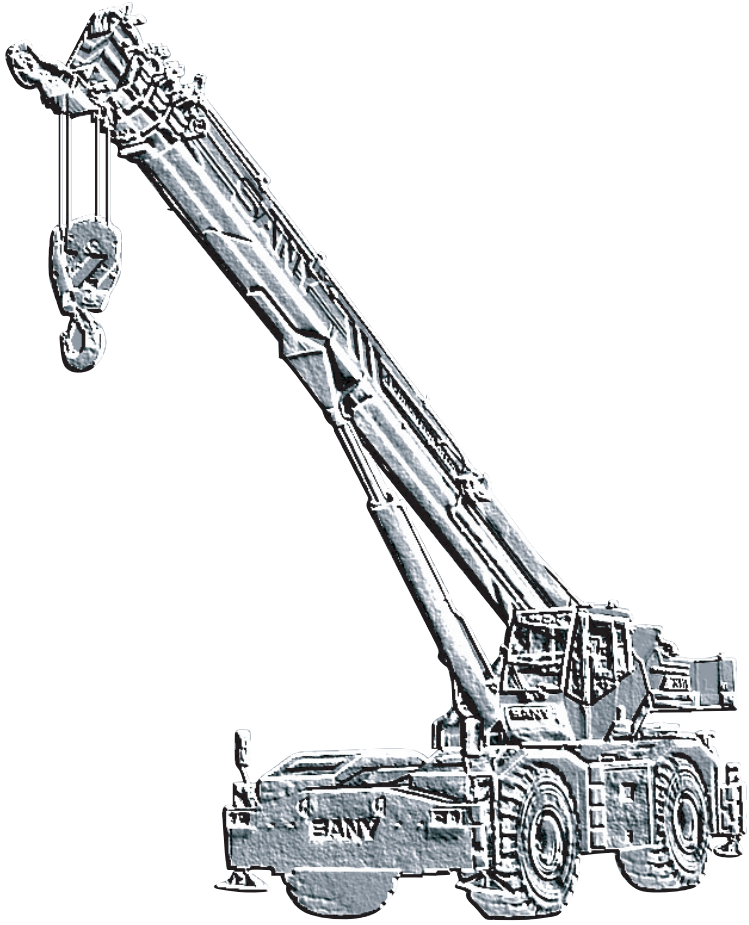
SANY AMERICA INC.

Quality changes the world

Rough Terrain Cranes

SRC865
SRC865XL



Safety, Operation & Maintenance Manual

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SANY

SRC865 & SRC865XL Rough Terrain Crane

Safety, Operation & Maintenance Manual

Publication No. TA1ZD007

WARNING

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

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100 World Drive, Suite 218
Peachtree City, Georgia 30269

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Phone: 770-631-8131

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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.

Table of Contents

Troubleshooting 1

Specifications

Introduction

WARNING

To prevent death or serious injury:

- Avoid unsafe operation and maintenance
- This crane 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 Safety, Operation & Maintenance Manual and Rating Plate supplied with crane.
- Store the Safety, Operation & Maintenance Manual in operator cab seat pocket.
- If the Safety, Operation & Maintenance Manual or Load Charts Manual are missing from the operator's cab, do not use the crane until replacements have been obtained from your SANY distributor.

WARNING

Always read the Safety section of this manual before attempting to operate this equipment. Failure to do this could result in machine damage, personnel injury or death.

OVERVIEW

SANY-built rough terrain cranes offer high-quality performance and excellent after-sales service support.

SANY-built rough terrain cranes are widely used throughout the industry for various types of applications.

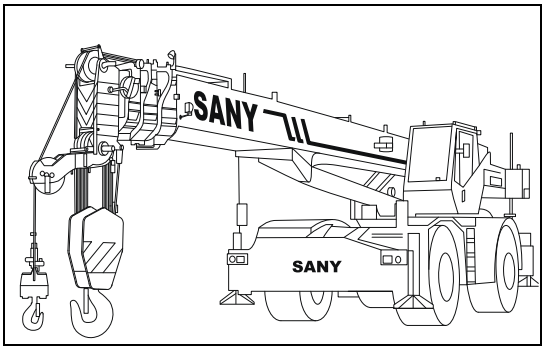

Fig. 1-1

SANY is a leading manufacturer of construction equipment worldwide.

This operator's manual provides safety, operation, maintenance, troubleshooting and technical specifications. A copy must be kept in the cab (a) at all times. In order to properly use your equipment, it is important to read this manual carefully before beginning any operations.

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.

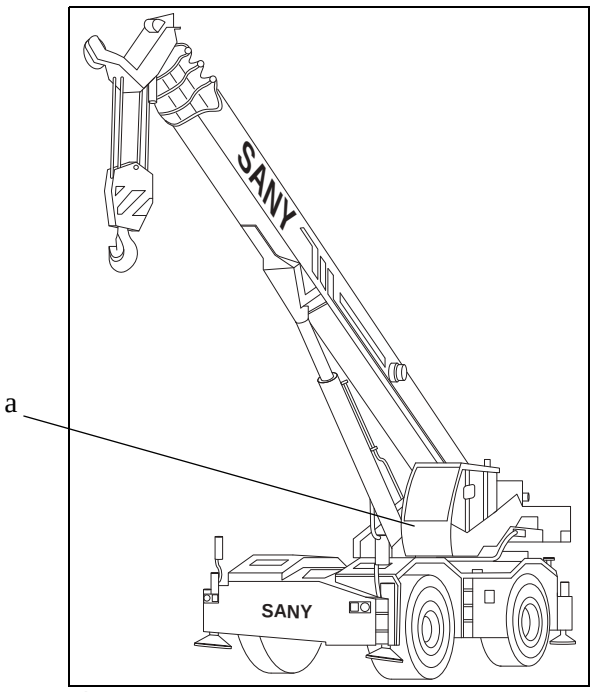

Fig. 1-2

Always keep this manual nearby and have all personnel involved with any work operations read it periodically.

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

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.

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.

YOUR DOCUMENTATION PACKAGE

The documentation for this machine includes the following items:

Safety, Operation & Maintenance Manual

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

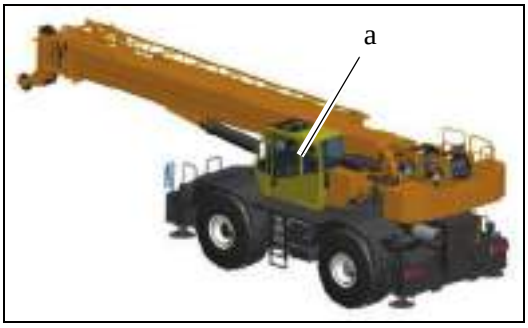

Fig. 1-3

Shop Manual

This manual provides detailed rebuild / replacement / repair information. Study and become familiar with all repair and maintenance procedures before performing any repair or maintenance operations.

Load Charts Manual

One of the most important tools of every SANY crane is the Load Charts Manual found in the crane operator’s cab. The Load Charts Manual contains a large amount of information, which must be thoroughly understood by the operator. Never remove the Load Chart Manual from the crane.

Parts Book

This publication consists of parts lists and matching drawings for ordering spare parts as needed.

Using and Storing the Documentation

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

Keep all pages inside their binder (if shipped loose-leaf).

Always keep the operator’s manual and load charts with the machine in the operator cab (a) seat pocket.

The shop manual and parts book are best left in the workshop area or office. They should always be available to the maintenance and service personnel as required.

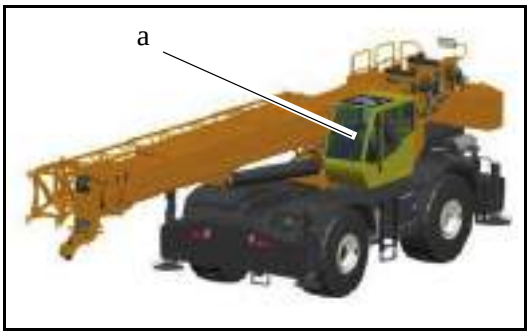

Fig. 1-4

ORGANIZATION OF THIS MANUAL

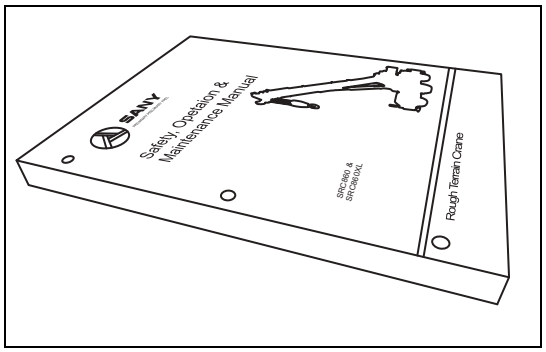

Fig. 1-5

Each section of this manual provides information you should know before operating or performing maintenance on this machine. Keep a copy of this manual inside the operator cab for your reference at all times. Replace it immediately if it is damaged or lost.

NOTE: Due to improvement and updating of products, some information in this manual may differ from your machine.

NOTE: If you have any questions about this data, 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 tables of contents at the start of each section in this manual that are more detailed.

Introduction

This section provides an overview of what is covered in the rest of this manual, including machine label 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 provides all general maintenance and repair procedures.

Troubleshooting

This section includes common malfunctions and fault diagnostics procedures for the operating systems.

Specifications

This section provides dimensions and weights for the equipment, and systems/components performance information. Some information may vary due to design changes.

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. 1-6

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: 770-631-8131

Fax: 770-631-7731

Safety

WARNING

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

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.

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

Carelessness or neglect by machine operators, job supervisors, service and maintenance staff, and job site workers can result in their death or injury and costly damage to the machine and property.

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

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.

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.**

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.

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.

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.

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.
- 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

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.

CAUTION

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

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.

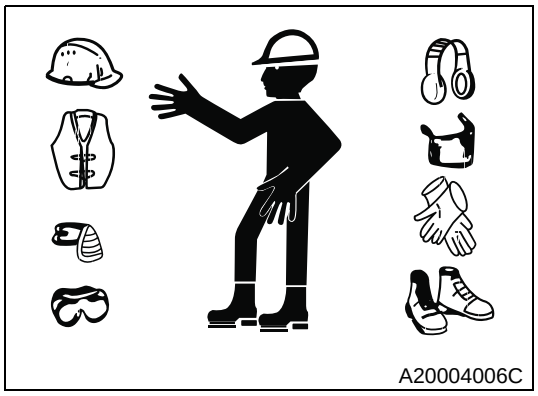

Fig. 2-1

General Fire Safety

WARNING

Fuel, oil, electrical and other flammable material can pose a serious hazard when using lifting 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.

Fuel and Oil Fires

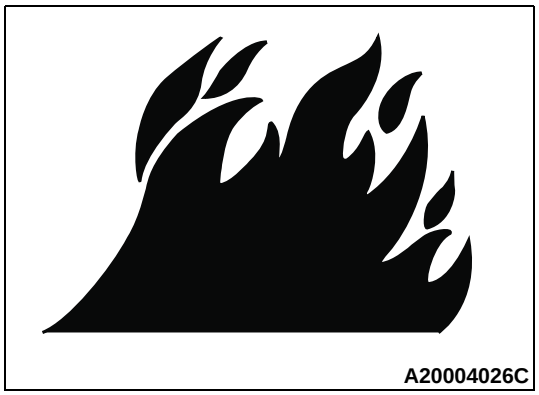

Fig. 2-2

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

- 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

Fig. 2-3

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:

- 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

Electrical Fires and Explosions

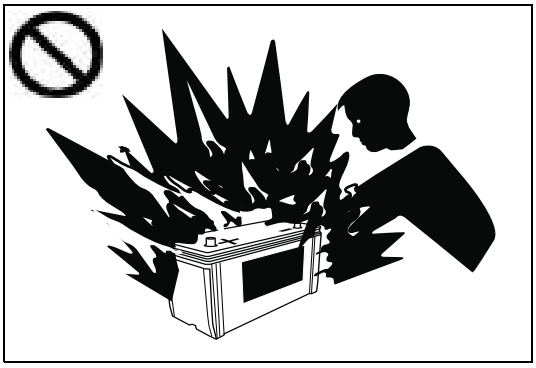

Fig. 2-4

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.

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

Fig. 2-5

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.

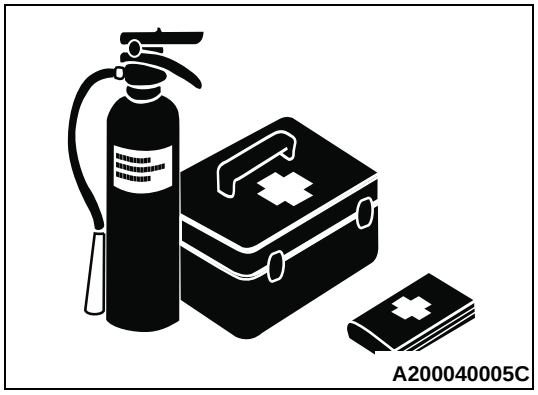

Fig. 2-6

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:

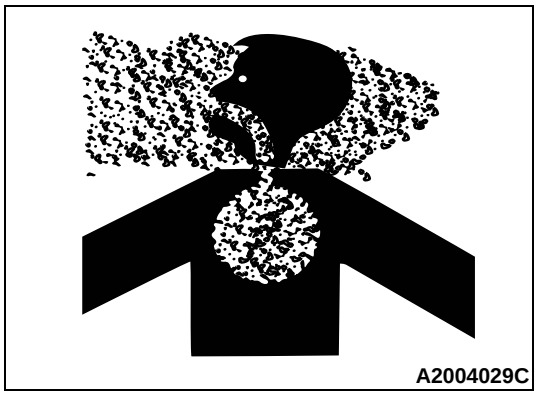

Fig. 2-7

- 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.
- 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.

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.

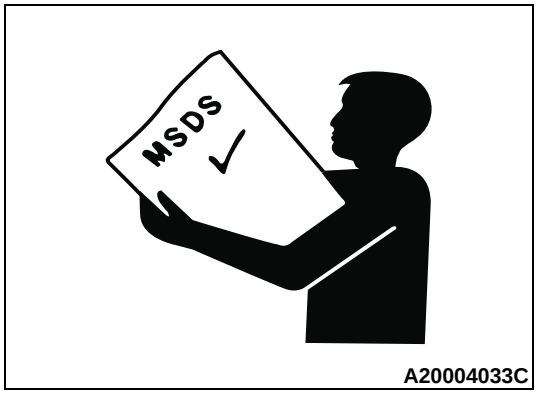

Fig. 2-8

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:

- 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.
- 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.

Fig. 2-9

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.

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: Table of Minimum Distances Between Machine and Wire Rope

Cable Voltage, kV (kilovolts) (volts)	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 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.

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.

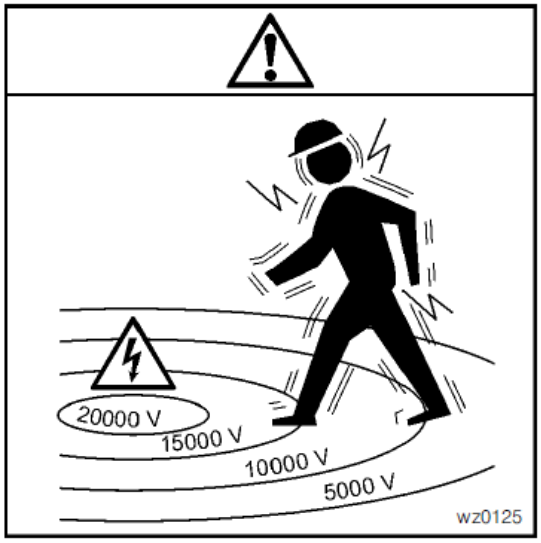

Fig. 2-10

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 travelling 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.
- 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:

- The boom should be fully retracted and lowered to the travel position. (Crane: All loads lowered to the ground.)
- Stop the engine and disconnect the battery.
- 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 2-23
- 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

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.

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.

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.

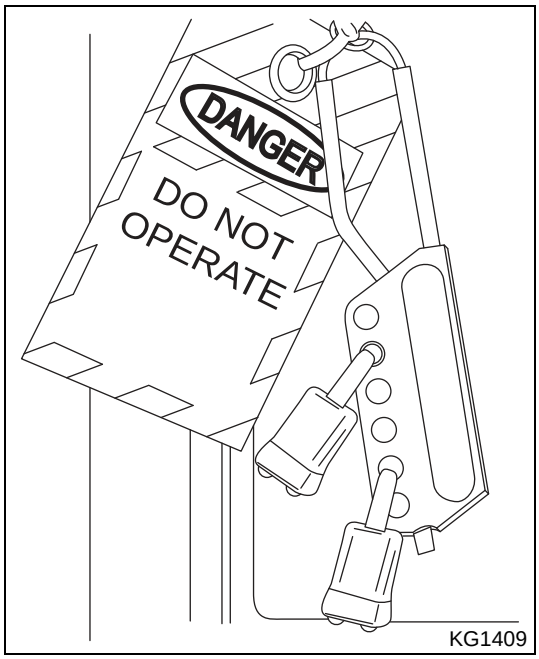

Fig. 2-11

Fig. 2-12

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.

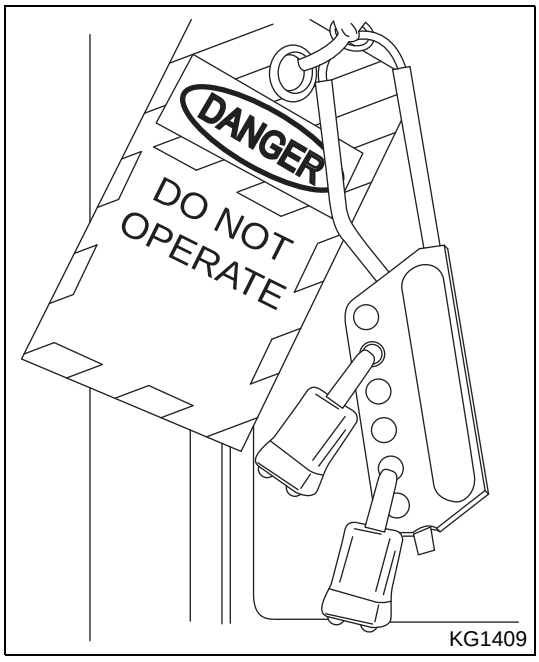

Fig. 2-13

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.

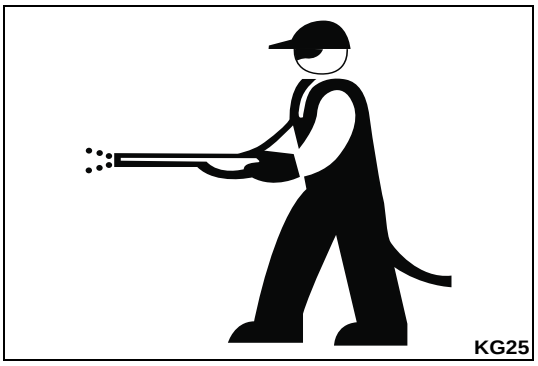

Fig. 2-14

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.

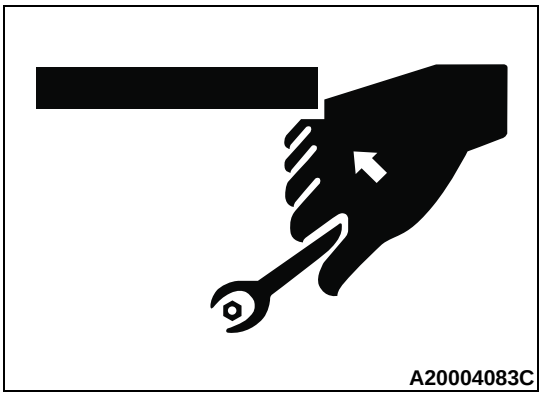

Fig. 2-15

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.

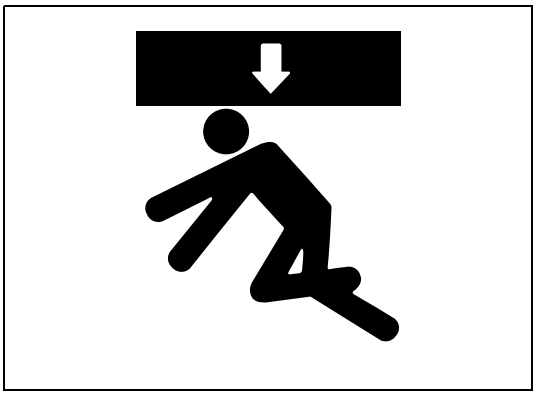
Fig. 2-16

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:

- 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.

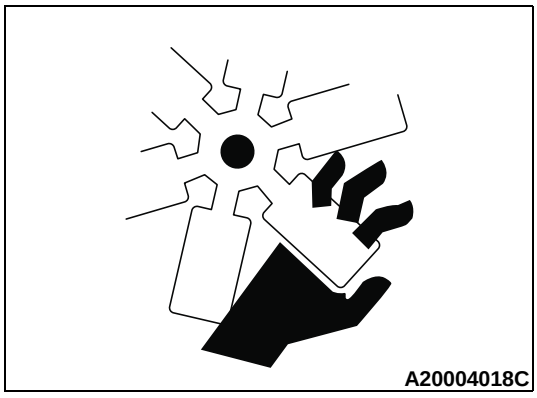

Fig. 2-17

- 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.

Removing Attachments

Fig. 2-18

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.

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.

Welding, Drilling, Cutting or Grinding on the Machine

Never drill, cut, weld, grind or modify the machine in any way. The strength of the component may be reduced and the system may not be able to fulfill its function properly. Components should be replaced if they are damaged.

Adding Fluids to the Machine

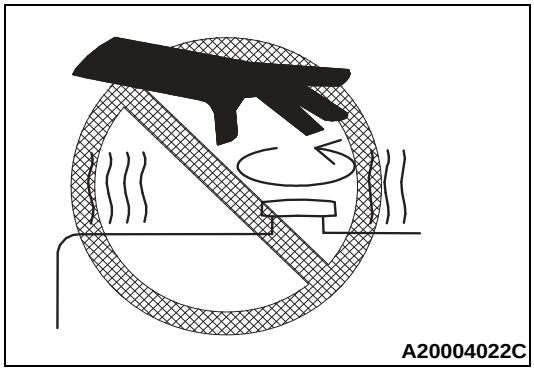

Fig. 2-19

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.

Refueling

Fig. 2-20

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.
- 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.

High-Pressure Fluid Lines

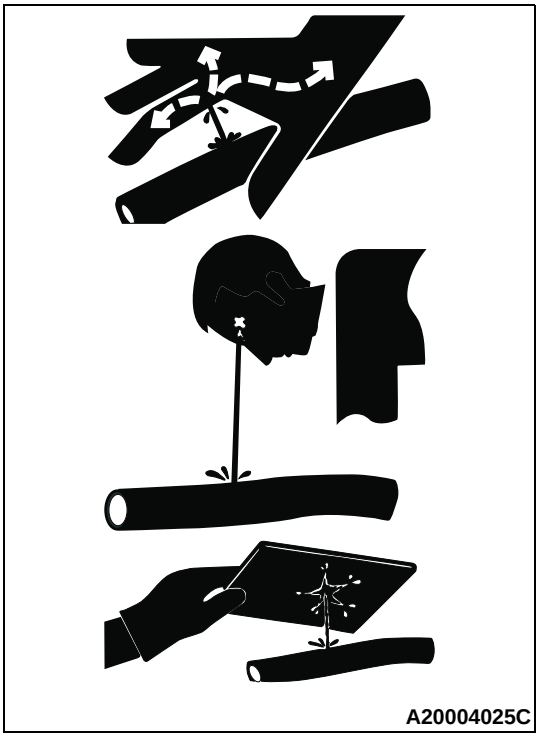

Fig. 2-21

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.

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.

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. 2-22

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:

- Always wear personal protective equipment when working around batteries.

Fig. 2-23

- Battery gasses are extremely explosive. Smoking, sparks or open flames could cause an unexpected explosion. When opening a battery compartment always allow ample time for the gasses 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.

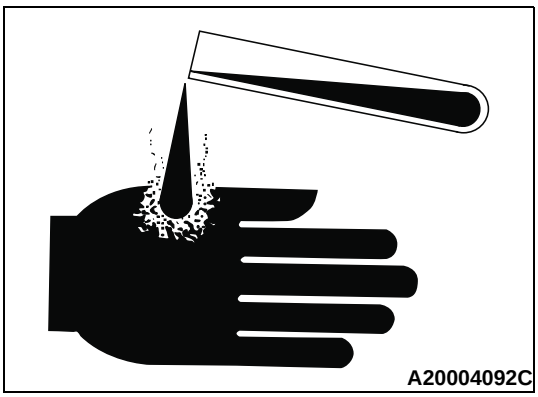

Fig. 2-24

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 truck. 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.

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.

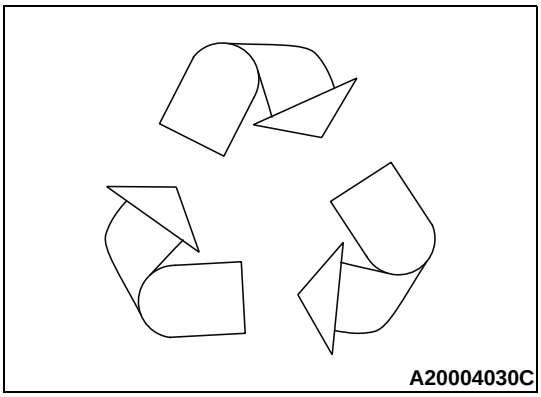

Fig. 2-25

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.

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.

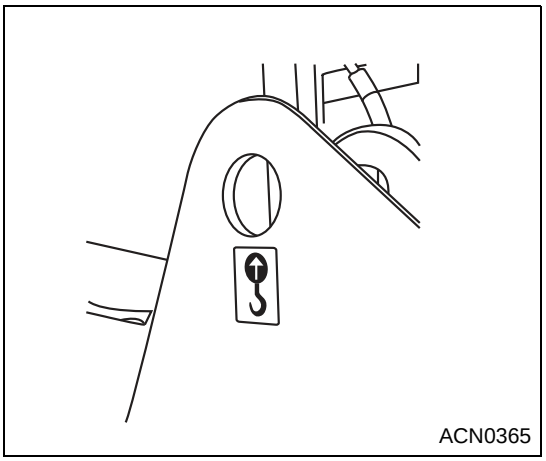

Fig. 2-26

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.

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 Crane

The authorized use of the crane consists solely in vertical lifting and lowering of freely suspended loads, whose weight and center of gravity are known.

To do so, a hook or hook block approved by SANY must be mounted on the wire rope, and it may only be operated within the permissible working range.

No matter if the crane is with or without an attached load, it is permissible to drive the crane only when a corresponding driving or load chart is available. The crane must be operated according to the configurations and safety conditions prescribed in the corresponding operating instructions.

Any other use or any operation beyond the specified working range is **not** authorized use.

Part of the authorized use must also comply with the required safety regulations, conditions, preconditions, crane configurations and working steps as noted throughout this Safety, Operation & Maintenance manual.

Unauthorized Use of the Crane

Unauthorized includes (but is not limited to) the following:

- Working outside the permissible crane configuration in the load chart
- Working outside the permissible projection radius and slewing range in the load chart

- Working with load values, which do not match the actual crane configuration
- Working with LMI-Settings, which do not match the actual crane configuration
- Working with load moment limiter or hoist limit switch which is shut off
- Increasing the projection radius of the lifted load after a LMI shut-off, for example by diagonally pulling the load
- Using equipment or attached parts which are not approved for the crane
- Using the crane as sports and recreational events, especially for “Bungee” jumps
- Driving on a public road in a non-permissible driving condition (axle load and dimension)
- Driving with the equipment in a place in a non-permissible driving condition
- Pushing, pulling or lifting loads with the leveling jacks, the sliding beams or the support cylinders
- Pushing, pulling or lifting loads by actuating the slewing gear, the luffing gear or the telescoping gear
- Ripping stuck objects loose with the crane
- Utilizing the crane for a longer period of time for material handling tasks or high duty cycle operations that may result in overheating the hydraulic system
- Releasing the crane suddenly (grapple or dumping operation)
- Putting the crane into service when the weight of the load, which is suspended load no the crane, is changed, for example by filling a container suspended on the load hook.

