please clean the strainer of the oil pump • Please replace the related parts of the oil pump
Abnormal engine noise	Air leakage noise	<ul style="list-style-type: none"> • Fitting looseness or damage of the exhaust pipe • Fuel injector looseness • Looseness of exhaust manifold fitting • Cylinder gasket broken 	<ul style="list-style-type: none"> • Please screw down exhaust pipe fittings or replace the exhaust pipe • Please tighten up the fuel injector and replace the gasket • Please tighten up the exhaust manifold fitting • Please replace the cylinder liner
	Continuous noise	<ul style="list-style-type: none"> • Fan belt looseness • Cooling fan looseness • Wear or damage of water pump bearing • Improper adjustment of valve clearance 	<ul style="list-style-type: none"> • Please adjust the tension of the belt • Please tighten the cooling fan • Please replace the bearing of the water pump • Please adjust the valve clearance

6.3.2 High Water Temperature

WARNING

- Do not open the cover of the cooler when the water temperature is excessively high, and if you do so, the boiling water or steam may splash and cause scald. When the temperature of the coolant goes down, please pad a thick cloth on the cover and open it slowly.

CAUTION

- Do not stop the engine immediately. Otherwise the rising temperature will burn the engine parts
- Please add water slowly in multiple times in case the sudden injection of cool water cracks the engine.

When the reading of the water thermometer exceeds 100°C and the indication light is on, it means the water temperature of the cooler exceeds the limit. Please stop the device, and keep the engine running at a speed a little higher than idle speed to cool down. When the pointer of the water thermometer goes to the center and the High Temperature Light is off, stop the engine, then do as follows.

1. Check whether there is coolant leakage of the cooler rubber hose.
2. Check the amount of coolant. Please refill coolant when it is insufficient.
3. Check whether there is object in front of the cooler.
4. Coolant leakage or constant water temperature out-of-gauge indicates cooling system failure.

6.3.3 Engine Oil Pressure Abnormality (Low Engine Oil Pressure)

When the engine is just started, oil pressure gauge indicates high pressure. After adequate preheating operation, please check the oil pressure once more.

When the indicator warns abnormal oil pressure. Please stop the machine, and shut down the engine immediately and do as follows.

CAUTION

- Please shut down the engine immediately for continuing operation may bring damage to the engine.

1. Check whether the engine oil leaks.
2. Check the amount of the engine oil, and refill if insufficient.
 - Take out the engine oil dipstick [1], and clean the engine oil with cloth.
 - Dip the dipstick completely into the engine oil, then take out slowly.
 - If the engine oil trace on the dipstick is between H and L, the oil amount is normal.
 - Refill the engine with oil timely if it is insufficient. Replace the engine oil if it is obviously unclean.
 - Put the dipstick back to the slot after examination.
3. When the engine oil is of normal amount but the warning light still indicates abnormal pressure, please contact Sany authorized dealer to repair.

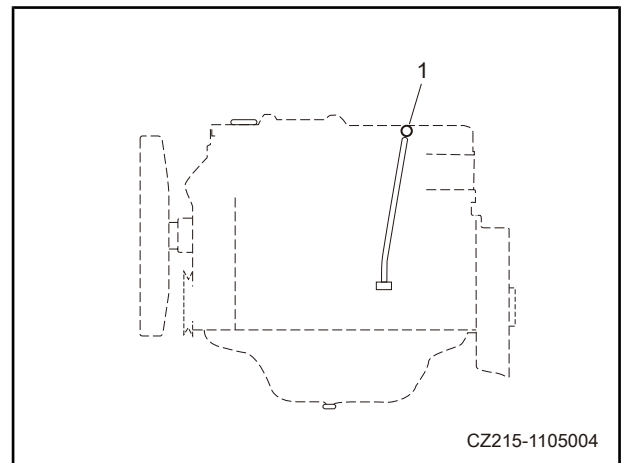


Fig.6-8

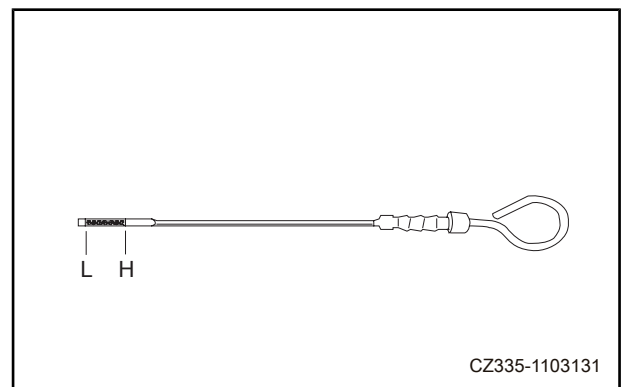


Fig.6-9

6.3.4 Fuel Run-Out

When fuel runs out, remember to add fuel before starting the engine, and discharge air from fuel system.

⚠ WARNING

- Neither use lighter nor smoke during bleeding. Otherwise it may lead to fire and cause serious accident.
- Splashed engine oil or fuel may catch fire in case of heat source or cause slipping accident, so please clean up the splashed engine oil and fuel at the exhaust pipe or other places.
- Since the operation area is cramped, be careful not to get hurt by the surrounding parts.

1. Loosen the bleed screw [C], and cover it with cloth or something else.
2. Turn on the electromagnetic pump switch [2] to deliver fuel continuously, until there is no more bubbles coming out of the bleed screw.
3. Tighten the bleed screw [C] after making sure no bubbles come out.
4. Tighten the bleed screw and turn off the electromagnetic pump.
5. After the air is completely discharged, clean up the splashed fuel, then start the engine.
6. Please confirm if there is fuel leakage.

⚠ WARNING

- Do not operate the electromagnetic pump when the engine is in normal operation, for fear of damage to the pump.

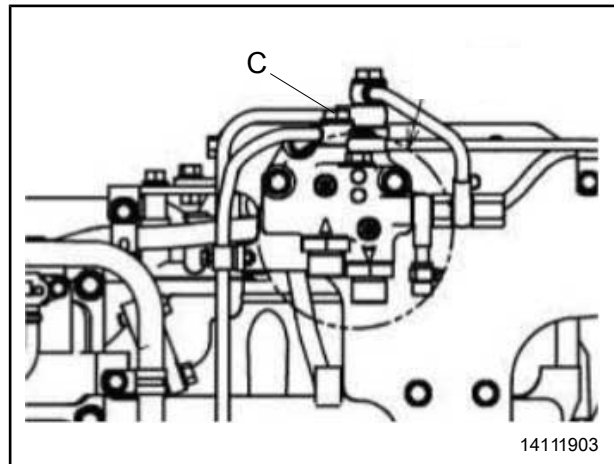


Fig.6-10

6.3.5 Engine Kick-Back

WARNING

- When the engine kicks back, please shut down the engine immediately, otherwise the engine will burn in a few minutes or serious accident may occur, and the exhaust gas from the air cleaner may also cause a fire.

When the engine kicks back, following situation will come up.

- Harsh impacting noise at the beginning of running.
- Black smoke from the air cleaner.
- Low engine oil pressure warning on the display.
Please check and clean the air cleaner and rubber hose after stop, and if any abnormality is found, replace the affected part with a new one.

6.4 Electrical System Failure

6.4.1 Faults Diagnosis Table of Electrical System

When a fault occurs, please conduct inspections according to the table below, and contact Sany authorized dealer to carry out repairs.

Fault content	Fault Analysis	Measures
The engine cannot be started	<ul style="list-style-type: none"> • Low battery • Internal fault of ignition switch • Pilot switch fault • Starter motor fault • Wire harness open circuit • Fuse fault • Short circuit of wire (grounding fault) • Internal fault of alternator • Starter relay fault 	<ul style="list-style-type: none"> • Charge or replace the battery • Replacement • Repair or replace the part • Repair or replace the part • Inspect and repair • Replacement • Inspect and repair • Repair or replace the part • Replacement
Irregular fluctuation of engine speed	<ul style="list-style-type: none"> • Open circuit of wire harness • Internal fault of sensor • Short circuit of wire (grounding fault) 	<ul style="list-style-type: none"> • Inspect and repair • Replacement • Inspect and repair

Fault content	Fault Analysis	Measures
	<ul style="list-style-type: none"> ● Internal fault of controller 	<ul style="list-style-type: none"> ● Replacement
<p>The complete vehicle can't be powered off</p>	<ul style="list-style-type: none"> ● Battery relay fault ● Surge diode breakdown 	<ul style="list-style-type: none"> ● Replacement ● Replacement
<p>It runs idly automatically and doesn't work</p>	<ul style="list-style-type: none"> ● Boom lifting signal fault ● Boom lowering signal fault ● Arm digging signal fault ● Arm unloading signal fault ● Bucket digging signal fault ● Bucket dumping signal fault ● Swing signal fault ● Traveling signal fault ● Accessory signal fault ● Controller fault 	<ul style="list-style-type: none"> ● Inspect and repair ● Inspect and repair ● Inspect and repair ● Inspect and repair ● Inspect and repair ● Inspect and repair ● Inspect and repair ● Inspect and repair ● Inspect and repair ● Replacement
<p>The preheating function is disabled</p>	<ul style="list-style-type: none"> ● Failure of glow plug fuse ● Failure of glow plug relay ● Short circuit of wire (grounding fault) 	<ul style="list-style-type: none"> ● Replacement ● Replacement ● Inspect and repair
<p>No equipment works</p>	<ul style="list-style-type: none"> ● Safety lock switch fault ● Short circuit of wire (grounding fault) ● Internal coil failure of pilot lockout solenoid valve 	<ul style="list-style-type: none"> ● Repair or replace the part ● Inspect and repair ● Replacement
<p>Slow and powerless rising movement of the boom</p>	<ul style="list-style-type: none"> ● Sensor fault ● Short circuit of wire harness (grounding fault) ● Harness open circuit ● Controller fault 	<ul style="list-style-type: none"> ● Replacement ● Inspect and repair ● Inspect and repair ● Replacement
<p>Slow and powerless movement of the arm</p>	<ul style="list-style-type: none"> ● Sensor fault ● Short circuit of wire harness (grounding fault) ● Harness open circuit ● Controller fault 	<ul style="list-style-type: none"> ● Replacement ● Inspect and repair ● Inspect and repair ● Replacement
<p>Slow and powerless movement of the bucket</p>	<ul style="list-style-type: none"> ● Sensor fault 	<ul style="list-style-type: none"> ● Replacement

Fault content	Fault Analysis	Measures
	<ul style="list-style-type: none"> ● Short circuit of wire harness (grounding fault) ● Harness open circuit ● Controller fault 	<ul style="list-style-type: none"> ● Inspect and repair ● Inspect and repair ● Replacement
Slow and powerless traveling movement	<ul style="list-style-type: none"> ● Sensor fault ● Short circuit of wire harness (grounding fault) ● Harness open circuit ● Controller fault 	<ul style="list-style-type: none"> ● Replacement ● Inspect and repair ● Inspect and repair ● Replacement
The display is blank	<ul style="list-style-type: none"> ● Fuse fault ● Wire disconnection fault ● Short circuit of wire (grounding fault) ● Display screen fault 	<ul style="list-style-type: none"> ● Replacement ● Inspect and repair ● Inspect and repair ● Replacement
The display has no display	<ul style="list-style-type: none"> ● Resistance fault ● Wire disconnection fault ● Short circuit of wire (grounding fault) ● Fault of display or controller 	<ul style="list-style-type: none"> ● Replacement ● Inspect and repair ● Inspect and repair ● Replacement
The high/low traveling speed function is disabled	<ul style="list-style-type: none"> ● Fault of high/low speed traveling solenoid valve ● Wire disconnection fault ● Short circuit of wire (grounding fault) 	<ul style="list-style-type: none"> ● Replacement ● Inspect and repair ● Inspect and repair
Incorrect temperature display of engine coolant	<ul style="list-style-type: none"> ● Coolant temperature sensor fault ● Wire disconnection fault ● Short circuit of wire (grounding fault) ● CAN bus abnormality 	<ul style="list-style-type: none"> ● Replacement ● Inspect and repair ● Inspect and repair ● Inspect and repair
The display of fuel level is inaccurate	<ul style="list-style-type: none"> ● Oil level sensor fault ● Wire disconnection fault ● Short circuit of wire (grounding fault) ● Short circuit of wire and 24 V 	<ul style="list-style-type: none"> ● Replacement ● Inspect and repair ● Inspect and repair ● Inspect and repair
The wiper doesn't work	<ul style="list-style-type: none"> ● Internal fault of wiper motor 	<ul style="list-style-type: none"> ● Repair or replace the part

Fault content	Fault Analysis	Measures
	<ul style="list-style-type: none"> ● Wire disconnection fault ● Short circuit of wire (grounding fault) 	<ul style="list-style-type: none"> ● Inspect and repair ● Inspect and repair
<p>The display of arm digging pilot pressure is inaccurate</p>	<ul style="list-style-type: none"> ● 5 V power supply fault ● Signal wire open circuit ● Signal wire short circuit ● Sensor fault 	<ul style="list-style-type: none"> ● Repair or replace the part ● Inspect and repair ● Inspect and repair ● Replacement
<p>The display of arm unloading pilot pressure is inaccurate</p>	<ul style="list-style-type: none"> ● 5 V power supply fault ● Signal wire open circuit ● Signal wire short circuit ● Sensor fault 	<ul style="list-style-type: none"> ● Repair or replace the part ● Inspect and repair ● Inspect and repair ● Replacement
<p>The display of boom lifting pilot pressure is inaccurate</p>	<ul style="list-style-type: none"> ● 5 V power supply fault ● Signal wire open circuit ● Signal wire short circuit ● Sensor fault 	<ul style="list-style-type: none"> ● Repair or replace the part ● Inspect and repair ● Inspect and repair ● Replacement
<p>The display of boom drop pilot pressure is inaccurate</p>	<ul style="list-style-type: none"> ● 5 V power supply fault ● Signal wire open circuit ● Signal wire short circuit ● Sensor fault 	<ul style="list-style-type: none"> ● Repair or replace the part ● Inspect and repair ● Inspect and repair ● Replacement
<p>The display of bucket digging pilot pressure is inaccurate</p>	<ul style="list-style-type: none"> ● 5 V power supply fault ● Signal wire open circuit ● Signal wire short circuit ● Sensor fault 	<ul style="list-style-type: none"> ● Repair or replace the part ● Inspect and repair ● Inspect and repair ● Replacement
<p>The display of bucket unloading pilot pressure is inaccurate</p>	<ul style="list-style-type: none"> ● 5 V power supply fault ● Signal wire open circuit ● Signal wire short circuit ● Sensor fault 	<ul style="list-style-type: none"> ● Repair or replace the part ● Inspect and repair ● Inspect and repair ● Replacement
<p>The display of swing pilot pressure is inaccurate</p>	<ul style="list-style-type: none"> ● 5 V power supply fault 	<ul style="list-style-type: none"> ● Repair or replace the part

Fault content	Fault Analysis	Measures
	<ul style="list-style-type: none"> ● Signal wire open circuit ● Signal wire short circuit ● Sensor fault 	<ul style="list-style-type: none"> ● Inspect and repair ● Inspect and repair ● Replacement
Incorrect display of travel pilot pressure	<ul style="list-style-type: none"> ● 5 V power supply fault ● Signal wire open circuit ● Signal wire short circuit ● Sensor fault 	<ul style="list-style-type: none"> ● Repair or replace the part ● Inspect and repair ● Inspect and repair ● Replacement

6.4.2 Display Monitor

Conduct fault diagnosis & analysis according to the DTC on the display. As for the description to DTC, please refer to relay-related description in the "Operation" section.

