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Excavator

SY335



Safety, Operation & Maintenance Manual

Part Number: 11282013

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SY335 Excavator

Safety, Operation & Maintenance Manual

This manual and its contents prepared by Sany America Technical Publications while deemed to be accurate, is preliminary, based upon technical information provided, and for a machine designed, manufactured and tested by:

SANY HEAVY INDUSTRY Co., LTD
NO.8 Beiqing Road,
Huilongguan, Changping District,
Beijing, China,102206

It is the responsibility of the owner, user, properly trained operator and lessor to be knowledgeable of, and comply with, all industry standards, government regulations, workplace rules and other directives that may govern and/or apply to this machine as well as its environment/conditions of use.

⚠ WARNING

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this equipment and before operating or servicing it. Failure to do this can cause property damage, personal injury or death.

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CALIFORNIA PROPOSITION 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

CALIFORNIA PROPOSITION 65 WARNING

Battery posts, terminals, and related accessories contain chemical lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Wash hands after handling.

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⚠ WARNING



To prevent death or serious injury:

- Avoid unsafe operation and maintenance.
- This equipment must be operated and maintained by trained and experienced personnel. Sany is not responsible for qualifying these personnel.
- Do not operate or work on this crane without first reading and understanding the Operator Manual and Rating Plate supplied with the crane.
- Store the Operator Manual in the operator cab seat pocket.

If the Operator Manual or Load Charts Manual are missing from the operator cab, do not use the crane until replacements have been obtained from your SANY distributor.

⚠ WARNING

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this equipment and before operating or servicing it. Failure to do this can cause property damage, personal injury or death.

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ABOUT THIS MANUAL

- Sany excavators offer high-quality performance and top-notch, after-sales service.
- Sany excavators are widely used throughout the industry for various types of applications.
- Sany is a leading manufacturer of construction equipment worldwide.



Fig. 1-1

This operator manual provides safety and operation, information. A copy must be kept in the cab (a) or nearby at all times. If a copy of the manual is not with the machine at the time of use, do not use the equipment until you have obtained a replacement copy from your Sany distributor.

In order to properly use your equipment, it is important to read this manual carefully before beginning any operations. Also, have all personnel involved with any work operations read this manual periodically so they remain knowledgeable about its contents.

Items addressed in this manual are designed to help you:

- Understand the structure and performance of your equipment.
- Reduce improper operation and point out possible hazardous situations when using equipment.
- Increase equipment efficiency during operation.
- Prolong the service life of your equipment.
- Reduce maintenance costs.

If this manual is damaged and any part of it is unreadable, you must immediately request a replacement copy from your Sany distributor.

If you sell the equipment, this manual must be provided to the new owner.

Continuing improvements in the design of this machine can lead to changes in detail which may not be covered in this manual. Always consult your Sany distributor for the latest available information on your machine or if you have questions regarding information in this manual.



Fig. 1-2

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YOUR DOCUMENTATION PACKAGE

The documentation for this machine includes the following items:

Operator Manual

A copy of this manual must always remain in the operator cab (a) when not being used. See “Organization of this Manual” on page 1-5 for complete details.

Parts Book

The Parts book consists of parts lists and matching drawings used for ordering spare parts as needed.



Fig. 1-3

Using and Storing the Documentation

This documentation applies only to this machine and should not be used with any other machines.

Always keep this manual with the machine in the operator cab (a) or nearby.

The Parts book are best left in the workshop area or office. It should always be available to the maintenance and service personnel as required. A copy of the Safety & Operator Manual should also be kept in the workshop area or office since it contains information required by the maintenance personnel.



Fig. 1-4

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ORGANIZATION OF THIS MANUAL

Due to improvement and updating of products, some information in this manual may differ from your machine. If you have any questions about the information in this manual, contact your Sany distributor before operating or maintenancing the machine.

Table of Contents

This provides a listing of the general topics that are contained in this manual along with the page number each starts on. There are also more detailed tables of contents at the start of each section in this manual.

Introduction

This section provides an overview of what is covered in the rest of this manual, including serial number information and Sany contact information.

Safety

This section covers basic safety information relating to this equipment. It also describes what the hazard alerts mean that are used throughout the manual.

System Functions

This section provides an overview of all the controls and operating systems.

Operation

This section provides detailed operating procedures.

Maintenance

This section covers basic maintenance information relating to this machine. It describes preventive and periodic tasks that need to be performed to keep the machine running efficiently.

Troubleshooting

This section provides an overview of common maintenance problems and how to repair them.

Specifications

Provides height, length, width and weights (fully operational and transport) of the machine.

Optional Equipment

Describes basic information on the function and operation of the breaker and shear optional attachments.

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SERIAL NUMBER LOCATION

The serial number (a) will be needed by your Sany distributor when ordering replacement parts or providing assistance for your equipment. Record this information in this manual for future use.



Fig. 1-5

Record of Serial Number and Distributor Information

This location is for you to record information relating to your machine. It is required that you keep this manual with your machine at all times for reference.	
Machine Serial No.	
Engine Serial No.	

Distributor Name:

Address:

Phone Numbers:

CONTACT INFORMATION

Thank you for purchasing a Sany machine. If you need to contact us for any reason, you can reach us as follows:

Sany America, Inc.
318 Cooper Circle
Peachtree City, Georgia 30269

http://www.sanyamerica.com

Phone: 678-251-2810

Fax: 770-631-7731



Fig. 1-6

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CORRECTION REQUEST FORM

If you find a problem with this manual, please make a copy of this page, fill out the information and send it to us, attention Technical Publications. See “Contact Information” on page 1-6

Date of this request
Your Name
Company Name
Your Department
Street Address
City, State & ZIP
Phone
E-mail
Machine Model & Serial No.
Description of Problem (wrong information, unclear or erroneous procedure, etc.)
Corrective Action by You (if any)

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⚠ WARNING

Read and understand all safety precautions and instructions in this section of this manual before reading the other sections of this manual or any other manuals provided with this crawler hydraulic crane and before operating or servicing the crawler hydraulic crane. Failure to do this can cause property damage, personal injury or death.

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SAFETY - GENERAL

⚠ WARNING

Make sure you fully understand the precautions described in this manual and the safety labels on the machine before operating or maintaining this machine. Read and follow all safety precautions. Failure to do so may result in equipment damage, serious injury or possibly death.

This section of your manual provides detailed information on basic safety precautions and preventative measures, during operation and maintenance of this machine.

Safe operation is very important. Prior to operation and maintenance, you must carefully read and understand all contents in this section of this manual. Only after completely understanding the contents in this manual, can you safely and expertly operate the machine. Following are some of the benefits of doing this:

- Avoid personal injury or machine damage caused by improper operation.
- Increase the reliability of the machine.
- Prolong the service life of the machine.
- Reduce repair cost and downtimes.

The safety information in this manual provides a basic guide line for safe operation for all authorized personnel. Sany is unable to forecast all risks on work sites, so workers, operators and owners must consider if there are other safety concerns that must be addressed for specific job situation.

Local governments or authorities may have more strict standards. If some stipulations in this manual disagree with the local laws or regulations, the stricter prevails.

Diesel Engine Exhaust

⚠ WARNING

CALIFORNIA PROPOSITION 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

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Battery Posts, Terminals, and Related Accessories

⚠ WARNING

CALIFORNIA PROPOSITION 65 WARNING

The battery posts, terminals, and related accessories contains chemical lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Wash hands after handling.

Hazard Alerts in This Manual

Most accidents are usually caused by the failure to follow fundamental safety rules for the operation and maintenance of the machine. To avoid accidents it is important to read and understand all information outlined in this manual before operating or performing maintenance on this machine.

Carelessness or neglect on the part of operators, job supervisors and planners, rigging personnel, service and maintenance staff, and job site workers can result in their death or injury and costly damage to the machine2 and property.

To alert operators, job supervisors and planners, rigging personnel, service and maintenance staff, and job site workers to hazardous operating practices and maintenance procedures, safety messages are used throughout the manual. Each safety message contains a safety alert symbol and a signal word to identify the hazard's degree of consequence if the message is ignored.

Read and understand all information outlined in this section of the manual before operating or performing maintenance on this machine.

The following (ANSI/ISO) signal words are used to inform you that there is a potentially hazardous situation that may lead to damage, personal injury or even death. In this manual and on the machine decals, different signal words or illustrations are used to express the potential level of hazard.

⚠ DANGER

Identifies an immediate hazard which, if not avoided, will result in serious injury or death.

⚠ WARNING

Identifies potential hazards which, if not avoided, could result in serious injury or possible death.

⚠ CAUTION

Identifies potential hazards which, if not avoided, could result in minor or major injury.

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NOTICE

Indicates a situation which can cause damage to the machine, personal property and/or the environment, or cause the equipment to operate improperly.



This symbol is used in a graphic to alert the user **not** to do something.

Sany cannot predict every circumstance that might involve a potential hazard in operation or maintenance. Some safety messages in this manual and on the machine may not include all possible safety precautions.

If any procedures or actions not specified, recommended or allowed in this manual are used, you must be sure that you and others can perform such procedures and actions safely and without damaging the machine, causing injury to yourself or other personnel. If you are unsure about the safety of some procedures, contact your local Sany distributor.

⚠ WARNING

- **All personnel involved with the operation, maintenance or service of this equipment must read this manual thoroughly before operating or maintaining this equipment.**
- **This manual must be kept on the machine for reference and periodically reviewed by all personnel involved with operation, maintenance or service of this equipment.**
- **Some actions involved in the operation or maintenance of this equipment could cause a serious accident if they are not performed in the manner described in this manual.**
- **All procedures and precautions outlined in this manual apply only to intended uses of this equipment. If you use your equipment for any unintended uses that are not specifically prohibited, you must be sure that it is safe for you and others to do so. In no event should you or others engage in prohibited uses or actions as described in this manual.**
- **Sany delivers equipment that complies with all applicable regulations and standards of the country to which the equipment has been shipped. If this equipment was purchased in another country or purchased from someone in another country, it may lack certain safety features and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, contact your local Sany distributor before operating this equipment.**
- **Improper operation or maintenance of this equipment can be hazardous and could result in serious injury or even death.**

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Machine Decals

All safety, alert and warning decals must be in place, undamaged, and not covered. The operator and all other personnel involved with this machine must be aware of the decal content and locations on the equipment.

NOTE: Your Sany dealer can supply you with new replacement decals if needed. Never modify or change existing decal information unless authorized by your Sany distributor.

When replacing decals, be sure they are placed in the proper locations.

NOTE: Additional safety or warning decals may be added to your machine if necessary.

Operator Safety Information

It is impossible to compile a list of safety precautions covering every situation. However, there are basic principles that must be followed during the daily routine of using this machine.

Only qualified persons who have been specially trained are permitted to operate and/or work on this machine.

Inspect the operator aids of this machine daily and make sure all each operator aid is in normal conditions. Any faults found shall be reported to Sany and or you nearest Sany distributor. Stop all work immediately if any operator aid is found to be not working properly.

There is a risk of lethal accidents if the machine is not operated correctly.

Incorrect operation of the machine can result in death or serious injury.

All accident prevention guidelines, operating instructions, etc. are based on authorized use of the machine.

You must read and understand this manual and any accompanying manuals before operating this machine.

This manual must be readily available to the operator at all times and must remain in the cab while the machine is in use.

Ensure that all personnel in the working area around the machine are thoroughly familiar with safe operating practices as stated in this manual.

You must be thoroughly familiar with the location and content of all decals on the machine. Walk around the machine and review each of them. Decals provide important instructions and warnings and must be read prior to any operational or maintenance function.

You must review the local, state, and federal regulations and standards regarding this equipment and its operation. Work practice requirements may vary slightly between government regulations, industry standards, and employer policies so a thorough knowledge of all such relevant work rules is required before operating this equipment or doing maintenance on it.

Do not remove any decal from this machine.

Inspect the equipment before the start of each workday shift. Ensure that routine maintenance and lubrication are being performed as stated in this manual. Don’t operate a damaged or poorly maintained equipment.

No one besides the operator is to be anywhere on the equipment while it is functioning or moving.

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Operator is Important

The information in this manual has been provided to assist you, the operator, in promoting a safe working area for yourself and those around you. This manual is not meant to cover every possible circumstance which could arise. It is intended to present basic safety precautions that should be followed in daily operation and to promote you, the operator, to take charge of all matters that could relate to safety.

The operator's responsibility is not lessened by the addition of operational aids or warning devices. The operator must guard against acquiring a false sense of security when using them. Operational aids and/or warning devices assist, but do not direct the operation. They are subject to failure or misuse and should not be relied upon in place of good operating practices.

The operator's first priority is to ensure his safety and the safety of those around them.

Remember, failure to follow even a single safety precaution could allow an accident to occur resulting in death or serious injury to personnel or damage to equipment. You are responsible for the safety of yourself and those around you.

Report all accidents, malfunctions, and equipment damages to your local Sany distributor at once. The local Sany distributor must be immediately advised of the incident and consulted on necessary inspections and repairs following an accident or damage to equipment.

If the distributor is not immediately available, contact Sany America directly. The equipment must not be returned to service until it is thoroughly inspected following all accidents, malfunctions, and equipment damage. All damaged parts must be repaired or replaced as authorized by your local Sany distributor and Sany America.

Operator Qualifications

Do not operate this equipment unless you comply with the following:

- You have been trained on this specific machine. Controls and design may vary from between models, therefore, it is important that you have specific training on the specific equipment you will be operating. Training is essential for proper equipment operation and safety.

- You have read and understand this Safety section, the operating recommendations in the remainder of this Safety, Operation & Maintenance Manual, and any other manuals provided with this equipment, your employer's work rules, and applicable industry standards and government regulations.

- You are sure the machine is operating properly and has been inspected and maintained in accordance with this manual's stated requirements.

- You are sure that all safety signs, guards, and other operating features are in place and in proper condition.

- You are mentally and physically fit to operate this equipment. Never attempt to operate this equipment while under the influence of medication, narcotics, or alcohol. Any type of drug could impair physical, visual and mental reactions, and capabilities.

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General Machine Safety

Do the following:

- Be sure all guards and covers are in place, especially after servicing the machine.
- If guards or covers are damaged, have them repaired or replaced immediately.
- Use all safety equipment such as locks, belts and guards properly.
- Never remove or modify safety features. Always keep them in good condition.
- Always secure the machine in a safe position when job operations are done.

Unauthorized Machine Modifications

Unauthorized modifications may adversely effect the machine’s performance and strength. If this machine is modified without authorization from Sany, there is a danger that performance and safety problems may occur which could lead to equipment failure, personal injury or possibly death.

General Job Safety

Review each of these carefully:

- Only trained and authorized personnel shall be allowed to operate and service the equipment.
- Keep this manual with your machine at all times for ease of reference and study it to become familiar with all controls and safety decals before operating this equipment.
- It is the owner and or operator's responsibility to replace any safety, warning or caution decals if they are defaced or removed from the equipment.
- Never operate equipment that is unsafe or in poor operating condition.
- Always perform a pre-operational check on your equipment before operating it. Never operate a machine that is in need of repair, damaged or unsafe.
- Never use your equipment for tasks it was not designed for; damage to the machine or injury to the operator and other personnel may result.
- Never leave your equipment running and unattended. Instead, always park the equipment in a stable level area, lower any work equipment to a safe position, set the parking brake, lock the controls to secure the machine prevent tampering by unauthorized personnel and turn the engine off before exiting the work site even for a moment.
- When leaving the job site, always lower all work equipment to a safe position and secure it properly to avoid tampering by unauthorized personnel.
- Before starting any work operations, travel or maintenance and repair procedures, be sure all personnel are at a safe distance away from any point on the machine. Never allow anyone to stand near the machine while in operation or under maintenance or repair. Remember, the larger the equipment, the more restricted your visibility will be.

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- If pedestrians are in the area, proceed slowly and sound your horn. Keep in mind, pedestrians have the right of way; a loaded or smaller machine has the right away over a larger or unloaded machine.
- Always study the job site carefully.
- The operator of this equipment must be alert, physically fit and free from the influences of alcohol, drugs or medications that might affect eyesight, hearing, reaction or judgment.
- Follow all rules relating to safety as outlined in this manual and by your company. Never get involved in horseplay.
- Know your location to report an accident or fire. In case of an emergency, have a local emergency phone number available.
- Keep all safety equipment and job-related warning equipment in good working condition. Replace them if they should become damaged.
- Conduct periodic safety training and familiarize all personnel with emergency procedures.
- Never drive up to anyone standing in your path of travel. Always be sure all personnel are standing to the side when you approach them and they acknowledge your approach.
- When working with another person on a work site, insure all personnel involved understand all hand signals that are to be used.
- The operator shall respond to operating signals from the proper signal person only but shall obey a stop signal at any time from anybody.
- Take action to prevent unauthorized personnel from entering or approaching the job site area.
- As an operator, you must always be able to see the point of work location. If this is not possible then a spotter must be used. If visibility should become blocked for any reason, stop operation immediately.

Job Site Safety

Within the job site (also called “construction site”) is the “work area” (where the actual job function is being performed). Within the work area are “hazard areas”, that is, areas immediately surrounding the machine where personnel may be at risk due to machine operation or movement.

With the machine operator being responsible for the safe and correct operation of the machine, he/she is responsible for safety within the hazard zones while the machine is in use. Immediate work stoppage and machine shutdown by the machine operator is required if unauthorized personnel enter any of the hazard areas.

All hazard areas must be clearly identified, marked and secured to prevent access by unauthorized personnel and must be visible to the machine operator at all times and under all circumstances. If this is not possible, a signal person must be assigned to supervise activities within hazard areas. Personnel within a hazard area must use increased caution and wear suitable personal protective equipment as required.

Pre-Operation Inspection

⚠ CAUTION

Failure perform pre-operation checks may result in damage to the machine or possible injury to the operator and other personnel.

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Before starting your work operations, it is important to perform a pre-operation check to be sure your equipment is in safe operating condition. If any problems are found during your pre-operation check, have them repaired immediately. Never operate a machine that is unsafe, damaged or in need of repair.

Personal Protective Equipment

Your safety is important so read and understand the following:

- If your machine is equipped with safety equipment, OSHA requires this equipment to be used when operating your machine.
- Avoid any loose fitting clothing, jewelry and loose long hair. These can get caught in moving parts or on the controls and could cause serious injury.
- If required, wear a hard hat, safety glasses, safety shoes, face mask and gloves when operating or maintaining the equipment.
- Before using personal protective equipment, be sure it is in good condition and will be able to perform its task.
- Wear hearing protection if you will be near loud noises.

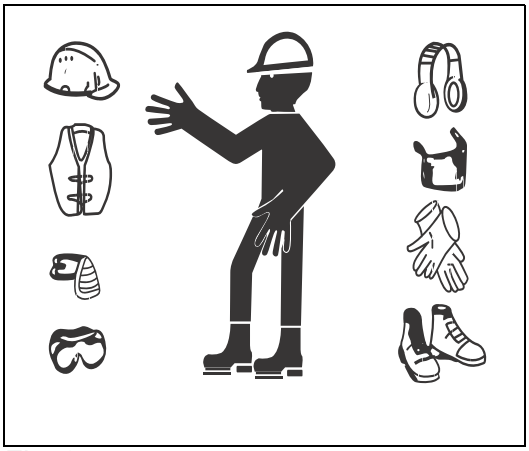


Fig. 2-7

General Fire Safety

⚠ WARNING

Fuel, oil, electrical and other flammable material can pose a serious hazard when using heavy equipment on the job, especially when working in areas where flammable debris could build up around hot engine systems. The following points can help reduce the chance of incidents of fire or explosion on your machine. Failure to be aware if these alerts could result in an unexpected fire or explosion causing possible injury or death.

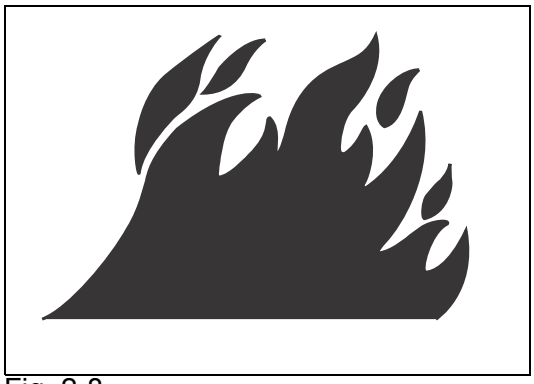
Fuel, oil, electrical and various types of substances are flammable. Always observe the following:

- Keep open flames, airborne sparks or burning embers away from the machine.
- Stop the engine and do not smoke when refueling or servicing the machine.
- Refueling or adding oil should be done in a well-ventilated area.
- Clean up any spilled fluids immediately.
- Check the machine daily for excess debris buildup.

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Fuel and Oil Fires

Fuel and oil are particularly flammable and can be hazardous. Pay close attention to the following:


Fig. 2-8

- Do not smoke or bring open flames or sparks near fuel or oil. Always stop the engine before refueling.
- Never use fuel starting aids or other unapproved cleaning solvents to clean the machine or parts.
- Never leave the machine while in the process of adding oils or fuel.
- Tighten all fuel and oil caps securely.
- Always inspect the machine for fuel or oil leakage during a pre-operational check. If any leakage is found, have it repaired immediately. Never operate a machine that is leaking fuel or oil.
- Be careful not to spill fuel or oil, especially not on hot parts, machine surfaces or electrical components. Clean up fuel or oil spills immediately.
- Never overfill the oil or fuel tanks. During operation, hot fuel or oil could be spewed out onto hot components, causing a fire or explosion.
- When adding fuel or oil to the equipment, always perform these operations in a well-ventilated area.

Hydraulic Fires

Excess oil accumulation, leaks or spurting hydraulic components can cause a fire on your machine. Always be aware of these situations and have them repaired immediately. Always observe and obey the following:


Fig. 2-9

- Never weld, cut, drill or modify hydraulic components in any manner.
- When performing pre-operational checks, always inspect hoses and tubing clamps for leaks and that they are properly secured. If they are loose, they may vibrate during operation and rub against other parts. This may lead to damage to the hoses and cause high-pressure oil to spurt out, leading to fire damage or serious injury.
- Check the machine for oil leaks daily. Never operate a machine that is leaking oil in any manner. Doing so could case an explosion or a fire

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Electrical Fires and Explosions

Short circuits in the electrical system, damage or overcharging batteries can cause fires. Adhere to the following:

- Never use a welder or a machine of a higher voltage to jump-start your machine.
- Check the wiring on the machine for damage when doing a pre-operational check. Repair or replace any damaged wiring.
- Never install aftermarket electrical equipment without approval from your Sany distributor.

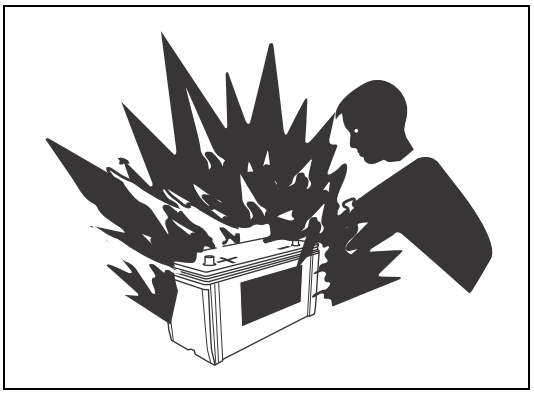


Fig. 2-10

In Case of Fire

If a fire occurs on your machine, escape from the machine as follows:

- Immediately turn the ignition switch to the OFF position to stop the engine and shut the machine down. Never attempt to move or continue operating the machine.
- Exit the area immediately and remain clear of the machine until the fire department gives you permission to come near the machine.



Fig. 2-11

- Immediately call for help.
- If you will be using a fire extinguisher, always aim the extinguisher nozzle at the base of the fire.

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Extinguisher and First Aid Kit

As a precaution for fire or injury to personnel, always keep a fire extinguisher and first aid kit in your machine and on the job. Also, do the following:

- Be sure the fire extinguisher is in good condition and all personnel know how to use it.
- Be sure the fire extinguisher is a minimum of a 10 pound “A, B, C” fire-rated extinguisher (ASME B30.5-2007).
- Keep a first aid kit in the storage area and inspect it periodically.
- Keep a list of emergency phone numbers handy in case of an accident.

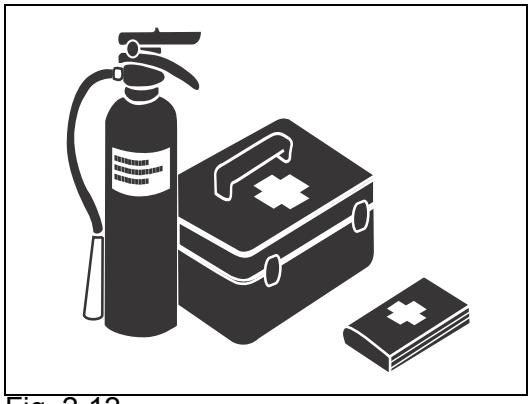


Fig. 2-12

Dust and Chemical Hazards

⚠ WARNING

Performing equipment operations and/or encountering hazardous materials on the job site often releases substances that could pose a hazard. Exposure to hazardous chemicals or dusts pose a serious danger if they are released or mishandled. All workers involved should use approved personal protective equipment and follow all environmental safety regulations. Serious injury or death may result unless proper precautions are observed while working with these materials.

Dust in the air from the job operation could cause lung damage if inhaled. If there is danger of inhaling these dusts when working on the job sites, always observe the following:

- Spray water to keep down the dust when cleaning. Do not use compressed air for cleaning.
- If there is danger that there may be asbestos dust or similar dusts in the air, always operate the machine from an upwind position. All workers should use approved respirators.
- Always observe the rules and regulations for work site and environmental standards.
- Never allow unauthorized or improperly protected personnel in the work area.

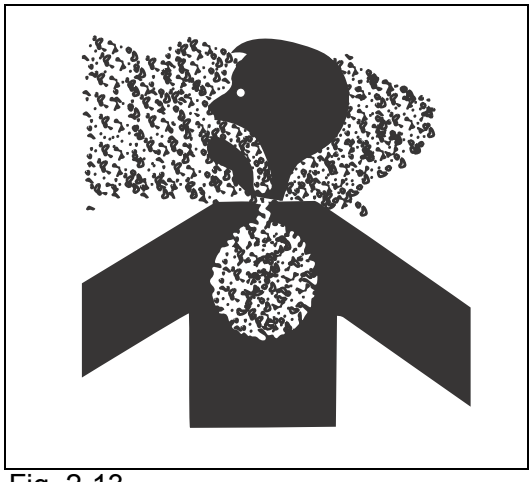


Fig. 2-13

- Sany machines do not contain asbestos, but there is a possibility that imitation or aftermarket parts may contain asbestos. Always use genuine Sany replacement parts.

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Material Safety Data Sheets (MSDS)

The contractor on the job site must provide all personnel with the proper Material Safety Data Sheet (MSDS) information relating to the materials the workers could be exposed to.

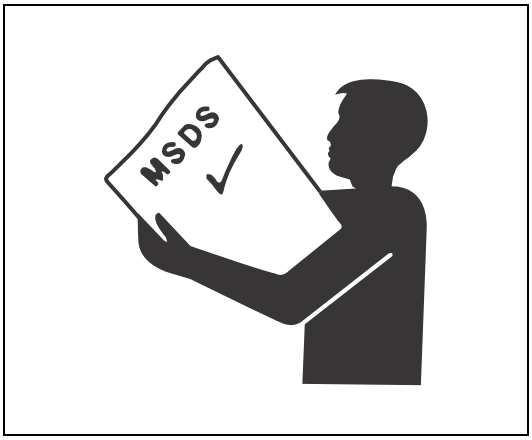


Fig. 2-14

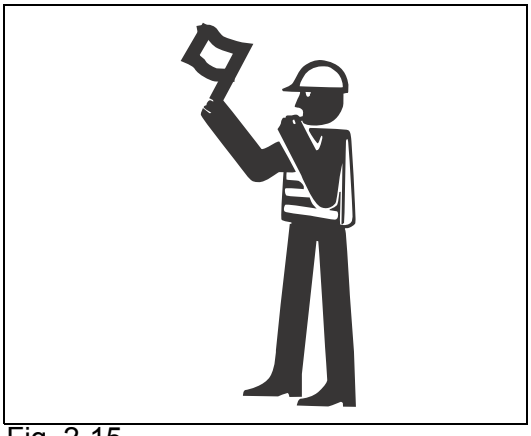
MSDS data sheets provide both workers and emergency personnel with the proper procedures for handling or working with a particular substance. Information includes physical data, health effects, first aid, reactivity, storage, disposal and protective equipment required.

Comply with the following:

- Keep MSDS data sheets conveniently placed and available to all job site personnel and emergency personnel.
- Be sure all personnel involved with job site operations are familiar with all MSDS information as it relates to hazardous materials they could be exposed to.
- Consult the appropriate MSDS and verify its data before handling hazardous materials.

Surface and Underground Hazards

Do the following before starting any operations:


Fig. 2-15

- Determine the safest method of entrance and operation.
- Contact all utility departments in your area to have them identify and mark any underground system locations, (gas lines, water lines, electrical lines, sewer lines, etc.).
- Check your work area for any unusual ground conditions and be sure the ground surface is stable enough to support the equipment.
- Be sure there are no obstructions in your working area spaces.
- Do not operate where there is a hazard of landslides or falling objects.
- If possible, never set up or operate near excavated sites. Always use extreme caution when near the edge of a cut, ditch, water way or similar areas, as the edge may give way causing the machine to slide or roll over.

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- Make sure your work area is a level as possible and you will be able to maneuver your work equipment or machine easily.
- If you will be working near a high-traffic area (pedestrians or cars), have a dedicated worker available to direct traffic or install safety fencing around your work site.
- Always be aware of all your work site dangers or distractions.

High Voltage Areas

⚠ WARNING

If you will be working in an area where overhead power lines pose a hazard, it is important to be aware of the dangers involved with these systems. High humidity may pose an even greater hazard even if your machine clears the overhead power lines. Always use extra caution when working near overhead power lines. Failure to follow the information listed below could result in serious injury or death.

Operating equipment near high frequency towers (for instance, cell phone towers) may pose an electrical hazard. Ask the company to shut this system down until your work is finished.

Always be aware of the dangers when working around overhead electrical lines; high humidity may pose an electrical hazard even if your equipment clears the overhead power lines.

If your machine should come in contact with overhead electrical lines, stop the machine and remain on the machine until the power company clears the lines and it is safe to get off or move the equipment.

If you must exit the machine, keep both feet and legs together, your arms and hands at your side. Jump clear from the equipment, maintain balance and land with both feet, legs, arms and hands still together. Your hands, arms or any part of your body should not touch the equipment during the jump. Once on the ground continue to bunny hop away from the affected area as far as possible.

If you are not sure of your clearances, request the aid of another person who can guide or warn you if you maneuver the machine too close to objects.

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Electrocution Hazard

Keep all parts of this machine at least 20 ft away from all electrical power lines with voltage less than 50,000 and electrical power source. See Table 2-1:

Table 2-1: Minimum Distances Between Machine and Power Lines

Cable Voltage, kV (kilovolts)	Minimum Required Clearance, ft (m)
50 - 350	20 (6.10)
Over 350 - 500	25 (7.62)
Over 500 - 750	35 (10.67)
Over 750 - 1,000	45 (13.72)

Contact the power utility company for assurance that the power has been turned off before operating this machine in the vicinity of electrical power lines or electrical power source.

This machine is not insulated.

Treat all overhead power lines as being energized, and not insulated, unless you have reliable information to the contrary from the utility company or owner.

The requirements stated in this manual must be followed at all times, even if the electrical power lines or electrical power source have been turned off.

If any part of the equipment contacts or comes too close to an electrical power source, everyone in, on, and around the equipment can be seriously injured or killed.

The equipment operator is responsible for alerting all personnel of dangers associated with electrical power lines and electrical power source. Do not allow unnecessary personnel in the vicinity during operation. The operator must prevent everyone from touching the equipment.

It is not always necessary to contact a power line or power source to become electrocuted. Electricity, depending on magnitude, can arc or jump to any part of the equipment if it comes too close to an electrical power source.

Read, understand, and abide by all applicable federal, state, and local regulations.

The use of electrocution hazard devices (insulated links, insulated boom cages/guards, proximity warning devices or mechanical limit stops) do not assure that electrical contact will not occur. Even if codes or regulations require the use of such devices, failure to follow the rules listed in this manual may result in serious injury or death. Electrocution hazard devices have limitations and you must follow the rules and precautions outlined in this manual at all times even if the unit is equipped with these devices.

Grounding of the equipment affords little or no protection from electrical hazards. The effectiveness of grounding is limited by the size of the conductor (wire) used, the condition of the ground, the magnitude of the voltage and current present, and numerous other factors.

Because of the voltages involved, overhead power lines present an extremely high risk of fatal electric shock. If contact occurs, proper safety procedures should be followed. The danger posed by overhead power lines at the construction site is often compounded by other factors, such as uneven ground that could cause the equipment to

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weave or bob into power lines, and windy conditions that can make the power lines sway, reducing clearance.

To address these risks:

- Identify overhead power lines and mark safe routes where the equipment must repeatedly travel.
- Operate the equipment at a slower-than-normal speed in the vicinity of power lines.
- When working around overhead power lines, de-energize and ground them, or take other protective measures such as guarding or insulating the lines.
- If the power lines are not de-energized, operate the equipment in the area ONLY if a safe minimum clearance is maintained.
- If maintaining safe clearance by visual means is difficult, designate a person to observe the clearance and to give immediate warning when the equipment approaches the limits of safe clearance.
- All persons should keep well away from the equipment whenever it is close to power lines.
- Do not touch the equipment until a signal person indicates that it is safe to do so.
- The use of electrocution hazard devices is not a substitute for de-energizing lines, or maintaining safe clearance.

While operating the equipment near transmitter towers, de-energize the transmitter, or (for equipment) use equipment with an electrical ground connected directly to the upper structure of the boom, or (for materials) attach materials to ground jumper cables.

If the equipment or any of its components does touch contact an energized power source, you must:

1. Remain calm and DO NOT PANIC.
2. Immediately warn personnel in the vicinity to stay away.
3. Attempt to move the equipment away from the contacted power source using the equipment’s controls which are likely to remain functional.
4. If in the cab, stay there until the power company has been contacted and the power source has been de-energized. NO ONE must attempt to come close to the equipment until the power has been turned off.

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If it is absolutely necessary to leave the equipment cab or chassis, jump completely clear of the vehicle. Do not simply step off the vehicle. Hop away with both feet together. DO NOT walk or run as this will cause a electrical arc resulting in serious injury or death.

Following any contact with an energized electrical source, the local, authorized, Sany distributor must be immediately advised of the incident and consulted on necessary inspections and repairs. Should the distributor not be immediately available, contact Sany America. The equipment must not be returned to service until it is thoroughly inspected for any damage and all damaged parts are repaired or replaced as authorized by Sany or your local Sany distributor.

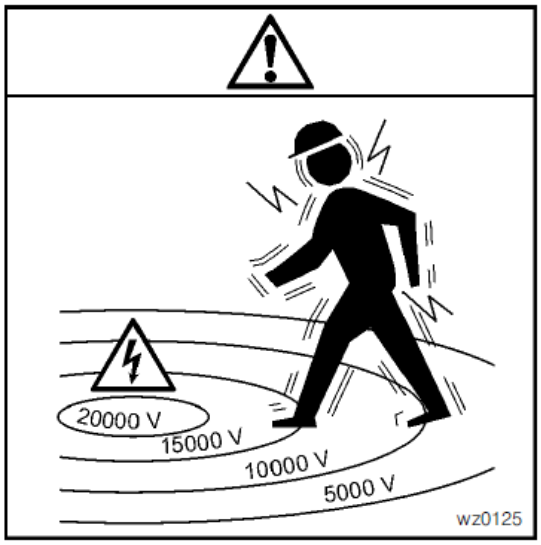


Fig. 2-16

Safety During Transport (to Job Site)

Transporting your equipment may pose some hazards. Always travel in a safe manner and remain alert at all times. A safety-conscious driver is the most important insurance when traveling with your machine. Below are several situations and information the driver should be aware of.

Before traveling with the equipment, do the following:

- If your machine must be transported to the job site on another vehicle, always verify that the transport vehicle is capable of supporting the weight of the machine before loading the machine onto the transport vehicle.
- (Transported machines) Ensure the machine is adequately secured to the transport vehicle during travel.
- (Transported vehicles) Always sound the horn of the transport vehicle to warn others in the area before traveling to the job site.
- Be sure there is no trash, debris or tools on the equipment that could fall off during travel.
- Be sure there is nothing in the driver’s compartment that could distract the driver (empty soda cans, food, loose tools, mud, etc).
- Be sure all components are secured properly in place.
- Be sure the windshield and mirrors are clean and free of dirt, frost or ice.
- Verify that all lighting systems work and are not damaged or obstructed.
- Check the tires and brake operation before starting.
- Know your route; contact state and local districts to be sure you are able to legally travel in these locations.
- Obey all regulations regarding the permissible width, height, length, weight and speed.

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- Always drive carefully and at a controllable speed.
- Never travel over objects that could tip the machine or cause you to lose control.
- Avoid sudden stops or high speed turns which could cause loss of control or a possible rollover.
- Watch clearances when traveling. Do not take a chance of running into overhead or side obstructions.
- When moving in tight quarters, post a signal person to help guard against collisions.
- Check the suitability of proposed route with regard to machine height, width, and length.
- Before traveling across bridges, ensure they will carry a load greater than the loaded vehicle's weight.
- Check state and local restrictions and regulations.
- Stay alert at the steering wheel.
- Never back up without the aid of a signal person to verify that the area behind the vehicle is clear of obstructions and/or personnel.

Maintenance Safety - General

⚠ WARNING

All maintenance to be performed on this equipment must be performed by trained and authorized personnel only. When performing maintenance, it is important to follow all outlined maintenance or repair procedures and safety information as outlined in this manual. Failure to do so may result in possible injury or death.

The machine must be inspected prior to each work shift that it will be used. The owner, user, and operator must ensure that required routine maintenance and lubrication tasks have been performed as stated in this manual by a qualified person(s). Never operate a damaged or poorly maintained machine.

Perform function checks after repairs have been made to ensure proper operation.

Fill out the required maintenance record form. See maintenance section of this manual for information about this.

Direct any questions to your local authorized Sany distributor.

Preparing for Maintenance

Select an area where there is no danger of falling objects or interference with other equipment, personnel or pedestrian traffic.

Before performing any maintenance on the equipment:

- Stop the engine and disconnect the battery.

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- Controls, and power source, should be properly tagged. During all maintenance or repair, Lockout/Tagout procedures must be used to ensure the safety of service personnel involved in the maintenance process of the machine. All power sources must be disabled, locked and tagged with a warning label. See “Lockout/Tagout Procedures” on page 2-21

- Recognize and avoid pinch-points while performing maintenance.

After maintenance or repairs:

- Fill out the required maintenance record form. See maintenance section of this manual for information about this.

- Replace all guards and covers that have been removed.

- Remove all tags, connect the battery, and perform a function check of all operating controls.

Lockout/Tagout Procedures

⚠ WARNING

Never work on the machine without first ensuring that the lockout/tagout process has been followed. Contact your supervisor or Sany with any questions. Failure to follow this warning could result in serious injuries or death.

Only authorized employees performing repairs on the machine shall perform Lockout/Tagout in accordance with the procedure listed below.

If the employee performing repairs to the machine is issued a lock and key, the employee shall not share the lock or key with other employees until all repair procedures are complete and the machine is ready to put back into service.

The following steps shall be performed in the sequence listed when the equipment is to be locked-out and tagged-out for service or repair.

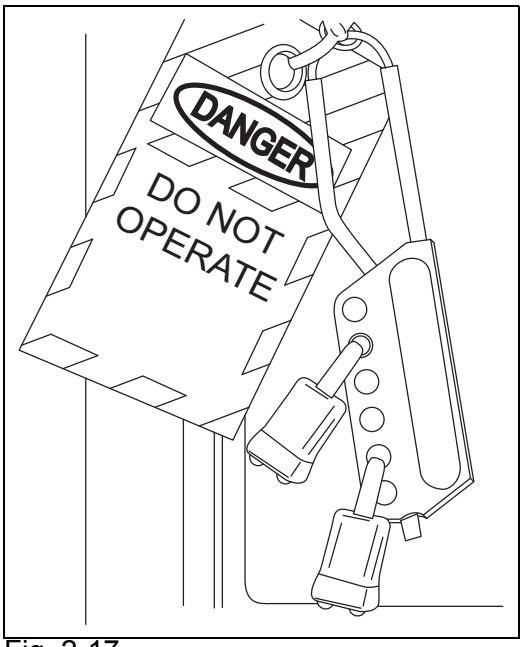


Fig. 2-17

Locking out of service

1. Notify all employees who may be potentially affected by the repair or maintenance on the machine.

2. Secure the machine in a safe position. If so equipped, set the parking brake or hydraulic lock lever in the parked (or locked) position.

3. Identify, remove or disconnect all power or energy sources and be sure to install a Lockout/Tagout device on them.

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4. If the machine is equipped with a Maintenance Alert Tag, attach it to the machine controls.

5. Be sure all employees involved in the repairs have installed their own locks on the power source before performing any repairs. Each employee who completes a repair must remove his own lock and not access the machine further.



Fig. 2-18

Returning to service

1. The authorized person who performed the Lockout/ Tagout procedure shall check the area around the machine to ensure that no one is exposed to any hazard before start-up.

2. The authorized person who performed the Lockout/ Tagout shall ensure that all guards have been properly reinstalled to their respective locations, all tools, equipment and locks have been removed.

3. The authorized person who performed the Lockout/ Tagout shall verify that all controls are in the neutral or “off” position and that all personnel are aware of the time the machine will be back in service.

4. Remove the Lockout/Tagout mechanisms and all tags and re-energize the machine for return to service.

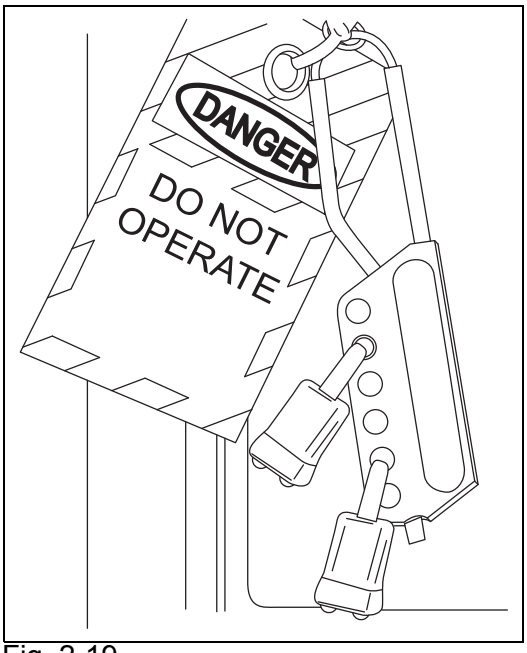


Fig. 2-19

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Cleaning the Machine

Always use hot water and mild, non-flammable grease-cutting soaps or cleaning agents to clean the machine parts. Never use flammable or caustic cleaning agents.

Never use high-pressure steam cleaners to clean the equipment. Steam cleaners will damage the paint, hoses or electrical system.

Never pressure-wash or flood the driver's compartment. This will damage sensitive electrical components.

Always grease the equipment thoroughly after cleaning to force out any water or soap residue.

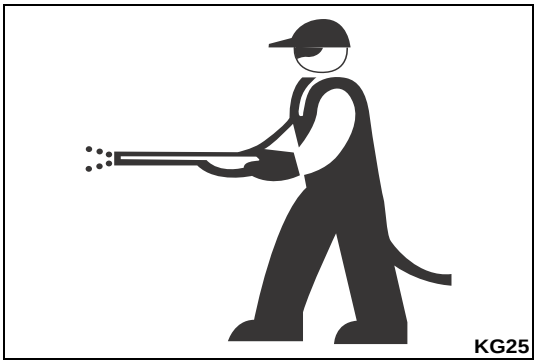


Fig. 2-20

Using the Correct Tools

Always do the following:

- Always use the proper tools for the job. Using tools that are incorrect, defective or damaged could cause serious injury. CAUTION: Be careful when working in tight areas to prevent injury to yourself.
- Keep your tools clean, and when the job is complete, take inventory of the tools you were using to be sure no tools were left in the machine.
- Always put shop tools back in there proper storage location when finished.

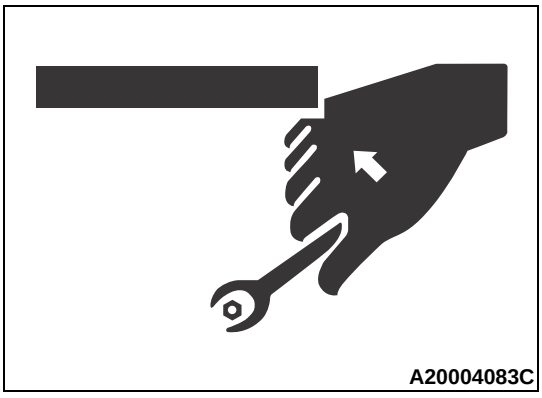


Fig. 2-21

Jacking Up the Machine

Always do the following:

- If you will be working under the machine, always use approved jack stands that will support the weight of the machine you are working on.
- Never rely on the hydraulics of the machine or a hydraulic jack to support the machine during repairs.
- Always lower any work equipment to the ground and check the stability of the machine before going under the machine.


Fig. 2-22

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Rotating Parts

Run the machine during maintenance procedures ONLY if directed to do so in this manual. If the machine must be run when making repairs, it is important to follow some basic safety rules:

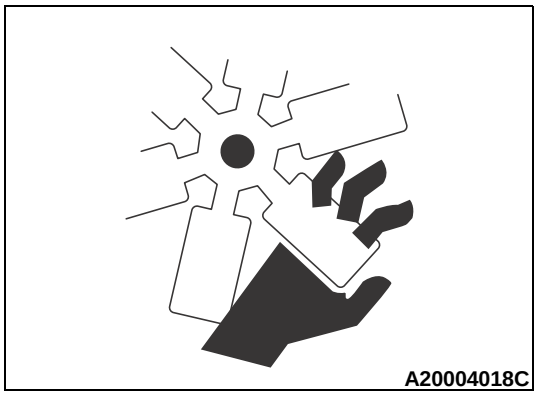


Fig. 2-23

- Always be aware of rotating components.
- During maintenance operations while the engine is running, one worker must remain in the operator seat of the machine with clear contact between the person performing the repairs on the machine at all times.
- If equipped, all lock levers must be in the **LOCK** position or the parking brake must be in the **PARK** position.
- Never touch any controls. If a control lever must be operated, always maintain a clear view to the person doing the repair and signal them when you are about to move the control lever.

Track Recoil Springs

Track recoil springs are used to reduce the impact on the idler. This spring is under extreme pressure at all times. If it is disassembled by mistake, the spring will fly out and cause serious injury. Never disassemble the recoil spring. Contact your Sany distributor if this component requires servicing.

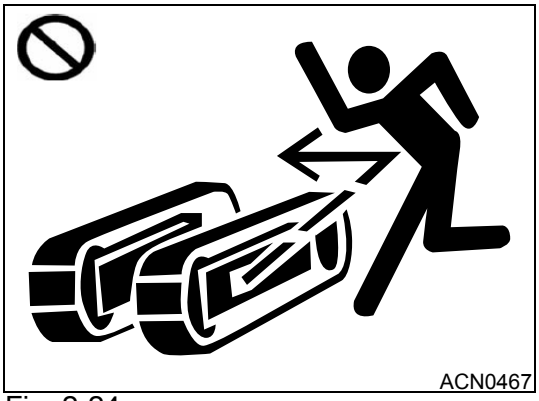


Fig. 2-24

Removing Attachments

If removing large, heavy attachments, always be sure to use the correct lifting equipment rated for the capacity of the load you will be lifting.

After the attachment or part has been removed, store it where it cannot fall or move. Always be sure the attachment is stable on a solid surface and clear of all walkways or fire exits.

When installing and using optional attachments, read and follow the instruction manual for the attachment.



Fig. 2-25

Do not use attachments that are not authorized by your Sany

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distributor. Use of unauthorized attachments could create a safety problem and adversely affect proper operation and useful life of the machine. Any injuries, accidents, product failures resulting from the use of unauthorized attachments will not be the responsibility of Sany.

Welding, Drilling, Cutting or Grinding on the Machine

NOTE: Please contact your Sany America Customer Service Department for proper guidance on any welding being attempted.

Personnel welding on the machine must be fully qualified and certified to use the processes and equipment they may operate in making these repairs. Customers are responsible for the structural integrity of any completed repair. Sany strongly recommends against welding on connectors and fine grain hi-strength steels. Components should be replaced if they are damaged.

Adding Fluids to the Machine

Before adding fluids, shut the equipment down and allow the systems to cool to outdoor ambient temperature before removing any caps. Failure to do so may result in serious burns or a sudden loss of fluid.

If fluids must be added to the equipment during operation, always be aware that these systems are under high pressure and hot.

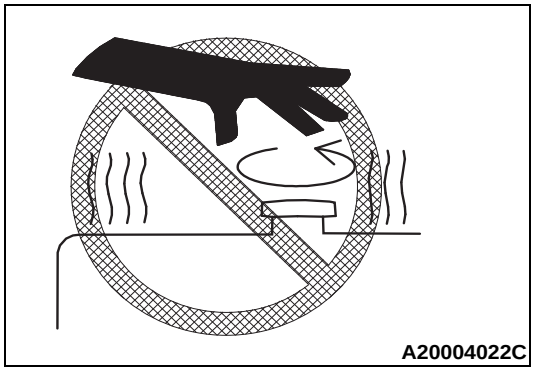


Fig. 2-26

Refueling

Before adding fluids, shut the equipment down and allow the systems to cool to outdoor ambient temperature before removing any caps. Failure to do so may result in serious burns or a sudden loss of fluid. Read and understand the following:

- Refueling the machine could pose some hazards. Grease, fuel, oil or coolant spills pose a hazard if not cleaned up immediately.
- When refueling or adding any fluids to the machine, be sure you are in a well-ventilated area. Never smoke or allow open flames near you while you are refueling the machine.



Fig. 2-27

- Never mix gasoline with diesel fuel. Gasoline is extremely flammable and could cause an explosion.
- Always allow room for the fuel to expand when filling the fuel tank.

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High-Pressure Fluid Lines

During normal operations, it may be necessary to replace a hydraulic hose if a leak is found or failure occurs. Always remember that this system is highly pressurized.

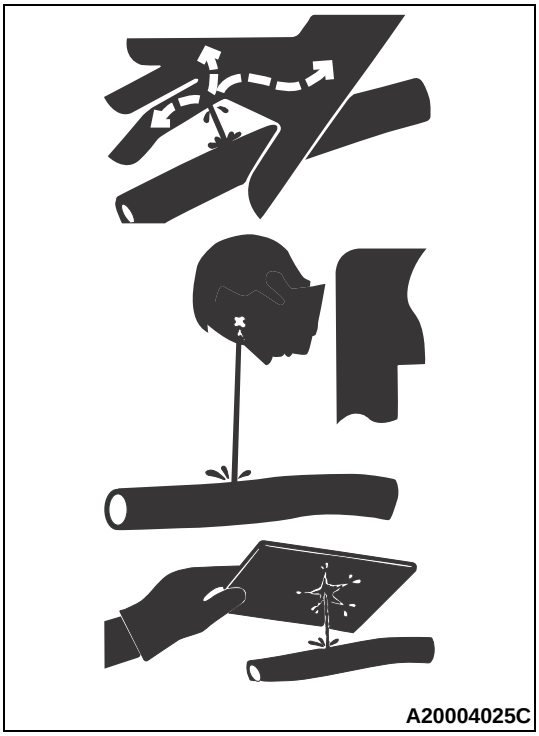


Fig. 2-28

Always do as follows:

- Check for cracks in the piping or hoses and for swelling in the hoses. If there is any leakage from a line or hose, the surrounding area will be wet.
- Never perform inspections or replace items while the system is under pressure. Working on a system still under pressure could lead to serious injury.
- Never use any part of your body to check or feel for leaks. Always wear safety glasses and leather gloves when checking for leaks and use a piece of wood or cardboard when checking leaks from small holes.
- If high-pressure fluids penetrate your skin or get into your eyes, seek medical attention immediately.

Accumulator

This machine is equipped with an accumulator charged with high-pressure nitrogen gas. Before servicing the accumulator, it is important to follow these basic precautions.



Fig. 2-29

- Do not disassemble the accumulator.
- Never expose the accumulator to high heat or open flames.
- Never weld on the accumulator.
- Never drill or cut on the accumulator.
- Never strike the accumulator.
- If the accumulator should need servicing, contact your Sany distributor.

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Electrical System

Always clean the electrical system using only approved electrical cleaners.

Never use caustic soaps, high-pressure water or steam cleaners to clean the electrical system, as these could damage the system or cause intermittent system failures.



Fig. 2-30

Battery Safety

When working with batteries, always work in a well-ventilated area. Working around batteries always poses a hazard – especially if the battery has been in service for a long period of time. Listed below are some basic precautions to be aware of when servicing or working around batteries:



Fig. 2-31

- Always wear personal protective equipment when working around batteries.
- Battery gases are extremely explosive. Smoking, sparks or open flames could cause an unexpected explosion. When opening a battery compartment always allow ample time for the gases to escape before servicing the battery.
- If the battery is corroded, flush the area with a baking soda and warm water mix.
- If battery acid gets on your skin or in your eyes, flush the area immediately with fresh water and seek medical attention.

Check battery condition only with proper test equipment. Batteries shall not be charged except in an open, well-ventilated area that is free of flame, smoking, sparks, and fire.

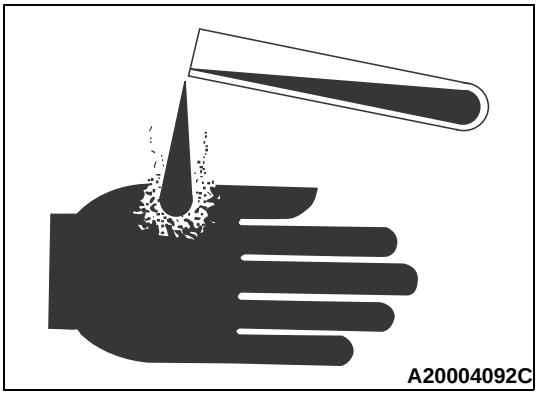


Fig. 2-32

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Start-up Safety

Never start the machine by tampering with or shorting the starter terminals. Accidental movements of the machine may result, leading to injury or possibly death. Always start the machine from a seated position in the operator's seat using the ignition switch.

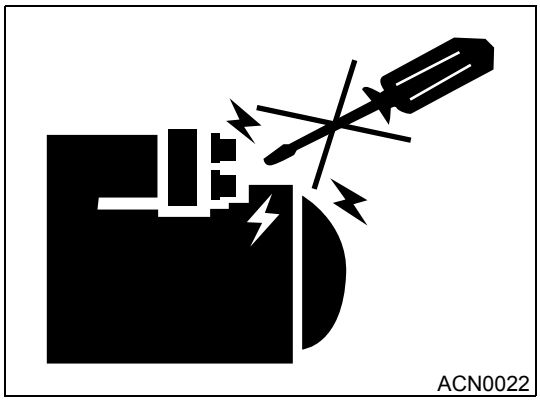


Fig. 2-33

Disconnecting the Battery

When disconnecting the battery, always disconnect the negative (-) terminal first, then disconnect the positive (+) cable.

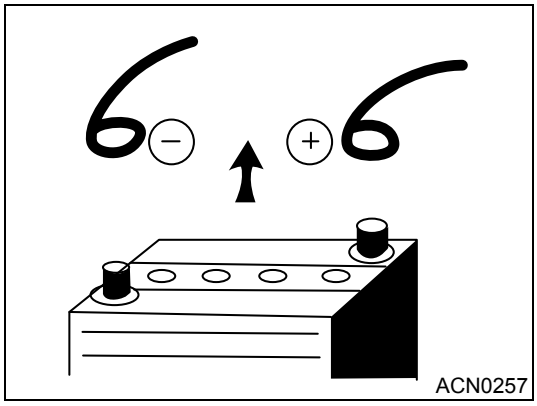


Fig. 2-34

Jump-Start Safety

When using jumper cables to start the engine, hook the positive (+) jumper first, then connect the negative (-) jumper to a remote location on the chassis away from the battery.

Never use a welder or equipment with a higher voltage system to jump-start the machine. Using a higher voltage to jump-start the engine may damage the truck's electrical system or cause an unexpected explosion or fire. Always jump-start the engine with equal voltages.

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Environmental Precautions

Recycling used oil, coolants or filters conserves a natural resource and is good for the environment. Engine fluids poured onto the ground, into storm drains or tossed into trash cans (even in a sealed container) can contaminate and pollute the soil, groundwater, streams, and rivers (and it's illegal!). Recycling your used engine fluids reduces this pollution threat.

Never dump waste fluids into a sewer system, on the ground, in rivers, etc.

NOTE: Always drain fluids from your machine into an appropriate container and dispose of properly.

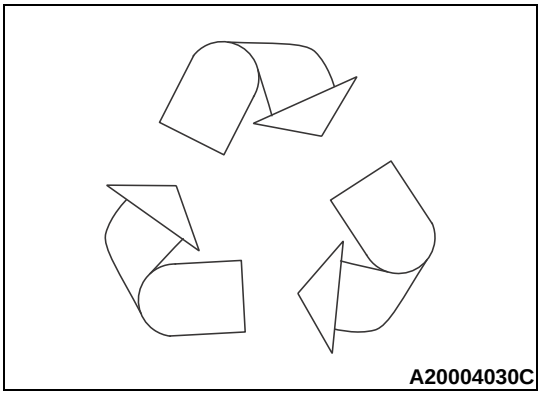


Fig. 2-35

NOTE: Drain, crush and dispose of all filters properly. Once the oil is drained from the filters, recycle them.

Obey all appropriate laws and regulations when disposing of harmful objects such as oil, fuel, filters, batteries, hydraulic oils or used parts.

Always recycle whenever possible. Failure to do so may result in fines or punishment.

Towing or Lifting the Machine

Serious injury or death could result if a disabled machine is towed or lifted incorrectly or if there is a mistake in the selection of cable or towing locations. Adhere to the following:

- Use only the designated lift points to lift the machine and designated tow points to tow the machine. Be sure the lift and tow points are undamaged and in good working order.
- Always tow or lift in the direction indicated by the decal. If the decal is missing or damaged, contact your Sany distributor for the proper procedures.
- Always wear leather gloves when handling cable.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Never tow a machine on a slope.
- Never use towing equipment that is damaged, stretched or overstressed.

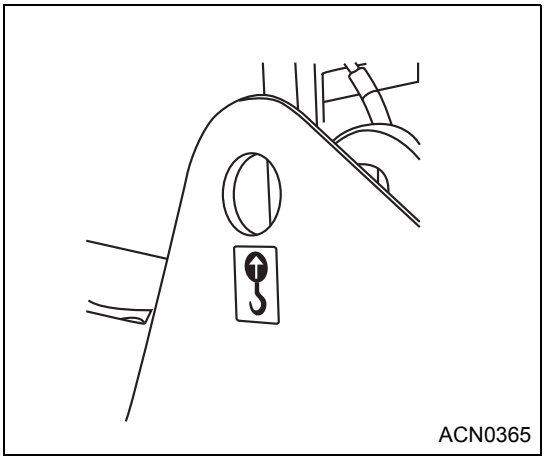


Fig. 2-36

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Optional Attachments

When installing and using optional attachments, read the instruction manual for the attachment and information related to the attachment.

Do not use attachments that are not authorized by your Sany distributor. Use of unauthorized attachments could create a safety problem and adversely affect proper operation and useful life of the machine. Any injuries, accidents, product failures resulting from the use of unauthorized attachments will not be the responsibility of Sany.