The crane may **not** be used for the following:

- Attaching a stuck load for which the weight and center of gravity are not known and which has been released first, for example with a cutting torch;
- Letting persons ride along outside the driver’s cab
- Transporting personnel in the crane cab while driving
- Transporting personnel with the lifting equipment and on the load
- Transporting loads on the chassis
- Two hook operation without auxiliary equipment
- Extended material handling operation or high duty cycle operations that may result in overheating the hydraulic system

This Safety section must be read and used by all persons who are involved in use, operation, assembly and maintenance of the crane.

Operational Aids

The manuals that SANY America provides are specific for each crane and they must be followed carefully. If an operational aid should stop working properly, the crane user or owner must see that repairs or recalibrations are accomplished as soon as is reasonably possible.

Operational Aids include, but are not limited to the following:

- This Safety, Operation & Maintenance Manual (SOMM)
- The Load Charts Manual
- Load Moment Indicator (LMI)
- Anti-Two Block Prevention/Warning Device
- Load Indicator
- Rated Capacity Limiter
- Boom Angle Indicator
- Crane Level Indicator
- Boom Length Indicator
- Radius Indicator

If any operational aid is inoperative or malfunctioning, follow the guidance provided in ASME B30.5 Section 5-3.2.1.2 (b).

Directional Positions of the Crane

Front — That side of the chassis without the engine

Rear — That side of the chassis with the engine

Left — That side of the chassis with the operator cab

Right — That side of the chassis without the operator cab

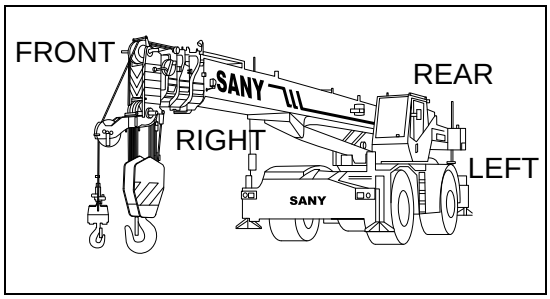

Fig. 2-27

Crane Stability and Structural Integrity

To avoid death or serious injury, ensure that the crane is on a firm and stable surface before lifting a load.

Use adequate cribbing under the outrigger pads to distribute weight over a greater area.

Ensure that the load and crane's configuration are within capacity as shown in the crane Load Chart Manual and any other notes.

Strictly adhere to the guidelines and restrictions in the Load Chart for pick-and-carry operations.

The boom must be lowered to the travel position. before moving the crane.

Test the LMI and control lock-out system daily for proper operation. Never interfere with the proper functioning of operational aids or warning devices.

Before swinging the superstructure over the side of the crane with the outrigger beams retracted, check the load chart for backwards stability.

The boom can create a tipping condition when in an extended position and lowered without retraction. Retract the boom proportionally with reference to the capacity of the applicable Load Chart Manual. If a tipping condition starts to occur, immediately lower the load with the hoist line and then retract or elevate the boom to decrease the load radius. Never lower or extend the boom, this will aggravate the condition.

NOTE: Reducing the load radius is the answer to this problem.

Ensure that the load is properly rigged and attached to the hook. Re-check the load chart against the weight of the load. Lift the load slightly off the ground and re-check the stability before proceeding with the lift.

Remember that all rigging (slings, etc.) and lifting devices (hook block, swingaway boom extension, etc.) must be considered part of the load. Always determine the weight of the total lifting load correctly before beginning lifting operations.

When lifting a load, the crane will lean toward the boom and the load will swing out, increasing the load radius. Ensure the load chart is not exceeded when this occurs.

Be sure the hoist wire rope is vertical, hanging down from the nose of the boom, before lifting. Do not subject the crane to side-loading. A side load can tip the crane or cause it to fail structurally.

Avoid sudden starts and stops when slewing or extending the load. The inertia and an increased load radius could tip the crane over or cause it to fail structurally.

Load chart capacities are based on freely suspended loads. Do not pull posts, pilings, or submerged articles. Be sure the load is not frozen or otherwise attached to the ground before lifting.

Ensure all boom related pins are properly installed and outrigger beams are properly extended and pinned before lifting on outrigger beams. All four outrigger beam lock pins must be engaged before operating from the mid-extend position.

Carefully follow the procedures in this manual when positioning the outrigger beams for lifting and when stowing the outrigger beams. Death or serious injury could result from improper crane setup on outrigger beams.

All four outrigger beams must be equally extended to the mid position or fully extended position before beginning operation. If any outrigger beams must be used in a configuration other than equally extended, you are required to use the next lower outrigger beam position (or no outrigger beams) when choosing a load chart for a given lift.

The crane chassis must be level before any lifting operations or swinging of the superstructure occurs.

The operator must select the proper load chart and LMI system program for the outrigger beam position selected.

The crane can tip over or fail structurally if:

- The lifting load and crane's configuration is not within the capacity as shown on the applicable load chart and notes
- The ground is soft and/or the surface conditions are poor
- Outrigger beams are not properly extended, pinned and set
- Cribbing under the outrigger pads is inadequate
- The crane is improperly operated

Wind

Wind can have a significant effect on loads that may be lifted by a crane. Wind forces act differently on a crane, depending upon the direction from which the wind is blowing (e.g., wind on the rear of the boom can result in decreased forward stability, wind on the underside of the boom can result in decreased backward stability, and wind on the side of the boom can result in structural damages, etc.).

SANY America recommends that if the wind speed (velocity) is between 20 mph (32 km/h) to 30 mph (48 km/h), that the load capacities be reduced to account for the size and shape of the load and the wind direction in relation to the machine for all boom, and swingaway boom extension lengths.

SANY America also recommends that operation of the crane in wind velocities over 30 mph (48 km/h) be prohibited. To assist you in determining prevailing wind conditions, refer to the following table.

Wind Force		Wind Velocity km/h (mph)	Visible Indicator Effects of Wind as Observed on Land
Beaufort Scale	Designation		
Zero (0)	Calm	<2 (<1)	No wind: smoke rises vertically
1	Light Air	2-5 (1-3)	Wind direction seen by smoke but not by wind vanes
2	Light Breeze	6-11 (4-7)	Wind felt on face: leaves rustle: wind vane moves slightly
3	Gentle Breeze	13-19 (8-12)	Leaves/small twigs in constant motion: wind extends flag

Wind Force		Wind Velocity km/h (mph)	Visible Indicator Effects of Wind as Observed on Land
Beaufort Scale	Designation		
4	Moderate Breeze	21-29 (13-18)	Raises dust & loose paper: moves small branches
Reduce crane load ratings and operating parameters at 32 km/h (20 mph)			
5	Fresh Breeze	31-39 (19-24)	Small trees in leaf begin to sway: on ponds, crested wavelets form
6	Strong Breeze	40-50 (25-31)	Large branches in motion: telegraph wires whistle: umbrellas used with difficulty
Cease all craning operations at 48 km/h (30 mph); lower & retract boom			
7	Moderate Gale	52-61 (32-38)	Whole trees in motion: walking against wind is inconvenient

Load Charts

Load charts state the maximum allowable lifting loads, which are based on either stability or structural limitations of the crane under specific set-up conditions. Knowing the precise lifting weight, load radius, boom length, and boom angle should be a part of your daily planning and operational preparations. Actual lifting loads, including allowances for hookblock, wire rope, etc., must be kept below the capacity shown on the applicable load chart.

You must use the correct load chart when determining the capability of the crane in the set-up configuration required to perform the lift.

Maximum lifting capacity is available at the shortest radius, minimum boom length, and highest boom angle.

Death or serious injury could result from the crane tipping over or failing structurally if the wrong load chart is chosen for a given lifting load and crane configuration. Do not rely on the tipping of the crane and your ability to stop it to determine your lifting capacity.

Never remove the Load Charts Manual from the crane.

Cold Weather Operation

Cold weather operation requires additional caution:

- Check operating procedures in this manual or the engine manual for cold weather starting.
- Do not touch metal surfaces that could cause you to be frozen to them.
- Keep the crane clear of all ice and snow.
- Allow time for the hydraulic oil to warm up.
- Park the crane in an area where it cannot become frozen to the ground.

Temperature Effects On Hydraulic Cylinders

Hydraulic oil expands when heated and contracts when cooled (as does all fluids). The coefficient of expansion for API Group 1 hydraulic oil is approximately 0.00043 cubic inches per cubic inch of volume for 1°F of temperature change.

Thermal contraction will allow a cylinder to retract as the hydraulic fluid which is trapped in the cylinder cools. The change in the length of a cylinder is proportional to the extended length of the cylinder and to the change in temperature of the oil in the cylinder. For example, a cylinder extended 25 feet in which the oil cools 60°F would retract approximately 7 3/4 inches (see chart below). A cylinder extended 5 feet in which the oil cools 60°F would only retract approximately 1 1/2 inches. The rate at which the oil cools depends on many factors and will be more noticeable with a larger difference in oil temperature verses the ambient temperature.

Thermal contraction coupled with improper lubrication or improper wear pad adjustments may, under certain conditions, cause a “stick-slip” condition in the boom. This “stick-slip” condition could result in the load not moving smoothly. Proper boom lubrication and wear pad adjustment is important to permit the boom sections to slide freely. Slow movement, of the boom may be undetected by the operator unless a load is suspended for a long period of time.

If a load and the boom is allowed to remain stationary for a period of time and the ambient temperature is cooler than the trapped oil temperature, the trapped oil in the cylinders will cool. The load will lower as the telescope cylinder(s) retracts allowing the boom to come in. Also, the boom angle will decrease as the lift cylinder(s) retracts causing an increase in radius and a decrease in load height.

This situation will also occur in reverse. If a crane is set up in the morning with cool oil and the daytime ambient temperature heats the oil, the cylinders will extend in similar proportions.

Table 2-1: has been prepared to assist the operator in determining the approximate amount of retraction/extension that may be expected from a hydraulic cylinder as a result of change in the temperature of the hydraulic oil inside the cylinder. The chart is for dry rod cylinders. If the cylinder rod is filled with hydraulic oil, the contraction rate is somewhat greater.

NOTE: Operators and service personnel must be aware that load movement can be easily mistaken as leaking cylinder seals or faulty holding valves.

Table 2-2: : BOOM DRIFT CHART (Cylinder length change in inches)

Coeff. =	0.00043	(in^3/in^3/ °F)								
STROKE	Temperature Change (°F)									
(FT.)	10	20	30	40	50	60	70	80	90	100
5	0.26	0.52	0.77	1.03	1.29	1.55	1.81	2.06	2.32	2.58
10	0.52	1.03	1.55	2.06	2.58	3.10	3.61	4.13	4.64	5.16
15	0.77	1.55	2.32	3.10	3.87	4.64	5.42	6.19	6.97	7.74
20	1.03	2.06	3.10	4.13	5.16	6.19	7.22	8.26	9.29	10.32
25	1.29	2.58	3.87	5.16	6.45	7.74	9.03	10.32	11.61	12.90
30	1.55	3.10	4.64	6.19	7.74	9.29	10.84	12.38	13.93	15.48
35	1.81	3.61	5.42	7.22	9.03	10.84	12.64	14.45	16.25	18.06
40	2.06	4.13	6.19	8.26	10.32	12.38	14.45	16.51	18.58	20.64
45	2.32	4.64	6.97	9.29	11.61	13.93	16.25	18.58	20.90	23.22
50	2.58	5.16	7.74	10.32	12.90	15.48	18.06	20.64	23.22	25.80
55	2.84	5.68	8.51	11.35	14.19	17.03	19.87	22.70	25.54	28.38
60	3.10	6.19	9.29	12.38	15.48	18.58	21.67	24.77	27.86	30.96
Length change in inches = Stroke (Ft.) X Temperature Change (°F) X Coeff. (in^3/in^3/ °F) X 12 in/ft										

Counterweight

Ensure that the appropriate counterweights (a) are properly installed for the lift being considered.

To reduce the crushing hazard, which will prevent death or serious injury, always clear all personnel from the counterweight and superstructure area before removing or installing the counterweight or rotating the superstructure.

Do not add material to the counterweight to increase capacity.

Federal law prohibits modification or additions which affect the capacity or safe operation of the equipment without the manufacturer's written approval. [29CFR 1926.1434(a)(1)].

Fig. 2-28

Multiple Crane Lifts

Multiple crane lifts are not recommended. If it is necessary to perform a multi-crane lift, the operator shall be responsible for assuring that the following minimum safety precautions are taken. Any lift that requires more that one crane must be precisely planned and coordinated by a qualified engineer.

The following must be followed in any multiple crane lifts:

- Obtain the services of a qualified engineer to direct the operation.
- Use one qualified signal person.
- Coordinate lifting plans with the operator, engineer, and signal person prior to beginning the lift.

- Communication between all parties must be maintained throughout the entire operation. If possible, provide approved radio equipment for voice communication between all parties engaged in the lift.
- Be certain cranes are of adequate lifting capacity. Use cranes and rigging of equal capabilities and use the same boom length.
- Use outrigger beams on each crane.
- Calculate the amount of weight to be lifted by each crane and attach slings at the correct points for proper weight distribution.
- Ensure the load lines are directly over the attach points to avoid side loading and transfer of loading from one crane to the other.
- DO NOT TRAVEL. Lift only from a stationary position.

Load Moment Indicating (LMI) Systems

Under no condition should an LMI system be relied upon to replace the use of load charts and operating instructions. Sole reliance upon this operator aid in place of good operating practices can cause an accident.

Know the weight of all loads and always check the load chart before making any lifts. Never exceed the rated capacity shown on the load chart. Always check the load chart to ensure the load to be lifted at the desired radius is within the rated capacity of the crane.

Ground Load Capacity

Equipment owners and operators should ensure that equipment is properly set-up with outrigger pads supported by firm stable footings.

Equipment set-ups should be closely observed during lifting operations to detect instability caused by changing load and ground conditions.

Prior to set-up and operations, owners and operators should evaluate the soil bearing capacity at the site to ensure that equipment, loads and procedures are compatible with work site conditions.

Soil type	kg/cm^2	lb/in^2
Soil, not artificial	0 - 1	0 - 14
Natural soil, not obviously damaged		
Silt, peat and swamp	0	0
Non-sticking and hard soils • High-quality moderate sand • Sand and gravel layer	 5 2	 71 28

Soil type	kg/cm^2	lb/in^2
Sticking soil • Fertile • Soft • Solid • Semi-solid • Hard	 0 4 1 1 4	 0 57 14 14 57
Stone with thin cracks, solid, not weathered, at good position • At a compact soil layer 1 • Solid or cylinder soil layer	 15 30	 213 427
Artificial solid ground	0	0
Asphalt road	5 - 73	15 - 213
Concrete • BI concrete • BII concrete	 50 - 250 350 - 550	 711 - 3,556 4,978 - 7,823

Electrical Contact

If the crane should come in contact with an energized power source, you must remember the following:

1. DON'T PANIC. Stay in the cab until the power company has been contacted and the power source has been de-energized. NO ONE must attempt to come close to the crane or load until the power has been turned off.

2. Immediately warn personnel in the vicinity to stay away.

3. Attempt to move the crane away from the contacted power source using the crane's controls which are likely to remain functional.

If it is absolutely necessary to leave the cab, jump completely clear of the crane. Do not step off the crane. 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. If the distributor is not immediately available, contact SANY America. The crane 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.

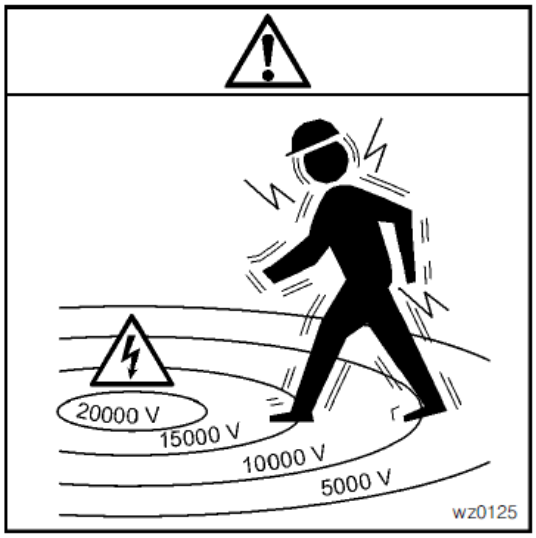

Fig. 2-29

Crushing Hazards

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

Make sure all personnel are away from the counterweight (a) and superstructure (b) area before removing the counterweight or rotating the superstructure.

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

Never allow anyone to stand or work on or near the superstructure (b) while the crane is in operation. Always barricade the tail-swing area of the rotating superstructure.

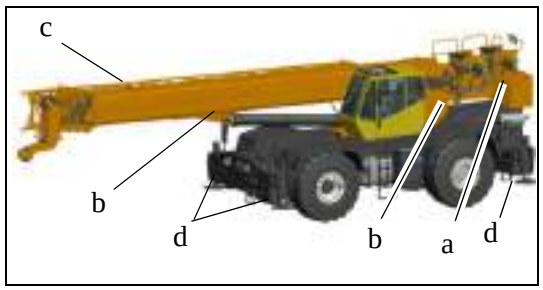

Fig. 2-30

Before initiating a boom (c) swing or any other crane function, sound the horn and verify that all personnel are clear of rotating and moving parts.

Watch the path of the boom (c) and load when in movement to avoid lowering or swinging the boom and load into ground personnel, equipment, or other objects.

Clear all personnel from the outrigger (d) area before extending or retracting the outrigger beams.

Personnel Handling

The American Society of Mechanical Engineers issued a new American National Standard entitled, “Personnel Lifting Systems, ASME B30.23-1998.” This standard provides, “lifting and lowering of personnel using ASME B30 Standard hoisting equipment shall be undertaken only in circumstances when it is not possible to accomplish the task by less hazardous means. Unless all of the applicable requirements of this volume are met, the lifting or lowering of personnel using ASME B30 Standard equipment is prohibited.”

This new standard is consistent with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulations for Construction that state, in 29CFRI926.1431 (Hoisting Personnel): “General requirements. The use of a crane or derrick to hoist employees on a personnel platform is prohibited, except when the erection, use, and dismantling of conventional means of reaching the worksite, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold, would be more hazardous or is not possible because of structural design or worksite conditions.”

Additional requirements for crane operations are stated in ASME B30.5, “Mobile And Locomotive Cranes, and in OSHA regulations 29CFRI910.180 for General Industry and 29CFRI926. Subpart cc - Cranes and Derricks in Construction.”

Use of a SANY crane to handle personnel is acceptable provided the following is observed:

- The requirements of the applicable national, state and local regulations and safety codes are met.
- A determination has been made that it is the least hazardous means to perform the work.
- The crane operator is qualified to operate this specific crane to be used in the personnel lift.

- The crane operator and occupants are aware of the recognized hazards of personnel platform lifts.
- The crane is in proper working order.
- The crane is equipped with a functional anti-two block device.
- This manual and the crane Load Charts Manual is affixed inside the crane cab, readily accessible to the operator. The total weight of the loaded personnel platform and related rigging shall not exceed 50 percent of the rated capacity for the radius and configuration of the crane.
- The crane is uniformly level within 1 percent of level grade and located on a firm footing. Cranes with outrigger beams shall have them all fully deployed following the manufacturer's specifications.
- The platform meets the requirements as prescribed by applicable standards and regulations.
- For cable suspended platforms, the crane is equipped with a hook that can be closed and locked, eliminating the throat opening.
- The platform is properly attached and secure.

Pre-Operational Inspection

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

Do the following before operating the crane:

- Inspect the crane prior to each work shift in which the crane will be operational and check for cracked welds, damaged components, and evidence of improper maintenance (as stated in this manual).
- Ensure that all covers, doors, and guards are in place.
- Ensure that the outrigger beams and jacks are properly extended and pinned before performing any lifting operations.
- Wear appropriate clothing and personal protective equipment for the job to be performed.
- Make sure the crane is clean, free of dirt, debris, and grease.
- Do not store flammable materials on the crane or in the operator’s cab.
- Be familiar with the location and use of the nearest fire extinguisher.

CAUTION

Failure to do perform this inspection and have repairs done may result in further damage to the machine or possible injury to the operator and other personnel.

Keeping the Operator Cab Clean

Observe the following:

Fig. 2-31

- When entering the operator cab, always remove all mud, oils or any debris from the soles of your shoes. If you operate the pedals with mud, oils or any debris on your shoes, your foot may slip and you could cause a possible accident.
- Always keep the operator cab clean. Never leave tools or obstacles lying in the operator cab.
- Do not stick objects on the window glass. These may restrict your view.
- Do not use cell phones inside the operator cab when traveling or operating the machine.
- Never bring dangerous objects or fluids into the operator cab. These could spill, ignite or explode.
- Keep the windows clean and free of mud or film build-up. Clean the windows daily before starting your work operations.
- If the windows are broken or cracked, replace them immediately. Never operate the machine with broken or cracked windows
- Never modify any operator cab components, systems or surfaces. Any modification without authorization from SANY can create a hazard. SANY will not be responsible for any injury or damage caused by any unauthorized modifications.

Mounting and Dismounting the Machine

Due to the size of this machine, mounting or dismounting could pose some hazards. Observe the following:

Fig. 2-32

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

- 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.

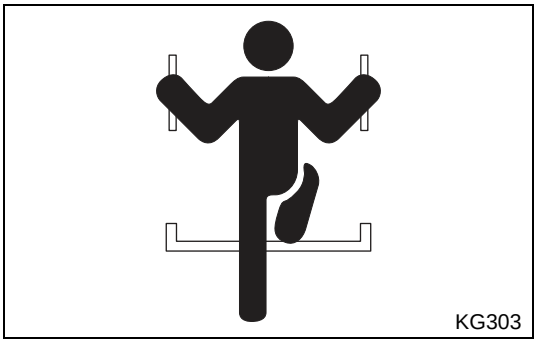

Fig. 2-33

- If you will be walking on the carrier surface of the crane, always try to maintain a three-point contact whenever possible to help keep your balance.

- Do not walk on a surface of the crane if slip-resistant material is missing or excessively worn. Do not step on surfaces of the crane that are not approved or suitable for walking and working. Keep all walking and working surfaces of the crane clean, dry and slip-resistant.

- Wear shoes with a highly slip-resistant sole material. Clean any mud or debris from shoes before entering the crane cab or climbing onto the crane 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.

- 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.

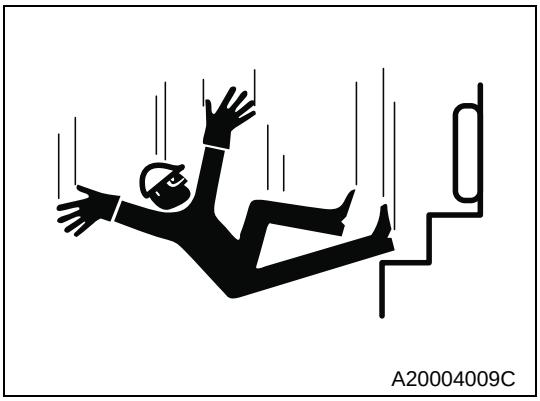

Fig. 2-34

- Always enter and exit the surface of the crane using the steps (a, typical) provided on the crane.

Fig. 2-35

- When entering the operator cab, open the door by sliding it to the rear of the cab until it is securely latched and held in position. Use the hand rails on the operator cab and door while entering or exiting the operator cab.

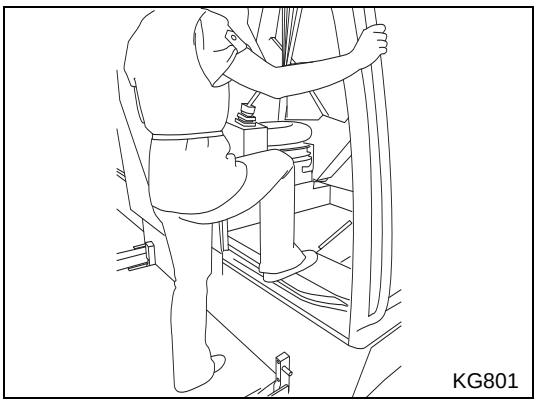

Fig. 2-36

- Use a ladder or aerial work platform to access the boom head if necessary.
- Do not use the top of the boom as a walkway.
- Do not step on the outrigger beams or outrigger pads to enter or exit the crane.
- Do not modify the crane's access system in any way that has not been evaluated and approved by SANY America.

Inside the Operator Cab

Once inside the operator cab, observe the following:

- Be seated in a comfortable position before operating the machine. Adjust the seat and console so you can easily access all controls from a seated position and be sure your vision is clear in all directions as viewed from the seated position.

Fig. 2-37

- 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.
- Fasten the seat belt snuggly around your waist and prepare to start the machine for work operations.
- 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.
- Start the crane, check all gauges and allow the engine ample warm-up time before traveling or performing any type of work operations.

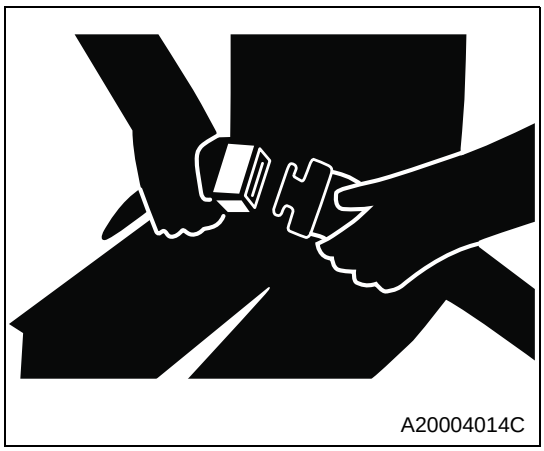

Fig. 2-38

Start-Up Safety

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

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

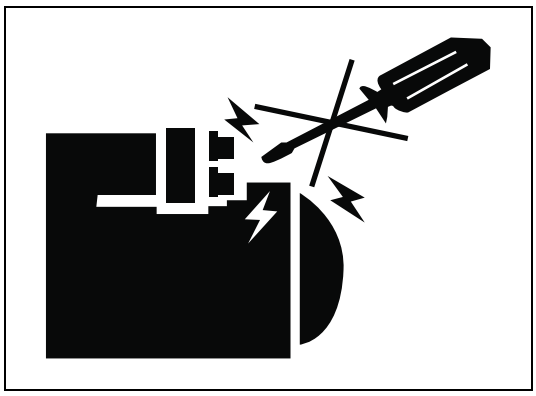

Fig. 2-39

CAUTION

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

Before starting operations observe the following:

- Ask for inspection and maintenance records and verity that the appropriate operator manual and Load Charts Manual are inside the cab.
- Walk around the equipment and check for nearby and unauthorized personnel and objects.
- 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 else inside the cab or on the machine during operation.
- Check your view. Be sure you can see all work areas around your crane clearly.

If 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.

DANGER

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.

Safety During Operation

CAUTION

It is important to be aware of the hazards involved with use of this type of equipment before proceeding with any lifting operations. Below is a list of some basic hazards outlining what to do to avoid some of these hazards. Failure to observe these alerts could result in equipment damage or possible injury.