DTC	Fault content	Activating conditions
E101	Internal fault of controller	RAM/EEPROM error; Task pause detected
E102	Controller internal temperature abnormality	Temperature inside the controller sustains at over 110°C or -40°C for 10s
E103	Sensor power abnormality	Sensor power output abnormality detected and lasting for 1s.
E104	Storage error (GPS locking storage)	GPS lock memory error
E105	CPU error	CPU processing abnormality detected; unrecoverable memory error detected; I2C communication pause detected; Program writing abnormality; parameter writing abnormality.
E401	CAN bus abnormality	PGN receipt pause (1s) or invalid SPN data detected
E501	Throttle knob abnormality	Input signal is beyond the threshold range (0.25~4.75V), which lasts for a period longer than the setting time (0.2s).
H401	Hydraulic oil temperature sensor abnormality	Voltage except acquired voltage (0.25~4.75V) lasts for 0.2s
P402	Fuel level sensor abnormality	Input signal is beyond the threshold range (0.25~4.75V), which lasts for a period longer than the setting time (0.2s).
H101	P1 pump pressure abnormality	
H102	P2 pump pressure abnormality	
H204	Arm unloading pilot pressure abnormality	

DTC	Fault content	Activating conditions
H203	Arm digging pilot pressure abnormality	
H205	Boom lifting pilot pressure abnormality	
H206	Boom lifting pilot pressure abnormality	
H202	Bucket unloading pilot pressure abnormality	
H201	Bucket digging pilot pressure abnormality	
H209	Swing pilot pressure abnormality	
H207	Left travel pilot pressure abnormality	
H208	Right travel pilot pressure abnormality	
H113	Pressure abnormality of large hydraulic oil chamber of boom	
H114	Cooling pump pressure abnormality	
H105	P1 pump proportional valve current abnormality	
H108	P2 pump proportional valve current abnormality	
H312	Boom priority 2 proportional valve current abnormality	
H318	Arm 2 converging solenoid valve abnormality	
H321	Cooling pump proportional valve current abnormality	
H324	Boom 2 converging solenoid valve abnormality	
H309	Boom priority proportional valve current abnormality	ON/OFF solenoid voltage abnormality. When the command is ON, the voltage stays below the threshold (15 V), which lasts for a period longer than the setting time (0.1 s);
H315	Traveling high and low speed solenoid abnormality	
E703	Alarm lamp (light) relay abnormality	

DTC	Fault content	Activating conditions
E702	Starter motor relay abnormality	when the command is OFF, the voltage stays above the threshold (3 V), which lasts for a period longer than the setting time (0.1s).
E701	Shutdown delay relay abnormality	
E704	Alarm lamp (sound) relay abnormality	
H327	Pilot locking solenoid valve abnormality	
P605	Fuel filter relay abnormality	
H402	hydraulic oil overheating	Hydraulic temperature above 90°C
E201	Low power voltage	Voltage <18V, delay = 10s
E202	High power voltage	Voltage >32V, and delay = 10s.
P101	Too low engine oil pressure	ECM sends alarm signal of low engine oil pressure.
P301	Cooling water overheating	ECM sends water alarm signal of overheating.
P401	Low fuel level	Fuel level ≤10%, delay = 10s.
P501	Air filter blocked	Air filter on-off action blocked.
P601	Water separator water level too high	Water separator high water level switch is actuated.
P606	Fuel filter system abnormality	Fuel filter system alarms on-off action.
P100	Engine abnormality	Engine fault

6.4.3 Battery

6.4.3.1 General

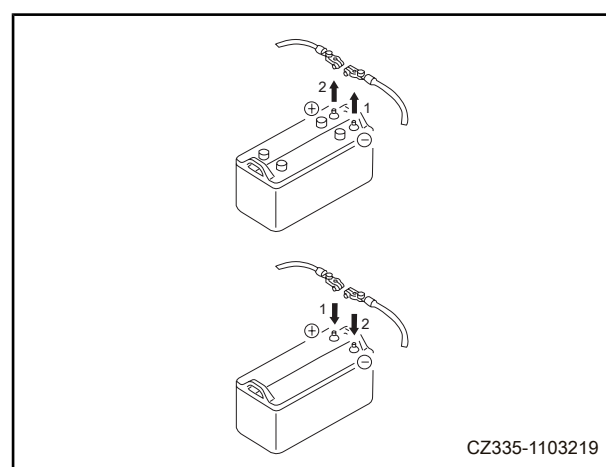


Fig.6-11

⚠ WARNING

- It is dangerous to charge the battery when the battery is mounted in the machine. Always disassemble the battery from the machine before charging.
- When checking or handling the battery, always turn the ignition key to OFF to shut down the engine.
- When handling the battery, always wear goggles and rubber gloves.
- When disassembling the battery, disconnect earthing cable (negative terminal [-]) first. When mounting, first mount the positive terminal [+]. Be careful not get the tool touching the positive terminal and chassis; otherwise, fire hazard may ensue.
- Loose contact of terminal may generate sparks, causing explosion.
- When disassembling or assembling terminals, test which is the positive terminal [+], and which is the negative terminal [-].

6.4.3.2 Removal and Refitting of Battery

- Before disassembling battery, always disassemble earthing cable (normally connected to negative terminal [-]) first.
- If the tool touches between the positive terminal and chassis, fire disaster may occur.
- Use clamp to fix the battery when changing battery.
- Order of connecting battery wire: first connect the battery positive wire, then connect the battery negative wire.
- Order of disconnecting battery wire: first disconnect the battery negative wire, then disconnect the battery positive wire.

6.4.3.3 Battery Charge

When charging the battery, any improper operation may lead to explosion. Always operate according to the battery and charger specifications, and do as follows:

- Adjust the charger voltage to match the battery. If the wrong voltage is selected, the charger may go overheating, and cause explosion.
- Connect the charger positive terminal [+] to the battery positive terminal [+], and connect the charger negative terminal [-] to the battery negative terminal [-]. Always fix the clamp.
- Adjust the charging current to the 1/10 of the rated battery capacity; in case of fast charging, tune down the charging current under rated battery capacity. Overcurrent may lead to electrolyte leakage or vaporization, which will cause battery on fire or exploding.
- If the battery electrolyte freezes, do not charge the battery or use different power supply to start the engine. Otherwise it will ignite the battery electrolyte and result in battery explosion.

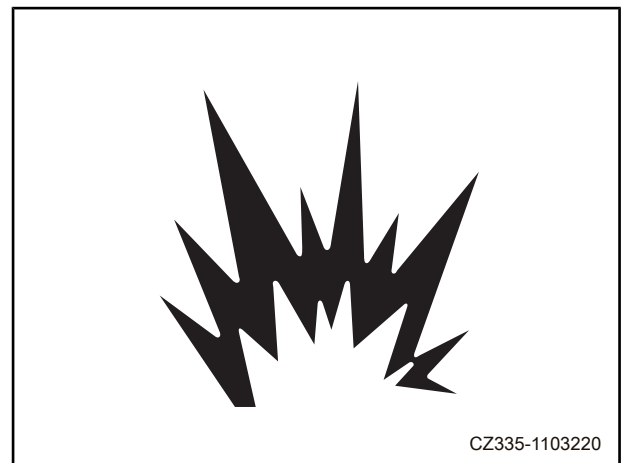


Fig.6-12

6.4.3.4 Start Engine with Auxiliary Wire

Connect and disconnect auxiliary wire

⚠ WARNING

- When connecting the wires, do not let the positive terminal [+] contact the negative terminal [-].
- Avoid the contact between normal machine and failed machine, so as to prevent sparks being generated around the battery igniting the hydrogen released from the battery.
- Be careful not to make mistakes in connecting auxiliary wires. At the end of connection (i.e. connection with upper frame), sparks will come up, so you need to connect the wire as far away from the battery as possible. (But always avoid work equipment since it is not good conductor)
- When removing the auxiliary wire, be extremely careful not to let the wire clamps touch each other or contact the chassis.

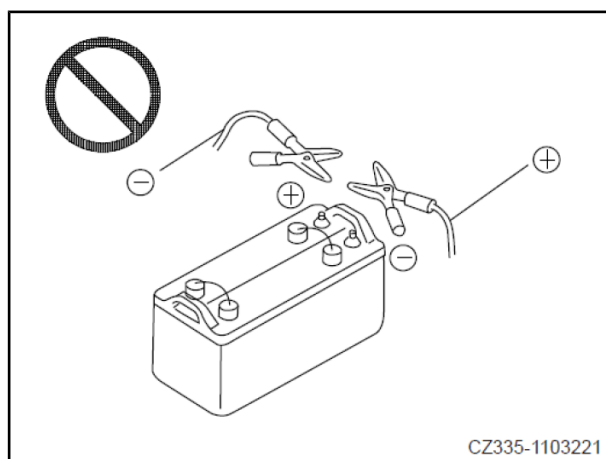


Fig.6-13

NOTE :

- The starting system adopts 24V voltage, is normally supplied by two 12V battery in series.
- The specification of auxiliary wire and clamp should conform to the battery specification.
- The battery should have the same capacity with the engine which it will start.
- Check whether the wires and clamps are broken or corroded.
- Make sure the wires and clamps fixed well.
- Check whether the safety lock control lever of the two machine both at the "LOCK" position.
- Check whether all levers stay at the middle.

Auxiliary wire connection

Keep the ignition switches of normal machine and failed machine at OFF. Connect the auxiliary wire according to the number order marked on the picture.

1. Connect the clamp of auxiliary wire [A] to the positive terminal [+] of the failed machine battery [C].
2. Connect the other clamp of auxiliary wire [A] to the positive terminal [+] of the normal machine battery [D].
3. Connect the other clamp of auxiliary wire [B] to the negative terminal [-] of the normal machine battery [D].
4. Connect the other clamp of auxiliary wire [B] to the failed machine swing frame [E].

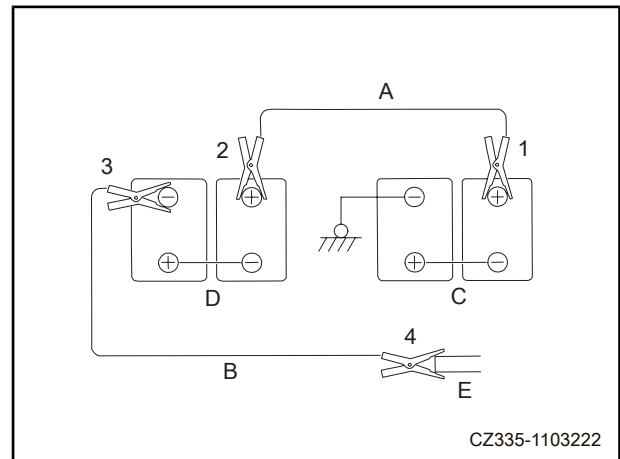


Fig.6-14

Start the engine

⚠ WARNING

- No matter when the machine is operating normally or has failed already, always check the machine, and keep the safety lock control lever at the "LOCK" position, and check whether all levers stay at the neutral position.

1. Make sure that the clamps and battery terminals connected firmly.
2. Start the engine of a normal machine and run it at high idle speed.
3. Turn the ignition switch of the failed machine to the "START" position and start the engine.

If the engine fails to start in first time, try again 2 minutes later.

Auxiliary wire disconnection

After the engine starting, disconnect the auxiliary wires in the reverse order of connecting them.

1. Disassemble a clamp of auxiliary wire [B] from swing frame of the failed machine [E].
2. Disassemble the clamps of auxiliary wire [B] from the battery [D] negative terminal [-] of the normal machine.
3. Disassemble the clamps of auxiliary wire [A] from the battery [D] positive terminal [+] of the normal machine.
4. Disassemble the clamps of auxiliary wire [A] from the battery [C] positive terminal [+] of the failed machine.