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PRODUCT SPECIFIC SAFETY

Machine Decals

All safety, alert and warning decals must be in place, undamaged, covered or removed. The operator and all other personnel involved with this machine must be aware of the decal content and locations on the equipment.

NOTE: Your Sany dealer can supply you with new replacement decals if needed. Never modify or change existing decal information unless authorized by your Sany distributor.

When replacing decals, be sure they are placed in the proper locations.

NOTE: Additional safety or warning decals may be added to your machine if necessary.

Authorized Use of the Excavator

The excavator is designed to be used to dig and remove earth for construction purposes.

Unauthorized Use of the Excavator

- Using equipment or attachments not authorized for the excavator.
- Driving the excavator on a public road in a not-permissible driving condition.
- Never use your equipment for tasks it was not designed for; damage to the machine or injury to the operator and other personnel may result.
    - Do not use the swinging force to compact the ground or break objects.
    - Do not cut the bucket into the ground and use the traveling force to excavate.
    - Do not operate any cylinder at the very end of the stroke.
    - Do not use the bucket landing force for excavating, digging, breaking, or pile-driving.
    - Do not use the weight of the machine to excavate hard or rocky ground.
    - Do not move any control lever or pedal to abruptly change the direction of the machine.
    - Do not stop the machine suddenly by releasing the lever or pedal while traveling at high speed.

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Accumulation of Flammable Material

During continuous operation of the machine over a long period of time, flammable material can build up within the machine's operating systems. Dry leaves, wood debris and trash could ignite when coming into contact with hot parts. Listed below is some information to help prevent fires from occurring during continuous operation in areas where the machine is exposed to these types of environments. (See also "Inside Operator Cab" on page 2-33)



Fig. 2-37

- Always inspect and remove any dry leaves, wood chips, paper or any flammable material accumulated or affixed around the engine, exhaust system, battery or under covers on the machine.
- Operations such as logging, land clearing, mulching or landfill work may cause trash and debris to accumulate on the machine.
- Always inspect and remove this debris accumulation daily.
- Clean the machine after servicing the hydraulic system, engine or fuel system.
- Operating near burn piles or any type of open burning could cause airborne sparks or glowing embers to land on the machine and ignite any accumulated debris or oil residue.
- Never place any part of the machine in direct contact with open flames. Damage to the machine or a fire on the machine may result.

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Inside Operator Cab

Lock Lever

⚠ WARNING

Never stand up from a seated position with the engine running and the work equipment hydraulic lock lever in an UNLOCKED (free) position (a). Accidental activation of the work equipment controls could result in unexpected movement of the work equipment, causing possible damage, loss of control or injury or possibly death.

If you must stand up from the operator's seat for any reason, be sure the work equipment is fully lowered to the ground, the engine is shut down and the work equipment hydraulic lock lever is in the LOCK position (a).

Always remain seated with the seat belt fastened snuggly around your waist when the engine is running and you are operating the machine.



Fig. 2-38

Start-Up Safety

Never start the excavator by tampering with or shorting the starter terminals. Accidental movements of the excavator may result and lead to injury or possibly death.

Always start the excavator from a seated position in the driver's seat using the ignition switch.

⚠ CAUTION

Never use starting aids to start the engine. Starting aids are explosive and will damage the engine or may result in minor or major injury.

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Before starting operations:

- Ask for inspection and maintenance records and verity that the appropriate operator manual is inside the cab you are using.
- Walk around the equipment and check for people or objects that might be in the way.
- Do not start the equipment if warning tags have been attached to the control levers.
- Sound your horn to warn others in the area before starting the engine, moving the machine or starting any machine operation.
- Operate the machine in the proper position only.
- Never allow anyone in the driver's compartment or on the machine during operation.
- Check your view. Be sure you can see all work areas around your excavator clearly.

When using jumper cables to start the machine, connect the positive (+) jumper first, then the negative (-) jumper to a remote location on the chassis away from the battery.

⚠ WARNING

Never use a welder or a machine with a higher voltage system to jump-start the machine. Using a higher voltage to jump-start a machine may damage the machine's electrical system or cause an unexpected explosion or fire. Always jump-start a machine with equal voltages. Failure to follow this alert may result in injury or possibly death.

Crush or Pinch-Point Precautions

Never place any part of your body out the windows or doors during operation or travel. The movement of the work equipment or falling objects could injure you.

Keep all safeguards on the equipment in place.

Never remove the side window of an excavator. If this window should become damaged or broken, replace it immediately.



Fig. 2-39

Death or serious injury could result from being crushed by moving parts of this excavator.

Barricade the entire area where the excavator is working and keep all unnecessary personnel out of the work area.

Before initiating a arm swing or any other excavator function, sound the horn and verify that all personnel are clear of rotating and moving parts.

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Watch the path of the arm when in movement to avoid lowering or swinging the arm into personnel, equipment, or other objects.

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Leaving the Operator Cab

Before leaving the operator cab, it is important to keep in mind that you are responsible for the safety and security of the machine. Listed below are several items you should be aware of as an operator of the machine.

- Be sure the machine is in a stable secure area.
- Lower all work equipment (a) to the ground and shut the engine down.



Fig. 2-40

- Neutralize all the controls by rotating the work equipment control levers a full 360° several times, then move the work equipment hydraulic lock lever to the **LOCK** position (b).

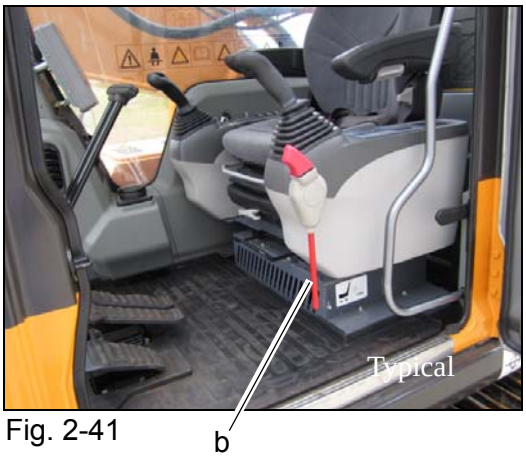


Fig. 2-41

- Remove the ignition key (c) and keep it with your person to prevent unauthorized operation of the machine.



Fig. 2-42

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- Lock and secure all lockable areas on the machine.

⚠ WARNING

Never leave your machine running and unattended, even for a moment. Never leave a load suspended in the air. Lower all loads to the ground before leaving the machine. Shut the engine down. Failure to observe and follow this warning could result in injury or possibly death.



Fig. 2-43

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Optional Attachment Use

If you will be using optional attachments with your machine, always contact your Sany distributor first. Any injuries, accidents, or product failures resulting from the use of unauthorized attachments will not be the responsibility of Sany. Do not use attachments that are not authorized by your Sany distributor. Use of unauthorized attachments could create a safety problem and adversely effect the performance of the machine.

Large or Optional Attachments

When using large attachments on your machine, always be aware that the performance and handling of the machine will be different from that of the standard digging bucket. Before using a larger or optional attachment always be aware of the following:



Fig. 2-44

- Be careful when folding the work equipment for travel or when repositioning the machine. The possibility of the attachment contacting the operator cab becomes greater depending on the size of the attachment.
- Before using unfamiliar work equipment, check if there is a danger of interference, then proceed with operation in a cautious manner.
- Never operate any attachments near the operator cab of the machine. Always be aware that the larger the attachment on the machine, the more the center of gravity will change. Be careful when traveling on slopes.

Operating Precautions

As an operator of the machine, you are responsible for the safe operation of your equipment at all times regardless of the situation. Although Sany cannot cover or predict all operating conditions that pose a major hazard, listed here are a few basic situations and information to be aware of when using the excavator during work or travel operations. It is advised to study these items and always be aware of them before and during your work operations. Failure to do so may result in damage to the machine, injury or possibly death.

Pre-Operational Checks

Before starting any work operations it is important to perform a **pre-operational check** on your machine to be sure your equipment is in safe operating condition. If any problems are found during your pre-operational check, have them repaired immediately. Never operate a machine that is unsafe, damaged or in need of repair. “Making do” with broken or damaged equipment may result in damage to the machine or injury to the operator and other personnel. Keep in mind, it is also important that a pre-operational check be performed at the beginning of your work shift, even if you are taking the machine operations over from another operator. Always perform a pre-operational check before you start your work.

Starting Operations

- Before operating your equipment, walk around the machine and check for objects or personnel that might be in the way.

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- Never start the machine if warning tags have been attached to the control levers.
- Check your view. Be sure you can see all work areas around your machine clearly.
- Be sure all personnel are clear from your work site before starting any operations.
- Sound your horn to warn others in the area before starting the engine or moving the machine.
- Never start the machine by tampering with or shorting the starter terminals. Accidental movements of the machine may result, leading to injury or possibly death. Always start the machine from a seated position in the operator's seat using the ignition switch.
- Always operate the machine from a seated position with the seat belt fastened snuggly around your waist.
- Do not allow anyone in the operator cab or on the machine during work operations whatsoever.

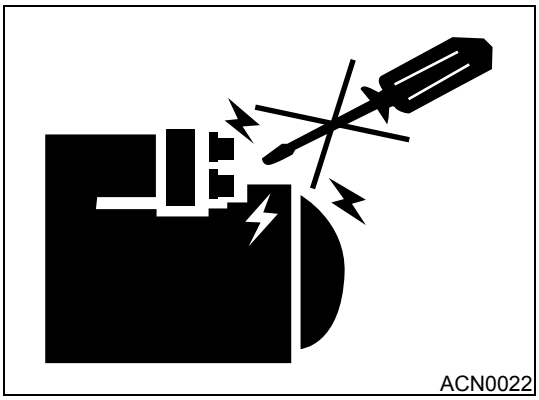


Fig. 2-45

During Operation

- It is important to follow all operating procedures as outlined in this operator's manual before any excavation operations are to begin. Failure to do so may result in damage to the machine or property and even injury or death.
- Keep the machine free from flammable materials such as vegetation, trash, grease, oil or fuel.
- Never use the excavator to lift, transport or provide a work platform or device for personnel in any manner.
- Never allow personnel in the operator cab (a) of the machine with you during operation or travel procedures, regardless of the situation.



Fig. 2-46

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- Always be aware of the swing circle area (b) of the machine, especially in tight operating conditions.

- Maintain a clear and visible swing circle area during machine operations at all times.



Fig. 2-47

- Never allow other personnel near your machine while in operation. The possibility of getting hit by falling objects, lowering work equipment (c) or pinning them between the machine and surrounding objects becomes greater the closer they are.

- Never use any part of the bucket or work equipment to lift or maneuver objects if these implements are not equipped with the proper lifting devices. Loss of control or loss of a load may result.

- If your digging bucket is equipped with a designated lifting eye, use only the lifting eye to lift objects. Never use the bucket teeth, “H” link or mounting point to lift objects.

- When lifting objects with the bucket lifting eye, always maneuver the work equipment carefully and slowly.

- Never use your person or other personnel to handle or maneuver loads being lifted by the machine in any manner. The possibility of loss of control, being trapped or pulled by the load can happen if operations like this are performed.

- When handling a load, always remain clear of the load at all times until the load is on the ground and it is safe to approach.



Fig. 2-48 Typical

- Never drag or pull a load with the machine using the swing mechanism. Damage to the swing mechanism or loss of control could result.

- It is also not recommended to pull a load towards the machine. If the cable should snap or the load should come free, the possibility of an object hitting the operator cab could cause damage to the machine or injury to the operator.

- Never dig the bucket into the ground and use the travel force to carry out excavation operations. Doing this will damage the machine or work equipment or could cause loss of control.

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- Do not use the dropping force of the machine for digging or breaking up material. Using the bucket as a pickax, breaker or pile driver will damage the machine. Keep in mind that operating the machine like a pickax, breaker, pile driver or in similar manners will reduce the life of the machine or possibly cause injury to the operator.

- Do not use the swing force of the machine to strike, move or dismantle a structure or a large object. Damage to the swing system will result.

- Do not use the dropping force of the machine for digging or pulling materials from a high-level area. Damage to the machine or injury to the operator may result.

- If the work equipment is used with the cylinder rod operated to its end and the impact by some external force is applied, the hydraulic cylinder will be damaged and may cause personnel injury. Avoid operations with the hydraulic cylinder fully retracted or fully extended.

Avoid sudden travel lever shifting:

- Always maintain a firm grip on the travel levers when traveling, stopping or changing direction with the machine.

- Avoid any sudden release of the travel levers when changing from forward movement to backward movement. Doing so may cause the machine to tip, rock or result in loss of control and damage to the machine.

- Avoid sudden lever release when traveling at top speeds to stop the machine. Loss of control or damage to the machine may result.

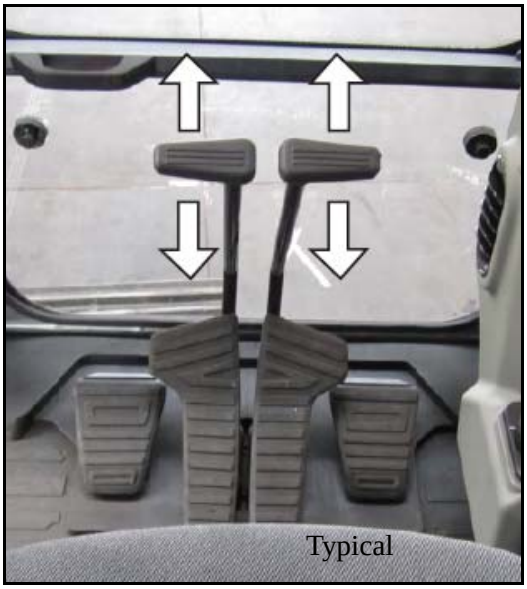


Fig. 2-49

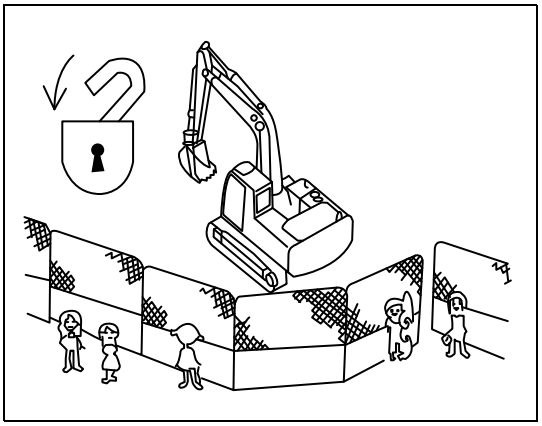
Security of the machine at the end of a work day is very important. Vandalism, access to the machine by children or other unauthorized personnel can and will happen if the machine is not properly locked and secured. Keep in mind that you are responsible for the security of your machine at all times.

- If possible, park the machine in an area away from people.

- Lower all work equipment to the ground.

- Shut the engine down and neutralize all controls to relieve any hydraulic pressure in the work equipment hydraulic system.

- Close and lock all windows and roof hatch covers.


Fig. 2-50

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- Remove the ignition key and lock the door and all service access panels.
- Before leaving the area, double check to be sure the machine is safely secured and all lockable areas are locked.
- Take the key to the machine with you off the job site.

Job Site Precautions

As an operator of this machine, you are responsible for the safe operation of the machine at all times, regardless of the situation. Although Sany cannot cover all operating conditions that pose a hazard, here are a few basic situations to avoid or be aware of when using excavator equipment during all types of work.

- Thoroughly inspect the area for any unusual conditions that could be dangerous before starting any operations.
- Be careful when operating around or near open burning operations.
- Before starting any work operations, travel or maintenance and repair procedures, be sure all personnel are at a safe distance away from any point on the machine. Never allow anyone to stand near the machine while it is in operation, under maintenance or being repaired.
- If pedestrians are in the area, proceed slowly and sound your horn. Keep in mind that pedestrians have the right of way and a loaded or smaller machine has the right of way over an unloaded machine. Remember also that the larger the equipment, the more restricted your visibility will be.
- When working with another person on a work site, ensure that all personnel involved understand all hand signals that are to be used. The operator shall respond to ***operating signals*** from only the proper signal person. However, the operator shall obey a ***stop signal*** from anybody at any time.
- When leaving the job site, always lower all work equipment to a safe position, neutralize work equipment controls and lock and secure your equipment properly to avoid tampering by unauthorized personnel.
- Never drive up to anyone standing in your path of travel. Always be sure all personnel are standing to the side when you approach them and they acknowledge your approach.
- Never leave your equipment running and unattended. Always park the equipment in a stable, level area, lower any work equipment to a safe position, lock the controls and turn the engine off before exiting the operator’s cab.

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- Never allow anyone to approach your work area during operation or travel. If they should approach, stop operation or travel immediately and signal them to leave immediately. Do not resume operation or travel until they have left your work area and are at a safe distance.

- If they must approach, signal them to stop where they are, lower all work equipment to the ground, set the work equipment hydraulic lock lever in the **LOCK** position and shut the engine down. When it is safe for them to approach, signal them to approach.

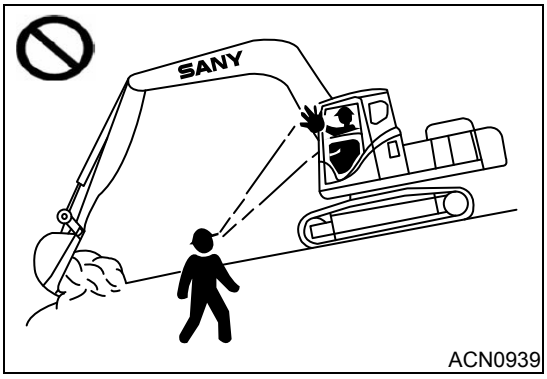


Fig. 2-51

- Never use any part of your machine or work equipment to place or remove material from a burning fire. The possibility of damaging or causing a fire on the machine is heightened by the intensity of the burning fire and the distance the machine is from the fire.

- Always keep all parts of the machine clear from a burning fire at all times.

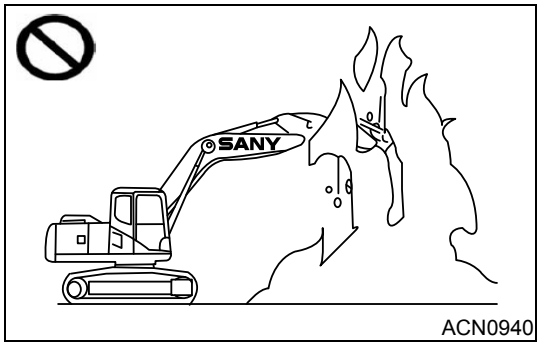


Fig. 2-52

Surface and Underground Hazards

It is important to study the area for hazards involved with the job operation before placing the machine on a job site or starting any work operations. Below is a list of what to do to avoid some of these hazards. Below is a list of what to do to avoid some of these hazards.

- Before unloading the machine, be sure the ground surface will support the machine. Note that when operating on embankments, ditches near waterways or soft areas, there is a possibility that the weight and vibration of the machine will cause the soil to collapse.

- Before starting any excavation operations, contact all utility departments in your area and have them identify and mark any underground systems locations, gas lines, water lines, electrical lines, sewer lines, etc.

- Check the area for any unusual ground conditions.

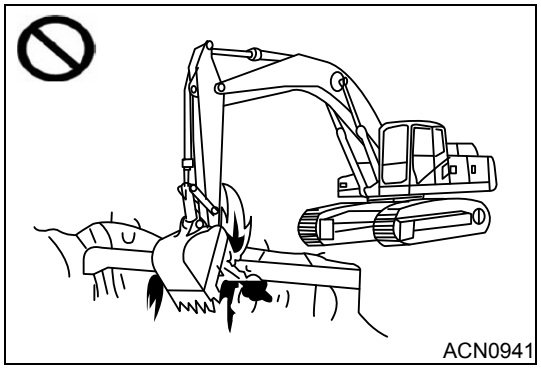


Fig. 2-53

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- Make sure your work area is stable and as level as possible and that you will be able to maneuver your work equipment or machine safely.



Fig. 2-54

- If you will be working in areas where high traffic or pedestrians are a problem, have a dedicated worker available to direct traffic or install safety fencing around your work site.

- Always be aware of all your work site dangers or distractions.

- Avoid operating or traveling too close to the edge of a cliff, overhang or deep ditches. The ground may be weak in these areas. If the ground should collapse under the weight or vibration of the machine, there is a possibility the machine may fall or tip over.

- When performing excavation operations on an embankment, cliff or a large dig area, always position the track carriage at right angles with the machine as shown in the illustration. If the bank should give way during operations, placing the carriage in this position will allow you the advantage of escaping the area easier.

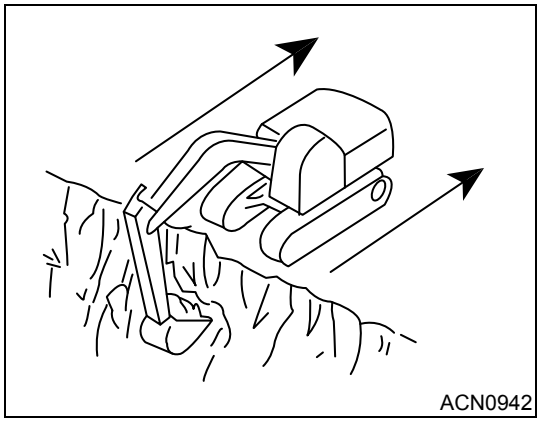


Fig. 2-55

- When excavating a trench, always be aware of the ground condition and never attempt to dig too close or under the machine. The possibility of the machine falling into the excavated site becomes greater the closer the excavation is to the machine.

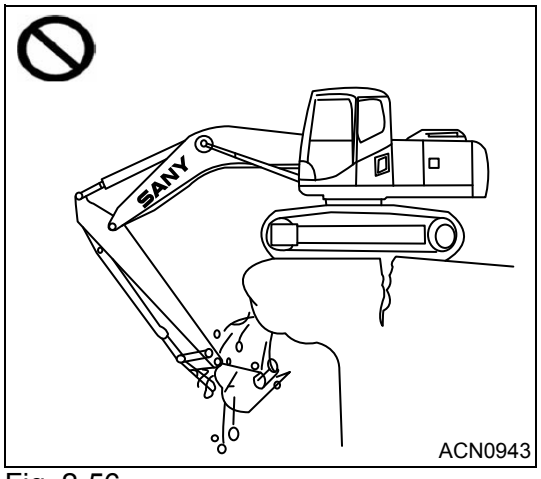


Fig. 2-56

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- Never perform job operations under overhangs or excavated bank areas. These could collapse and damage the machine or injure the operator.
- Keep in mind that the soil will be loose after a heavy rain, blasting or earthquakes.
- When traveling or operating in shallow water or soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting any operations.

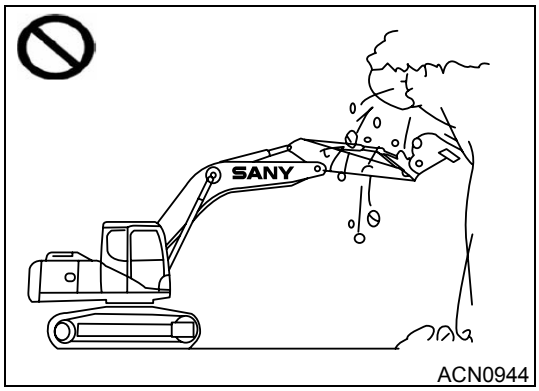


Fig. 2-57

- Never perform demolition work under the machine. This will cause a hazard as the machine could become unstable or tip resulting in loss of control.
- When working on tops of structures, check the support strength before starting any operations. Keep in mind, if these supports should collapse, you could be seriously injured.

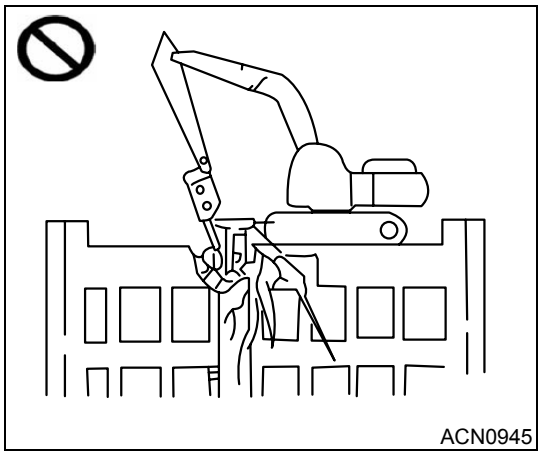


Fig. 2-58

Job Site Working Clearances

Listed are some basic safety precautions regarding clearance to prevent risk:

- After you have checked the condition of your working surfaces, be aware of your working clearances around, above and behind you. Be sure you will have the space to swing the machine without interference and that you can extend the work equipment without striking any surrounding objects/areas.
- If you will be traveling, be sure you have the room to maneuver the machine and work equipment. As mentioned above, be sure the ground surface will support your machine.

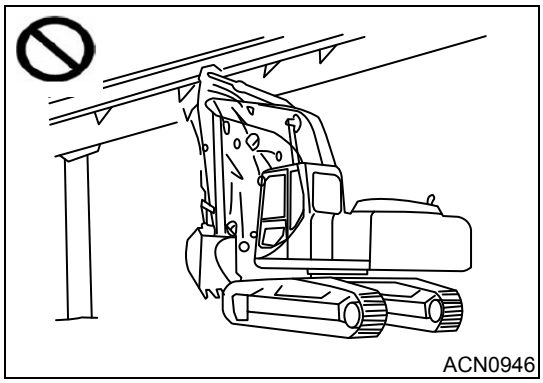


Fig. 2-59

- Travel at a slow, cautious speed when working or traveling in an area where clearances are a problem.
- Always maintain a clear and safe location for the machine at all times, regardless of the situation when performing demolition operations.

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- Never change a demolition plan unless authorized and agreed upon by the demolition supervisor or structural engineer and other co-workers.

- Always study the demolition procedure before performing any operations.

- Never place yourself or co-workers in harm's way when performing demolition operations and be sure all personnel maintain a clear distance from the demolition site at all times.

- If you are not sure of your clearances, request the aid of another person who can guide or warn you if you get too close to objects.

- Always be aware of your work equipment position and location. Keep all parts of your work equipment in full view all the time when working in areas where clearances are a problem.

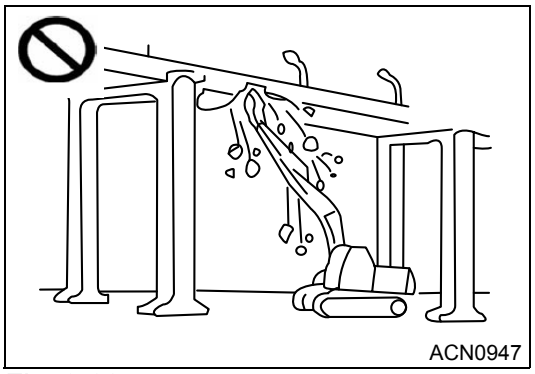


Fig. 2-60

Slopes or Inclined Surfaces

Always operate machine on a flat, stable, level surface whenever possible. But if work must be done on a slope or inclined surface, follow these rules:

- Always avoid operating the machine on slopes or areas that could pose a rollover or loss of control situation. Movement of the work equipment on an unstable or sloped surface could cause the machine to tip or roll over.

- Remember that if you will be working on a slope or inclined surface of any kind, there is always a danger that the machine may roll over when the swing or work equipment is operated. Situations like this may lead to serious injury or property damage. Always provide a stable place when performing these types of operations, and work carefully.

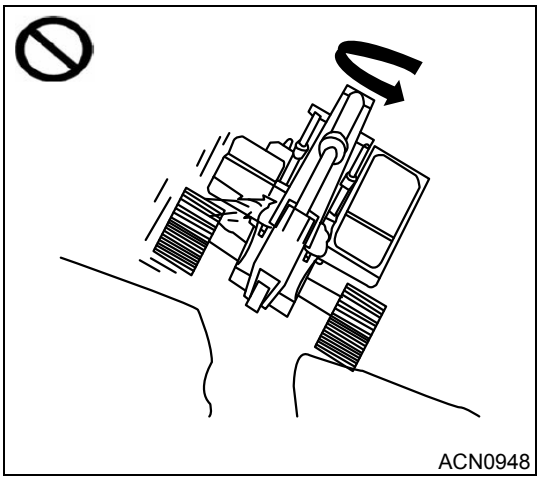


Fig. 2-61

- Do not swing the work equipment from the uphill side to the downhill side when the bucket is loaded. This operation is dangerous and may cause the machine to tip over.

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- If the machine must be used on a slope, pile soil to make a platform that will keep the machine as horizontal as possible. Operate the machine carefully and always be aware of your ground conditions.

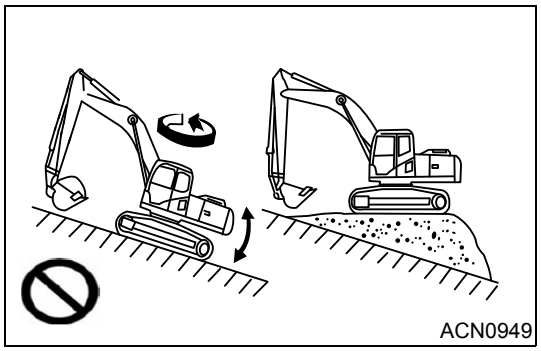


Fig. 2-62

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Snow or Frozen Surfaces

It is extremely important to be extra careful when traveling or operating your machine on frozen or snowy surfaces. Snow-covered or frozen surfaces are slippery. Your ability to maneuver the machine is seriously affected. The machine may not respond as you expect when turning.

- Always travel at a slow speed and gently operate the controls.
- Avoid any rapid movement, acceleration or quick stopping. Always be aware of the increased stopping distance required on these surfaces. Give yourself ample distance to stop the machine.
- Avoid deep snow or frozen bodies of water. You could get easily trapped in these areas.
- Keep in mind, even a slight slope may cause the machine to slip out of control. Be extra careful when working on a sloped surface covered with snow or ice.
- When traveling or moving the machine on a snow-covered slope, slow down gently. To reduce the speed, use the engine to slow the machine down. If necessary, lower the work equipment to the ground.

High Voltage Areas

⚠ DANGER

If you will be working in an area where overhead power lines pose a hazard, it is important to be aware of the dangers involved with these systems. High humidity may pose an even greater hazard even if your machine clears the overhead power lines. Always use extra caution when working near overhead power lines. Failure to follow the information listed below could result in injury or possibly death.

- Never assume or trust the word of a coworker or job site personnel that power lines are de-energized. Always contact a representative of the power company in your area for proper authorization and be sure power lines are de-energized.
- If you are not sure of your clearances, request the aid of another person who can guide or warn you if you get too close to the power lines.

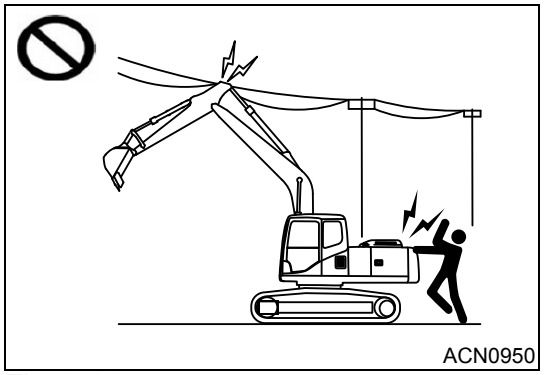


Fig. 2-63

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- Always be aware of the dangers when working around overhead electrical lines. High humidity may pose an electrical hazard even if your equipment seems to be safely clear of the overhead power lines. See the table below for minimum machine-to-cable distances.

Power Line Voltage	Minimum Distance Between Machine and Cables	
	(ft)	(m)
0 - 50,000	Over 10	Over 3.0
50,000 - 200,000	Over 15	Over 4.5
200,000 - 350,000	Over 20	Over 6.0
350,000 - 500,000	Over 25	Over 7.5
500,000 - 750,000	Over 35	Over 10.0
750,000 - 1,000,000	Over 45	Over 13.5

Operating equipment near high frequency towers (for instance, cell phone towers) may pose an electrical hazard. Ask the company to shut this system down until your work is finished.

Always be aware of the dangers when working around overhead electrical lines; high humidity may pose an electrical hazard even if your equipment clears the overhead power lines.

If your machine should come in contact with overhead electrical lines, stop the machine and remain on the machine until the power company clears the lines and it is safe to get off or move the equipment.

If you must exit the machine, keep both feet and legs together, your arms and hands at your side. Jump clear from the equipment, maintain balance and land with both feet, legs, arms and hands still together. Your hands, arms or any part of your body should not touch the equipment during the jump. Once on the ground continue to bunny hop away from the affected area as far as possible.

If you are not sure of your clearances, request the aid of another person who can guide or warn you if you maneuver the machine too close to objects.

Electrocution Hazard

Keep all parts of this machine, the rigging, and materials being lifted at least 20 ft away from all electrical power lines with voltage less than 50,000 and electrical power source.

Before operating this excavator in the vicinity of electrical power lines or electrical power source, notify the power utility company and assurance that the power has been turned off.

This machine is not insulated. All parts of the load and the excavator, including the cable, hoist cable, pendant cables, and tag lines, can be conductors of electrical energy.

Treat all overhead power lines as being energized, and not insulated, unless you have reliable information to the contrary from the utility company or owner.

The requirements stated in this manual must be followed at all times, even if the electrical power lines or electrical power source have been turned off.

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If any part of the excavator or load contacts or comes too close to an electrical power source, everyone in, on, and around the excavator can be seriously injured or killed.

The excavator operator is responsible for alerting all personnel of dangers associated with electrical power lines and electrical power source. Do not allow unnecessary personnel in the vicinity of the excavator while operating. The excavator operator must permit no one to touch the excavator.

It is not always necessary to contact a power line or power source to become electrocuted. Electricity, depending on magnitude, can arc or jump to any part of the load, load line, or excavator boom if it comes too close to an electrical power source.

Read, understand, and abide by all applicable federal, state, and local regulations.

The use of electrocution hazard devices does not assure that electrical contact will not occur. Even if codes or regulations require the use of such devices, failure to follow the rules listed in this manual may result in serious injury or death. Electrocution hazard devices have limitations and you must follow the rules and precautions outlined in this manual at all times even if the excavator is equipped with these devices.

Grounding of a excavator affords little or no protection from electrical hazards. The effectiveness of grounding is limited by the size of the conductor (wire) used, the condition of the ground, the magnitude of the voltage and current present, and numerous other factors.

Because of the voltages involved, overhead power lines present an extremely high risk of fatal electric shock. If contact occurs, proper safety procedures should be followed. The danger posed by overhead power lines at the construction site is often compounded by other factors, such as uneven ground that could cause the excavator to weave or bob into power lines, and windy conditions that can make the power lines sway, reducing clearance.

To address these risks:

- Identify overhead power lines and mark safe routes where excavator must repeatedly travel.
- Operate the excavator at a slower-than-normal speed in the vicinity of power lines.
- When working around overhead power lines, de-energize and ground them, or take other protective measures such as guarding or insulating the lines.
- If the power lines are not de-energized, operate excavator in the area ONLY if a safe minimum clearance is maintained.
- If maintaining safe clearance by visual means is difficult, designate a person to observe the clearance and to give immediate warning when the excavator approaches the limits of safe clearance.
- All persons should keep well away from the excavator whenever it is close to power lines.
- Do not contact the excavator or its load until a signal person indicates that it is safe to do so.
- Use cage-type boom guards, insulating links, or proximity warning devices, but do not substitute for de-energizing and grounding lines, or maintaining safe clearance.

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Electrical Contact

If the excavator should come in contact with an energized power source, you must:

1. Stay in the excavator cab. DON'T PANIC.
2. Immediately warn personnel in the vicinity to stay away.
3. Attempt to move the excavator away from the contacted power source using the excavator's controls which are likely to remain functional.
4. Stay in the excavator until the power company has been contacted and the power source has been de-energized. NO ONE must attempt to come close to the excavator or load until the power has been turned off.

If it is absolutely necessary to leave the operator station, Jump completely clear of the excavator. Do not step off the excavator. Hop away with both feet together. DO NOT walk or run as this will cause a electrical arc resulting in serious injury or death.

Following any contact with an energized electrical source, the local, authorized, Sany distributor must be immediately advised of the incident and consulted on necessary inspections and repairs. Should the distributor not be immediately available, contact Sany America. The excavator must not be returned to service until it is thoroughly inspected for any damage and all damaged parts are repaired or replaced as authorized by Sany or your local Sany distributor.

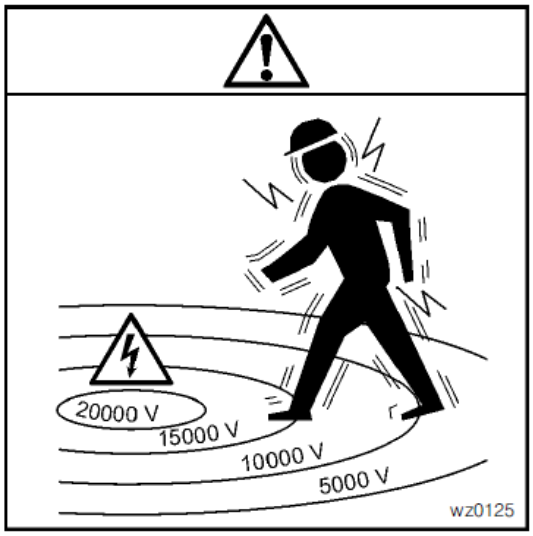


Fig. 2-64

Travel Precautions

Traveling with an excavator may pose some hazards. If you will be traveling with your machine, always travel in a safe, controllable manner and remain alert at all times. Be sure you can see all of your work equipment and areas around you clearly. Remember a safety-conscious operator is the most important insurance when traveling with the machine. Below are several procedures and information the operator of the machine should be aware of when traveling with the machine.

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Basic Travel Advice

- Before traveling with the machine, be sure the track carriage is positioned correctly with the travel levers; (Right lever, right track) (Left lever, left track). If necessary, reposition the track carriage so travel levers are with the correct track.

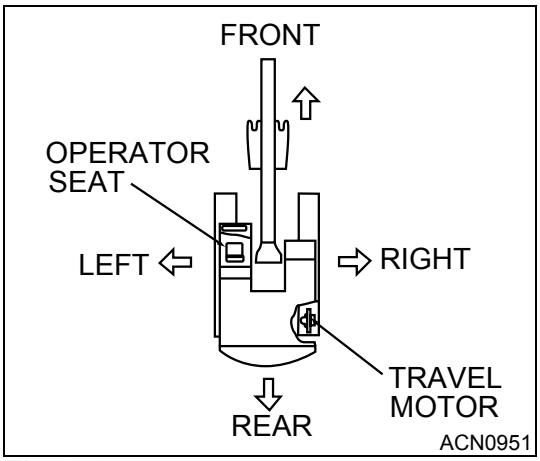


Fig. 2-65

- When traveling on level ground, position the work equipment so you can see all parts of the work equipment. Keep the height of the work equipment 40 to 50 cm (16 to 20 in.) from the ground surface.

- If you will be traveling over rough ground, travel at a low, controllable speed and do not operate the steering suddenly since there is a danger loss of control could result. Be sure the work equipment does not hit the ground surface and cause a loss of balance or equipment damage.

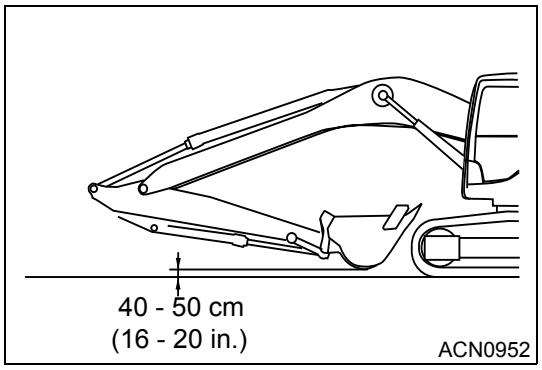


Fig. 2-66

- (If equipped) be sure the auto-decel switch is in the **OFF** position. If the auto-decel switch is set in the **ON** position, the engine speed may accelerate and the travel speed may suddenly increase.

- Always avoid traveling over obstacles or raised areas if possible. Traveling over obstacles or raised areas could result in loss of control or damage to the machine. If you must travel over raised areas, always travel at a slow speed with the work equipment as close the ground as possible. Avoid any sharp turns or sudden stops.

- During travel, always maintain a clear distance from people or surrounding objects.

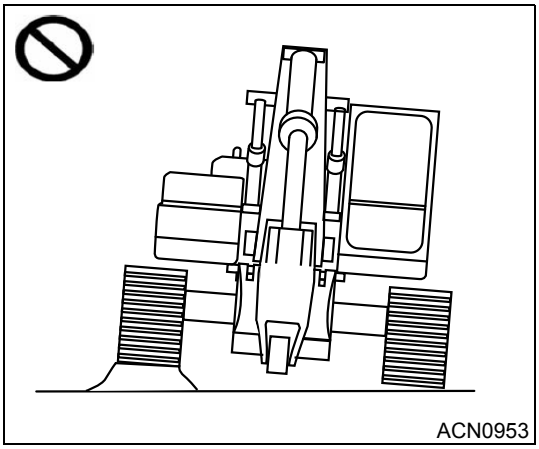


Fig. 2-67

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- Always check to be sure surface areas such as bridges or road ways will support the weight of the machine.

- Before traveling on public roads or in publicly owned areas, always check with the relevant authorities and follow their instructions. Failure to do may result in damage, loss of control, fines or punishment.

- Always be extra careful when traveling in tunnels, under bridges, near utility lines or in places with limited weight, height or where clearance is a problem. Operate slowly and be extremely careful not to let the machine or work equipment come in contact with anything.

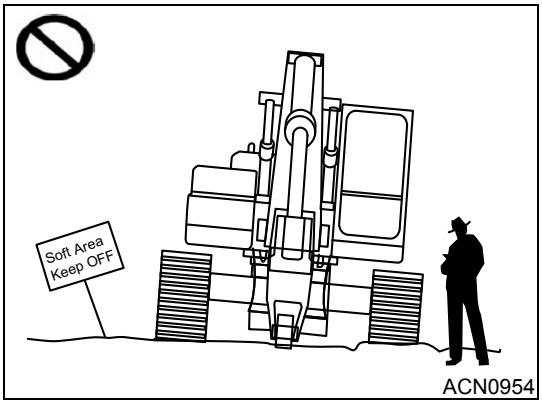


Fig. 2-68

Traveling With a Reversed Carriage

Traveling with the carriage reversed could pose a hazard. Travel direction for all Sany excavators is indicated on the inside of the track motor with an arrow. Although Sany does not recommend traveling with the carriage reversed, below is a list of some basic rules to follow when traveling with a reversed carriage:

- Always keep in mind the travel lever controls will be working in the opposite direction from normal travel.

- Before moving your machine, always check the position of the carriage as it relates to the travel levers.


Fig. 2-69

- If you will be traveling in areas where the machine will be exposed to surrounding hazards, rough surfaces or tight maneuvering, you may want to travel with the carriage in the normal position.

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Traveling on Sloped Areas

Traveling on sloped areas with an excavator always poses a hazard.Work equipment position, counterweight location and carriage position all effect the stability of the machine when traveling on sloped areas. Repositioning of the work equipment, carriage or counterweight while traveling on these surfaces will change the center of gravity location on the machine. In order to prevent tipping, loss of control or a rollover, it is important to follow some basic, simple rules when traveling on sloped areas.

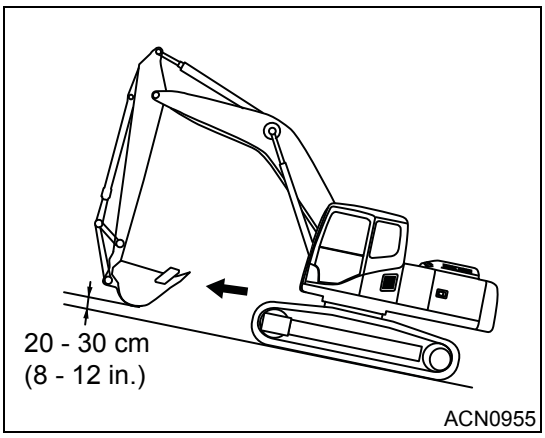


Fig. 2-70

- Never turn the ignition switch off when traveling up or down a slope. If the engine should stop, lower the work equipment to the ground immediately.
- Always keep the work equipment approximately 20 to 30 cm (8 to 12 in.) above the ground. Avoid moving the work equipment or shifting the position of the carriage when traveling on a slope. Doing so will change the center of gravity on the machine.
- Always face the front of the operator cab uphill when traveling up a slopes.
- When traveling down slopes, set the operator cab facing downhill.
- Always check the firmness of the surface on the slope before you attempt to travel on it.

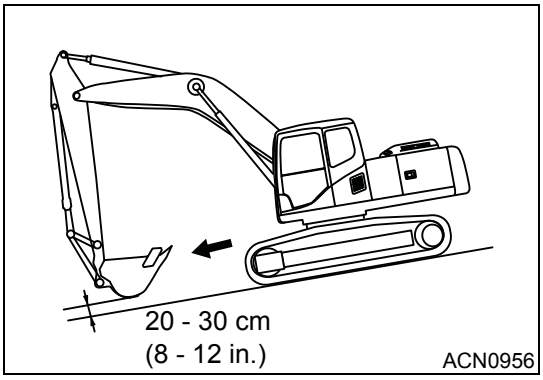


Fig. 2-71

- If you will be traveling up an extremely steep slope, extend the work equipment to the front of the machine to help balance the machine.
- Keep the work equipment approximately 20 to 30 cm (8 to 12 in.) above the ground and travel at a slow speed. When traveling downhill, lower the engine speed, keep the travel at a low speed.

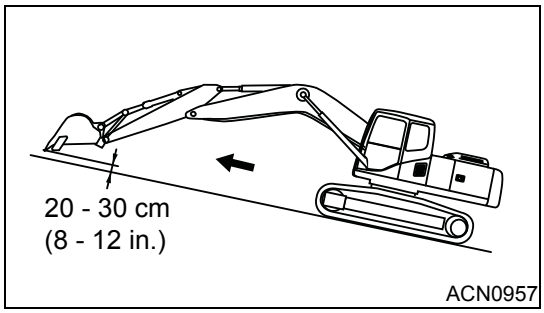


Fig. 2-72

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- Always travel straight up or straight down a slope. Travel at an angle on a slope may cause loss of control or the machine to tip.

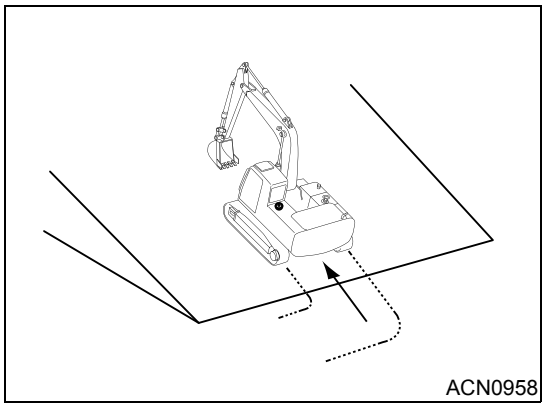


Fig. 2-73

- Never turn on a slope or reposition the work equipment or carriage on a slope.
- Never swing the carriage while on a slope for any reason.

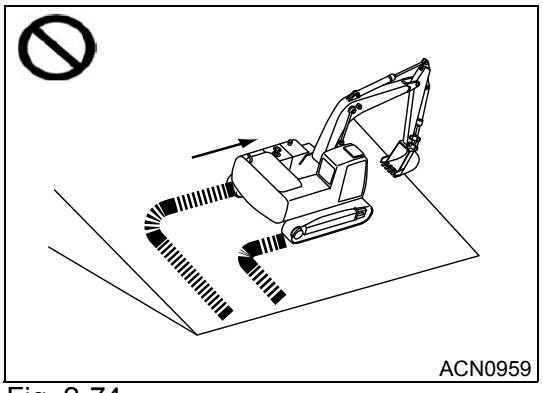


Fig. 2-74

Parking and Securing the Machine

When parking the machine, it is important to follow several basic safety rules. Always keep in mind that you are responsible for the security of the machine when it is parked. Listed below are some simple rules to follow when parking your machine:

- Always park the machine on a flat, level and stable surface away from people, traffic or other equipment.
- Lower all work equipment to the ground, turn the ignition switch to the **OFF** position and neutralize all controls.

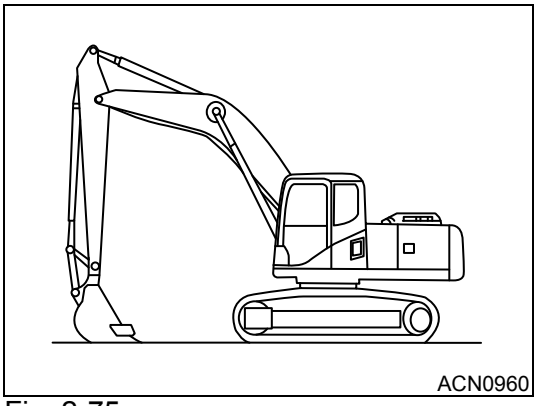


Fig. 2-75

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- Set the hydraulic lock lever for the work equipment in the **LOCK** position (a).



Fig. 2-76

- Remove the ignition key (b) and keep it with you.
- Close and lock all windows and doors on the machine.
- Be sure all access covers, tanks and areas equipped with locks are locked and secured properly.
- Before leaving the job site for the day, double-check the machine to be sure it is fully secured. Failure to do so may result in vandalism or unauthorized access to the machine.



Fig. 2-77

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Maintenance Safety

⚠ WARNING

All maintenance to be performed on this equipment must be performed by trained and authorized personnel only. When performing maintenance, it is important to follow all outlined maintenance or repair procedures and safety information as outlined in this manual. Failure to do so may result in injury or possibly death.

Maintenance

The excavator must be inspected prior to each work shift that it will be used. The owner, user, and operator must ensure that required routine maintenance and lubrication tasks have been performed as stated in this manual. Never operate a damaged or poorly maintained excavator.

Perform a function checks after repairs have been made to ensure proper operation.

Routine maintenance of this excavator must be performed by a qualified person(s). Any questions regarding procedures and specifications should be directed to the your local, authorized Sany Distributor.

Preparing for Maintenance

1. Park the machine on a dry, level surface, lower the work equipment to the ground, then turn off the engine and remove the ignition key.



Fig. 2-78

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2. Neutralize the controls, then set the hydraulic lock lever to the **LOCK** position (a).

3. Follow the Lock-out Tag-out procedure below before proceeding.



Fig. 2-79

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⚠ WARNING

Read and understand all safety precautions and instructions in this section of this manual before reading the other sections of this manual or any other manuals provided with this crawler hydraulic crane and before operating or servicing the crawler hydraulic crane. Failure to do this can cause property damage, personal injury or death.

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EXTERIOR COMPONENTS

This section provides information regarding the basic description and overview of all the controls, alerts and operating systems on the excavator unit. It is important to study and become familiar with all systems before proceeding with any operations. Be sure you have and read and understand the information in the Safety section of this manual.

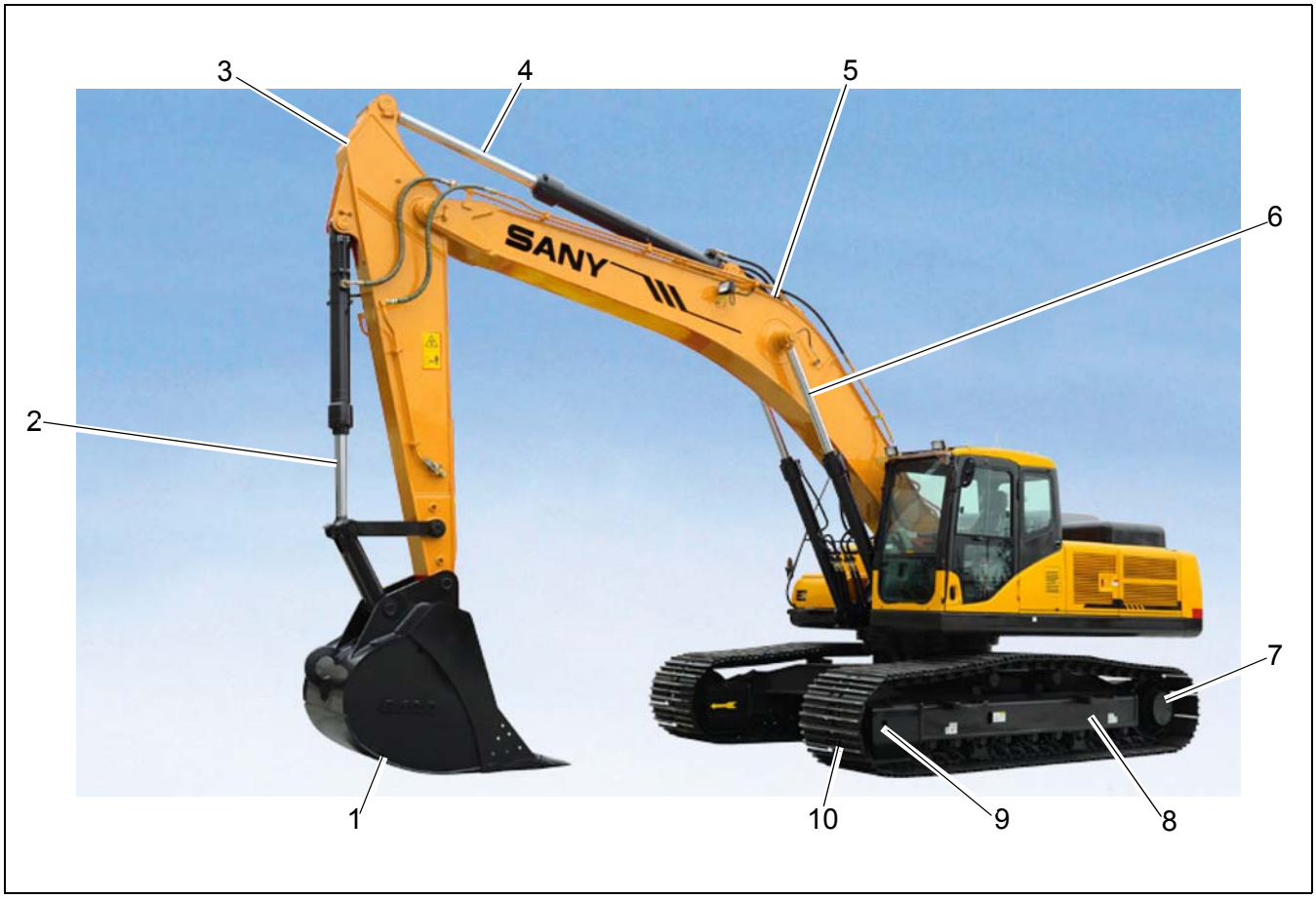


Fig. 3-1

1. Bucket	6. Boom cylinder
2. Bucket cylinder	7. Drive sprocket
3. Arm	8. Track frame
4. Arm cylinder	9. Idler wheel
5. Boom	10. Track shoe

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CAB EXTERIOR

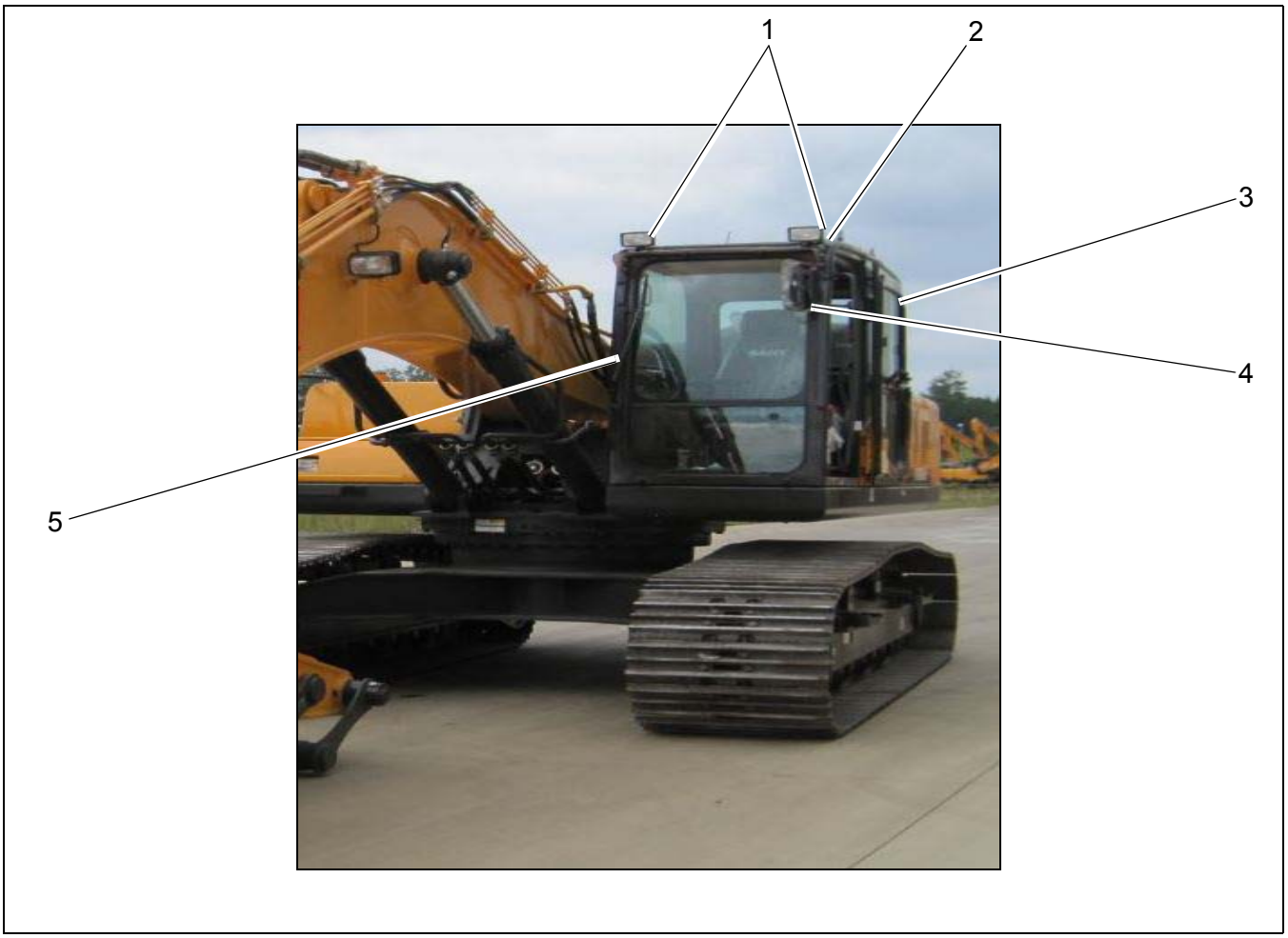


Fig. 3-2

1. Work lamps	4. Rear-view mirror
2. Overhead protection shield	5. Windshield wiper, see page 3-17
3. Door	

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CAB INTERIOR



Fig. 3-3

1. Left control console, see page 3-6	6. Combined instrument display, see page 3-28
2. Left joystick, see page 3-22	7. Right joystick, see page 3-22
3. Foot rest	8. Ignition switch, see page 3-15
4. Travel controls, see page 3-23	9. Right control console, see page 3-13
5. Optional equipment control pedal	

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Seat and Seat Belt

A multi-position, adjustable seat is provided for operator comfort. The front/rear position, up/down positions, and the front/rear incline angle seat back can be adjusted.

The seat has two armrests (a).

The seat belt (b) keeps the operator securely in the operator's seat.

The headrest (c) can be raised or lowered by grasping the headrest with both hands and pulling it up or pushing it down.

The seat's air suspension can be adjusting by turning the knob (d) clockwise to increase the firmness or counterclockwise to decrease the firmness.