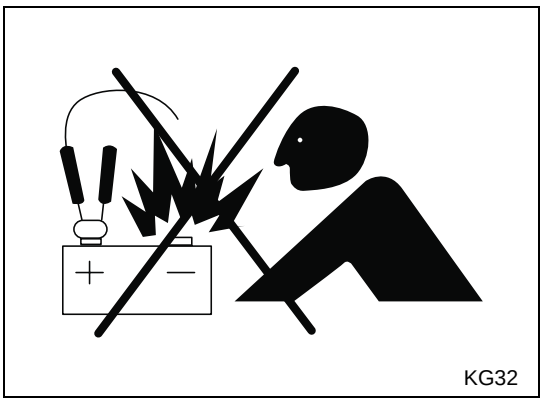

Fig. 2-40

Operator's Manual

Follow all operating procedures as provided in this manual before beginning any lifting operations. Failure to do so may result in damage to the machine or property and even injury or death.

Communications between crane operator and signal-person

Clear communications for operator and signalman are an effective means for avoiding accidental contact with nearby structures or objects. In addition to voice communication systems, hand signals are an excellent method for communicating with crane operators. A set of one- and two-hand signals is presented in the ASME B30. 5 standard, and is required during crane operations by OSHA.

A qualified signal person shall be used at all times when:

- Working in the vicinity of power lines
- The crane operator cannot clearly see the load at all times
- Moving the crane in an area or direction in which the operator cannot clearly see the path of travel

When a signalman is used:

- Never begin operations until all signals are clearly understood. If non-standard signals are to be used, be sure the operator and signalman agree on them before operations are to begin.
- Keep your attention focused on crane operation. Stop all crane movement if you become distracted.
- If communication with the signal person is obstructed in any way, crane movement must be stopped until communications are restored.
- Keep your attention focused on the crane's operation. If for some reason you must look in another direction, first stop all crane movement.
- Obey a signal to stop from anyone.
- A crane operator should always move loads according to the established code of signals using a signal person.

- There should be only one designated person at a time giving crane signals.
- A crane operator should move loads only on crane signals from a designated signalman.
- The person giving crane signals must have a clear view of the load and equipment at all times.
- The person giving crane signals must keep all personnel outside the crane's operating area. Any requests or questions should be addressed to the signal person only.
- The person giving crane signals should never direct a load over a person.
- Always maintain the proper clearances from power lines and towers.

NOTE: Each crane operator should be held directly responsible for the safe operation of the crane. Whenever there is any doubt as to safety, the crane operator should stop the crane and refuse to handle loads until safety has been assured.

Hoisting a load safely

Be sure the hoist brake is working correctly before lifting. Check the hoist brake by raising the load slightly off the ground, stopping the hoist and holding the load.

When lowering a load always slow the descent before coming to a complete stop.

Lift one load at a time. Do not lift two or more separately rigged loads at the same time, even if the loads are within the crane's stated Load Chart capacity.

Do not leave the cab of the crane with a load suspended. Lower the load to the ground and stop the engine before leaving the cab.

Remember: Each piece of rigging equipment must be considered as part of the load when figuring lifting capacities from the Load Chart. Lifting capacities vary with working areas and when swinging from one working area to another the operator must ensure that the Load Chart capacities are not exceeded.

Stop the hook block from swinging before unhooking a load.

Swing the load slowly and with great care. Keep the load lines vertical: Swinging rapidly can cause the load to swing out and increase the load radius.

Keep everyone away from suspended loads allowing no one to walk under a load. If someone approaches the lift area or machine during lifting operations, stop all operations immediately and signal them not to approach until all lifting operations are complete and the boom and area is safe.

Ensure that all slings, ties, and hooks are correctly placed and secured before raising or lowering the load.

Use tag lines (as appropriate) for positioning and restraining loads. Check the load slings before lifting.

Be sure everyone is clear of the crane and work area before making any lifts.

Be sure the load is secured properly and attached to the hookblock with rigging of proper size and in good condition.

Use only slings or other rigging devices rated for the lift to be made and use them properly.

Do not wrap the hoist cable around a load.

Refuse to use faulty tackle, hardware and slings for any lift.

Never operate the crane when darkness, fog, or other visibility restrictions make such operations unsafe.

For the first 100-hour traveling during the running-in period of a new crane, you must keep the working load and speed at the medium or low level, and not lift loads more than 75% of the rated lifting capacity.

Control the loads within the rated capacity.

Do not drag or lift weight diagonally. Do not lift objects from an interlaced pile. Do not lift any object embedded in the earth or frozen on the ground.

Concentrate on your work. Do not look around or carry on conversations with others.

Pay attention to the circumstances around the crane in operation. When the load is being lifted, never leave your working position.

Constantly check the temperature of hydraulic oil. If the oil temperature exceeds 80°C (176°F) allow the oil to cool before resuming crane operations.

Before performing any lifting operations, be sure there are no obstructions before raising the boom and always be aware of your working range and area spaces during lifting operations.

Always check weather conditions. Wind speeds in excess of standard ratings and electrical storms could cause injury or even death.

Lower the boom system immediately and take shelter if high winds or an electrical storm should occur during lifting operations.

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.

Do not reach in the cab window or cab door of the crane to operate any controls.

Operate the crane slowly and with great care, looking carefully in the direction of movement.

A good practice is to make a “dry run” without a load before making the first lift. Become familiar with all factors specific to each job site.

Ensure that the wire rope is properly installed on the hook block and the boom head and that all wire rope guards are in place.

Use enough parts of line for all lifts and check all slings, chains and lines for correct attachment. Note: To obtain maximum lifting capacities, the hook block must be set up with enough parts of line.

When slings, ties, hooks, etc., are to be used, make certain that they are correctly positioned and that they are secured before raising or lowering any load.

Before hoisting a load, be sure that the hook block is above the center of gravity on the load. Never lift unstable or uneven loads. Doing so may result in loss of control.

Only certified rigging personnel shall be allowed to rig loads.

Rigging equipment shall be inspected on a regular basis before use on the job.

All crane operations shall be carried out within a radius as small as possible. Failure to do so may result in the machine tipping or loss of control.

In order to control the crane properly, there should be no barrier obstructing the passage of the crane and the load.

Avoid multiple operation of the crane controls. Performing more than one task at the same time could lead to loss of control, unstable load or damage. Always lift and move the load in single sequence operations.

Always maintain control of the load at all times, especially when swinging or traveling with a load. If necessary, use tag lines to guide or snub a load. Never stand near the load.

If the load becomes unstable, leave the area immediately and lower the load back down to the ground.

No less than three wraps of wire rope should remain on the hoist drum.

Use tag lines when possible to position and restrain the loads. Personnel using tag lines must be on the ground.

Always use good rigging practices.

Never attach or wrap the line around any part of your body in any manner if you will be using a tag line to steady a load during lifting operations. Loss of load control or unexpected load drift may cause the tag line to be unexpectedly pulled.

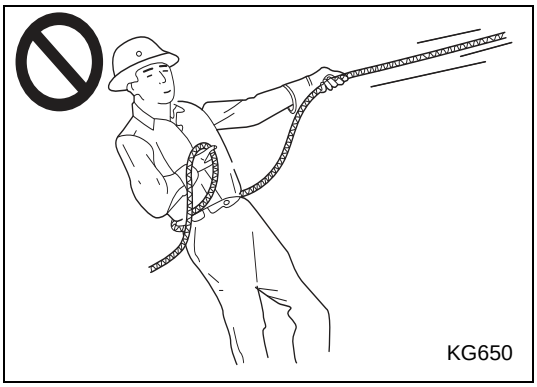

Fig. 2-41

Always have the tag line in a position where it can be easily released and clear of any part of your body if the load should suddenly drift.

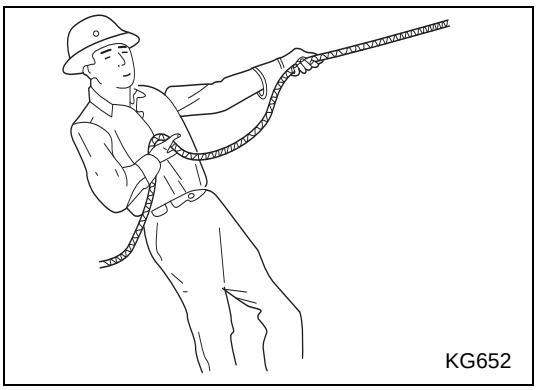

Fig. 2-42

WARNING

Failure to observe or follow this warning may result in serious injury or death.

Never drag or pull a load with the crane mechanism in any manner. Doing so may cause the machine to tip or roll-over.

Always keep in mind a crane is designed for lifting objects only.

Avoid lifting objects during high wind conditions. Excessive wind speeds can cause loss of control or a roll over.

Do not operate the crane in thunderstorms or when darkness, fog or mother visibility restrictions make operation unsafe.

If stormy weather occurs, especially an electrical storm, lower the crane boom to ground level and remain in the crane until the storm passes.

Use extreme caution when near the edge of a cut, ditch, waterway or similar areas as the edge may give way causing the machine to slide or roll over.

When working in these areas, the safe distance shall be measured from the ditch bottom, and:

Distance on soft, backfilled soil is equal to two times the ditch depth (A2 = 2xT)

Distance on solid soil is equal to one time the ditch depth is (A1 = 1xT)

Never exceed the lifting capacity of the machine. Doing so may result in damage to the machine or object being lifted, loss of control or a roll-over.

If you will be traveling with a load, always travel at a slow, controllable speed. Be sure the surface is flat, level and stable. Never slew the machine or operate the boom controls. Make sure that the superstructure lock pin is properly engaged prior to traveling. Loss of control, tipping or unstable conditions may result.

Wire Rope Safety

Use only wire rope specified by SANY America as indicated in the crane Load Chart Manual. Substitution of an alternate wire rope may require the use of a different permissible line pull and, therefore, require different reeving.

Always make daily inspections of the wire rope, keeping in mind that all wire rope will eventually deteriorate to a point where it is no longer usable. A wire rope shall be taken out of service when any of the following conditions exist:

- For rotation-resistant running ropes-more than two (2) broken wires in a length of wire rope equal to six (6) times the wire rope diameter, or more than four (4) broken wires in a length of wire rope equal to thirty (30) times the wire rope diameter.
- For running ropes other than rotation resistant-six (6) broken wires in one wire rope lay or three (3) broken wires in one strand.
- One valley break where the wire fractures between strands in a running wire rope is cause for removal.
- Abrasion of the wire rope resulting in wear of the individual outside wires of 1/3 of the original wire diameter.
- Any kinking, bird caging, crushing, corrosion, or other damage resulting in distortion of the wire rope structure.
- Wire rope that has been in contact with a live power line or has been used as a ground in an electric circuit (e.g., welding) may have wires that are fused or annealed and must be removed from service.
- In standing ropes, more than three (3) breaks in one wire rope lay in sections beyond the end connection or more than two (2) broken wires at an end connection.
- Core deterioration is usually observed as a rapid reduction in wire rope diameter and is cause for immediate removal of the wire rope.

Operators must not work with worn or damaged wire rope.

Never handle the wire rope with bare hands.

Periodic wire rope inspection records are required by law. Make sure these records have been reviewed and are up to date.

When installing a new wire rope do the following:

- Follow proper instructions for removing wire rope from a reel.
- Apply back tension to the storage/payoff reel of the new wire rope to insure tight, even spooling onto the hoist drum.
- Operate the new wire rope - first through several cycles at light load and then through several cycles at intermediate load to allow the wire rope to adjust to operating conditions.

When using a wedge socket do the following:

- Always inspect socket, wedge, and pin for correct size and condition.
- Do not use parts that are damaged, cracked, or modified.
- Assemble the wedge socket with live end of wire rope aligned with the centerline of pin and assure proper length of tail (dead end) protrudes beyond the socket.

Never overload or shock load a wire rope.

Lubricate the wire rope periodically as the lubricant becomes depleted.

Inspect the boom head and hook block sheaves for wear. Damaged sheaves cause rapid deterioration of wire rope.

For maximum wire rope life and minimized hook block rotation, it is recommended that even numbers of parts-of-line be used in multiple-part reeving whenever possible.

Crane Shut-Down Safety

Do not leave the cab of the crane with a load suspended. Lower the load to the ground and stop the engine before leaving the cab.

Perform the following steps in this order when shutting down the crane:

1. Engage the parking brake.
2. Fully retract and lower the boom.
3. Engage the pin swing lock or 360-degree swing lock.
4. Place controls in neutral position.
5. Shut down the engine and remove the ignition key.
6. Chock the wheels.
7. Lock the operator's cab and install vandal guards, if used.

Note: In cold weather, never park the crane where the tires can become frozen to the ground.

Swingaway Boom Extension Safety

Follow the proper procedures during erection, stowage, and use of the swingaway boom extension (a) to avoid death or serious injury.

- Install and secure all pins properly as stated in this manual.
- Control the movement of the swingaway boom extension at all times.

Fig. 2-43

System Functions

WARNING

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

GENERAL OVERVIEW

This section of the manual provides detailed information regarding the basic description and overview of all the controls and operating systems on your crane. It is important to study and become familiar with all systems before proceeding to operate this crane.

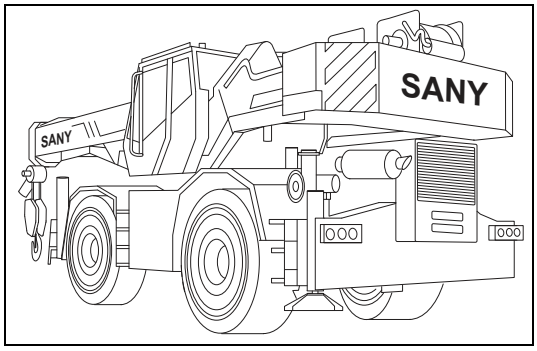

Fig. 3-1

Your SANY Rough Terrain crane was manufactured using the latest advanced domestic and international technology and includes these features:

- Unique, streamlined shape
- Broad vision
- High maneuverability
- Flexible control system
- Stable, double-H-shaped outriggers
- Strong telescopic boom
- Lattice-type swingaway boom extension
- Easy-to-use superstructure system

SANY Rough Terrain cranes offer superior working characteristics, strong lifting capacity and convenient operation performance.

The rough terrain crane incorporates an all-welded-steel frame, using planetary drive axles to provide four-wheel drive. Axle steering is accomplished utilizing hydraulic steering cylinders. The engine is mounted at the rear of the crane and provides power through a six-speed forward- and reverse-transmission. Hydraulically operated, double-box, sliding beam outriggers are integral with the frame.

The carrier frame incorporates an integral fifth wheel, to which the rear axle is mounted, to provide axle oscillation. Axle oscillation lockout is automatic when the superstructure rotates +/- 6° from the travel position (boom over the front).

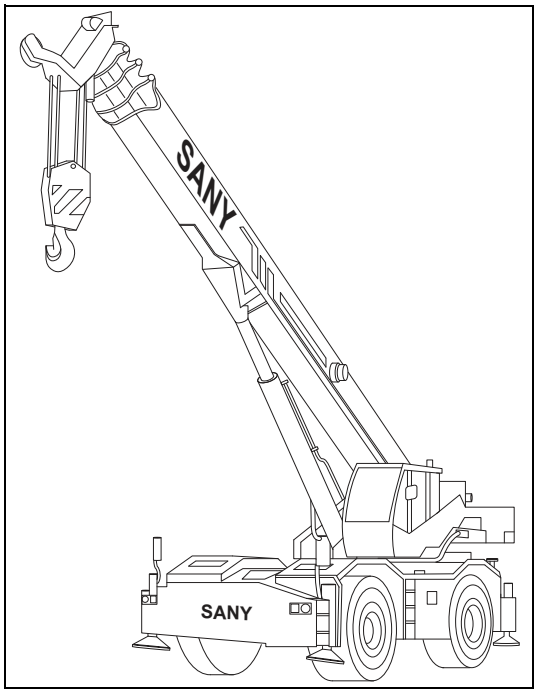

Fig. 3-2

The superstructure is capable of 360° rotation in either direction. All crane functions are controlled from within the fully-enclosed cab mounted on the superstructure. The SRC865 crane is equipped with a four-section, sequenced, cable-synchronized boom. The SRC865XL is equipped with a full power five-section boom. Additional reach is obtained by utilizing an optional swingaway boom extension. Lifting is provided by a main hoist and an optional auxiliary hoist.

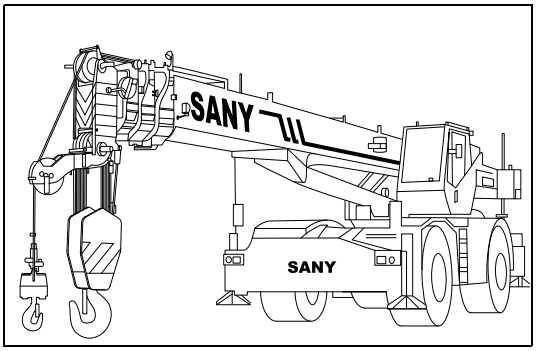

Fig. 3-3

Main Component Locations

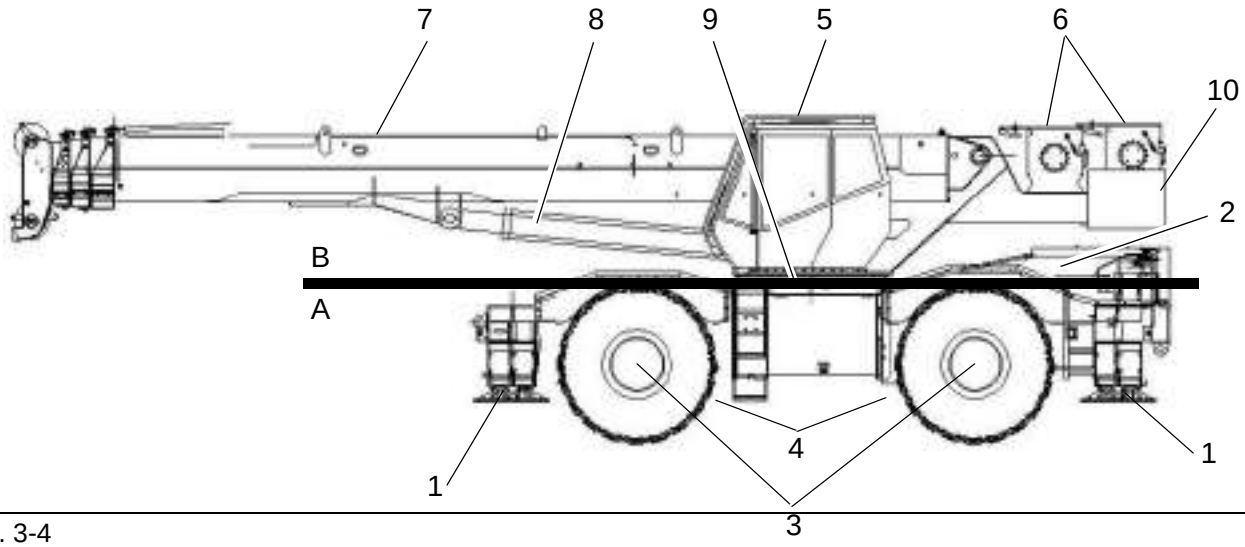

Fig. 3-4

A — Chassis Components	1	Outriggers
	2	Engine and transmission
	3	Axles and suspension
	4	Steering and brakes
B — Superstructure Components	5	Cab, controls, gauges, indicator lamps & load moment indicator (LMI)
	6	Hoist and wire rope
	7	Boom and swingaway boom extension
	8	Lift cylinder
	9	Swing drive
	10	Counterweight

CHASSIS

The SANY-designed, four-wheel drive and four-wheel steering (4x4x4) chassis (a) is of box-type construction with reinforcing crossmembers, a precision-machined turntable bearing mounting plate and integrally welded outrigger boxes. The decking is equipped with anti-skid surfaces.

Fig. 3-5

Outriggers

The outrigger system includes the outrigger jacks, outrigger beams and controls.

Out-and-down outrigger operation is easily maintained due to an integrated oil circuit design and is electronically controlled from two locations:

Beams and Jacks

During operation, a hydraulic cylinder is used to extend/ retract the outrigger beams (d) to increase the support width of chassis and keep the machine balanced during a 360° free-swing. They can be extended to full (a) or mid (b) positions.

NOTE: The outrigger beams must be extended, when the weight exceeds the allowable range for "On Tire" lifting. The outrigger beams may remain stowed and unused for jobs with low-weight loads. See the "On Tires" load charts.

Outrigger jack cylinders (c) are used to support and level the crane.

Fig. 3-6

Easily removable steel pads (e), each with an area of 450 in.^{2} (2,900 cm^2), are stowed on the outrigger boxes (f) at their point of use.

Fig. 3-7

Controls

Complete controls and a sight-leveling bubble (a) are located in the operator's cab.

Emergency outrigger controls are located in the chassis electrical box.

Fig. 3-8

Emergency Outrigger Controls

The switches (a) are protected from the elements inside the electrical cabinet located on the left side of the chassis.

Fig. 3-9

The switches are used for the follows:

a Left front outrigger beam / jack

b Right front outrigger beam / jack

c Left rear outrigger beam / jack

d Right rear outrigger beam / jack

e Extend/Retract

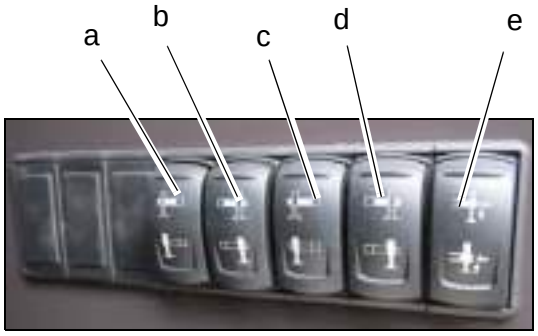

Fig. 3-10

NOTE: These exterior switches are for emergency use only, such as in case of loss of electrical power to the superstructure. Their operation is almost the same as the switches in the operator's cab. Refer to the Operation section of this manual for more details.

Cab Outrigger Controls

A series of rocker switches on the dashboard to the left of the steering wheel are the main switches (a - f):

a Extend beam / retract jack – Retract beam/extend jack

b Simultaneous outrigger beam / jack operation

c Left rear outrigger beam / jack selection

d Left front outrigger beam / jack selection

e Right rear outrigger beam / jack selection

f Right front outrigger beam / jack selection

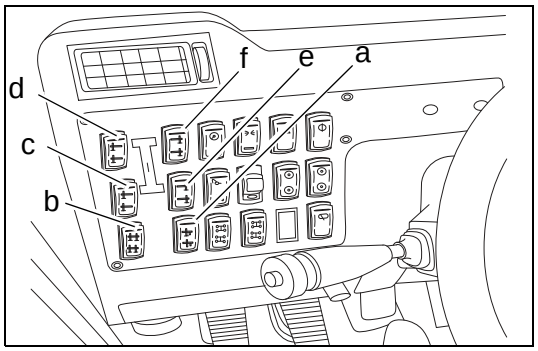

Fig. 3-11

Engine

Refer to your Cummins engine manual for complete details of the engine (a).

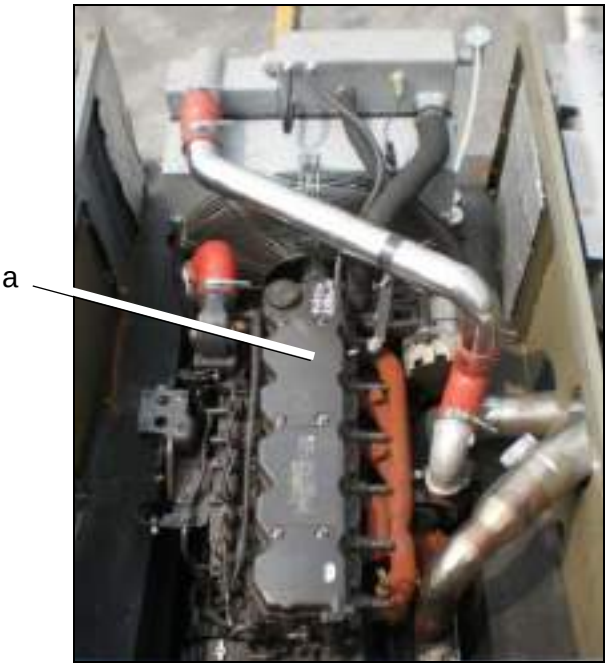

Fig. 3-12

Transmission

The range-shift-type, power-shift transmission provides 6 forward speeds and 6 reverse speeds across a low gear range and a high gear range. Starting is enabled only in neutral (neutral safety start).

Controls

Transmission control is via a three-position rotating collar on the arm on the right side of the steering column inside the operator's cab as shown here.

Machine travel direction is controlled by the up, down or center position of the arm. Gear position is controlled as indicated here:

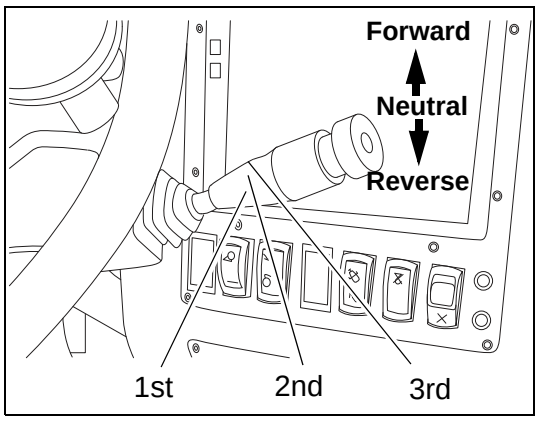

Fig. 3-13

Low Gear	Speed	High Gear	Speed
1st	1.5 mph	1st	4 mph
2nd	3.0 mph	2nd	9 mph
3rd	7.0 mph	3rd	22 mph

Drive Type

Four-wheel drive mode automatically engages the low gear range, and two-wheel drive mode automatically engages the high gear range.

A rocker switch (a) on the dashboard to the left of the steering wheel is used to select either four-wheel drive mode or two-wheel drive mode.

NOTE: This switch changes the gear ratio and travel speed as required (low gear for slower travel speed but more power, and high gear for faster travel speed but less power).

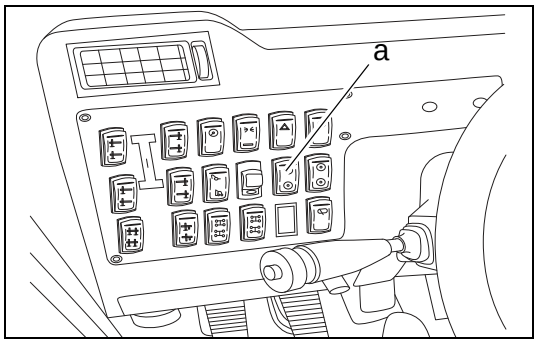

Fig. 3-14

To override this and remain in only low gear, press the "Enable/Disable Transmission High Gear" rocker switch (b) on the panel to the left of the steering wheel.

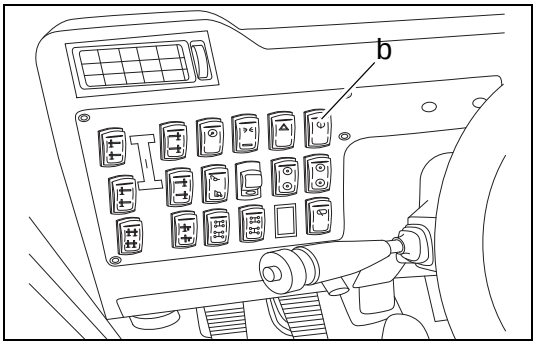

Fig. 3-15

Axles and Suspension

The rear axle is a planetary drive (a), steer type (b) with 8.6 in. (218 mm) of total oscillation. Automatic oscillation lockouts engage when the superstructure is rotated +/- 6° from the travel position (boom over the front).

The front axle is a planetary drive/steer type, rigid-mounted to the chassis for increased stability.