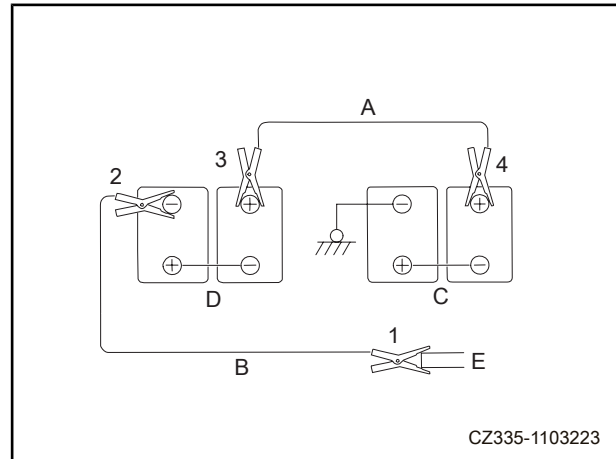


Fig.6-15

6.5 Hydraulic System Failure

- When failures occur, please conduct examination according to the table below, and contact Sany authorized dealer to carry out repairs.
- Set the working mode as S Mode and engage the 10th gear to conduct fault diagnosis.

Fault content	Fault Analysis	Measures
The work equipment moves slowly, or it has low traveling and rotation speed	<ul style="list-style-type: none"> • Main relief valve improperly adjusted or fails • Pilot relief valve failure • Regulator failure • Piston pump failure 	<ul style="list-style-type: none"> • Replace • Replace • Repair, replace • Inspect and repair
Work equipment, travel or swing failure	<ul style="list-style-type: none"> • Pilot pump relief valve failure • Hydraulic pump failure • Coupling failure 	<ul style="list-style-type: none"> • Replace • Inspect and repair • Inspect and repair
The hydraulic pump has unusual noise	<ul style="list-style-type: none"> • Hydraulic oil level decrease • Hydraulic oil of poor quality • Hydraulic oil tank top cap air breather blocked 	<ul style="list-style-type: none"> • Feeding with hydraulic oil • Replace suitable hydraulic oil • Clean up or replace

Fault content	Fault Analysis	Measures
	<ul style="list-style-type: none"> ● Hydraulic oil tank strainer blocked ● Piston pump failure 	<ul style="list-style-type: none"> ● Clean up or replace ● Inspect and repair
Automatic idle speed failure	<ul style="list-style-type: none"> ● Sensor failure ● Pilot valve failure ● Controller failure 	<ul style="list-style-type: none"> ● Replace ● Replace ● Repair, replace
Slow boom movement	<ul style="list-style-type: none"> ● Right pilot valve (boom oil line) failure ● Pressure sensor failure ● Boom control valve (spool) failure ● Boom control valve (holding valve) failure ● Boom control valve (safety valve and refilling valve) failure or seal failure ● Boom cylinder failure 	<ul style="list-style-type: none"> ● Inspect and repair ● Replace ● Repair, replace ● Repair, replace ● Repair, replace ● Repair, replace
Slow arm movement	<ul style="list-style-type: none"> ● Left pilot valve (arm oil line) failure ● Pressure sensor failure ● Arm control valve (spool) failure ● Arm control valve (regeneration valve) failure ● Arm control valve (safety valve and refilling valve) failure or seal failure ● Arm cylinder failure 	<ul style="list-style-type: none"> ● Inspect and repair ● Replace ● Repair, replace ● Repair, replace ● Repair, replace ● Inspect and repair
Slow bucket movement	<ul style="list-style-type: none"> ● Right pilot valve (bucket oil line) failure ● Pressure sensor failure ● Bucket control valve (spool) failure ● Bucket control valve (holding valve) failure ● Arm control valve (safety valve and refilling valve) failure or seal failure ● Bucket cylinder failure 	<ul style="list-style-type: none"> ● Inspect and repair ● Replace ● Repair, replace ● Repair, replace ● Repair, replace ● Inspect and repair

Fault content	Fault Analysis	Measures
The single cylinder of the work equipment has no movement	<ul style="list-style-type: none"> ● Pilot valve failure ● Pressure sensor failure ● Work equipment control valve (spool) failure 	<ul style="list-style-type: none"> ● Inspect and repair ● Replace ● Repair, replace
The cylinder drift of the work equipment is too large	<ul style="list-style-type: none"> ● Work equipment cylinder failure ● Maintaining valve (boom, arm) failure ● Work equipment control valve (safety valve and refilling valve) seal failure ● Work equipment valve spool failure 	<ul style="list-style-type: none"> ● Repair, replace ● Repair, replace ● Repair, replace ● Repair, replace
The work equipment moves slowly	<ul style="list-style-type: none"> ● Arm regeneration valve failure ● Control valve (safety valve and refilling valve) failure 	<ul style="list-style-type: none"> ● Repair, replace ● Repair, replace
Other work equipment moves when a single oil line has an overflow	<ul style="list-style-type: none"> ● Control valve seal failure 	<ul style="list-style-type: none"> ● Replace
Swinging or traveling speed decreasing obviously	<ul style="list-style-type: none"> ● Straight travel valve spool failure 	<ul style="list-style-type: none"> ● Repair or replace
The machine has off-tracking during traveling	<ul style="list-style-type: none"> ● Travel pilot valve failure ● Pilot relief valve failure ● Regulator failure ● Proportional solenoid stuck ● Travel valve spool stuck ● Hydraulic swivel stuck ● Travel motor failure ● Travel pilot pressure sensor failure 	<ul style="list-style-type: none"> ● Repair, replace ● Replace ● Repair, replace ● Repair, replace ● Repair, replace ● Repair, replace ● Repair, replace ● Replace
Machine traveling slowly	<ul style="list-style-type: none"> ● Travel pilot valve failure ● Pilot relief valve failure ● Sensor failure ● Travel control valve (spool) failure ● Travel control valve (oil filing valve) failure ● Travel motor failure 	<ul style="list-style-type: none"> ● Repair, replace ● Replace ● Replace ● Repair, replace ● Repair, replace ● Inspect and repair

Fault content		Fault Analysis	Measures
The machine is hard to turn or powerless		<ul style="list-style-type: none"> ● Travel pilot valve failure ● Travel pilot pressure sensor failure ● Travel control valve (spool) failure ● Travel control valve (oil filling valve) failure ● Travel motor (safety valve) failure ● Travel motor (check valve) failure 	<ul style="list-style-type: none"> ● Repair, replace ● Replace ● Repair, replace ● Repair, replace ● Repair, replace ● Repair, replace
The traveling speed cannot be shifted		<ul style="list-style-type: none"> ● High speed switching solenoid valve failure ● Travel motor failure 	<ul style="list-style-type: none"> ● Replace ● Inspect and repair
It cannot travel (only on one side)		<ul style="list-style-type: none"> ● Travel base valve failure ● Travel motor safety valve failure ● Travel motor balance valve failure ● Travel motor failure ● Pilot pressure sensor failure 	<ul style="list-style-type: none"> ● Repair, replace ● Repair, replace ● Repair, replace ● Inspect and repair ● Replace
The machine cannot swing	Swing failure to left and right	<ul style="list-style-type: none"> ● Swing motor ● Swing motor (safety valve) improperly adjusted or failed ● Swing motor failure ● Swing mechanism failure 	<ul style="list-style-type: none"> ● Inspect and repair ● Adjust, replace ● Inspect and repair ● Inspect and repair
	Swing failure in single direction	<ul style="list-style-type: none"> ● Pilot valve failure ● Swing control valve (spool) failure ● Swing motor (refilling valve) seal failure 	<ul style="list-style-type: none"> ● Repair, replace ● Repair, replace ● Replace
Slow swing	Poor acceleration performance or slow swing	<ul style="list-style-type: none"> ● Swing motor ● Swing motor (safety valve) improperly adjusted or failed ● Swing motor failure ● Brake control lines blocked 	<ul style="list-style-type: none"> ● Inspect and repair ● Adjust, replace ● Inspect and repair ● Unclog or replace the lines

Fault content		Fault Analysis	Measures
	Poor acceleration performance in single direction, or slow swing	<ul style="list-style-type: none"> • Pilot valve failure • Swing motor (pressure compensation valve) failure • Swing motor (refilling valve) seal failure • Swing pilot pressure sensor shuttle valve leakage on single side 	<ul style="list-style-type: none"> • Repair, replace • Repair, replace • Replace • Repair, replace
The overrun is too large when swing stops	Overswing in two directions	<ul style="list-style-type: none"> • Swing motor (safety valve) improperly adjusted or failed • Swing motor failure 	<ul style="list-style-type: none"> • Adjust, replace • Inspect and repair
	Overswing in single direction	<ul style="list-style-type: none"> • Pilot valve failure • Swing control valve (spool) failure • Swing motor (refilling valve) seal failure 	<ul style="list-style-type: none"> • Repair, replace • Repair, replace • Replace
The impact is too large when swing stops		<ul style="list-style-type: none"> • Swing pilot valve failure • Rebound damping valve failure • Swing relief valve failure 	<ul style="list-style-type: none"> • Repair, replace • Repair, replace • Repair, replace
The unusual noise is too loud when swing stops		<ul style="list-style-type: none"> • Back pressure valve failure • Swing motor (safety valve) failure • Swing motor (refilling valve) failure • Swing mechanic structure failure 	<ul style="list-style-type: none"> • Repair, replace • Repair, replace • Repair, replace • Inspect and repair
Excessive swing hydraulic drifting	When applying swing parking brake	• Swing brake control lines failure	• Inspect and repair
		• Swing motor (parking brake)	• Repair, replace
	When applying swing parking brake failure	• Swing control valve (spool) failure	• Repair, replace
		• Swing motor (relief valve) failure	• Repair, replace
		• Swing motor (refilling valve) failure	• Repair, replace

6.6 Other Common Faults

Fault content	Fault Analysis	Measures
Noisy structural member	• Looseness and unusual noise of fasteners	• Check and tighten up again

Fault content	Fault Analysis	Measures
	<ul style="list-style-type: none"> ● Increasing end clearance between bucket and arm due to abrasion 	<ul style="list-style-type: none"> ● Adjust the clearance to 1mm
Bucket tooth dropping in operation	<ul style="list-style-type: none"> ● Deformation and weakness of bucket tooth pin spring after long-term use ● Mismatching of bucket tooth pin with tooth base 	<ul style="list-style-type: none"> ● Replace the bucket tooth pin
Track twist under the excavator	<ul style="list-style-type: none"> ● Loose track ● Sprocket running fast in front on the bumpy road 	<ul style="list-style-type: none"> ● Tighten the track ● Guide wheel running slow in front on the bumpy wheel
Running failure of fan	<ul style="list-style-type: none"> ● Poor contact of electrics or connector ● Blowing rate switch, relay or temperature control switch damage ● Fuse breakage or low battery voltage 	<ul style="list-style-type: none"> ● Repair or replace
Small air volume with fan running normally	<ul style="list-style-type: none"> ● Obstacle at intake side ● Poor heat transfer due to blockage of evaporator or condenser fin ● One of the fan impeller stuck or damaged 	<ul style="list-style-type: none"> ● Clean up ● Clean up ● Replace
Failed or difficult running of compressor	<ul style="list-style-type: none"> ● Clutch engagement failure because of broken line and poor contact in electric circuit ● Undertensioning of compressor belt ● Coil breakage and failure of compressor clutch coil ● Too much or too little refrigerant 	<ul style="list-style-type: none"> ● Repair ● Adjust compressor belt tension ● Replace clutch coil ● Adjust the filling amount of refrigerant
Coolant (freezing medium) shortage	<ul style="list-style-type: none"> ● Coolant leakage ● Coolant underfilling 	<ul style="list-style-type: none"> ● Eliminate leaking point ● Add coolant as appropriate
Readings of high and low pressure gauge in normal working condition	<ul style="list-style-type: none"> ● When environment temperature is 30~50°C ● High pressure reading: 1.47~1.67MPa(15~17kgf/cm²) ● Low pressure reading: 0.13~0.20MPa(1.4~2.11kgf/cm²) 	

Fault content		Fault Analysis	Measures
Low pressure above specified value	Frost attached on the surface of low pressure pipe	<ul style="list-style-type: none"> Excessive opening width of expansion valve Poor contact of expansion valve sensing bulb Excessive coolant inside the system 	<ul style="list-style-type: none"> Replace the expansion valve Properly mount the sensing bulb Drain some coolant to the specified amount
Low pressure below specified value	Both high and low pressure below normal value	<ul style="list-style-type: none"> Coolant shortage 	<ul style="list-style-type: none"> Refill coolant to the specified amount.
	Negative pressure sometimes indicated on the low pressure gauge	<ul style="list-style-type: none"> Low pressure hose blocked, expansion valve blocked by ice or dirt 	<ul style="list-style-type: none"> Repair the system, replace the liquid reservoir if blocked by ice
	Evaporator freeze	<ul style="list-style-type: none"> Thermostat out of operation 	<ul style="list-style-type: none"> Replace thermostat
Frosting at inlet side of expansion valve		<ul style="list-style-type: none"> Expansion valve blocked 	<ul style="list-style-type: none"> Clean or replace the expansion valve
Expansion valve inlet side not felt cold, but low pressure being negative sometimes		<ul style="list-style-type: none"> Air leakage of expansion valve sensing pipe or sensing bulb 	<ul style="list-style-type: none"> Replace the expansion valve
High pressure above the specified value	Both high and low pressure above normal value	<ul style="list-style-type: none"> Air mixed into circulation system Coolant overfilling 	<ul style="list-style-type: none"> Drain away coolant, vacuumize again, and then add coolant Drain coolant as appropriate
	Poor performance of condenser	<ul style="list-style-type: none"> Condenser blocked by dust Condenser fan damaged 	<ul style="list-style-type: none"> Clean and unblock the condenser Check and replace condenser fan
High pressure below the specified value	Both high and low pressure below the specified value, negative reading sometimes shown on the low pressure gauge, and compressor and high pressure pipe overheated	<ul style="list-style-type: none"> Coolant shortage Low pressure pipeline blocked and damaged Internal failure of compressor 	<ul style="list-style-type: none"> Repair, and refill with refrigerant as specified Clean and replace failed part Replace compressor
Poor cooling effect due to warm air influence		<ul style="list-style-type: none"> Closing failure of heater valve due to damage 	<ul style="list-style-type: none"> Replace heater solenoid valve

SANY

Accessories and Options

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 **WARNING**

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this machine and before operation or maintaining it. Failure to do this could result in death or serious injury.