To adjust the angle of the seat back, pull up on the seat back adjusting lever (e).

To move the seat forward or backward, pull up on the adjusting lever (f) and slide the seat forward or backward until the desired position is reached.

To move the seat base forward or backward, pull up on the adjusting lever (g) and slide the seat base forward or backward until the desired position is reached.

To adjust the angle of the seat base, pull up on the adjusting lever (h).

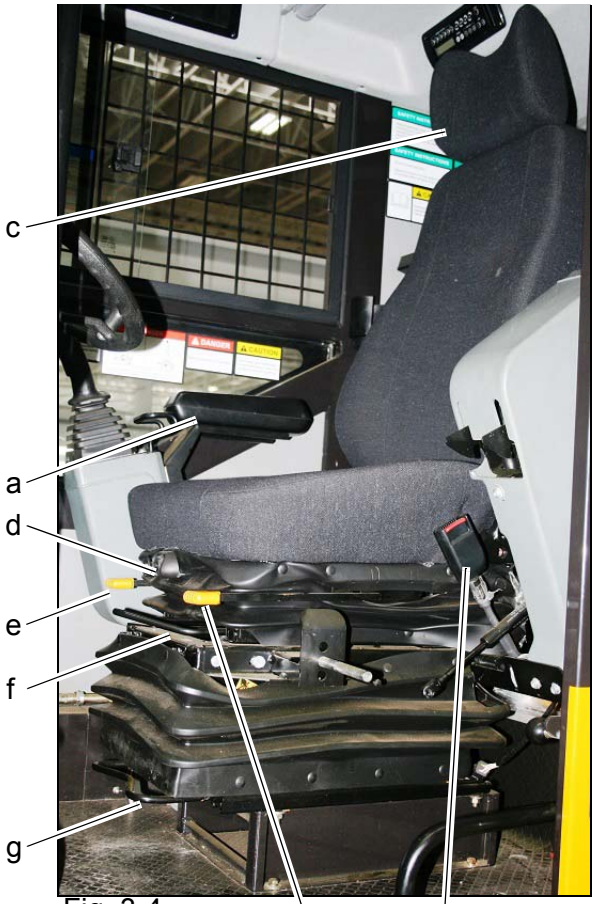


Fig. 3-4

Be sure your vision is clear in all directions as viewed from the seated position.

Never allow other personnel to ride with you inside the operator cab regardless of the situation and never bring objects into the operator cab that could restrict your movement or vision in any manner.

Close or latch all doors or windows in place.


Fig. 3-5

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Fasten the seat belt snuggly around your waist and prepare to start the machine for work operations.

NOTE: See “Seat and Seat Belt” on page 4-20 for additional information.

Be sure your vision is clear in all directions as viewed from the seated position.

Check the work area to be sure all personnel and equipment are clear from your machine. Before starting the machine, sound your horn to warn others you are about to start the machine.

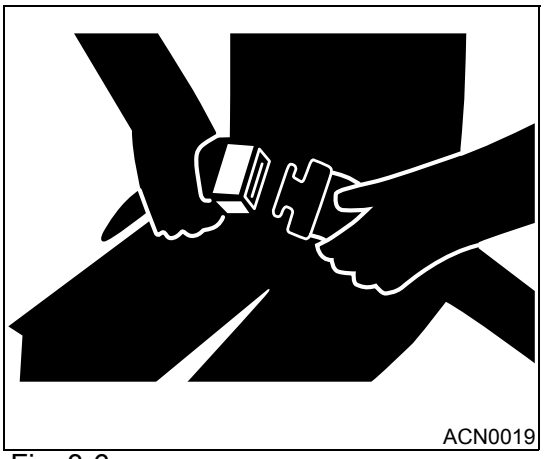


Fig. 3-6

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Left Control Console

The left control console is to the left of the operator when seated and facing toward the windshield.

The left control console contains the following items:

1. Left joystick, see page 3-22
2. Slewing optional equipment buttons, see page 3-22
3. Hydraulic lockout control, see page 3-17
4. Radio control panel, see page 3-11
5. Air conditioning control panel, see page 3-9



Fig. 3-7

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Air Conditioning System - Control Panel

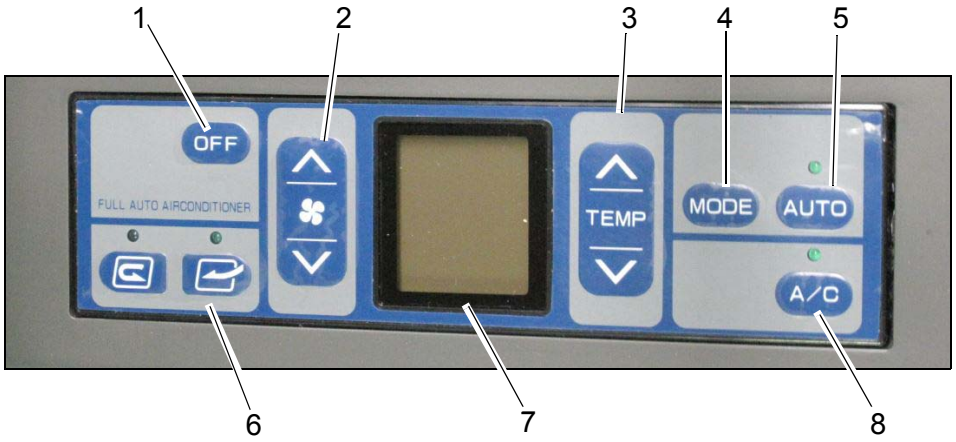


Fig. 3-8

1. OFF switch	5. Auto mode switch
2. Fan control switch	6. Fresh air/recirculation shift switch
3. Temperature setup switch	7. LCD
4. Vent mode setup switch	8. A/C power

1. OFF switch

This switch is used to stop the fan and air conditioner.

2. Fan control switch

The switch is used to regulate the volume of air flow, which can be set to any of six levels.

3. Temperature switch

This switch is used to control the temperature inside the cab. Temperature can be set between 64° F (18° C) and 90° F (32° C)

4. Vent Mode Set-up switch is used when setting up manual control

5. Automatic control switch

This switch can be used to set air flow, outlets and fresh air or circulation automatically according to the preset temperature.

NOTE: When automatic control is selected, the airflow may remain at HIGH if the temperature is set at 64° F (18° C) or 90° F (32° C)

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6. Fresh air/recirculation switch

This switch open or closes the fresh air inlet.

7. LCD display

The LCD display shows the preset temperature, air flow and outlet position during operation. Press the OFF switch to turn the display off.

8. Air conditioner switch

The air conditioner switch is used to switch on/off the air conditioner or its operation (cooling, dehumidifying and heating).

9. Sunlight sensor

The sunlight sensor (1) will adjust the air flow to match the variation of temperature caused by direct sunlight.

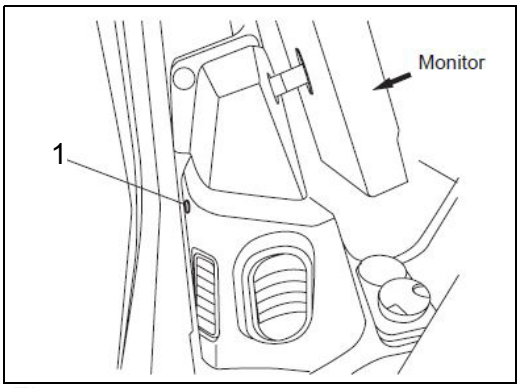


Fig. 3-9

10. A/C operation precautions

- When running the air conditioning system, always start with the engine running at a low speed. Avoid starting the air conditioner when the engine is running at a high speed, or possible damage to the air conditioner may result.
- If water should get on control panel or sunlight sensor, an unexpected failure may result. Always keep these components clear and free from water.
- “A/C controller failure” will be displayed on the air conditioner control panel if there are problems with your a/c unit. If this occurs please contact your Sany distributor to investigate and repair it.

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Radio Control Panel

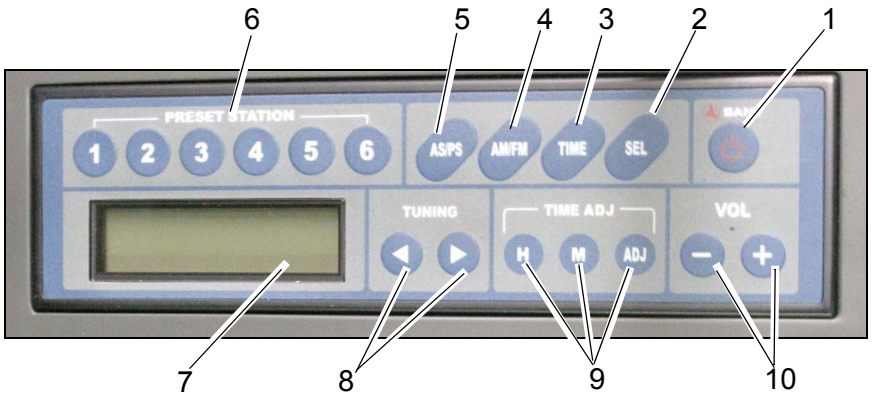


Fig. 3-10

1. Power switch	6. Preset stations (1,2,3,4,5,6)
2. Sound effect switch	7. LCD
3. Time display	8. Tuning keys
4. FM/AM selector	9. Time adjusting keys
5. AS/PS key	10. Volume control

1. Power switch

Push the power switch in order to turn on the radio. The frequency is shown on the LCD display.

2. Tone adjustment

When this switch is pressed, the tone will be displayed in turn at each pressing:

- VOL → BAS → TRE → Balance. The device returns to frequency display when no operation is performed within 5 seconds.

3. Time display

When the frequency is displayed, press the switch to show local time for 5 seconds. The display returns to display frequency after 5 seconds.

4. FM/AM band selector

Press the switch to select the desired band. Pressing the key each time toggles the band between FM and AM.

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5. AS/PS key

This key is used to auto scan and preset stations.

Auto Scan:

- When tuning in the radio, pressing the AS/PS key allows you to scan each preset station, which will be played for 10 seconds, while the number of the preset station scanned is blinking on the display. If you want to tune in a station, press the key again.

6. Preset Stations:

When tuning the radio, depressing the AS/PS key for more than 2 seconds will activate the auto scanning of all current stations. The six radio stations having the strongest signal will be stored in turn to the six keys (1-6).

- Once the preset is activated you can key them in to play any of the selected stations.

7. LCD display

The band, radio frequency, preset number and time will be shown on the display.

8. Tuning key

Press the Tuning key to change frequency.

9. Time adjustment

Use these keys to adjust the time.

- H: Hour
- M: Minute
- ADJ: Set to 00 minute

10. Volume control

- Press the key “+” to increase sound volume.
- Press the key “-” to decrease sound volume.

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Right Control Console

The right control console is to the right of the operator when seated and facing toward the windshield.

The right control console contains the following items:

1. Ignition switch, see page 3-15
2. Indicator lights, see page 3-14
3. Throttle control dial, see page 3-15
4. 12V power supply, see page 3-15
5. Work lamp switch, see page 3-16
6. Manual regeneration switch, see page 3-16
7. Windshield wiper switch, see page 3-17
8. Memory clear switch, see page 3-16
9. Regeneration disable switch, see page 3-16
10. Windshield washer switch, see page 3-17
11. Head lamp switch, see page 3-17

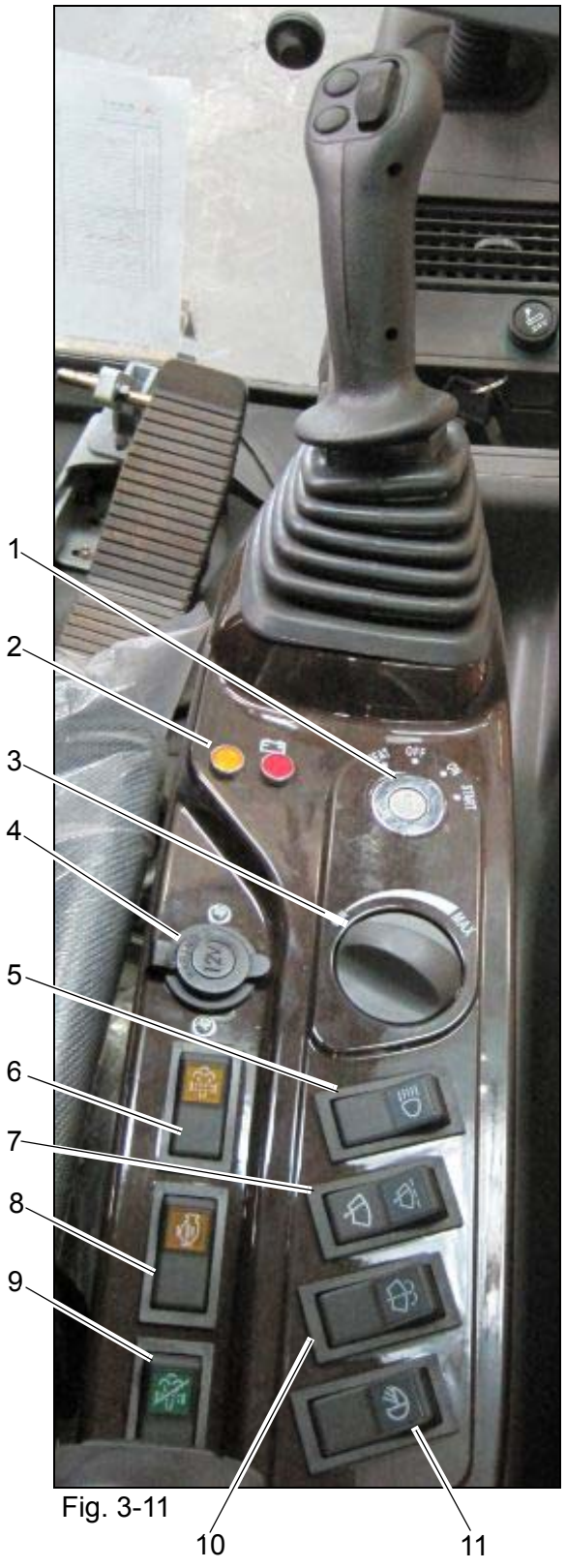


Fig. 3-11

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Indicator Lights

The indicator lights are for:

1. Failure indicator

The failure indicator is normally off to indicate the excavator is free from failure. If this light starts to flash frequently there is a system failure and you will need to turn the machine off and notify your Sany distributor.

2. Charging indicator

The charging indicator should light up to a bright red when the ignition switch is turned to the ON position. This light will go off when the engine is running and the alternator is charging the electrical system.



Fig. 3-12

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Ignition Switch

NOTICE

If the engine does not stop at low idle speed, the service life of engine will be reduced. Except for emergencies, never shut off the engine while it is running at high speed. Stopping the engine at high speed may cause the cylinder cap to crack or may damage the bearing of the turbocharger.

The start switch is used to turn on/off the engine.

1. OFF This position allows to insert or remove the key. All switches of the electrical system (except for outdoor lamps) are cut off and the engine is shut down.

2. HEAT Hold the key in this position to preheat the engine. Releasing the key, it will return to the OFF position.

3. ON Electric current passes through the charging and lamp circuits. Leave the ignition key in the ON position when the engine is running.

4. START This is engine starting position. Hold the key in this position during starting. Release the key immediately after the engine is started. The key will return to the ON position (3) automatically.

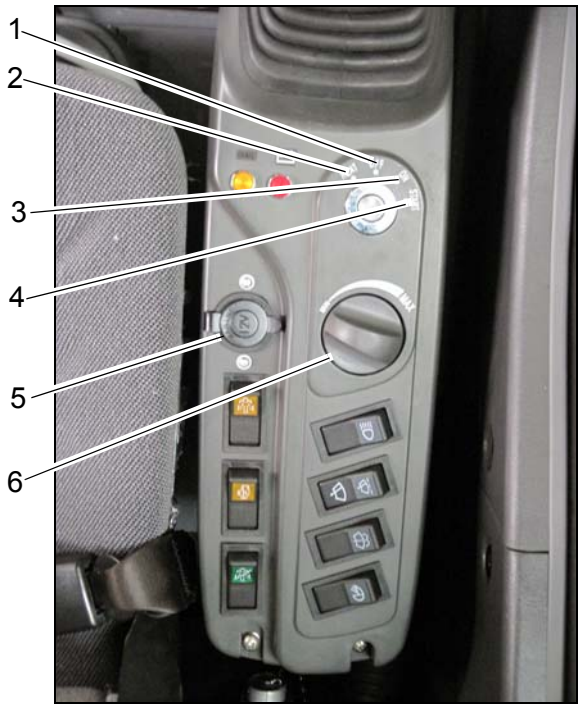


Fig. 3-13

12V Power Supply

This 12 volt charger (5) can be used to charge your mobile phone, or other 12 volt items of equipment.

Throttle Control Dial

The throttle control dial (6) is used to adjust engine speed and output power. Turn the dial clockwise to increase speed and counterclockwise to decrease speed.

- Low Idle (MIN): Turn it counterclockwise to the end.
- Full Speed (MAX): Turn it clockwise to the end.

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24V Power Outlet/Lighter

This socket (1) can be used as a power source for devices rated not more than 240 W (24V×10A).

NOTE: This is a 24V device, never use it as a power source for a 12V device.

Push in the power outlet/lighter to activate it, it returns to its original position after a few seconds. Pull it out to light a cigarette.



Fig. 3-14

Work Lamp Switch

This switch (1) is used to turn the boom lamps on/off.

Manual Regeneration Switch

When the DPF (Diesel Particulate Filter) state indicator flashes, you may keep operating but need to press the switch (2) immediately in order to facilitate DPF operation.

NOTE: Flashes when the DPF is starting to overfill with soot because the system is unable to automatically regenerate. A reduction in power may be noticed

Memory Clear Switch

The Memory Switch (3) is used to clear the Regeneration Memory status.

Regeneration Disable Switch

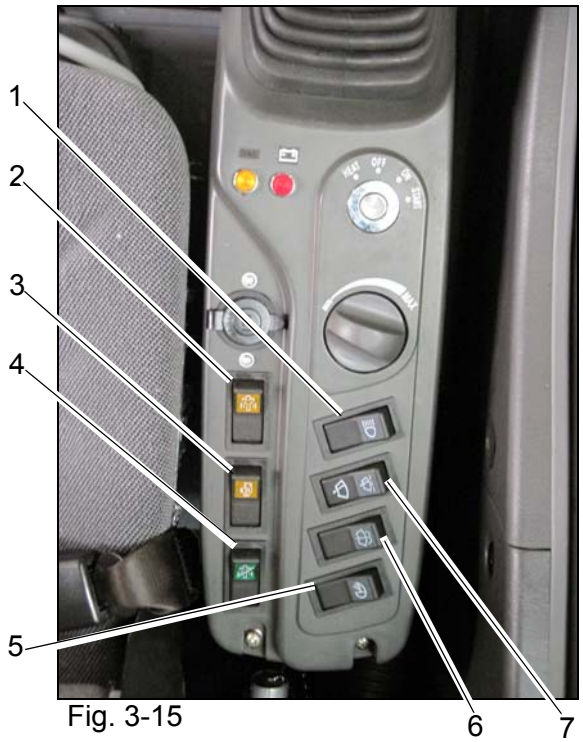


Fig. 3-15

The Regeneration Disable Switch (4) is used to prevent flammable materials from burning or exploding due to high regeneration temperature.

NOTE: With the active regeneration (automatic) function disabled, the DPF will eventually fill with soot. A manual regeneration will be necessary if the active regeneration (automatic) function is not restored.

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Head Lamp Switch

This switch (5) is used to turn on/off the chassis lamp.

Windshield Washer Switch

NOTE: Press washer switch to eject some detergent before using the wiper switch in order to prevent damaging the wiper due to friction.

Press switch (6) to eject detergent. Depress the switch to keep ejecting detergent. The switch springs back when released, and the washer stops ejecting detergent.

Windshield Wiper Switch

NOTE: Insure the front window of the cab is closed first.

Press switch (7) to activate the wiper when it is raining.

Hydraulic Lockout Control

⚠ WARNING

Always place the hydraulic lockout control securely in the LOCK position before leaving the operator cab. If the hydraulic lockout control is not in the LOCK position any unintended touch of the control levers may cause serious injury or death. Take care not to touch either joystick when you pull (up) or push (down) the lockout control.

The hydraulic lockout control (1) is a device used to lock out the control levers of all work equipment to include the swing system, travel system and optional attachments.

- To engage the machine in the LOCK position push down the hydraulic lockout control. The machine will not move even if you maneuver the controls.
- Pulling up the hydraulic control level places the machine in the UNLOCKED position where the machine moves in accordance with the joysticks and other control levers.



Fig. 3-16

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⚠ WARNING

If any part of the machine moves when the hydraulic lockout control is engaged, it indicates a failure in your machine. In this case, immediately engage the hydraulic lockout control and stop the engine. Contact your Sany distributor to solve this problem.

Emergency Stop Switch

The engine emergency stop switch (1), which is located just below the hydraulic lockout control (2), is normally on during regular operation of the excavator.

In case of an emergency, press the emergency stop switch to shut down the engine. The hydraulic lockout control can be used to lock out the hydraulic system while the engine emergency stop switch (1) is used to ensure the safety of the engine.

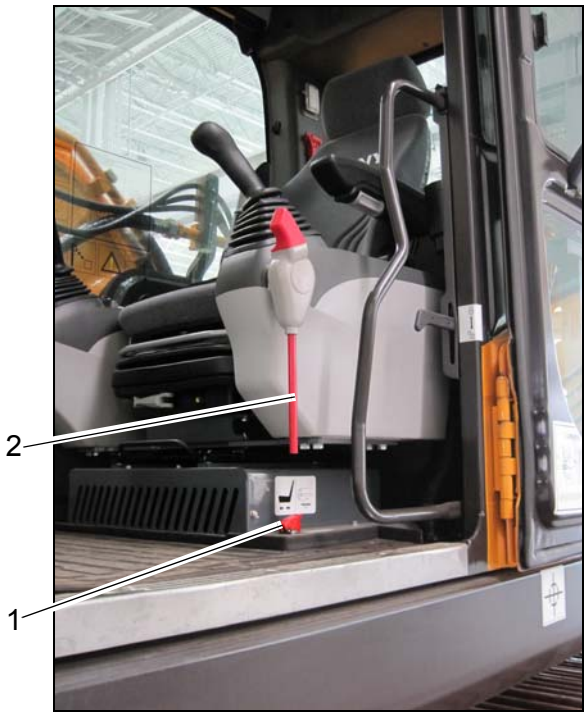


Fig. 3-17

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Joystick Controls

⚠ WARNING

Never expose any part of your body outside the window, this may put you in danger of being hurt by the boom if the joystick is moved unexpectedly. If a window is broken or missing, replace it immediately.Know the positions and functions of each joystick control. Unexpected movement of the machine could cause personal injury or death!

There are two operating modes available for the joysticks; the SAE (Society of Automotive Engineers) mode (see page 3-19) and BHL (Back Hoe Loader) mode (see page 3-19). To chose between these two modes follow these instructions.



Fig. 3-18

SAE/BHL Selector Switch

The SAE/BHL selector switch (a) is located below the engine air cleaner inside the left side front cover.

The SAE/BHL selector switch (b) swaps the control of the boom and the arm from one joystick to the other. The position shown (b) is the SAE mode position. To change to the BHL position pull the pin up (c) and rotate the bar to the left. Release the pin to lock the bar in place.

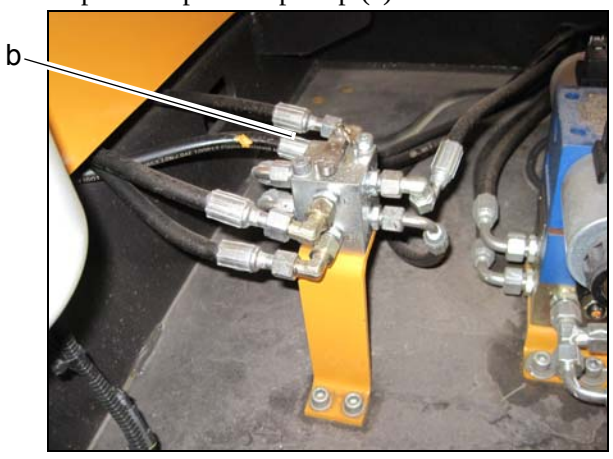




Fig. 3-19

- In SAE (Society of Automotive Engineers) mode, the arm is controlled using the left joystick and the boom using the right joystick (see page 3-20).
- In BHL (Back Hoe Loader) mode, the arm is controlled using the right joystick and the boom is controlled using the left joystick (see page 3-21).

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SAE Mode



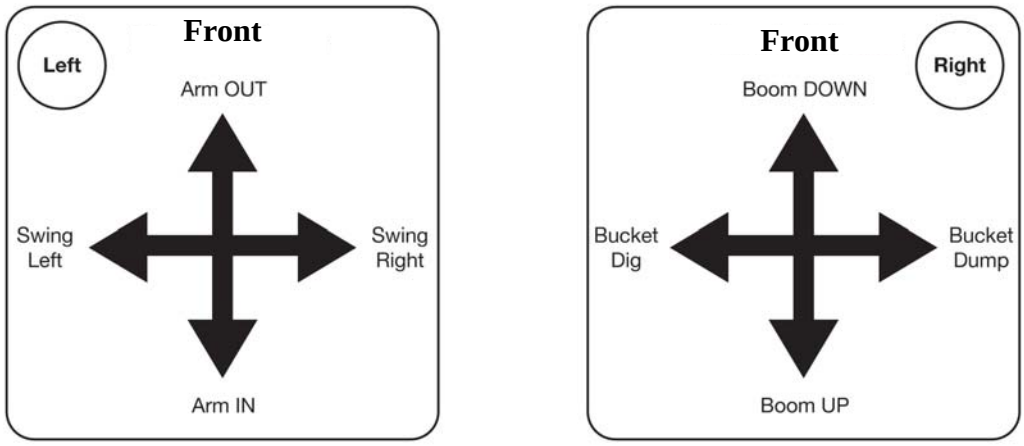


Fig. 3-20

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BHL Mode



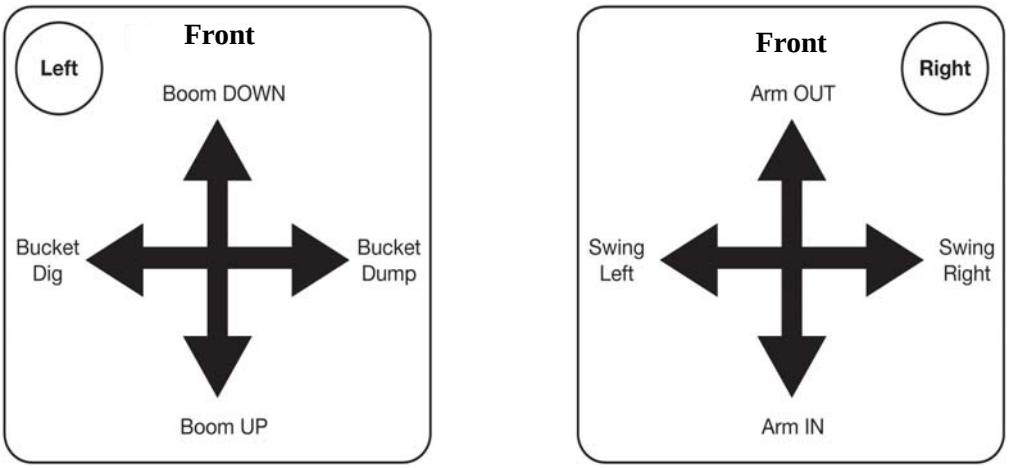


Fig. 3-21

When travel control levers and joystick controls are in neutral, any maneuver of the control lever will set the engine speed to go up to the speed set by the throttle. If travel control levers and joystick controls stay in neutral, engine speed will decrease by 100 rpm. About four seconds later the engine will drop to the level (about 1,400 rpm) set for automatic deceleration (see page 3-24).

Once you release the control lever or joystick, the machine goes back into neutral and the machine stops.

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Joystick Switches

Left Joystick

The left joystick contains three buttons which are used to control optional equipment:

- Button 1 slews the optional equipment left
- Button 2 slews optional equipment right
- Button 3 optional equipment button; activated only with the Nibbler and Breaker tools

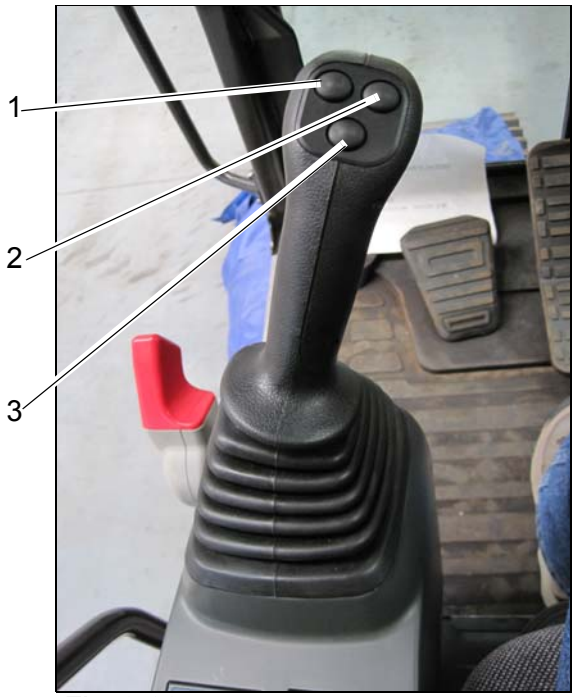


Fig. 3-22

Right Joystick

The right joystick contains two buttons and a switch:

- Switch 4 controls optional equipment which is activated by sliding the switch back (on) and forward (off).
- Button 5 activates the horn
- Button 6 is the back-up horn.

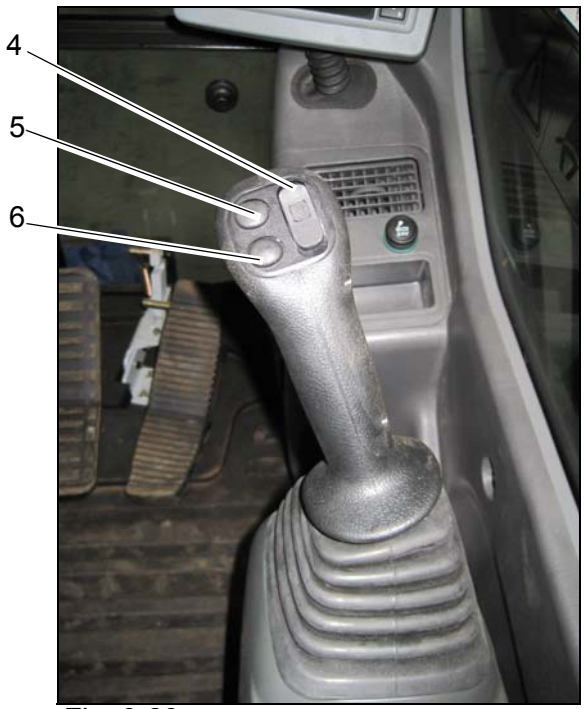


Fig. 3-23

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Travel Controls

⚠ WARNING

Take extra care when driving or steering the machine with pedals. Do not put your foot on any pedal when they are not used.

The machine Travel Controls group consists of the following pedals:

1. Travel control levers
2. Travel control pedals
3. Foot rest
4. Auxiliary equipment control pedal

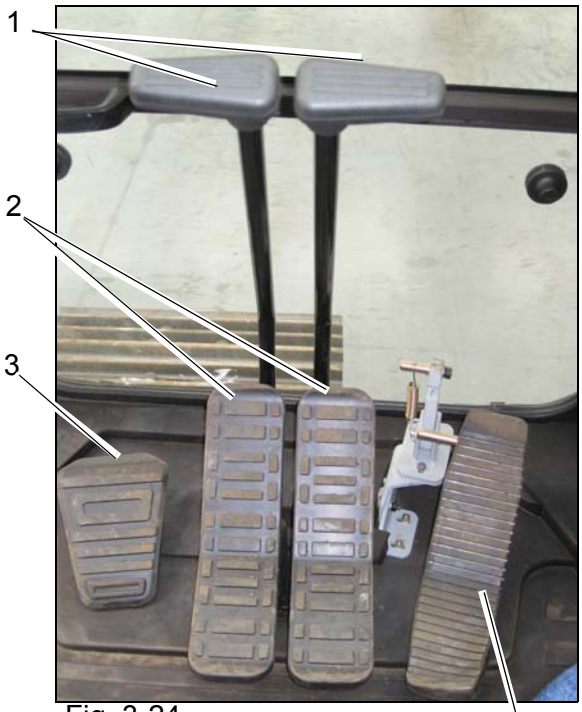


Fig. 3-24

The control levers/pedals are used to change travel direction of your machine. The description in brackets is given for pedal operation.

1. Forward travel:

Push the control lever (pedal tilts forward)

2. Backward travel:

Pull the control lever (pedal tilts backward)

3. N - (Neutral Position): Machine stops.

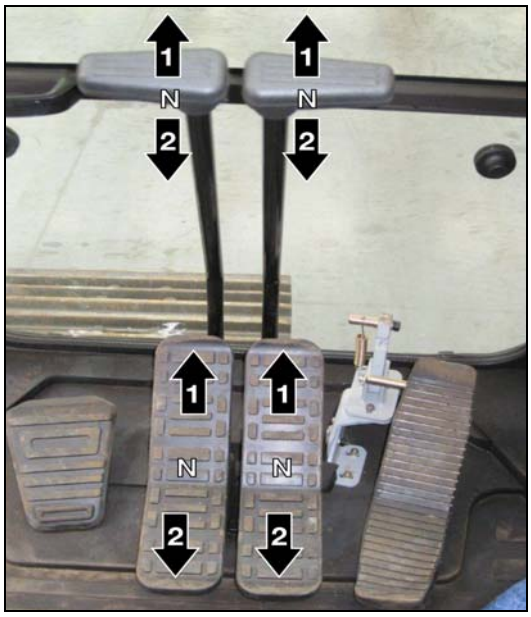


Fig. 3-25

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Always check the direction (4) of track frame before you maneuver the travel control levers. (If the sprocket is in the rear, the track frame faces the front.)

When the track frame faces backward remember that the travel direction will be opposite to the maneuvering direction of travel control lever. (Machine moves forward when you pull control levers and backward when you push them. The left and right directions are reversed too.)

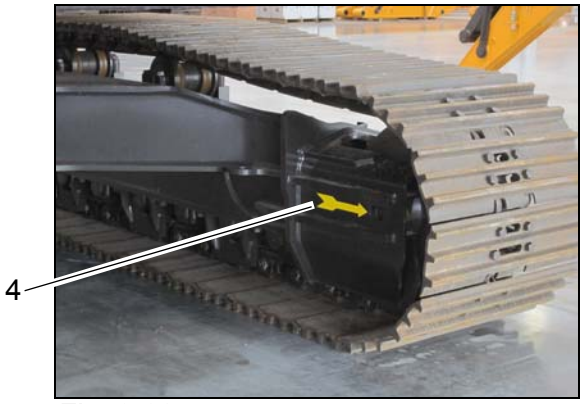


Fig. 3-26

Automatic Deceleration Function

The automatic declaration mode is automatically activated when the machine is energized. When no control levers are operated within 5 seconds with the engine running, engine speed drops to idle to cut fuel consumption and reduce noise. When any of the control levers is operated or fuel control dial is adjusted while the engine is idling, engine speed returns to previous level or the newly set level automatically. With the automatic deceleration function the travel control levers can be used to change engine speed in the following way.

- When travel control levers and joystick controls are in neutral position, engine speed will drop to medium level even if fuel control dial is set above medium speed. If you maneuver any control, the engine speed will rise to the level set on the throttle.

- If travel control levers and joystick controls are in neutral the engine speed will decrease by 100 rpm. About four seconds later engine will drop to the level (about 1,400 rpm) set for automatic deceleration.

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Fuses and Batteries

The fuse panel (1) is located at the left rear of operator's seat.

Fuse location, circuit & amperage	
F2. Cab Lamp, 2A	F1. Horn, 5A
F4. Display, 10A	F3. Ignition circuit, 20A
F6. ECM, 30A	F5. 12V power supply, 10A
F8. Connector, 10A	F7. 24V power supply, 10A
F10. Dome lamp, 10A	F9. Boom light, 10A
F12. Air conditioner, 20A	F11. HCU controller, 15A
F14. Battery charge, 15A	F13. Radio, 3A
F16. Travel alarm, 2A	F15. Windshield washer, 2A
F18. Windshield Wiper, 10A	F17. Pilot Control, 10A
F20. Rear camera, 5A	F19. Emergency stop, 5A



Fig. 3-27

NOTICE

Before replacing a fuse, make sure that the start switch is in OFF position. Fuses should be replaced if it is eroded, produces white powder or becomes loose in the fuse panel. Always replace a fuse with one of the same capacity, never replace a fuse with one of a higher capacity. Doing this may cause the machine to catch on fire.

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Batteries and Power Disconnect Process

Battery

The machine uses a 24C DC electrical system, supplied by two batteries connected in series and located inside the vehicle as shown (1). The batteries (2) are used to start the engine and supply power for the electric control cables and lighting equipment.



Fig. 3-28

Power disconnect process

1. Locate and unlock the battery compartment access panel (a) on the left front side of the machine.

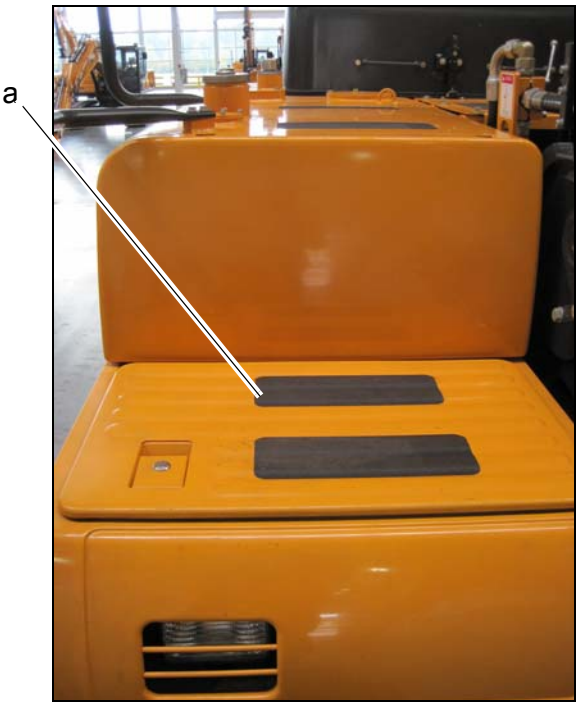


Fig. 3-29

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2. Open the battery compartment access panel to view the batteries (b).To disconnect power from the machine remove the black (ground) cable (c) from the battery terminal first, then remove the red (power) cable (d) from the battery terminal second.



Fig. 3-30

⚠ WARNING

When working with any open electrical power source ensure that your hands are free of any metal objects (rings, watches, jewelry) that could come in contact with electrical power points. Failure to do so could cause personal injury or electrical shock.

3. To reconnect power, reverse the process shown in step 2 insuring that the red cable is connected first followed by the black cable.

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COMBINED INSTRUMENTS DISPLAY/MONITOR

When the key switch of excavator is turned to the ON position, the Combined Instrument Display is energized by the engine battery and initializes. A full display of the working Combined Instrument Display is shown below:



Fig. 3-31

Combined Instrument Display screen

The Combined Instrument Display shows the working mode selection and various elements of machine performance.

- Displaying running parameters
- Viewing machine configuration
- Viewing failure codes
- Throttle (rpm)
- Setting up system clock
- Setting up service hours
- Setting up key parameters

Additional details may be seen on the display by using the Function Icons (1) and the corresponding Function Keys (2).

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The Combined Instrument Display shows page heading, contents, parameters, time and function icons according to the item selected. Options, values or parameters for the machine can be set-up as desired. Major information elements are as follows:

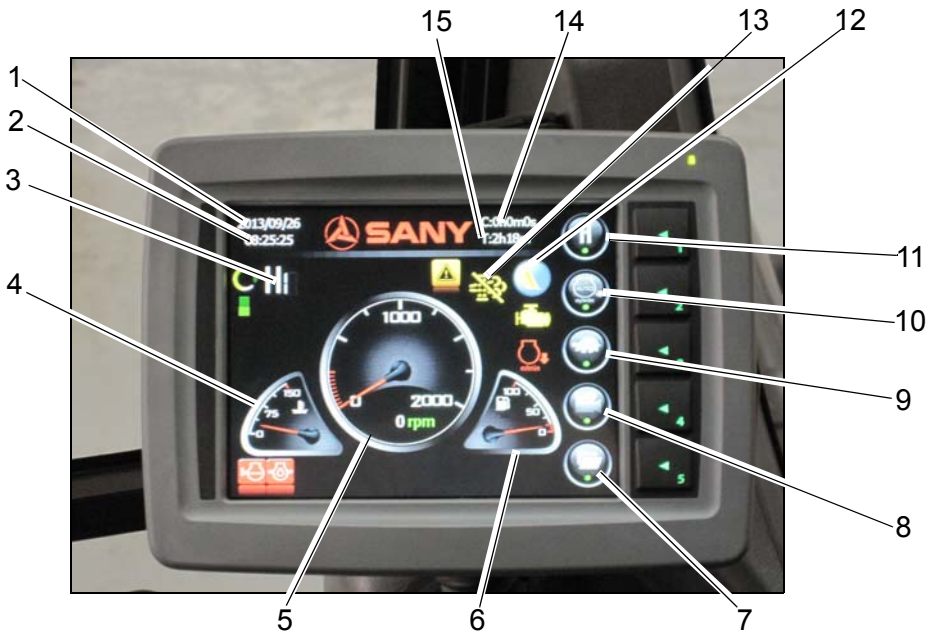


Fig. 3-32

1. Local date (year/month/day)	9. Travel speed (high/low): Lo → Hi → Lo.
2. Local time (hour/minute/second)	10. Auto Deceleration function - Off/On
3. Working mode (S, H, L or B)	11. Change working mode: H → S → L → B → H.
4. Coolant temperature	12. Tool selected (Bucket - Breaker - Nibbler)
5. Tachometer	13. Regeneration symbol (shows regeneration disabled)
6. Fuel gauge	14. Current service hours
7. Next page	15. Total service hours
8. Backup camera	

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This is the default operating condition after the machine is powered on:

- Working mode: S
- Full speed/auto deceleration: Auto deceleration
- Travel speed (high/low): Low

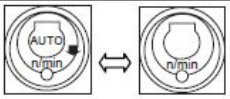
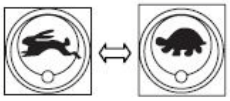
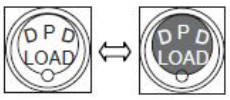
Display Type	Symbol	Item	Range	Display Method
Monitor		Working mode	S → H → L → B	Set mode
		Auto decelera-tion		Set speed
		High/low speed		Operating condition
Monitor		Manual regen-eration Auto loading		Operating condition
Clock	12:12:12	Clock	24 hours format	Time

Fig. 3-33

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Function Icons

Function icons for corresponding keys and functions are given in the table below:

Symbol	Key	Item	Function
	Key 1	Return	Return to previous page.
	Key 1	Select user mode	Select a working mode.
	Key 3	Select user mode	Select high/low travel speed.
	Key 2	Select user mode	Enable or disable auto deceleration.
	Key 5	Enter	Enter an option/setup.
	Key 3	Select an item	Select System Information.
	Key 4	Select an item	Select next item or decrease by 1.
	Key 3	Select an item	Select previous item or increase by 1.
	Key 4	Select an item	Select a right item.
	Key 3	Select an item	Select a left item.
	Key 2	Select an item	Start/stop password entry
	Key 1	Select an item	Switch on video camera.
	Key 4	Select an item	View failure codes.
	Key 2	Select an item	Adjust the LCD brightness.
	Key 5	Select an item	Enter next page.
	Key 5	Select an item	Back to previous page.
* 	Key 4	Select an item	Enable or disable manual regeneration auto loading switch.

Fig. 3-34

Function Keys

The function keys are used to change a screen page, select an item and modify a value. Details are provided in separate descriptions on the following pages.

System Information

Enter the password before accessing the system information page.

NOTE: If you do not know the password contact your supervisor.

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1. Enter your 5-digit password. Each digit is indicated by an asterisk (*) standing for a value from 0 to 9. A numeral appears at the digit where the cursor is located while the other four digits remains as asterisks.
2. Pressing Key 2 switches between Left-Right function and increase/decrease function.
3. Pressing Key 1 goes back to previous page.

Use the function keys to:

- Key 1: Back to previous page.
- Key 2: Start or stop setting up the code number on digit where the cursor is located.
- Key 3: Decrease a value or move the cursor to the left digit.
- Key 4: Increase a value or move the cursor to the right digit.
- Key 5: Check the validity of password entered. If it is valid, you have access to the Main Menu.

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Main Menu Functions

Once you enter the password you should go to the Main Menu. These are a list of system functions that can be accessed by selecting an item and then entering the corresponding page. Each icon will be highlighted as you chose them.

1. Parameter - view the running parameters of the engine and hydraulic system
2. Maintenance - view maintenance information on the excavator
3. Fault info (Error codes)
4. Work Equip (Bucket- Breaker - Shear)
5. Config - configure the machine and view configuration of the excavator
6. System Setup - language selection



Fig. 3-35

7. To select each icon press Key 4
8. To select a previous icon press Key 1
9. To approve the selection press Key 5

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Engine and Throttle Signals

Engine running parameters are displayed as shown.

- Press Key 4 to view pilot pressure signals.
- Press Key 3 to view main pump signals.
- Press Key 1 to return to the Main Menu.



Fig. 3-36

Pilot (Hydraulic Control) Pressure Signals

Pilot (Hydraulic Control) pressure signals are displayed as shown.

- Press Key 3 to view engine signals.
- Press Key 1 to return to the Main Menu.



Fig. 3-37

Main Pump Signals

Main pump signals are displayed as shown.

- Press Key 4 to view engine signals.
- Press Key 1 to return to the Main Menu.



Fig. 3-38

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Machine Configuration

Information on key components of the machine is displayed as shown.

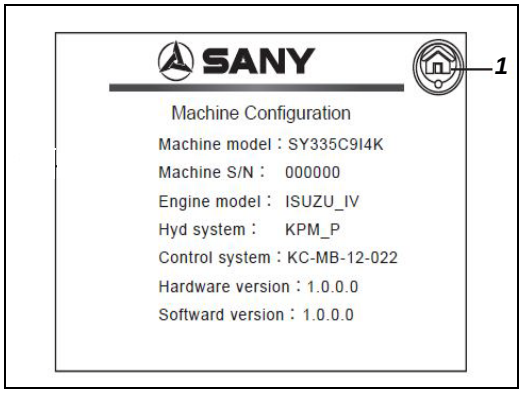


Fig. 3-39

- Press Key 1 to view return to the Main Menu.

Fault Information

Error codes and explanation are displayed as shown.



Fig. 3-40

1. Failure code.
2. Failure code explanations.
    - To return to the home page press Key 1.

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System Language Selection

How to select a language for the system.

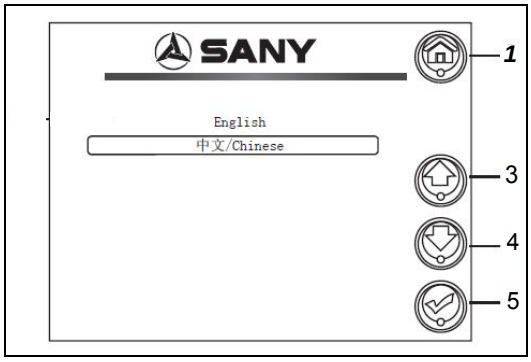


Fig. 3-41

1. Display of language options.
    - Press Key 1 to return the Main Menu.
    - Press Key 3 to scroll up the list.
    - Press Key 4 to scroll down the list.
    - Press Key 5 to accept the language selected.

Machine Configuration Setup

To set up the serial number of the machine.



Fig. 3-42

1. Press Key 1 to enter system setup.
2. Press Key 2 to:
    - (a) choose the digit where the number goes
    - (b) accept the number selected
3. Press Key 3 to move the cursor to a right digit to locate a number.
4. Press Key 4 to move the cursor to a left digit to locate a number.
5. Press Key 5 to accept the serial number entered and return to System Setup.

Time Setup

To modify the date and time.

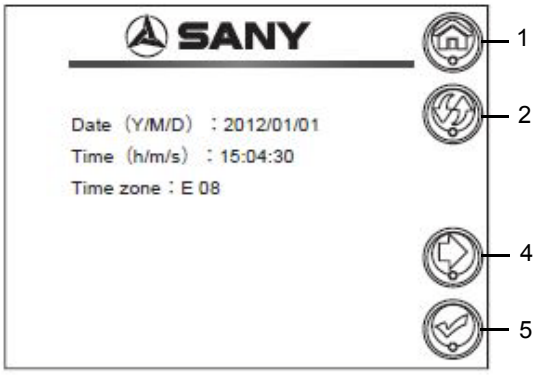


Fig. 3-43

1. Press Key 2 to start/stop modifying the value of digit at where the cursor is located.
2. Press Key 4 to switch between the increase/ decrease keys and left-right keys.

Use the function keys to:

- Key 1: Back to previous page.
- Key 5: Accept time setup and return to previous page.

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Service Hours Setup

To monitor service hours.

- Press Key 5 to accept your setup.
- Press Key 4 to move the cursor to the right.
- Press Key 3 to move the cursor to the left.
- Press Key 2 to start/stop setting up the number where the cursor is located.
- Press Key 1 to return to System Setup.

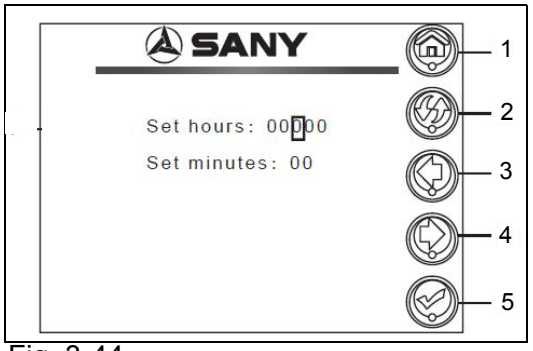


Fig. 3-44

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⚠ WARNING

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this equipment and before operating or servicing it. Failure to do this can cause property damage, personal injury or death.

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WORK AREA

The work area is defined as the location where the work is being performed with the machine. The work area and its surroundings include obstacles in the work and traveling areas, and the ground's load-bearing capacity.

⚠ WARNING

Do not move the machine onto a surface or area that has not been approved for the machine. The machine is heavy and could possibly break through surfaces that are not strong enough to support the machine. This could cause damage to the machine as well as injury or possibly death.

Remember the following points:

- Those within the work area must wear personal protective equipment.

NOTE: See "Personal Protective Equipment" on page 2-11

- The safety of all personnel within the work area is the responsibility of the machine operator.

General Job Safety

Review each of these carefully:

- Only trained and authorized personnel shall be allowed to operate and service the equipment.
- Keep this manual with your machine at all times for ease of reference and study it to become familiar with all controls and safety decals before operating this equipment.
- It is the responsibility of the owner and / or the operator to replace any safety, warning or caution decals if they are defaced or removed from the equipment.
- Never operate equipment that is unsafe or in poor operating condition.
- Always perform a pre-operational check on your equipment before operating it. Never operate a machine that is in need of repair, damaged or unsafe.
- Never use your equipment for tasks it was not designed for; damage to the machine or injury to the operator and other personnel may result.
    - Do not use swinging force to compact the ground or break objects.
    - Do not cut the bucket into the ground and use the traveling force to excavate.
    - Do not operate any cylinder at the very end of the stroke.
    - Do not use the bucket landing force for excavating, digging, breaking, or pile-driving.

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  - Do not use the weight of the machine to excavate hard or rocky ground.
  - Move gradually, do not move any control lever or pedal to abruptly change the direction of the machine.
  - Do not stop the machine suddenly by releasing the lever or pedal while traveling at high speed.

- Never leave your equipment running and unattended. Instead, always park the equipment in a stable level area, lower any work equipment to a safe position, lock the controls to secure the machine prevent tampering by unauthorized personnel and turn the engine off before exiting the work site even for a moment.
- When leaving the job site, always lower all work equipment to a safe position and secure it properly to avoid tampering by unauthorized personnel.
- Before starting any work operations, travel or maintenance and repair procedures, be sure all personnel are at a safe distance away from any point on the machine. Never allow anyone to stand near the machine while in operation or under maintenance or repair. Remember, the larger the equipment, the more restricted your visibility will be.
- If pedestrians are in the area, proceed slowly and sound your horn. Keep in mind, pedestrians have the right of way; a loaded or smaller machine has the right away over a larger or unloaded machine.
- Always study the job site carefully.
- The operator of this equipment must be alert, physically fit and free from the influences of alcohol, drugs or medications that might affect eyesight, hearing, reaction or judgment.
- Follow all rules relating to safety as outlined in this manual and by your company. Never get involved in horseplay.
- Know your location to report an accident or fire. In case of an emergency, have a local emergency phone number available.
- Keep all safety equipment and job-related warning equipment in good working condition. Replace them if they should become damaged.
- Never drive up to anyone standing in your path of travel. Always be sure all personnel are standing to the side when you approach them and they acknowledge your approach.
- When working with another person on a work site, insure all personnel involved understand all hand signals that are to be used.
- The operator shall respond to operating signals from the proper signal person only but shall obey a stop signal at any time from anybody.
- Take action to prevent unauthorized personnel from entering or approaching the job site area.
- As an operator, you must always be able to see the point of work location. If this is not possible then a spotter must be used. If visibility should become blocked for any reason, stop operation immediately.

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Job Site Safety

Within the job site is the “work area” (where the actual job function is being performed). Within the work area are “hazard areas”, that is, areas immediately surrounding the machine where personnel may be at risk due to machine operation or movement.

With the machine operator being responsible for the safe and correct operation of the machine, he/she is responsible for safety within the hazard zones while the machine is in use. Immediate work stoppage and machine shutdown by the machine operator is required if unauthorized personnel enter any of the hazard areas.

- All hazard areas must be clearly identified, marked and secured to prevent access by unauthorized personnel and must be visible to the machine operator at all times and under all circumstances. If this is not possible, a signal person must be assigned to supervise activities within hazard areas. Personnel within a hazard area must use increased caution and wear suitable personal protective equipment as required.

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WORK CREW

Supervisor

This person is the legal representative of the equipment owner and has overall responsibility for the safe and proper use of the machine. They are required to be at the machine during inspection, preparation for operations and post-work procedures.

Besides the machine, the supervisor also has overall responsibility for personnel and safety matters. This means they must ensure that:

- Only qualified or properly instructed persons work on or with the machine.
- Written safety, operational and other instructions are always available and have been read and understood by the work crew.

In addition, the supervisor is responsible for producing operating procedures unique to the job at hand and which may not be included in this technical publication but are of national import.

These procedures must cover the duties involved in supervising and notifying special organizational features, e.g., organization of work, working procedures or the personnel entrusted with the work.

Also, there must be reference to other general valid legal and also required regulations regarding accident prevention and environmental protection. These may also include how to handle hazardous substances (for instance, Material Safety Data Sheets), distribution and proper wearing of personal protective equipment or with national road traffic regulations.

Familiarize yourself with the job site and learn how to operate fire extinguishers. Observe the fire alarm and fire fighting procedures.

Finally, the supervisor must be aware of and follow regulations as issued by legal authorities in the job site county, national supervisory bodies, and the responsible commercial liability insurance company.

Owner and Other Authorized Personnel

Only those personnel who have read and understand the instructions in the Safety section of this manual can be allowed to operate and maintain this machine. All operating and maintenance personnel must be periodically tested on machine and safety knowledge to maintain their qualifications to use the machine.

Operations must cease if any safety defect is found and any accident, especially those concerning serious injury and/or property damage, must be reported to Sany America.

The machine must be maintained and repaired in accordance with maintenance intervals indicated in this manual. Inspections mandated by the manufacturers must be performed as outlined in this manual in addition to other inspections mandated by relevant national and local regulations.

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Machine Operator

This individual is trained in and responsible for the safe and correct operation of the machine. He/she reports directly to the supervisor.

The machine operator must do the following:

- Reject the work site if they have doubts regarding technical safety.
- Become familiar with the working area and surroundings before work is begun.

The machine can only be operated by:

- An operator who is physically capable, has passed the exam and holds a valid certificate
- A trainee who has been instructed for over half a year under the direct supervision of a qualified operator
- Maintenance and operating personnel needing to operate the machine for their tasks
- Safety supervisor entrusted by the superior
- Only these persons listed above are allowed to enter the cab

⚠ WARNING

The machine must not be operated by persons under the influence of alcohol, drugs or medication!

The operator must become familiar with the following:

- (Prior to first-time operation) Read and completely understand the instructions in this Operator Manual.
- Read and completely understand the load capacity for this machine.
- Know and obey the operating procedures, relevant laws and regulations.
- Know and follow the requirements for safe operation.
- Know and use the required safety precautions and protective devices.
- Know basic information about the systems of this machine.
- Know and use the correct hand signals between the machine operator and a signal person.

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Obligations and precautions of the machine operator:

- Before starting to work, the machine operator must check brake functions and the emergency stop devices. He/she must monitor the condition of the machine for obvious defects.
- The operator must concentrate solely on machine operation when using the machine.
- Stop machine operations in case any defects endangering safety are found.
- The machine operator must control, operate and adjust the machine to protect the personnel or other facilities in the vicinity of the machine.

The machine operator must make sure that:

- All control devices are set to neutral or idle position before supplying power to the drive components.
- The control devices are set to neutral or idle position and the power supply is shut off before leaving the control platform.
- The machine operator must give warning signs when necessary.
- He/she uses all necessary personal protective equipment on the job.

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NEW MACHINE RUN-IN

Your machine has been thoroughly adjusted and tested before shipment. However, initial operation of the machine under severe conditions can adversely affect the performance of the machine or shorten the machine life. Therefore, Sany recommends that you allow a run-in period of 100 operating hours for a new machine.



Fig. 4-1

Properly running-in a new machine is crucial for guaranteeing a long service life of the machine by allowing time for new cylinder piston rings and other internal engine parts to wear in properly. Ensure that the machine is in a normal working condition before proceeding with the running-in.

Refer to the applicable engine manual for details on running-in the engine.

The following points are not limitations but instead guidelines for familiarization of the machine and development of good operating habits.

- Operate as much as possible in the half to three-quarters throttle or load range.
- When performing an engine cold start, keep the engine speed at or near idle until the engine reaches its normal operating temperature.
- Avoid long periods of operation with the engine at idle or continuous maximum horsepower levels.
- Avoid sudden starts, movements or stops.
- Manage engine power to a point that allows acceleration to governed speed when conditions require more power.
- Monitor the instruments frequently — especially the engine oil and coolant pressures. Shut down the machine at the first indication of an abnormal reading.
- Shift down to a lower speed setting before climbing up a slope to keep the engine speed elevated.
- Check all components frequently for proper operation, unusual noises, and excessive heating.
- Frequently check all machine operating temperatures. Determine the cause if overheating occurs and perform adjustments or repairs immediately.
- Always let the system cool down at the end of the working day.
- Frequently check the bolts and screws for tightness.
- After running-in has been completed, have the machine chassis maintenance procedures performed at an authorized Sany service center.