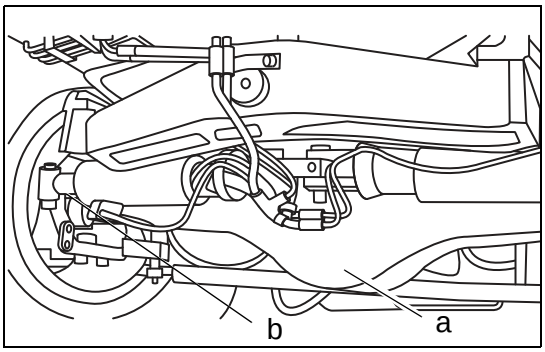

Fig. 3-16

Steering

Hydraulic, full power steering at either the front or rear axles is easily controlled by the steering wheel inside the cab.

Four steering modes are available as shown below:

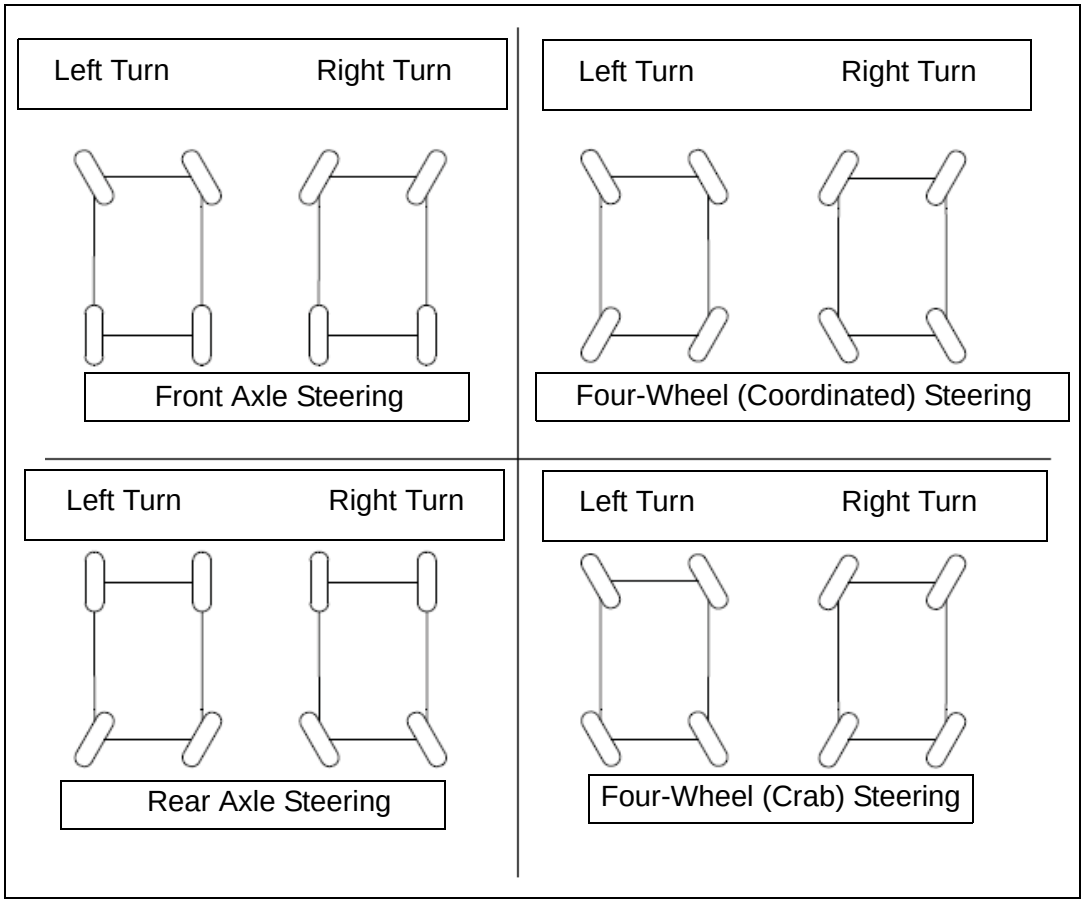

Fig. 3-17

The desired steering mode is selected via rocker switches (a, b) on the dashboard to the left of the steering wheel.

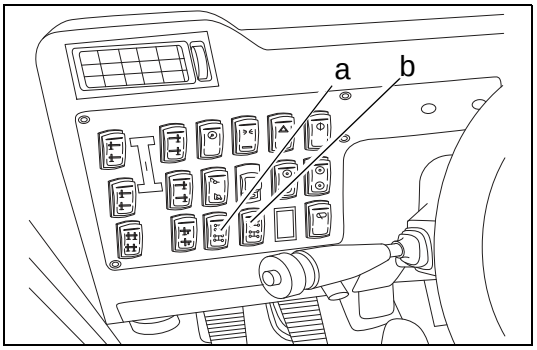

Fig. 3-18

Brake Systems

The travel braking system consists of fully hydraulic actuated disc/caliper brakes at each of the four wheels.

Each front wheel has dual calipers, while each rear wheel has one caliper.

The travel braking system is actuated by a foot pedal (a) inside the operator's cab.

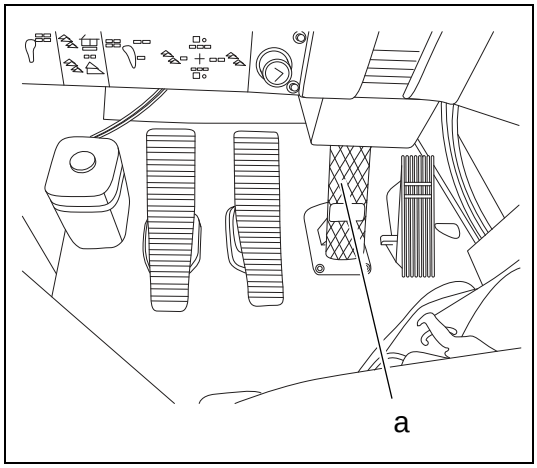

Fig. 3-19

The hydraulic pump charges the accumulator through a prefill valve. When the accumulator pressure reaches maximum, the prefill valve will stop the charging. When the driver steps on the brake pedal, the hydraulic pressure of accumulator is distributed to all four of the wheel brakes. When the brake pedal is released, the hydraulic pressure is released and the prefill valve again charges the accumulator. This is a continuous working cycle.

The parking brake disc is mounted to the front axle differential and is activated by a two-position switch (b) on the dashboard to the left of the steering wheel. The square LED on the switch lights when the pressure switch in the brake release system is activated. The switch is guarded to prevent accidental activation.

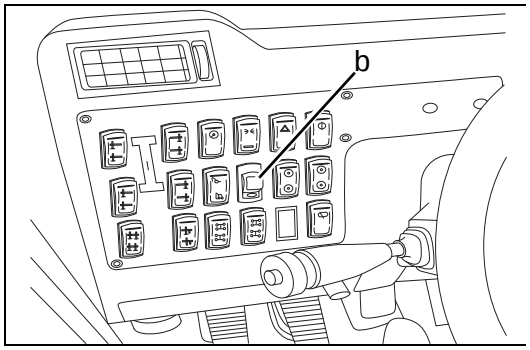

Fig. 3-20

Tires

29.5R25 (29.5×25, 28 PR) wide earthmover-style tread tires (a) provide good service life and high load ratings.

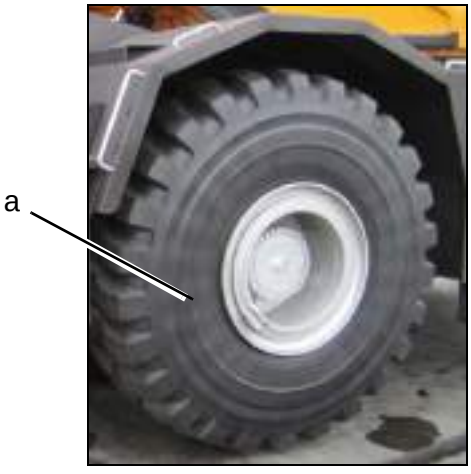

Fig. 3-21

SUPERSTRUCTURE

The SANY-designed superstructure (a) includes everything above the turntable bearing.

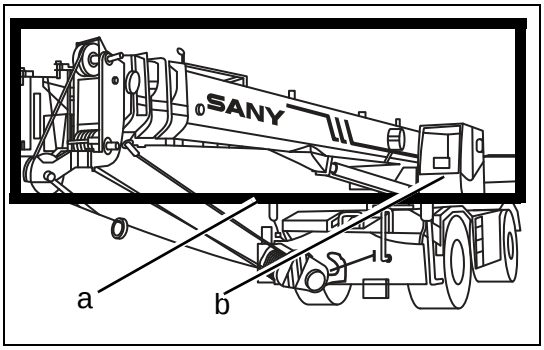

Fig. 3-22

Operator's Cab

The operator's cab (b) features all-steel construction, optimum visibility, tinted safety glass throughout, rubber floor and is mounted on vibration-absorbing pads.

A sliding door (b) is located on the left side for operator entrance and exit.

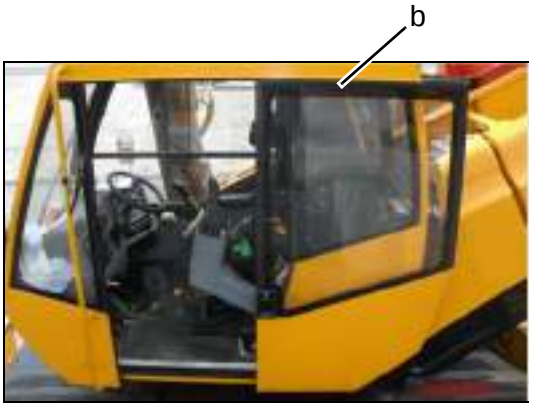

Fig. 3-23

A framed sliding window (c) on the right side and opening top hatch is included for optimum visibility.

Acoustical foam padding insulates against sound and weather.

Fig. 3-24

The deluxe six-way adjustable seat (d) is equipped with a mechanical suspension and includes a headrest, armrests and a seat belt.

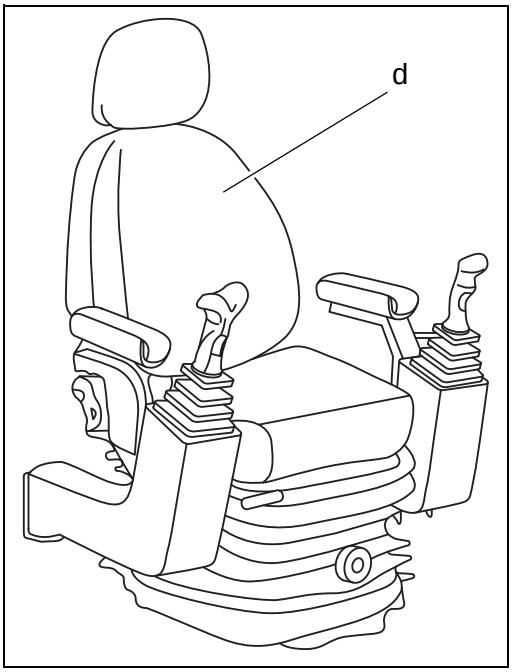

Fig. 3-25

Controls & Switches

Joystick

Hoist, swing and boom operation controls are mounted on hydraulic pilot-operated joystick controllers on the armrests. Both armrests can be raised and locked in place for improved access.

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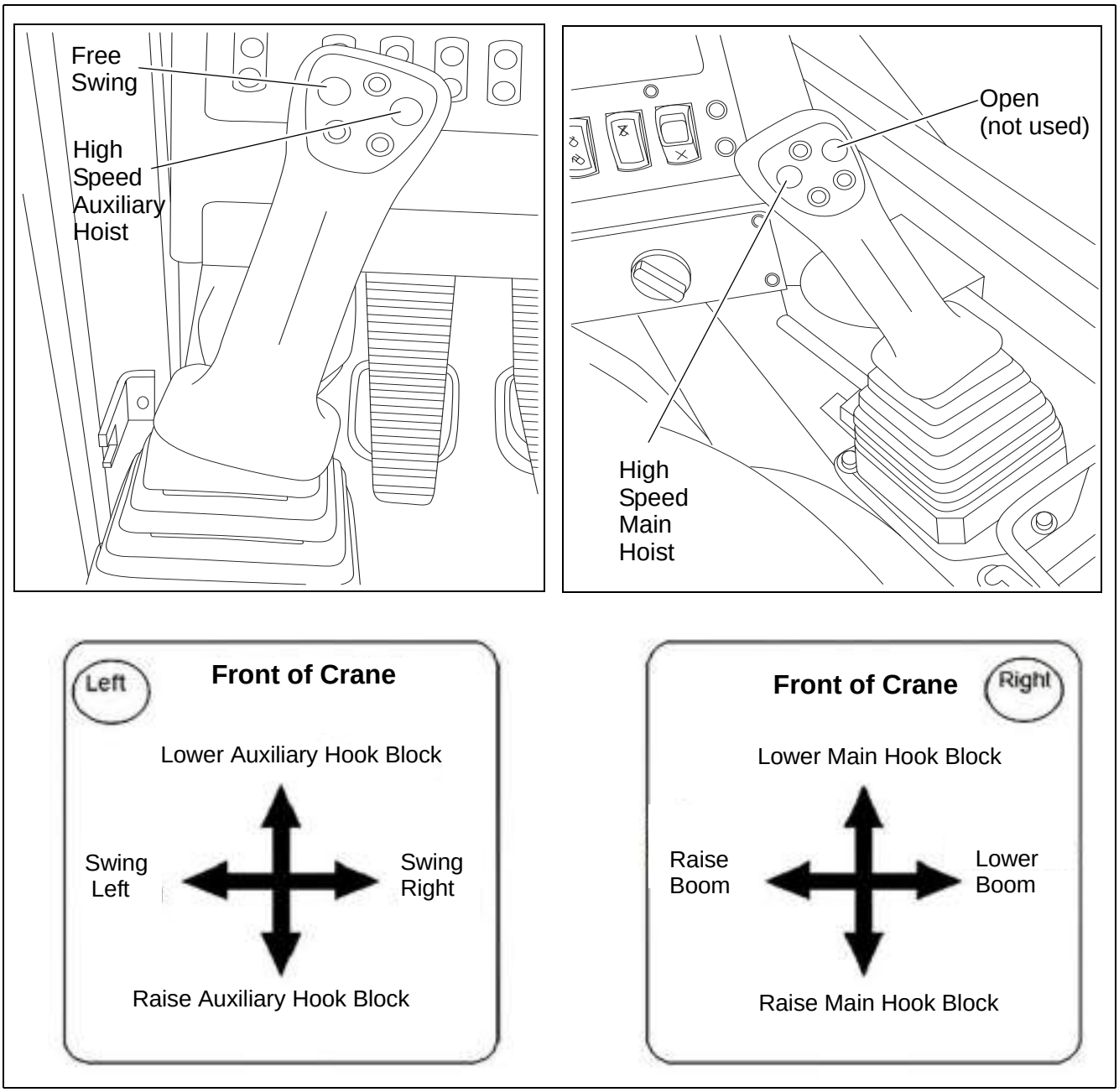


Fig. 3-26

Left Steering Column Lever

A lever mounted on the left side of the steering column controls the horn, turn signals and windshield wiper:

a Windshield wiper speed

b Windshield washer

c Horn

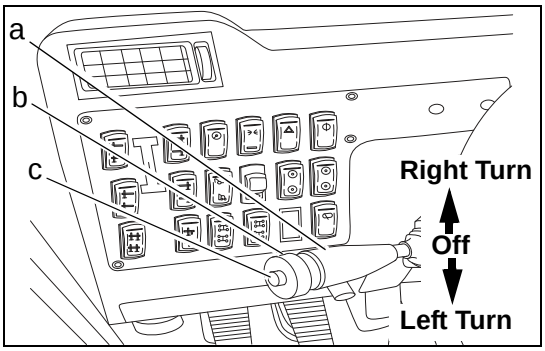


Fig. 3-27

Right Steering Column Lever

A lever mounted on the right side of the steering column controls direction of travel and the transmission.

Machine travel direction is controlled by the up, down or center position of the lever. Gear position is controlled by a rotating collar on the lever as indicated here:

Low Gear	Speed	High Gear	Speed
1st	1.5 mph	1st	4 mph
2nd	3.0 mph	2nd	9 mph
3rd	7.0 mph	3rd	22 mph

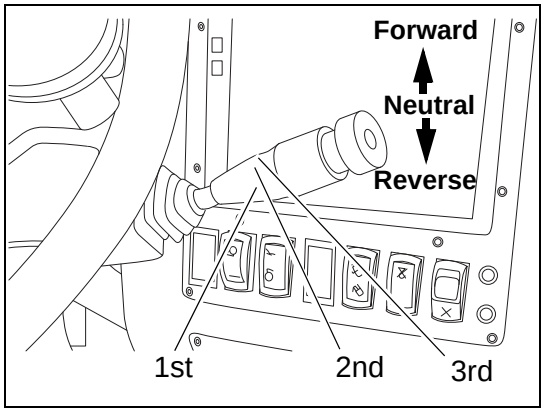


Fig. 3-28

Foot Pedals

The foot control pedals are as shown here:

a Swing brake

b Boom telescoping operation

c Travel brake

d Throttle

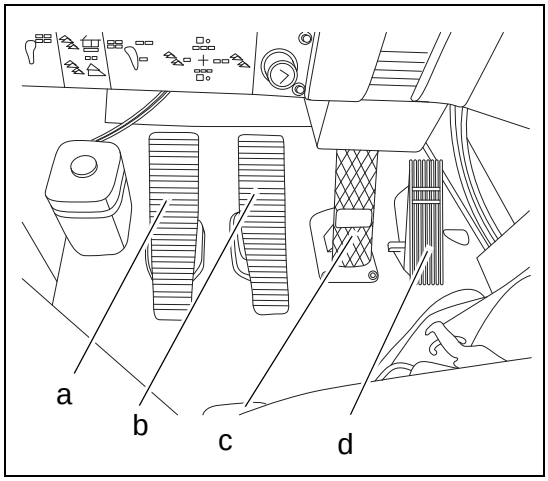


Fig. 3-29

Left Dashboard Switches

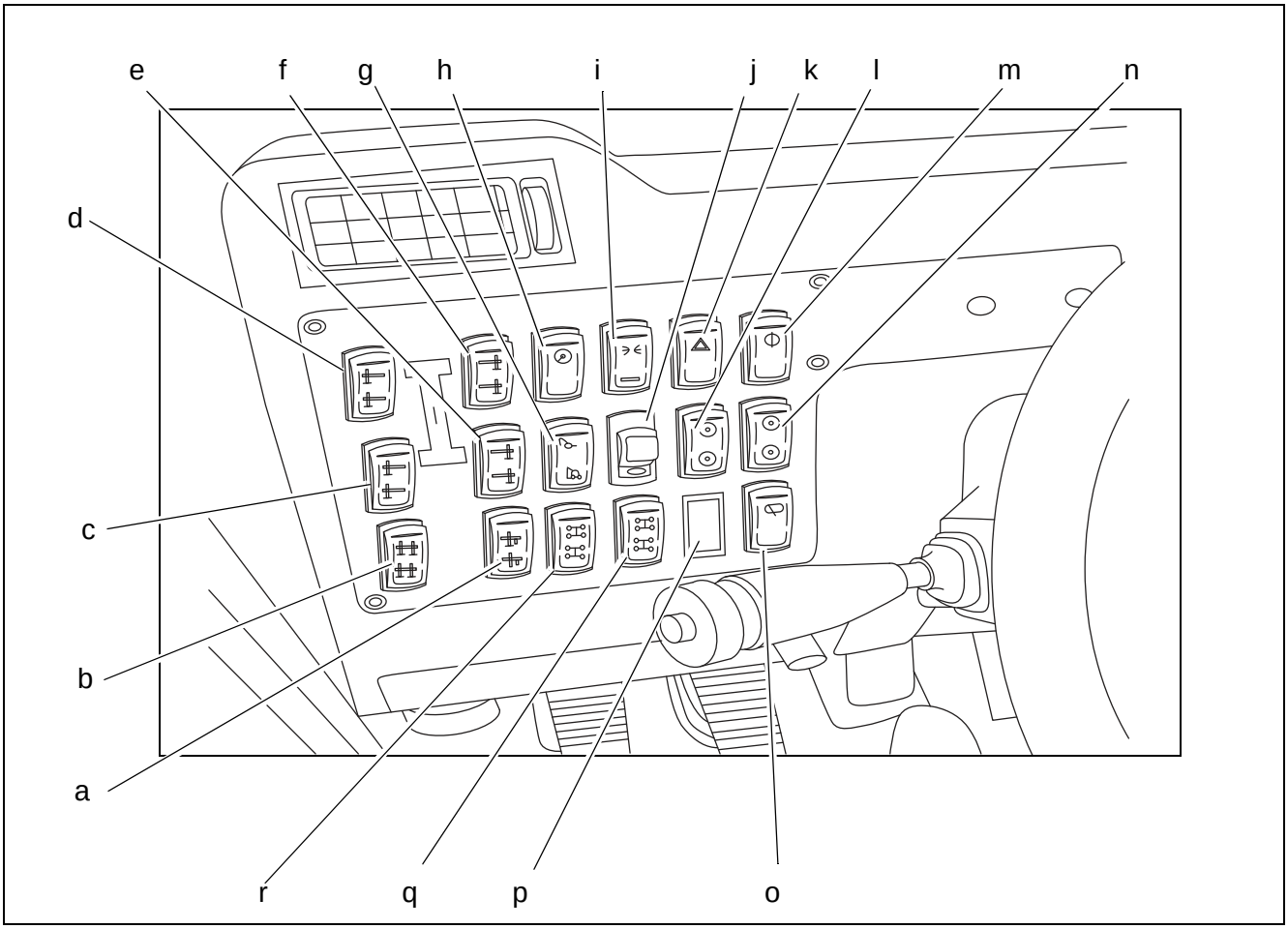


Fig. 3-30

Table 3-3: Left Dashboard Switches

a - Extend beam/retract jack – Retract beam/extend jack	j - Parking brake
b - Simultaneous outrigger beam / jack operation	k - Enable / disable external flashing lights
c - Left rear outrigger beam / jack selection	l - 2-wheel / 4-wheel mode selection
d - Left front outrigger beam / jack selection	m - Enable / disable transmission high gears
e - Right rear outrigger beam / jack selection	n - Transmission Auto / Manual operation
f - Right front outrigger beam / jack selection	o - Top hatch window wiper
g - (3-position) Power to boom or power to travel (normal) or power to travel (“creep” speed)	p - Blank (not used)
h - Instrument cluster lights on / off	q - Steering: 4-wheel coordinated, 4-wheel crabbing, 2-wheel only
i - Cab-front work lamps on / off	r - Steering: front wheel, rear wheel

Right Dashboard Switches

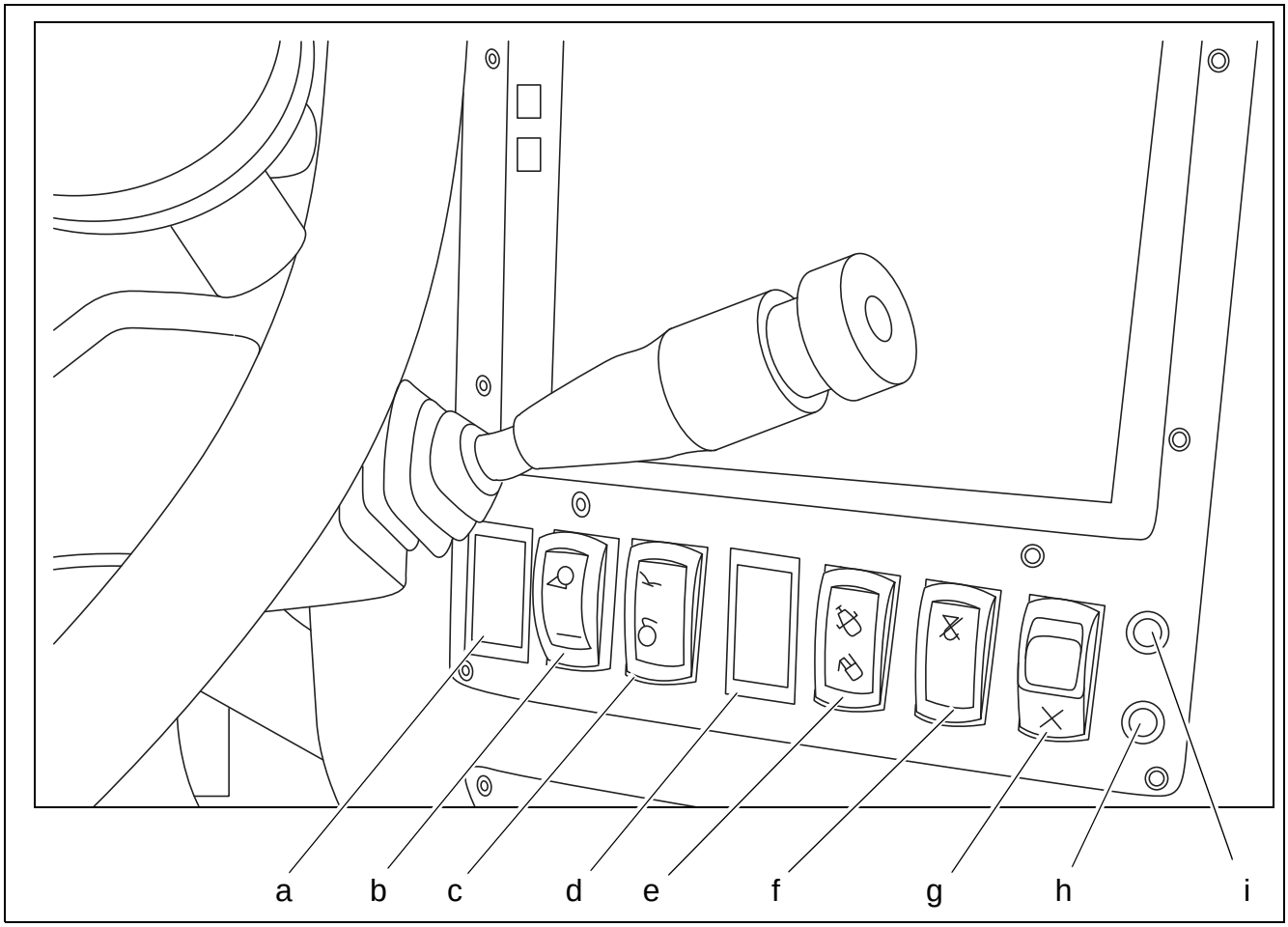


Fig. 3-31

Table 3-4: Right Dashboard Switches

a - Blank (not used)	f - Disable LMI anti-two block alarm
b - Work lamp on / off	g - Disable all alarms
c - Swing lock on / off	h - Yellow caution lamp
d - Blank (not used)	i - Red warning lamp
e - Boom telescoping cylinder #1 and boom telescoping cylinder #2	

Monitor display screen

The touch-screen (a) enables the operator to quickly and efficiently use the Load Moment Indicator (LMI). See “Load Moment Indicator (LMI) System” on page 3-25.

Fig. 3-32

Instrumentation and Accessories

Accessories include the following:

- Fire extinguisher
- Interior dome light
- Exterior work lights (one each on boom head and the cab)
- Windshield washer/wiper
- Top skylight wiper
- Right-hand and left-hand rear view mirrors
- Dashboard lights
- Seat belt

Hydraulic function gauges (a) are located in the cab behind operator seat. The electrical controls and circuit breakers are well-protected and also conveniently located in cab.

Fig. 3-33

Main and Auxiliary Hoists

Each hoist consists of its own hydraulic bent axis piston motor (a) and planetary reduction gearing for 2-speed operation with equal speeds for power-up and power-down. Each hoist is equipped with an integral automatic brake, grooved drum, tapered flanges, standard wire rope roller on drum, and an electronic drum rotation indicator.

Fig. 3-34

Wire Rope

WARNING

Never use a worn or damaged wire rope. Failure to observe and follow this warning could result in injury or possible death.