7. Accessories and Options

7.1 Safety precautions

Pay attention to safety while installing accessories or options on board. Please comply with the following precautions for selection, installation and use of accessories or options:

Precautions for selection

- Before installing accessories or options on board, please consult the agents authorized by Sany Heavy Machinery Co., Ltd. Depending on the type of accessory or option, front guard, overhead guard or other safety structures may be required to be installed on board additionally.
- Only accessories or options approved by Sany Heavy Machinery Co., Ltd. shall be installed. Sany Heavy Machinery Co., Ltd. will take no responsibility for the accident, damage or malfunction caused by unapproved accessories or options.

Please read the Operation Manual carefully

- Before installing and using any accessories or options, be sure to read carefully and understand the contents of the corresponding Operation Manual.
- If the Operation Manual was lost or damaged, you should ask the manufacturer of accessories or the agents authorized by Sany Heavy Machinery Co., Ltd. for a new one.

Precautions for removal and installation

Ensure safety while removing and installing accessories or options. Please comply with the following precautions:

- Remove and install the accessories or options in a flat and solid place.
- When the cooperative work between two or more persons is required, one should be the commander and others follow his/her commands.
- Use the lift to carry the object over 25 kg. (The lift must be operated by qualified and experienced staff with official license.) It is forbidden to stay under the lifted object.
- During removal and installation process, please don't use the machine while any object is being lifted. Please use a holder to avoid the object falling if necessary.
- Before removing some heavy parts, consider the effect of the removal on the balance of the machine. To prevent rollover, the machine may be supported before removal of some heavy parts, if necessary.
- Ensure the accessories or options to be installed or removed ones are stable and would not turn over.
- As for more details about removal or installation, please consult the agents authorized by Sany Heavy Machinery Co., Ltd.

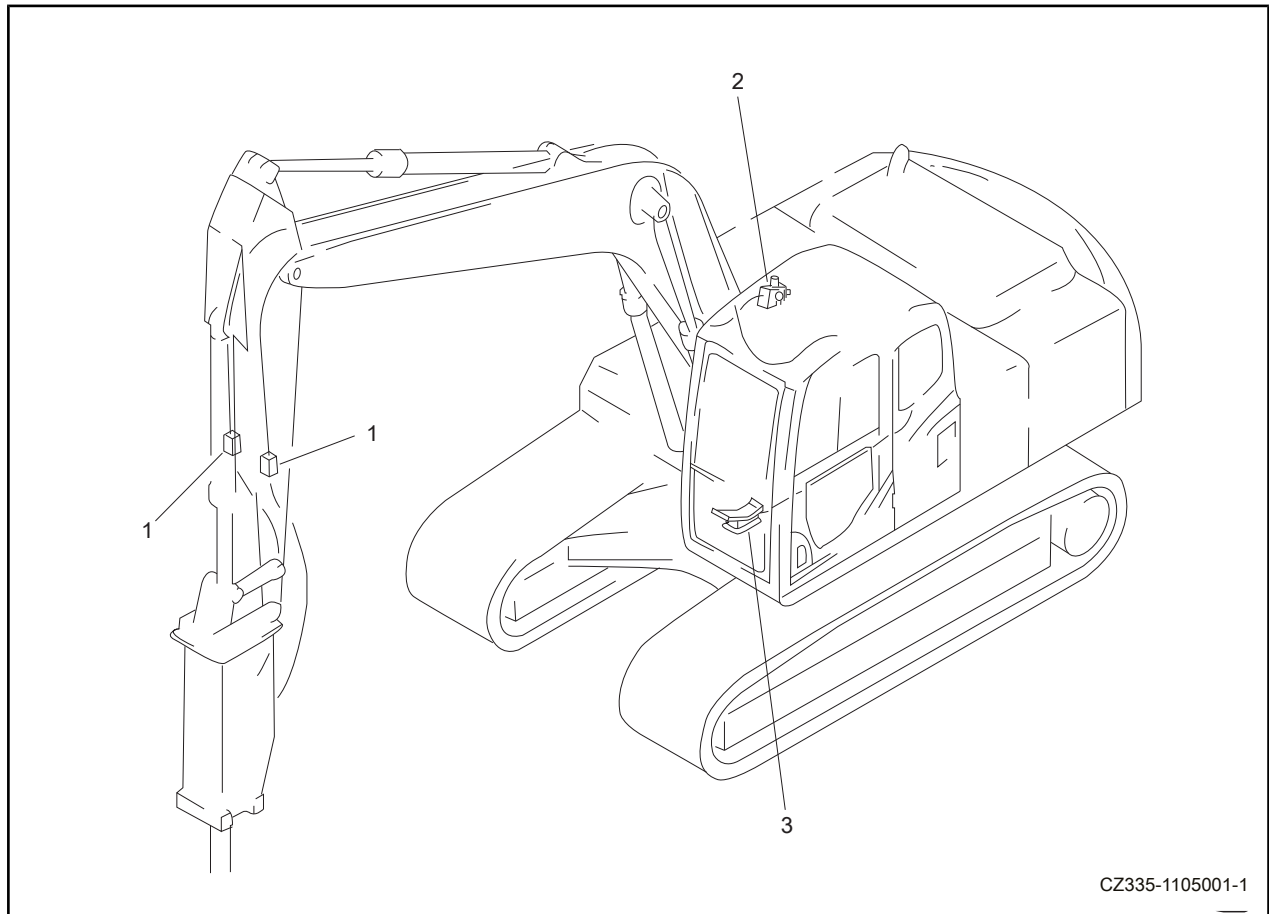
Precautions for use

Please keep in mind the following precautions while installing large or heavy accessories or options.

- Before operation, please move the machine to a safe place for trial operation and make sure that you have clearly known the movement, center of gravity and working range of the machine.
- Do not swing the machine if it is inclined; otherwise, the machine would be in the risk of turning over.
- In the process of operation, make sure to keep a safe distance from the machine to the surrounding obstacles. Please pay attention to the followings while installing heavy accessories or options:
 - The turning circle of heavy accessories or options may be large. Incorrectly calculating their turning circle could cause a risk of hitting other objects. Please reserve a large space for rotational motion.
 - When the lifting process stops, the heavier the accessories or options are, the longer distance they will move downwards under their dead weight. Therefore do not stop them at the lifting position, but lower them down to the ground.
 - Never swing, lower or stop the accessories or options abruptly to prevent the machine from turning over.
 - Never extend or retract the boom cylinder abruptly to avoid machine rollover due to impact.

7.2 Hydraulic control component and line supporting accessories

7.2.1 Position of components



CZ335-1105001-1

Fig.7-1

[1] Ball valve

[3] Control pedal

[2] Selector valve

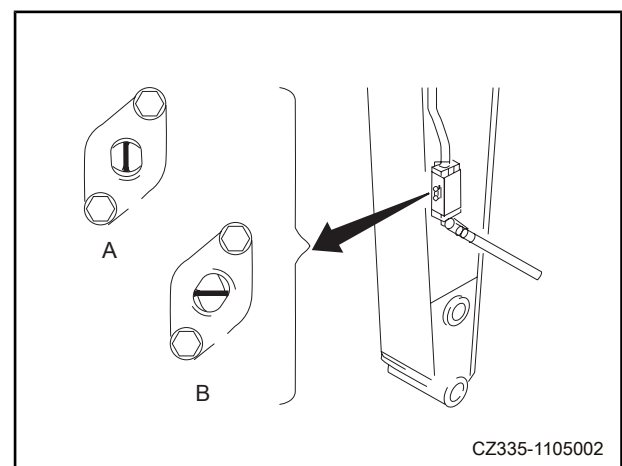
Ball valve[1]

Ball valve is used for controlling the flow of hydraulic fluid.

Position[A]: FREE, hydraulic lines ON

Position[B]: LOCK, hydraulic lines OFF

When removing or installing accessories, adjust this valve to LOCK position.



CZ335-1105002

Fig.7-2

Selector valve [2]

Selector valve is used for switching the flow direction of hydraulic fluid.

This valve should be set based on the selected working mode, which must match the installed accessories.

For more details about working mode switching, see “Hydraulic lines” in Page 7-6.

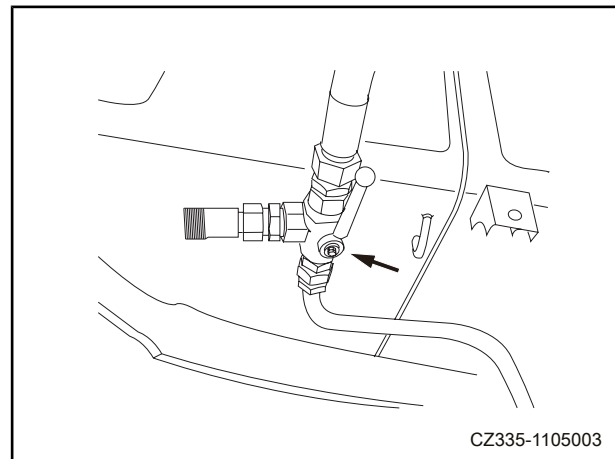


Fig.7-3

Control pedal [3]

Control pedal is used for controlling accessories. When the forepart and rear-part of the control pedal is depressed, the performance of the accessories is as follows:

- Hydraulic breaker
 - Forepart of the pedal [A]: ON
 - Rear-part of the pedal [B]: OFF

NOTE :

As for other accessories, please consult the manufacturers before installation to determine the operation of the pedal and accessories before use.

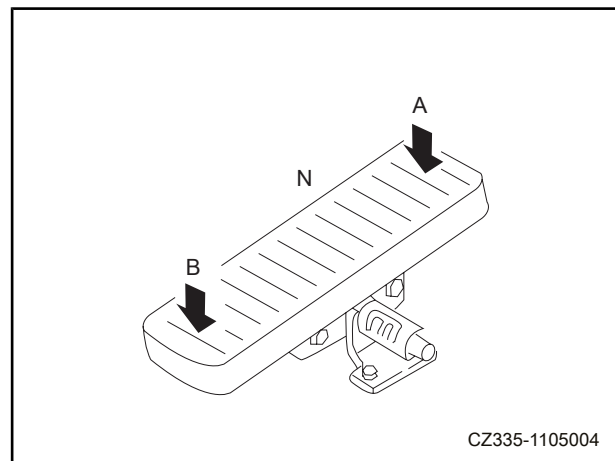


Fig.7-4

7.2.2 Hydraulic lines

When the machine is equipped with a hydraulic breaker, the return lines must lead to the return filter directly. Therefore, do not use return lines except for in mode B. When the hydraulic breaker pipeline is not pre-installed on the machine, if the user installs this pipeline by itself, the return pipeline must be provided with a filter. The pipeline of the hydraulic breaker and the filter must be verified by the agents authorized by Sany Heavy Machinery Co., Ltd, otherwise any subsequent consequences shall be borne by the user.

The standard set pressure of the relief valve in the service valves has already been set when the machine was delivered from the factory. When choosing Mode B, it is set as 20.6 MPa (210 kgf/cm²); when choosing the hydraulic shear mode, it shall be set as 20.6 / 31.4 MPa (210 / 320 kgf/cm²). Depending on the type of accessories, it may need to be adjusted. In case of that, please contact the agents authorized by Sany Heavy Machinery Co., Ltd for adjustment.

Switching of hydraulic lines

- Depending on the type of accessories, set the working mode in the display screen in accordance with the following standard.
- The set pressure of the relief valve in the service valves and the switch of the hydraulic lines is specified as per the selected working mode.

Accessories	Working mode	Hydraulic lines	Set pressure of relief valve in service valves
Accessories of No. 1 hydraulic line, e.g. hydraulic breaker	Mode B	The hydraulic line automatically forms at the point where the return line doesn't lead to the control valve.	When delivered from the factory: 20.6Mpa(210kgf/cm ² , 2980PSI)
Accessories of double acting hydraulic line, e.g. hydraulic shear	Mode S	The hydraulic line automatically forms at the point where the return line leads to the control valve.	When delivered from the factory: 20.6/31.4 MPa (210/320 kgf/cm ²) Note: When clamp operates: 320 kgf/cm ² When clamp opens: 210 kgf/cm ²

Switch between hydraulic breaker and general accessories

- When optional accessories are installed and Mode B is set as the working mode
 1. The hydraulic line of the hydraulic breaker (No. 1 hydraulic line) forms.
 2. Overflow valve is set to low pressure.
When delivered from the factory: 20.6 MPa (210 kgf/cm²)
- When optional accessories are installed and Mode S is set as the working mode
 1. The hydraulic line of the hydraulic shear (double acting hydraulic line) forms.
 2. Overflow valve is set to high pressure. When delivered from the factory: 31.4 MPa (320 kgf/cm²)

Connection of hydraulic lines

When connecting accessories, please connect the hydraulic lines as per the following steps.