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MOUNT AND DISMOUNT THE MACHINE

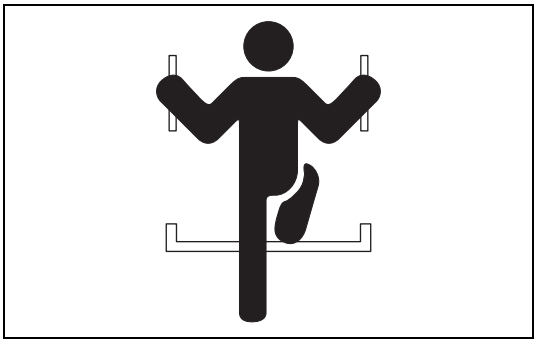
Mounting or dismounting could pose some hazards. Observe the following:

- Always be sure the machine is at a full stop before attempting to access the machine. Never jump onto or off of the machine.
- Never exit or enter the machine cab or deck by any other means than the access systems provided steps (a) and grab handles (b).



Fig. 4-2

- Always maintain a **three-point contact** (both feet and one hand or one foot and both hands) with the handrails, steps, catwalks and platforms to ensure that you support yourself properly.
- If you will be walking on the carrier surface of the machine, always try to maintain a three-point contact whenever possible to help keep your balance.


Fig. 4-3

- Do not walk on a surface of the machine if slip-resistant material is missing or excessively worn. Do not step on surfaces of the machine that are not approved or suitable for walking and working. Keep all walking and working surfaces of the machine clean, dry and slip-resistant.
- Wear shoes with a highly slip-resistant sole material. Clean any mud or debris from shoes before entering the machine cab or climbing onto the machine superstructure.
- Always keep handrails, step plates and walkway areas clean and clear of mud, oil, grease or similar debris. If these areas are damaged, have them repaired or replaced immediately.
- Never leave tools or similar objects on the machine catwalks or service areas. These could fall and get caught in the machine operating systems.

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- Never climb on areas of the machine that are not designated walk areas. You could lose your balance, slip and fall from the machine.
- Never climb on or off the machine with tools or similar objects in your hands.
- Do not modify the machine's access system in any way that has not been evaluated and approved by Sany America.

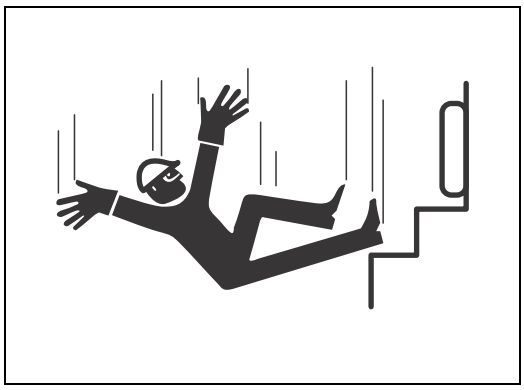


Fig. 4-4

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PRE-START CHECKS

⚠ CAUTION

Failure to perform this inspection and have needed issues resolved may result in further damage to the machine or possible injury to the operator and other personnel.

Always complete a walk-around visual inspection of the machine with special attention to structural damage, loose equipment, leaks or other conditions that require immediate correction for safe operation.



Fig. 4-5

- Check work equipment, cylinders, arms, and hoses for cracks, excessive wear or loosening.
- Remove any dirt or debris around the engine, battery and tracks.
- Check for any coolant or oil leaks around the engine.
- Check the hydraulic pump, hydraulic tank, hoses, and joints for any sign of leaks.
- Check the undercarriage (track, sprockets, tension rollers, and guards) for damage, wear, loose bolts, or roller leakage.
- Check the handholds and step for any looseness or damage.
- Check the hoisting hook, guide plate and hook seat on the back of the bucket for any damage if installed.

NOTE: If any problems are found during your pre-start check, have these problems resolved immediately. Never operate a machine that is unsafe, damaged or in need of repair.

Daily Maintenance Record

Ensure that the Daily Maintenance Checks have been performed before operating this equipment.

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Fuel Level

To check the fuel level first make sure the fuel cap (a) is on tight and locked.



Fig. 4-6

The system monitor (b) in the cab displays the fuel level indicator (c).





Fig. 4-7

NOTE: See “Refueling” on page 2-25 if fuel level is low. Use the following fuel grades:

- -30# Diesel: -22° to 68° F (-30° to 20° C)
- -10# Diesel: 14° to 122° F (-10° to 50° C)
- 0# Diesel: 32° to 122° F (0° to 50° C)

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Draining Primary Fuel Filter

⚠ CAUTION

Never smoke or service the fuel system near open burning locations. Doing so could result in fire, explosion or possible injury.

1. Locate the primary fuel/water separator (a) within the hydraulic pump enclosure behind the door on the right side.

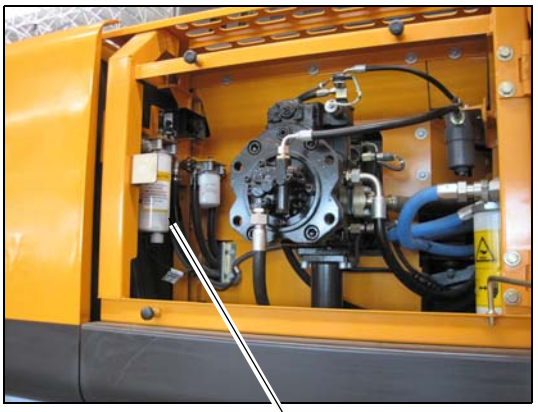


Fig. 4-8

2. Place an appropriate size container below the primary fuel/water separator (a), then open the drain valve (b) to allow all water or contaminated fuel to drain from the filter.

   NOTE: Avoid draining the primary fuel/water separator completely, air could enter the fuel system.

3. Close the drain valve (b) when the flow from the primary fuel/water separator is free of water and contamination, and dispose of the contaminated fuel properly.

   NOTE: See “Environmental Precautions” on page 2-29



Fig. 4-9

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Hydraulic Oil Level

The work equipment should be positioned as shown in the illustration. If the equipment is NOT in the illustrated position, start the engine and, running the engine at low speed, retract the arm and bucket cylinders, lower the boom front end to rest on the ground, and stop the engine and follow normal shutdown and parking procedures.



Fig. 4-10

NOTE: See “Control Work Equipment” on page 4-46

1. Locate the hydraulic oil level sight glass (a) within the hydraulic pump enclosure behind the door on the right side.



Fig. 4-11

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2. Check the hydraulic oil tank level.

   NOTE: The oil level should be between the H and L marks on the site glass (b). If the level is not within the specified level fill the system with hydraulic fluid (HDZ32 or HDZ46)

   •HDZ32: -15° to 86° F (-25° to 30° C)

   •HDZ46: -4° to 104° F (-20° to 40° C)

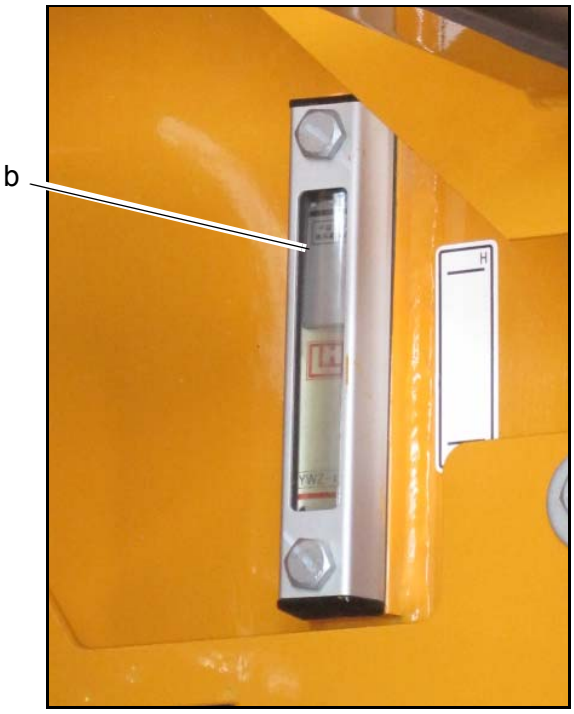


Fig. 4-12

Engine Oil Level

1. Open the engine hood (a).



Fig. 4-13

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2. Pull out the engine oil dipstick (b) and wipe off the oil with a clean lint free cloth.

3. Insert the dipstick to the bottom and pull it out again.

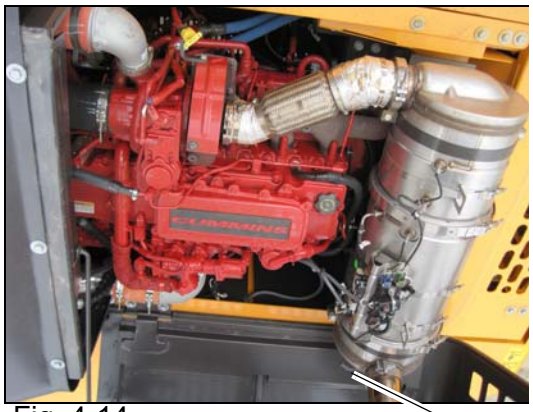


Fig. 4-14

NOTE: The oil level should be between the H and L marks on the dipstick. If the oil is not within the specified level, fill the engine with engine oil (until the oil level is between the H and L marks). Please use one of the following oil types based upon the operating temperature of your work area.

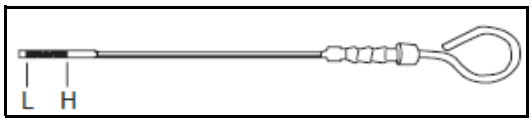


Fig. 4-15

- 5W- 30: -22° to 86° F (-30° to 30° C)
- 5W- 40: -22° to 104° F (-30° to 40° C)
- 10W- 30: -4° to 104°F (-20° to 40° C)
- 15W- 40: -8° to 104° F (-15° to 40° C)
- 40W: 32° to 104° F (0° to 40° C)

SAE/BHL Selector Switch

The SAE/BHL selector switch (a) is located below the engine air cleaner inside the left side front cover.



Fig. 4-16

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The SAE/BHL selector switch (b) swaps the control of the boom and the arm from one joystick to the other. To go to SAE position see step 2, to go to BHL position go to step 1.



Fig. 4-17

1. Pull the pin up (c) and rotate the bar to the left for BHL. Release the pin to lock the bar in place

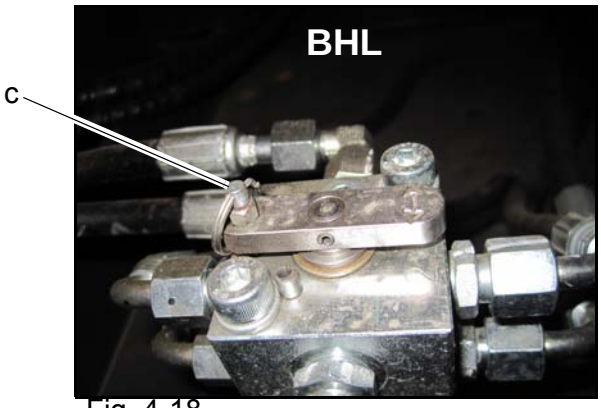


Fig. 4-18

2. Pull the pin up (c) and rotate the bar to the right for SAE. Release the pin to lock the bar in place

   NOTE: See “SAE Control Pattern” on page 4-48 and See “BHL Control Pattern” on page 4-49 for more information.



Fig. 4-19

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Engine Coolant Level

⚠ WARNING

Check coolant level only when the engine is cold and there is no pressure in the system. Failure to follow this directive may cause severe burns or other injuries.

1. Locate and open the Radiator Access Door (a) next to the engine compartment.



Fig. 4-20

2. Check and make sure the radiator cap is cool to the touch; then open the radiator cap (b) and visually check to ensure that there is coolant in the radiator.

   NOTE: Loosen the cap of the radiator slowly to release internal pressures within the coolant system.

3. Add coolant as necessary to a level that shows the coolant in the bottom of the radiator neck (c).

   NOTE: Use any coolant that meets the standards outlined by American Society for Testing and Materials (ASTM) standard D6210. Sany recommends use of Fleetguard Charge D6210 coolant adding Supplement Coolant Additive (SCA) as mandated by your work environment.

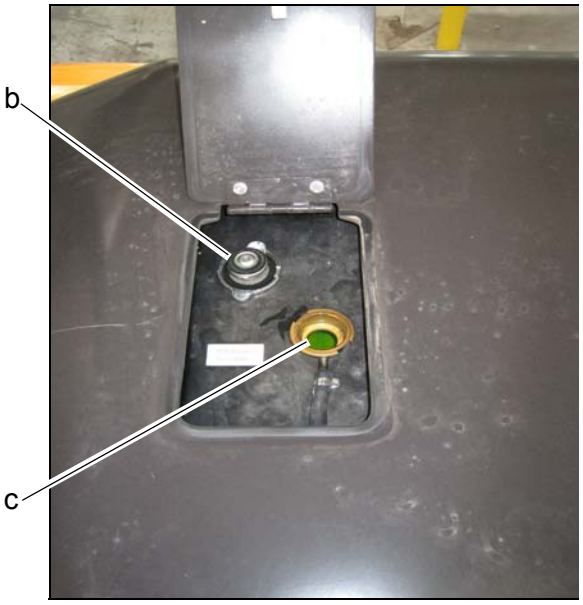


Fig. 4-21

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Cab

Clean these items after each shift:

- Windows (a) and mirrors

NOTE: Remove all trash from inside the cab to avoid its interfering with operation of the equipment.

- Handrails (b)
- Steps (c)

NOTE: Wipe the handrails to remove grease or dirt to help ensure a firm grip is possible when entering or exiting the cab area.



Fig. 4-22

Safety, Operation and Maintenance Manual

Ensure that the Safety, Operation and Maintenance Manual is in the cab.

Seat, Seat Belt, Mirrors and Backup Camera

Seat and Seat Belt

1. Always adjust the driver's seat to the position in which you will drive before fastening the seat belt.

   NOTE: See "Seat and Seat Belt" on page 3-6 for additional information

2. Pull the belt across your lap and push the latch plate (a) into the buckle (b) until it clicks.
3. To reduce the risk of sliding under the belt during a collision, put the belt across your lap as low on your hips as possible and pull it towards the door to a snug fit so the retractor can take up the slack.

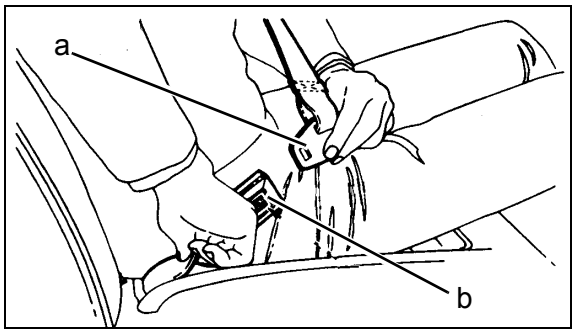


Fig. 4-23

NOTE: The lap/shoulder belt is designed to lock only during a sudden stop or impact. At other times it should move freely.

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4. If the shoulder belt is too snug, do the following:

   A. Pull the shoulder belt out at least 5 in. (13 cm) so that when it is released, it returns to your chest.

   B. Then pull down on the shoulder belt the least amount needed to ease pressure but no more than 1.0 in. (25 mm) and release it.

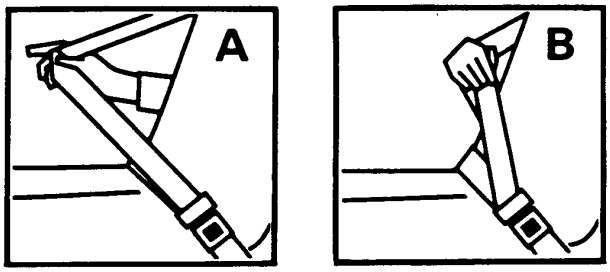


Fig. 4-24

5. To reduce slack in the belt, pull the belt out as you did in step 4A.

⚠ WARNING

Keep any shoulder belt slack to no more than 1 in. (25 mm). Belt slack beyond this amount could significantly reduce your protection in an accident because the belt is too loose to restrain you as intended. Failure to observe and follow this warning could result in personal injury or death.

6. To unfasten the belt, press the button (b) in the center of the buckle. To store the belt, pull it out about 7 in. (18 cm) and release it.

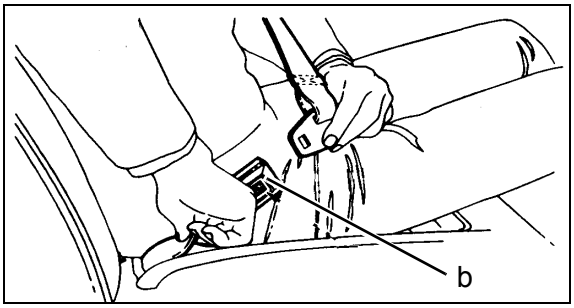


Fig. 4-25

The belt should retract when the buckle is unlatched. To help prevent damage to the seat belt and interior, be sure the belt is fully retracted and the latch plate is out of the way before closing the door.

NOTE: Seat belt assemblies are maintenance-free; however, they should be periodically inspected to ensure that they are not damaged and are in proper operating condition, especially if they have been subjected to severe stress.

Mirrors

Adjust the side mirrors for clear vision and safe driving.

NOTE: See “Cab Exterior” on page 3-4 for additional information.

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Backup Camera

Ensure your rear view camera (a) is operating correctly and is free of all obstructions.

NOTE: See “Combined Instrument Display screen” on page 3-28 for additional information.



Fig. 4-26

Work Lights and Warning Devices

Check the following for proper operation with the key set to the ON position (a).

- Work Lamps (b)
- Horn (c)
- Travel alarm (sounds when travel pedal or lever is moved)

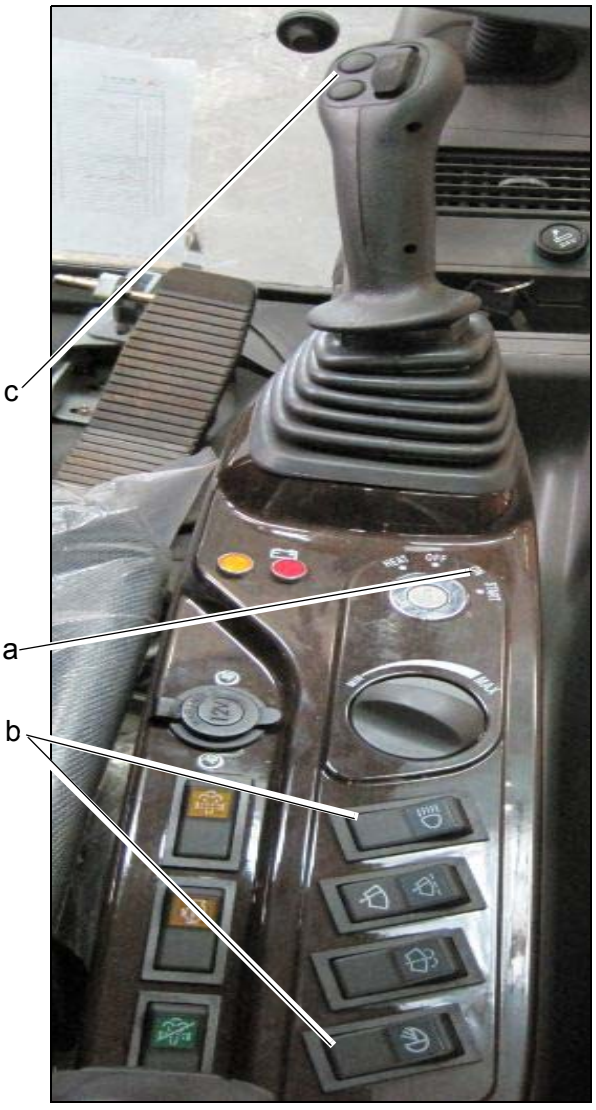


Fig. 4-27

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Operator Controls

Check all operator control lever movements for smooth operation with key in the ON position. The control lever should return to neutral freely. There should not be any excessive play in the control lever.

NOTE: See “Cab Interior” on page 3-5 for controls information.



Fig. 4-28

Fire Extinguisher & Escape Tool

Check that both the fire extinguisher (a) and the escape tool (b) are on the back wall of the cab.

NOTE: Be sure the fire extinguisher is a minimum of a 10 pound “A, B, C” fire-rated extinguisher (ASME B30.5-2007).

NOTE: See “Extinguisher and First Aid Kit” on page 2-14.

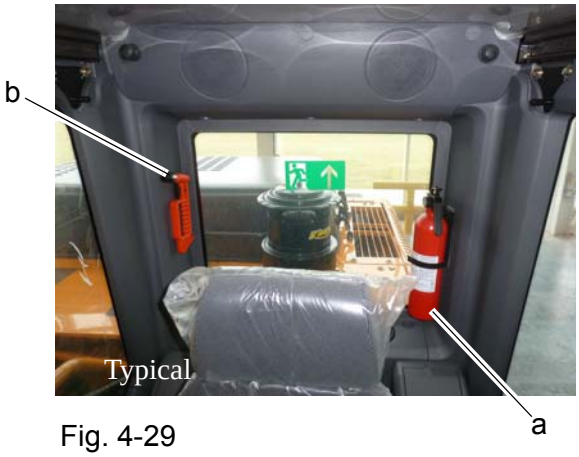


Fig. 4-29

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COMBINED INSTRUMENTS DISPLAY/MONITOR SETTINGS

When the key switch of machine is turned to the ON position, the Combined Instrument Display is energized by the engine battery and initializes. A full display of the working Combined Instrument Display is shown below:



Fig. 4-30

Additional details may be seen on the display by using the Function Icons (1) and the corresponding Function Keys (2).

Set Language Display - First Time

1. Turn the ignition switch (a) to the ON position to display the Operator screen on the Combined Instrument Display.



Fig. 4-31

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2. Press Key 5 to go to System Information/Password (b) See “Function Keys” on page 3-28.

3. Enter your 5-digit password. Each digit is indicated by an asterisk (*) standing for a value from 0 to 9. A numeral appears at the digit where the cursor is located while the other four digits remains as asterisks.

4. Pressing Key 2 switches between Left-Right function and increase/decrease function.

5. Pressing Key 1 goes back to previous page.



Fig. 4-32

Use the function keys to:

- Key 1: Back to previous page.
- Key 2: Start or stop setting up the code number on digit where the cursor is located.
- Key 3: Decrease a value or move the cursor to the left digit.
- Key 4: Increase a value or move the cursor to the right digit.
- Key 5: Check the validity of password entered. If it is valid, you have access to the Main Menu.

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6. Once you enter the password you should go to the Main Menu. (See “Main Menu Functions” on page 3-30). These are a list of system functions that can be accessed by selecting an item and then entering the corresponding page. Each icon will be highlighted as you chose them.



Fig. 4-33

•Parameter - view the running parameters of the engine and hydraulic system

•Maintenance - view maintenance information on the machine

•Fault Info (Error codes)

•System Setup - language selection

•Machine Config - configure the machine and view configuration of the machine

•Tools Select (Bucket- Breaker - Nibbler)

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7. Go to System Settings for language selection (See “System Language Selection” on page 3-33).

8. Pressing Key 5 will take you to Language Setting.



Fig. 4-34

9. You will see a display of language options.
   - Press Key 3 to scroll up the list.
   - Press Key 4 to scroll down the list.
   - Press Key 5 to accept the language selected.



Fig. 4-35

Set Date/Time Setting - First Time

1. Press Key 1 to go back to the System Setting screen.

2. Press Key 4 to go down the list to Date/Time Setting and then Press Key 5 to accept. (See “Time Setup” on page 3-33).



Fig. 4-36

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3. Press Key 2 to start/stop modifying the value of digit at where the cursor is located.

4. Press Key 4 to switch between the increase/ decrease keys and left-right keys.

5. Press Key 5 to accept time setup and return to previous page.



Fig. 4-37

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ENGINE PROCEDURES

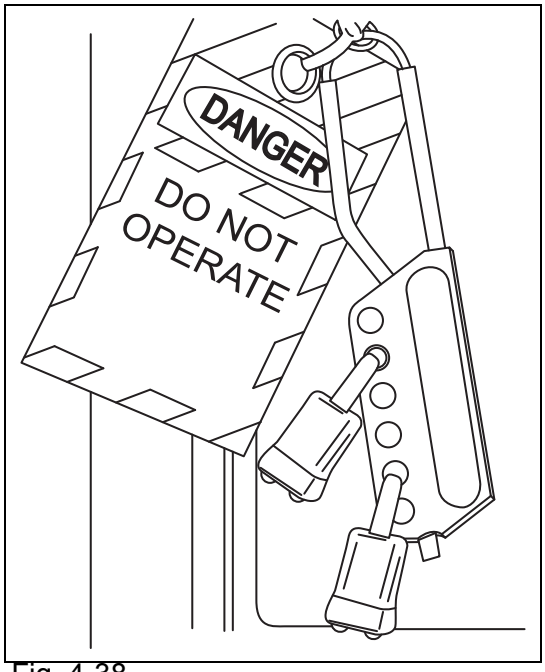


Fig. 4-38

⚠ WARNING

Never attempt to start the machine if it has been locked out by maintenance personnel. If in doubt, contact the maintenance supervisor. Failure to follow this can cause damage to the machine, and could lead to serious injury or death.

NOTE: Check the work area to be sure all personnel and equipment are clear from your machine. Before starting the machine, sound your horn to warn others you are about to start the machine.

Starting and shutdown procedures for most diesel engines are generally the same. Therefore, use the following procedures except where specific differences are noted. (Refer to the applicable engine manufacturer's manual for detailed procedures.)

⚠ WARNING

Diesel engine exhaust can be harmful to your health or even fatal. Operate the engine only in a well-ventilated area or vent the exhaust to the outside. Failure to observe and follow this warning could result in personal injury or death.

Cold Weather Operation

The following recommendations are for operating Sany excavators in very low (i.e., sub-zero) temperatures.

NOTE: Detailed cold weather starting and operating procedures are covered in the engine manual.

This machine must have appropriate hydraulic oil, lubricants and other auxiliary items required for operation in sub-zero temperatures. Individual machine functions should be operated to ensure they are sufficiently warmed prior to performing work. Contact your Sany representative for recommended lubricants and fluids for cold weather operations.

Operation of machine at full rated capacities in temperatures between 0°F (-18°C) and -40°F(-40°C) or lower should be accomplished only by competent operators who possess the skill, experience, and dexterity to ensure smooth operation. Shock loading must be avoided.

The correct grade of oil for the prevailing temperature must be used in the crankcase. Diesel fuel must have a pour point of 10°F (6°C) less than the lowest expected temperature.

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Cold weather operations requires additional precautions:

- Do not touch cold metal surfaces that could cause you to freeze to them.
- Keep the machine clear of all ice and snow.
- Allow sufficient time for the hydraulic oil to warm up.
- Park the machine in an area where it will not freeze to the ground.

Engine Start Procedure

⚠ CAUTION

Do not spray starting fluid into the air inlet. The spray will contact the heater elements and could explode causing equipment damage and personal injury.

⚠ CAUTION

NEVER attempt to start the machine if it has been locked-out by maintenance personnel or if the main power disconnect switch is in the OFF position. If in doubt, contact the maintenance supervisor. Failure to observe and follow this caution may result in equipment damage, improper equipment operation or personal injury.

Perform the following steps to start the engine:

NOTE: Detailed cold weather starting and operating procedures are covered in the engine manual.

1. Set the hydraulic lockout lever (a) to the LOCKED position.

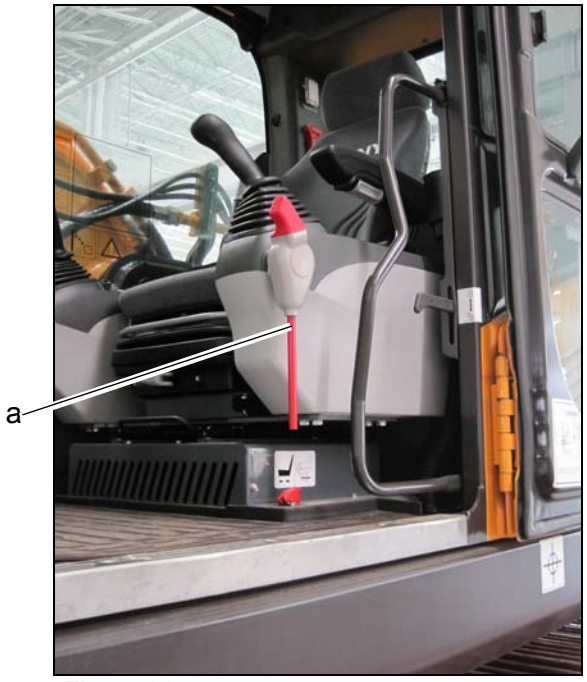


Fig. 4-39

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2. Set the throttle (b) to the MIN position.

3. Turn the ignition key (c) from OFF to ON.

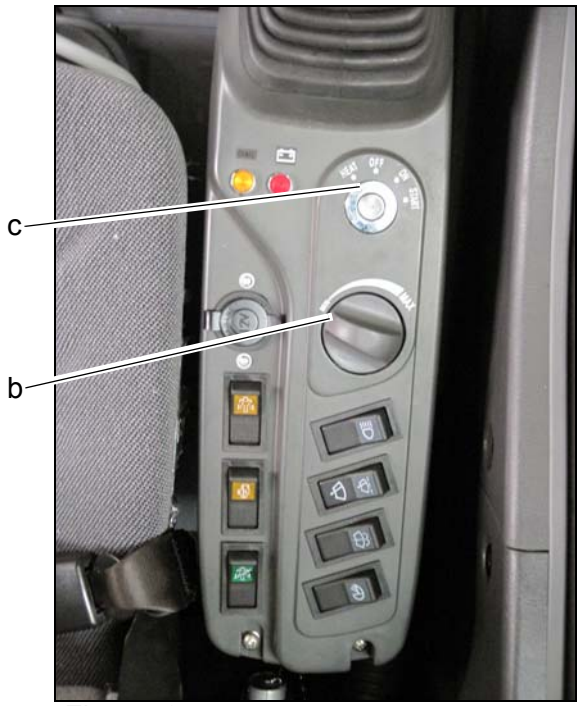


Fig. 4-40

The monitor (d) displays the default screen two seconds after the key is turned to the ON position. The display allows access to:

- •Displaying running parameters
- •Viewing machine configuration
- •Viewing failure codes
- •Throttle (rpm)
- •Setting up system clock
- •Setting up service hours
- •Setting up key parameters



Fig. 4-41

NOTE: The warning indicator lights if a fault is detected. A fault code displays near the bottom of the display. Contact your local Sany service representative to correct the issue.



Fig. 4-42

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4. Turn the ignition key to START and release it immediately when the engine starts.

   NOTE: If the engine fails to start after five attempts, correct the malfunction before attempting further starts.

Immediately check the engine instruments and monitor for any alarm codes after starting. Shut down the engine if an alarm is displayed on the display screen.(See “Main Menu Functions” on page 3-30)

NOTICE

Never crank the engine for more than 15 seconds. If the engine fails to start after 15 seconds, stop and allow the starter motor to cool for at least 10 seconds before attempting another start. Failure to observe and follow this warning could result in equipment damage.

Idle the Engine

Idling the engine unnecessarily for long periods of time wastes fuel and fouls injector nozzles. Unburned fuel causes carbon formation, oil dilution, formation of lacquer or gummy deposits on the valves, pistons, and rings, and rapid accumulation of sludge in the engine.

NOTICE

NEVER race the engine during the warm-up period and NEVER operate the engine beyond the governed speed. Engine bearings, pistons, and valves may be damaged if these precautions are not taken. Failure to observe and follow this warning could result in equipment damage.

Engine Shutdown

1. Retract the arm and bucket cylinders, lower the boom front end to rest on the ground

2. Run the engine at idle speed (1000 rpm) for about 5 minutes.



Fig. 4-43

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3. Turn the keyswitch (a) to the OFF position and remove the key.

4. Operate all functional controls to relieve pressure on the systems.

5. Remove the key from the switch.



Fig. 4-44

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TRAVEL OPERATIONS

⚠ WARNING

1. Never allow any personnel to be within 26 ft (8m) of the rear of the machine to avoid injury.
2. Never allow any personnel to be around the machine while it is moving.
3. Be aware of all crush points on the machine and ensure that all personnel keep clear of these areas.
All of these activities could result in serious injury or possibly death.

Preheat the Machine

NOTICE

Do not enter into operation immediately after starting the engine. Perform the following preheat procedures to prepare the system for operations.

1. Adjust the throttle to make the engine run unloaded at low speed (1,000 rpm) for about five minutes.

2. Adjust throttle to make the engine run at moderate speed (1,400 rpm), and then slowly operate the bucket for five minutes.

   NOTE: See “Control Work Equipment” on page 4-46

3. Adjust the throttle to make the engine run at high speed (2000 rpm), and operate the boom, arm and bucket for 5-10 minutes.

4. Cycle each action of machine for several times before ending the preheat operation.

5. Continue to preheat the machine if coolant temperature fails to reach the middle of the display on the monitor panel.

6. Check for excessive black exhaust smoke, very loud noise or excessive vibration. If found please notify your distributor immediately or Sany for assistance.

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7. Press Key 1 to select the desired working mode.

   NOTE: The working mode (2) is displayed in the upper left corner of the monitor screen.Working mode options are:

   - S: Standard duty: Used for normal excavating.
   - H: Heavy duty: Used for excavating in hard or rocky ground.
   - L: Light duty: Used for light tasks such as digging in soft soil.
   - B: Breaker mode: Used when operating with attachments such as a jackhammer.



Fig. 4-45

Before Travel

1. Turn the throttle (a) clockwise to increase the engine speed.

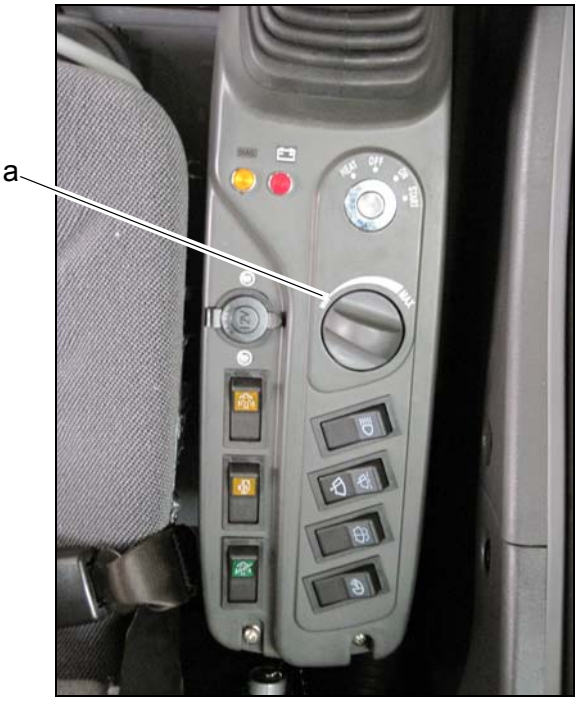


Fig. 4-46

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2. Place the hydraulic lockout control to the UNLOCKED position (b).



Fig. 4-47

3. Retract the working equipment until it is 16 - 20 inches (40 - 50 cm) above the ground.

   NOTE: See “Control Work Equipment” on page 4-46.



Fig. 4-48

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4. Move the boom to ensure good all round visibility.

NOTE: See “Control Work Equipment” on page 4-46.



Fig. 4-49

NOTE: Whenever possible rotate the cab to face in the direction of the arrow (c) painted on the inside of the crawler track. If the track frame faces the rear (behind the sprockets), the machine will move in a direction opposite to the operating direction of travel control lever or pedal (Both the forward and backward travels are reversed, and the leftward and rightward travels as well).



Fig. 4-50

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Right Turn

The left travel control lever causes the left track to move forward or backward depending on which direction the control is moved.

NOTE: Forward direction of the left track is shown in the illustration.

The further the control is moved in ether direction the faster the left track moves.

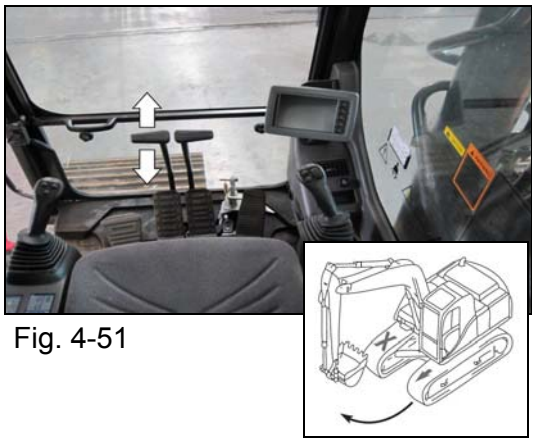


Fig. 4-51

Left Turn

The right travel control lever causes the right track to move forward or backward depending on which direction the control is moved.

NOTE: Forward direction of the right track is shown in the illustration.

The further the control is moved in ether direction the faster the right track moves.

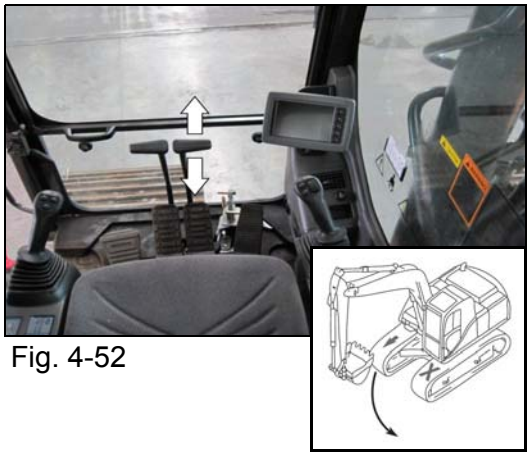


Fig. 4-52

Straight Travel

Moving both controls causes both tracks to move forward or backward depending on which direction the control is moved.

NOTE: Forward direction of both tracks are shown in the illustration.

The further the controls are moved in ether direction the faster each track moves.

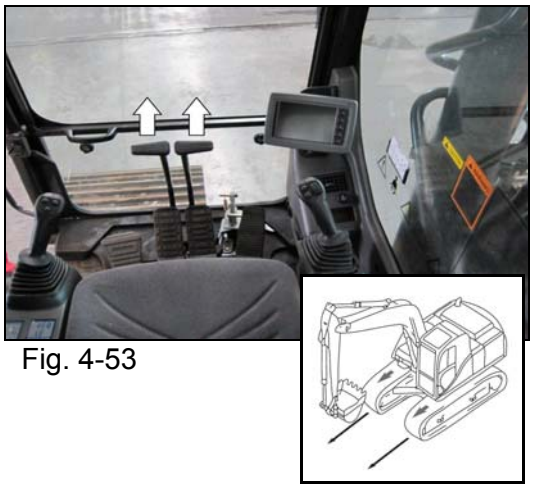


Fig. 4-53

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Counter Rotate

Left Zero Degree Rotation: Pushing the right lever forward and pulling the left lever rearward causes a left zero degree rotation of the machine.



Fig. 4-54

Right Zero Degree Rotation: Pushing the left lever forward and pulling the right lever rearward causes a right zero degree rotation of the machine.

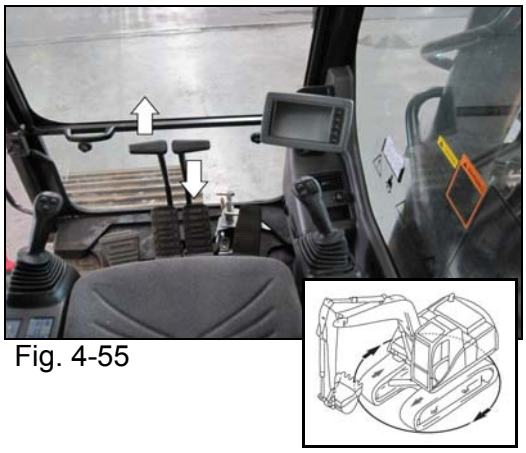


Fig. 4-55

Slopes

Observe the following when operating an machine on a slope:

- The slope – side-to-side or fore and aft – must not exceed 15%.
- The hydraulic tank must be filled to the specified level (See “Hydraulic Oil Level” on page 4-15). The fuel tank must be over half full.
- Avoid holes, rocks, extremely soft surfaces, and other obstacles that might subject the machine to undue stresses and possible tipover.
- Position the bucket 16 - 20 inches (20 - 30cm) above the ground while traveling.
- Always set the throttle and speed selector to maintain a slow speed while traveling up or down a slope.
- Do not turn the machine while on a slope.
- Do not travel in reverse on a slope.

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Operations in Water

Observe the following when operating a machine in water:

- Do not drive the machine into water where the water level could reach the center of the carrier rollers (1).

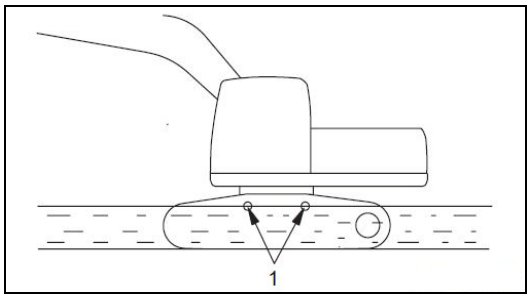
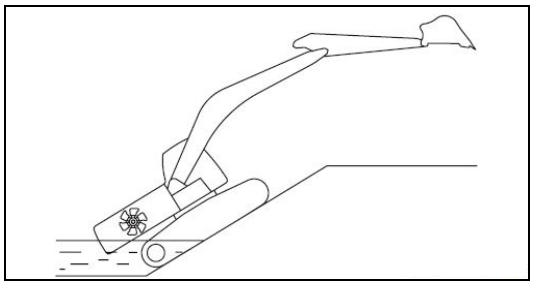


Fig. 4-56

NOTICE

If the swing bearing, swing gear and central swing joint are soaked in water, the drain plug should be removed to drain mud and water then lubricate the mesh gear and swing bearing.

- Do not operate the machine in water unless the foundation of the work site is strong enough to properly support the machine.
- Do not drive the machine out of water at an slope greater than 15°, the engine cooling fan could be damaged by immersion in the water.
- Add grease to parts that have been soaked in water until all the old grease is squeezed out of the bearing.


Fig. 4-57

Release Excavator from Mud

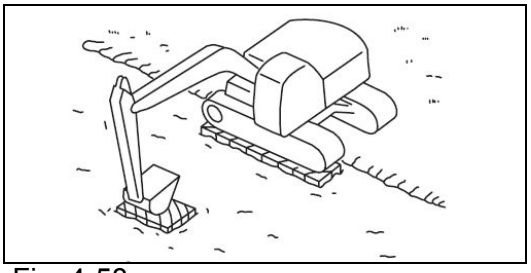
If the machine becomes stuck in mud, drive it out of the mud using the following methods:

One Track Stuck

1. Position the boom and arm at an angle between 90° and 110°.

   NOTE: See “Operator Controls” on page 4-23

2. Pivot the upper structure to position the boom over the track that is stuck.


Fig. 4-58

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3. Curl the bucket so that the back of the bucket contracts the ground. Use cribbing to provide a firm surface if necessary.

4. Move the joystick forward to lower the boom to lift the track.

5. Place cribbing under the track.

6. Drive the machine out of the mud.

NOTE: See “Travel Operations” on page 4-34

Two Tracks Stuck

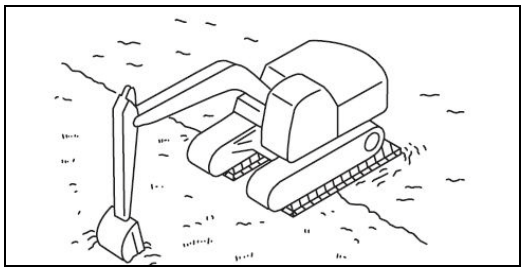


Fig. 4-59

1. Position the boom and arm at an angle between 90° and 110°.

2. Pivot the upper structure to position the boom over the front of the machine.

3. Curl the bucket so that the back of the bucket contracts the ground. Use cribbing to provide a firm surface if necessary.

4. Move the joystick forward to lower the boom to lift the front of the tracks.

5. Place cribbing under the tracks.

6. Cut the bucket into the ground in front of the machine.

7. Retract the arm as done with normal excavating while driving the machine forward out of the mud.

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Recommended Applications

⚠ WARNING

Always check with your supervisor prior to digging in any area to ensure that you do not disturb any underground structures or utilities.

Backhoe operation

Backhoe operation is for digging an area lower than the machine. The digging range of the arm is from 30° and 45°. The angle may vary according to the digging depth but it is better to keep it within the stated range.

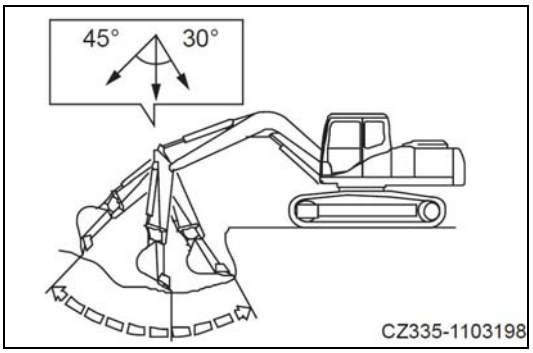


Fig. 4-60

For maximum digging force can be obtained when the angle between the boom and the arm and the bucket cylinder and the bucket bracket are both 90°

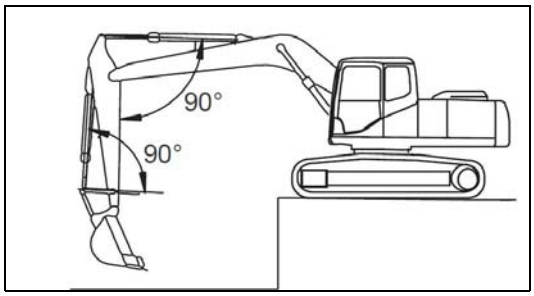


Fig. 4-61

Digging a trench

Trench work can be done efficiently by using a suitable bucket and positioning the tracks parallel to the trench line. When digging a wider trench, excavate the sides first then remove the middle.

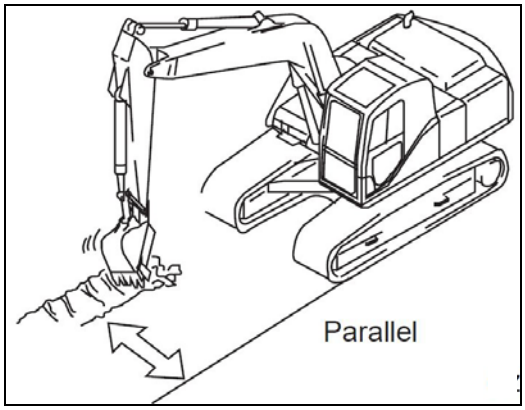


Fig. 4-62

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Bucket Replacement

⚠ WARNING

1. Driving a pin with a hammer can cause metal pieces to fly off leading to severe injuries. Wear goggles, a hard hat, protective gloves and other PPE during these operations.
2. Place the bucket in a stable place after it has been removed.
3. Make sure that the surrounding area is clear of personnel when hammering any of the pins; they could fly out and cause personal injury.
4. Do not stand behind the bucket when removing pins.
5. Take extra care not to place your foot under the bucket.
6. Do not put your finger into the pin bore during alignment.

Park the machine on a hard, level ground. This is a two person job, get someone to assist you with ground guidance and safety when replacing the bucket.

1. Place the bucket on level ground.

   •Before removing the pin slowly lower the bucket to a level where it just contacts the ground. If a larger force is used to lower the bucket to the ground, resistance could increase on the pin roll, causing difficulties while removing it.

2. Remove the nuts and screws on the plate retaining arm pin and link pin (a), take out arm pin and link pin (b), and then remove the bucket.

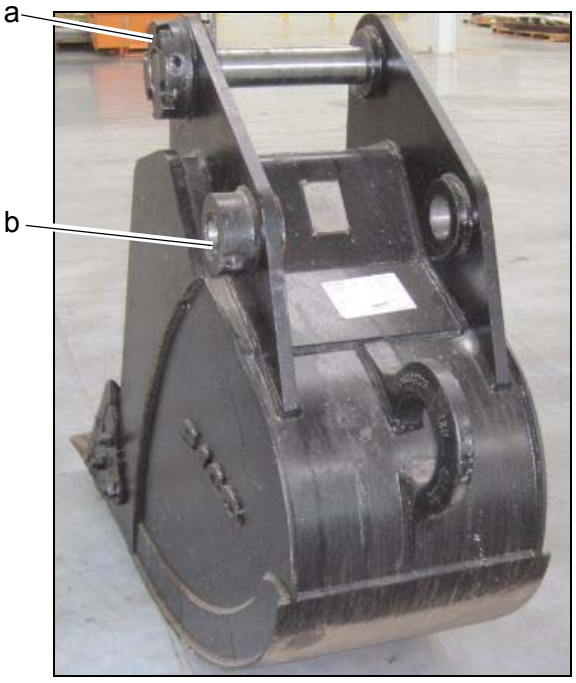


Fig. 4-63

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3. Align arm (c) with the bore for bucket replacement and the link (d) with bore (e). Insert the greased pins into bore (g) and bore (h) respectively.

   NOTE: Make sure the pins are free from mud or sand after removal. Both ends of the bushing are installed with seals against dust. Be careful not to damage them.

4. Reinstall the nuts and bolts onto the plate retaining the pin rolls. Add grease to the pin rolls.

   •Inject grease until the grease is squeezed out of the end face.

   •Replace any broken seals when replacing a bucket.
   The use of broken seals could allow sand or dust to penetrate through to the pins and causing abnormal wear.



Fig. 4-64

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END OF WORKDAY CHECKS

1. Check the cab for any trash or debris and deposit it into an approved trash can.



Fig. 4-65

2. Remove all built up mud or debris on the undercarriage or machine exterior.



Fig. 4-66

3. Inspect the machine work equipment, machine exterior, and undercarriage for signs of fluid leaks or damage.



Fig. 4-67

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CONTROL WORK EQUIPMENT

⚠ WARNING

1. Never allow any personnel to be within 26 ft (8m) of the rear of the machine to avoid injury.
2. Never allow any personnel to be around the machine while it is moving.
3. Be aware of all crush points on the machine and ensure that all personnel keep clear of these areas.
All of these activities could result in serious injury or possibly death.

Set SAE/BHL Selector Switch

The SAE/BHL selector switch (a) is located below the engine air cleaner inside the left side front cover.



Fig. 4-68

The SAE/BHL selector switch (b) swaps the control of the boom and the arm from one joystick to the other. To go to SAE position see step 2, to go to BHL position go to step 1.

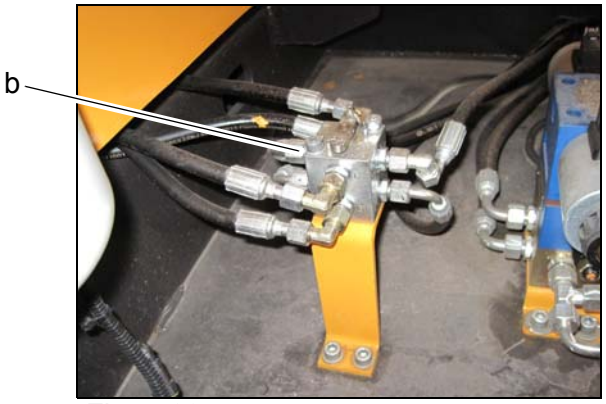


Fig. 4-69

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1. Pull the pin up (c) and rotate the bar to the left for BHL. Release the pin to lock the bar in place

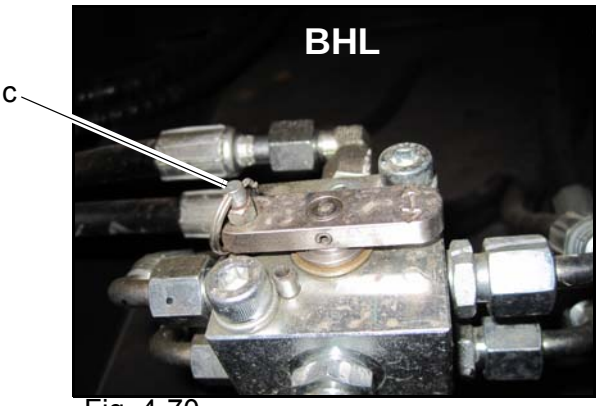


Fig. 4-70

2. Pull the pin up (c) and rotate the bar to the right for SAE. Release the pin to lock the bar in place



Fig. 4-71

3. Patterns for both the SAE and BHL modes are printed on a card (d) posted in the cab and on a decal on the right hand window. See “SAE Control Pattern” on page 4-48 and See “BHL Control Pattern” on page 4-49 for additional information.



Fig. 4-72

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SAE Control Pattern

Swing

Moving the left joystick to the left swings the work equipment to the left. Moving the left joystick to the right swings the work equipment to the right.

NOTE: The swing function is the same for SAE and BHL.

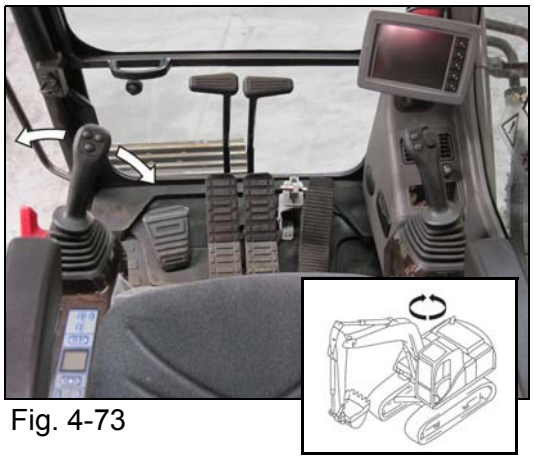


Fig. 4-73

Arm

Moving the left joystick forward extends the arm. Moving the left joystick rearward retracts the arm.



Fig. 4-74

Boom

Moving the right joystick forward lowers the boom. Moving the right joystick rearward raises the boom.



Fig. 4-75

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Bucket

Moving the right joystick to the left curls the bucket. Moving the right joystick to the right dumps the bucket.

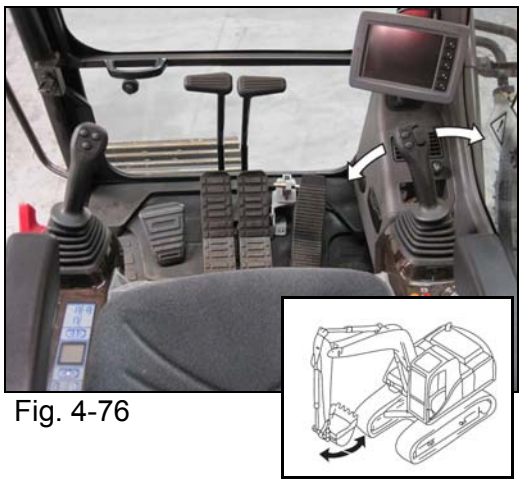


Fig. 4-76

BHL Control Pattern

Swing

Moving the left joystick to the left swings the work equipment to the left. Moving the left joystick to the right swings the work equipment to the right.

NOTE: The swing function is the same for ASE and BHL.

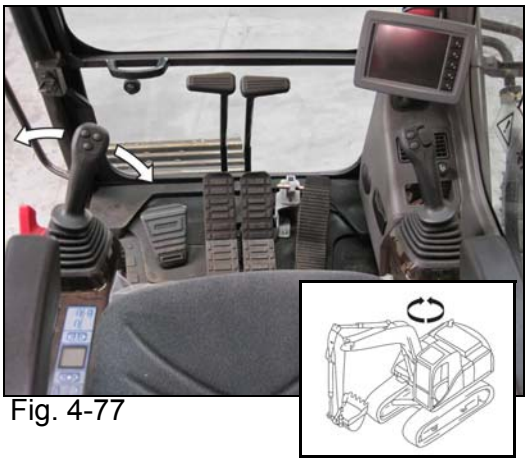


Fig. 4-77

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Arm

Moving the right joystick forward extends the arm. Moving the right joystick rearward retracts the arm.



Fig. 4-78

Boom

Moving the left joystick forward lowers the boom. Moving the left joystick rearward raises the boom.



Fig. 4-79

Bucket

Moving the right joystick to the left curls the bucket. Moving the right joystick to the right dumps the bucket.

NOTE: The bucket function is the same for ASE and BHL.



Fig. 4-80

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PARK AND STORE THE MACHINE

Overnight Storage

1. Park the machine on a flat, level and stable surface away from people, traffic or other equipment, then use the control handles to lower the working equipment to the ground.

2. Run the engine at idle speed (about 1000 rpm) for about five minutes to allow for heat dissipation. Extend this cool-down time in hot weather.



Fig. 4-81

3. Turn the ignition switch (a) to the OFF position and remove the key.

   NOTE: Always remove the ignition key and take it with you, even if you are leaving the machine for only a moment. Keep it with you to prevent unauthorized operation of the machine.

4. Operate all controls in all directions to relieve stored pressure within the hydraulic system.



Fig. 4-82

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5. Set the hydraulic locking lever in the LOCKED position (b).

6. Close and lock the windows.

7. Exit the cab.

   NOTE: See “Mount and Dismount the Machine” on page 4-10

8. Fill the fuel tank to the maximum level.

   NOTE: See “Refueling” on page 2-25

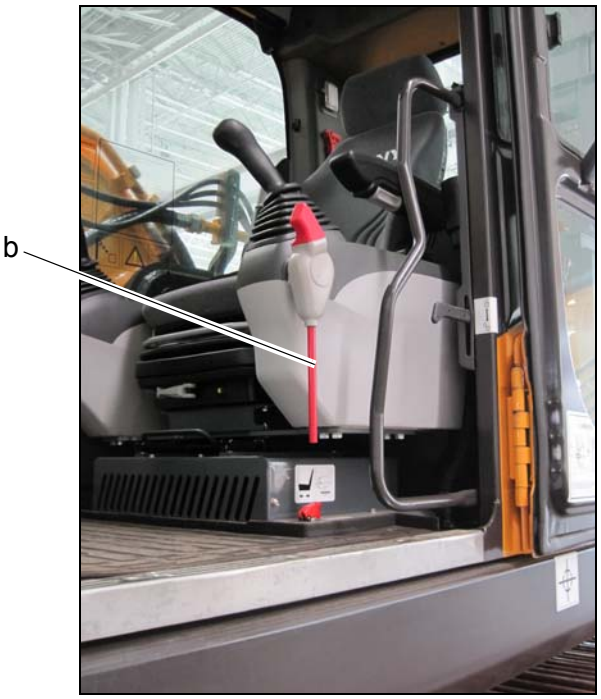


Fig. 4-83

9. Ensure that the following items are secured and locked on the left side.

   - Cab door (c)
   - A/C fresh air inlet door (d)
   - Left rear door (e)
   - Engine hood (g)



Fig. 4-84

10. Ensure that the following items are secured and locked on the right side.

    - Hydraulic tank filler cap (h)
    - Right rear door (k)
    - Fuel tank cap (m)



Fig. 4-85

Long Term Storage

Proper preparation for long term storage will reduce the chances for damage or deterioration of the equipment.

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Preparation

1. Park the machine in a secure location and position the work equipment as shown in the illustration to the right.

2. Run the engine at idle speed (about 1000 rpm) for about five minutes to avoid increasing internal temperatures and to allow for heat dissipation. Extend this cool-down time in hot weather.

3. Turn the ignition switch (a) to the OFF position and remove the key.

   NOTE: Always remove the ignition key and take it with you, even if you are leaving the machine for only a moment. Keep it with you to prevent unauthorized operation of the machine.

4. Operate all controls in all directions to relieve stored pressure within the hydraulic system.



Fig. 4-86



Fig. 4-87

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5. Set the hydraulic locking lever in the LOCKED position (b).