Environmental conditions

The life expectancy of a wire rope (a) may vary due to the degree of environmental conditions and other factors to which the wire rope may be subjected. Variation in temperature, excessive moisture, exposure to corrosive chemicals or subjecting the wire rope to abrasive material may shorten normal wire rope life. Frequent inspections and maintenance of your wire rope is required for preventing premature wear and to insure long-term satisfactory performance. See the Maintenance section of this manual for wire rope lubrication requirements.

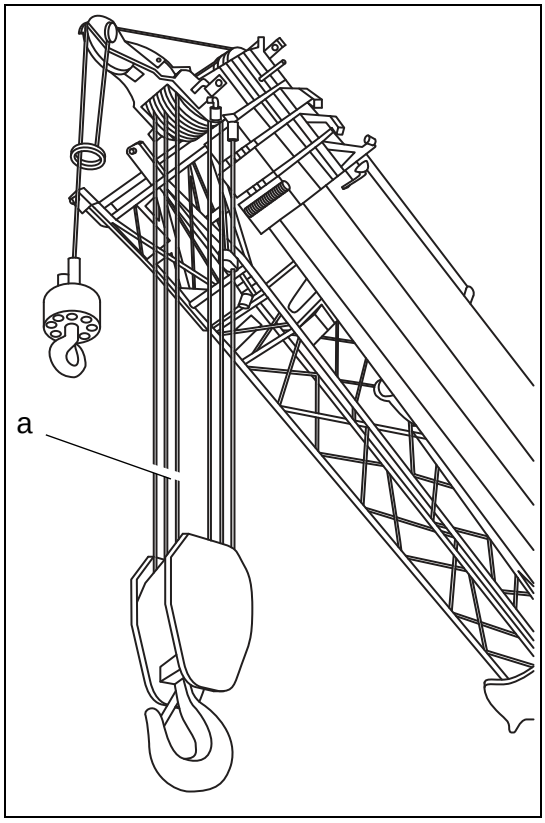


Fig. 3-35

Dynamic shock loads

Subjecting a wire rope to loads beyond the specified limit will shorten the wire rope's life expectancy. Examples of this type of loading are listed below.

- Hoisting or swinging of a load followed by abrupt stops.
- Suspending loads while traveling over irregular surfaces such as railroad tracks, potholes and rough terrain.
- Lifting a load that is beyond the rated capacity of the crane and/or the wire rope.

Boom

The fully powered boom retracts using four sections (SRC865) or five sections SRC865XL,

Boom Sections

The boom is comprised of a base section 1 (a), section 2 (b), section 3 (c) and section 4 (d) for the SRC865. There is a section 5 on the SRC865XL.. The boom sections are made of two high strength steel plates, formed into a hexagonal cross-section. Each boom section has greasable anti-friction slide pads.

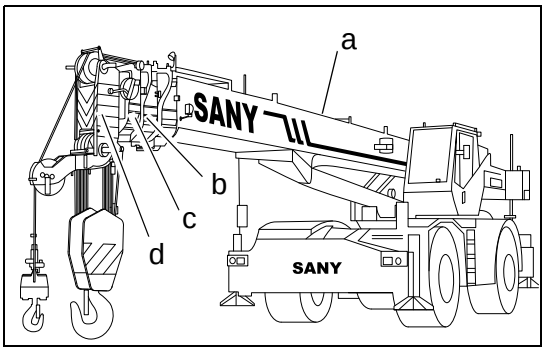


Fig. 3-36

Synchronization

Telescoping is sequenced and synchronized by a single-lever controller in the cab. The telescoping system consists of two internal telescope cylinders and a synchronization cable.

Section 2 (h) is fully extend, followed by sections 3 (i) and 4 (j), all synchronized by the cable system. Boom retraction is the reverse sequence of telescoping. The SRC865XL has a section 5.

NOTE: The operation of the SRC865 is shown here. The operation of the SRC865XL is the same with the addition of one section.

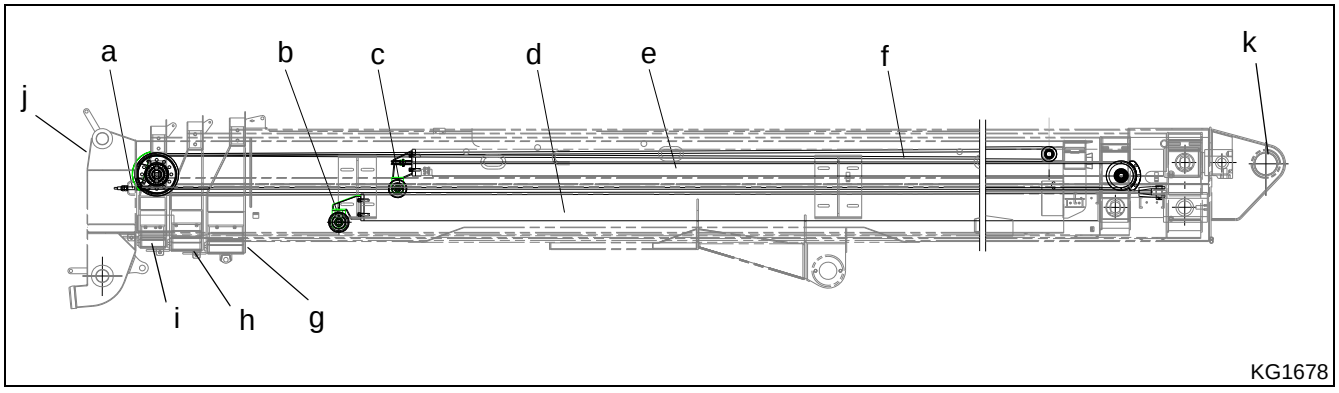


Fig. 3-37

a. Retraction sheave
b. Guide wheel
c. Cylinder bracket
d. Telescopic cylinder #2
e. Telescopic cylinder #1
f. Extension rope
g. Section 1
h. Section 2
i. Section 3
j. Section 4
k. Pivot Pin

Swingaway Boom Extension

The swingaway boom extension (a) is a side-stowed, lattice-type extension to increase the reach of the boom (b).

NOTE: SRC865 = 30.2 - 53.8 ft (9.2 - 16.4 m)

NOTE: SRC865XL = 30.2 - 52.5 ft (9.2 - 16 m)

The swingaway boom extension fly section (c) has a single nylon sheave mounted on an anti-friction bearing which supports a single part of line (wire rope).

The boom extension is provided with a swing-out section.

The swingaway boom extension is offsettable:

NOTE: SRC865 = 0°, 20°or 40°. Maximum tip height is 175 ft (53.34 m).

NOTE: SRC865XL = 0°, 15°or 30°. Maximum tip height is 197 ft (60 m).

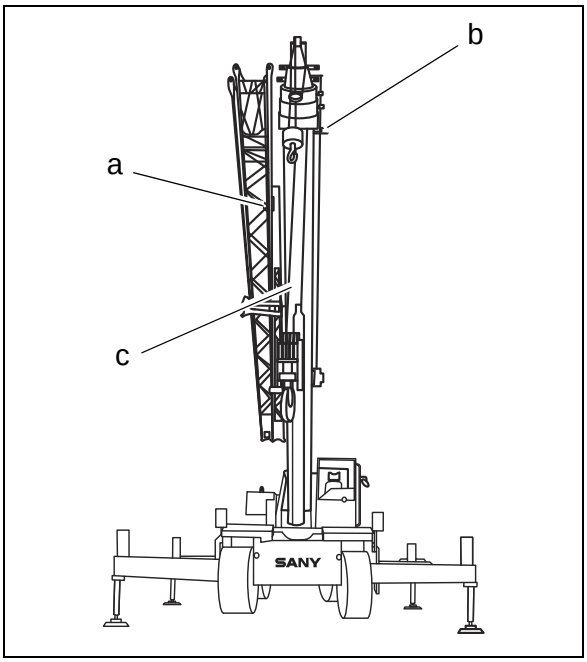


Fig. 3-38

Main Boom Head

The main boom head (a) is welded to the end of boom section 4. It has five nylon load sheaves and an aircraft warning beacon. Provisions include mounting for the side-stow swingaway boom extension (b).

Auxiliary Boom Head

The removable auxiliary boom head (c) installs on the 4th or 5th boom section only and has a single nylon sheave mounted on anti-friction bearing and a removable pin-type rope guard for quick reeving.

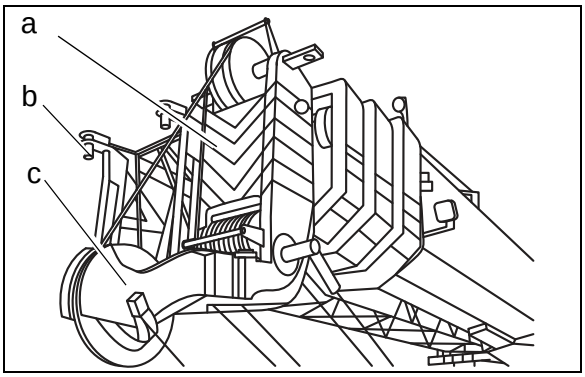


Fig. 3-40

Boom Lift Cylinder

The boom lift cylinder (a) controls the up-and-down boom movement. A single boom-lift-cylinder provides for boom elevation of -2° to 78°. Maximum tip height 117ft (35.8 m).

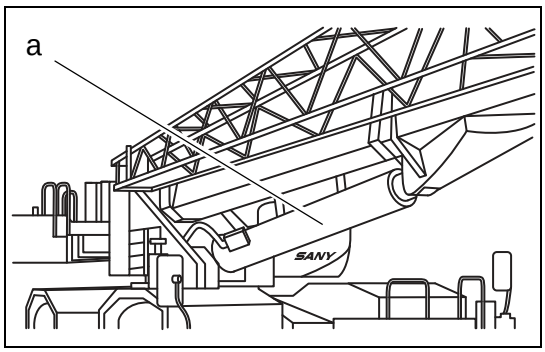


Fig. 3-41

The right joystick (b) is used to raise and lower the boom.

- Moving the joystick to the left raises the boom.
- Moving the joystick to the right lowers the boom.

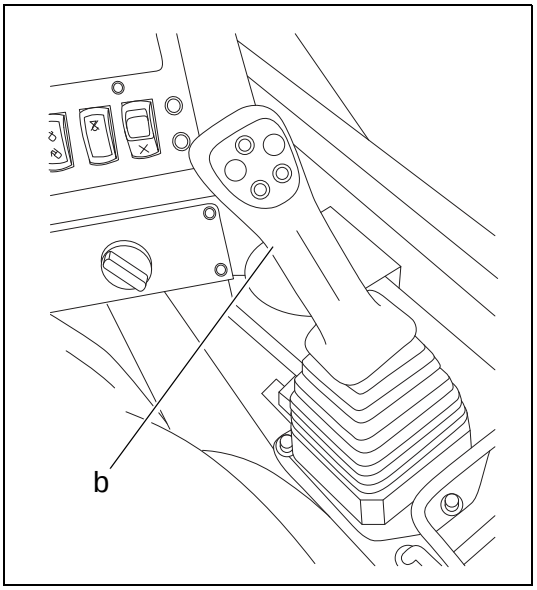


Fig. 3-42

Swing Drive

A hydraulic motor (a) drives a planetary reduction gear for precise and smooth swing function.

The swing bearing is a single row, ball-type, with internal teeth. The swing bearing is bolted to the revolving upper structure and to the carrier frame.

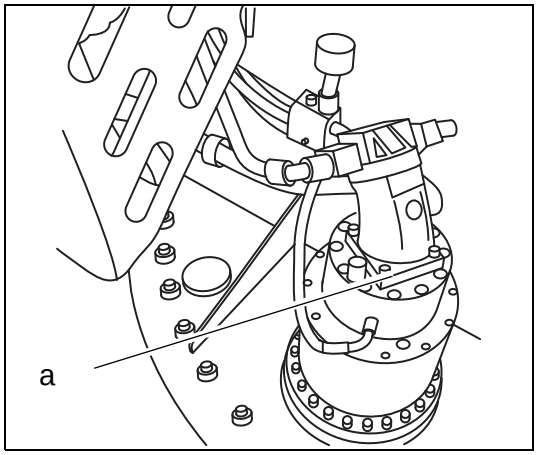


Fig. 3-43

A heavy duty, multiple-disc swing brake is spring- applied, hydraulically released and mounted directly to the swing motor.

A foot pedal (b) in the cab is pressed to apply the brake. The brake may be locked on or used as a momentary brake.

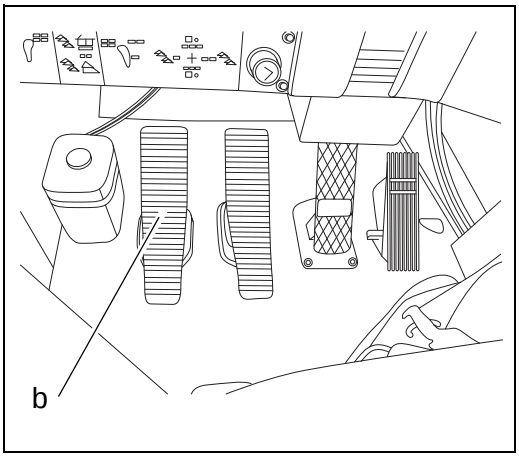


Fig. 3-44

A 360° mechanical house lock (c) is used to secure the superstructure in place.

Fig. 3-45

A single-position swing lock (d) for securing the superstructure over the front during travel is also included.

Fig. 3-46

The left joystick (e) is used to swing the boom.

- Moving the joystick to the left swings left.
- Moving the joystick to the right swings right.

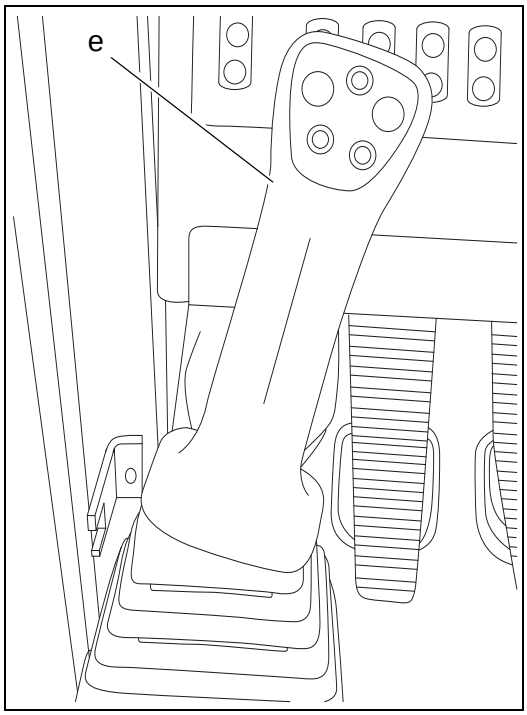


Fig. 3-47

Counterweight

The counterweight (a) is bolted to the superstructure.

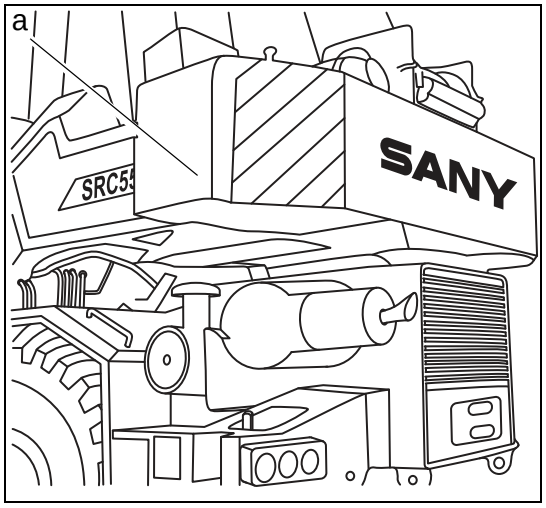


Fig. 3-48

LOAD MOMENT INDICATOR (LMI) SYSTEM

Overview of Functions


Fig. 3-49

The alarm and limiting functions are covered here:

- Overload alarm
- Anti-two blocking alarm
- Third-wrap indicator alarm
- General fault alarm

If any of these alarms occur:

- Alarm information will appear on the main screen
- Specific systems will be disabled

Alarm Information	Cause	System Action
Overload alarm	The weight of the actual load to be lifted exceeds the rated lifting capacity of the machine	Boom will not lower or telescope outward; hoist will not take up rope
Anti-two block alarm	The hook ball or hook block reaches the boom head	Boom will not lower or telescope outward; hoist will not take up rope
Third-wrap indicator alarm	The rope on the hoist reaches the third wrap of the drum	Hoist locked in position (will not take up rope nor release rope)
Fault	Incorrect setting or faulty hardware	All systems disabled

NOTICE

The rated lifting capacity the capability of telescoping a load will be restricted by the LMI when the actual lifting capacity reaches 30% of the rated lifting capacity.

Screens and Icons

Description of main screens

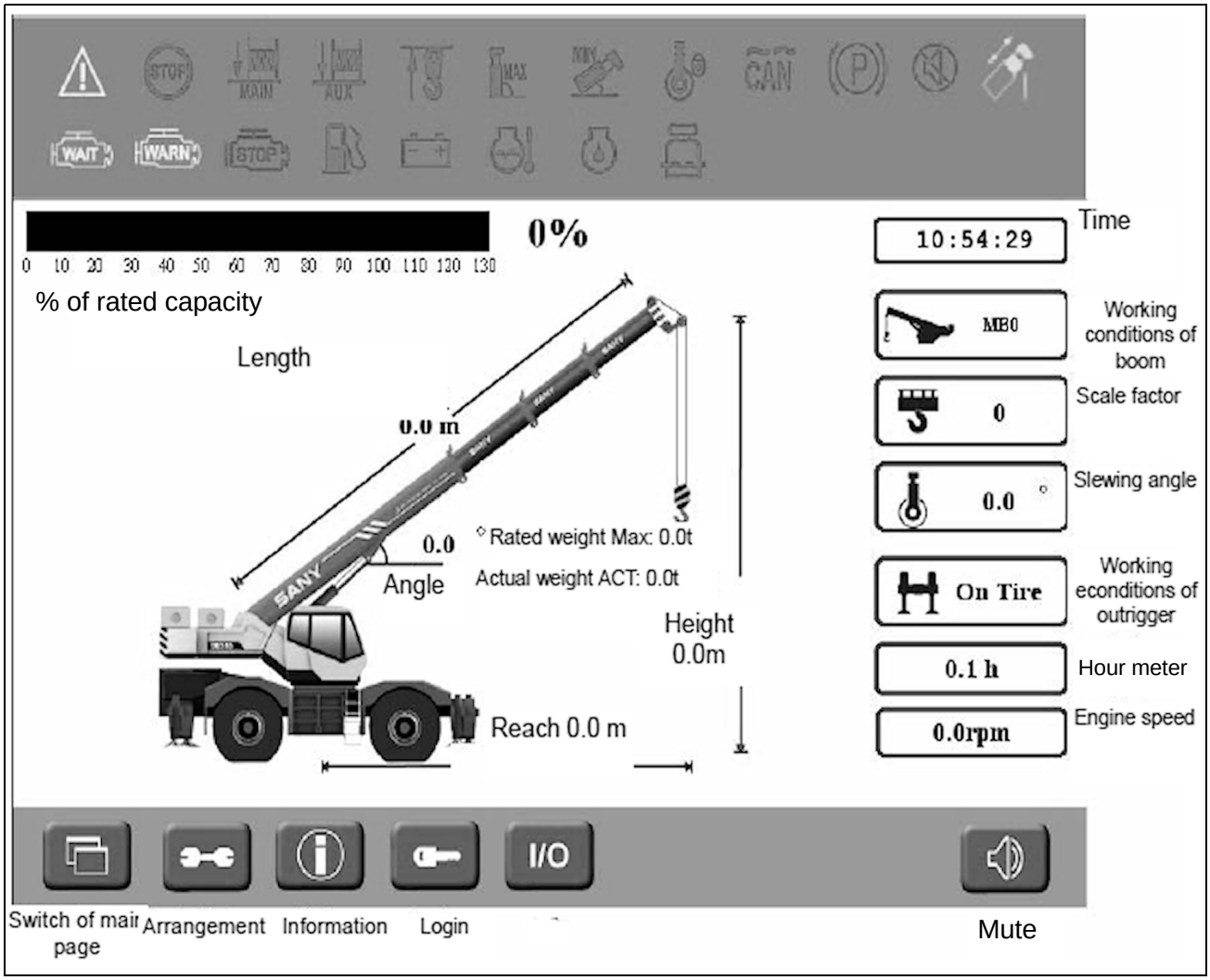


Fig. 3-50 - LMI main screen 1

Main screen 1 appears when the system is initiated

NOTE: The “Scale Factor” is the number of parts of line.

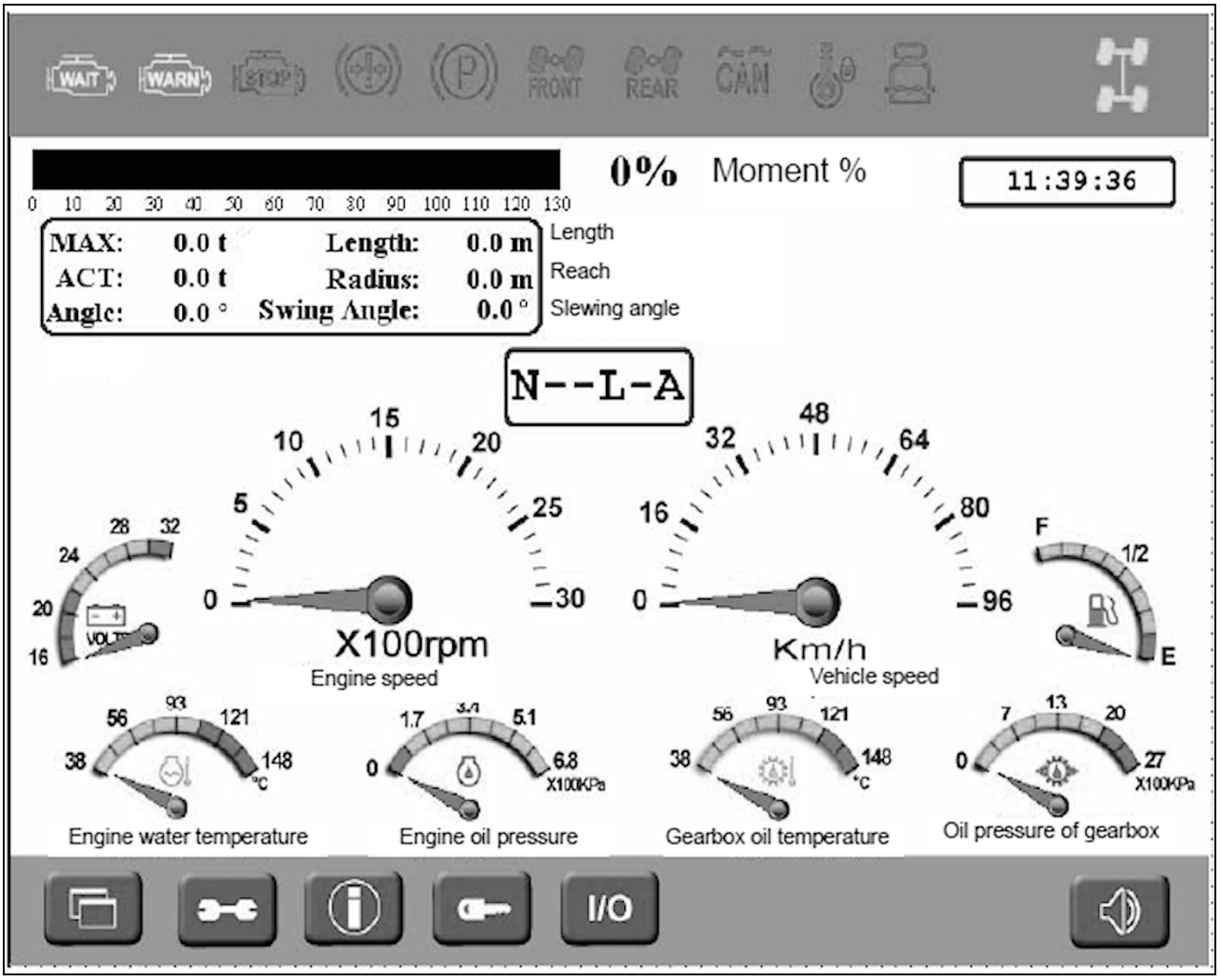


Fig. 3-51 - LMI main screen 2

Main screen 2 can be selected to display additional data. The display is an oversized touchscreen LCD imported with display content mainly including:

Main menu 1 and main menu 2 toggle icon

Press the icon at the lower left corner (a) of either main screen to toggle back and forth between main screen 1 and main screen 2.

Alarm icons

Alarm icons (b) displayed along the top of both main screens blink if an error condition occurs. The blinking stops when the error condition is removed. See also Fig. 3-53.

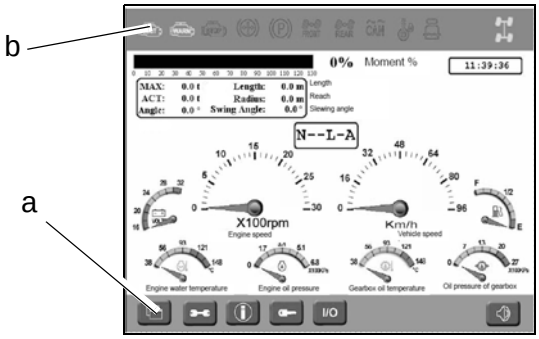


Fig. 3-52

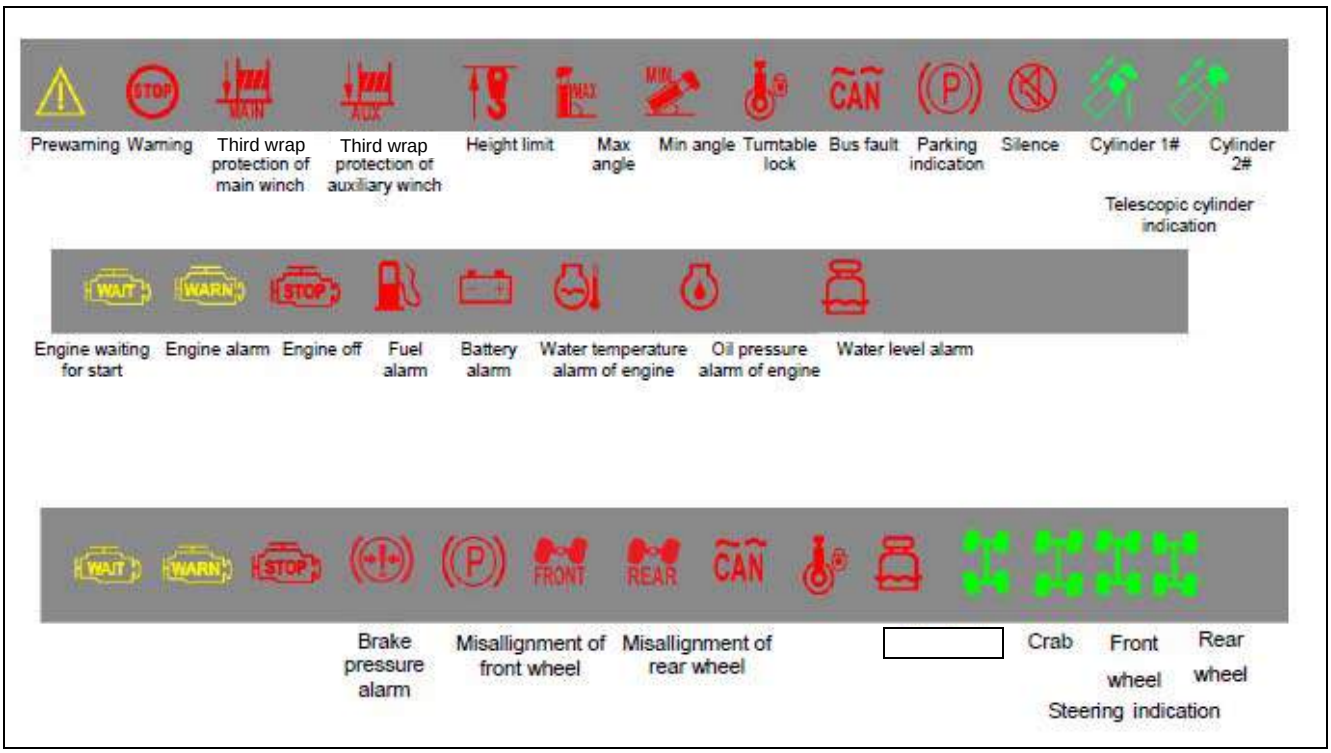


Fig. 3-53 - LMI alarm icons

Working condition setups

Before beginning normal operation, the proper working conditions for the boom, outrigger and other systems must be set.