1. Check whether the ball valve is in LOCK position [B].
 - FREE: Hydraulic lines ON (the direction of arrow is parallel to the length direction of the arm)
 - LOCK: Hydraulic lines OFF (the direction of arrow is vertical to the length direction of the arm)

2. Remove the screw plugs [1] at the end of the ball valve pipeline (one on the left and one on the right).

NOTE :

Do not lose or damage the removed parts.

3. After removing the screw plug [1], ask the manufacturer of the accessory to connect the hydraulic line of the accessory [2].

As for the dimensions of the connector and the added accumulator, different manufacturers require different measures. Therefore please contact the agents authorized by Sany Heavy Machinery Co., Ltd.

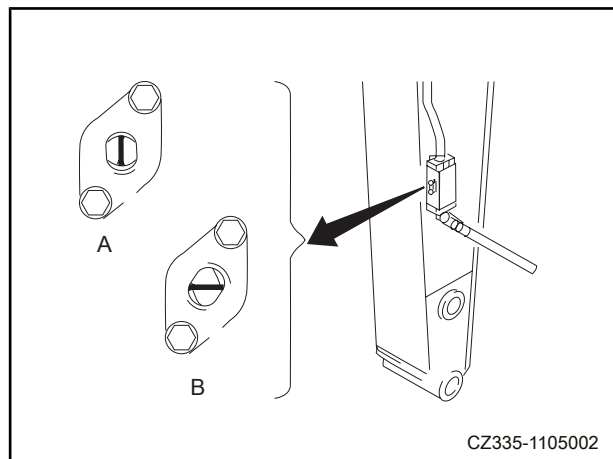


Fig.7-5

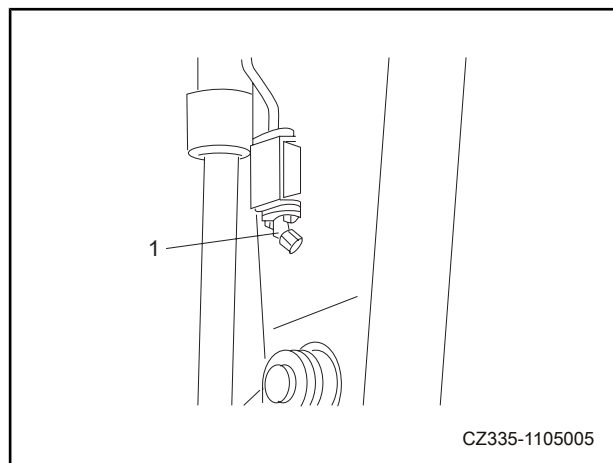


Fig.7-6

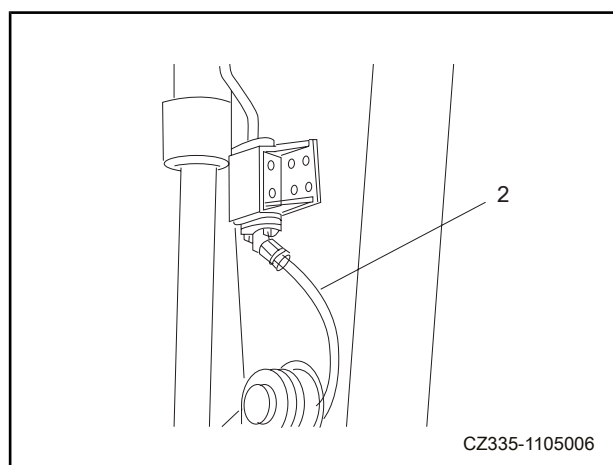


Fig.7-7

Flow path of hydraulic fluid

The operation direction of the pedal and the flow path of hydraulic fluid are as shown below.

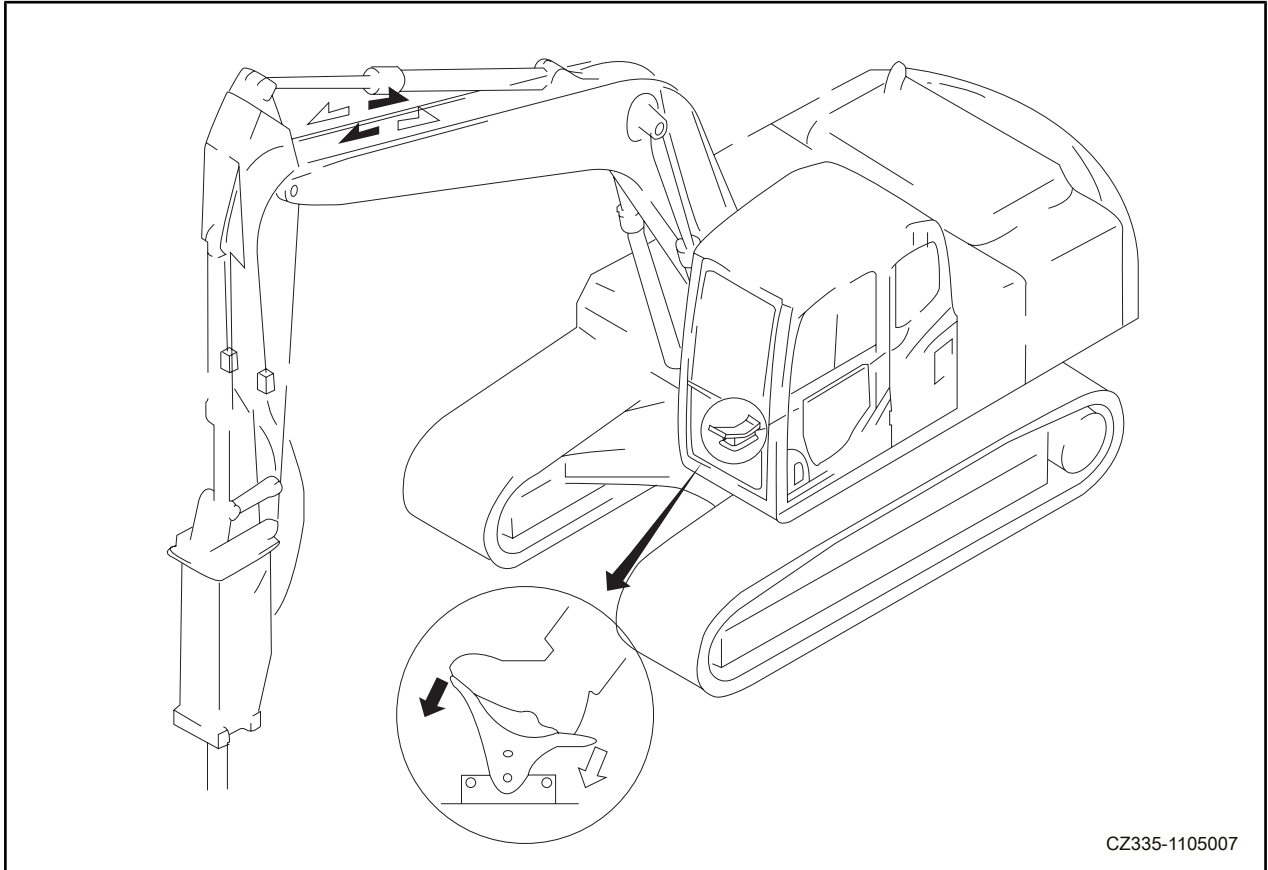


Fig.7-8

When the forepart of the pedal is depressed, the hydraulic fluid will flow to the left pipeline of the work equipment; when the rear part of the pedal is depressed, the hydraulic fluid will flow to the right pipeline of the work equipment. (When a hydraulic breaker is installed, only the forepart of the pedal works.)

7.2.3 Removal and installation of accessories

Removal of accessories

1. Lower down the work equipment to the ground and shut down the engine.
2. Turn the ignition switch to [ON] position, then set the safety lock control lever to "UNLOCK" position.
3. After finishing step 2, fully operate two joysticks frontward, rearward, leftward and leftward in 15 seconds and step on the accessory control pedal 2-3 times to release the internal pressure in the hydraulic lines.

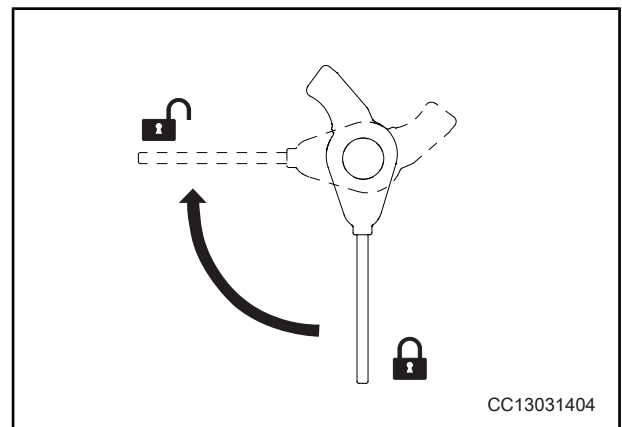


Fig.7-9

4. Turn the safety lock control lever to "LOCK" position.

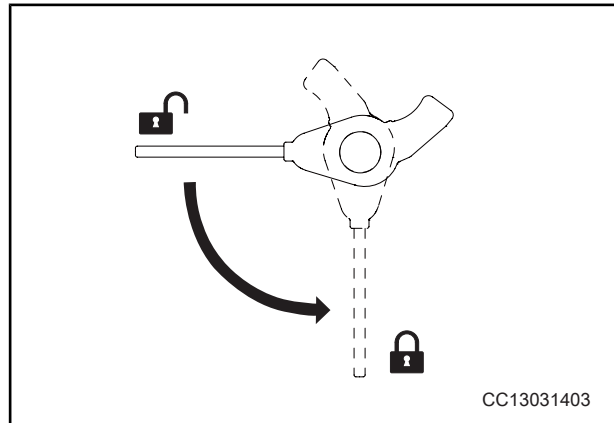


Fig.7-10

5. The internal pressure in the hydraulic lines will be released through the breather valve [F] at the top of the hydraulic tank.

To release all pressure, rotate and open the butterfly nut of the breather valve [F] and press the release button to release pressure.

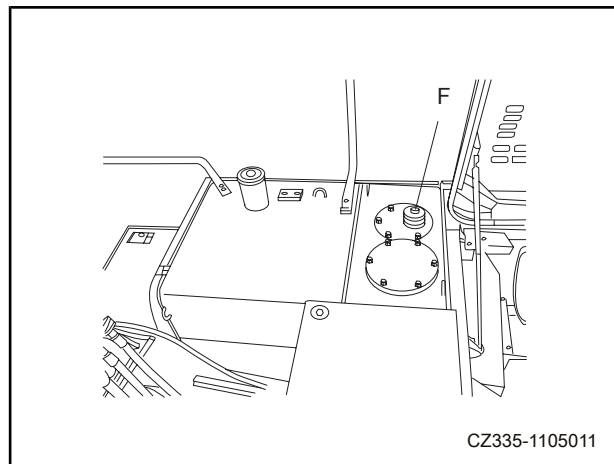


Fig.7-11

6. Check that the hydraulic fluid temperature has declined, and turn the rotor of the ball valve (installed at the outlet and inlet pipelines at the side of the arm) to "LOCK" position [B].

- FREE: Hydraulic lines ON (the direction of arrow is parallel to the length direction of the arm)
- LOCK: Hydraulic lines OFF (the direction of arrow is vertical to the length direction of the arm)

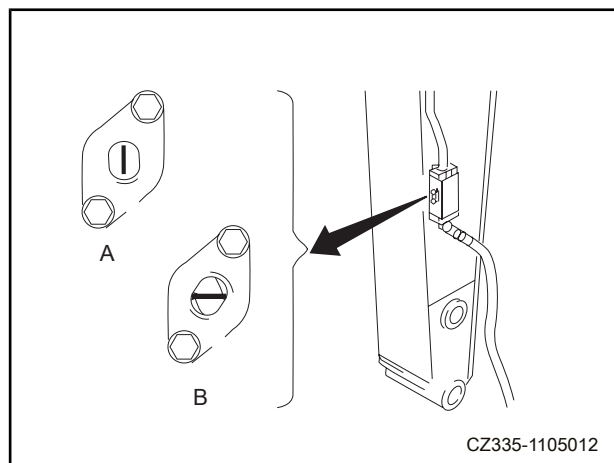


Fig.7-12

7. Remove the hose at the side of accessory. Install the screw plugs at two outlets.

NOTE :

The screw plugs are used for avoiding incorrect operation of the accessories caused by the entry of foreign matters. After correct installation of the screw plugs, the accessories shall be preserved.

8. Pull out the mounting pins (at 2 points), remove the accessories and install the bucket.

As for more detail about installation steps of the bucket, please see "Replacement of bucket" in Page 5-21.

9. After installing the bucket, check the fluid level in the hydraulic tank.

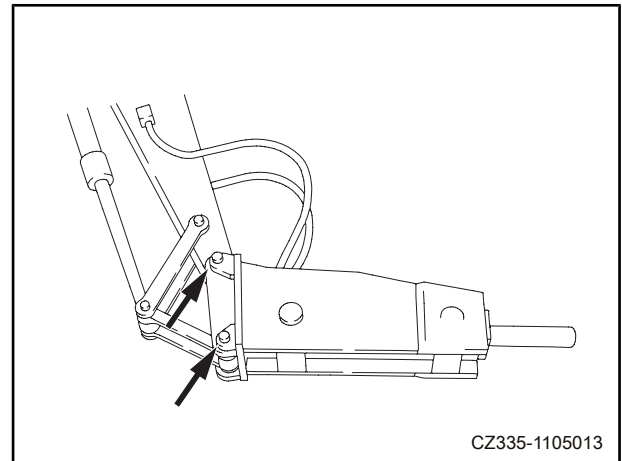


Fig.7-13

Installation of accessories

1. Remove the bucket.
2. Place the accessory horizontally, set pin [A], and then use pin [B] to install the accessory to the arm.
3. Lower down the work equipment to the ground and shut down the engine.