6. Close and lock the windows.

7. Exit the cab.

   NOTE: See “Mount and Dismount the Machine” on page 4-10

8. Fill the fuel tank to the maximum level.

   NOTE: See “Refueling” on page 2-25

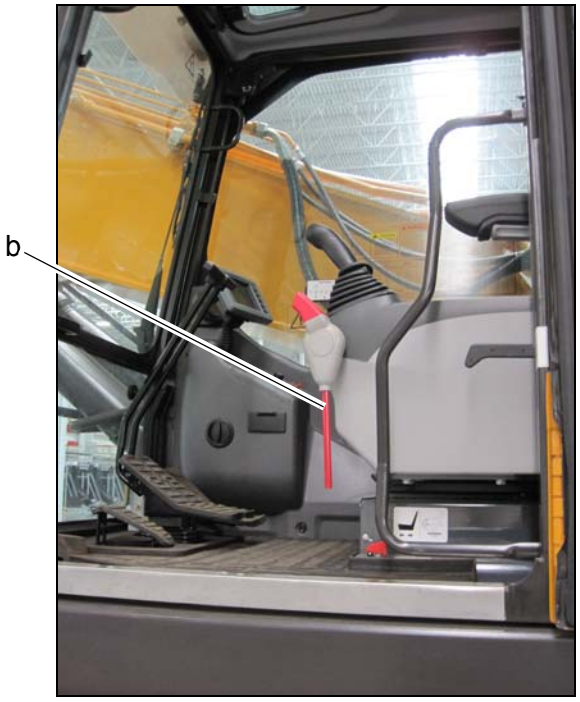


Fig. 4-88

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9. Pivot all mirrors (c) inward so that they are within the perimeter of the machine.



Fig. 4-89

.

10. Ensure that the following items are secured and locked on the left side.

    - Cab door (d)
    - A/C fresh air inlet door (e)
    - Left rear door (g)
    - Engine hood (h)

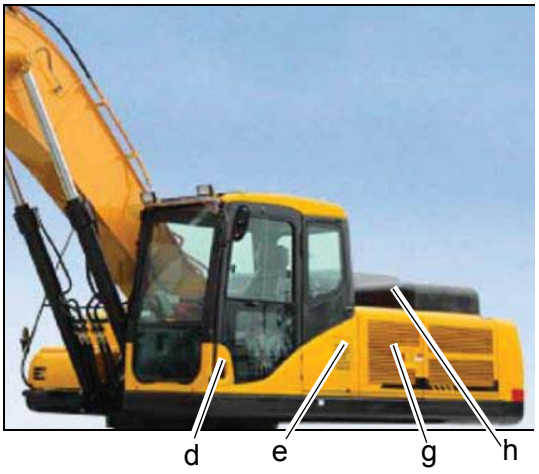


Fig. 4-90

11. Ensure that the following items are secured and locked on the right side.

    - Hydraulic tank filler cap (k)
    - Right rear door (m)
    - Fuel tank cap (n)



Fig. 4-91

12. Apply grease to any exposed parts of the piston rods.

13. Change the engine oil in accordance with engine manufacturer’s procedures.

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14. Disconnect the battery negative terminal and reinstall the battery cover or remove the batteries and store them in a separate location.

During Storage

⚠ WARNING

When operating equipment inside a building it is necessary to open doors and windows to provide adequate ventilation. Failure to do so may result in severe injury.

1. Start the machine once a month.

   NOTE: See “Engine Start Procedure” on page 4-30.

2. Drive the machine a short distance each month.

   NOTE: See “Travel Operations” on page 4-34.

⚠ CAUTION

Wipe off all the grease off of cylinder pistons before operating the work equipment. Failure to do so could damage the piston seals.

3. Cycle each cylinder a few times once a month to coat pistons with oil.

   NOTE: See “Control Work Equipment” on page 4-46.

4. Turn on the air conditioner and allow it to run for 3 to 5 minutes each month to lubricate the compressor and related parts.

5. Return the equipment to the proper storage location and condition.

   NOTE: See “Preparation” on page 4-53.

Return to Service

1. Check the fuel and engine oil for water contamination. Drain water or replace fluids as necessary.

   NOTE: See “Draining Primary Fuel Filter” on page 4-14

2. Examine the exterior of the machine for signs of rust or damage and repair as necessary.

3. Start the machine and test all operations.

   NOTE: See “Engine Start Procedure” on page 4-30 and See “Before Travel” on page 4-35.

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TRANSPORT

Follow all local, state, and federal regulations and laws regarding transporting the machine. When loading or unloading the equipment observe each of the items in the following table:

⚠ WARNING

1. Select a location that is firm level ground and a safe distance from any road or structure.
2. Ensure that the trailer is properly chocked to prevent any movement while loading or unloading.
3. Use an access ramp with enough length, strength, and width to properly support the equipment. The ramp grade should not exceed 15°.
4. Drive slowly at the junction of the ramp and the trailer. The machine may shift suddenly due to change in center of gravity.
5. Do not move work equipment attached to the machine while loading or unloading.
6. Use a signal man to observe and alert the operator of any potential hazards.

Failure to observe these precautions could cause the machine to tip causing severe injury.

Load the machine

Contact your Sany representative for proper cab protection to be used during transport of the machine.

1. Clean the tracks to prevent slipping during loading.



Fig. 4-92

2. Position the machine so that the centerline of the machine matches the centerline of the trailer.

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3. Press Key 2 to set the auto idle (a) on the monitor (b) to OFF.

4. Press Key 3 to set the travel speed (c) to LOW.

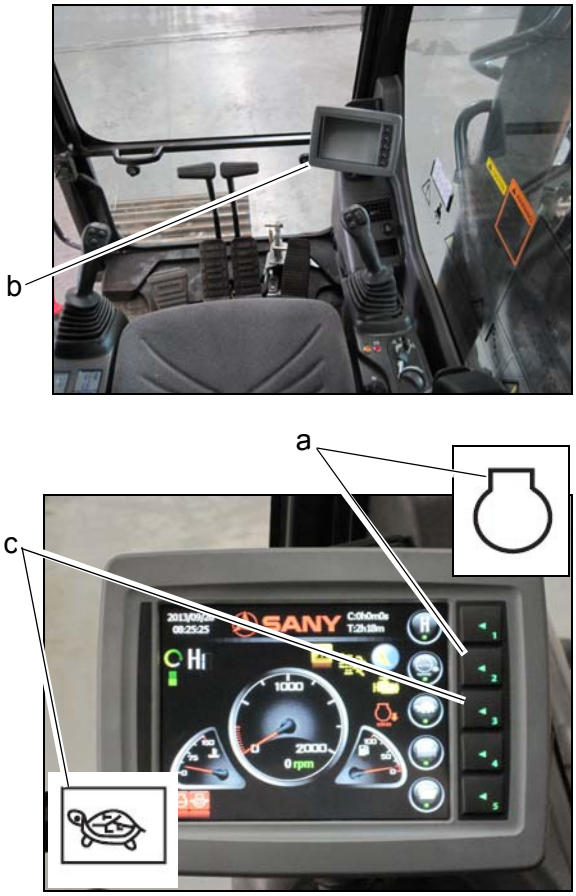


Fig. 4-93

If work equipment is attached to the machine it should be positioned in front of the machine during loading. If if no work equipment is attached, back the machine onto the trailer.

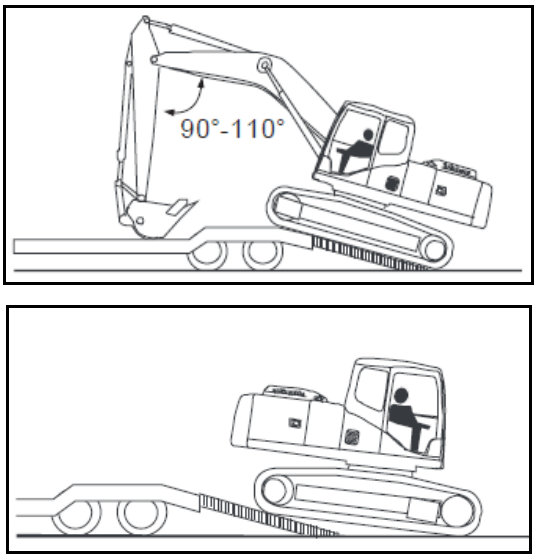


Fig. 4-94

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5. Drive the machine slowly until the tracks have full contact with the trailer.

   NOTE: See “Travel Operations” on page 4-34.

   NOTE: The machine may lean forward when it passes over the trailer wheels.

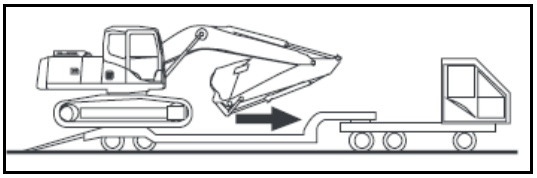


Fig. 4-95

6. Raise the work equipment slowly just enough to clear the trailer.

   NOTE: See “Control Work Equipment” on page 4-46

7. Swing the cab around so that the work equipment faces the back of the trailer.



Fig. 4-96

8. Place wood on the trailer under the work equipment.
9. Fully extend the bucket cylinder arm and arm cylinder.
10. Lower the work equipment onto the support block (d).
11. Shut down the machine.

    NOTE: See “Engine Shutdown” on page 4-32.



Fig. 4-97

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12. Exit the cab.

13. Pivot all mirrors (e) inward so that they are within the perimeter of the machine.



Fig. 4-98

14. Close and lock the windows.

15. Ensure that the following items are secured and locked on the left side.

    - Cab door (f)
    - A/C fresh air inlet door (g)
    - Left rear door (h)
    - Engine hood (k)



Fig. 4-99

16. Ensure that the following items are secured and locked on the right side.

    - Hydraulic tank filler cap (m)
    - Right rear door (n)
    - Fuel tank cap (o)



Fig. 4-100

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17. Cover the exhaust (p) to prevent foreign material from entering during transport.



Fig. 4-101

18. Secure the machine to the trailer with suitable tie downs (q) in accordance with all applicable laws and regulations.



Fig. 4-102

Unload the machine

1. Chock the trailer to ensure that it will not move during unloading.
2. Attach or construct ramps of suitable strength, width, and length to unload the machine.
3. Remove all tie downs (a) and blocks securing the machine to the trailer.
4. Pivot the mirrors out to the proper settings so that the operator has a clear view to the front and rear of the machine.
5. Unlock and start the machine and allow it to warm up fully.

   NOTE: See “Engine Start Procedure” on page 4-30.



Fig. 4-103

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6. Press Key 2 to set the auto idle (b) on the monitor (c) to OFF.

7. Press Key 3 to set the travel speed (d) to LOW.



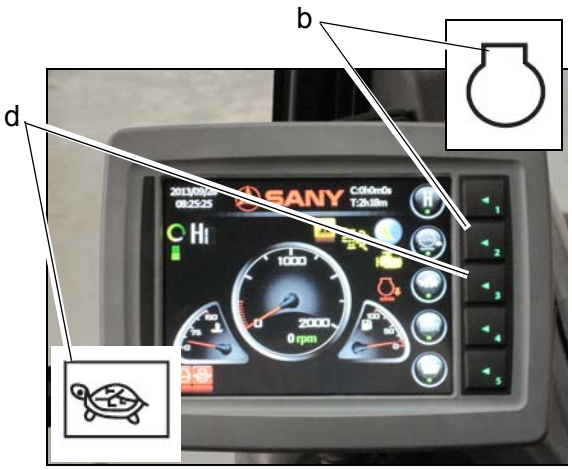


Fig. 4-104

8. Set the hydraulic locking lever (e) to the unlocked position.

9. Raise the work equipment to clear the trailer.

   NOTE: See “Control Work Equipment” on page 4-46.



Fig. 4-105

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10. Drive the machine slowly off the trailer.

    NOTE: See “Travel Operations” on page 4-34.

    NOTE: When unloading off the back of the trailer stop the machine when it is directly over the rear wheels and level. Position the work equipment so that the angle between the arm and the boom is 90 to 110°.



Fig. 4-106

11. Lower the bucket to the ground and move slowly down the ramp operating the boom and arm inward to provide support as the machine moves forward off the ramp.

12. Park the machine in the desired location.

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Maintenance

Maintenance Information 5-4
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⚠ WARNING

Read and understand the safety precautions and instructions in this manual before reading this section and performing any maintenance procedures on this machine. Failure to do can cause serious injury, death or property damage.

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MAINTENANCE INFORMATION

Do not perform any maintenance and/or repairs not authorized in this Safety, Operation & Maintenance Manual or the Service Manual for this machine. Always observe and follow all safety precautions and use the proper tools when performing any maintenance procedures.



Fig. 5-1

Checks Before Maintenance

Read and understand the Safety section of this manual — including the Lockout/Tagout procedure —before proceeding with any inspection or maintenance procedures.

NOTE: See “Lockout/Tagout Procedures” on page 2-21.

Observe and understand these points to ensure your safety:

- Do not perform any maintenance not authorized in this operator’s manual maintenance section for this machine. If maintenance is required that is not listed within this manual please contact your Sany distributor before proceeding.
- Avoid working on the machine while the engine is running unless required to do so in the procedure. If the engine must remain running during a procedure, always have a person in the cab who can correctly operate the machine and who is in clear contact with you at all times.
- Contact your Sany distributor if you are unable to perform the procedures listed in this manual or if additional procedures are required.
- Always use the proper tools when performing any maintenance procedures.
- Obtain the maintenance record for this machine before proceeding with any repair work.
- Always use the maintenance record for this machine to keep a daily record of the hour meter reading, then refer to it when determining your schedule of maintenance procedures.
- Always use genuine Sany parts, coolants and lubricants when maintaining this machine. Failure to do so may result in premature system or component failure.
- Use only the grease types listed in “Lubricating Grease/Temperature Data” on page 5-12 when lubricating the machine.
- If any access covers must be open when working on this machine, be sure those covers are properly supported.

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Checks After Maintenance or Repairs

Always do the following after performing any maintenance to the machine.

With the engine off:

- Be sure you have completed all the steps in the maintenance or repair of the machine.
- If necessary, have a coworker inspect your work for correct and proper completion.

With the machine running:

- Check for any leakage or overheating in the system you have serviced.
- Be sure there are no abnormal sounds coming from the engine or hydraulic system and nothing is loose.

Hour Meter Reading

Keep track of the hour meter reading on a daily basis. Confirm meter readings with the required maintenance schedule listed in this manual.

Genuine Sany Replacement Parts

Use genuine Sany replacement parts when repairing or replacing a part on the machine. Failure to do so may result in premature system or part failure.

Sany-Approved Lubricants

Never substitute lubricants or coolants with aftermarket products. System failure or the service life of the machine may be shortened. Always use approved Sany coolants and lubricants. Never mix lubricants of different brands. System damage or premature failure may result.

Windshield Washer Fluid

Use automotive windshield washer fluid only. Never use flammable liquids that could ignite or explode. Never use tap water, dirty water or fluids that could freeze, clog or damage the system.

Grease

Sany recommends Shell Alvania Grease EP (LF) 2 designed for:

- Heavy duty bearings and general industrial lubrication.
- Heavy duty plain and rolling element bearings operating under severe conditions, including shock loading in wet environments.
- Operation over 212°F (100°C) for bearings operating at 75% of the maximum rated speed (can withstand up to 248°F/120°C intermittently)

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Oil and Filter Inspection

Always inspect the drained oils and filters for signs of metal particles and foreign material. Contact your Sany distributor for an oil analysis test if any abnormality is found in the filter or oil.

Welding on the Machine

NOTE: Please contact your Sany America Customer Service Department for proper guidance on any welding being attempted.

Personnel welding on the machine must be fully qualified and certified to use the processes and equipment they may operate in making these repairs. Customers are responsible for the structural integrity of any completed repair. Sany strongly recommends against welding on chords or connectors, and fine grain hi-strength steels. Components should be replaced with Sany-authorized parts if they are damaged or modified.

Inventory Your Tools and Parts

After performing maintenance or repairs to the machine, always take time to inventory your tools, parts used and nuts and bolts to be sure none of these items were left on or inside the machine. Failure to do so could result in unexpected failure or damage to the machine.

Cleaning Parts or the Machine

- Never clean the machine with caustic chemicals or steam cleaners. Damage to the paint or operating systems could result. Instead, use mild soaps and a pressure washer to clean the machine. Always protect electrical parts when cleaning the machine.
- Never flood or pressure-wash the inside of the operator’s cab. Damage to the cab electrical system could result.
- Use only nonflammable cleaning solvents. Never use caustic or flammable liquids to clean parts or systems.

Adverse Work Site Conditions

If the machine will be operating under dusty or adverse conditions, Sany recommends that you:

- Clean the radiator and oil cooler core to avoid any clogging.
- Clean or replace the fuel filters more frequently than recommended later in this section.
- Check and clean any electrical components to avoid any accumulated corrosion.
- Check and clean any areas where extreme heat is present, such as the exhaust system, manifold and turbocharger.

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Covers and Locks

When servicing the machine with the covers open, be sure they are properly supported in place. Also be sure the covers close tightly and latch securely in place. If a lock is present, be sure the lock is properly latched for security.

Hydraulic Hoses, Lines or Components

Inspect hydraulic oil for any signs of contaminant. Contact your Sany distributor for an oil analysis test or replacement if any abnormality is found. Inspect the filters for signs of metal particles and foreign material and replace the abnormal ones. Failure to do so may affect the efficiency of hydraulic oil.

Third-Party Inspection Requirements

By law (OSHA) all employers shall designate a competent person (third-party) to inspect all machinery and equipment prior to and during use, ensuring the equipment is in safe operating condition. All deficiencies should be repaired, or defective parts replaced, before continued use.

Annual inspections of all hoisting machinery shall be made by a third-party or a government or private agency recognized by the U.S. Department of Labor. Owners are required to maintain a record of the inspection to include the date and results for each hoisting machine and piece of equipment used.

Inspection and Maintenance in Severe Environments

Operation in Mud, Rain or Snow

- Before operation: Inspect each plug and pin for looseness.
- After operation: Clean the crane, inspect for missing or loose bolts and nuts, and add oil and lubricating grease as needed.

Operation Near Ocean (Salt Air) Environments

Before operation: Inspect each plug and pin for looseness. Apply grease where rust is found, especially at connecting rods and control levers.

After operation: Thoroughly wash away the salt residue, apply grease where rust is found, and perform maintenance carefully on the electric components to prevent corrosion.

Dusty Environments

- Air filter: Clean the filter cartridge and dust collector frequently.
- Radiator: Clean the radiator core frequently to prevent blockage.
- Fuel equipment: Clean the filter parts frequently.
- Electric components: Clean the starter and contact surface of sensor carefully.

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Rocky Ground Surface

Crawlers should be set slightly loose from what is required for other environments. Crawler track tension is normally 20 - 45 mm (0.75 - 1.75 in.), Sany recommends that you loosen the crawler track tension to 45mm/1.75 inches for rocky ground surfaces only. Inspect the crawlers for damage, such as cracks, abrasions and scars on the travel mechanism and loose or missing bolts or nuts.

Cold Environments

In extreme cold environments (32F/0C) lubricate only with the oils shown in Engine Oil Viscosity/Temperature Data page 5-12. Sany recommends the use of fuels identified in Fluids and Lubricants, page 5-11 for extreme cold environments. Prior to staring the engine, ensure that the battery is fully charged and that the battery case and the cables have not cracked.

Other Weather Environments

During the maintenance and re-installation of track rollers, the direction should be reversed to prolong the lifetime of guide rails. This is much like rotating tires on a automobile for better tread wear. When reinstalling the rollers rotate them 180 degrees about the vertical axis from the orientation they were in when initially removed.

Inspect all items listed in this section to ensure the safe use of the chine before the initial use, or before use after maintenance or repair. Remember to include the results in the Maintenance Log. In addition to the previously described inspection items, clean and lubricate all components after a long-term (more than two weeks) shutdown of the machine.

Based on past experience and suggestions by lubricating oil suppliers, the lubricating intervals listed in the following tables apply only to “normal operating conditions”. In harsh environments, including dusty and corrosive air, abnormal external temperature, extremely heavy overload, frequent operating times, long-time duty cycle etc; lubricating intervals should be shortened. Always follow the schedule described in this manual until enough experience is obtained to establish a new schedule.

NOTE: If there is evidence of overheating of bearings or bushings, loose parts or rust during regular inspection; increase the frequency of lubrication.

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Torque Values

⚠ CAUTION

Nuts, bolts or other parts not tightened to specific torque values may lead to loose or damaged parts, resulting in machine failure and operating troubles.

Always refer to this chart if the tightening torque value is not listed or specified in the procedure. Unless specified otherwise, the metric nuts and bolts shall be tightened to the values given in the following table. The tightening torque is determined by the width of screw cap or nut. In replacement of the bolts or nuts, use Sany genuine parts of equivalent size.

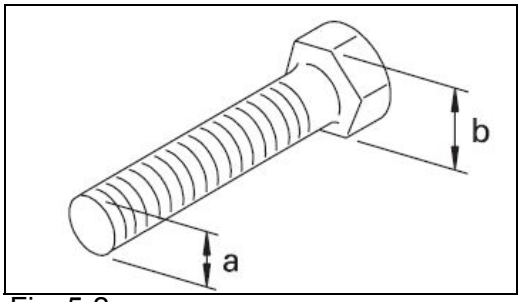


Fig. 5-2

Thread Dia. a (mm)	Square Size b (mm)	Tightening Torque					
		Target Value			Limit		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
6	10	13.2	1.35	9.8	11.8 – 14.7	1.2 – 1.5	8.7 – 10.8
8	13	31	3.2	23.1	27 – 34	2.8 – 3.5	20.3 – 25.3
10	17	66	6.7	48.5	59 – 74	6.0 – 7.5	43.4 – 54.2
12	19	113	11.5	83.2	98 – 123	10.0 – 12.5	72.3 – 90.4
14	22	177	18	130.2	157 – 196	16.0 – 20.0	115.7 – 144.7
16	24	279	28.5	206.1	245 – 309	25.0 – 31.5	180.8 – 227.8
18	27	382	39	282.1	343 – 425	35.0 – 43.5	253.2 – 314.6
20	30	549	56	405	490 – 608	50.0 – 62.0	361.7 – 448.4
22	32	745	76	549.7	662 – 829	67.5 – 84.5	488.2 – 611.2
24	36	927	94.5	683.5	824 – 1030	84.0 – 105.0	607.6 – 759.5
27	41	1320	135	976.5	1180 – 1470	120.0 – 150.0	868.0 – 1085.0
30	46	1720	175	1265.8	1520 – 1910	155.0 – 195.0	1121.1 – 1410.4
33	50	2210	225	1627.4	1960 – 2450	200.0 – 250.0	1446.6 – 1808.3
36	55	2750	280	2025.2	2450 – 3040	250.0 – 310.0	1808.3 – 2242.2
39	60	3280	335	2423.1	2890 – 3630	295.0 – 370.0	2133.7 – 2676.2

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Hydraulic hoses are tightened according to the torque values shown below:

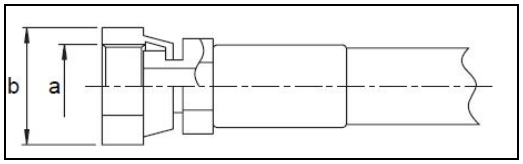


Fig. 5-3

Nominal Thread Number (a)	Square Size (b) (mm)	Tightening Torque					
		Target Value			Permissible Range		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
9/16-18UNF	19	44	4.5	32.5	35 – 63	3.5 – 6.5	25.3 – 47
11/16-16UN	22	74	7.5	54.2	54 – 93	5.5 – 9.5	39.8 – 68.7
13/16-16UN	27	103	10.5	75.9	84 – 132	8.5 – 13.5	61.5 – 97.6
1-14UNS	32	157	16.0	115.7	128 – 186	13.0 – 19.0	94 – 137.4
13/16-12UN	36	216	22.0	159.1	177 – 245	18.0 – 25.0	130.2 – 180.8
☆1 -7/16 - 12UN - 2B	41	215	22.0	159.1	176 – 234	18.0 – 24.0	130.2 – 180.8

NOTE: The item marked with ☆ is used for tightening the hose on top of the swivel joint.

Port Fitting	Tightening Torque Value		Tube Fitting	Tightening Torque Value	
	N•m	lbf•ft or (lbf•in.)		N•m	lbf•ft or (lbf•in.)
M14	34.3 ± 5	25 ± 4	G1/8	16.7 ± 2	(148 ± 18)
M16	54 ± 5	40 ± 4	G1/4	36.7 ± 2.5	27.1 ± 2
M18	70 ± 10	52 ± 7	G3/8	73.5 ± 5	54 ± 4
M20	93 ± 10	69 ± 7	G1/2	107.8 ± 7.8	80 ± 6
M22	125 ± 10	92 ± 7	G3/4	161.7 ± 14	119 ± 10
M24	142 ± 20	105 ± 15	G1	220 ± 25	162 ± 18
M24	68.6 ± 10	51 ± 7			
M26	180 ± 20	133 ± 15			
M20	49 ± 5	36 ± 4			
G3/8	68.6 ± 20	51 ± 15			
G3/4 (A)	1,661.7 ± 14	1,226 ± 10			

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FLUIDS & LUBRICANTS

Always use Sany-recommended lubricants, coolants and filters. Never mix fluids of different brands and never overfill the system you are servicing. Failure to follow these standards will reduce machine life.

Location	Approx. Capacity*	Lubricant/Coolant
Engine: QSL9 CM2250 EPA Tier4	7.67 gal. (29L)	See “Engine Oil Viscosity/Temperature Data” on page 5-12
Fuel system	137 gal. (520 L)	#2 Diesel Fuel.
Engine Cooling System	12.5 gal (48L)	Any brand meeting the Cummins® Engineering Standard 14603.
Slewing gearbox	1.3 gal. (5 L)	See “Industrial Gear Oil/Temperature Data” on page 5-12
Crawler gearbox/Final Drive	1 gal. (4 L)	
Hydraulic system (including tank)	108.3 gal. (410 L)	See “Hydraulic Oil/Ambient Temperature Data” on page 5-13
Slewing bearing	75 lb (34 kg)	See “Lubricating Grease/Temperature Data” on page 5-12
Anaerobic sealant	NA	Any anaerobic sealant having properties similar to LOCTITE 243 (Blue)
Spray lubricant	NA	Any lithium grease based spray lubricant
Mineral spirits	NA	Type II odorless mineral spirit and/or Class 1 (high flashpoint)
* The capacities in this table are approximations. For exact capacities, please use the inspection points, inspection plugs, dipsticks, and the sight glasses. Sany is not responsible for damage caused by using unauthorized lubricants and coolants.		

Fuel

Sany recommends the use of #2 diesel fuel for all normal operations. Use of #1 diesel fuel in a blend with #2 diesel is normally mandated by local authorities in cold weather environments for more efficient operations.

NOTE: Sany does not recommend the use of any diesel fuel with a Cetane level less than 40.

NOTE: Do not use gasoline, kerosene or any unapproved fuels in the fuel system. If fuel waxing or bacteria occurs in the fuel system, contact your Sany distributor for help. Never dilute fuels, damage to the fuel injection system may result from this action

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Table 5-1: Engine Oil Viscosity/Temperature Data

Temperature °F (°C) / Oil Type	-22 (-30)	-4 (-20)	5 (-15)	32 (0)	50 (10)	68 (20)	86 (30)	104 (40)	122 (50)
SAE15W-40									
SAE10W-30									
SAE5W-30									
SAE 5W-40									
SAE 40W									

NOTE: Due to its comparatively better lubricating characteristics (including improved oil consumption, engine operation in frigid climates, and continued lubrication in high temperatures), SAE 5W-40 is recommended for a majority of climates. In some circumstances, short-term use of low viscosity engine oil in cold temperatures (below 23°F / -5°C) is acceptable, long-term use can reduce engine life.

Table 5-2: Lubricating Grease/Temperature Data

Temperature °F (°C) / Grease Type	Summer	Winter
#2 molybdenum disulfide lithium-based grease		
#3 molybdenum disulfide lithium-based grease		

NOTE: The maximum operating temperature of lubricating grease must be 20°-30º C lower than its dropping point.

Table 5-3: Industrial Gear Oil/Temperature Data

Temperature °F (°C) / Oil Type	-4 (-20)	14 (-10)	32 (0)	50 (10)	68 (20)	86 (30)	104 (40)	122 (50)
220LS2								

NOTE: Short-term use of low viscosity engine oil in cold temperatures (below 23°F / -5°C) promotes engine life; long-term use of low-viscosity engine oil can reduce engine life.

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Table 5-4: Hydraulic Oil/Ambient Temperature Data

Temperature °F (°C) / Oil Type	-22 (-30)	-4 (-20)	14 (-10)	32 (0)	50 (10)	68 (20)	86 (30)	104 (40)	122 (50)
L-HM46 antiwear hydraulic oil									
L-HV32 low temperature antiwear hydraulic oil									

NOTES:
1. Select proper hydraulic oil based on local operating climate and conditions:
   - Use L-HM46 antiwear hydraulic oil in generally temperate climates.
   - Use L-HV32 low temperature antiwear hydraulic oil (pour point is -43.6° F (-42° C) in generally arctic areas where ambient temperatures during operation can reach -22° F (-30° C).

2. To prevent damage to the hydraulic system, perform the following warm-up procedure in ambient temperatures below 32° F (0° C):
   (a) Start the engine and run it at idle speed for 7 - 10 minutes; then increase the engine speed to 1,000 - 1,200 rpm and perform only no-load traveling for at least 30 minutes or until the hydraulic oil temperature is at least 68°F (20°C).
   (b) Proceed with normal operation only after completing warm-up as described above or else adjust the warm-up period according to the ambient temperature. During normal construction operation, take care to operate the controls slowly and observe the traveling system for any signs of trouble. Operation with oil temperature of 68° F (20° C) or below may damage the hydraulic system.

Engine Oil

Engine oil change intervals will vary according to the amount of sulfur in the fuel. Change engine oil according to the following table:

Fuel Sulfur Content	Engine Oil Change Interval
0.5 to 1.0%	1/2 of the regular interval
Above 1.0%	1/4 of the regular interval

Lubricants

Sany recommends using only those lubricants listed in “Fluids & Lubricants” on page 5-11 and does not recommend commercially available lubricants or additives other than what is listed in this chart. Note that commercially available lubricants and additives may cause harm.

NOTE: Contact your Sany distributor for assistance if the machine will be operated in subzero temperatures where the aid of an auxiliary heating device is needed.

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DAILY MAINTENANCE

NOTICE

Failure to perform the following procedures when and how directed will result in shortened service life of the machine or a system failure during operation.

1. Park the machine on a level flat surface (a), shut the engine down and remove the ignition key.



Fig. 5-4

2. Follow the Lock-out Tag-out procedure in the Safety section of this manual. Always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-21 for details.

3. With the machine secured, proceed with the following:

   NOTE: Obtain the maintenance record for this machine and complete it at the close of all maintenance procedures.

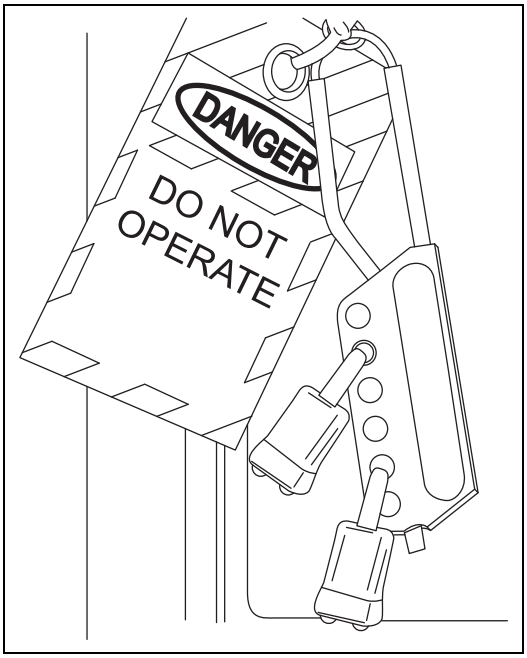


Fig. 5-5

Checks:

- Safety, Operation & Maintenance Manual (see page 5-15)
- Operating Functions (see page 5-15)
- Signal, Running Lights and Horn (see page 5-15)
- Brakes (see page 5-18)
- Fire Extinguisher and First Aid Kit (see page 5-18)
- Engine Oil Level (see page 5-19)

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- Pump Mounting Bolts (see page 5-20)
- Fuel Level (see page 5-21)
- Engine Coolant Level (see page 5-21)
- Engine Serpentine Belt (see page 5-22)
- Slewing Gearbox (see page 5-24)
- Hydraulic Oil Level (see page 5-25)
- Hydraulic Line Connections (see page 5-26)
- Electrical System (see page 5-28)
- Air Conditioner (see page 5-30)
- Idler Wheel (see page 5-33)
- Sheet Metal (see page 5-34)

Drain:

- Primary Fuel Filter (see page 5-35)

Check

Safety, Operation & Maintenance Manual

Be sure the Safety, Operation & Maintenance manual is with the machine in the cab.

NOTE: If damaged or missing, contact your Sany distributor.

Operating Functions

⚠ WARNING

Ensure that no one is on or around the machine when testing operating functions. Failure to ensure this could result in serious injury or possible death.

Check that all functions in the operating cab work correctly.

NOTE: See “Cab Interior” on page 3-5.

Signal, Running Lights and Horn

Check all lighting systems, be sure all lights function properly and are not damaged. Check the function of the horn, be sure it is operational.

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NOTE: See “Cab Interior” on page 3-5.

NOTE: If any component is damaged or inoperable, contact your Sany distributor.

Ensure that the following lamps and other devices work properly:

- Horns (1)



Fig. 5-6

- Chassis work lamp (2)



Fig. 5-7

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- Cab work lamps (3)



Fig. 5-8

- Boom work lamps (4)



Fig. 5-9

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- Windshield wiper and washer (5)



Fig. 5-10

Fire Extinguisher and Escape Tool

Check to be sure the fire extinguisher (1) is installed on the machine and in proper working order. Follow the instructions on the extinguisher to test the operation and condition.

Check to be sure the escape tool (2) is installed on the machine.

NOTE: See “Extinguisher and First Aid Kit” on page 2-14.



Fig. 5-11 Typical

Backup Camera

Check and ensure that the backup camera is operational and that the camera (1) itself is free of all obstructions and debris.

NOTE: See “Backup Camera” on page 4-22 for additional information.



Fig. 5-12

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Engine Oil Level

NOTE: See “Engine Oil Level” on page 4-16 for information on checking the oil level.

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Pump Mounting Bolts

1. Locate and inspect the Hydraulic Pump (a) for loose, broken or missing pump mounting bolts (b), and leaks or cracking at these mounting bolt locations.



Fig. 5-13

NOTE: Not all pump mounting bolts are shown here. Be sure to inspect all pump mounting bolt locations.

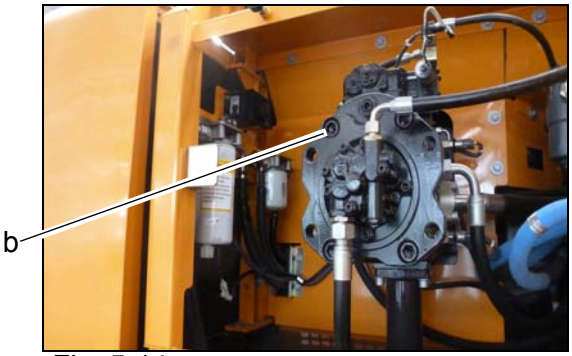


Fig. 5-14

2. Use the following table when tightening these bolts.

Bolt Type	Torque Value
Pump Mounting Bolt (M10×35) 10.9	36 ft•lb (49 N•m)

NOTE: Contact your Sany distributor if any abnormality is found.

NOTICE

Do not overtighten the mounting bolts. Failure to observe and follow this directive may result in damage to the bolts, the mounting brackets or the engine case.

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Fuel Level

NOTE: To check the Fuel Level See “Fuel Level” on page 4-13, see also “Fluids & Lubricants” on page 5-11.

Engine Coolant Level

Cummins® engine cooling system general recommendations are listed below. These recommendations apply to both standard service intervals and extended service intervals. For an engine using standard service interval coolant, the additive and glycol levels must be tested every 6 months.

Standard Maintenance

- A small amount of coolant can leak when servicing the coolant filter (if equipped) with the shutoff valve in the **OFF** position. Avoid contact with hot coolant to reduce the possibility of personal injury. Always allow sufficient time for the engine to cool down to outdoor temperatures before servicing the cooling system.

⚠ WARNING

Coolant is toxic. Keep it away from children and pets.

NOTICE

If not re-used, dispose of the coolant in accordance with local environmental regulations. Failure to do so may result in fines or punishment.

- Fill up and top off cooling systems using a fully formulated coolant which meets Cummins®® Engineering Standard 14603. Replace the coolant filter(s) at every recommended coolant filter change interval.

⚠ CAUTION

Do not remove the filler cap while the engine is hot. Engine coolant is under pressure when hot and will spurt out. Always wait for the engine to cool to outdoor ambient temperatures before removing the filler cap. Failure to follow this warning could result in minor or major injuries.

NOTE: See “Engine Coolant Level” on page 4-19 for information on checking the Engine Coolant Level, see also “Fluids & Lubricants” on page 5-11 for further information on coolant type.

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Engine Serpentine Belt

1. Unlock and open the engine hood (a).



Fig. 5-15

2. Locate the engine serpentine belt (b) and inspect the belt for those items listed in step 3.



Fig. 5-16

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3. Compare the information here with the actual belt.

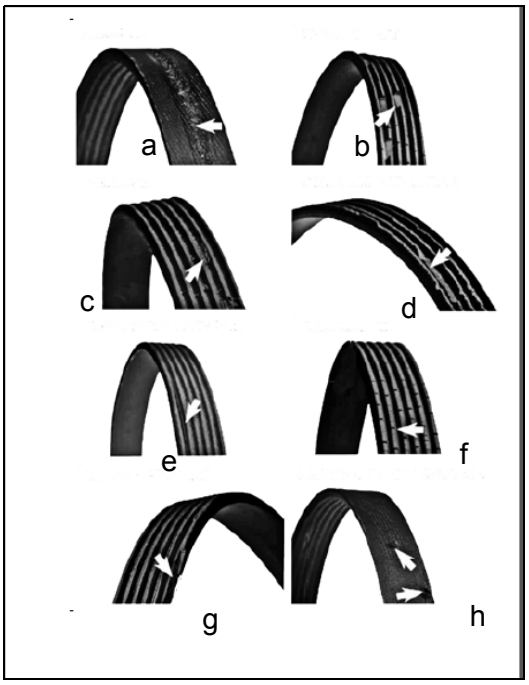


Fig. 5-17

   a. Abrasion: The belt appears shiny, glazed or fabric is exposed. This is a sign that the belt is in contact with an object such as a flange or bolt.

   b. Chunk-out: Chunks of rubber material have broken off from the belt. At this stage, the belt can fail at any moment. Heat, age and stress are the primary contributors.

   c. Pulling: Belt material is sheared off from the ribs. Lack of tension, misalignment, worn pulleys or a combination of these are factors.

   d. Uneven rib wear: Belt shows damage to the side with the possibility of breaks in the tensile cord or jagged-edged ribs. A thumping/grinding noise may also be heard when running.

   e. Improper installation: A belt rib begins separating from the strands. If left unattended, the cover will often separate, causing the belt to unravel.

   f. Cracking: Small visible cracks along the length of a rib or ribs. With continuous exposure to high temperatures, the stress of bending around the pulley leads to cracking.

   g. Misalignment: Sidewalls of the belt may appear glazed or the edge-cord may become frayed. A noticeable noise may result.

   h. Gravel penetration: Small pinholes are visible on the backside of the belt. Bumps may be visible and fabric around the holes can be frayed, indicating damage from foreign objects such as dirt, gravel or similar debris.

4. Replace all damaged belts.

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Slewing Gearbox

1. Locate and inspect the slewing gearbox (a) for physical damage of any kind. Contact your Sany representative for further advice if any damage is found.



Fig. 5-18

2. Remove the dipstick (b) from the slewing gearbox and note the oil level on the dipstick.

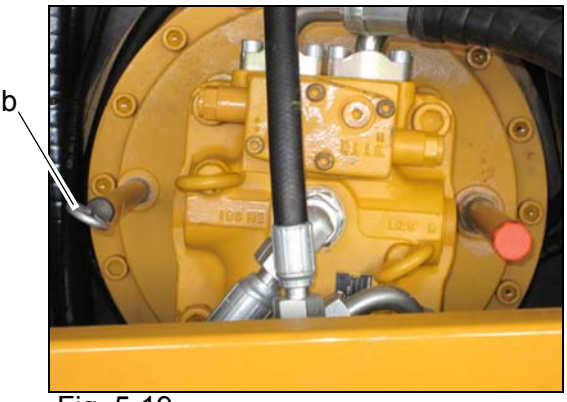


Fig. 5-19

3. The oil level should be within the etched area (c) on the dip stick surface.

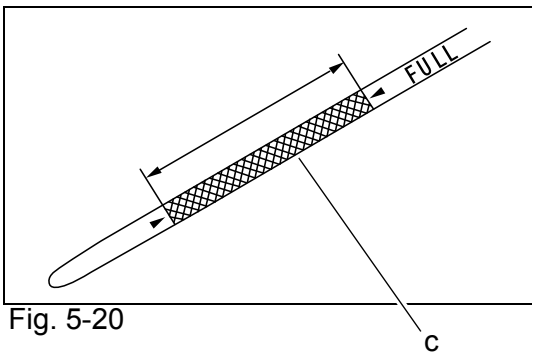


Fig. 5-20

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4. If necessary, remove the oil filler cap (d), add oil as needed, then reinstall the cap. See “Fluids & Lubricants” on page 5-11

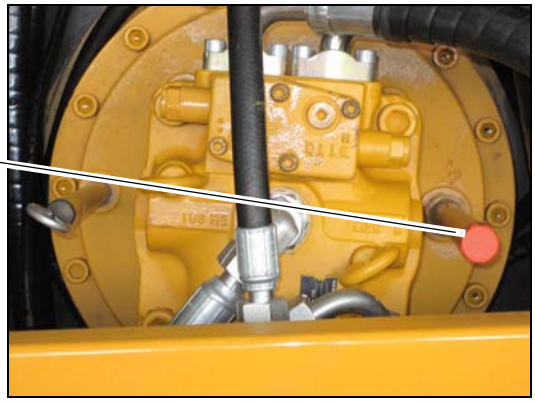


Fig. 5-21

Hydraulic Oil Tank

⚠ CAUTION

Hydraulic oil is hot and under pressure. Always wait for the machine to cool down to below 160°F (71°C) before attempting to maintain the hydraulic oil system. Failure to do so could result in minor or major injuries.

1. Open the right rear access panel to access the hydraulic oil tank (a), then check it for leaks, exterior rust and other damage.



Fig. 5-22

2. Check the oil level (b) via the sight glass on the side of tank. Insure that the oil level is between the level marks on the sight glass.

   NOTE: See “Hydraulic Oil/Ambient Temperature Data” on page 5-13 for proper hydraulic oil.

   NOTE: Do not add hydraulic oil to the tank if the instrument display shows a reading higher than 160°F (71°C)



Fig. 5-23

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3. If necessary, remove the filler cover (c) and add hydraulic oil to the system until the hydraulic oil level is between the level marks on the sight glass (b).

4. Check and tighten the various hydraulic fittings and/or replace any that are defective, especially if the hydraulic oil level has noticeably dropped since the previous level check.

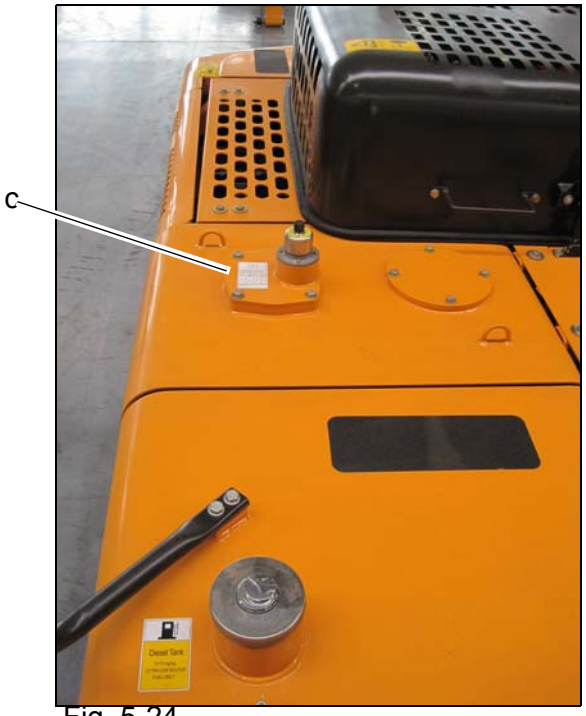


Fig. 5-24

Hydraulic Line Connections

1. Open the right rear access panel (a).



Fig. 5-25

2. Examine the hoses (b) between the tank and the hydraulic pump for leaks, breaks or loose connections.



Fig. 5-26

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3. Check fittings (c) at both ends of the flexible hose every day. Be sure to inspect all bolt locations.

   NOTE: These bolts/screws at each end of this hose may loosen occasionally due to vibration. Leaks at the angled seals will eventually result in pump failure.

4. Replace any damaged or defective bolts and retighten any loose bolts.

Bolt Diameter (Grade)	Torque Value
M16 (8.8	86-106 ft•lb (116-144 N•m)

NOTE: Do NOT use thread sealant when reinstalling loose bolts and installing new bolts.

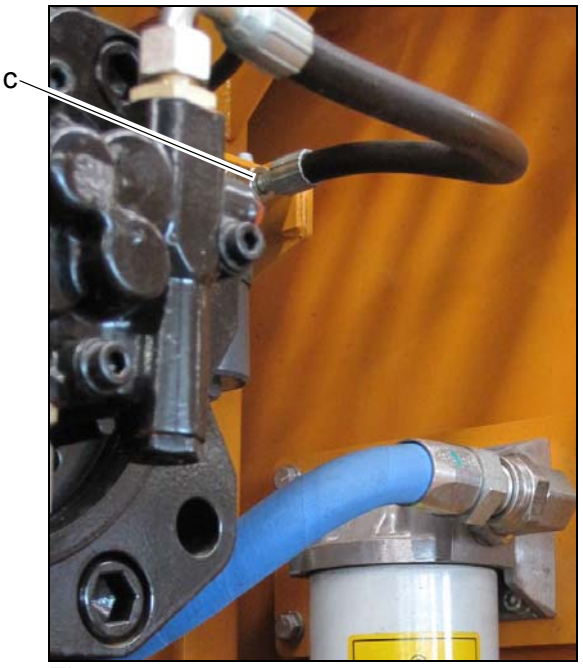


Fig. 5-27

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Electrical System

The electrical system should be inspected starting with the box. The fuse box (a) is located at the left rear of operator's seat. If a fuse is corroded or if a white powder can be seen on it, contact your Sany distributor for repair information regarding the electrical circuit in question.



Fig. 5-28

Fuse location, circuit & amperage	
F2. Cab Lamp, 2A	F1. Horn, 5A
F4. Display, 10A	F3. Ignition circuit, 20A
F6. ECM, 30A	F5. 12V power supply, 10A
F8. Connector, 10A	F7. 24V power supply, 10A
F10. Dome lamp, 10A	F9. Boom light, 10A
F12. Air conditioner, 20A	F11. HCU controller, 15A
F14. Battery charge, 15A	F13. Radio, 3A
F16. Travel alarm, 2A	F15. Windshield washer, 2A
F18. Windshield Wiper, 10A	F17. Pilot Control, 10A
F20. Rear camera, 5A	F19. Emergency stop, 5A

NOTICE

Before replacing a fuse, make sure that the start switch is in OFF position and the battery is disconnected. Fuses should be replaced if it is eroded, produces white powder or becomes loose in the fuse panel. Always replace a fuse with one of the same capacity, never replace a fuse with one of a higher capacity. Doing this may cause the machine to catch on fire.

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Electrical power disconnect process

1. Locate and unlock the battery compartment access panel (a) on the right front side of the machine.



Fig. 5-29

2. Open the battery compartment access panel to view the batteries (b).To disconnect power from the machine remove the black (ground) cable (c) from the battery post first, then remove the red (power) cable (d) from the battery post second.

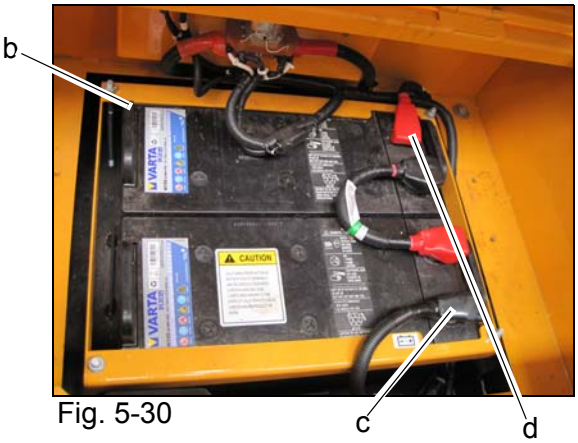


Fig. 5-30

⚠ WARNING

When working with any open electrical power source ensure that your hands are free of any metal objects (rings, watches, jewelry) that could come in contact with electrical power points. Failure to do so could cause personal injury or electrical shock.

3. To reconnect power, reverse the process shown in step 2 insuring that the red cable is connected first followed by the black cable.

Other electrical inspection points:

- Inspect all electrical equipment and circuitry regularly; if necessary, remove and replace all faulty items, including loose connectors, worn or degraded wiring, cables, etc.
- Locate and remove the cause of any electrical faults.
- Use only genuine spare parts and fuses as specified here.
- Shut off the machine immediately if a fault occurs with the power supply.

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- Do not modify the electrical system without authorization.

Air Conditioner

1. Engage the air conditioner control located (a) on the left console..



Fig. 5-31

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2. Press the air conditioning fan switch (b) inside the cab to check startup, air flow and fan speed control.

   NOTE: To change temperature display from C° to F° (or vice versa) press and hold the temperature up/down arrows at the same time.

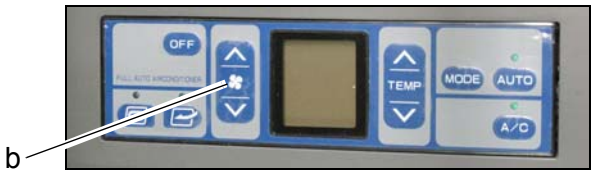


Fig. 5-32

3. Go to the air conditioner compressor which is located under the left engine hood (c).



Fig. 5-33

   NOTE: The a/c compressor (d) is located above the engine next to the exhaust pipe.

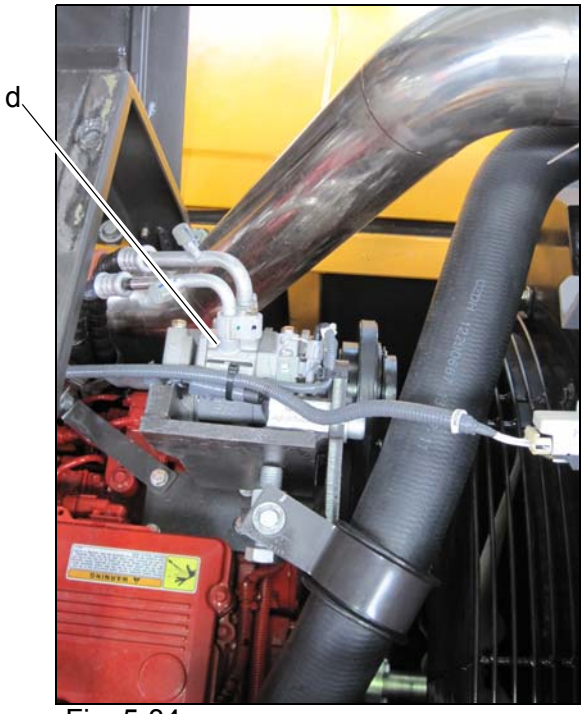


Fig. 5-34

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4. Check for the following:

   - Refrigerant leakage at the pipeline connections (e)
   - Any blockage by debris
   - That the drive belt (g) is not loose, worn or twisted

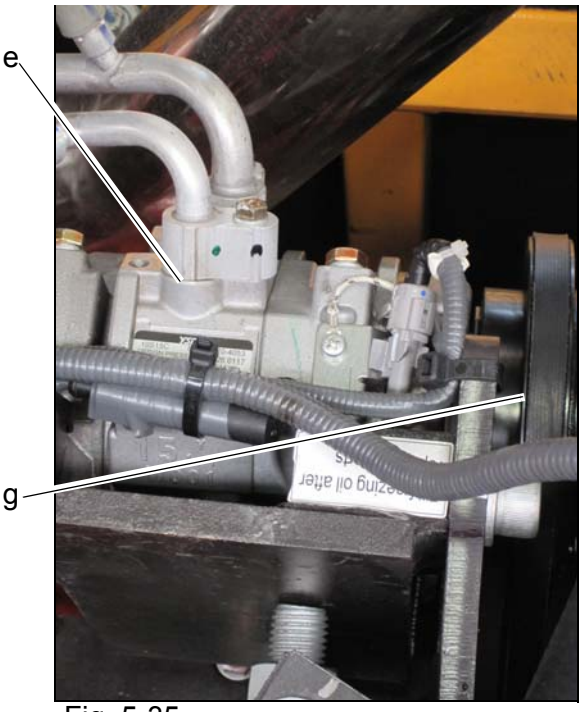


Fig. 5-35

5. Open the left side rear access panel (h) to check the a/c condensor.



Fig. 5-36

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6. Check the sight glass on top of the condensor (k) for refrigerant quantity.

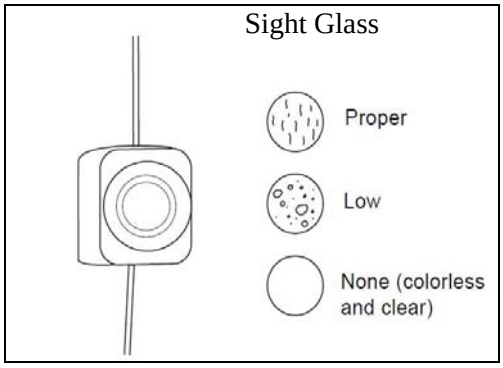




Fig. 5-37

Idler Wheel

Check the idler wheel (a) looking for cracks and distortion.



Fig. 5-38

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Sheet Metal

Check (a) for loss, damage, loose connections or missing bolts.



Fig. 5-39

Decals

All safety decals (b) should be visible and complete.

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Drain

Draining the Primary Fuel Filter

⚠ DANGER

Never service the fuel system near an open flame or while smoking. Doing so could result in fire, explosion, serious injury or death.

NOTE: See “Draining Primary Fuel Filter” on page 4-14 for information on how to drain the Primary Fuel Filter. If an excessive amount of water or contaminant was found while draining the primary fuel filter, Sany recommends that the fuel tank should be drained.

1. Place a large enough container(137 gal/ 520 L) to hold the drained fuel under the drain valve (c) located below the hydraulic pilot line filter against the wall.

   NOTE: See “Fluids & Lubricants” on page 5-11 for additional information.



Fig. 5-40

2. Rotate and move the drain valve (d) counterclockwise to open it.

3. Rotate the drain valve (d) clockwise when the flow from the tank bottom is free of water or contaminant.

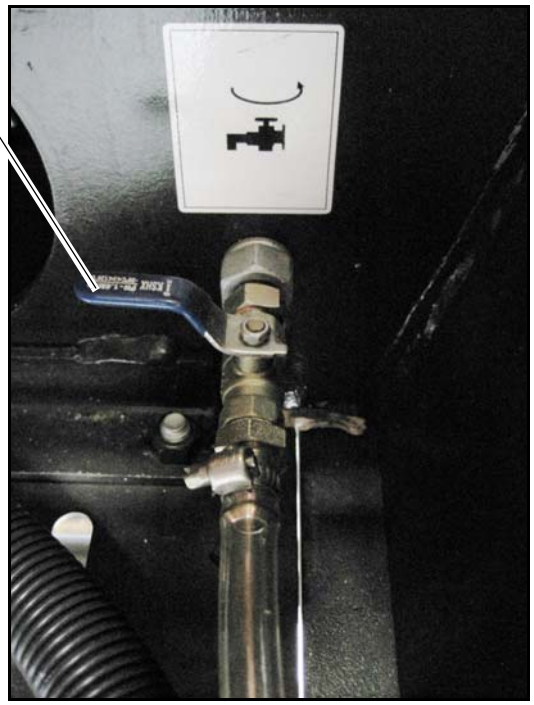


Fig. 5-41

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NOTICE

Dispose of the contaminated fuel properly. Failure to do so will violate environmental laws and ordinances.

4. Start the engine and allow it to run at idle speed, then check for leaks in the fuel system.
5. Repair any leaks, then close and lock the access panel.

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50 HOURS OF MAINTENANCE

NOTICE

Failure to perform the following procedures when and how directed will result in shortened service life of the machine or a system failure during operation.

1. Park the machine on a level flat surface (a).



Fig. 5-42

2. Follow the Lock-out Tag-out procedure in the Safety section of this manual. Always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-21 for details.

   NOTE: Obtain the maintenance record for this machine and complete it at the close of all maintenance procedures.

3. With the machine secured, proceed with the following:

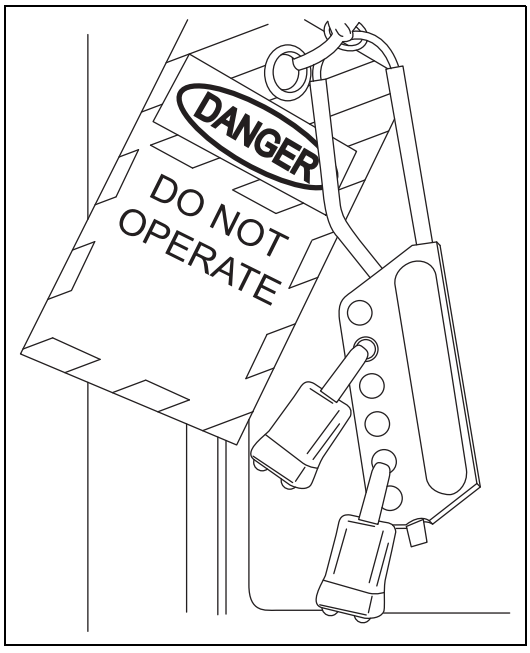


Fig. 5-43

Change:

- Engine Oil and Filter - Initial (see page 5-38)

Check:

- Slewing Gearbox Oil Level (see page 5-24)
- Air Intake System (see page 5-42)
- Muffler and Exhaust System (see page 5-43)
- Hydraulic Hoses (see page 5-44)
- Batteries (see page 5-45)
- Crawler Shoe Connecting Pins (see page 5-48)

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- Crawler Support Roller Mounting Bolts (see page 5-48)
- Crawler Gearbox Oil Level (see page 5-49)
- Crawler Drive Sprocket Mounting Bolts (see page 5-50)
- Track Tension - Initial (see page 5-51)

Lubricate:

- Slewing Bearing (see page 5-54)

Change

Engine Oil and Filter - Initial

⚠ WARNING

Do not perform this task when the engine is hot. Wait for the temperature to cool down before doing this job. Failure to do so may cause burns or other serious injury.

1. Remove the belly plate (a) under the engine compartment.

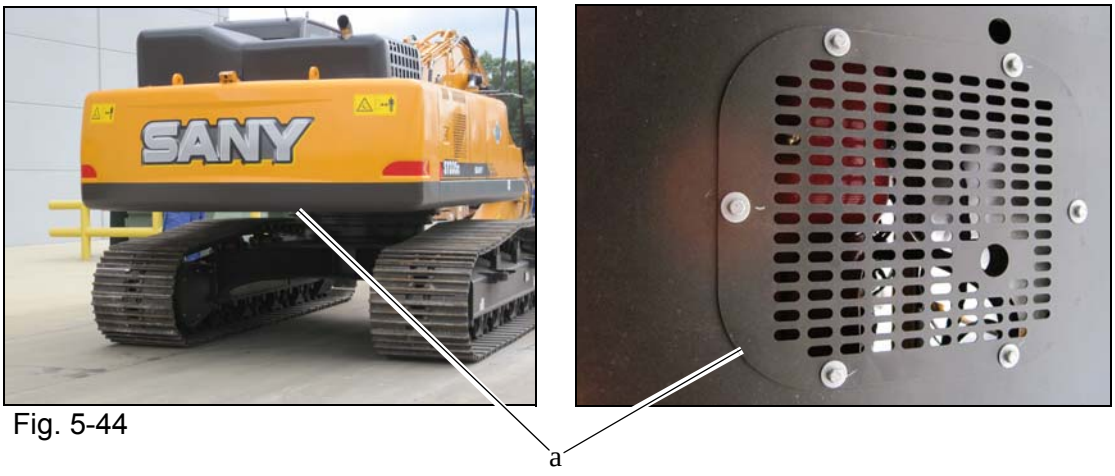


Fig. 5-44

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2. Open engine cover (b).