To begin the setup procedures, press the second icon (c) at the lower left of either main screen to access the working condition setup screen.

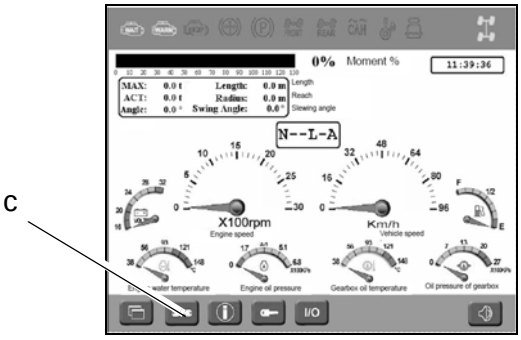


Fig. 3-54

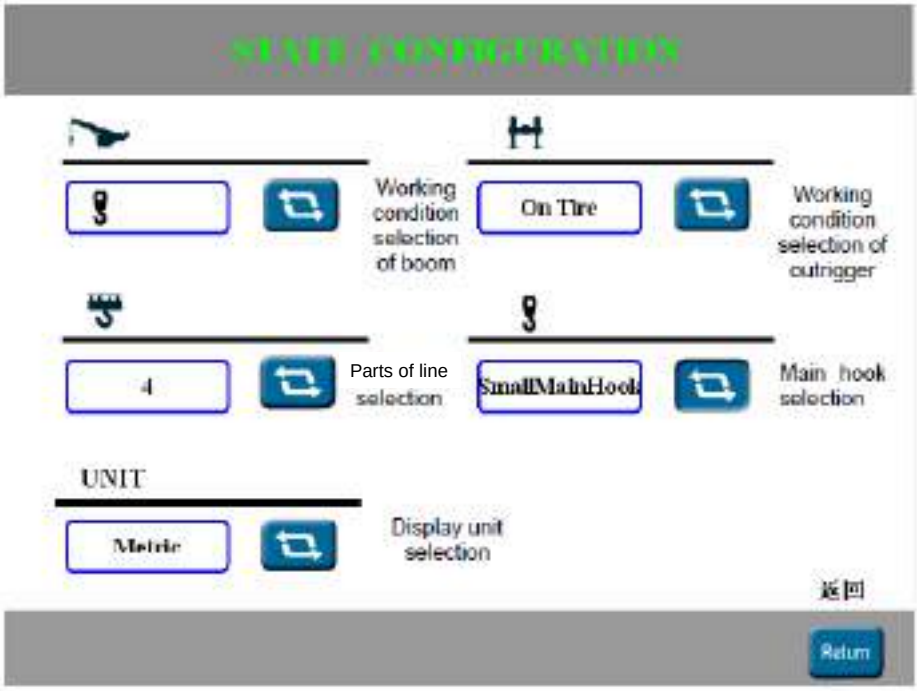


Fig. 3-55 - LMI working condition setup screen

Boom Selection

Fig. 3-56

NOTE: Options shown are for the SRC865 4-section boom. The SRC865XL 5-section boom is similar.

Press this icon to choose between the following options:

- MB0 main hook of main boom
- MB1 auxiliary hook of main boom
- Swingaway boom extension -9.2-0 jib 9.2 m, 0 degrees
- Swingaway boom extension -16.4-0 jib 16.4 m, 0 degrees
- Swingaway boom extension -9.2-20 jib 9.2 m, 20 degrees
- Swingaway boom extension -16.4-20 jib 16.4 m, 20 degrees
- Swingaway boom extension -9.2-40 jib 9.2 m, 40 degrees
- Swingaway boom extension -16.4-40 jib16.4 m, 40 degrees

Outrigger Selection

Press this icon to choose between the following options:

- 100%: full extension
- 50%: half extension
- 0%: no extension
- On Tire: lift with tire on load
- On Tire: travel with load (pick & carry)

Fig. 3-57

Parts of Line Selection

Press this icon as-needed to choose the desired value (ranging from 1 through 10).

Fig. 3-58

Main Hook Selection

Press this icon to choose between the following options:

- Small Hook
- Big Hook
- Aux Hook

Fig. 3-59

Display Unit Selection

Press this icon to toggle between metric and U.S. display units.

Fig. 3-60

Information screens

Press the third icon (c) at the lower left of either main screen to access the series of two informational screens.

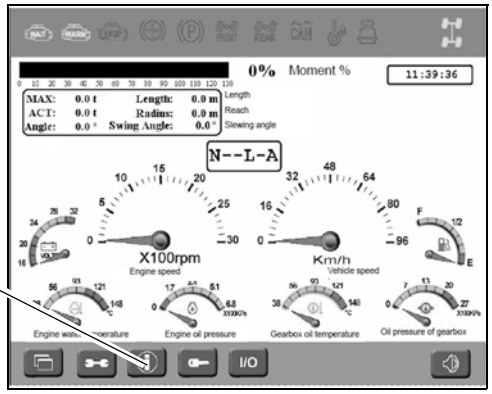


Fig. 3-61

Information screen 1

This screen provides information on: LMI pressure, length and angle sensors, general data on boom length and angle. It also includes overload information.

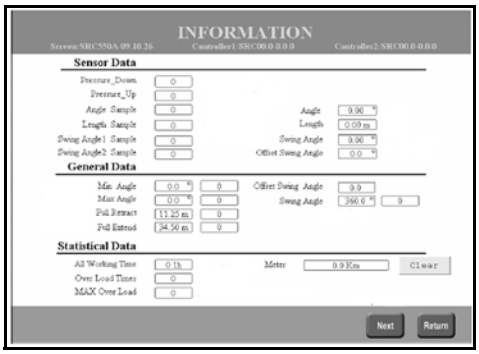


Fig. 3-62

Information screen 2

This screen provides error code information for the engine, sensors, CAN Bus and transmission.

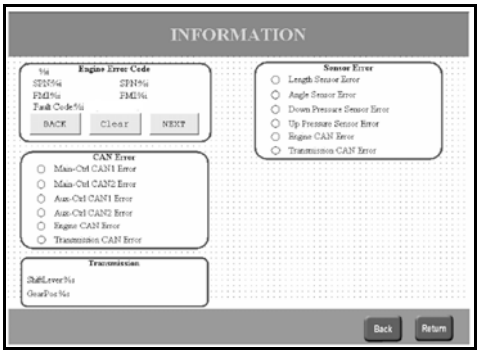


Fig. 3-63

Sensor screen set-up

Press the fourth icon (d) at the lower left of either main screen and enter the appropriate password to access the series of two sensor configuration screens.

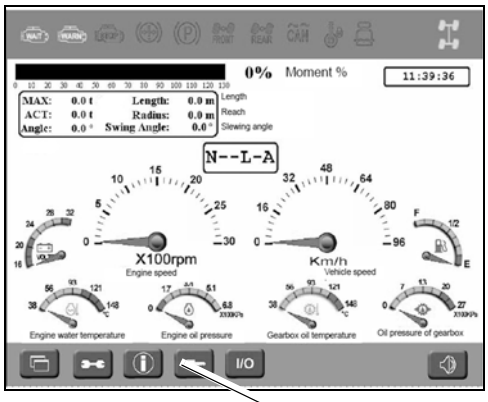


Fig. 3-64

Sensor configuration screen 1 (Service Screen)

A password is required to access the sensor configuration page. Only a qualified Sany technician should calibrate the sensors.

Fig. 3-65

Sensor configuration screen 2 (Service Screen)

A password is required to access the sensor configuration page. Only a qualified Sany technician should calibrate the sensors.

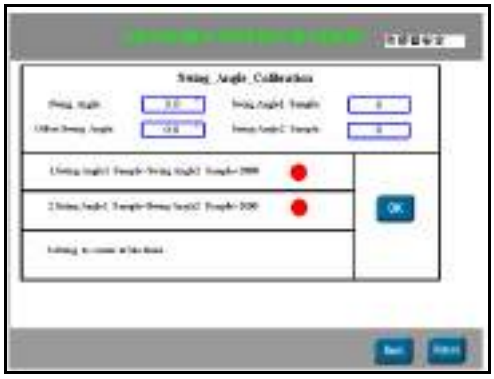


Fig. 3-66

List of control system functions:

No.	Name	Function Introduction
1	Real-time check and display of working condition	Checking and displaying the real-time crane boom length, angle, lifting capacity, rated capacity, and moment percentage
2	Working condition setting	Setting the working condition, **Parts of line and** counterweight
3	Automatic protection and alarm for overload	Automatically limiting action leading to larger moment after the overload
4	Automatic protection and alarm for the min. limit angle	Avoiding exceeding the min. working angle during operation.
5	Overrelaxing, overwinding mechanism and alarm	Protecting the hook and boom head device to avoid the rope overrelaxing.
6	Clock	Clock display
7	Record of the accumulative operation time of the engine	Storing the accumulative operation time of the engine
8	**Engine information display of** input/output ports	Displaying the valid or invalid state of the input/output ports of the controller
9	Slewing angle check and display	Displaying the current slewing angle during working

Fig. 3-67

Operation

WARNING

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

WORK AREA, CREW STAFF AND DUTIES DEFINED

Work Area

The work area is where the lift is being made and the area surrounding the crane. The work area and surroundings include obstacles in the work and travelling areas, the load-bearing capacity of the supporting ground and any barriers separating the construction site from public roads.

Note that some portions of the work area may become very dangerous for crew members, depending on the task being performed (that is, outrigger beam extension and leveling, boom extending and placement, etc).

Also remember the following points:

- Secure and clearly mark the work area using tape, cones or other suitable items.
- Those within the work area must wear personal protective equipment as described in the Safety section of this manual.
- The safety of all personnel within the work area is the responsibility of the machine operator.

Supervisor

This person is the designated representative of the equipment owner and has overall responsibility for the safe and proper use of the machine. He is required to be at the machine during setup, preparation for travel (driving) and post-work procedures.

Besides the machine, the supervisor also has overall responsibility for personnel and safety matters. This means he 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 high 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 the manufacturer's instructions, industry standards and, state and federal government regulations relative to the operation of hydraulic mobile cranes.

The Owner and Other Authorized Personnel

The Safety, Operation and Maintenance Manual must be read and understood by any person allowed to operate or maintain this crane.

Make sure crane operators and service personnel are qualified for their assigned duties and are fully aware of their responsibilities.

Initial and refresher training must be provided by the employer for crane operators, signal persons and, maintenance and repair personnel as noted in 29 CFR 1926 - Subpart CC.

Should a malfunction occur or deficiency be identified during craning operations, the machine should be shut down immediately. Never operate a machine that is unsafe, damaged or in need of repair.

In addition to inspections designated by the manufacturer, other inspections may be required in order to comply with crane industry standards and, state and federal government regulations.

Keep the crane properly maintained and adjusted at all times. Shut down the crane while making repairs or adjustments.

IMMEDIATELY report all accidents, malfunctions and equipment damages to your local SANY distributor. Following any accident or damage to equipment, the local SANY distributor must be immediately advised of the incident and consulted on necessary inspections and repairs. Should the distributor not be immediately available, contact should be made directly with SANY. The crane must not be returned to service until it is thoroughly inspected for any evidence of damage. All damaged parts must be repaired or replaced as authorized by your local SANY distributor and/or SANY.

Crane Operator

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

The machine operator must do the following:

- Reject the work site if he has doubts regarding technical safety. See in the Safety section of this manual.
- Become familiar with the working area and surroundings before work is begun.

The crane can only be operated by:

- An operator who is physically capable, has passed the exam and hold a valid certificate;
- A trainee who has been instructed for over half a year under the direct supervision of a qualified operator;
- Maintaining and operating personnel needing to operate the crane for their tasks;
- Safety supervisor entrusted by the superior.

- Only these persons listed above are allowed to get on the cab.

The crane cannot 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 Safety, Operation & Maintenance Manual.
- Read and completely understand the load charts manual.
- 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 the basic information about the engine, electrical system, hydraulic system, etc.
- Know and use the correct hand signals between the crane operator and a signal person.

Obligations and precautions of the crane operator:

- Before starting to work, the crane operator must check the brake function and the emergency stop devices. He must monitor the condition of the crane for obvious defects.
- The operator must concentrate solely on crane operation and not involved in any distracting activity.
- Stop crane operation in case any defects endangering the safety are found.
- The crane operator must control, operate and adjust the crane to protect the personnel or other facilities in the vicinity of the crane. Attention: A large number of crane accidents can be ascribed to improper operation.
- The crane 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 crane operator must monitor the load at all crane movements or the load tackle devices when moving the crane without a load to avoid all accidents. If observation is not possible, then the crane operator may move the crane only with the aid of a guide.
- The crane operator must give warning signs when necessary.
- The crane operator must ensure that the crane is not operated in wind conditions beyond the limits which were set by SANY, and that the boom is retracted at least when the critical wind speeds for the crane are reached and at the end of the work.

- Any loads attached by hand may only be moved by the crane operator after he received a clear sign from the person who attached the load, the guide or any other responsible party which was assigned to that task by the contractor. If signals must be used with the crane operator, then they must be agreed upon the signals before use between the responsible party and the crane operator. If the crane operator determines that loads are not properly attached, then he may not move them.

- Should the Load Moment or Anti-Two Block lockouts engage, the operator will be prevented from booming down, telescoping the boom out and hoisting up.

- The operator must be provided with necessary personal protective equipment. Do not wear loose clothes, scarf, unbuttoned coat or untie your shirt sleeves; otherwise serious injuries may be caused by moving parts grasping or rolling your wearing inside.

Basic lifting terminology

Boom Length

The measurement between the boom pivot pin (a) and the center line of the lower boom head load sheaves (b).

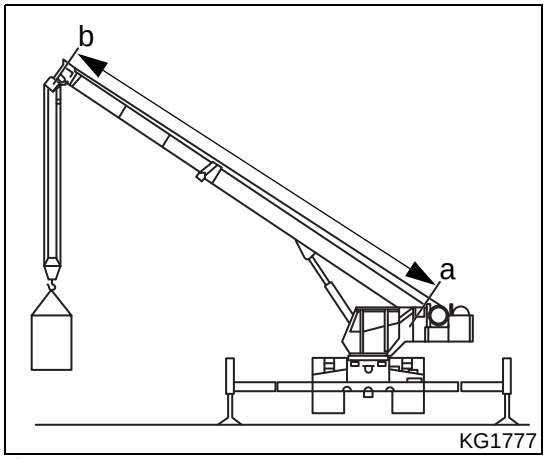


Fig. 4-1

Tip Height

The measurement between the surface (a) to the center line of the boom head load sheaves (b).

NOTE: Not to be used for overhead clearance measurements.

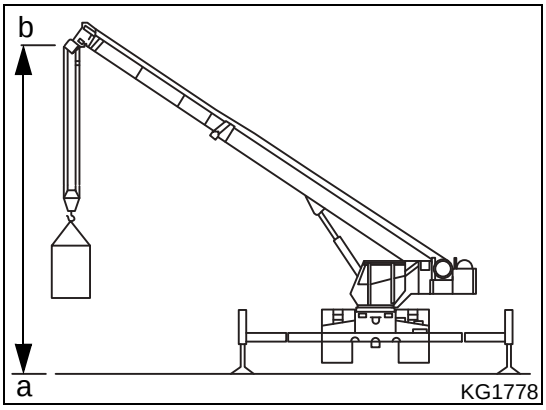


Fig. 4-2

Boom Angle

The angle measured from the horizontal plane 0° (a) to the bottom of the boom section 1 (b).

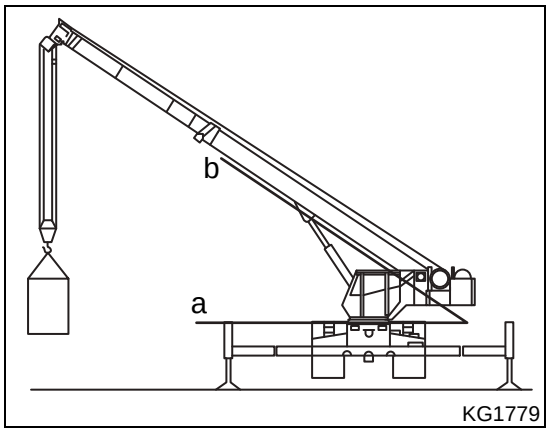


Fig. 4-3

Load Radius

The measurement between the cranes axis of rotation (center line of rotation) to the supporting surface, to the center of the vertical hoist line or tackle with load applied.

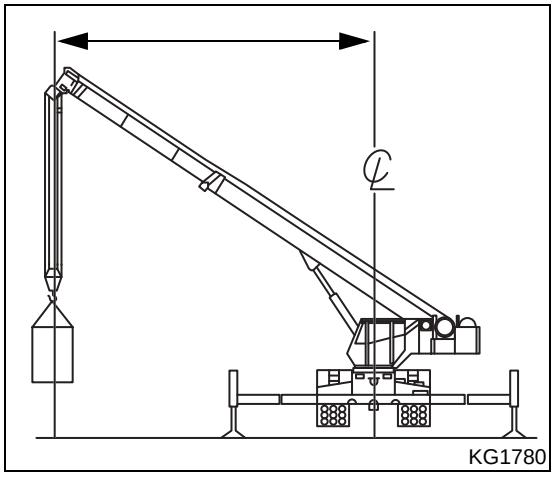
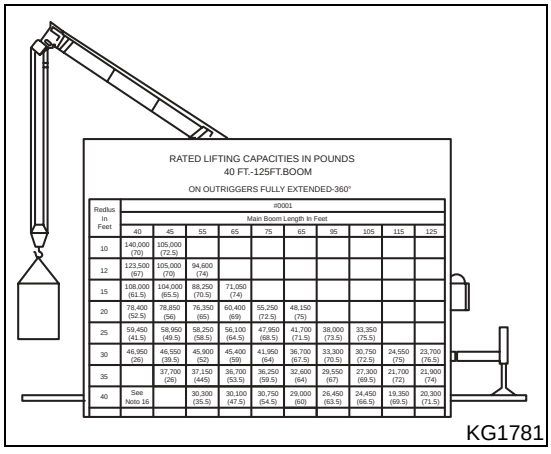


Fig. 4-4

Rated Load (Maximum Load)

The maximum load value shown on the applicable load chart for a particular configuration (boom length, boom angle, outrigger beam spread, counterweight set-up, etc.).



Radius in Feet	#0001 Main Boom Length in Feet									
	40	45	55	65	75	65	95	105	115	125
10	140,000 (70)	105,000 (72.5)								
12	123,500 (67)	105,000 (70)	94,600 (74)							
15	108,000 (61.5)	104,000 (65.5)	88,250 (70.5)	71,050 (74)						
20	78,400 (52.5)	78,850 (56)	76,350 (65)	60,400 (69)	55,250 (72.5)	48,150 (75)				
25	59,450 (41.5)	58,950 (49.5)	58,250 (58.5)	56,100 (64.5)	47,950 (68.5)	41,700 (71.5)	38,000 (73.5)	33,350 (75.5)		
30	46,950 (26)	46,550 (39.5)	45,900 (52)	45,400 (59)	41,950 (64)	36,700 (67.5)	33,300 (70.5)	30,750 (72.5)	24,550 (75)	23,700 (76.5)
35		37,700 (26)	37,150 (445)	36,700 (53.5)	36,250 (59.5)	32,600 (64)	29,550 (67)	27,300 (69.5)	21,700 (72)	21,900 (74)
40	See Noto 16		30,300 (35.5)	30,100 (47.5)	30,750 (54.5)	29,000 (60)	26,450 (63.5)	24,450 (66.5)	19,350 (69.5)	20,300 (71.5)

Fig. 4-5

Actual Load (Working Load)

The weight of the load being lifted added to the additional equipment used for lifting the load (hook block, additional parts of line, slings, etc.).

Using your load chart

NOTE: One of the most important tools of every SANY crane is the Load Charts Manual found in the crane operator's cab.

The load chart contains information, which must be thoroughly understood by the operator.

Load charts are a vital tool to assist operators in understanding proper crane set up, operation, and maximum allowable loads the crane can lift. Having a good understanding of how load charts are constructed and how to properly use the chart to set up the machine and determine the maximum allowable loads is imperative to safe crane operations.

The load charts contain three outrigger capacity charts: fully extended, mid-extension position, fully retracted outrigger beams. In addition, the load chart contains three on-rubber capacity charts: over front stationary, 360° stationary, and pick and carry over front. These charts are for main boom lifting. Also included are load charts for the off-set fixed boom extension on fully extended outrigger beams.

Rough Terrain cranes are very versatile machines. In addition to the on outrigger lifting capabilities, the cranes can lift loads while stationary on-rubber (tires) or they can pick loads and carry them to different locations on the work site.

When lifting on rubber, in addition to the different capacity charts the operator must use, there are a different set of standards and notes that have to be followed. You must read and understand these capacity charts and notes before operating the crane.

In all cases the on-rubber capacities will be lower than the on outriggers capacities.

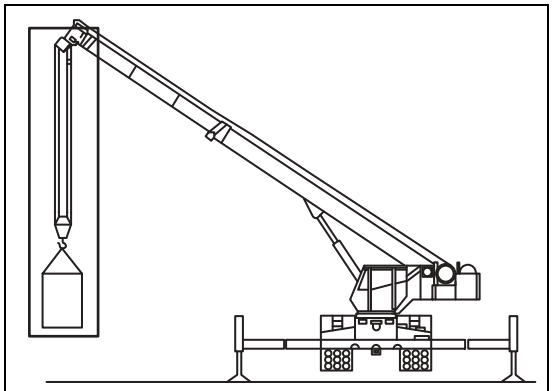


Fig. 4-6

On Outriggers Fully Extended,360° Rotation

Load Radius (FT)	Boom Length (FT)								
	37	40	55	62	75	85	95	105	113
10	120000	86170	81700						
12	100260	86170	81700	64260					
15	86310	83530	81240	61830	37580	37140	31540		
20	66660	66250	65140	51470	37580	37140	31540		
25	49160	53240	65460	42650	37140	34170	30370	27220	24470
30		38000	38190	35380	33480	29210	25990	24580	22390
35			27440	27700	28960	25500	22580	22310	20390
40			21680	21180	22390	22260	20230	19290	18840
45				16630	18600	18600	17960	17520	17410
50				13280	15070	15620	15780	16130	15430
55					12370	13390	14000	14480	13910
60					10220	12060	11770	12240	12560
65						9390	9960	10420	10730
70						7900	8460	8910	9220
75							7200	7640	7940
80							6120	6560	6850
85								5630	5920
90								4810	5100
95									4380
100									3740
Parts of line	10	8	8	6	6	6	4	3	3

Fig. 4-7

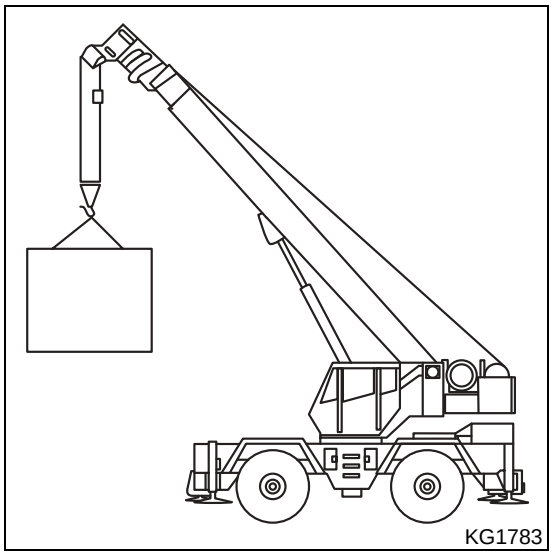


Fig. 4-8

The principle of lift weights

The fulcrum point for the crane will be the outrigger beam stabilizer(s) nearest the load (unless lifting on tires). In this case the front two stabilizers are the fulcrum point. Load is considered anything in front of the fulcrum point. Counterweight is everything behind the fulcrum. The counterweight is what is counterbalancing the load in front of the fulcrum point.

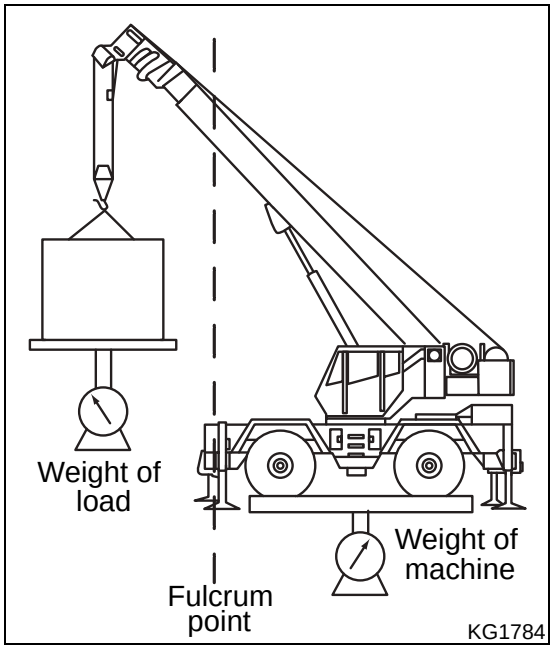


Fig. 4-9

Lifting more weight than the crane weighs is achieved by moving the counterweight further from the fulcrum point while the load stays closer.

In the case of a crane, as the outrigger beam spread increases, the counterweight is moved further from the fulcrum point, making it possible to lift more than it's own weight.

If you had a lever long enough you could lift very heavy loads. However, the lever and the outrigger beams have to be strong enough to handle the weight.

As we require greater leverage to lift heavier loads strength of material becomes a vital part of the design process. Thus greater capacities are limited by two elements: outrigger beam spread and strength of material.

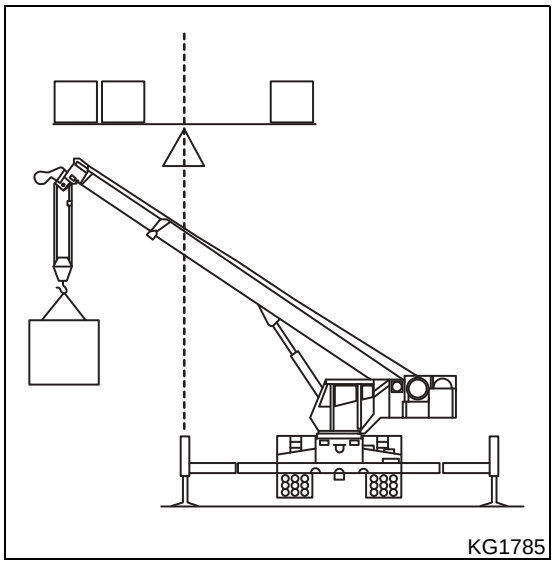
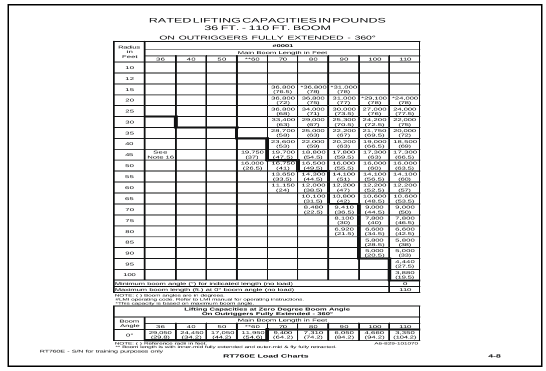


Fig. 4-10

Load chart understanding

NOTE: See your Load Chart Manual for the actual load charts for this specific crane.