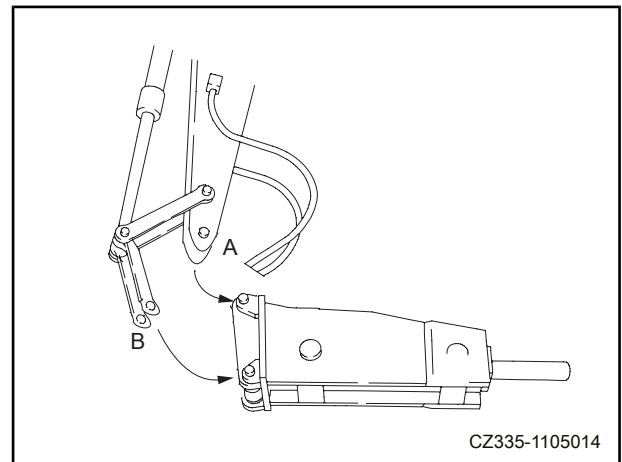


Fig.7-14

4. Turn the ignition switch to [ON] position, then set the safety lock control lever to "UN-LOCK" position.

5. After finishing step 2, fully operate two joysticks frontward, rearward, leftward and rightward in 15 seconds and step on the accessory control pedal 2-3 times to release the internal pressure in the hydraulic lines.

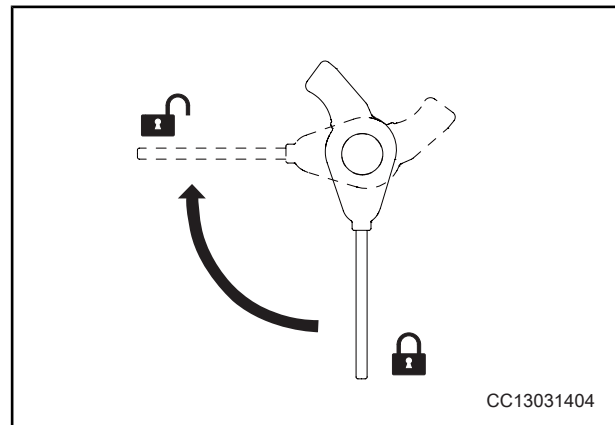


Fig.7-15

6. Turn the safety lock control lever to "LOCK" position.

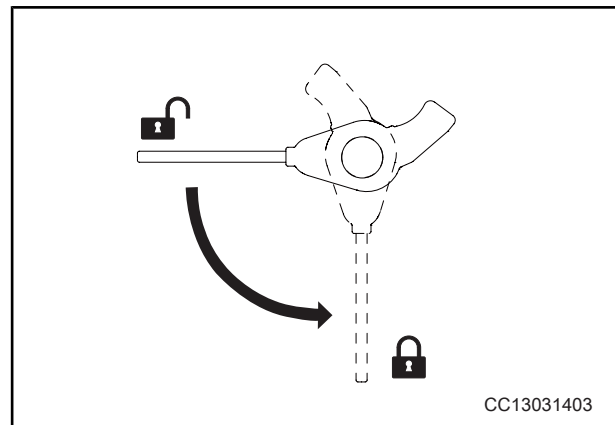


Fig.7-16

7. The internal pressure in the hydraulic lines will be released through the breather valve [F] at the top of the hydraulic tank.

To release all pressure, rotate and open the butterfly nut of the breather valve [F] and press the release button to release pressure.

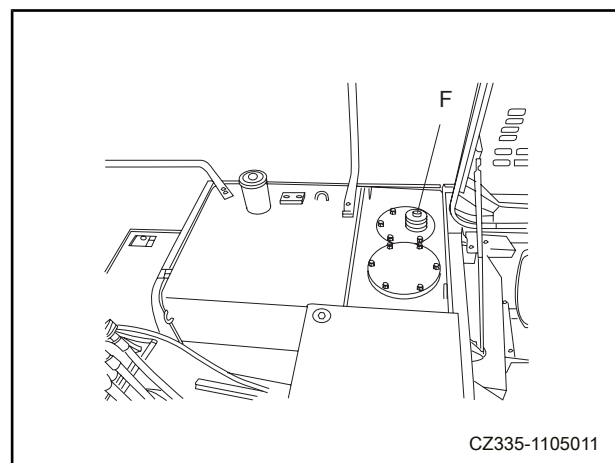


Fig.7-17

8. Check that the hydraulic fluid temperature has declined, and remove the screw plugs from the outlet and inlet respectively. Pay attention to avoiding any dust or dirt affixed to the connection of the hose.

If the O-ring is damaged, replace it with a new one.

9. Connect the hose at the side of the accessory. During connection, check that the hydraulic fluid flows in correct direction.

10. Set the rotors of the ball valves installed at the inlet and outlet pipelines at the side of the arm to FREE position [A].

- FREE: Hydraulic lines ON (the direction of arrow is parallel to the length direction of the arm)
- LOCK: Hydraulic lines OFF (the direction of arrow is vertical to the length direction of the arm)

11. After installing the accessory, check the fluid level of the hydraulic tank.

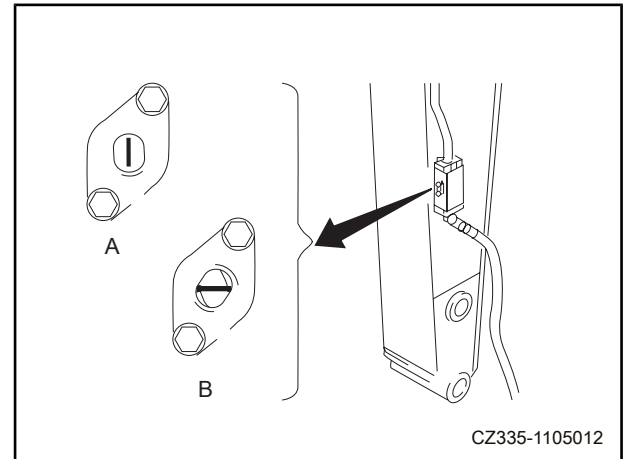


Fig.7-18

7.2.4 Replacement of hydraulic fluid and hydraulic tank filter

The operation of the hydraulic breaker will accelerate the pollution of the hydraulic system and the degradation of hydraulic fluid. Therefore, compared with the machine equipped with the bucket, the machine with hydraulic breaker requires frequenter replacement of hydraulic fluid and hydraulic tank filter. Failure to observe this may cause damage to the hydraulic breaker, hydraulic pump and other parts of the hydraulic system. Recommended replacement interval is as follows. (As for the replacement method of the filter element and the hydraulic fluid, see the Section "Maintenance".)

Replacement interval (unit: hour)

	Machine with hydraulic breaker	Machine with general bucket
Hydraulic oil	600	1,500 or 2,000 or 4,000
Filter element	100	1000

NOTE :

- The data in the table above are based on the 100% operation time of the hydraulic breaker. When the operation time of the hydraulic breaker declines, the replacement interval could be prolonged as shown below.
- After continuous operation of the hydraulic breaker for 100 hours, the filter element must be replaced.

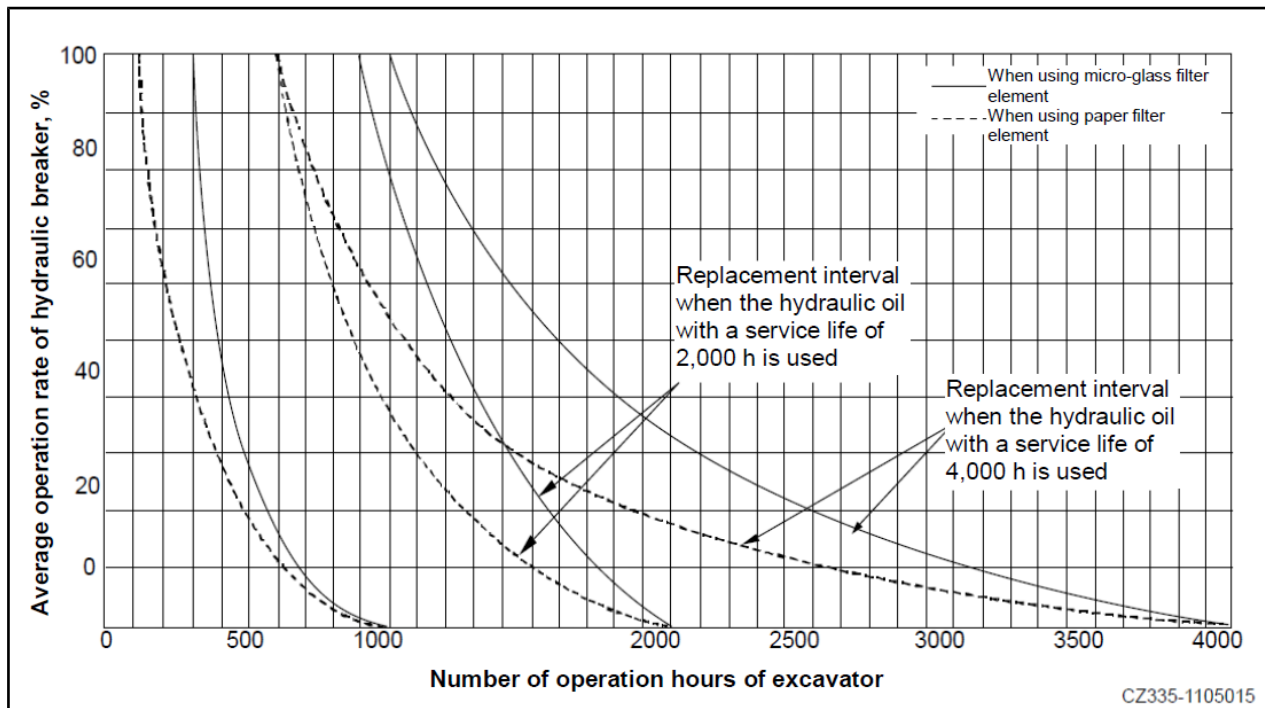


Fig.7-19

7.2.5 Long-term storage

If the equipment will not be in use for a long time, please follow the steps below.

- Turn the ball valve to [LOCK] position.
- Install the screw plug on the valve.
- Turn the lock pin to [LOCK] position. If no hydraulic breaker or general accessory is installed on the machine, overheating or other issues may arise during operation of the pedal.

7.3 Recommended accessory operation**7.3.1 General**

During operation of the hydraulic excavator equipped with accessories, following specifications must be complied with.

NOTE :

The type of applicable accessories or the model of special accessories depends on the model of the hydraulic excavator. Therefore, as for the selection of the related accessories, please contact the agents authorized by Sany Heavy Machinery Co., Ltd.

7.3.2 Hydraulic breaker**Main purposes:**

- Rock crushing
- Removal operation
- Road project

This accessory is widely used for removing buildings, crushing road or slag, tunnel operation, rock crushing and the crushing operation in quarry.

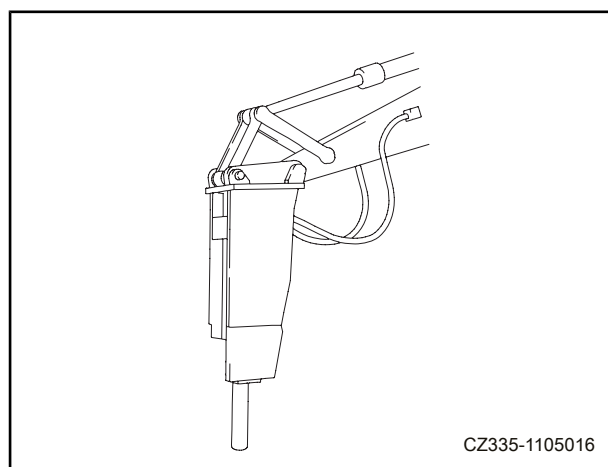


Fig.7-20

7.3.3 Operation of hydraulic breaker

1. When conducting crushing operation, tightly press the drill rod vertically on the surface of the target object.

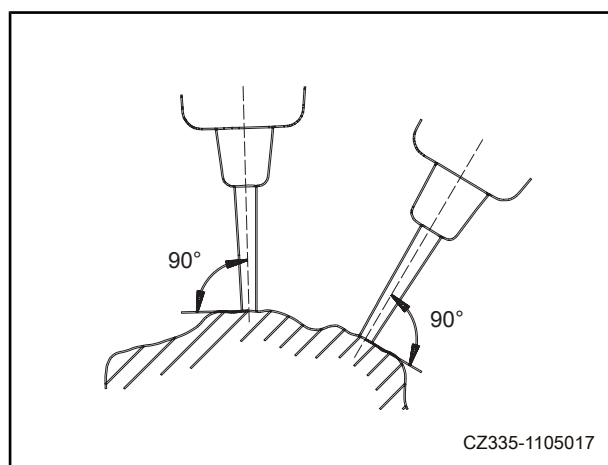


Fig.7-21

2. When applying impact, press the drill rod on the impact surface, leaving the forepart of the lower structure about 5 cm (2 in) above the ground, as shown on the right. Don't leave the machine more than that value above the ground.

NOTE :

Don't lift the excavator too high.

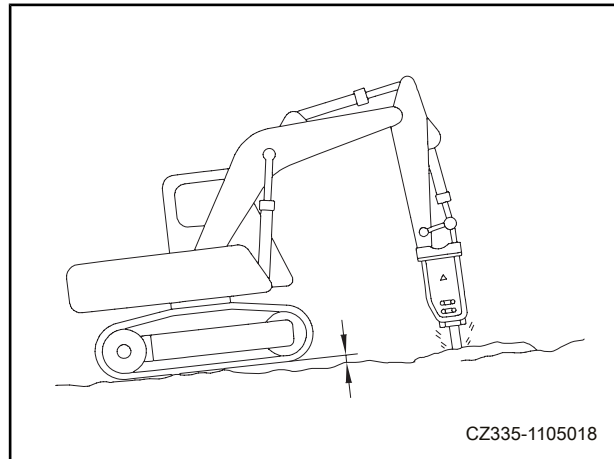


Fig.7-22

3. During application of continuous impact to the same surface, if the drill rod is unable to pierce or crush the surface, change the impact part and conduct crushing again on the part near the edge.