Fig. 5-45

3. Remove the engine oil filler cap (c).



Fig. 5-46

4. Place a container (at least 6 gal/ 23 L) in size under the drain valve (d).
5. Slowly open the valve to drain all of the oil.
6. Close the valve when all of the oil has drained from the engine.
7. Replace the belly plate (a).



Fig. 5-47

NOTICE

Dispose of the contaminated oil properly. Failure to do so will violate environmental laws and ordinances.

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8. Open the right rear access panel (c) and locate the engine oil filter (d).



Fig. 5-48



9. Turn the engine oil filter (e) to the left to remove the oil filter.

10. Clean the engine oil filter mount (g).

    NOTE: Check the mount for any of the previous seal. If found remove this used seal to prevent oil leakage when a new filter is mounted in place.

11. Clean the oil filter mounting surface, then coat the new filter seal ring with a thin layer of engine oil.

12. Thread the filter into place on its mount until the filter gasket contacts the filter mount, then tighten the filter 3/4 turn more.



Fig. 5-49

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13. Check engine oil dipstick level (k).



Fig. 5-51

14. Replace oil until the oil level falls between the etched marks (m).

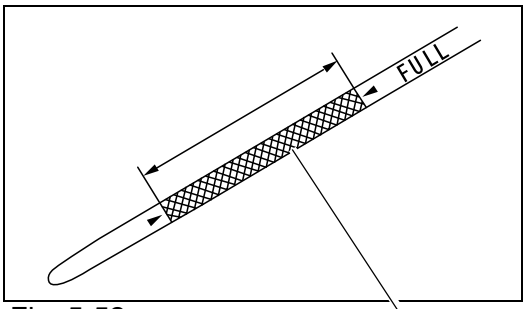


Fig. 5-52

15. Replace engine oil through the fill point (n). See “Engine Oil Viscosity/Temperature Data” on page 5-12.

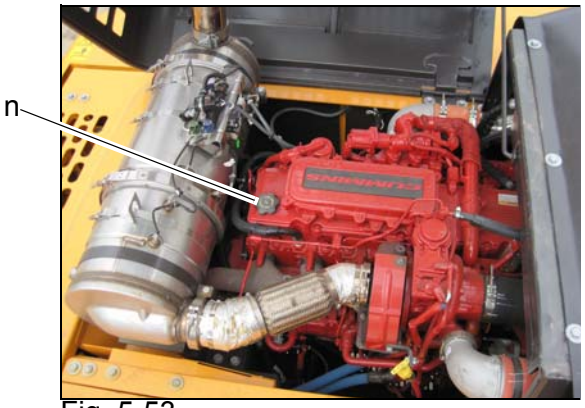


Fig. 5-53

16. After adding the required amount of oil to the engine, start and run the engine at idle speed for a short time and check for leaks.

17. Shut the engine down, wait for several minutes, then remove the dipstick from the engine and note the oil level on the dipstick.

    NOTE: The oil level should be within the etched area (m) on the dip stick surface.

18. If necessary, remove the oil filler cap (n), add oil as needed, then reinstall the cap.

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Check

Air Intake System

1. Locate the air intake system inside the left side access panel (a).



Fig. 5-54

2. Squeeze the dust vacuator (b) mounted at the bottom of the filter housing to release any dust or debris.



Fig. 5-55

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3. Check the condition of the dust vacuator (c) and replace if required.

   NOTE: If the dust vacuator is cracked, torn, remains open or is missing, dust particles that are normally expelled can deposit themselves onto the filter and will shorten air filter service life.

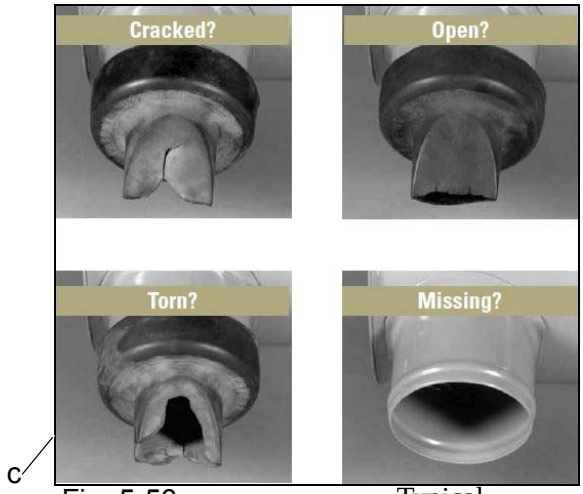


Fig. 5-56 Typical

Muffler and Exhaust System

1. Open the engine compartment (a).



Fig. 5-57

2. Locate the muffler and exhaust pipe (b) next to the engine.



Fig. 5-58

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3. Inspect the muffler (c) and its mount for leaks or signs of damage. Be sure the exhaust pipe is clear and not restricted. Check the connection to the expansion pipe to be sure there are no signs of leakage.

   NOTE: If any abnormality is found, contact your Sany distributor for repairs.

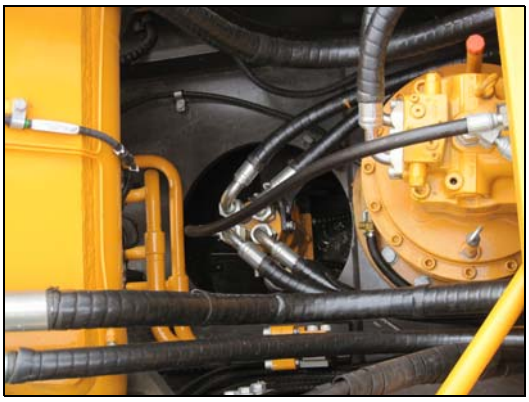


Fig. 5-59

⚠ CAUTION

Never operate a machine with a defective exhaust system. Exhaust leaks or a restricted or damaged exhaust system could cause an unexpected fire leading to minor or major injury.

Hydraulic Hoses


Fig. 5-60

Check all hoses regularly for possible leakage and replace damaged or leaking hoses immediately, even if there is a slightest damage.

Any hydraulic pump lines and connectors connected to the engine chamber must be replaced if they are damaged due to mechanical /thermal or other effects.

Ensure that there is a sufficient distance from all lines and hoses to the high temperature engine components (for instance, the exhaust system) and that there is no friction between them.

Possible hose defects are as follows:

- The couplings slip in the hose
- Damage, cuts or abrasions in the external rubber layer
- Hardening, chapping or burning of hose
- Any cracks, damage or serious corrosion on the couplings
- Any leakage at the hose couplings

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- Any twisted, broken, flat or distorted hose
- Blisters or softness in the external hose layer

Besides the defects listed above, also look for these signs of problems when doing the visual inspection:

- Oil leakage at the oil orifice of the engine block.
- Clogging by debris

NOTE: Repair or replace those items as described above.

Batteries

The batteries provide the power supply to start the engine, control electric apparatus, lighting and auxiliary electric equipment.

⚠ CAUTION

Before proceeding with any battery maintenance procedure follow and remember these points:

- **Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames.**
- **Wear personal protective equipment when working with batteries.**
- **Work in a well-ventilated area.**

If battery acid contacts your skin or your eyes, flush the area immediately with fresh water and seek medical attention.

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1. Locate, unlock and open the battery compartment access panel (a) on the right front side of the machine.

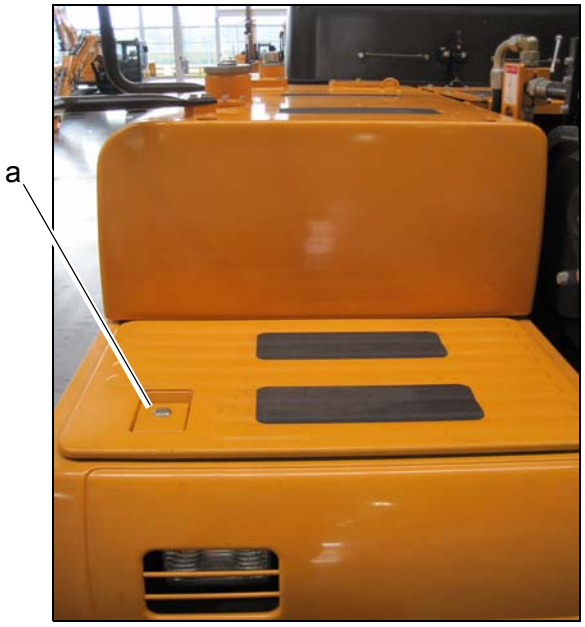


Fig. 5-61

NOTE: Allow several minutes for any accumulated battery gases to clear before servicing the batteries (b).

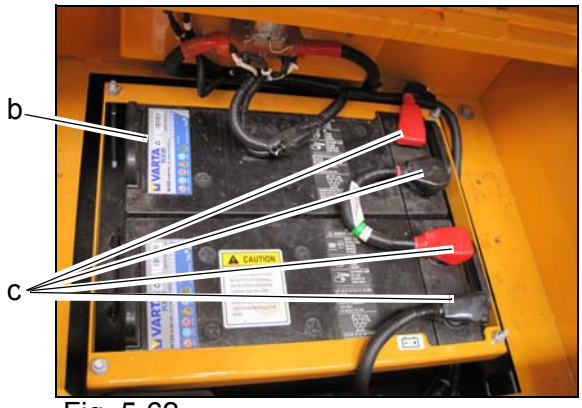


Fig. 5-62

2. Check the top surfaces and all the battery connections (c) for signs of corrosion or dirt build-up. Use a clean rag to wipe any dirt from the batteries. If corrosion is found, flush the area with a mix of baking soda and warm water.

3. Remove any trash, tools parts or debris from the battery compartment.

4. Once the battery service procedures are complete close the battery compartment access panel.

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Replacement

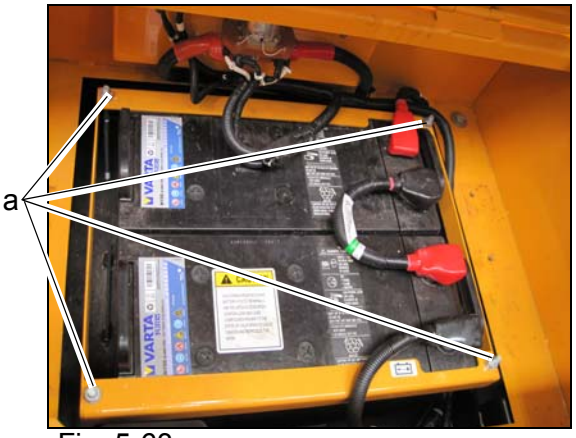


Fig. 5-63

1. Disconnect the black ground (-) battery cables first, then disconnect the red positive (+) cables last and lift out the failed battery.

2. Remove the battery retaining frame by disconnecting the four nuts (a) at the corners of the frame and then lift the frame out taking care not to come in contact with the battery terminals.

3. Install the new battery (or batteries) inside the battery compartment positioned correctly.

4. Install the battery retaining frame following the directions shown in step 1 in reverse.

5. Connect the red positive (+) cables first then the black ground (-) cables afterwards.

   NOTE: Both 12-volt batteries are attached in series. Be sure they are installed in the same manner.

6. Torque the battery cable clamps to 7.2 lbf·ft (9.8 N·m).

   NOTE: Dispose of the old batteries properly.

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Crawler Shoe Connecting Pins

1. Ensure that all retaining bolts (a) are properly in place at each pair of crawler shoes (b) and not broken, bent or damaged.

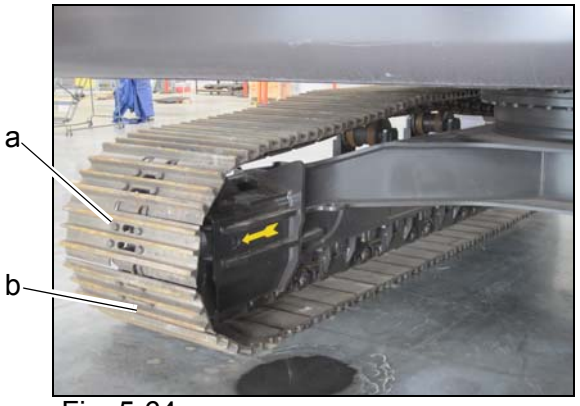


Fig. 5-64

2. If the bolts are loose, tighten them in sequence (c) to 440-500 lb ft (61-69 kgf) ensuring the nuts and track shoe are in close contact with the link mating surface.

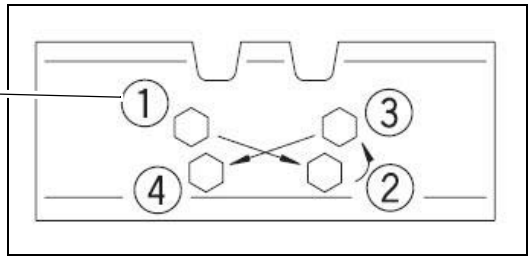


Fig. 5-65

Crawler Support Roller Mounting Bolts

1. Inspect the mounting bolts (a) that secure the support rollers to the side frame for rust, damage or looseness.

2. Replace any damaged or defective bolts and tighten any loose bolts.

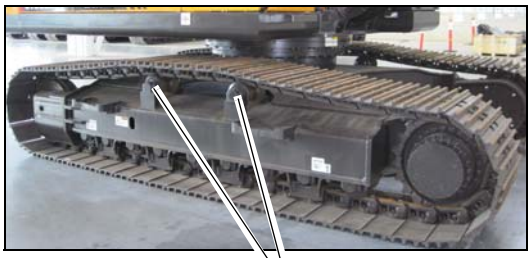


Fig. 5-66

NOTE: Use thread sealant when reinstalling loose bolts and installing new bolts, tightening each of them to the following values.

Item	Diameter	Torque Value	Thread Sealant
Mounting Bolt GB5782	M18x100	399 - 485 ft•lb (540 - 658 N•m)	Anaerobic sealant

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Crawler Gearbox Oil Level

1. Park the crane on firm, level ground with the drain plug (a) positioned at the bottom.

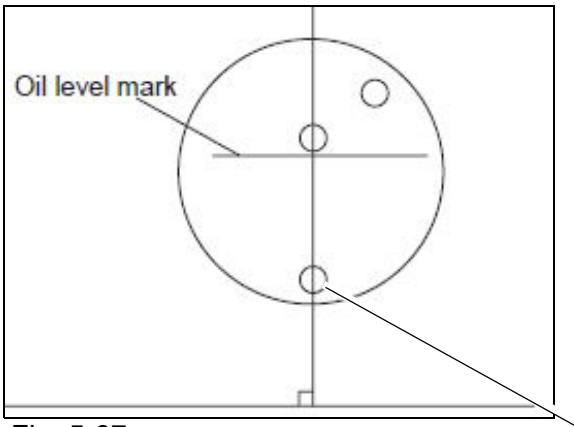


Fig. 5-67



2. With the machine running, listen for abnormal noise from inside the crawler gearbox.

   NOTE: Contact Sany if abnormal noise is heard.

3. Stop the machine, then remove the check plug (b) and visually check to be sure the oil level is within 0.4 in. (10 mm) of the bottom of the check plug hole.

4. If the oil level is low, add oil through the check plug hole (c) until the level is within 0.4 in. (10 mm) of the bottom of the hole.

   NOTE: See “Fluids & Lubricants” on page 5-11 for more information if needed.

NOTICE

Do not overfill the case or damage to the case seals may result.

5. Install and tighten the check plug to 50 ft•lb (68 N•m).

6. Check for external leakage.

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NOTICE

If oil leakage is found during the oil level inspection, stop the inspection, locate and repair the cause of the oil leakage. Failure to do this may result in low oil level during operation and component failure.

Crawler Drive Sprocket Mounting Bolts

1. Locate and remove the Crawler Drive Sprocket cover (a)



Fig. 5-68

2. Inspect all of the crawler drive sprocket mounting bolts (b) and the hydraulic motor mounting bolts (c) for rust, damage or looseness.

3. Replace any damaged or defective bolts and retighten any loose bolts.

   NOTE: Use anaerobic thread sealant when reinstalling loose bolts and installing new bolts, tightening all of them to the following values:

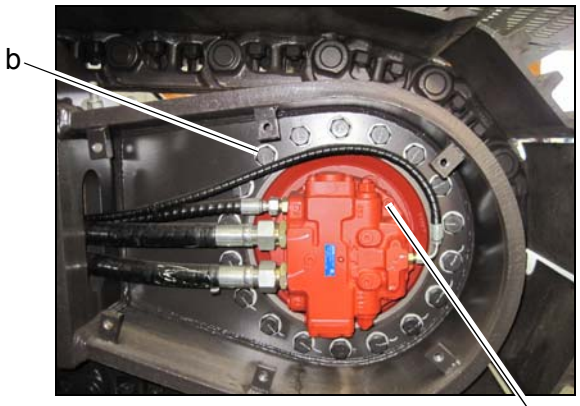


Fig. 5-69

https://truckmanualshub.com/

NOTE: Contact Sany if any abnormalities are found.

Item	Diameter	Grade	Torque Value	Thread Sealant
Drive Sprocket Mounting Bolt	M24	10.9	738 ft•lb (1,000 N•m)	Anaerobic sealant
Hydraulic Motor Mounting Bolt	M20		516 ft•lb (700 N•m)	

Track Tension - Initial

If track tension is noticeably loose, operate the machine with the engine at an idle speed. Travel forward a distance of about 4 meters (13 feet) on level flat clear surface, then stop the machine.



Fig. 5-70

Measure track tension:

1. Place a straight edge (3) between track idler wheel (1) and rollers (2), then measure the track droop value “a” as shown in the illustration. The required measurement should be 0.4-1.2 in (10-30 mm)

   NOTE: Be sure the surface is flat and stable.

2. If the tension is outside standard range parameters, adjust as required.

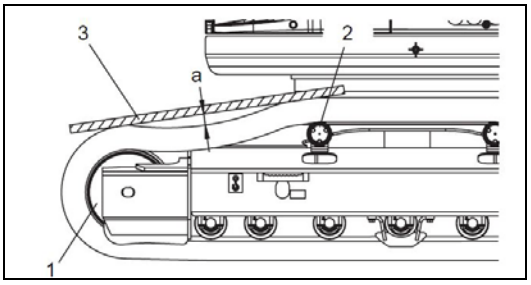


Fig. 5-71 Typical

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Increase track tension:

1. Add grease through the grease fitting (a). (The grease fitting (a) and the screw plug are integral.)

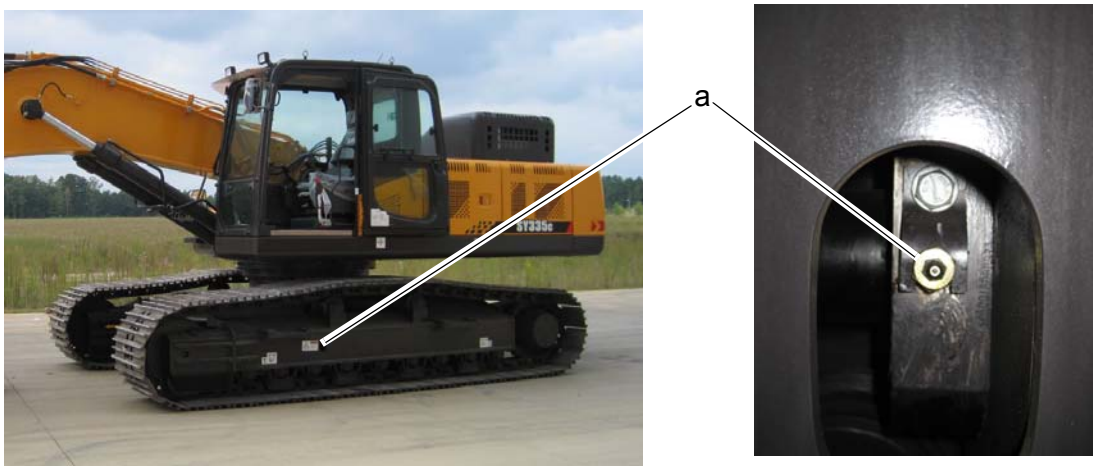


Fig. 5-72

2. Slowly travel the machine forward 23-26 ft (7-8 m), stop and recheck to see if the track tension is suitable.

3. Add additional grease through the grease fitting if it is still beyond the required range.

NOTE: If the tension is still loose, when the distance [S] becomes null (0), it is probably because the bolt and bushing are worn. The bolt or bushing must be repaired or replaced. Contact your Sany dealer for this repair.

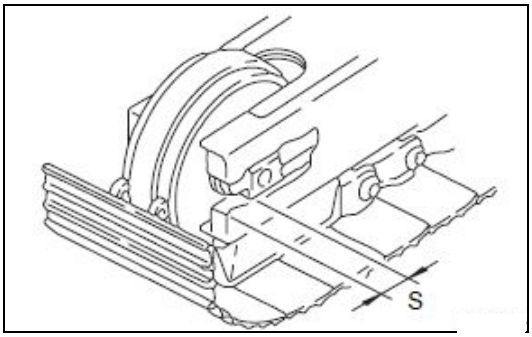


Fig. 5-73

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Reduce track tension:

DANGER

Do not loosen grease fitting (b)! This grease fitting is under pressure and can come out of the track tensioning cylinder quickly and forcefully.

Failure to follow these instruction will cause serious injury or death!

1. Ensure that there is no gravel or mud between the sprocket and the track link before decreasing track tension.
2. Position yourself off to the side, not the front of the grease valve (a). Using the proper tools slowly loosen grease valve (a) counterclockwise, in 90° increments (one quarter turn) to decrease track tension.

   NOTE: The grease will come out behind the grease valve.

3. If the grease does not come out smoothly, move the machine back and forth for a short distance.
4. Check track tension, when it is correct turn grease valve (a) clockwise and torque to 35 lb/ft (47N·m).
5. Move the machine forward at low idle speed, to a distance that is equivalent to the length of an unfolded track, and then park the machine.
6. Check track tension again. Readjust if it is still beyond the standard range.
7. Tighten grease valve (a), torque to 108 ft/lb (15 kgf/m).

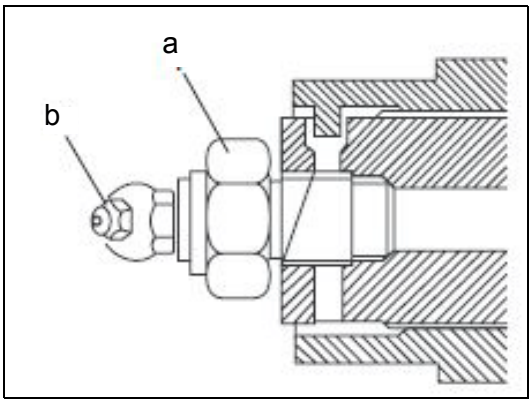


Fig. 5-74

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Lubricate

NOTE: Add grease to any component that produced abnormal noise regardless of the greasing schedule.

NOTE: After operating in water, the machine's wet support rollers (a) should be greased.



Fig. 5-75

Slewing Turntable Bearing

NOTE: It will be necessary to power up the machinery and have one person perform the lubrication procedure inspection while the crane operator slowly slews the crane 45 degrees at a time through a complete circle, 360 degrees.

⚠ DANGER

Do not perform this check unless you have another person helping/viewing you who can clearly communicate with the operator. Slew the crane slowly and insure that the person lubricating the turntable does not place any body part where it may be crushed.

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1. Inject clean, lubricating grease at the fittings (a) on the slewing bearing until the grease seeps out of the seal.

   NOTE: See “Fluids & Lubricants” on page 5-11 for the correct type of grease.

2. Check the seal condition and if it leaks replace it immediately.



Fig. 5-76

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Work Equipment

Inject grease through the work equipment greasing points as indicated in the following illustration. and as shown in the decal next to the cab door.See “Fluids & Lubricants” on page 5-11 for additional information.

The following is a summary of lubrication points on the machine..

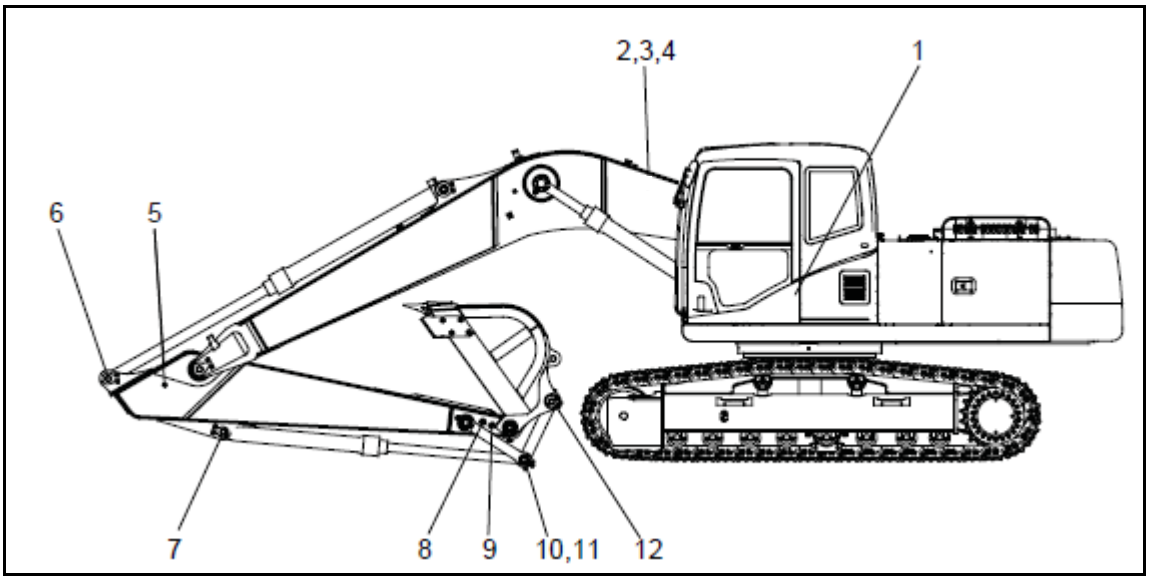


Fig. 5-77

1. Boom Cylinder Root Pin (2)	7. Bucket Cylinder Root Pin (1)
2. Boom Cylinder Root Pin(2)	8. Bucket-Rod Joining Pin (1)
3. Boom Cylinder Piston Rod End (2)	9. Arm-Bucket Joining Pin (1)
4. Arm Cylinder Root Pin (1)	10: Rod Joining Pin (2)
5. Boom-Arm Joining Pin (2)	11. Bucket Cylinder Piston Rod End (1)
6. Arm Cylinder Piston Rod End (1)	12. Bucket-Rod Joining Pin (1)

NOTE: The following pages give additional details on each of the lubrication points shown above.

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1. Inject grease the two boom cylinder root pin fittings (a).



Fig. 5-78

2. Inject grease into the two boom pin fittings (b), the two boom cylinder piston rod end fittings (c), and the arm cylinder root pin (d) fitting.

   NOTE: These fittings are mounted on the top of the boom near the base with lines leading to the bearings.



Fig. 5-79

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3. Inject grease into the two boom-arm joining pin fittings (e).

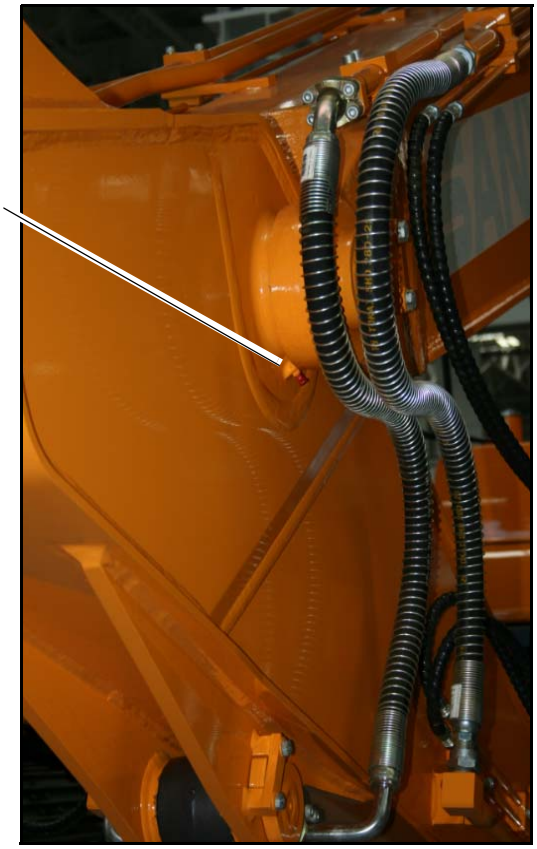


Fig. 5-80

4. Inject grease into the arm cylinder rod end fitting (f).



Fig. 5-81

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5. Inject grease into the bucket cylinder root pin fitting (g).



Fig. 5-82

6. Inject grease into the arm-bucket joining pin fitting (h) and the bucket-rod joining pin fitting (k).



Fig. 5-83

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7. Inject grease into the two rod joining pin fittings (m), the bucket cylinder piston rod end fitting (n), and the bucket-rod joining pin fitting (o)

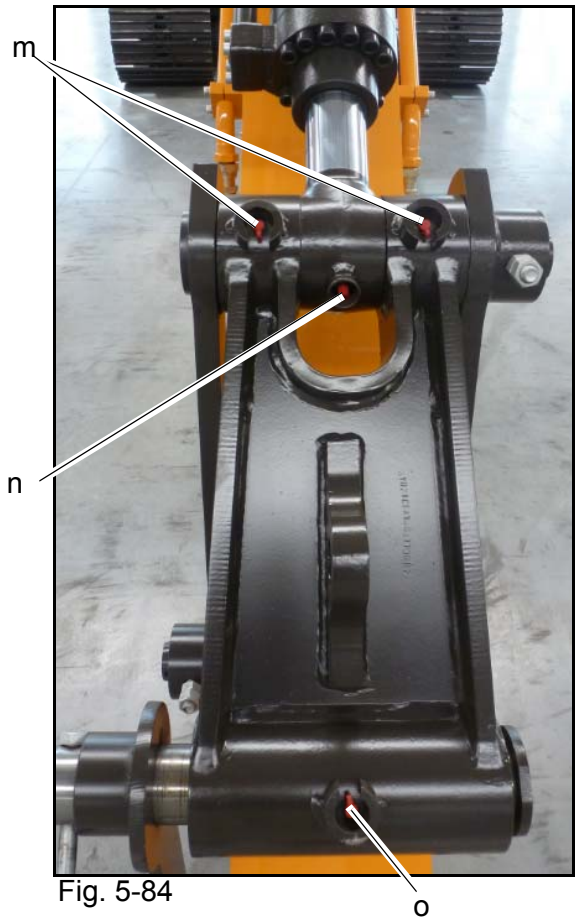


Fig. 5-84

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250 HOURS OF SERVICE

NOTICE

Failure to perform the following procedures when and how directed will result in shortened service life of the machine or a system failure during operation.

1. Park the machine on a level flat surface (a).



Fig. 5-85

2. Follow the Lock-out Tag-out procedure in the Safety section of this manual. Always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-21 for details.

   NOTE: Obtain the maintenance record for this machine and complete it at the close of all maintenance procedures

3. With the machine secured, proceed with the following:

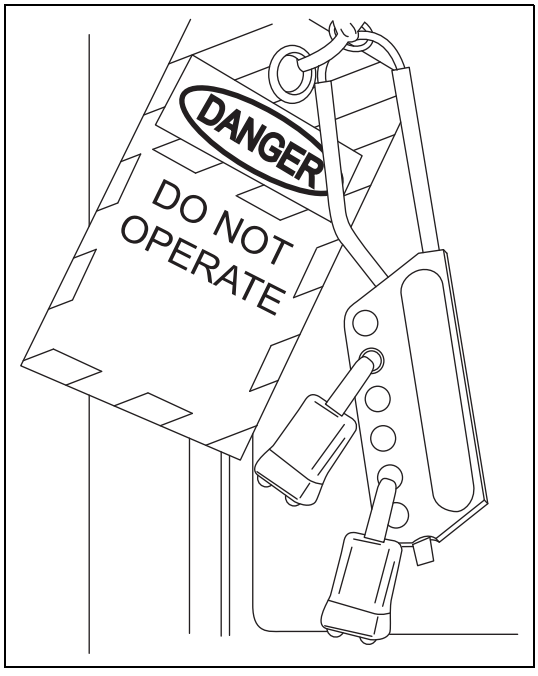


Fig. 5-86

Change:

- Engine Oil and Filter (see page 5-75)
- Air Filter (see page 5-67)
- Hydraulic Tank Return Filter Elements - Initial (see page 5-62)
- Replacing Hydraulic Pilot Line Filter Element - Initial (see page 5-64)
- Hydraulic Oil - Breaker only at 400 Hours (see page 5-65)

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Check:

- Air Conditioner Compressor (see page 5-65)
- Crawler Assemblies (see page 5-70)
- Checking and Adjusting Track Tension (see page 5-51
- Electrical System (see page 5-28)
- Supplemental Coolant Additive (SCA) Levels (if used) (see page 5-72)
- Windshield Washer and Window Wipers (see page 5-72)
- Handrails and Steps (see page 5-73)
- Access Panels and Locks (see page 5-73)

Change:

Engine Oil and Filter

See “Engine Oil and Filter - Initial” on page 5-38

Hydraulic Tank Return Filter Elements — Initial

⚠ CAUTION

Hydraulic oil is hot and under pressure. Always wait for the machine to cool down before proceeding. Failure to do so could result in minor or major injuries.

NOTE: Perform this procedure every 1000 service hours after this first-time replacement, or at least once each year, whichever occurs first.

NOTE: For machines equipped with a hydraulic breaker, the hydraulic oil deteriorates faster than that of machines operating with a bucket.

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1. Park your machine on a hard, level ground (a). Lower the work equipment to ground and turn off the engine.



Fig. 5-87

2. Turn the butterfly nut on the breather valve and press the venting button (b).

3. Loosen the four bolts and remove the cap (c). When the cap is removed, it may fly out due to the action of the internal spring. In this case, hold down the cap when removing the bolts.

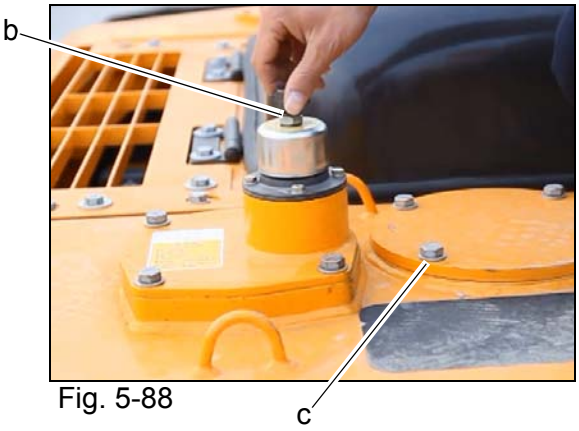


Fig. 5-88

4. Remove the spring (d) and filter (e) Check the bottom of the filter and remove dirt if any.

5. Clean the disassembled parts with mineral spirits. See “Fluids & Lubricants” on page 5-11 for the proper grade of mineral spirits.

6. Install a new filter element.

7. Restore the filter (e) and spring (d).

8. Install the cap (c) to its position. Hold down the cap and tighten the bolts.



Fig. 5-89

9. In order to vent the air, start the engine and run the engine at low idle for 10 minutes.

10. Stop the engine.

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Hydraulic Pilot Line Filter Element — Initial

NOTE: Perform this procedure every 1000 service hours after this first-time replacement or at least once each year, whichever occurs first.

NOTE: Ensure that the machine is on flat, solid ground before proceeding.

1. Locate the Hydraulic Pilot Line Filter (a) next to the hydraulic pump.

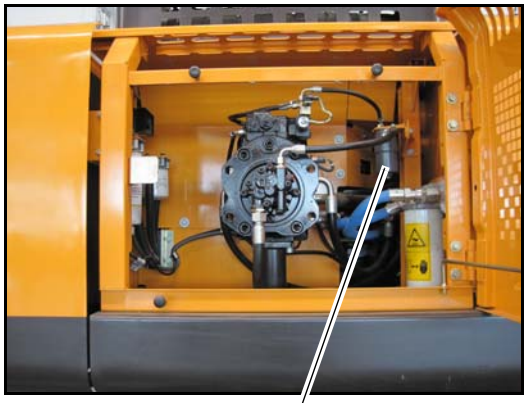


Fig. 5-90

2. Use a wrench on the end of the hex end (b) at the bottom of the filter casing to loosen the casing.

   NOTE: Place an oil catch pan underneath the filter casing to catch any oil that may leak out.

3. Loosen, then remove the filter casing (c) with the enclosed filter element, then remove the filter element from the casing.

4. Clean the inside of the filter casing.

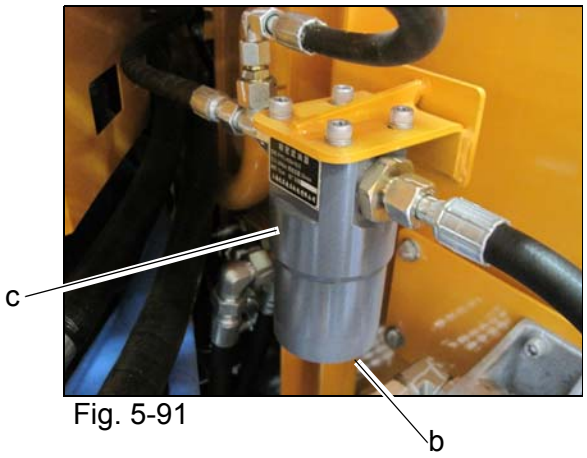


Fig. 5-91

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5. Install a new filter inside the casing and install it in place (d).

   NOTE: Install a new gasket and O-ring

   NOTE: Be careful not to cross-thread the filter casing during installation so that the mating surface (c) seals correctly.



Fig. 5-92

Hydraulic Oil - Breaker only at 400 Hours

Machines using the optional breaker attachment use up hydraulic oil at a faster rate than those using the bucket or nibbler. Breaker equipped machines need to change hydraulic oil every 400 hours, for information on changing the hydraulic oil see “Hydraulic Oil” on page 5-97.

Check

Air Conditioner Compressor

Inspection

1. Open both engine compartment doors (a)



Fig. 5-93

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1. Go to the V-belt located at (b).

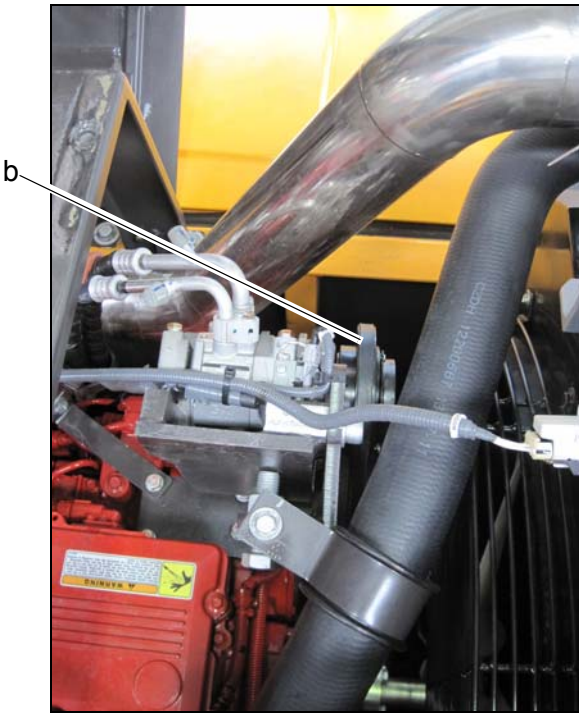


Fig. 5-94

2. With a force of about 58.8N (6kgf), press down with your finger on the middle section of the belt between the drive pulley and the compressor pulley in order to check the deflection (b), which should be 0.2 -0.3 in (5-8mm).

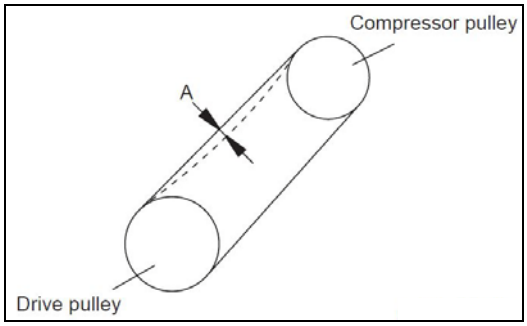


Fig. 5-95

Adjustment

1. Loosen the bolts (a) and (b).

2. Move the compressor (c) and its bracket (d) in order to adjust belt tension.

3. Tighten the bolt (a) and (b) after positioning the compressor (c).

4. Check the belt tensioner after adjustment.

NOTE: Use a tension meter to check the belt tension of the compressor. The tension of a new belt should measure 470 lb/ft (637 N), an old belt will measure 318 lb/ft (441 N)

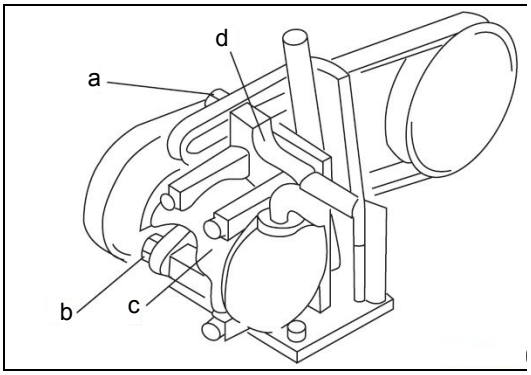


Fig. 5-96

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5. Check for damaged pulleys and worn V-groove and V-belt. In addition, make sure that the V-belt does not rub against the bottom of the V-groove.

Replace the fan belt if:

- it has stretched and there is little margin left for adjustment.
- cuts or cracks are found in the belt.
- the belt skids or squeaks.

NOTE: Newly installed V-belts need to be readjusted after the first hour of operation.

Air Filter

See “Air Intake System” on page 5-42 to remove the air filter element.

NOTE: Some machine systems may have a clog indicator on the machine system monitor display. If this indicator is on or activated, the air filter element should be inspected or replaced.

NOTE: The filter element must be replaced:

- After 2 years of use.
- After being cleaned 5 times.
- If contaminated by rust

1. Use dry, compressed air (no more than 73 psi, 5 bar) to clean the external surface of the filter element (a).



Fig. 5-97

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2. Afterwards, use compressed air to clean the inside surface of the filter through to the outside.

3. If compressed air is not available or otherwise cannot be used, carefully tap the external surface of the filter element (b) slightly to loosen and remove some of the dust and debris.

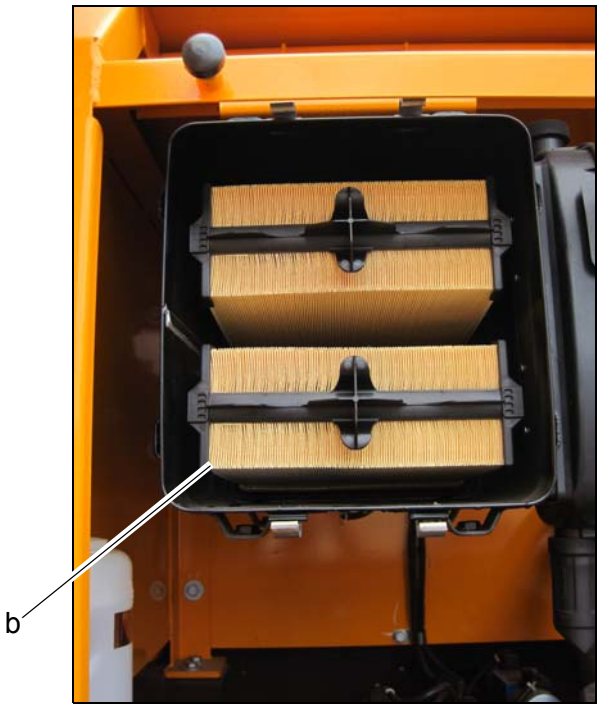


Fig. 5-98

4. Shake the filter element (c) free of loose dust and debris.



Fig. 5-99

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5. Wipe the internal seal support with a clean, dry cloth.

6. Remove and inspect the secondary air filter element (d) for any excess accumulation of dust while the primary air filter element has been removed.

   NOTE: Avoid damage to the filter element.

7. Clean and reinstall the secondary air filter element

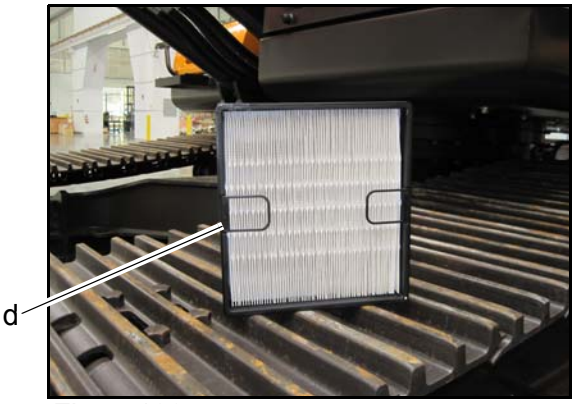


Fig. 5-100

8. Install the primary air filter element, and then reinstall the outer cover (e).

   NOTE: Always read and follow any air filter manufacturer's instructions on the air filter when servicing the filter element.

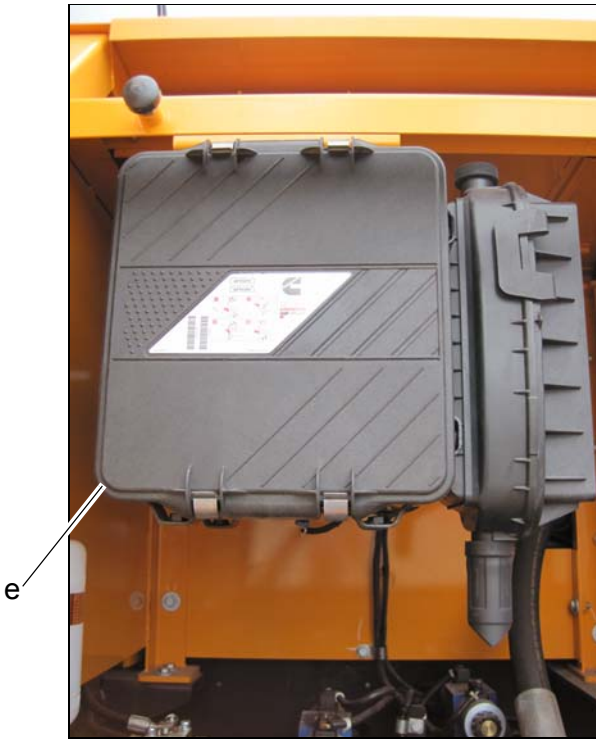


Fig. 5-101

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Crawler Assemblies

Inspection and Lubrication

1. Use a pry bar (a) to shift and/or lift the track shoes as-needed to perform this procedure.

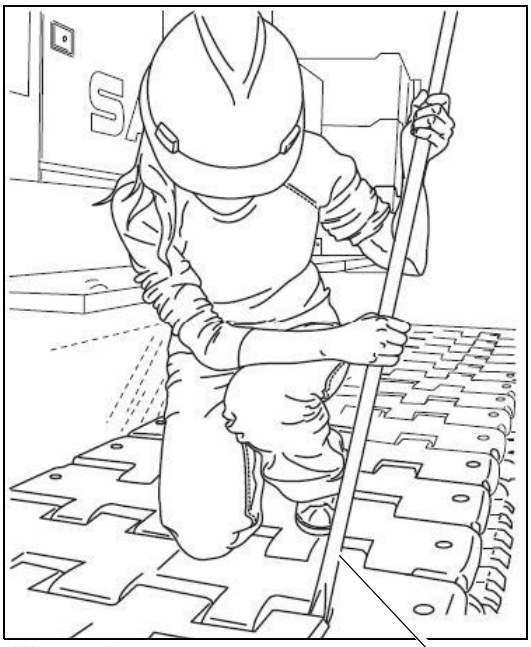


Fig. 5-102
Typical

2. Check the crawler pads (b) for damage, wear, unevenness, looseness, raised sections, and tightening of crawler pads or any other abnormality.



Fig. 5-103

3. Check the idler wheel (c) track rollers (d) and supporting rollers (e) for wear, lubrication and proper operation.

4. Check the crawler final drive motors (g) for wear, lubrication of the gearbox.

5. Remove as much accumulated dirt as possible from the crawler assemblies. Excess dirt requires more energy to operate the crawlers and causes severe wear at moving parts of the crawler.

NOTE: If a track shoe is found to be defective or damaged, mark it with paint for repair reference after the track inspection is completed.

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Track Tension

See “Track Tension - Initial” on page 5-51 for further information.

Fuses

See “Electrical System” on page 5-28 for additional information.

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Windshield Washer and Window Wipers

1. Check the washer fluid level inside the windshield washer tank (a) located next to the air filter on the left side of the machine. Add windshield washer fluid (or water with and a small amount of suitable window cleaner) as necessary.



Fig. 5-104

2. Check the operation of the windshield washer nozzle and wiper (b) to ensure there is no smearing across the windshield during operation. Replace the wiper blade with a new one if smearing does occur.

3. If necessary, adjust the spray nozzle to ensure that the fluid spray is properly directed.

   NOTE: Do not operate the wiper on a dry window. Risk of damage to the wiper blade and wiper motor may result due to resistance of forcing a dry wiper blade across a dry window surface.

   NOTE: Use washer fluid suitable for use in very cold or winter climates as required.

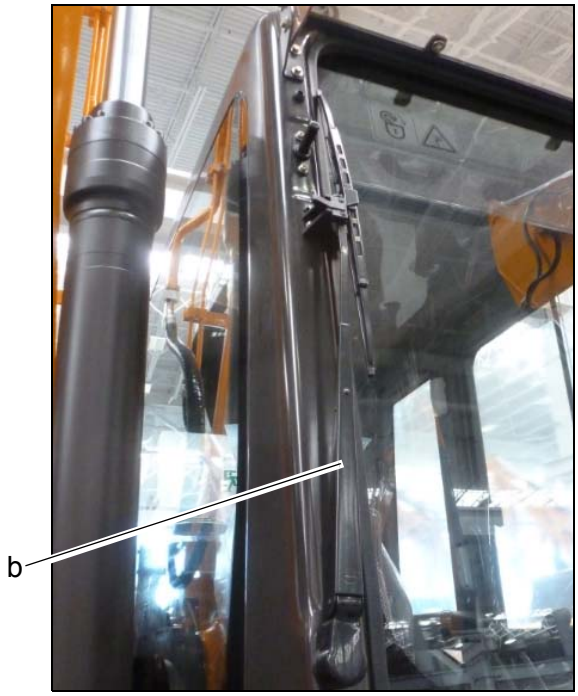


Fig. 5-105

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Handrails and Steps

1. Check the mounting bolts on the handrails and steps (a) and replace any missing or damaged mounting bolts and tighten any loose bolts.

   NOTE: Remove any tools, lubricants or debris from the steps. Never allow loose items to remain on the machine.

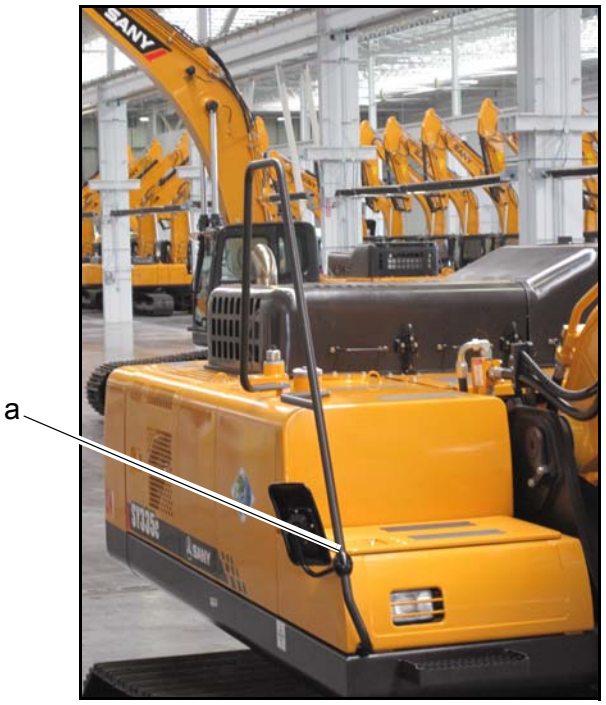


Fig. 5-106

Access Panels and Locks

1. Inspect all access doors and panels (a) to be sure they are closed and locked properly. This is important for the security of the machine.

2. Repair or replace any damaged locks (b). Failure to do so could result in unauthorized tampering or vandalism.



Fig. 5-107

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500 HOURS OF SERVICE

NOTICE

Failure to perform the following procedures when and how directed will result in shortened service life of the machine or a system failure during operation.

1. Park the machine on a level flat surface (a).



Fig. 5-108

2. Follow the Lock-out Tag-out procedure in the Safety section of this manual. Always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-21 for details.

   NOTE: Obtain the maintenance record for this machine and complete it at the close of all maintenance procedures

3. With the machine secured, proceed with the following:

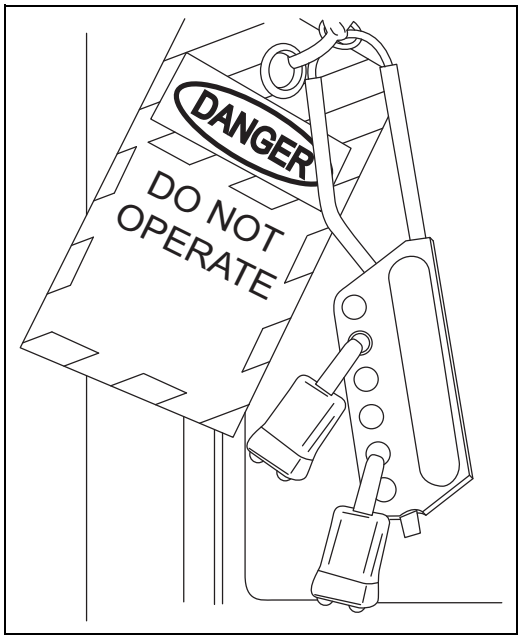


Fig. 5-109

Change:

- Primary Fuel Filter (see page 5-75)
- Coolant Filter (see page 5-77)
- Slewing Gearbox Oil (see page 5-78)
- Hydraulic System Breather Filter (see page 5-79)

Checks:

- Radiator, Oil Cooler and A/C Condensor Fins (see page 5-80)
- Air Conditioning Fresh Air and Recirculation Air Filters (see page 5-82)

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- Slewing Gearbox Bolts (see page 5-84)
- Hydraulic Hoses (see page 5-85)
- Hydraulic pump (see page 5-85)
- Upperworks and Lowerworks (see page 5-86)
- Final Drive (see page 5-87)
- Swing Gear Pinion Grease Level (see page 5-88)

Lubricate:

- Work Equipment, (see page 5-56)

Change

.

Primary Fuel Filter

1. Open the right rear access panel of your machine to locate the primary fuel filter (a).
2. Place a drain pan under the primary fuel filter to hold the fuel drained.

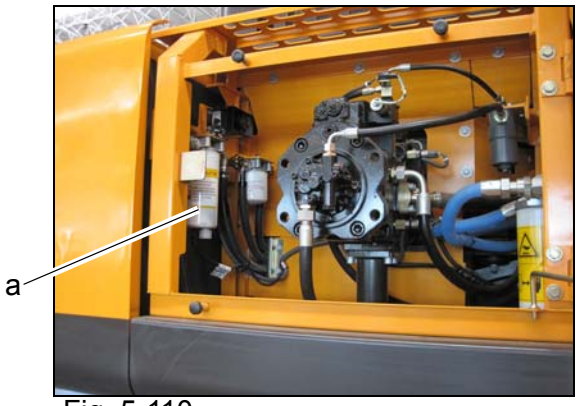


Fig. 5-110

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3. Loosen the drain valve (b), to drain all water and sediment from the filter (a).

4. Remove the fuel accumulated in the bowl.

NOTICE

Dispose of the contaminated fuel properly. Failure to do so will violate environmental laws and ordinances.

5. Remove the filter by turning it counterclockwise.

6. Clean the surface of the filter fitting and oil it prior to replacing the old filter with a new filter.

7. Clean the filter seat and fill the new filter element with clean fuel.

   NOTE: Do not remove the cover (c) when filling the fuel. The fuel must be filled through the eight holes (d) around the center hole. Remove cover (c) after refilling. Keep dirt or debris from entering the fuel.

8. Apply a film of machine oil to the sealing surfaces before installing the new filter to its fitting.

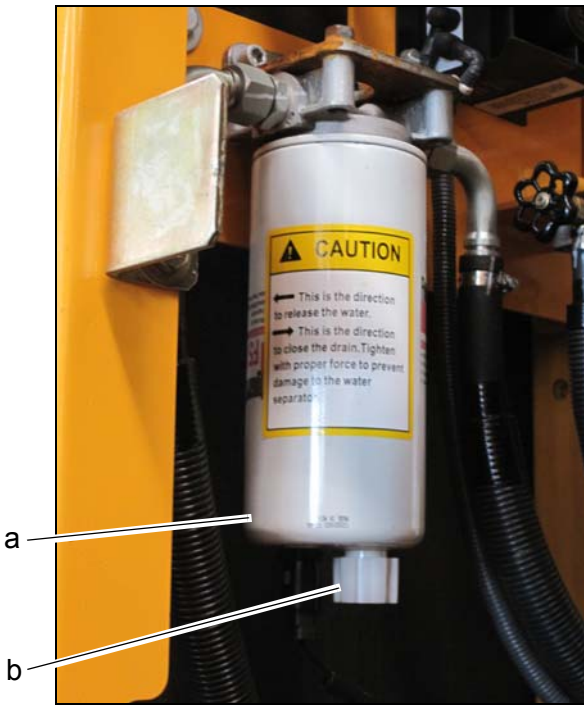


Fig. 5-111

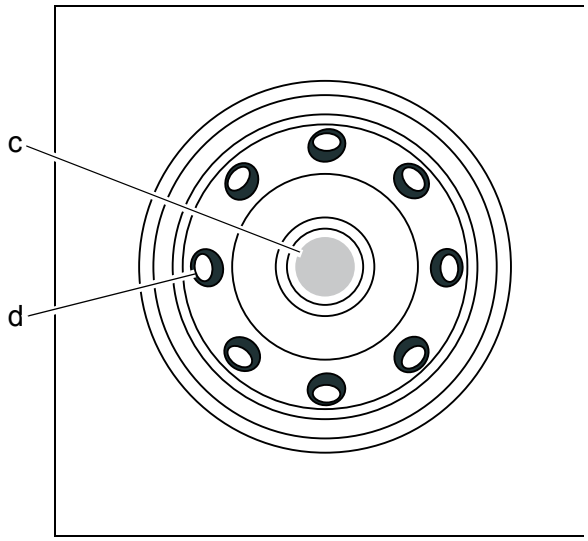


Fig. 5-112

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Coolant Filter

1. Open the right rear access door of your machine to locate the coolant filter (a).

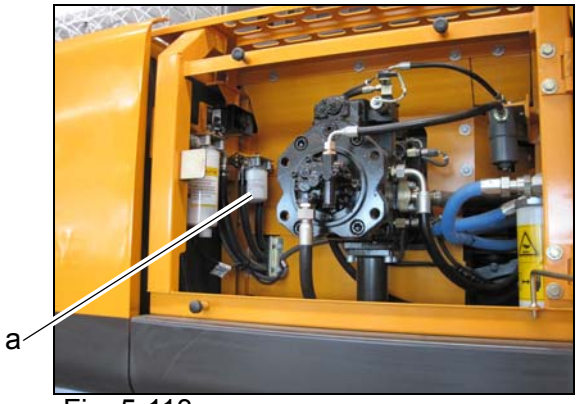


Fig. 5-113

2. Close the valves on either side of the coolant filter (b).
3. Place a bowl under the filter to catch any coolant.
4. Turn the coolant filter (c) counterclockwise with a filter spanner to remove the oil filter. Remove the coolant caught in the bowl.