Capacity charts provide operators with a lot of vital information. The capacity charts are divided into structural strength and stability limits. This is shown by the bold line across the chart. Capacities above the line are structural strength limits and capacities below the line are stability limits. Per ASME B30.5, capacities for on fully extended outriggers are 85% of the maximum load ratings and on tires, 75% of the maximum load ratings.



RATED LIFTING CAPACITIES IN POUNDS
36 FT. - 110 FT. BOOM
ON OUTRIGGERS FULLY EXTENDED - 360°

Radius in Feet	#0001								
	Main Boom Length in Feet								
	36	40	50	**60	70	80	90	100	110
10									
12									
15					36,800 (76.5)	*36,800 (78)	*31,000 (78)		
20					36,800 (72)	36,800 (75)	31,000 (77)	*29,100 (78)	*24,000 (78)
25					36,800 (68)	34,000 (71)	30,000 (73.5)	27,000 (76)	24,000 (77.5)
30					33,400 (63)	29,000 (67)	25,300 (70.5)	24,200 (72.5)	22,000 (75)
35					28,700 (58)	25,000 (63)	22,200 (67)	21,750 (69.5)	20,000 (72)
40					23,600 (53)	22,000 (59)	20,200 (63)	19,000 (66.5)	18,500 (69)
45	See Note 16			19,750 (37)	19,700 (47.5)	18,800 (54.5)	17,800 (59.5)	17,300 (63)	17,300 (66.5)
50				16,000 (26.5)	16,750 (41)	16,500 (49.5)	16,000 (55.5)	16,000 (60)	16,000 (63.5)
55					13,650 (33.5)	14,300 (44.5)	14,100 (51)	14,100 (56.5)	14,100 (60)
60					11,150 (24)	12,000 (38.5)	12,200 (47)	12,200 (52.5)	12,200 (57)
65						10,100 (31.5)	10,800 (42)	10,600 (48.5)	10,600 (53.5)
70						8,480 (22.5)	9,410 (36.5)	9,000 (44.5)	9,000 (50)
75							8,100 (30)	7,800 (40)	7,800 (46.5)
80							6,920 (21.5)	6,600 (34.5)	6,600 (42.5)
85								5,800 (28.5)	5,800 (38)
90								5,000 (20.5)	5,000 (33)
95									4,440 (27.5)
100									3,880 (19.5)
Minimum boom angle (°) for indicated length (no load)									0
Maximum boom length (ft.) at 0° boom angle (no load)									110

NOTE: ( ) Boom angles are in degrees.
#LMI operating code. Refer to LMI manual for operating instructions.
*This capacity is based on maximum boom angle.

Lifting Capacities at Zero Degree Boom Angle
On Outriggers Fully Extended - 360°

Boom Angle	Main Boom Length in Feet								
	36	40	50	**60	70	80	90	100	110
0°	29,050 (29.8)	24,450 (34.2)	17,050 (44.2)	11,950 (54.6)	9,400 (64.2)	7,310 (74.2)	6,050 (84.2)	4,660 (94.2)	3,350 (104.2)

NOTE: ( ) Reference radii in feet. A6-829-101070
** Boom length is with inner-mid fully extended and outer-mid & fly fully retracted.
RT760E - S/N for training purposes only
RT760E Load Charts 4-8

Fig. 4-11

The left column is the load radius, which is the distance from the center of crane rotation to the load center of gravity. The top row lists various boom lengths ranging from fully retracted to fully extended. The number at the intersection of the left column and top row is the total load capacity for that load radius and boom length. The number in parentheses below the total load capacity is the required boom angle (in degrees) for that load. Boom lengths between increments should always be treated as if it were the next longer length.

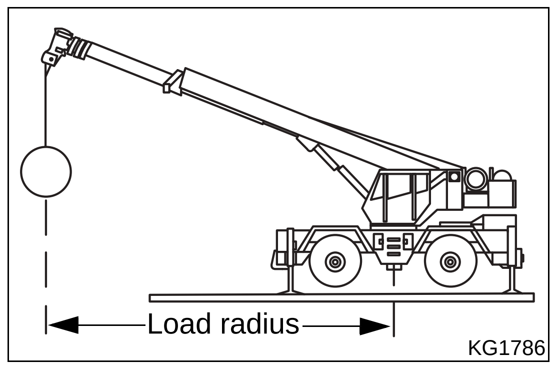


Fig. 4-12

NOTE: For example, if the actual boom length is 50 ft and the chart shows boom lengths of 48 and 54 ft, use the load capacity shown in the 54 ft column. Unless the rated capacity in the 54' column is higher than the rated capacity in the 48' column.

Another important tool for determining capacity is the working range diagram. The range diagram shows the operating radius and tip height that can be achieved at a given boom length and angle. If the operator knows the radius and tip height required for a specific lift, the angle and boom length can be quickly determined from the range diagram. Or, if the boom length and angle are known, the tip height and operating radius can be quickly determined.

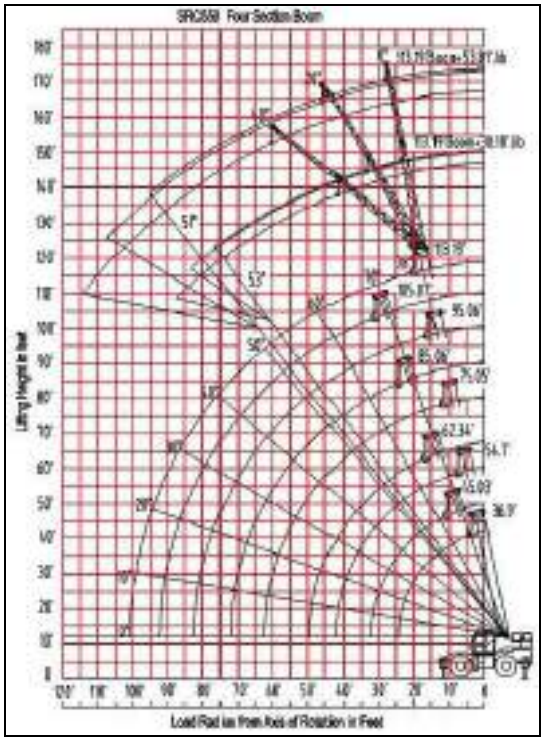


Fig. 4-13

A third important tool is working area diagram included to describe over side, over rear, and over front lifting areas. The working area diagram shows that the locations of the outrigger beam stabilizer cylinders in the full extended position are used to mark the boundaries of the lifting areas.

All load charts contain notes for lifting capacities. Be sure to read and understand all the notes concerning lifting capacities.

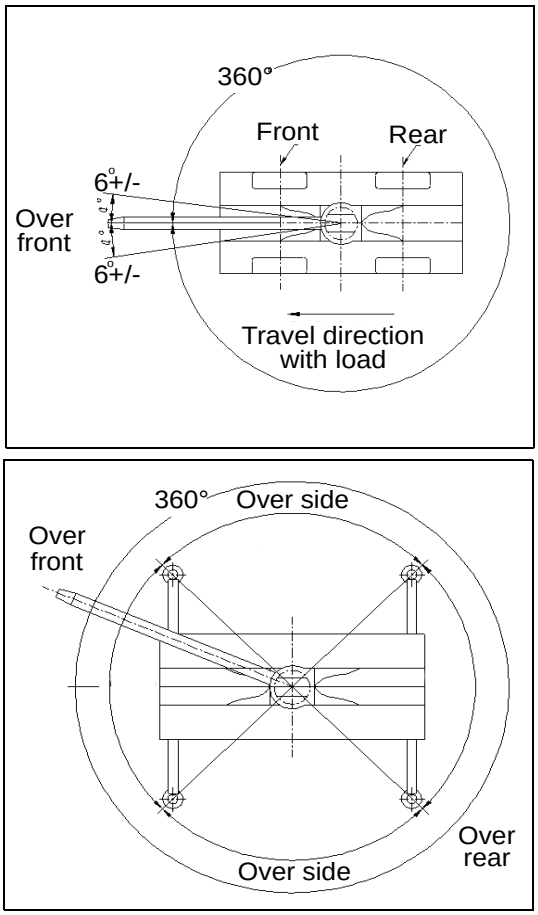


Fig. 4-14

The load chart also gives weight reductions for SANY load handling devices such as hook block, hook ball, boom extensions, etc., which must be taken into consideration as part of the load.

NOTE: Remember, the weight of any other load handling devices such as chains, slings, or spreader bars must be added to the weight of the load. The capacities in the load charts are for the total weight including all load handling devices such as hook block, hook ball, swingaway boom extension, auxiliary arm and wire rope.

NOTE: See your Load Charts Manual for the actual load charts for this specific crane.

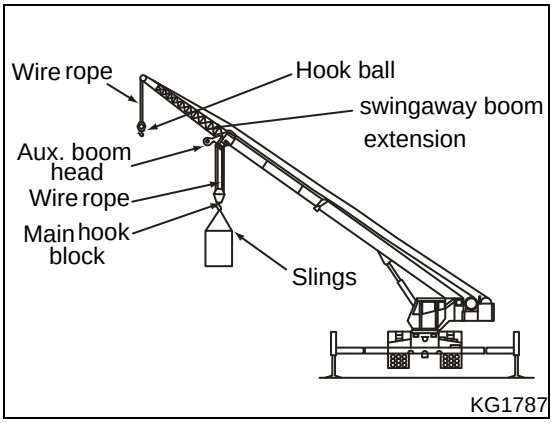


Fig. 4-15

Crane Signal Person

Main responsibilities

- If the crane driver view is restricted to prevent sight of the working devices (and danger zones) from the cab, a signal person should be appointed. A signal person is also needed where verbal communication is not practical due to loud noise.
- Be able to communicate with the operator effectively.
- Help the operator with effective and safe work, be familiar with these marks and signs, and be responsible and reliable.
- Stand at a safe location where all work places are viewable and that position is viewable by all working personnel.
- Use standard command signals, unless otherwise methods such as walkie-talkie, intercom and banner are permitted.

Hand Signals

Your SANY machine is also equipped with a label showing the recommended hand signals to be used on the job site. These hand signals are from the ASME B30.5-2007 standard.

These 18 distinct signals show the position of the signal person's hands, fingers, arms and body to communicate. The main signals include the following.

NOTE: Always stand in clear view of your crane hoist engineer. Be sure to stay a safe distance from hook, block or boom.

NOTE: See the Safety section of this manual for directives on using hand signals during crane operation.

WARNING

Always operate the crane slowly and cautiously, avoiding sudden, rapid movements. Failure to follow this warning could result in loss of control of the machine, equipment damage, personal injury or death.

HOIST — With forearm vertical and index finger pointing up, move the hand in a small horizontal circle.

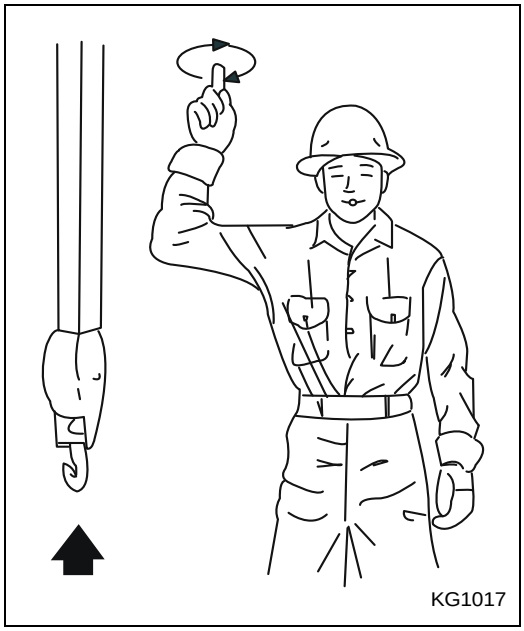


Fig. 4-16

LOWER — With arm extended downward and index finger pointing down, move hand in small horizontal circle.

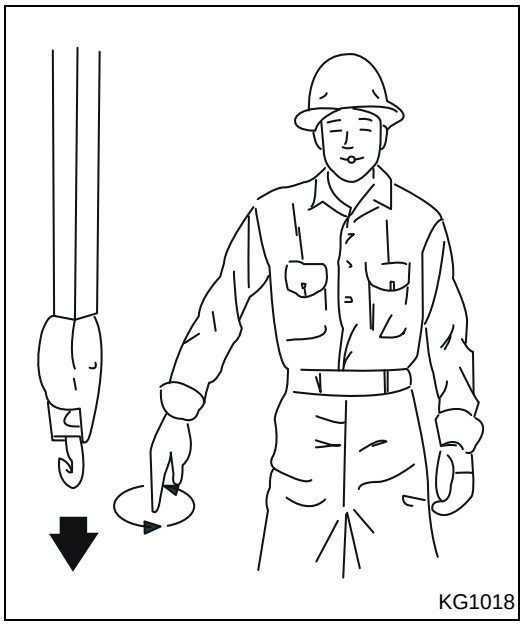


Fig. 4-17

USE MAIN HOIST — Tap fist on the head, then use regular signals.

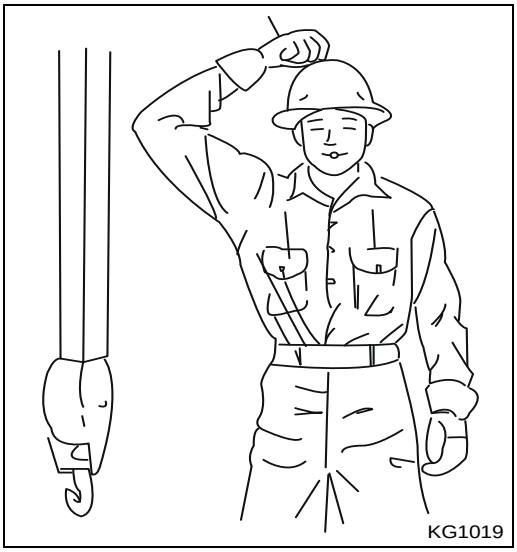


Fig. 4-18

USE WHIP LINE (AUXILIARY HOIST) — Tap the elbow with one hand then use regular signals.

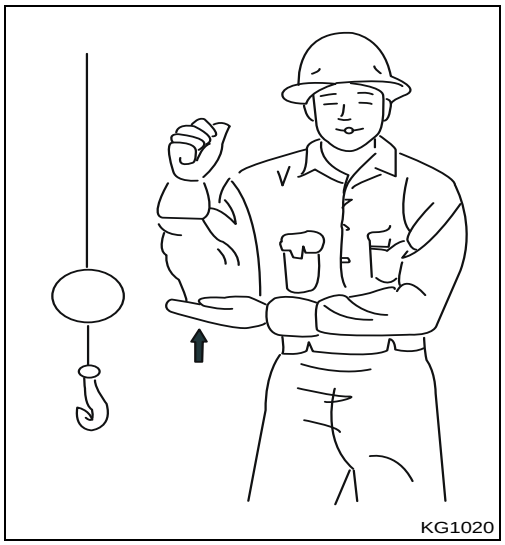


Fig. 4-19

RAISE BOOM — Arm extended, fingers closed and thumb pointing upward.

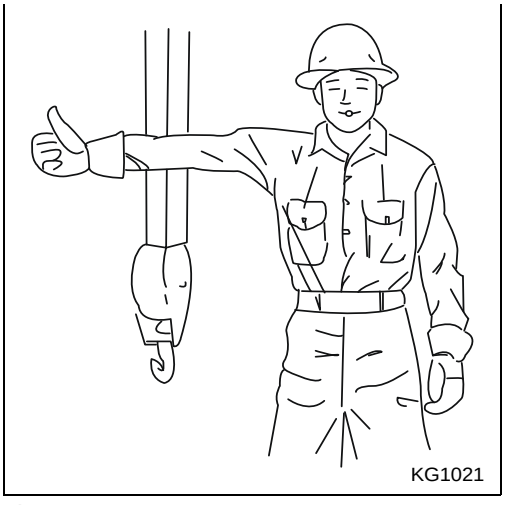


Fig. 4-20

LOWER BOOM — Arm extended, fingers closed, thumb pointing downward.

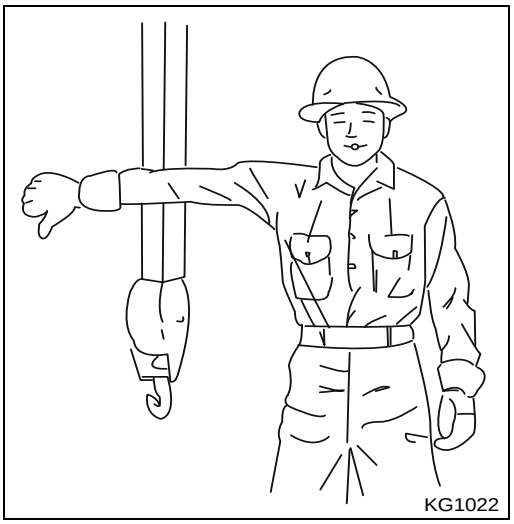


Fig. 4-21

MOVE SLOWLY — Use one hand to give any motion signal and place other hand motionless in front of the hand giving the motion signal. (Hoist slowly shown as example)

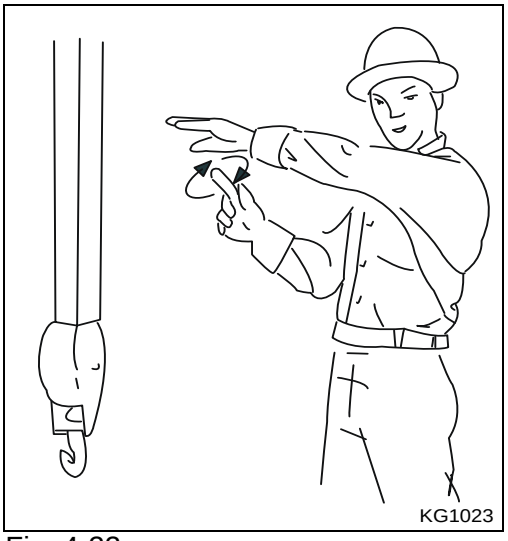


Fig. 4-22

RAISE THE BOOM AND LOWER THE LOAD — With arm extended and thumb pointing up, flex the fingers in and out as long as load movement is desired.

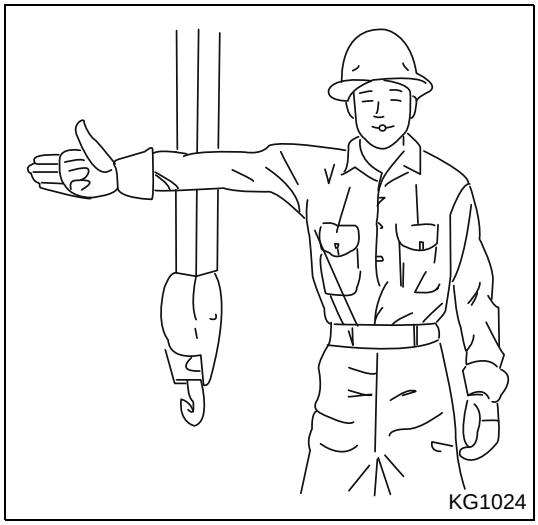


Fig. 4-23

LOWER THE BOOM AND RAISE THE LOAD — With the arm extended and thumb pointing down, flex fingers in and out as long as load movement is desired.

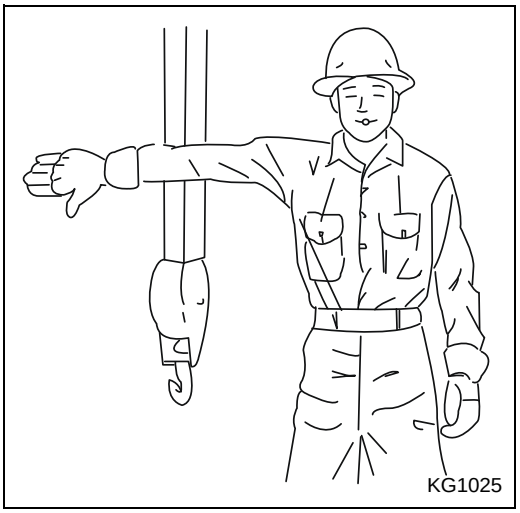


Fig. 4-24

SWING — Arm extended point with finger in direction of swing of boom.

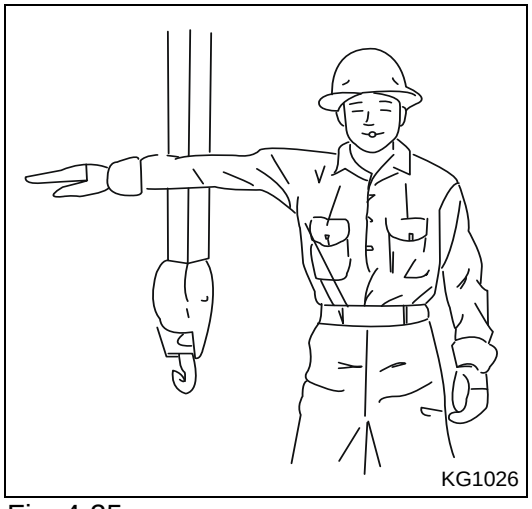


Fig. 4-25

STOP — Arm extended, palm down, move arm back and forth horizontally.

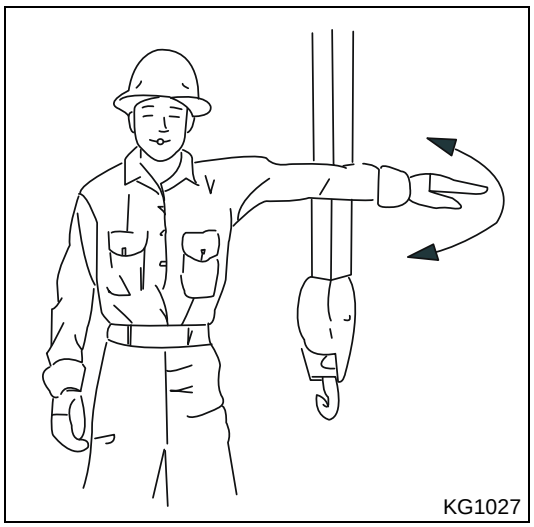


Fig. 4-26

EMERGENCY STOP — Both arms extended, palms down, move arms back and forth horizontally.

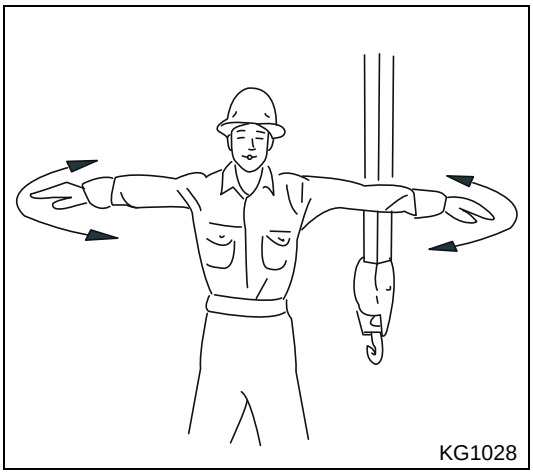


Fig. 4-27

TRAVEL — Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

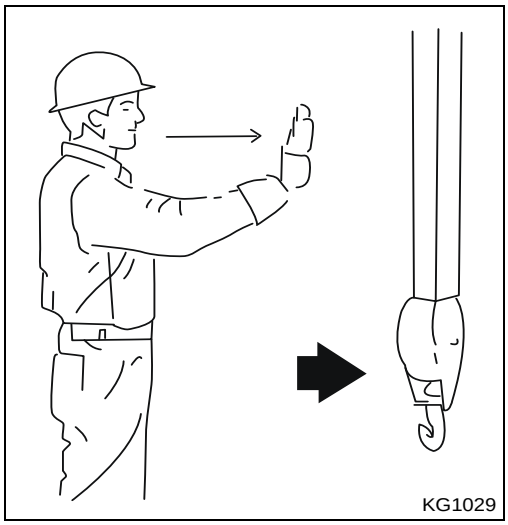


Fig. 4-28

DOG EVERYTHING — Clasp hands in front of body.

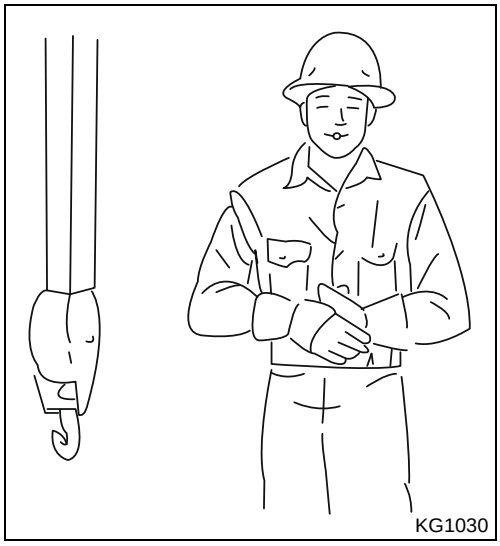


Fig. 4-29

EXTEND BOOM (TELESCOPING BOOMS) — Both fists in front of body with thumbs pointing outward.

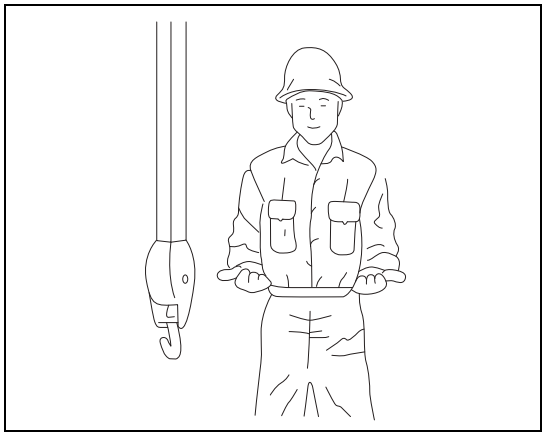


Fig. 4-30

RETRACT BOOM (TELESCOPING BOOMS) — Both fists in front of body with thumbs pointing toward each other.

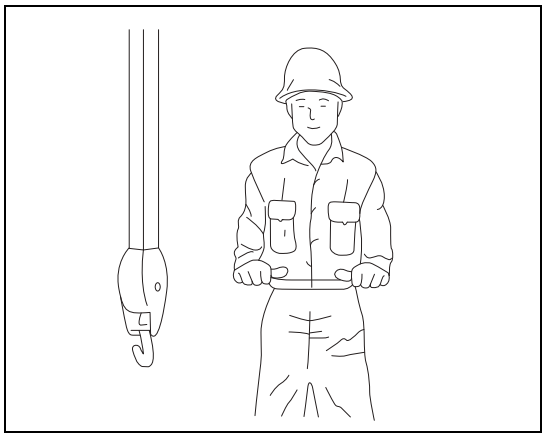


Fig. 4-31

EXTEND BOOM (TELESCOPING BOOMS) - ONE HAND SIGNAL — One fist in front of chest with thumb tapping chest.

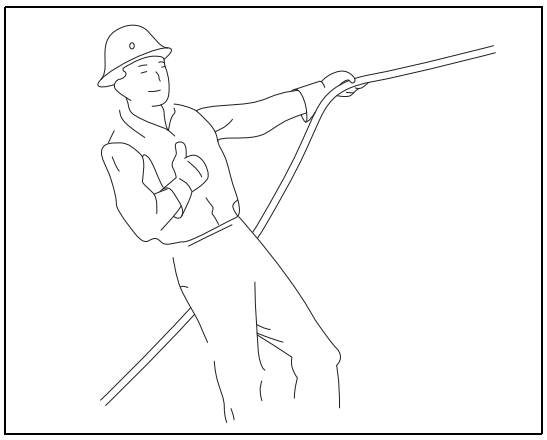


Fig. 4-32

RETRACT BOOM (TELESCOPING BOOMS) - ONE HAND SIGNAL — One fist in front of chest, thumb pointing outward and heal of fist tapping chest.