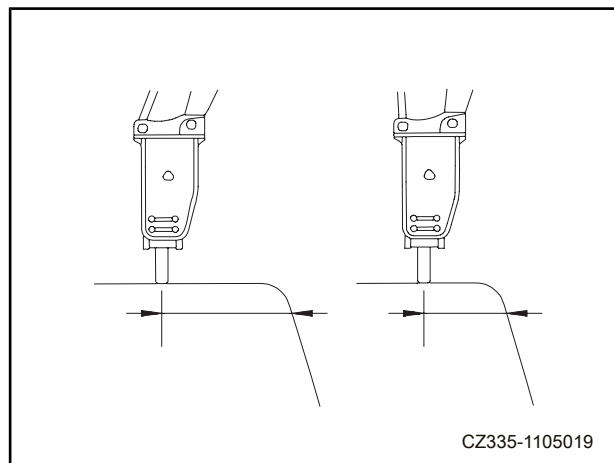


Fig.7-23

4. The piercing direction of the drill rod will gradually be out of line with the direction of the body of the hydraulic breaker. Adjust the bucket cylinder to align them.

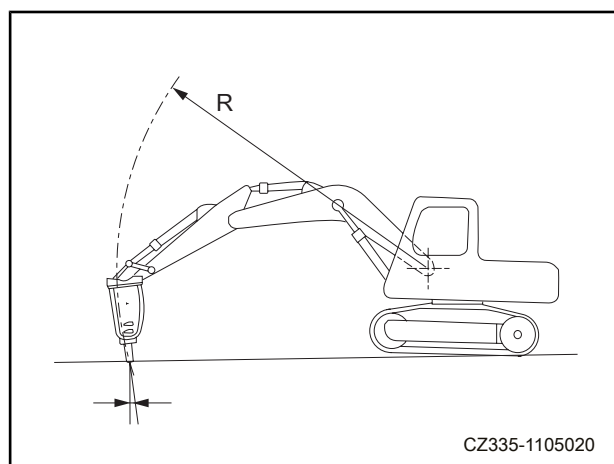


Fig.7-24

5. Consistently press the drill rod on the impact surface properly to prevent the impact without resistance.

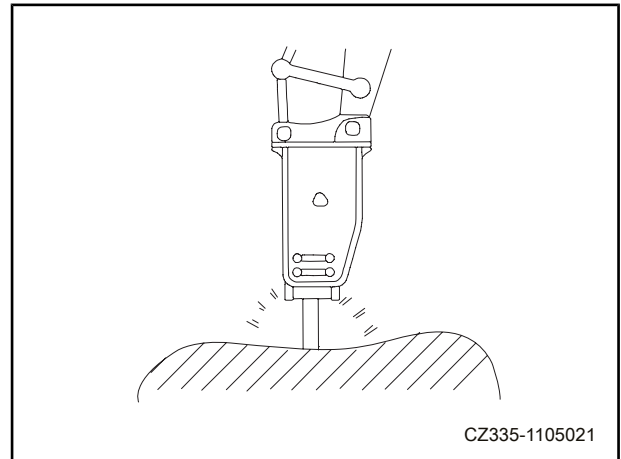


Fig.7-25

7.3.4 Forbidden operation

To ensure long service life and safe operation of the machine, do not operate the machine as the following.

- Do not operate all the cylinders to the end of the stroke. Make sure to keep a distance of about 5cm (2 in).

1. Accumulate the rocks and stones by the hydraulic breaker.

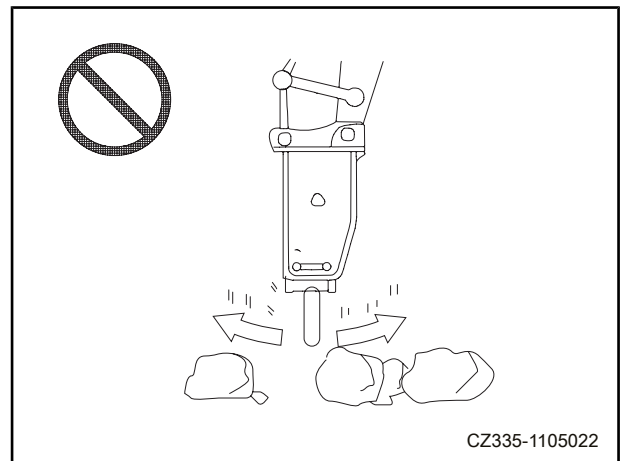


Fig.7-26

2. Operate with swing force.

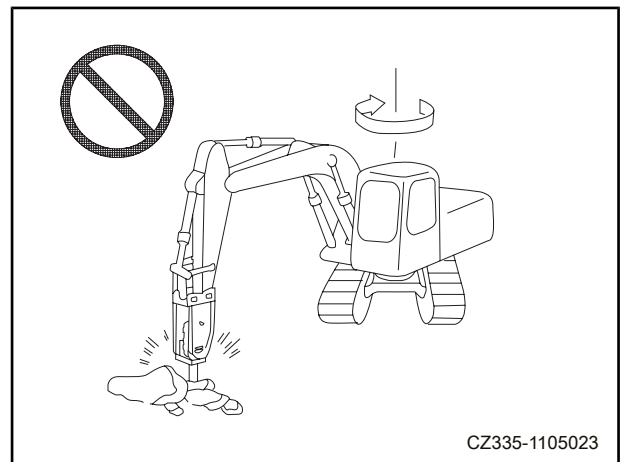


Fig.7-27

3. Move the drill rod during application of impact.

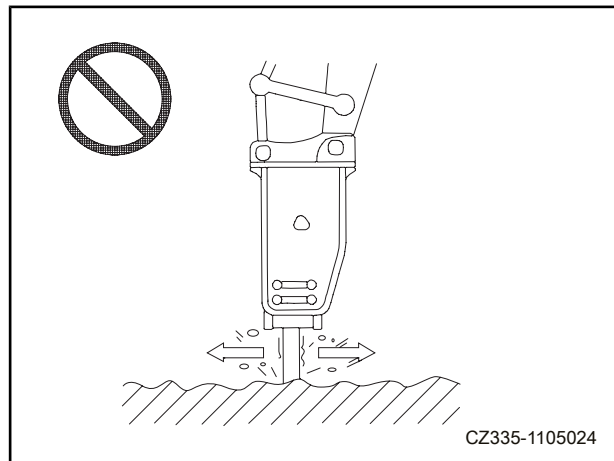


Fig.7-28

4. Keep the drill rod horizontal or upward during application of impact.

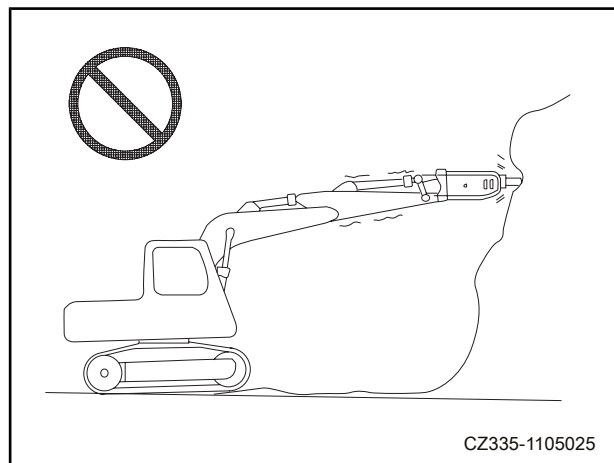


Fig.7-29

5. Swing the drill rod when the rock has been pierced.

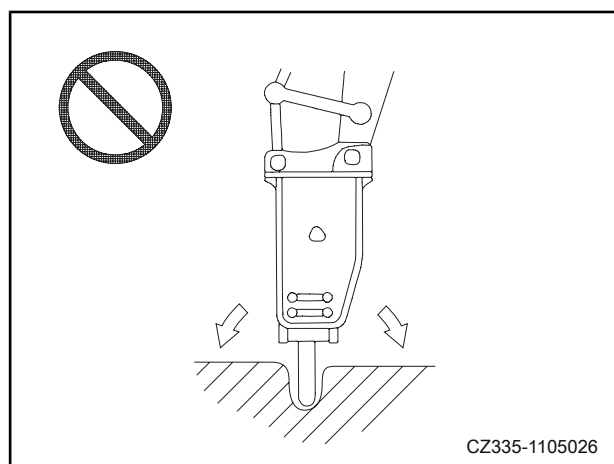


Fig.7-30

6. Pecking operation.

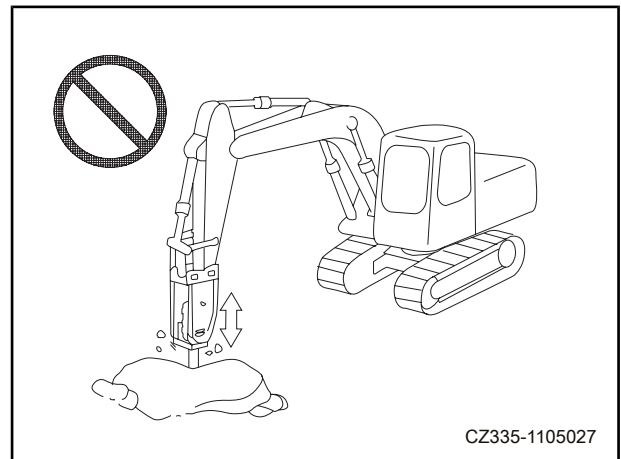


Fig.7-31

7. Lift the machine away from the ground by totally extending the bucket cylinder.

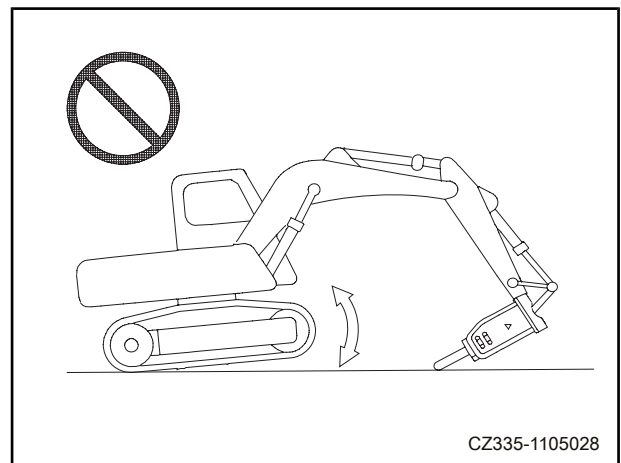


Fig.7-32

7.3.5 Greasing of hydraulic breaker

Add grease to the hydraulic breaker on the right place (as shown).

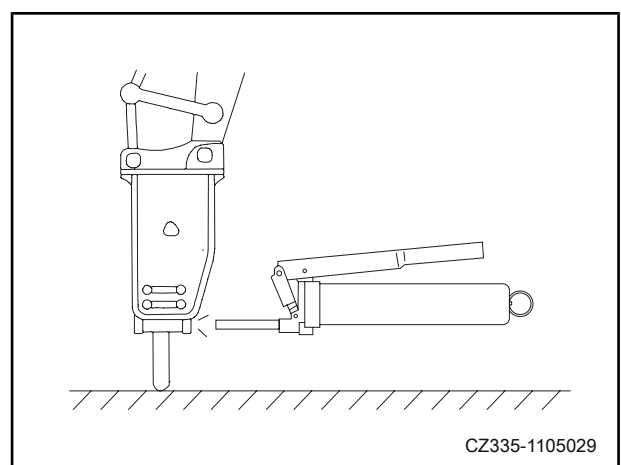


Fig.7-33

NOTE :

- Incorrect greasing operation may cause excessive grease. As a result, soil and sand will enter the hydraulic lines, such that, during operation of hydraulic breaker, the hydraulic parts will be damaged.
- Therefore, make sure to add grease to the breaker kept in right position.