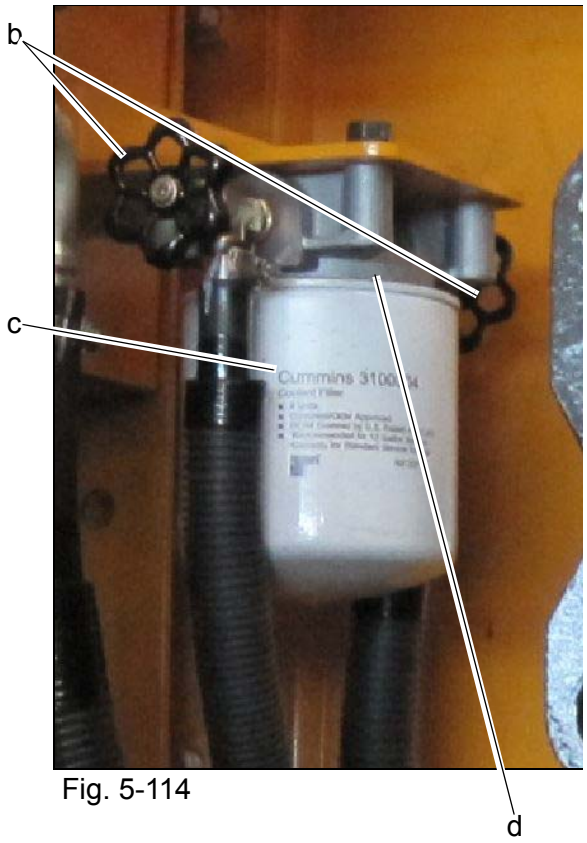


Fig. 5-114

NOTICE

Dispose of the contaminated coolant properly. Failure to do so will violate environmental laws and ordinances.

5. Clean the coolant filter mount (d). Check the mount seat for the presence of old filter seal. The presence of older seal in the mount seat can cause coolant leakage.
6. Clean the coolant filter mounting surface, then coat the new filter seal ring with a thin layer of lubricant.
7. Thread the filter into place on its mount until the filter gasket contacts the filter mount, then tighten the filter 3/4 turn more.

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8. Open the valves on either side of the coolant filter (b & c).

9. Start the engine and let it run for ten minutes. Recheck the coolant level and fill if needed (page 5-21).



Fig. 5-115

Slewing Gearbox Oil

⚠ WARNING

The slewing gearbox oil runs hot and can burn you if opened right after the engine has stopped. Wait for the temperature to drop and the gearbox to cool down before draining to ensure that serious injury does not occur.

1. Open the belly plate under the hydraulic valves/slewing gearbox area (a).



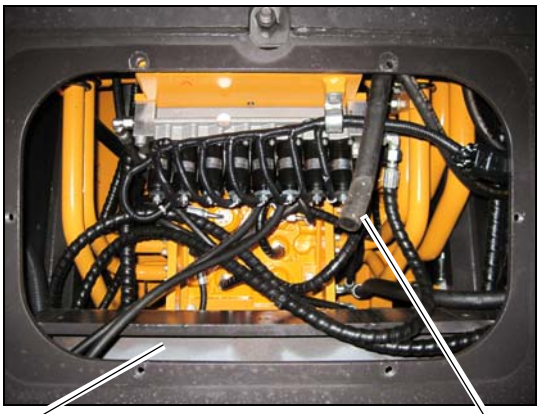


Fig. 5-116

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2. Place a suitable container (at least 2 gal/8 l) under the hose (b) to catch the oil drained from the gearbox.See See “Fluids & Lubricants” on page 5-11 for additional information on capacity.

3. Locate the slewing gearbox and open the drain shown at (c) near the dipstick. Let all of the oil drain from the gearbox and then dispose of the oil.

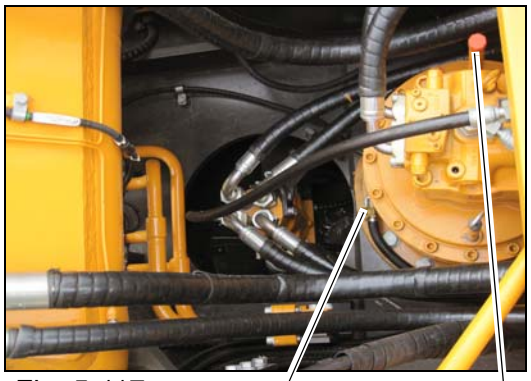


Fig. 5-117

NOTICE

Dispose of the contaminated oil properly. Failure to do so will violate environmental laws and ordinances.

4. Close the drain (c) and refill the gearbox oil through the fill point (d).

5. Fill and check the oil level using the dipstick (e), do not over fill (page 5-24). If you do overfill, drain oil until the proper level is achieved.

   NOTE: The gearbox holds 1 gal (4 L) of oil. See See “Fluids & Lubricants” on page 5-11 for additional information on capacity.

6. Replace the belly plate below the hydraulic valves/slewing gearbox area.

Hydraulic System Breather Filter

NOTE: The maximum service interval for the hydraulic tank breather filter shall not exceed 500 hours. Dependent upon the work environment and the degree of contamination the filter can be replaced more frequently than 500 hours.

1. Shut down the excavator, locate the breather valve (a) next to the engine compartment.

2. Clean the top area about the valve before disassembly.

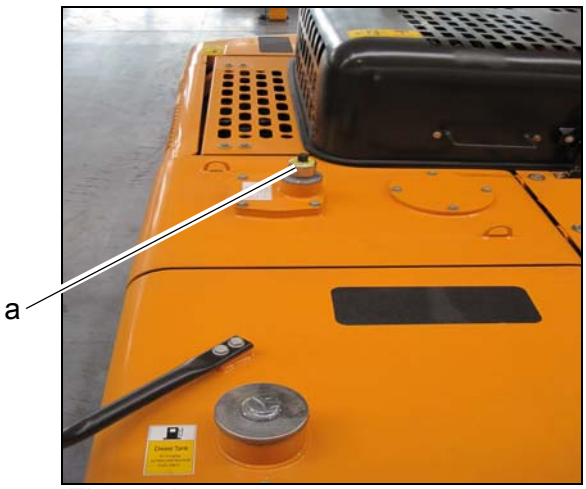


Fig. 5-118

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3. Unscrew the black butterfly nut (b) off the top of the breather valve and then carefully pull the filter element cover (c) off of the filter (d).

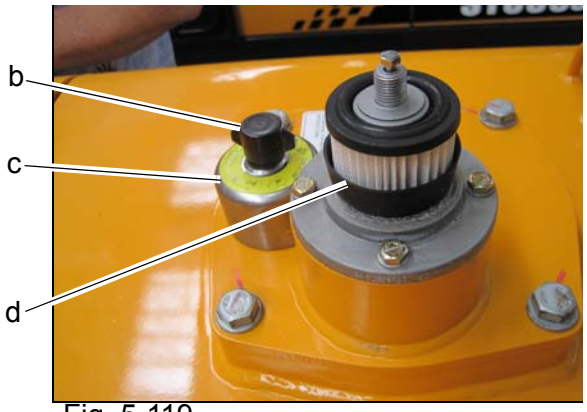


Fig. 5-119

4. Gently pull up and free the filter (e) from the valve body, placing the filter off to the side on a clean surface.

5. Replace the old filter with a new filter.

6. Clean the valve body with a clean dry cloth, if contaminants are still present use mineral spirits to clean the valve body. Ensure that the valve body is dry before reassembling the breather valve.

7. Reassemble the breather valve in reverse order of the instructions shown above.



Fig. 5-120

Check

Radiator, Oil Cooler, and AC Condenser Fins

1. Open the left engine cover (a).



Fig. 5-121

2. Open the left rear access panel (b).

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3. Remove the wing nuts securing the protection screen mounted in front of the engine coolant radiator (c).



Fig. 5-122 Typical

4. Remove the protection screen (d) and clean it using compressed air.



Fig. 5-123 Typical

5. Clean the engine coolant radiator (e), hydraulic oil cooler (g), and air conditioner condenser fins (h) using compressed air.

NOTICE

Use low pressure compressed air and keep the nozzle away from the radiator fins to avoid damaging the fins.

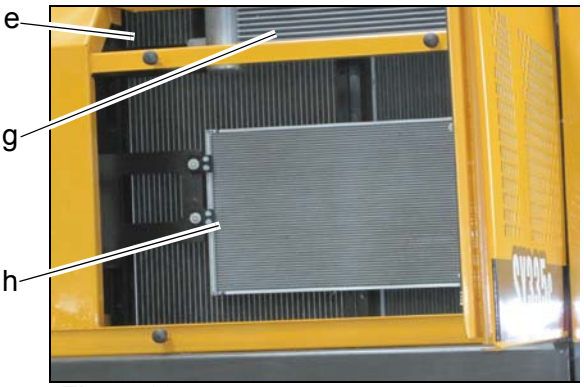


Fig. 5-124

6. Look below the radiators and clean out any debris that has accumulated during operations and cleaning.

7. Replace the covers and protection screen and secure them in place.

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Air Conditioning Fresh Air and Recirculation Air Filters

1. Unlock the fresh air filter access panel (a) located on the left side behind the cab door.

2. Remove the plastic tab at the bottom, securing the fresh air filter in place.



Fig. 5-125

3. Remove the filter (b) and clean it using compressed air.

4. Reinstall the filter and then place the plastic tab back in place at the bottom of the filter.

   NOTE: After cleaning the filter 5 times or if the filter cannot be cleaned replace the filter with a new one.

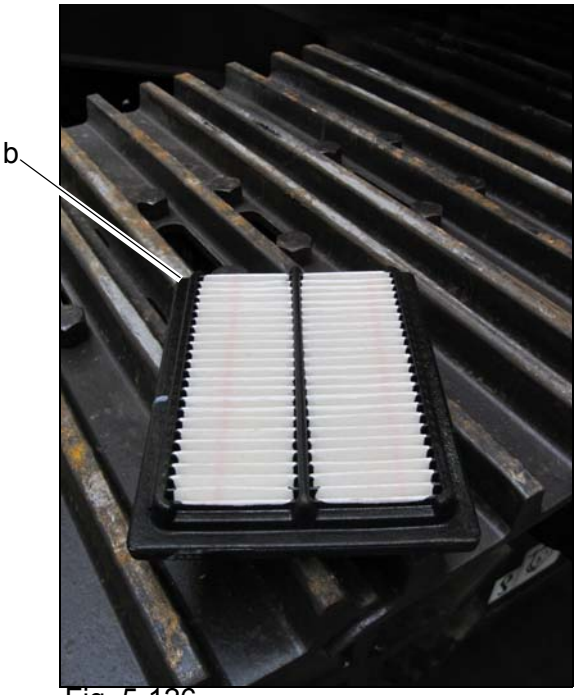


Fig. 5-126

5. Remove the bolts securing the cabin air filer cover (c) in place.

   NOTE: The cabin air filter is located behind the seat near the fuse access panel.



Fig. 5-127

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6. Remove the bolts (d) securing the cabin air filter to the cover.

7. Remove the cabin air filter and clean it using compressed air.

8. Reinstall the cabin air filter.

   NOTE: After cleaning the filter 5 times or if the filter cannot be cleaned replace the filter with a new one.

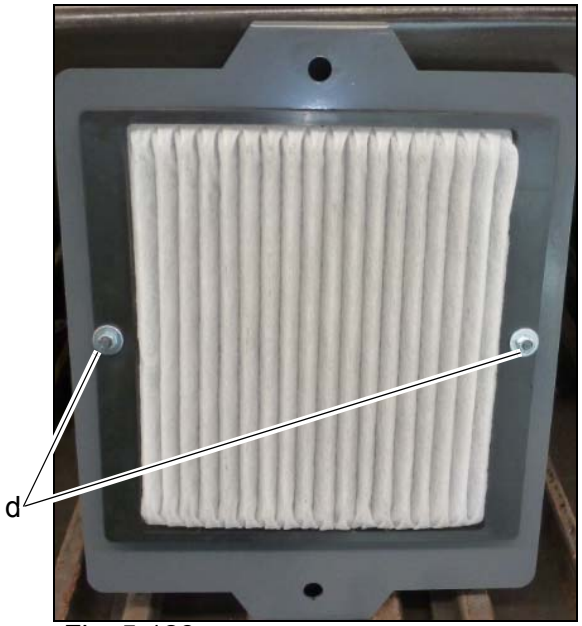


Fig. 5-128

9. While you are checking the air conditioning system also check for the following:

Assembly / Component	Symptom / Cause
Pipeline assembly	Check pipes and hoses for cracks and leaks.
	Loose connection; loose nuts and bolts
Connecting bolt	Connection is loose, nut and bolt are loose or damaged
Drive belt	Deterioration due to heavy wear, scaring and cracking
Condenser assembly	Blockage by debris (garbage, dust, grass, etc.)
Refrigerant leakage	Leakage at pipeline connections
Noise	Compressor (not under load)
	Fan of condenser and evaporator

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Slewing Gearbox Bolts

1. Go to the slewing gearbox (a).



Fig. 5-129

2. Check the slewing gearbox for missing or lose mounting bolts (b).

3. Replace all missing bolts and tighten as specified. See “Torque Values” on page 5-9.

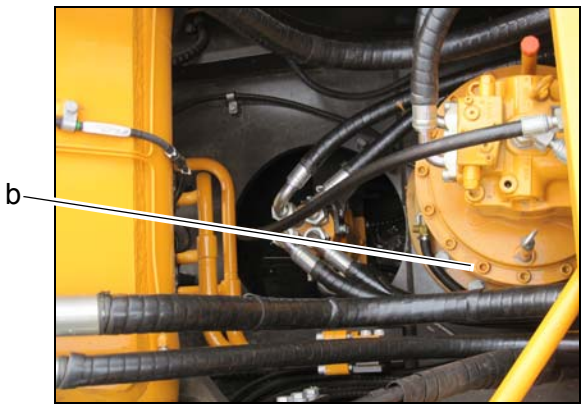


Fig. 5-130

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Hydraulic Hoses

⚠ CAUTION

Hydraulic oil is hot and under pressure. Always wait for the machine to cool down before proceeding. Failure to do so could result in minor or major injury.

NOTE: See “Hydraulic Hoses” on page 5-44

Hydraulic Pump

1. Locate the hydraulic pump (a).



Fig. 5-131

2. Check for leakage, function and noise (b).

   NOTE: Notify Sany if any abnormality is found.

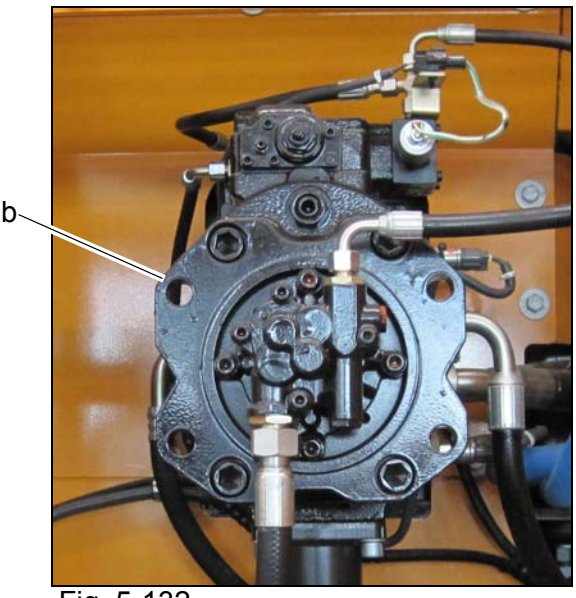


Fig. 5-132

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Upperworks and Lowerworks

Structural components

Check all structural components identified below for cracks or distortion.

NOTE: Notify Sany if any cracks or distortion is found.



Fig. 5-133

1. Arm (upperworks)

2. Boom (upperworks)

3. Operator cab (upperworks)

4. Engine compartment (upperworks)

5. Slewing turntable (lowerworks)

6. Crawler (track) assembly (lowerworks)

This machine consists of two major component groups:

- The lowerworks with its various components and assemblies
- The upperworks with its various components and assemblies

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Final Drive

1. Locate the final drive covers (a).

2. Remove the plates covering the final drive.

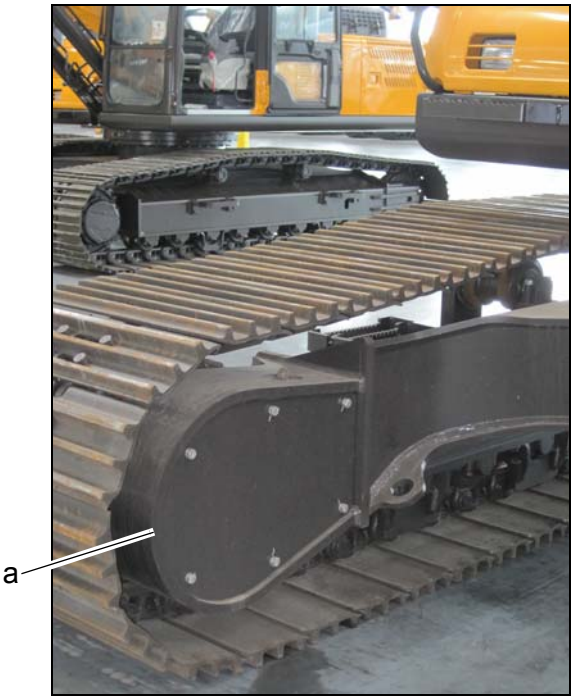


Fig. 5-134

3. Inspect the final drive (b) to ensure all hoses are connected tightly, all bolts are present and tight and that there are no leaks.

4. Replace any damaged or defective bolts and retighten any loose bolts.

   NOTE: Use anaerobic thread sealant when reinstalling loose bolts and installing new bolts, tightening all of them to the following values:

   NOTE: Contact Sany if any abnormalities are found.

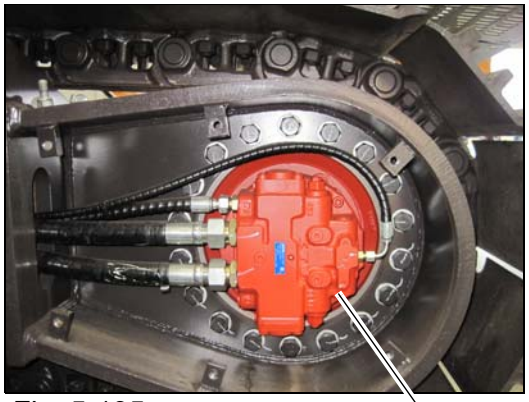


Fig. 5-135

Item	Diameter	Grade	Torque Value	Thread Sealant
Drive Sprocket Mounting Bolt	M24	10.9	738 ft•lb (1,000 N•m)	Anaerobic sealant
Hydraulic Motor Mounting Bolt	M20		516 ft•lb (700 N•m)	

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Swing Pinion Gear Grease Level

1. Locate the swing pinion gear grease check point (a).



Fig. 5-136

2. Remove the cover (b).

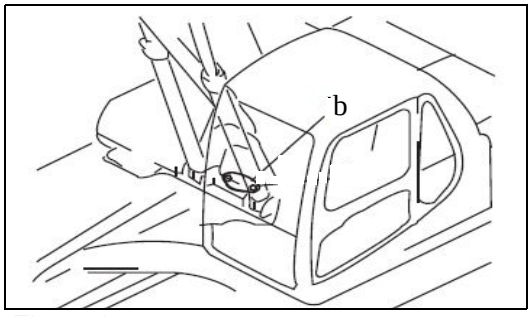


Fig. 5-137

3. Insert a ruler (c) into the grease through the hole for inspection and adjustment. Check the grease level, which should be 0.6 in (14 mm) at minimum, (d) where the pinion gear passes.

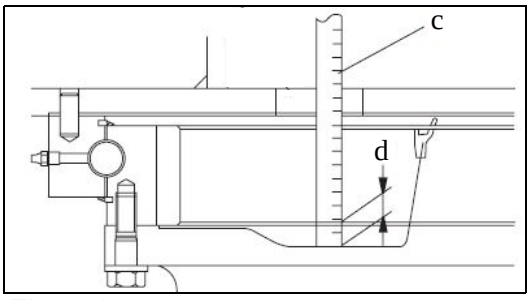


Fig. 5-138

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4. Check the grease to see whether it is milk white. Milk-white grease indicates that the grease has been contaminated and should be removed.

5. If the grease is contaminated or low please add grease through the open cover.

   NOTE: Total grease volume: 75 lbs (38 kg)

6. Reinstall the cover (b).

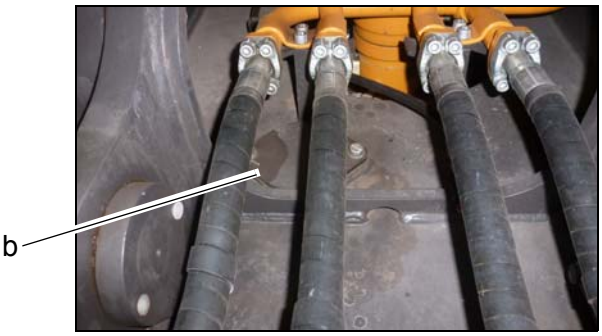


Fig. 5-139

Lubricate

Work Equipment

See “Work Equipment” on page 5-56.

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1,000 HOURS OF SERVICE

NOTICE

Failure to perform the following procedures when and how directed will result in shortened service life of the machine or a system failure during operation.

1. Park the machine on a level flat surface (a).



Fig. 5-140

2. Follow the Lock-out Tag-out procedure in the Safety section of this manual. Always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-21 for details.

   NOTE: Obtain the maintenance record for this machine and complete it at the close of all maintenance procedures

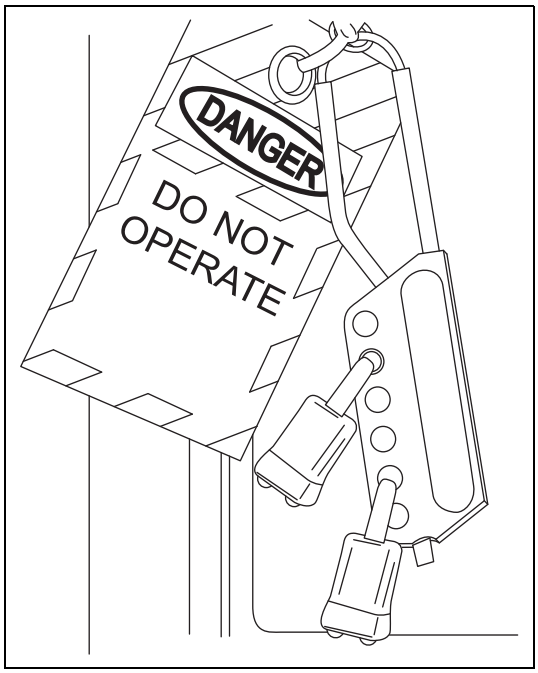


Fig. 5-141

With the machine secured, proceed with the following:

Change:

- Hydraulic Tank Return Filter (see page 5-62)
- Hydraulic Pilot Line Filter (see page 5-64)

Checks:

- Engine Exhaust Pipe Clamps (see page 5-91)
- Accumulator Nitrogen Pressure - Breaker use only (see page 5-92)
- Fuel Tank Strainer (see page 5-94)
- Fuel Lines (see page 5-95)

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Change

Hydraulic Tank Return Filter

See “Hydraulic Tank Return Filter Elements — Initial” on page 5-62

Hydraulic Pilot Line Filter

See “Hydraulic Pilot Line Filter Element — Initial” on page 5-64

Check

Engine Exhaust Pipe Clamps

1. Open the engine hood (a).

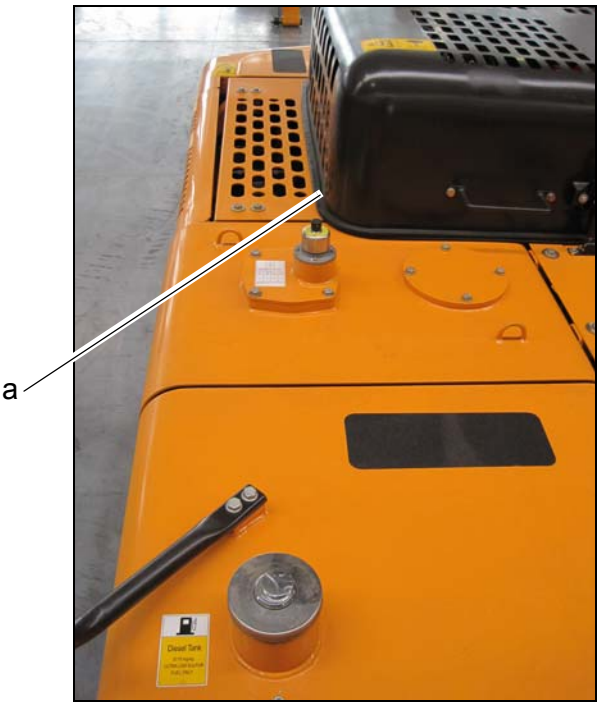


Fig. 5-142

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2. Check the clamps (b) on the exhaust system for presence and tightness, replace/tighten as required. (See “Torque Values” on page 5-9 as needed.)

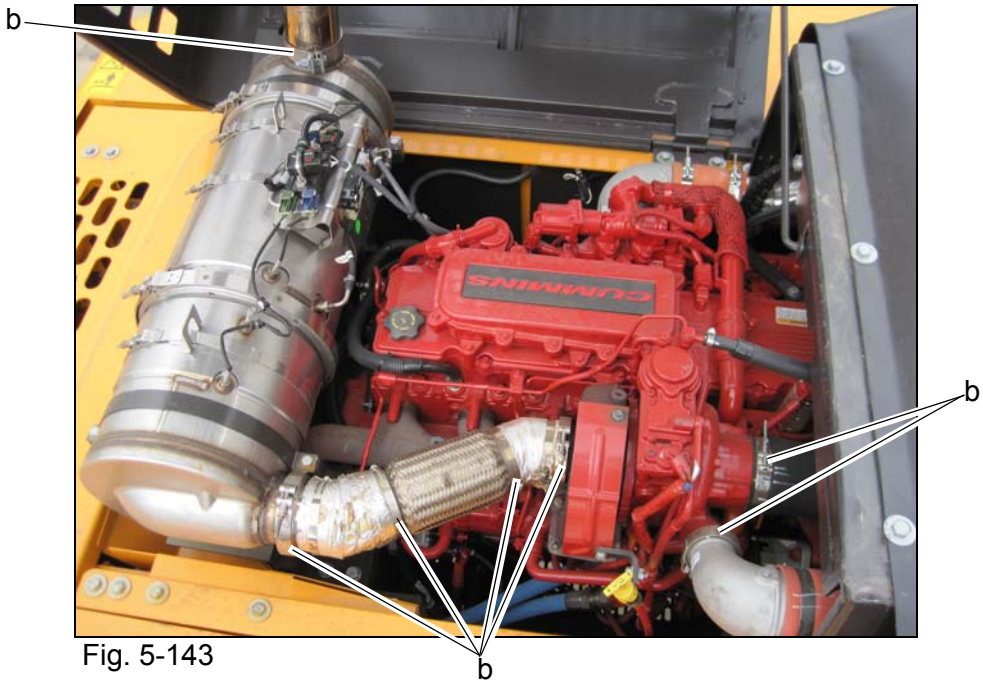


Fig. 5-143

Accumulator Nitrogen Pressure (Breaker only)

⚠ CAUTION

Hydraulic oil is hot and under pressure. Always wait for the machine to cool down before proceeding. Failure to do so could result in minor or major injury.

1. Shut down the engine and turn the ignition key switch to the “OFF” position and relieve the hydraulic system pressure, go to the accumulator (b) located at the base of the boom.



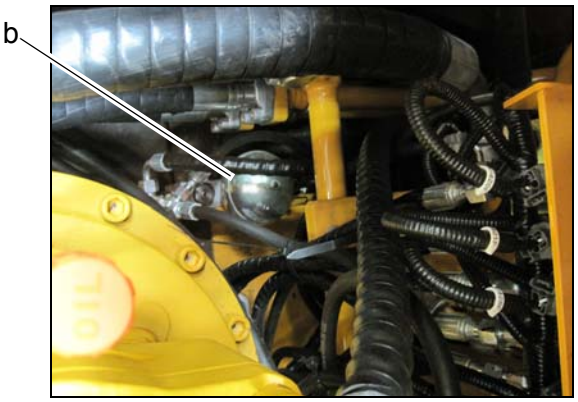
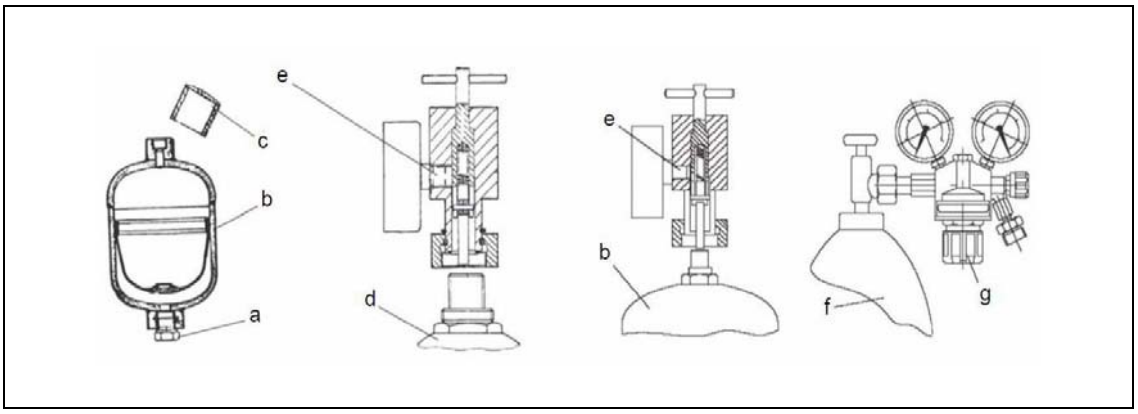


Fig. 5-144

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2. Slowly loosen the hydraulic pipeline collar nut (a) at the bottom of the accumulator (b), fully drain the



hydraulic oil from the accumulator, then tighten the collar nut

3. Remove the safety guard (c) from the valve (d) at the top of the accumulator, then attach a filling/testing device (e) with pressure gauge to the valve.

4. Use the filling/testing device to open the accumulator valve and note the accumulator pressure:

   - Rexroth system - Normal accumulator preload gas pressure is 217.5 psi (15 bar)

5. If the preload pressure is below normal, attach a nitrogen gas cylinder (f) to the filling/testing device (e) and charge the accumulator via the fitting (g) with nitrogen to the correct normal preload pressure.

NOTICE

Use industrial-grade (at least 99.5% pure) dry nitrogen to preload the accumulator. Use of any other gas or grade of nitrogen may cause the accumulator to fail.

6. Note the accumulator preload pressure after 3 or 4 minutes and recharge if necessary.

7. Replace the accumulator if it will not pressurize or fails to hold at least normal pressure.

8. If the preload pressure holds, remove the filling/testing device (e), reinstall the safety guard (c) and complete the inspection certificate (if present) on the accumulator after the normal preload pressure is reached and holds.

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Fuel Tank Strainer

1. Unlock and remove the fuel tank filler cap (a) and set it aside where it will not be lost.

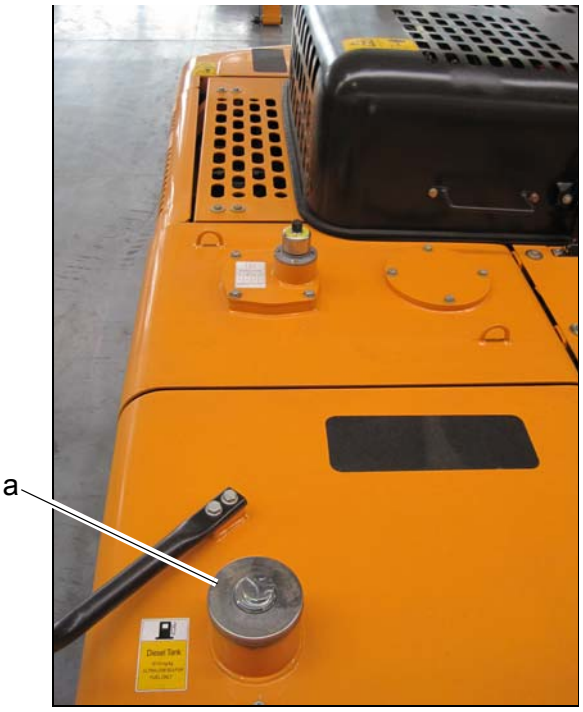


Fig. 5-145

2. Lift the fuel tank strainer element (b) out of the tank filler neck.

3. Clean and inspect the fuel tank strainer. Replace a damaged or missing fuel strainer with a new one.

   NOTE: Do not discard the fuel tank strainer.

4. Install the new or newly cleaned fuel tank strainer, then reinstall the fuel tank filler cap

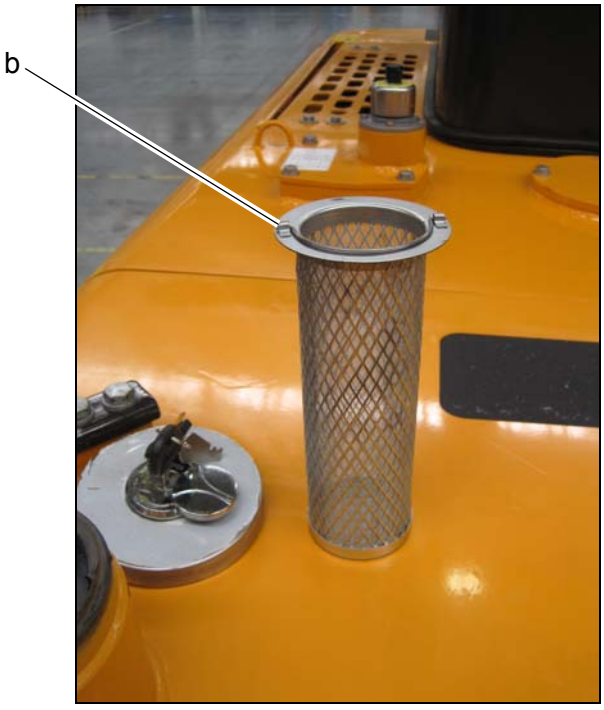


Fig. 5-146

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Fuel Lines

Inspect all steel, plastic and rubber fuel lines including those on the engine.

Replace any fuel lines which show signs of deterioration, wear, damage or leakage.

Contact your Sany distributor for inspection and repairs on the fuel system.



Fig. 5-147

⚠ CAUTION

Failure to perform this procedure as directed could result in a fire which could lead to equipment damage and major or minor personal injury.

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2,000 HOURS OF SERVICE

NOTICE

Failure to perform the following procedures when and how directed will result in shortened service life of the machine or a system failure during operation.

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).



Fig. 5-148

2. Follow the Lock-out Tag-out procedure in the Safety section of this manual. Always allow the systems time to cool down before proceeding with with any service. See “Lockout/Tagout Procedures” on page 2-21 for details.

   NOTE: Obtain the maintenance record for this machine and complete it at the close of all maintenance procedures

3. With the machine secured, proceed with the following:

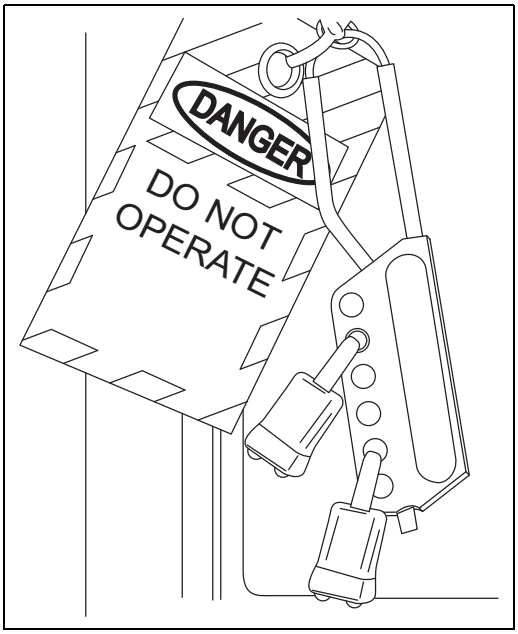


Fig. 5-149

Change:

- Hydraulic Oil (see page 5-97)
- Engine Coolant (see page 5-102)
- Final Drive Oil (see page 5-105)

Check:

- Hydraulic Hoses (see page 5-85)
- Accumulator Gas Pressure (non-Breaker use) (see page 5-92)

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Change

Hydraulic Oil

NOTICE

If you have used or are using the breaker attachment please note that you need to change hydraulic oil every 400 hours to avoid damage to the machine. See “Hydraulic Oil - Breaker only at 400 Hours” on page 5-65 for further details.

⚠ WARNING

Wait at least 24 hours after the machine has stopped for the hydraulic system to cool down sufficiently to allow it to drain. Failure to follow this step could burn or injure anyone coming in contact with the hot oil.

1. Swing the upper structure in order to position the drain plug (a) beneath the hydraulic tank outside the tracks.



Fig. 5-150

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2. Unscrew the bolts of the hydraulic tank cover plate (b) and remove the cover plate to access the bottom of the hydraulic tank.



Fig. 5-151

3. Position the machine as shown (c).



Fig. 5-152

4. Place the hydraulic lockout control (d) in the LOCKED position and stop the engine. Move the joysticks back and forth to relieve system pressure.



Fig. 5-153

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5. Release the air in the hydraulic system by pressing down on the hydraulic breather valve (e).

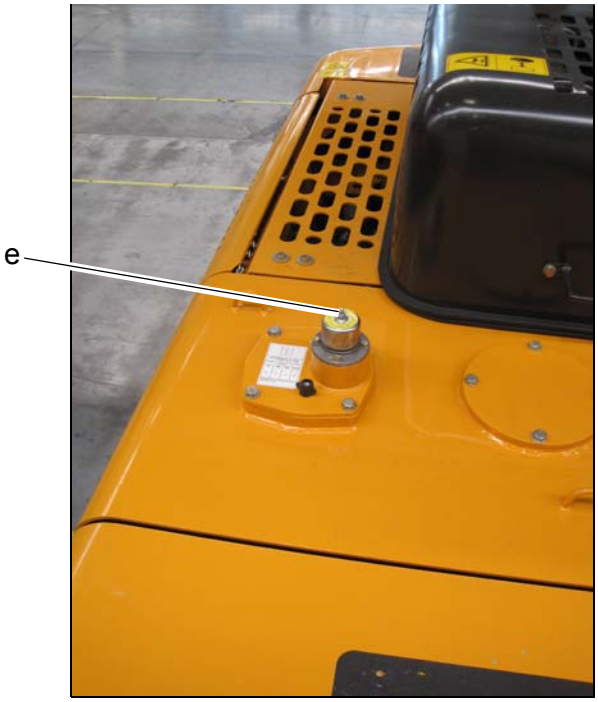


Fig. 5-154

NOTE: See “Hydraulic System Breather Filter” on page 5-79 for location and further information.



Fig. 5-155

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6. Remove all four bolts holding the filler cover (f) in place. Place the cover off to the side in a clean place.



Fig. 5-156

7. Under the filler cover is a handle connected to a rod. Hold the top end of the rod (g) and pull it upward in order to remove a spring and filter.

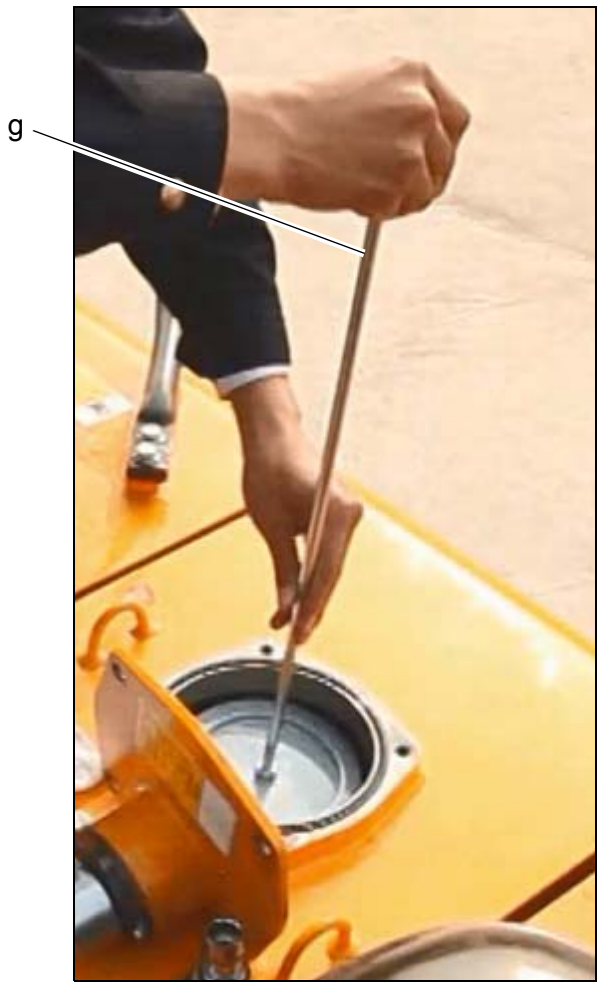


Fig. 5-157

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8. .Clean the filter (h) of all dirt by flushing it with mineral spirits. Replace if damaged.

   NOTE: See “Fluids & Lubricants” on page 5-11 for the correct type of mineral spirits.



Fig. 5-158

9. Place a suitably sized pan under the drain plug (k). Remove the drain plug to drain the oil. Check the O-ring on the drain plug and replace if broken.

10. Replace and tighten the plug (k) after draining.

    NOTE: Tightening torque: 683.5 ± 76.0lb ft (927±103N·m）

11. Add hydraulic oil through the filer cover (f).

12. Check and confirm that there is enough fluid in the tank through the sight glass on the side of the hydraulic tank (see page 5-25).

13. Replace the filter cover, spring and filter when complete (f).

14. Start the engine, unlock the hydraulic lockout lever (d) and run the engine for 10 minutes. Shut the engine down and check for leaks.

15. Tighten connections if leaks found; if no leaks replace the hydraulic tank cover plate (a) and dispose of the used hydraulic oil.



Fig. 5-159

NOTICE

Dispose of contaminated oil properly. Failure to do so will violate environmental laws and ordinances.

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Engine Coolant

⚠ CAUTION

Do not remove the filler cap while the engine is hot. Engine coolant is under pressure when hot and will spurt out. Always wait for the engine to cool to outdoor ambient temperatures before removing the filler cap. Failure to follow this warning could result in minor or major injury.

NOTE: See “Fluids & Lubricants” on page 5-11.

1. Swing the upper structure in order to position the drain valve beneath the radiator for better access.

2. Unscrew the bolts of the radiator tank cover plate (a) and remove the cover plate to access the bottom of the hydraulic tank.



Fig. 5-160

3. Shut down the engine. Go the engine compartment and open both doors (b).



Fig. 5-161

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4. Go to the expansion tank filler cap located above the radiator at (c).

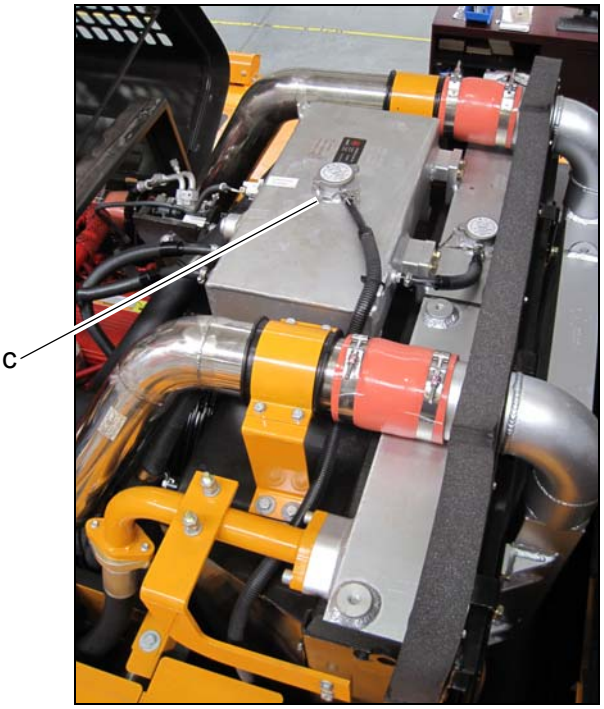


Fig. 5-162

5. Slowly open the expansion tank filler cap (d) to release the cooling system pressure. Remove the cap when all pressure has been relieved.



Fig. 5-163

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6. Place a suitable catch container (12.5 gal/48 L) under the radiator drain hose (e).

   NOTE: See “Fluids & Lubricants” on page 5-11 for additional information on capacity.

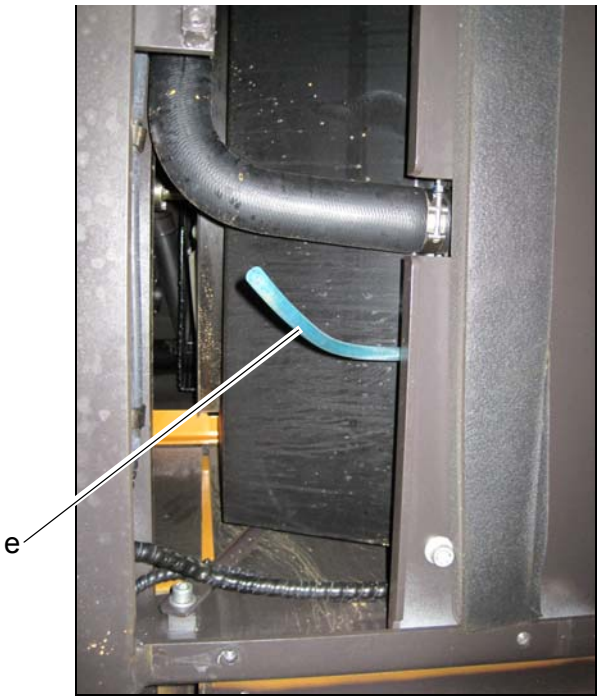


Fig. 5-164

7. Open the radiator drain valve (f) and allow the coolant to completely drain into the catch container.

8. Reinstall and tighten the drain valve (f) after the cooling system is empty.

9. Add new coolant directly into the expansion tank filler neck (d) until the coolant level reaches the bottom of the filler neck inspection hole.

   NOTE: See “Fluids & Lubricants” on page 5-11 for the type of coolant to be used.



Fig. 5-165

10. Start the engine and run it at idle speed for about 5 minutes and allow the coolant level to drop.

11. Shut down the engine, check the fluid level and add fresh coolant directly into the expansion tank filler neck until the coolant level again reaches the bottom of the filler neck inspection hole. (See “Engine Coolant Level” on page 5-21.)

12. Reinstall the expansion tank filler cap.

13. Replace the radiator tank cover plate and dispose of the used coolant.

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NOTICE

Dispose of contaminated coolant properly. Failure to do so will violate environmental laws and ordinances.

Final Drive Oil

⚠ CAUTION

When the engine is just shut off, the oil and final drive components are still hot and can burn. Wait until the oil ad the final drive has cooled before servicing.
Residual pressure in the final drive can cause oil to squirt out or the screw plug to fly out. Slowly loosen the screw plug in order to release the pressure. Personal injury could result if you stand in front of the plug as you loosen it.

1. Drive the machine on to a flat surface placing the final drive cover such that the plugs line up as shown (a).

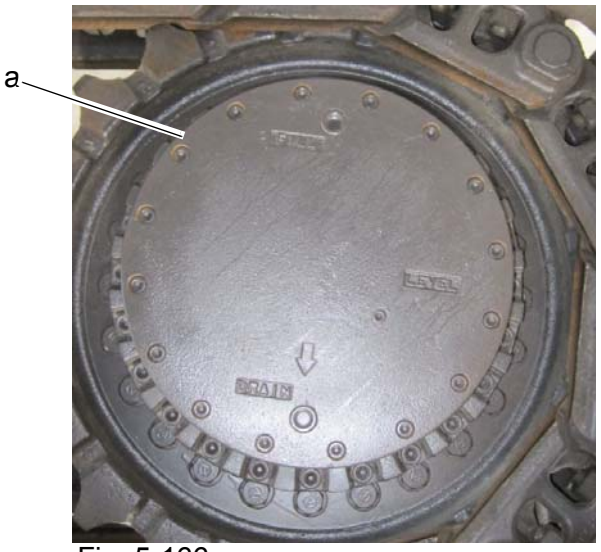


Fig. 5-166

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2. Adjust the position of the final drive cover by driving forward/backward so the filler cap plug (b) is at the top of the cover such that if a line was drawn through the drain screw plug (c) it would be perpendicular to the ground.

3. Use a flat tip screwdriver to eliminate dirt from the hexagonal socket of plugs (b-c-d) in order to avoid damage to the bolts.

4. Place a suitable sized container (1 gal/4 L) under drain plug (c) to catch the oil. and remove the drain plug slowly taking care not to stand in front of the drain plug.

5. Check the O-ring on screw plug (c), replace the O-ring if broken.

6. Replace and tighten drain plug (c) and remove plugs (b) and (d).

7. Add new oil through the filler cap plug (b).

   NOTE: See “Fluids & Lubricants” on page 5-11 for additional information.

8. When the oil is seen coming out of the final drive oil check plug (d), reinstall both plugs (b) and (d), tighten the plugs to 50 ft•lb (68 N•m).

9. Repeat this process for the other final drive, dispose of all used oil.

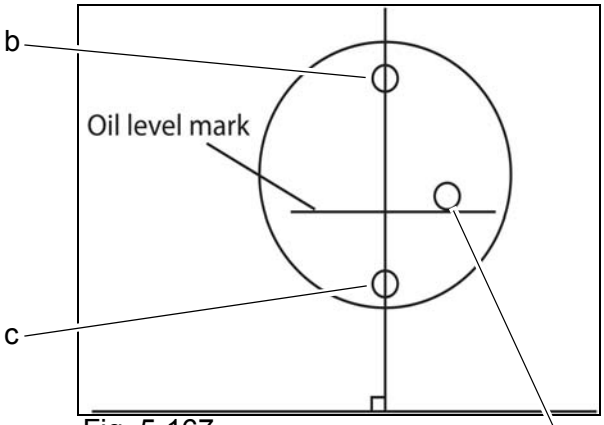


Fig. 5-167



Fig. 5-168

NOTICE

Dispose of contaminated oil properly. Failure to do so will violate environmental laws and ordinances.

Check

Hydraulic Hoses

See “Hydraulic Hoses” on page 5-85.

Accumulator Gas Pressure

See “Accumulator Nitrogen Pressure (Breaker only)” on page 5-92 and perform this procedure every 1,000 service hours or once each year, which ever occurs first.

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MACHINE STORAGE

Follow these procedures when placing the machine in storage. Store the machine in a secure area free of public access. If your storage area is near the ocean or other salt water environment, it is important to be aware of salt damage. Contact your Sany1 distributor for additional storage procedures if this is case.

Short-Term Storage (Less than 30 days)

- Clean the machine, keep it dry and fully lubricated.
- Cover the machine to protect from dust.

Long-Term Storage (Longer than 30 days)

- Clean the machine and travel system.
- Keep the machine in a dry well ventilated area.
- Lubricate oil all corrosive parts.
- Carefully lubricate the slewing bearing teeth.
- Change out the engine and hydraulic oils.
- Replace all the filter elements.
- Remove the batteries in accordance with the procedures shown in “Batteries” on page 5-45.
- Drain the cooling system and post a sign “No Coolant in Machine System” on the crane.
- Cover the engine with film to prevent moisture and dust.
- Inventory and properly store all required tools.

Run the engine at low speed with no load every month. During the period, pay attention to the engine cylinder temperature

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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 equipment and before operating or servicing it. Failure to do this can cause property damage, personal injury or death.

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BEFORE TROUBLESHOOTING

	Item	Judgement value	Remedy
Lubricating oil, coolant	1. Check fuel level and type of fuel	—	Add fuel
	2. Check for impurities in fuel	—	Clean, drain
	3. Check hydraulic oil level	—	Add oil
	4. Check hydraulic oil strainer	—	Clean, drain
	5. Check swing drive oil level	—	Add oil
	6. Check engine oil level (in oil pan)	—	Add oil
	7. Check coolant level	—	Add water
	8. Check dust indicator for clogging	—	Clean or replace
	9. Check hydraulic filter	—	Replace
	10. Check final drive oil level	—	Add oil
Electrical equipment	1. Check for looseness and corrosion of battery terminal and wiring	—	Tighten or replace
	2. Check for looseness and corrosion of alternator terminal and wiring	—	Tighten or replace
	3. Check for looseness and corrosion of start motor terminal and wiring	—	Tighten or replace
Hydraulic, mechanical equipment	1. Check for abnormal noise and smell	—	Repair
	2. Check for oil leakage	—	Repair
	3. Carry out air bleeding	—	Bleed air
Electrics, electrical equipment	1. Check battery voltage (engine stopped)	20-30V	Replace
	2. Check battery electrolyte level	—	Add or replace
	3. Check for discolored, burnt, exposed wiring	—	Replace
	4. Check for missing wiring clamps and hanging wiring	—	Repair
	5. Check for water leaking on wiring (be particularly careful attention to water leaking on connectors or terminals)	—	Disconnect connector and dry
	6. Check for blown or corroded fuses	—	Replace
	7. Check alternator voltage (engine running at 1/2 throttle or above)	After running for several minutes: 27.5~ 29.5V	Replace
	8. Check operating sound of battery relay (when switch is turned ON/OFF)	—	Replace

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TROUBLESHOOTING PRECAUTIONS

⚠ WARNING

Observe the following before performing any troubleshooting operations. Failure do so can cause machine damage, personal injury or death.
Park the machine on a hard, level ground. Make sure that the safety pins and blocks are effective.

- **Co-workers must use the same signal system. Keep irrelevant people a safe distance from the machine.**
- **If the radiator cap is removed when the engine is hot, hot coolant may squirt out and cause burns. Wait for the engine to cool down before troubleshooting.**
- **Take care not to touch any hot metal parts or be caught by any rotating parts.**
- **Before disconnecting any electrical wiring, always disconnect the batteries.**
- **Before removing the plug or cap from any vessel that contains pressurized oil. water, or air, release the internal pressure. When installing a measuring device, be sure to connect it properly.**

The aim of troubleshooting is to pinpoint the basic cause of the failure, to carry out repairs swiftly, and to prevent occurrence of the failure. A short cut to effective troubleshooting is to ask the operator questions to form some idea of possible causes of the failure that would produce the reported symptoms.

1. When performing troubleshooting, do not hurry to disassemble the components. If components are disassembled immediately it is possible that have no connection to the failure may be disassembled. It may become impossible to determine the root cause of the failure. It may also cause a waste of man-hours, parts, or fluids and may loose the confidence of the user or operator. For these reasons it is necessary to carry out a through investigation and carry out troubleshooting in accordance with the established procedure.

2. Questions to ask the user or operator:

   - Have any other problems occurred apart from the problem reported?
   - Was there anything strange about the machine before the failure occurred?
   - Did the failure occur suddenly, or were there problems th the machine condition before this?
   - Under what conditions did the failure occur?
   - Had any repairs been carried out before the failure, if so, what and when?
   - Has the same kind of failure occurred before?

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3. Check before troubleshooting

    - Check the oil level
    - Check for any external leakage of oil from the piping or hydraulic equipment.
    - Check the travel of the control levers
    - Other maintenance items can be checked externally, so check any item that is considered necessary

4. Confirming failure

    - Confirm the extent of the failure yourself, and judge whether to handle it as a real failure of as a problem with the method of operation, etc.
    - When operating the machine to reenact the troubleshooting symptoms, do not carry out any investigation or measurement that will make the problem worse.

5. Troubleshooting

    - Use the results of the investigation and inspection in items 2, 3 and 4 to narrow down the causes of the failure, then use the troubleshooting as follows:

        • Start from the simple points

        • Start from the most likely points

        • Investigate other related parts or information

6. Measure to remove root cause of failure

    - Even if the failure is repaired, if the root cause of the failure is not repaired, the same failure will occur again. To prevent this, always investigate why the problem occurred. Then, remove the rood cause.

Precautions Troubleshooting Electrical Circuits

1. Always turn off the power before disconnecting of connecting connectors.

2. Check that all related connectors are connected before any troubleshooting.

    - Disconnect and connect the related connectors several times to check.

3. Always connect any disconnected connectors before going on to the next step.

    - If the power is turned ON with the connectors disconnected, unnecessary abnormality displays will be generated.

4. When carrying out troubleshooting of circuits (measuring voltage, resistance, continuity, or current) move the related wiring several times and check that there is no change in the reading on the tester.

    - If there is any change, there is probably a short in that circuit.

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Precautions Handling Hydraulic Components

With the increase in pressure and precision of hydraulic equipment, the most common cause of failure is dirt (foreign material) in the hydraulic circuit. When adding hydraulic fluid, or when disassembling hydraulic equipment, it is necessary to be particularly careful.

1. Be careful of the operating environment.

    - Avoid adding hydraulic fluid, replacing filters, or repairing the machine in rain or high winds, or places where there is lots of dust.

2. If disassembly or maintenance work is carried out on hydraulic equipment in the field, there is danger of dust entering the equipment. It is also difficult to confirm the performance after repairs, so it is desirable to use unit exchange. Disassembly and maintenance of hydraulic equipment should be carried out in a specially prepared dust-proof workshop, and the performance should be confirmed with special test equipment.

3. Be careful not to let any dirt or dust get in when refilling hydraulic fluid. Always keep the oil filler and the area around it clean, and also use clean pumps and oil containers. If an oil cleaning device is used, it is possible to filter out the dirt that has collected during storage, so this is an even more effective method.

4. When changing the fluid, as much as possible of the old hydraulic fluid must be drained out. (Drain the fluid from the hydraulic tank, also drain the fluid from the filter and from the drain plug in the circuit.) If any old fluid that is left, the contaminates and sludge in it will mix with the new fluid and will shorten the lift of the hydraulic fluid.

5. After repairing the hydraulic equipment (pump, control valve, etc.) or when running the machine, carry out fluid cleaning to remove the sludge or contaminates in the hydraulic fluid circuit. The fluid cleaning equipment is used to remove the ultra fine (about 3μ) particles that the filter built into the hydraulic equipment cannot remove, so it is an extremely effective device.

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TOWING THE MACHINE

⚠ WARNING

Towing the machine improperly or using wire rope beyond specified limits could lead to serious injury or death.

- **Make sure that the wire ropes used for towing the machine are strong enough.**
- **While towing the machine, do not use wire rope with broken wires, reduced diameter, or knots to prevent rupture of the wire ropes.**
- **Always wear protective gloves when handling wire ropes.**
- **Never tow the machine on a slope.**
- **Never stand between the towing machine and the towed machine when performing towing operations.**
- **Operate the machine slowly and avoid imposing any sudden load on the wire rope.**

NOTE: The acceptable towing force is 9,921 ft/lb (4,500 kgf).

If the machine is trapped in mud and cannot move out of the mud with its own force, or the towing force of excavator is occupied by heavy object, wire cables can be used as shown in the right illustration.

Place wood blocks or other protective materials between where the wire cable contacts the machine in order to prevent friction between the wire cable and the machine.