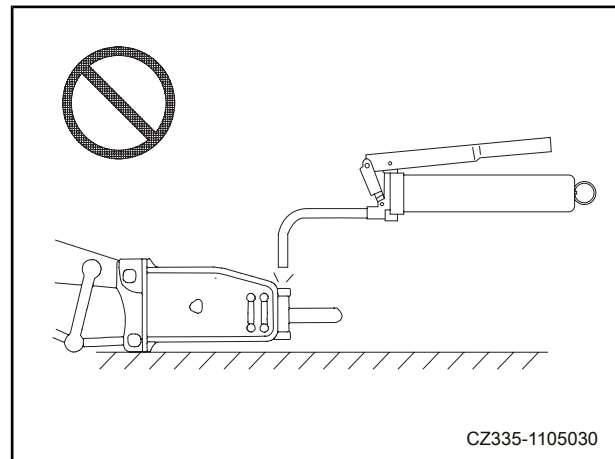


Fig.7-34

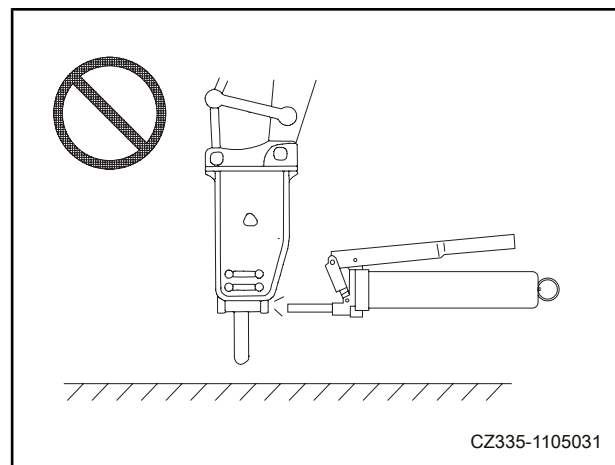


Fig.7-35

7.4 Quick coupler and control system

7.4.1 Operation method of quick coupler

1. Take out the safety shaft of the quick coupler, as shown on the right.

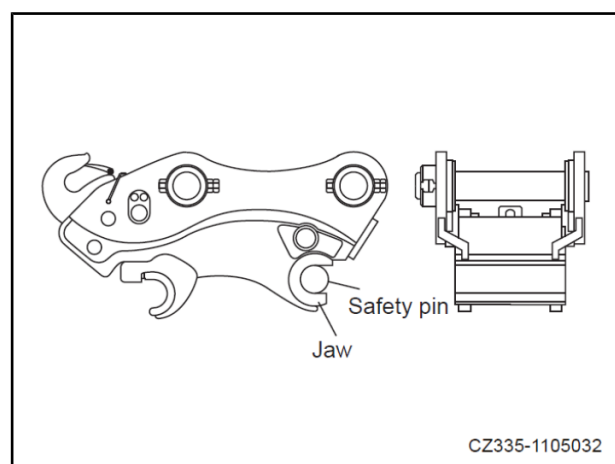


Fig.7-36

2. Press the quick coupler switch [1] (self-reset type) on the left joystick to close the moving and fixed jaws slowly.

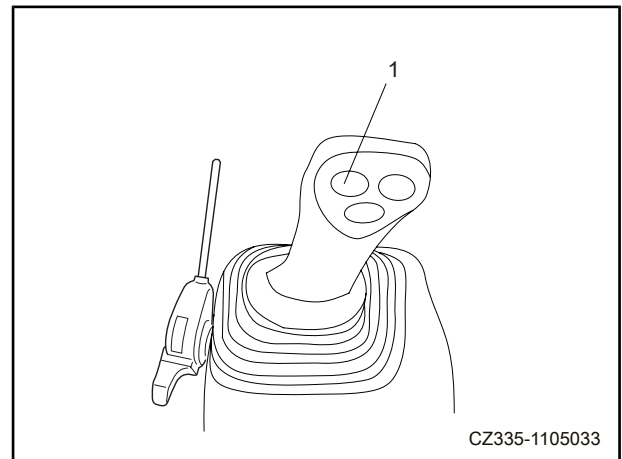


Fig.7-37

3. Make the fixed jaw of the quick coupler catch the bucket shaft [2] slowly, as shown on the right.

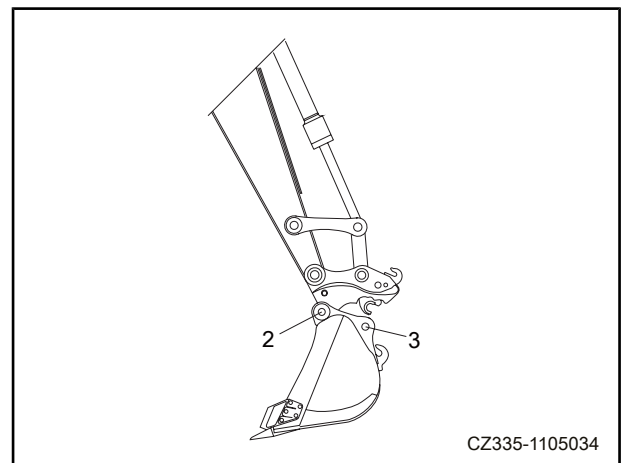


Fig.7-38

4. Extend the bucket cylinder and move the moving jaw of the quick coupler towards the bucket shaft [3] slowly.

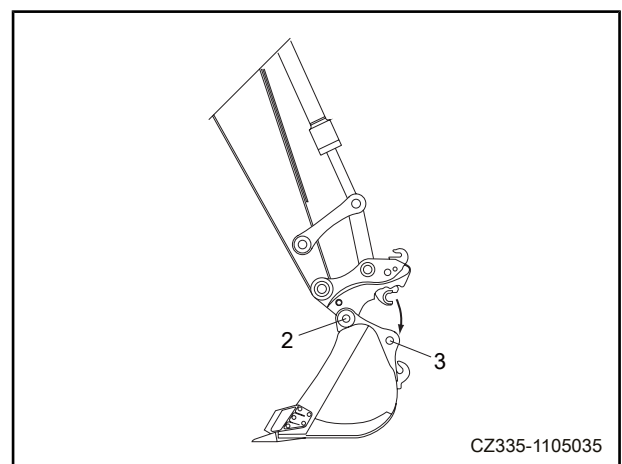


Fig.7-39

5. Allow the jaw of the quick coupler to get stuck with the bucket shaft [3] totally.

6. Loosen the quick coupler switch to make the quick coupler get stuck with the bucket shaft, and conduct other operation.

7. After finishing installation, plug the safety shaft again.

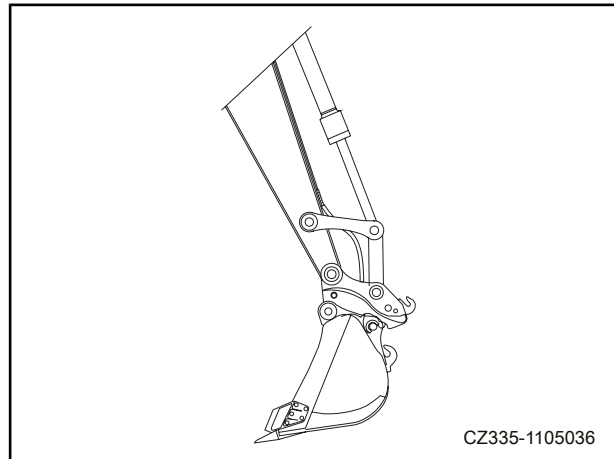


Fig.7-40

7.4.2 Precautions for safety operation of quick coupler

1. Due to installation of the quick coupler, the turning radius will be longer when the bucket and other connecting parts are operating. It is possible that these parts would collide with the cab or the boom of the excavator. Therefore please operate with care. Due to installation of the quick coupler, please retract the bucket (with the bucket cylinder fully extended) before the arm???. Never operate the bucket when the arm has been retracted to the right position (with the arm cylinder fully extended) to prevent collision with the boom.

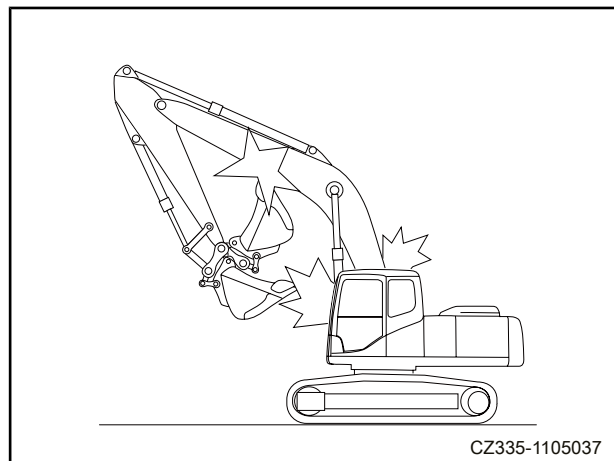


Fig.7-41

2. Overload operation will damage the part connected to the quick coupler and the excavator, thus reducing the service life of the machine.

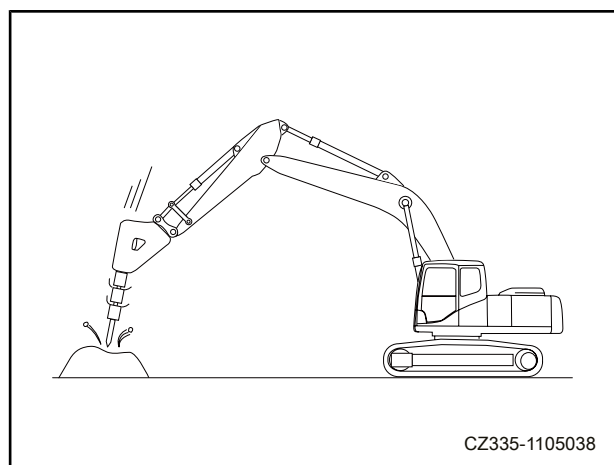


Fig.7-42

3. Do not exert pressure when the quick coupler contacts the ground. Please check that the quick coupler is connected to the bucket or other part during operation.

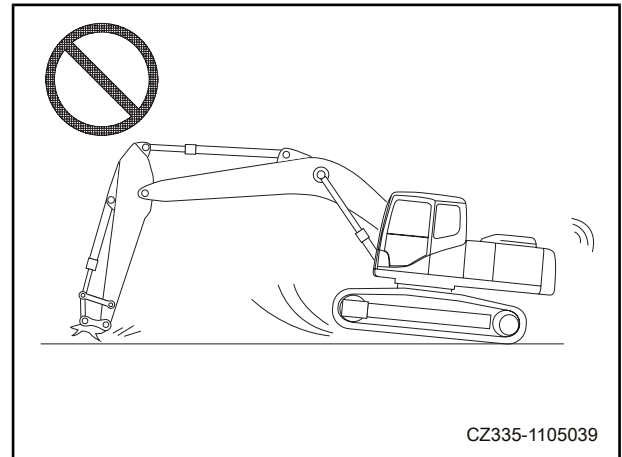


Fig.7-43

4. Moving a weight by the quick coupler is very dangerous and may also reduce the service life of the coupler.

NOTE :

If the installation of the quick coupler is necessary, please consult the local agents authorized by Sany Heavy Machinery Co., Ltd. Be sure to use the accessories designated by Sany Heavy Machinery Co., Ltd. Otherwise, Sany Heavy Machinery Co., Ltd will take no responsibility for any malfunction or accident caused by any unapproved accessories.

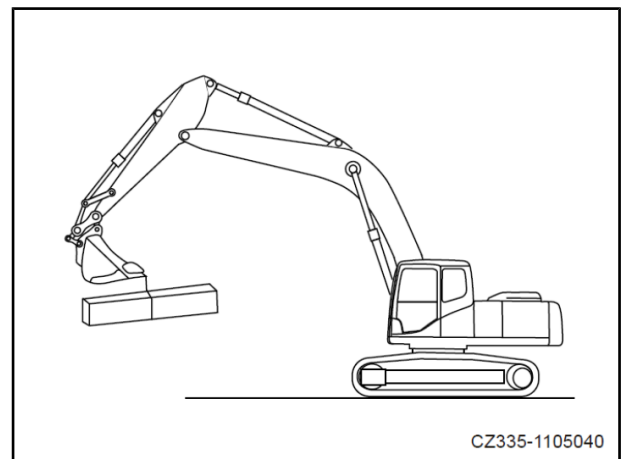


Fig.7-44

7.5 Refueling system

7.5.1 Introduction to refueling system

SANY excavator may be equipped with refueling system as an optional configuration. The system operates with the refueling pump assembly. Being powered by the vehicle-mounted battery, the refueling pump assembly is free from the limits of the area and power supply, thus having greatly enhanced work efficiency, increased economic benefit and reduced labor intensity.

The refueling volume of different types of machine is shown in the “Capacity table” in Page 5-11.

7.5.2 Composition of refueling system

- The refueling system of SANY large excavator is mainly composed of: refueling pump assembly (including related pipelines and valves) and control switch.
- Open the battery box cover [1] to find the control switch [2] and the refueling pump [3].

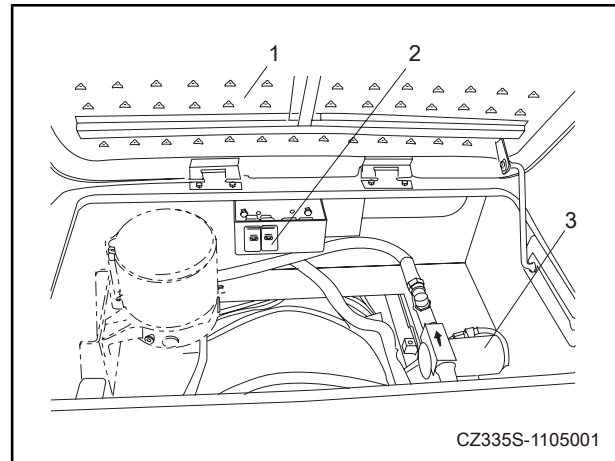


Fig.7-45

The main part of the refueling pump [3] is as shown on the right.

Main performance parameters of refueling pump

Pump flow	46L/min
Rated voltage	24V
Rated speed	2800rpm
Connector thread specification	3/4"G
Weight	3.5kg
Package dimension	215×120×160mm

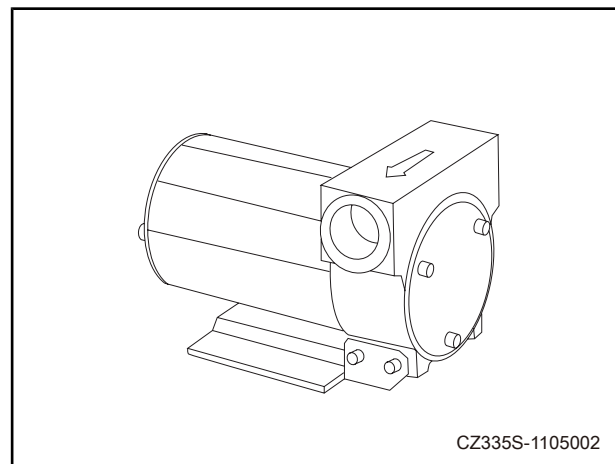


Fig.7-46

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