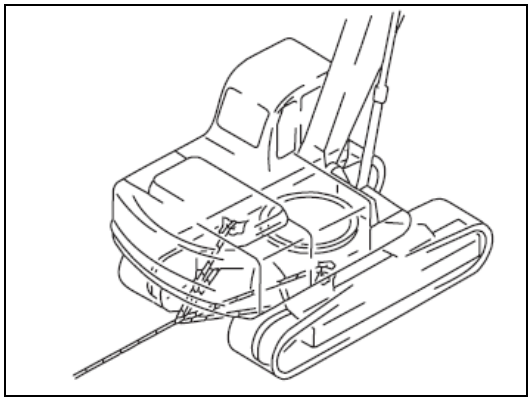


Fig. 6-1

Keep the wire cable parallel to the ground and align its direction with that of the track frame.

Move at a speed of 1Km/h when towing the machine. Tow the machine to a place suitable for repair. Never tow the machine over a long distance.

Towing of the machine is only allowed in case of emergency

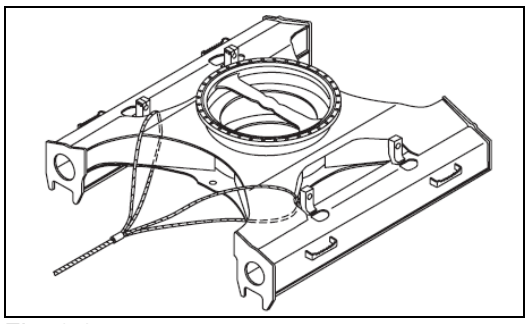


Fig. 6-2

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TOWING LIGHT LOADS

⚠ WARNING

Towing objects with the machine improperly could cause severe injury or death. The following items must be observed when towing with the machine:

A shackle must be used.

Keep the wire rope parallel to the ground and align its direction with that of the track frame.

Move the machine slowly and avoid imposing sudden loads on the wire rope.

The track frame has an eye which can be use when towing light objects.

NOTE: The maximum towing force is 3,968 ft/lb (1,800 kgf).

SEVERE OPERATING CONDITIONS

When excavating in water and the track support rollers go under water add grease to the support rollers before each operating task.

For heavy-loaded operations and deep excavation, add grease to the installation pins of the work tool (bucket, breaker, nibbler) prior to each operation. Cycle the operation of the boom, arm, and bucket several times prior to refilling the grease.

JUMP-STARTING THE ENGINE

General Information

- The starting system voltage and the battery voltage in the booster machine should be no more than 24 VDC.
- The jumper cables and their clamps must be undamaged, have no corrosion and be suitable for the battery amperage. All clamps must be securely attached to their jumper cable ends.
- The battery capacity of both machines must be the same.
- Place the hydraulic lock levers of both machines in the LOCK position.
- Set all control levers to their neutral positions.
- Use a jumper cable to connect ONLY the positive (+) terminals of BOTH the booster machine battery and the drained machine battery. NEVER connect the positive (+) terminal to a negative (-) terminal. Equipment damage or a possible explosion may result. Wear protective goggles and personal protective equipment when jumper-starting an engine.

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- Use a jumper cable to connect the negative (-) terminal on the booster machine battery to the engine block of the troubled machine and NOT the battery. A spark may result near the battery and cause an explosion.
- Always check and then double-check the jumper cable connections to confirm that they are correct before proceeding with engine startup.
- Be careful when disconnecting jumper cables after both engines are running. Never allow the jumper cable clamps to touch each other or to touch either machine.

Battery Access

Before proceeding with any battery jump-starting procedures, follow and remember these points:

- Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames.
- Wear personal protective equipment when working with batteries.
- Work in a well-ventilated area.
- If battery acid should get on your skin or in your eyes, flush the area immediately with fresh water and seek medical attention.

⚠ CAUTION

Failure to observe and follow these points listed above may result in equipment damage or possible injury.

Connecting the Jumper Cables

Ensure that the key switches of both machines are in the **OFF** position. See “Ignition Switch” on page 3-15 for key switch location.

1. Clamp one end of jumper cable “A” to the positive terminal (+) of the drained battery.
2. Clamp the other end of jumper cable “A” to the positive terminal (+) of the charged battery.
3. Clamp one end of jumper cable “B” to the ground terminal (-) of the charged battery.
4. Clamp the other end of jumper cable “B” to the engine cylinder block of the machine with the drained battery.

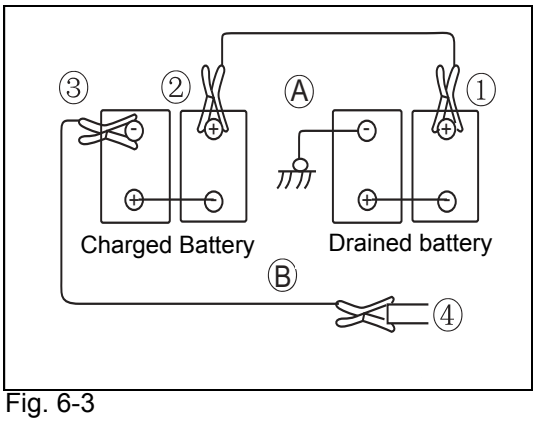


Fig. 6-3

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Starting the Engine

NOTICE

Ensure that all jumper cables are clamped to their connections securely. Failure to observe and follow this notice may result in equipment damage or poor starting.

NOTE: See “Engine Start Procedure” on page 4-30

1. Start the engine of the good machine and run it at a medium speed.
2. Attempt to start the engine of the trouble machine using the key switch as normal. Retry every 3 minutes if the engine will not start.

Disconnecting the Jumper Cables

Disconnect the jumper cables after the trouble engine has started as described here:

1. Unclamp jumper cable “B” from the engine block of the machine with the drained battery.
2. Unclamp the other end of jumper cable “B” from the ground terminal (-) of the charged battery.
3. Unclamp jumper cable “A” from the positive terminal (+) of the charged battery.
4. Unclamp the other end of jumper cable “A” from the positive terminal (+) of the drained battery.

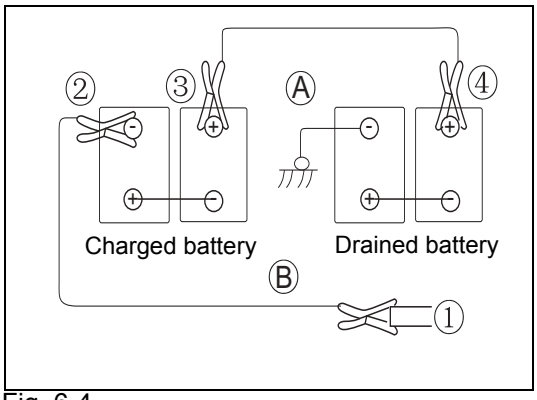


Fig. 6-4

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FUSES

The fuse box is located in the cab behind the seat.

Open the fuse box door to access the fuses (1).



Fig. 6-5

Fuse location, circuit & amperage	
F2. Charging Lamp, 5A	F1. Starting Circuit, 30A
F4. Working Lamp, 15A	F3. KPM controller, 10A
F6. Travel Alarm, 2A	F5. Cab Lamp, 5A
F8. Radio, 10A	F7. 12V Converter, 20A
F10. Air Conditioner, 20A	F9. Diagnostic Terminal, 5A
F12. Lighter, 20A	F11. Hydraulic Nibbler, 5A
F14. Pilot Control, 10A	F13. Fueling, 15A
F16. Display, 5A	F15. Washer & Wiper, 10A
F18. Dome Lamp, 5A	F17. KPM Controller, 5A
F20. Ignition (ECM), 5A	F19. ECM Power, 20

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ENGINE FAILURES

Failure		Causes	Remedy
When the engine fails to start	Starter failure or reluctant rotation.	• Battery dead • Battery that has disconnected or loose cable, or is corroded. • Fuse breaks. • Failure of start switch or start relay. • Failure of start motor. • Engine oil viscosity high.	• Recharge/replace the battery. • Remove the corroded part. • Replace the fuse. • Replace the start switch or relay. • Repair/replace the start motor. • Use engine oil with suitable viscosity.
	Starter is OK.	• Fuel exhausted. • Fuel injector opening pressure low. • Failure of fuel delivery valve of injection pump • Failure of control rack of injection pump • Worn or Stuck plunger of injection pump • Improper starting operation • Air trapped in the fuel system • Fuel filter plugged • Air cleaner plugged	• Refill the fuel and purge the air. • Adjust/replace the fuel injector. • Replace the fuel delivery valve. • Repair or replace the control rack. • Replace the plunger assembly. • Start the engine in regular steps. • Purge air from the fuel system. • Replace fuel filter element or cartridge. • Clean/replace air cleaner element.
Engine shuts down immediately after starting.		• Idle speed low. • Fuel filter plugged • Air cleaner plugged	• Battery dead • Replace fuel filter element or cartridge. • Clean/replace air cleaner element.

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Failure	Causes	Remedy
Unable to start the engine	• Fuel filter plugged	• Replace fuel filter element or cartridge.
	• Air cleaner plugged	• Clean/replace air cleaner element.
	• Clutch sideslip	• Repair/replace the clutch.
	• Loose clamp of the air intake hose of turbocharger	• Fasten the clamp properly.
	• Cracking intake hose of turbocharger	• Replace the hose.
Low idle speed instable	• Failure of low idle controller	• Repair/replace the low idle control system.
	• Fuel system leaks or is blocked.	• Repair the fuel system.
	• Air trapped in the fuel system	• Pure the air from fuel system.
	• Fuel system contains water.	• Change the fuel.
	• Fuel filter element plugged	• Replace fuel filter element or cartridge.
	• Failure of injection pump	• Repair/replace related parts of fuel injection pump.
	• Bad adjustment of air valve clearance	• Readjust air valve clearance.
	• Broken cylinder gasket, worn cylinder liner, stuck or ruptured piston ring, or defective contact between air valve and its seat	• Replace relevant parts.
Power insufficient	• Fuel filter plugged	• Replace fuel filter element or cartridge.
	• Fuel contaminated by water	• Change the fuel.
	• Air cleaner plugged	• Clean/replace air cleaner element.
	• Failure of fuel delivery pump	• Repair/replace fuel delivery pump
	• Fuel injector activating pressure low; injection effect not good	• Readjust/replace fuel injector.
	• Failure of injection pump	• Repair/replace related parts of the fuel injection pump.
	• Exhaust gas leaks. Air leaks.	• Replace relevant parts.
	• Turbocharger assembly damaged	• Replace turbocharge assembly.
	• Exhaust valve blocked	• Clean the exhaust pipe.
	• Bad adjustment of air valve clearance	• Adjust valve clearance.
	• Soft or broken spring of air valve	• Replace gas spring.
	• Broken cylinder gasket, worn cylinder liner, stuck or ruptured piston ring, or defective contact between air valve and its seat	• Replace relevant parts.

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Failure	Causes	Remedy
Engine overheated	• Insufficiency of coolant • Fan belt skids due to looseness or cracking. • Radiator cap damaged or radiator core plugged • Coolant pump damaged • Coolant leaks due to broken cylinder head or cylinder block seal cap • Thermostat damaged • Cooling system blocked by foreign object • Improper adjustment of fuel injection timing	• Refill coolant. • Replace fan belt. • Replace radiator cap or clean radiator core. • Repair/replace coolant pump. • Replace seal cap. • Replace thermostat. • Remove foreign object from the cooling system. • Readjust fuel injection timing.
White exhaust gas	• Fuel contaminated by water • Sluggish fuel injection timing • Broken cylinder gasket, worn cylinder liner, stuck or ruptured piston ring, or defective contact between air valve and its seat • Failure of turbocharger • Defective valve oil seal or worn valve stem and valve guide tube • Wear, rupture or incorrect setup of piston ring • Scratch or wear of cylinder liner	• Change the fuel. • Readjust fuel injection timing. • Replace relevant parts. • Repair/replace. • Replace valve oil seal, valve and valve guide tube. • Replace the piston or reset it correctly. • Replace cylinder liner.
Black exhaust gas	• Air cleaner plugged • Fuel injector activating pressure low or bad injection effect • Improper adjustment of fuel injection timing • Fuel drips after injection due to damage of fuel injection pump delivery valve • Excessive injection of the injection pump	• Clean/replace air cleaner element. • Readjust/replace fuel injector. • Readjust fuel injection timing. • Replace fuel delivery valve. • Readjust fuel injection amount.

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Failure	Causes	Remedy
Excessive consumption of fuel	• Fuel leaks. • Air cleaner plugged • Low idle improper • Fuel injector activating pressure low, or bad injection effect • Fuel injection timing incorrect • Fuel drips after injection due to damage of fuel injection pump delivery valve. • Air leaks from the intake side of turbocharger. • Turbocharger assembly damaged • Bad valve clearance • Soft or broken valve spring • Broken cylinder gasket, worn cylinder liner, stuck or ruptured piston ring, or defective contact between air valve and its seat	• Repair/replace related parts of the fuel system. • Clean/replace air cleaner element. • Readjust low idle. • Adjust/replace fuel injector. • Readjust fuel injection timing. • Replace fuel delivery valve. • Repair the intake side of turbocharger. • Replace turbocharger assembly. • Readjust valve clearance. • Replace valve spring. • Replace relevant parts.
Excessive consumption of oil	• Bad oil • Excessive oil • Oil leaks through oil seal and/or gasket. • No preheating operation • Defective valve oil seal, or wear of valve stem and valve guide tube • Wear, rupture or improper setup of piston ring • Scratch or wear of cylinder liner	• Use suitable oil. • Drain excessive oil. • Replace oil seal and/or gasket. • Follow the procedure specified • Replace related parts. • Replace piston ring or reset it properly. • Replace cylinder liner.
Oil pressure low	• Oil insufficient • Bad oil viscosity • Oil leaks through oil seal and/or gasket. • Oil filter element plugged • Stuck safety valve and/or soft bypass valve spring • Oil pump screen plugged • Wear of oil pump related parts	• Refill oil. • Use lubricant with proper viscosity. • Replace oil seal and/or gasket. • Replace oil filter element or cartridge. • Replace spring of safety valve and/or bypass valve. • Clean the screen of oil pump. • Replace related parts of oil pump.

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Failure		Causes	Remedy
Strange engine noise	Gas leaking noise	• Exhaust pipe connector loose or exhaust pipe broken • Fuel injector loose • Exhaust manifold connector loose • Cylinder gasket broken	• Tighten exhaust pipe connector or replace exhaust pipe. • Replace gasket and tighten fuel injector . • Tighten the connector of exhaust manifold. • Replace cylinder gasket.
	Continuous noise	• Fan belt loose • Cooling fan loose • Worn or damaged coolant pump bearing • Bad valve clearance	• Readjust belt tension. • Tighten the cooling fan. • Replace coolant pump bearing. • Readjust valve clearance.

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Failure	Causes	Remedy
Preheating function fails.	• Preheat fuse failure	• Replace
	• Preheat relay failure	• Replace
	• Short circuit of wire (grounding failure)	• Check/repair
	• Preheat controller failure	• Replace
All devices fail.	• Hydraulic lockout control failure	• Repair/replace
	• Short circuit of wire (grounding failure)	• Check/repair
	• Failure of internal coil of pilot lockout valve	• Replace
Boom slow and weak	• Sensor failure	• Replace
	• Short circuit of harness (grounding failure)	• Check/repair
	• Open circuit of harness	• Check/repair
	• Controller failure	• Replace
Arm slow and weak	• Sensor failure	• Replace
	• Short circuit of harness (grounding failure)	• Check/repair
	• Open circuit of harness	• Check/repair
	• Controller failure	• Replace
Bucket slow and weak	• Sensor failure	• Replace
	• Short circuit of harness (grounding failure)	• Check/repair
	• Open circuit of harness	• Check/repair
	• Bucket confluence solenoid valve failure	• Replace
	• Controller failure	• Replace
Travel slow and weak	• Sensor failure	• Replace
	• Short circuit of harness (grounding failure)	• Check/repair
	• Open circuit of harness	• Check/repair
	• Controller failure	• Replace
Monitor black-out	• Fuse failure	• Replace
	• Open circuit of wire	• Check/repair
	• Short circuit of wire (grounding failure)	• Check/repair
	• Monitor failure	• Replace
Monitor displays nothing.	• Resistor failure	• Replace
	• Open circuit of wire	• Check/repair
	• Short circuit of wire (grounding failure)	• Check/repair
	• Monitor or controller failure	• Replace

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Failure	Causes	Remedy
Dual-travel speed failure	• Dual travel speed solenoid valve failure • Open circuit of wire • Short circuit of wire (grounding failure)	• Replace • Check/repair • Check/repair
Engine coolant temperature reading incorrect	• Coolant temperature sensor failure • Open circuit of wire • Short circuit of wire (grounding failure) • Wire short-circuited with 24V	• Replace • Check/repair • Check/repair • Check/repair
Fuel level reading incorrect	• Fuel level sensor failure • Open circuit of wire • Short circuit of wire (grounding failure) • Wire short-circuited with 24V	• Replace • Check/repair • Check/repair • Check/repair
Wiper failure	• Wiper motor internal failure • Open circuit of wire • Short circuit of wire (grounding failure)	• Repair/replace • Check/repair • Check/repair
Arm-in pilot pressure reading incorrect	• 5V power supply failure • Open circuit of signal line • Short circuit of signal line • Sensor failure	• Repair/replace • Check/repair • Check/repair • Replace
Arm-out pilot pressure reading incorrect	• 5V power supply failure • Open circuit of signal line • Short circuit of signal line • Sensor failure	• Repair/replace • Check/repair • Check/repair • Replace
Boom-up pilot pressure reading incorrect	• 5V power supply failure • Open circuit of signal line • Short circuit of signal line • Sensor failure	• Repair/replace • Check/repair • Check/repair • Replace
Boom-down pilot pressure reading incorrect	• 5V power supply failure • Open circuit of signal line • Short circuit of signal line • Sensor failure	• Repair/replace • Check/repair • Check/repair • Replace
Bucket-dig pilot pressure reading incorrect	• 5V power supply failure • Open circuit of signal line • Short circuit of signal line • Sensor failure	• Repair/replace • Check/repair • Check/repair • Replace

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Failure		Causes	Remedy
Travel speed slow		• Travel pilot valve failure • Pilot relief valve failure • Sensor failure • Travel control valve (spool) failure • Travel control valve (feed valve) failure • Travel motor failure	• Repair/replace • Replace • Replace • Repair/replace • Repair/replace • Check/repair
Machine steering difficult or power insufficient		• Travel pilot valve failure • Travel pilot pressure sensor failure • Travel control valve (spool) failure • Travel control valve (feed) failure • Travel motor (safety valve) failure • Travel motor (check valve) failure	• Repair/replace • Replace • Repair/replace • Repair/replace • Repair/replace • Repair/replace
Unable to shift travel speed		• High/low travel speed shift valve failure • Travel motor failure	• Replace • Check/repair
Travel fails (on one side)		• Travel control valve (feed valve) seat failure • Travel motor (safety valve) seat failure • Travel motor (feed valve) seat failure • Travel motor failure • Pilot pressure sensor failure	• Repair/replace • Repair/replace • Repair/replace • Check/repair • Replace
Unable to swing	In both directions	• Swing motor (parking brake) failure • Bad adjustment or failure of swing motor (safety valve) • Swing motor failure • Swing drive failure	• Check/repair • Adjust/replace • Check/repair • Check/repair
	In one direction	• Pilot valve failure • Swing control valve (spool) failure • Swing motor (feed valve) seal failure	• Repair/replace • Repair/replace • Replace
Swing speed slow	Acceleration performance bad	• Swing motor (parking brake) failure • Bad adjustment or failure of swing motor (safety valve) • Swing motor failure • Brake control line blocked	• Check/repair • Adjust/replace • Check/repair • Remove obstruction or replace the pipeline.

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Failure	Causes	Remedy
Bucket-dump pilot pressure reading incorrect	• 5V power supply failure • Open circuit of signal line • Short circuit of signal line • Sensor failure	• Repair/replace • Check/repair • Check/repair • Replace
Swing pilot pressure reading incorrect	• 5V power supply failure • Open circuit of signal line • Short circuit of signal line • Sensor failure	• Repair/replace • Check/repair • Check/repair • Replace
Travel pilot pressure reading incorrect	• 5V power supply failure • Open circuit of signal line • Short circuit of signal line • Sensor failure	• Repair/replace • Check/repair • Check/repair • Replace

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FAILURE CODES

The failure codes (1) display in the cab on the machine system monitor.



Fig.6-6

Code	Symptom
E101	Controller memory error
E102	Temperature inside controller error
E103	Sensor power source error
E401	CAN bus error
E501	Gear rotate error
H101	Front pump output pressure error
H102	Rear pump output pressure error
H103	Power valve over current
H105	Front pump over current
H108	Rear pump over current
H112	Backup pilot pressure abnormal
H201	Bucket-dig pilot pressure abnormal
H202	Bucket-dump pilot pressure abnormal
H203	Arm-in pilot pressure abnormal
H204	Arm-dump pilot pressure abnormal
H205	Boom-up pilot pressure abnormal
H206	Boom-down pilot pressure abnormal
H207	Left travel pilot pressure abnormal
H208	Right travel pilot pressure abnormal
H209	Swing pilot pressure abnormal
H210	Shear opening/closing pilot pressure abnormal

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Code	Symptom
H211	Shear rotating pilot pressure abnormal
H303	Swing priority current abnormal
H306	Bucket confluence current abnormal
H309	Boom priority-1 current abnormal
H312	Boom priority-2 current abnormal
H315	Travel speed shift abnormal
H401	Hyd oil temp sensor voltage abnormal
H402	Hydraulic oil temp too high
P103	Coolant level too low
P104	Engine oil pressure too low
P105	Boosting temperature too high
P302	Coolant temperature resistance abnormal
P303	Coolant temperature too high
P402	Fuel meter abnormal
P403	Fuel level low
P404	Fuel temperature too high
P501	Air filter clogged
P601	Primary fuel filter clogged
P602	Secondary fuel filter clogged

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HYDRAULIC SYSTEM

Failure	Causes	Remedy
Work equipment moving slowly, or travel and swing speed slow	• Bad adjustment or main relief valve failure • Pilot relief valve failure • Regulator failure • Plunger pump failure	• Replace • Replace • Repair/replace • Check/repair
Work equipment, final drive or swing drive not functioning	• Pilot pump relief valve failure • Hydraulic pump failure • Coupling failure	• Replace • Check/repair • Check/repair
Abnormal noise in hydraulic pump	• Hydraulic oil level low • Bad hydraulic oil • Hydraulic tank cap vent plugged • Hydraulic tank filter screen plugged • Plunger pump failure	• Refill hydraulic oil • Use suitable hyd oil • Clean/replace • Clean/replace • Check/repair
Auto idle not functioning	• Sensor failure • Pilot valve failure • Controller failure	• Replace • Replace • Repair/replace
Boom speed slow	• Right pilot valve (boom circuit) failure • Pressure sensor failure • Boom control valve (spool) failure • Boom control valve (retaining valve) failure • Boom control valve (Safety valve and feed valve) seal failure • Boom cylinder failure	• Check/repair • Replace • Repair/replace • Repair/replace • Repair/replace • Check/repair
Arm speed slow	• Left pilot valve (arm circuit) failure • Pressure sensor failure • Arm control valve (spool) failure • Arm control valve (regeneration valve) failure • Arm control valve (Safety valve and feed valve) or seal failure • Arm cylinder failure	• Check/repair • Replace • Repair/replace • Repair/replace • Repair/replace • Check/repair

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Failure	Causes	Remedy
Bucket speed slow	• Right pilot valve (bucket circuit) failure • Pressure sensor failure • Bucket control valve (spool) failure • Bucket control valve (regeneration valve) failure • Bucket control valve (Safety valve and feed valve) or seal failure • Bucket cylinder failure	• Check/repair • Replace • Repair/replace • Repair/replace • Repair/replace • Check/repair
One cylinder of work equipment not working	• Pilot valve failure • Pressure sensor failure • Work equipment control valve (spool) failure	• Check/repair • Replace • Repair/replace
Work equipment cylinder drifting excessively	• Work equipment cylinder failure • Retaining valve (of boom or arm) failure • Work equipment control valve (safety valve and feed valve) seal failure • Work equipment valve spool failure	• Repair/replace • Repair/replace • Repair/replace • Repair/replace
Work equipment sluggish	• Arm regeneration valve failure • Control valve (safety valve and feed valve) failure	• Repair/replace • Repair/replace
Other work equipment moves when single cylinder is in relief.	• Control valve seal failure	• Replace
Travel speed drops remarkably during swing or travel operation.	• Straight travel valve failure	• Repair/replace
Machine runs out during travel	• Travel pilot valve failure • Pilot relief valve failure • Regulator failure • Proportional solenoid valve sluggish • Travel valve spool sluggish • Central swivel joint sluggish • Travel motor failure • Travel pilot pressure sensor failure	• Repair/replace • Replace • Repair/replace • Repair/replace • Repair/replace • Repair/replace • Repair/replace • Replace

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Failure		Causes	Remedy
Swing speed slow	Bad acceleration performance on one side or swing speed slow	• Pilot valve failure • Swing motor (pressure compensation valve) failure • Swing motor (feed valve) seal failure • Leak on one side the shuttle valve of swing pilot pressure sensor	• Repair/replace • Repair/replace • Replace • Repair/replace
Too much overrun in swing stoppage	In both directions	• Bad adjustment or failure of swing motor (safety valve) • Swing motor failure	• Adjust/replace • Check/repair
	In one direction	• Pilot valve failure • Swing control valve (spool) failure • Swing motor (feed valve) seal failure	• Repair/replace • Repair/replace • Replace
Too much jerk in swing stoppage		• Swing pilot valve failure • Swing anti-jerk valve failure • Swing relief valve failure	• Repair/replace • Repair/replace • Repair/replace
High abnormal noise in swing stoppage		• Back pressure valve failure • Swing motor (safety valve) failure • Swing motor (feed valve) failure • Swing system mechanical failure	• Repair/replace • Repair/replace • Repair/replace • Check/repair
Excessive hydraulic drift of swing	When swing brake engaged	• Swing brake control line failure • Swing motor (parking brake) failure	• Check/repair • Repair/replace
	When swing brake disengaged	• Swing control valve (spool) failure • Swing motor (relief valve) failure • Swing motor (feed valve) failure	• Repair/replace • Repair/replace • Repair/replace

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OTHER COMMON FAILURES

Failure	Causes	Remedy
Structure member noise loud	• Loose fastener • Bigger clearance between arm and bucket end faces due to wear	• Check and retighten. • Reduce the clearance to a value that is smaller than 1mm.
Bucket tip falls off during operation.	• Spring deformed and weak due to repeated use of bucket tip pin • Bucket tip pin not matching the adaptor	• Replace bucket tip pin
Track kinks.	• Loose track • Traveling at high speed on rough road in the direction of sprocket	• Tighten the track • Travel slowly on rough road in the direction of idler.
Fan not working	• Improper electrical connection or connector contact • Air flow control switch, relay or temperature control switch damaged • Fuse exploded or battery voltage low	• Repair/replace.
Fan running but producing less air flow	• Air intake side blocked • Evaporator or condenser fin plugged, giving ineffective heat conduction • Fan vane seized or damaged	• Clean/replace.
Compressor not working or working with difficulty	• Compressor clutch not picking up due to wire break or defective contact of electrical circuit • Loose compressor belt • Wire break or failure of compressor clutch coil • Insufficient or excessive refrigerant	• Repair • Adjust the tension of compressor belt • Replace clutch coil • Refill/drain the refrigerant to a suitable level
Refrigerant insufficient	• Refrigerant leaks. • Insufficient refilling	• Eliminate the leaking point. • Refill suitable amount of refrigerant.
High/low pressure reading in normal operation	• Ambient temperature: 30~50°C • High pressure gauge: 1.47~1.67MPa (15~17kgf/cm²) • Low pressure gauge: 0.13~0.20MPa (1.4~2.11kgf/cm²)	

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Failure		Causes	Remedy
Low pressure gauge reads higher.	Low pressure tube surface frosted	• Expansion valve opening excessively. • Defective contact of expansion valve thermo-bulb • Excessive refrigerant in the system	• Replace expansion valve. • Install thermo-bulb correctly. • • Drain refrigerant to the specified level.
Low pressure gauge reads lower.	Both high and low pressure gauge readings lower the standard value.	• Refrigerant insufficient	• Refill refrigerant to the specified level.
	Low pressure gauge could read negative.	• Low pressure hose blocked; expansion valve blocked by ice or contaminants.	• Repair the system. Replace reservoir in case of ice blockage.
	Evaporator frozen	• Thermostat failure	• Replace thermostat.
Expansion valve inlet felt cool and frosted.		• Expansion valve blocked.	• Clean/replace expansion valve.
Expansion valve outlet is not felt cool. Low pressure could be negative.		• Expansion valve thermo-tube or bulb leaks.	• Replace expansion valve.
High pressure gauge reads higher.	Both high/ low pressure gauges read higher than standard value.	• Air trapped in circulation system. • Excessive refrigerant refilled.	• Empty the system and vacuate to refill refrigerant. • Drain refrigerant to the specified level.
	Bad condensing effect of condenser.	• Condenser blocked by dust and debris • Condenser fan damaged	• Clean the condenser. • Check/replace condenser fan.

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SANY

Specifications

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Operating Ranges 7-5

⚠ WARNING

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this equipment and before operating or servicing it. Failure to do this can cause property damage, personal injury or death.

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MACHINE DIMENSIONS & SPECIFICATIONS

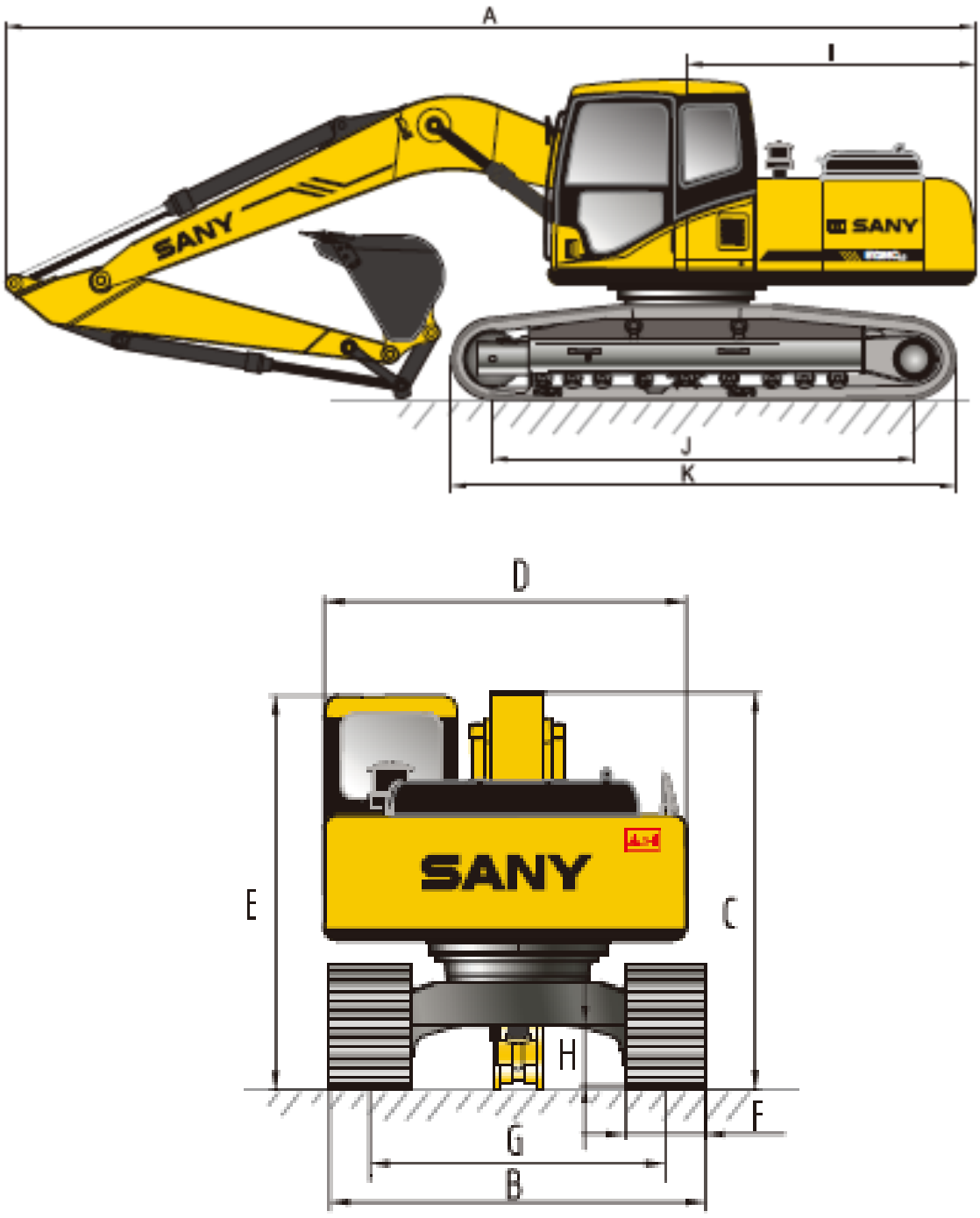


Fig. 7-7

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Overall Dimensions

Weight (loaded - full fuel tank, operator and standard bucket)	82,371 lb (37,363 kg)
Transport Weight - bucket (15% fuel in tank, no operator)	81,361 lb (36,905 kg)
A. Transport Length	36’ 5” (11,100 mm)
B. Transport Width	11’ 2” (3,410 mm)
C. Transport Height	11’ 6” (3,505 mm)
D. Upper Width	9’ 10” (3,000 mm)
E. Cab Height	10’ 8” (3,262 mm)
F. Std. Track shoe Width	2’ 7” (800 mm)
G. Track Gauge	8’ 6” (2,590 mm)
H. Minimum Ground Clearance	1’ 8” (541 mm)
I. Tail Swing Radius	10’ 10” (3,300 mm)
J. Length Center Idler to Center Sprocket	13’ 7” (4,150 mm)
K. Track Length	16’ 7” (5,080 mm)
Boom Length	21’ (6,400 mm)
Std Arm Length	10’ 6” (3,187 mm)

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Machine Parameters

Weight (loaded - full fuel tank, operator and standard bucket)	82,371 lb (37,363 kg)	
Engine	Model No.	Cummins, QSL9
	Type	6 in-line cylinders, 4-stroke, turbo pressurized, centralized air-colling, electric controls, etc.
	Control Method	ECU completely electric-controlled system of CAN bus
	Power Rating	275hp/2,200 rpm(205kw/2,200rpm)
	Torque Rating	895 lbf-ft/1,500 rpm (1213 Nm/1,500 rpm)
	Exhaust Gas Standard	EU Tier 4i
Main Pump Flow	2 x 106 gal (2 x 400 l)	
Swing Speed	9.8 rpm	
Travel Speed	2.1 / 3.2mph (3.4 /5.1km/h)	
Draw Bar Pull (Tractive Effort)	70,140 lbf (312 kN)	
Max Arm Digging Force	37,093 lbf (165 kN)	
Max Bucket Digging Force	49,458 lbf (220 kN)	
Number of Upper Rollers	2	
Number of Lower Rollers	9	
Fuel Tank Capacity	137 gal (520 l)	
Hydraulic Tank Capacity	108.3 gal (410 l)	
Cooling System Capacity	12.5 gal (48 l)	
Engine Oil Capacity	7.67 gal (29 l)	
Ground Pressure (800 mm Shoes)	6.5 psi (44.6 kPa)	

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OPERATING RANGES

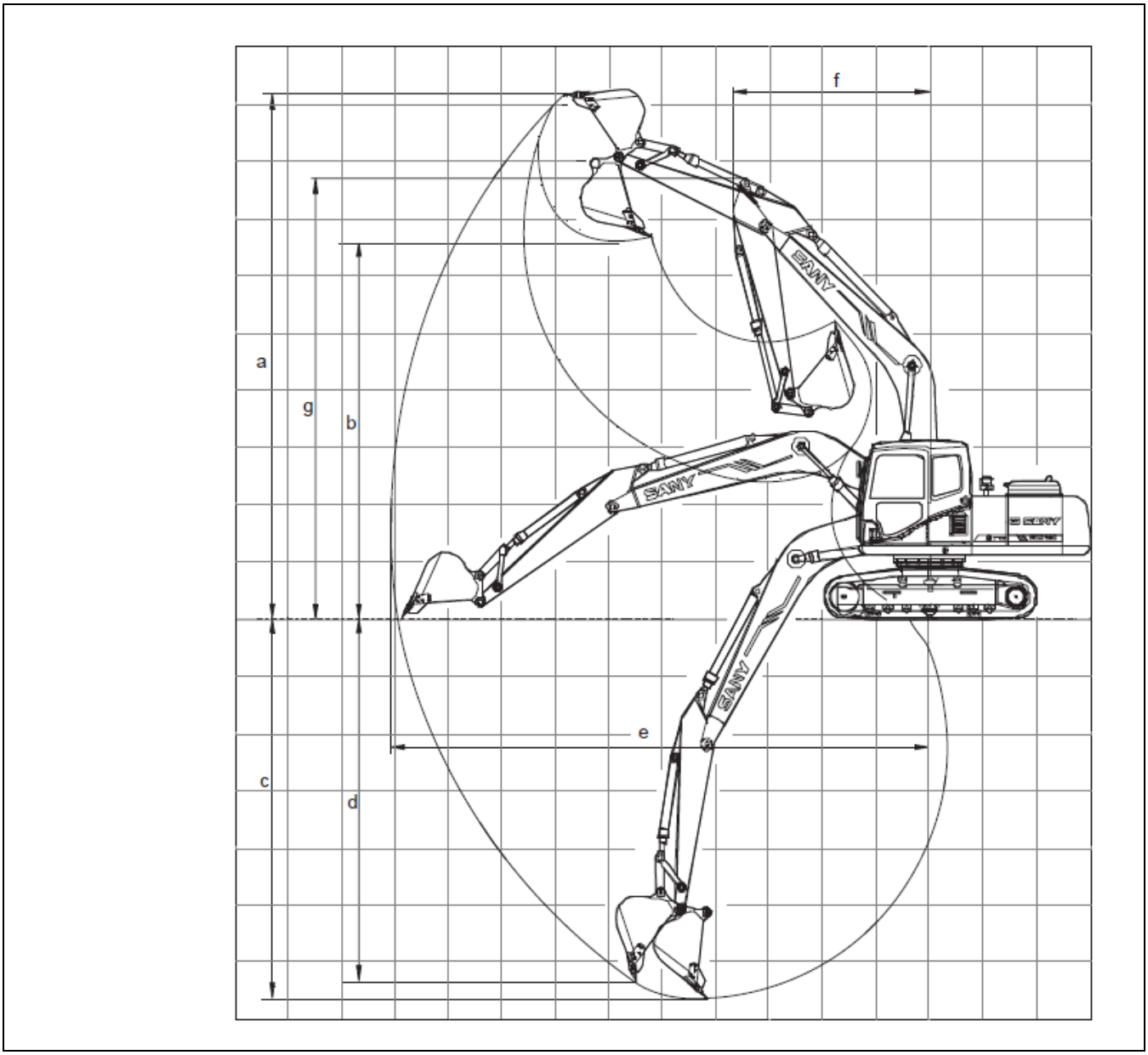


Fig. 7-8

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Operating Range

a	Max Digging Height	33’ 3” (10,135 mm)
b	Max Dumping Height	24’ 3” (7,391 mm)
c	Max Digging Depth	24’ 2” (7,377 mm)
d	Max Vertical Wall Digging Depth	23’ 1” (7,047 mm)
e	Max Digging Reach	36’ 5” (11,103 mm)
f	Min Swing Radius	14’ 7” (4,462 mm)
g	Max Height at Minimum Swing Radius	28’ (8,527 mm)

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Optional Equipment

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⚠ WARNING

Read and understand all safety precautions and instructions in this manual before reading any other manuals provided with this equipment and before operating or servicing it. Failure to do this can cause property damage, personal injury or death.

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OPTIONAL EQUIPMENT SAFETY EQUIPMENT

Be careful when installing any optional equipment to your machine. The following precautions must be strictly observed when selecting, installing and operating optional equipment.

Optional Equipment Selection

Please consult a Sany America authorized dealer before installing any optional equipment on your machine. Depending on the type of optional equipment selected, protective structures (such as front guards or top guards) may need to be installed on the machine.

Install only Sany-approved optional equipment. Sany America assumes no responsibility to accidents, loss or failures caused by any optional equipment that has not been approved by Sany.

Read Equipment Instructions

Carefully read and understand the optional equipment instruction manual before installing and operating any optional equipment. If your operation and maintenance manual is missing or broken, please contact the manufacturer of the optional equipment or Sany's authorized dealer to obtain a new one.

Removal And Installation Precautions

Observe the following in order to ensure safety when removing or installing optional equipment:

- Remove or install equipment only on a hard, level surface.
- Use a crane when handling heavy objects weighting more than 55 lbs (25 kg).
- Never stand under the boom of a crane holding any objects.
- Do not operate your machine when an object is being lifted on to it with a crane.
- Ensure your machine is well balanced and supported whenever you add or remove a heavy piece of equipment.
- For more information about removal and installation please consult any Sany America authorized dealer.

Optional Equipment Operation Precautions

Keep the following procedures in mind when installing any optional equipment. Prior to the operation, move your machine to a safe area and test it’s operation. Make sure that you know how it will move with an optional piece of equipment, the machine’s center of gravity, and working range.

- Ensure the machine is well balanced and does not list to one side or another.
- Maintain a safe distance to all surrounding barriers during machine operations.

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- Note the following points when installing optional equipment:
  - Heavy optional equipment requires a larger space to swing. There might be the danger of impacting other objects if the machine swinging range has not been calculated accurately. A larger space must be prepared before performing swinging the machine.
  - Never swing, lower or stop your machine suddenly in order to prevent it from tipping over.
  - Never extend or retract the boom cylinder suddenly in order to prevent impact that may cause the machine to tip.

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OPTIONAL EQUIPMENT SYSTEM FUNCTIONS

Component Location and Function

There are two stop valves located on the boom arm and a selector valve located near the boom base in the center of the machine.

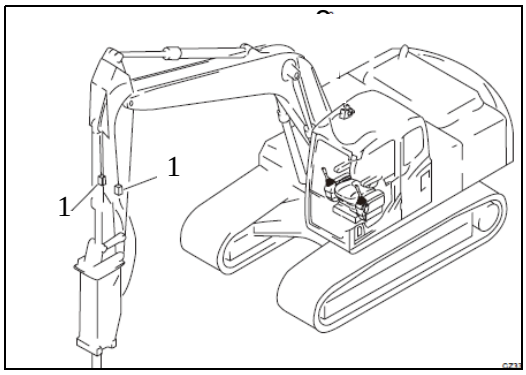


Fig. 8-1

Stop Valve

The stop valve (1) stops or allows flow of the hydraulic fluid.

- FREE position (a) allows flow of the hydraulic fluid.

NOTE: FREE position allows flow of hydraulic fluid. (The handle is parallel to the machine arm).

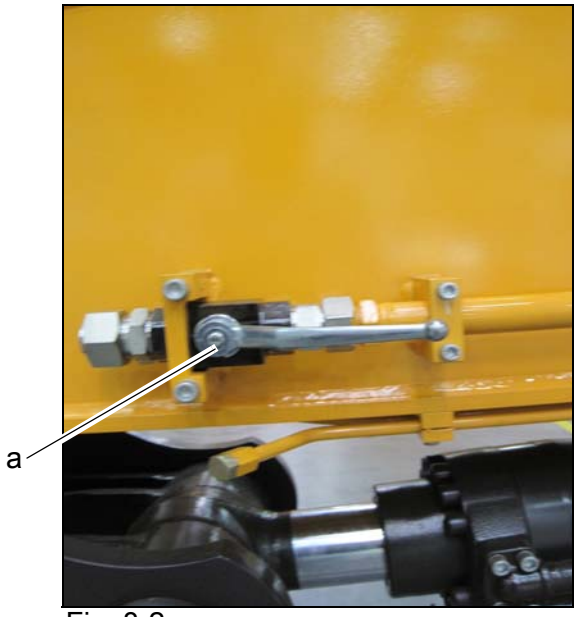


Fig. 8-2

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- LOCK position (b) stops flow of the hydraulic fluid. Switch the valve to LOCK position when removing or installing an optional equipment.

NOTE: LOCK position stops flow of hydraulic fluid. (The arrow is perpendicular to arm length).

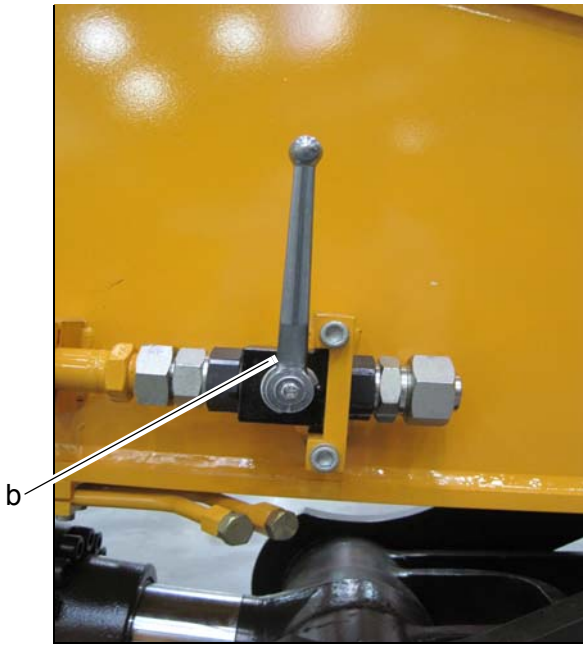


Fig. 8-3

Selector Valve

The selector valve (c) changes the flow direction of hydraulic fluid. The change of direction is made according to the operating mode selected. The operating mode must be applicable to the installed equipment.

NOTE: See “Optional Tool Selection” on page 8-7.

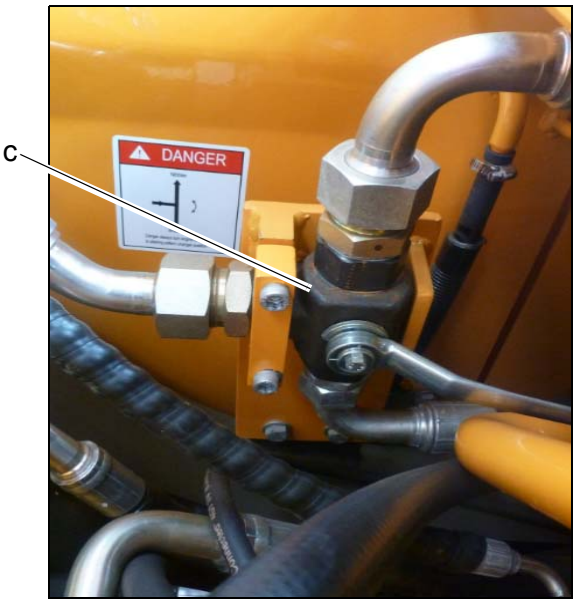


Fig. 8-4 Typical

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Hydraulic Circuit

NOTE: Standard set pressure of the safety valve was set at the factory before delivery. Further adjustment may be needed depending on the type of attachment. In this case, please contact Sany dealer for adjustment.

Set the operating mode on the monitor as per the following standards according to the type of optional equipment. The pressures set for the safety valve and for the switch of hydraulic line are determined by the operating mode selected.

Attachment	Selector Valve Setting	
One-way hydraulic attachment (e.g. breaker)		Handle is straight up. (As per attachment manufacturer's specifications. Contact Sany America's representative for adjustment.)
Dual-action hydraulic attachment (e.g. shears)		Handle is parallel to the ground. (As per attachment manufacturer's specifications. Contact Sany America's representative for adjustment.)

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Optional Tool Selection

Select the tool to be used (bucket, breaker, shear) per the following steps.

1. Go to the monitor in the cab and press button 5 to display the Main Menu screen.

2. Press button 4 until Tools icon (a) is highlighted, then press button 5.

   NOTE: The Work Equipment screen displays.



Fig. 8-5

3. Press button 4 until the tool to be used (bucket, breaker, shear) is highlighted. Press button 5 to select that tool.

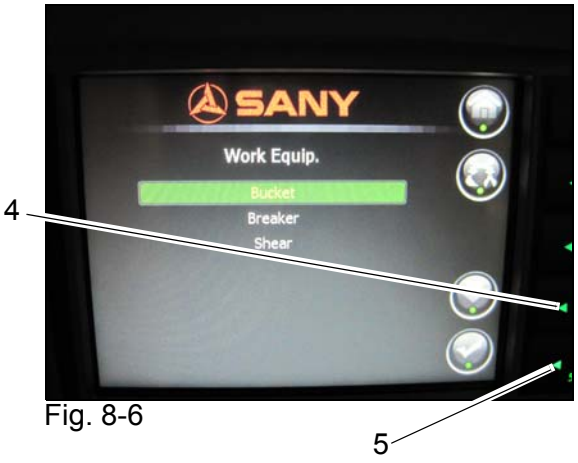


Fig. 8-6

4. Press button 1 to display the Main Menu.



Fig. 8-7

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5. Press button 1 again to display the Main screen.



Fig. 8-8

6. Verify that the icon shown at (b) is the one selected on the Work Equip. screen.

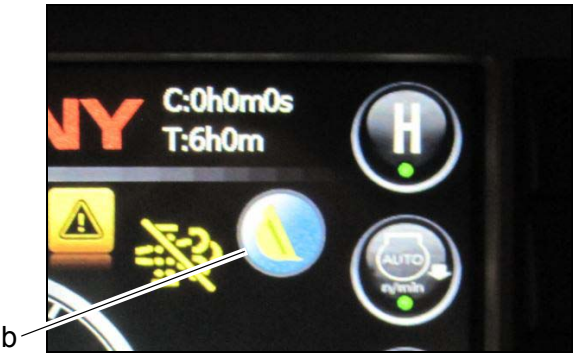


Fig. 8-9

- Bucket (c)



Fig. 8-10

- Breaker (d)



Fig. 8-11

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- Shear (e)



Fig. 8-12

Depending upon the tool selected the working mode of the machine must now be changed as well. There are four different working modes available, they are:

- S: Standard duty: Used for normal excavating.
- H: Heavy duty: Used for excavating in hard or rocky ground.
- L: Light duty: Used for light tasks such as digging in soft soil.
- B: Breaker mode

7. To chose the appropriate mode press button 1. The mode selected is shown in the icon (f) at the upper left of the screen.

   NOTE: The modes cycle through H - S - L - B.



Fig. 8-13

NOTICE

Failure to set the machine in the proper working mode may result in degraded performance of the optional tool or damage the machine.

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OPTIONAL EQUIPMENT OPERATION

Attach Optional Equipment

1. Lower the work equipment to the ground and shut down the engine.



Fig. 8-14

2. Turn the start switch to ON position, and place the hydraulic lockout control to the FREE position (a).

3. Fully cycle each control lever and control buttons for 2-3 times within 15 seconds in order to release the internal pressure remained in the hydraulic lines.



Fig. 8-15

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4. Place the hydraulic lockout lever to the LOCKED position (b).

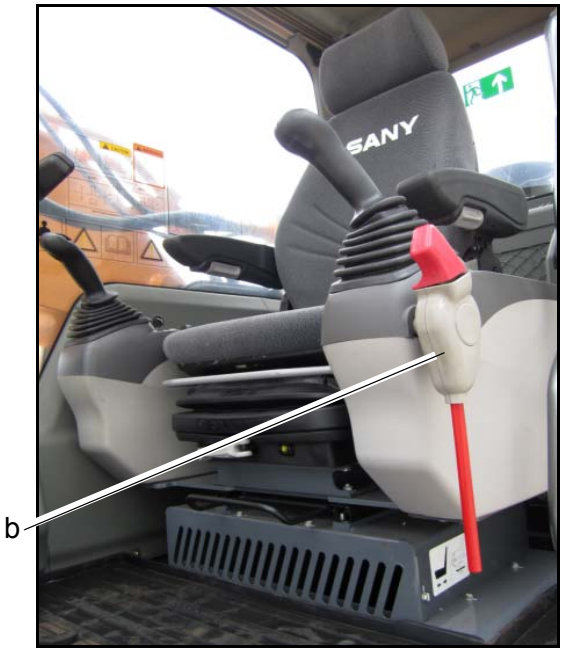


Fig. 8-16

5. Release the pressure completely by turning and opening the butterfly nut on the breather valve [c] and pressing the relief button to release the pressure.



Fig. 8-17

6. Check the temperature of hydraulic fluid (d) on the side of the hydraulic tank.

   NOTE: See “Hydraulic Oil Level” on page 4-15.



Fig. 8-18

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7. Go to the stop valve (e) located on the side of the machine arm.

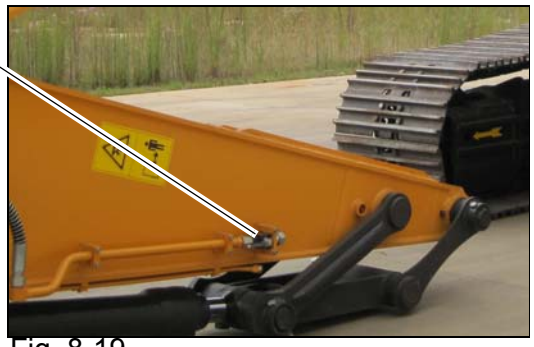


Fig. 8-19

8. Ensure that the stop valve (f) is in the locked position.

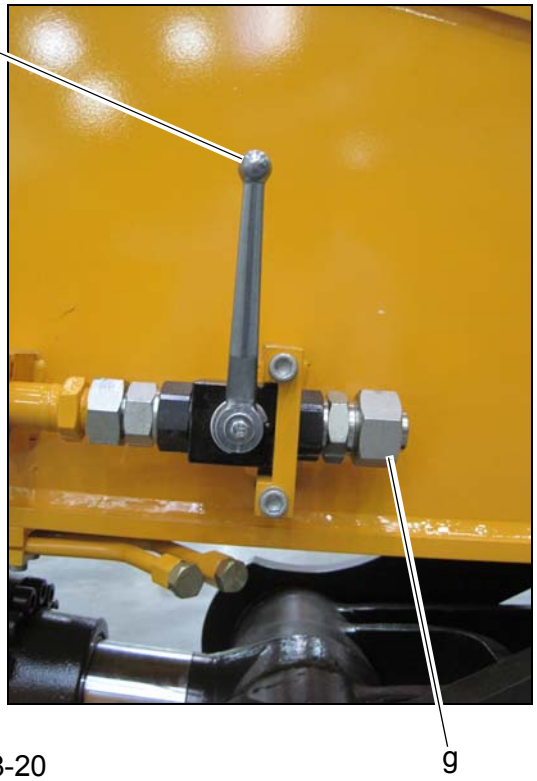


Fig. 8-20

9. Remove the screw cap (g) from the end of the stop valve line.

   NOTE: The disassembled parts should not be lost or damaged.

10. Connect the optional equipment lines in accordance with the manufacturer's instructions.

    NOTE: Connection sizes and additional accumulator may vary according to different optional equipment manufacturers. Please consult Sany America's authorized dealer in this regard.

11. Move the valves on the arm in accordance with the type of equipment used per the instructions shown in Hydraulic Circuit page 8-6.

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Optional Equipment Control

⚠ WARNING

Keep your thumbs off the control buttons on top of the joysticks when your are not operating the attachments. Inadvertent movement of attachments may cause serious injuries or death.

Control switch and buttons on top of the left (a) and right (b) joysticks are used to control attachment operation.



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Hydraulic Breaker Controls

Attachment control switch (a) on the right joystick is used to control a hydraulic breaker. Press upper part of this switch to operate the breaker. Release this switch to stop the breaker.

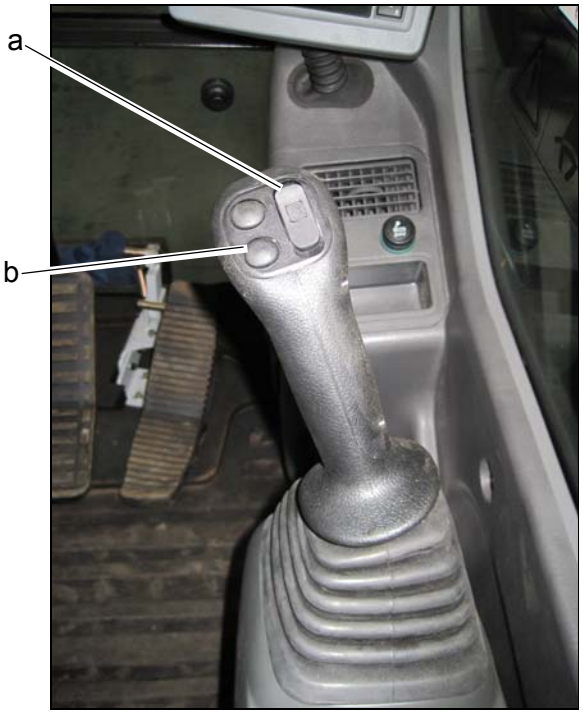


Fig. 8-21

Hydraulic Shears Controls

1. Press the upper part of switch (a) on the right joystick to open the shear and press the lower part to close the shear.

   NOTE: A backup button (b) is designed for future use when other attachments are installed. For control method of other attached tools, consult the maker of the attachment and the machine before installation.

2. Buttons (c) and (d) on the left joystick are used to swing the shears.

   NOTE: Press button (c) to swing the shear to the left. Press button (d) to swing the shear to the right.



Fig. 8-22

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Disconnecting Optional Equipment

1. Lower the work equipment to the ground and shut down the engine (a).



Fig. 8-23

2. Turn the start switch to ON position, and place the hydraulic lockout control to the FREE position (b.

3. Fully cycle each control lever and control buttons for 2-3 times within 15 seconds in order to release the internal pressure remained in the hydraulic lines.



Fig. 8-24

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4. Place the hydraulic lockout lever to the LOCKED position (c).



Fig. 8-25

5. To release the pressure completely, turn and open the butterfly nut on the breather valve [d] and press the relief button to release the pressure.

6. Check the temperature of hydraulic fluid (d) on the side of the hydraulic tank.

   NOTE: See “Hydraulic Oil Level” on page 4-15.



Fig. 8-26

7. Turn the handle of the stop valve (mounted to the inlet and outlet lines to the side of the arm) to LOCK position (e).

   NOTE: LOCK position stops flow of hydraulic oil. (The line is perpendicular to arm length).

8. Disconnect the hose at the side of the attachment and install the screw caps (f) to the two outlets.

   NOTE: The screw caps are used to avoid intrusion of foreign objects.

9. Remove the two installation pins and disassemble the attachment.

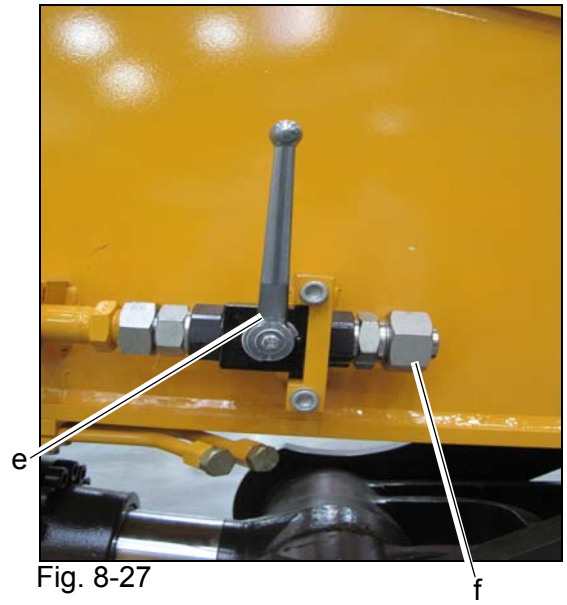


Fig. 8-27

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