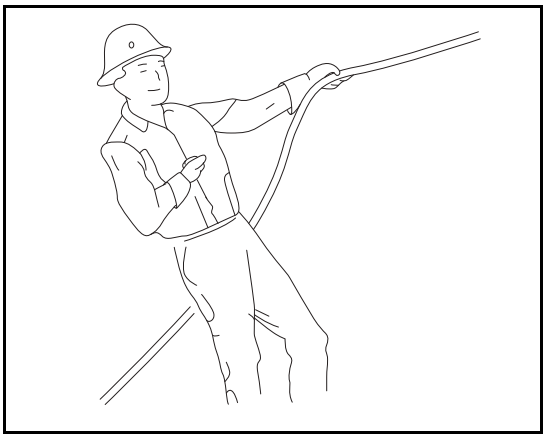


Fig. 4-33

Tips for safe signaling

See the Safety section of this manual for directives on using hand signals during crane operation

- Repeat signal to each other to verify accuracy.
- Maintain a clear load/crane pathway.
- Have the signal person wear distinctive clothing.
- Post the ASME B30.5 signal chart inside the crane cab.
- When in doubt, stop and ask for clarification!
- A new crane operator or a new signal person should brief each other to assure that each understands the other.

CRANE SET-UP

Installing Wire Rope onto a Hoist

NOTE: Straighten the wire rope before installing it onto the hoist drum.

NOTE: Carefully read and heed the recommendations of the wire rope manufacturer.

1. Position the wire rope over the boom head sheave (a), then route it to the hoist drum (b).

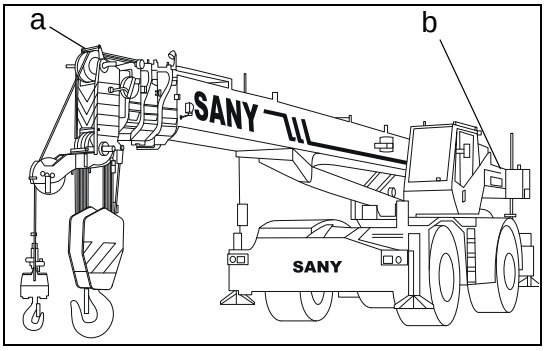


Fig. 4-34

2. Position the hoist drum so the wire rope anchor slot (e) is on top.

3. Insert the wire rope (c) through the wire rope anchor slot and position it around the anchor wedge (d).

   NOTE: The end of the wire rope should be even with the bottom of the anchor slot for the anchor wedge.

4. Position the anchor wedge (d) in the anchor slot (e), then pull firmly on the free end of the wire rope (c) to secure the wedge in place.

   NOTE: Carefully tap the top of the wedge with a mallet if the wedge does not seat securely in the slot.

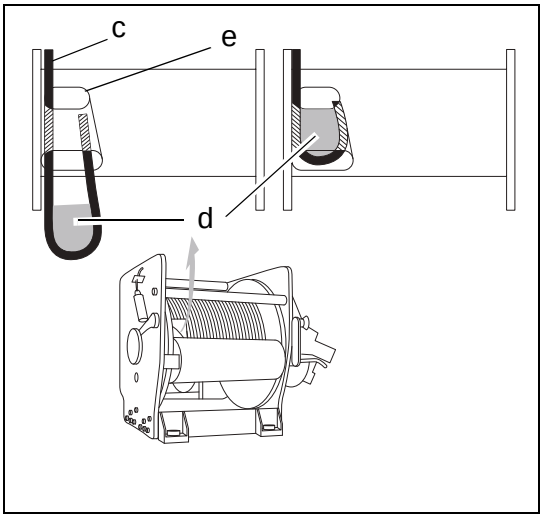


Fig. 4-35

5. Slowly rotate the drum, ensuring the first layer of wire rope is evenly wound onto the drum.

   NOTE: Keep tension on the wire rope as it is wound onto the drum

   NOTE: Carefully read and heed the recommendations of the wire rope manufacturer.

6. Install the remainder of the wire rope as required.

Wire Rope Reeving

Multi-part lines allow the operator to raise a greater load than can be raised with a single part line.

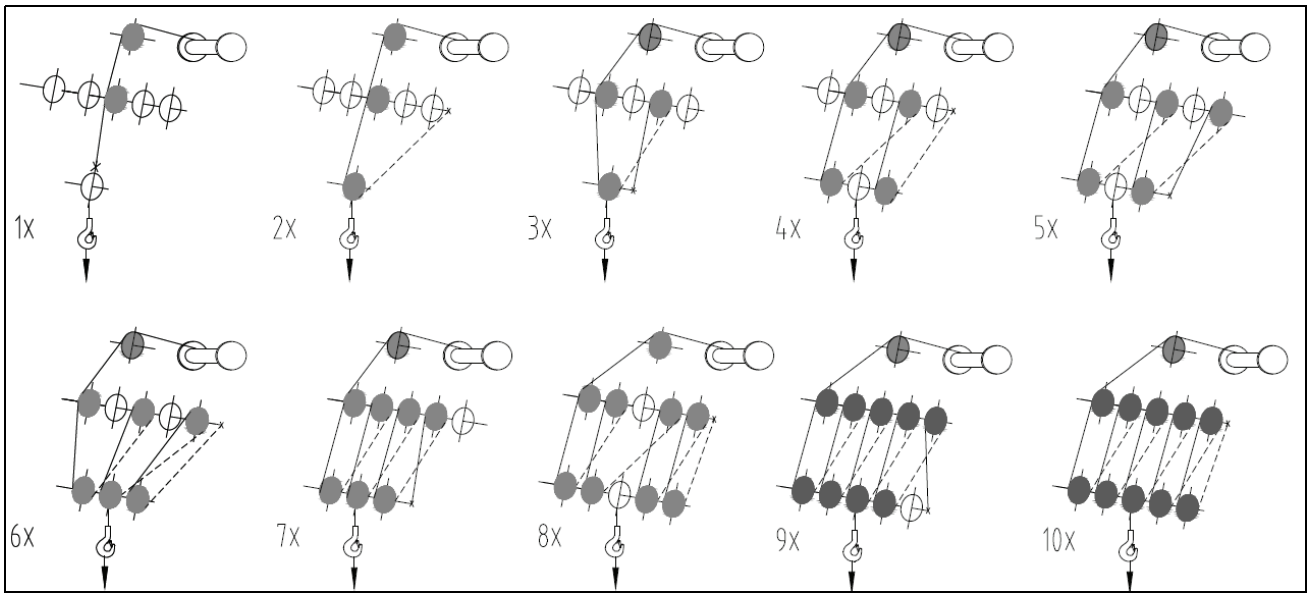


Fig. 4-36

This reeving should be done only by a qualified rigger using standard rigging procedures. Incorrect (A) and correct (B) reeving is shown here.

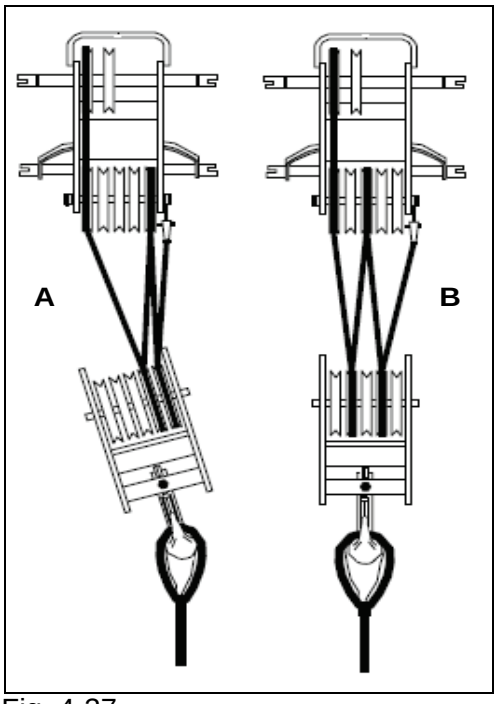


Fig. 4-37

Wire Rope Dead-End Rigging

Quick-release sockets (a) are used to terminate wire ropes on mobile cranes. A quick-release socket assembly is easily installed and removed but it must be done correctly.

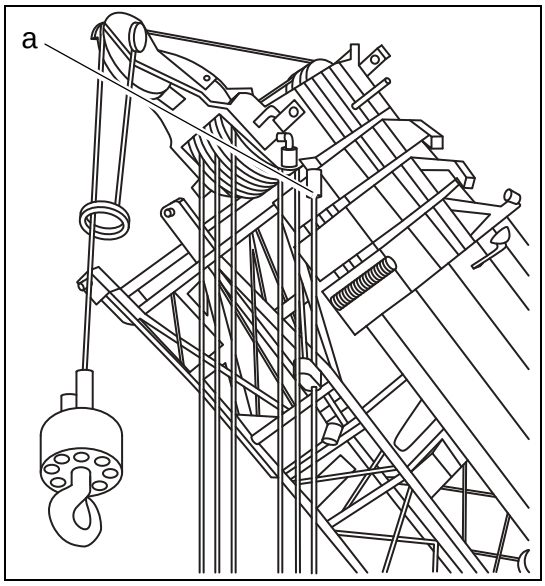


Fig. 4-38

NOTICE

Use only a quick-release socket of the correct size for the wire rope being fitted. Failure to do so may result in the wire rope pulling through the fitting.

State and local laws may vary and alternate attachment methods may be necessary, depending upon exact work conditions. If alternate methods are selected, the user must proceed in compliance with the regulations in force. If there are questions regarding any aspect of this procedure, contact your local SANY distributor or SANY America, Inc.

The selection, installation and use of a quick-release socket assembly must be according to the requirements of the quick-release socket manufacturer and the wire rope manufacturer upon whose wire rope the quick-release socket assembly will be used.

NOTE: Do not mix components from different manufacturers.

Wire Rope Assembly Testing

When assembly is complete, raise the boom with a load suspended to firmly seat the wedge and rope in the quick-release socket before beginning normal operation.

Outrigger Set-Up

General location

Ensure that the machine is located where the load-bearing surface (area the outrigger jacks will be resting on) will support the weight of the machine before extending the outrigger beams and their jacking cylinders.

The load-bearing surface must able to support at least 435 psi (3 MPa) for this machine. Lighter lifting requirements will mean lower load-bearing surface values.

Operators are not expected to make calculations on the job site. This information is given to show that the ground has many different load-bearing capacities and that different lifting weights impose different forces on the soil. The end result is that the greater the force imposed on the soil, the larger the dunnage area required.

Refer to OSHA 1926, Subpart P, Appendix A, for valuable information about soil classifications.

If you are in doubt about your work location stability and support, you should contact a soil specialist to have the area evaluated before proceeding.

The following are conditions to avoid during set-up:

- Very green grass in a circular shape
- Pipes extending from the ground
- Signs of recent excavation
- Sprinkler heads
- Backfill ditches
- Ditches with water (indicating recent rain)
- Loose soil
- Underground cavities/voids

Outrigger cribbing support

Carefully distribute the load evenly when positioning the outrigger beams and any customer-supplied cribbing (a) (supporting pads) to prevent tipovers caused by heavy loads on soft ground surfaces.

An example of a two-layer customer-supplied cribbing (a) is shown here. The size of your cribbing (if any) is dependent on the soil classification, weight of the machine and other factors. Refer to OSHA 1926, Subpart P, Appendix A, for valuable information about soil classifications.

Fig. 4-39

Walk around the unit during outrigger set-up and center any outrigger cribbing directly under each outrigger jack.

WARNING

Consult with a soil specialist to determine if your outrigger cribbing are sufficient before completing outrigger set-up. Failure to do so could result in a tipover situation with major equipment damage, personal injury and even death.

Outrigger placement

- Never set the outrigger jacks on a slope or hill. Be sure the outrigger jacks are sitting on flat level ground.

- Never place the outrigger jacks in a tilted position. Be sure all sides of the outrigger jacks are level and square with the surface.

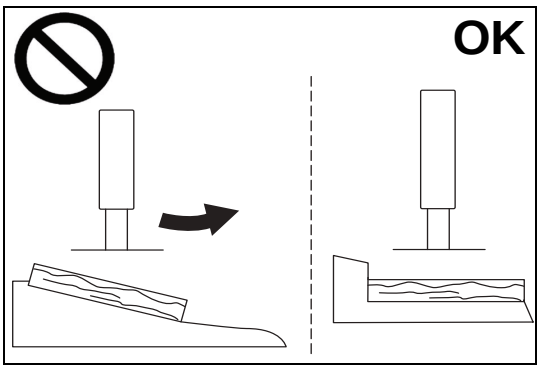


Fig. 4-40

- Never set the outrigger jacks on areas with voids. Be sure the surface is flat and stable.

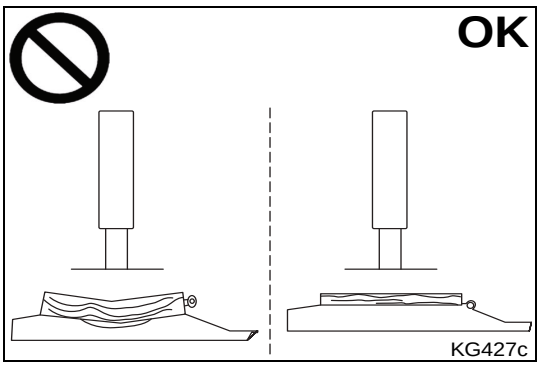


Fig. 4-41

- NEVER set up at the edge of a slope.

NOTE: Engineered support walls can be treated differently than excavations. In these cases, the operator may follow the advice of the contractor or engineer on the job.

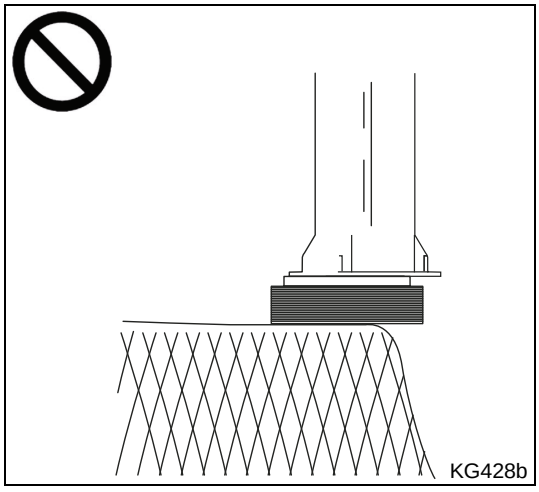


Fig. 4-42

- On a solid, compact surface, the distance “B” (from base of outrigger pad to edge of slope) should be no less than 1 x the distance “T” (pit depth).

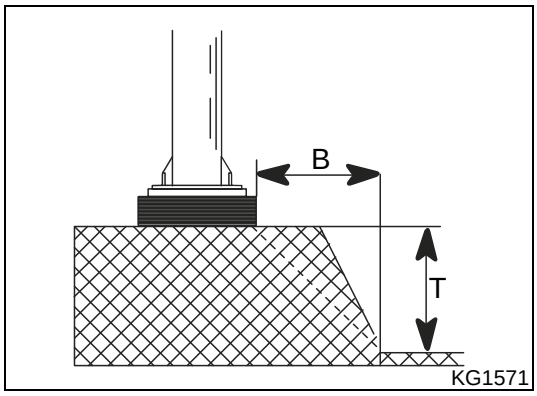


Fig. 4-43

- On a soft or loose, backfilled surface, the distance “B” should be no less than 2 x the distance “T” (pit depth).

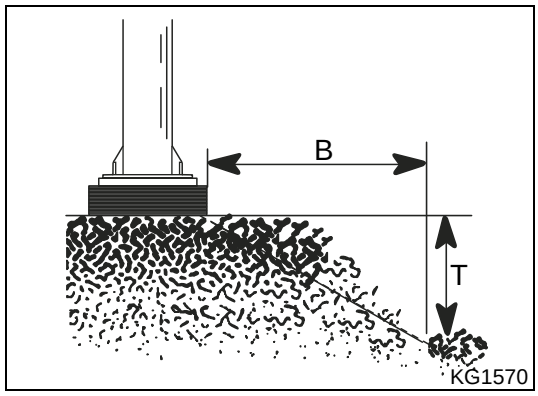


Fig. 4-44

- With “X” (or 45º) set-ups, the outrigger downward force emits pressure as a 45º cone angle below the surface. Therefore, it is very important to be aware of washouts (“X”) at the base of an embankment and ensure that the line of the imaginary cone angle does NOT exit the embankment wall.

  If it does, then reposition the machine so that all outrigger jacks are positioned well away from the edge of the embankment and the line of the imaginary cone angle does NOT exit the embankment wall

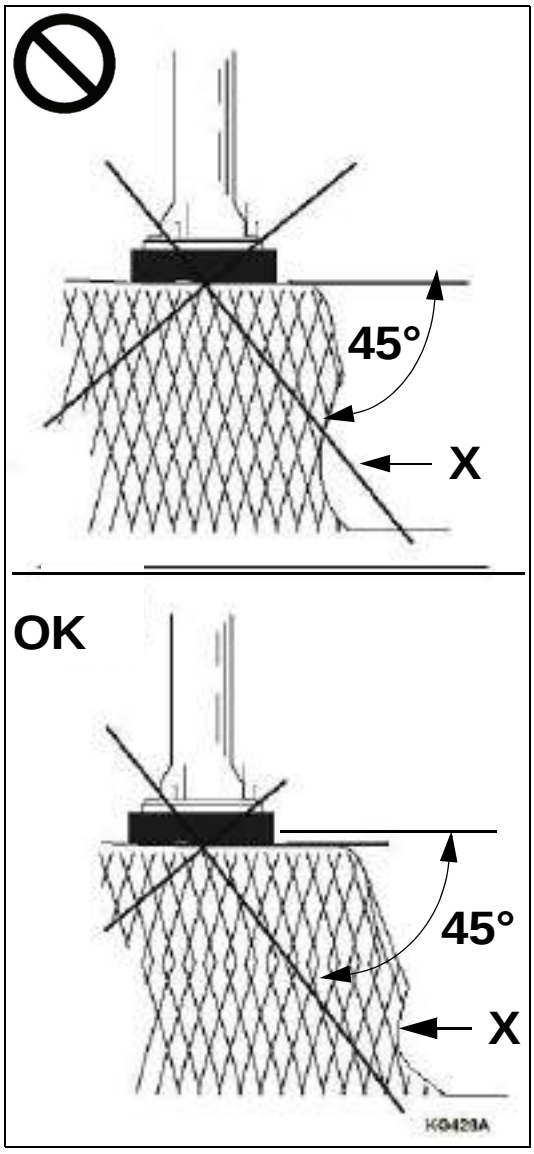


Fig. 4-45

Outrigger side clearance

Before extending each outrigger beam or lowering each outrigger jack, check the area to be sure you will have the clearance for the outrigger without restricting other jobs, traffic or personnel operations.

Be sure all unauthorized personnel or other equipment do not enter your work area or interfere at all with the outriggers

Erecting and Stowing the Swingaway Boom Extension

General warnings

WARNING

To prevent serious injury or death, always wear personal protective equipment, including a hard hat, eye protection, gloves and work shoes as required.

Read and follow all danger decals installed on the boom/boom head, swingaway boom extension, and stowage brackets before attempting to erect or stow the swingaway boom extension.

Control of the swingaway boom extension during erecting and stowing procedures is done by raising or lowering the boom. Failure to control the swingaway boom extension could cause serious injury or death.

Failure to observe and follow these warnings could result in equipment damage, personal injury or death.

Erecting

WARNING

Keep off the crane decking until the swingaway boom extension is secure. Failure to observe and follow this warning could result in personal injury or even death.

1. Fully extend and set the outriggers (a) using normal setup procedures as described in this section of the manual.

2. Position the boom (b) so that there is clearance in front and to the sides to complete the swingaway boom extension erecting steps.

Fig. 4-46

3. Fully retract all the boom sections and lower the boom to minimum elevation to permit ease of installation of pins and access to the boom head (c).

   NOTE: The auxiliary boom head (d) may remain installed. However, if reeved, the hoist wire rope (e must be removed from the sheave.

4. Rig either the main hoist or optional auxiliary hoist wire rope for single part line with nothing but the wedge socket on the end of the wire rope.

5. Attach a tag line to the tip of the swingaway boom extension (e) to control the movement of the swingaway boom extension.

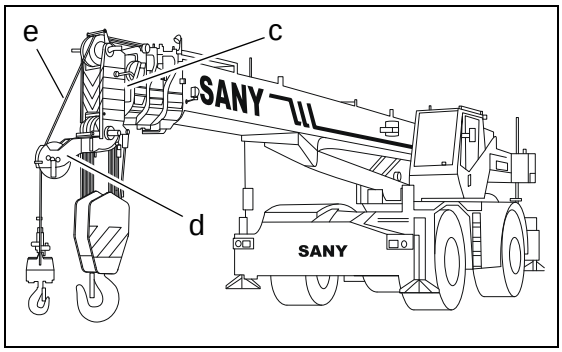


Fig. 4-47

Fig. 4-48

CAUTION

Always secure the swingaway boom extension with a tag line (rope) on the main boom before removing any connections. This will prevent the swingaway boom extension from swinging around and knocking you from the carrier or injuring other personnel in the swing range.

NOTE: The swingaway boom extension may swing out unexpectedly after you remove the last connection securing it to the side of the main boom. Be sure to secure the swingaway boom extension before proceeding.

6. Have a helper hold the tag line (rope) taught while the last connection is removed.

   NOTE: If no helper is available, secure the other end of the tag line (rope) on the crane (for example, on the steps of the access ladder or to the superstructure). Leave enough play in the tag line that it is taught only when you swing the swingaway boom extension towards the main boom head later in the procedure.

7. Swing the mid-position ramp (f) into position (g) and pin it.

Fig. 4-49

Fig. 4-50

WARNING

Before performing the next step, ensure that the tag line can control the swingaway boom extension from swinging outward. Ensure that you stay beneath the rear stowage bracket when removing the pins. Failure to observe and follow this warning could result in serious personal injury or even death when the swingaway boom extension swings outward.

8. Remove the pins (h), unlocking the swingaway boom extension from the rear stowage bracket (i).

   NOTE: Make sure the swingaway boom extension mounting pins are removed from the boom extension prior to engaging the boom head pins.

Fig. 4-51

Fig. 4-52

9. Slightly raise and/or lower the boom to help control the swingaway boom extension. Using the rope attached to the tip of the swingaway boom extension, manually pivot the swingaway boom extension at the front stowage lug (j).

Fig. 4-53

NOTE: This will cause the swingaway boom extension to pull away from the boom.

Fig. 4-54

10. Remove the four pins (l) from the swingaway boom extension

11. Engage the attachment fittings with the anchor fittings (k & m) on the right side of the boom head.

WARNING

Do not modify the attachment points to permit the installation of the attachment pins. Failure to observe and follow this warning could result in failure of the swingaway boom extension, serious personal injury or even death.

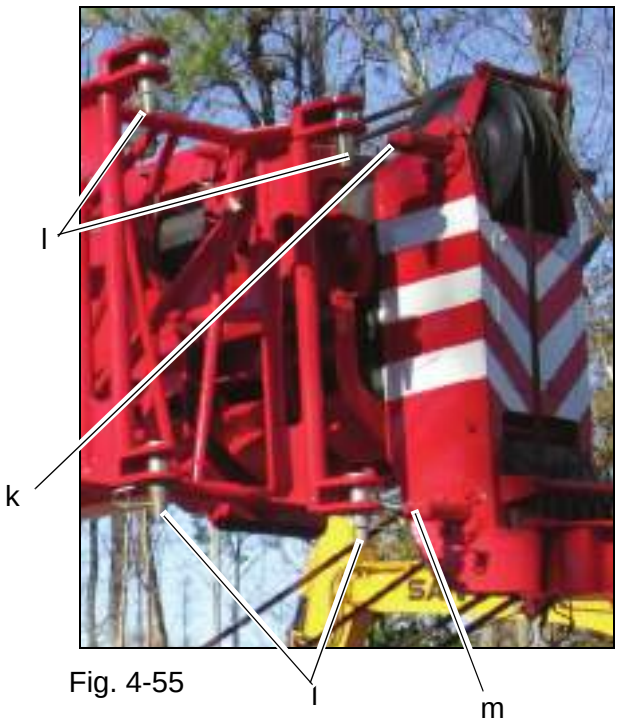


Fig. 4-55

12. Install the top right side attachment pin (k) and retainer clip into the upper anchor and attachment fittings of the boom head.

13. Install the bottom right side attachment pin (m) and retainer clip into the lower anchor and attachment fittings of the boom head.

14. Slightly raise and/or lower the boom to help control the swingaway boom extension. Using the rope attached to the tip of the swingaway boom extension, manually pivot the swingaway boom extension at the right side anchor points (k, m) to in front of the boom head. Engage the attachment pins and retainer clips (n) on the right side of the boom head.

Fig. 4-56

15. Lower the boom and remove the wire rope from the tip of the swingaway boom extension.

    NOTE: Refer to SETTING THE OFFSET in this Section to obtain a 20° or 40° offset with the swingaway boom extension.

16. Lower the boom to its lowest point and remove the wire rope retainer pins from the tip of the swingaway boom extension.

17. Remove the upper boom head wire rope retainer pin. This pin must be removed to prevent the wire rope from rubbing on the pin.

    NOTE: The wire rope must be routed over the swingaway boom extension and under the roller on the swingaway boom extension for all configurations.

18. Route the wire rope over the swingaway boom extension sheave, and over the sheave on the swingaway boom extension tip. Install the swingaway boom extension tip wire rope retainer pin.

19. Rig the hoist wire rope.

    NOTE: Connect all electrical plugs and make sure the anti-two block is installed and functioning.

20. Swing the mid-position ramp into the stowed position and pin it.

Stowing

WARNING

When stowing the swingaway boom extension, ensure that all personnel and equipment are kept clear of the swing path. Failure to observe and follow this warning could result in serious personal injury or even death.

NOTE: The swingaway boom extension must already be at its minimum offset. Refer to “Setting the offset (from higher to lesser)” on page 4-36.

NOTE: Refer to the “Erecting” on page 4-28 for reference.

1. Fully retract the boom and swingaway boom extension to over-the-front of the machine.

2. Lower the boom to minimum elevation.

3. Remove the wire rope retainer pin from the swingaway boom extension tip. Remove the hoist wire rope from the sheaves. Install the swingaway boom extension wire rope retainer pins

4. Attach a length of rope to the swingaway tip.

5. Ensure the pin and retaining pin are removed from the stowage brackets and that the mid-position ramp is pinned in the “OUT” position.

6. Remove the bottom left side retainer clip and attachment pin.

7. Remove the top left side attachment pin from the upper anchor and attachment fittings of the boom head.

NOTICE

Do not allow the swingaway boom extension to slam into the stowage bracket when swinging into the stowed position. Failure to observe and follow this warning could result in equipment damage.

8. Using the rope attached to the tip of the swingaway boom extension, manually swing it to the side of the boom.

9. Align the stowage lugs on the swingaway boom extension with the front mounting bracket and install the pin.

10. Remove the attachment pins and retainer clips from the anchor and attachment fittings on the right side of the boom head and stow them in the adapter of the swingaway boom extension.

11. Using the guide rope, pull the swingaway boom extension onto the ramp and into the stowage brackets and attach the pins.

12. Install the hitch pin and pin securing the swingaway boom extension to the rear stowage bracket.

13. Rig the boom head and wire rope as desired and operate the crane using normal operating procedures.

14. Swing the mid-position ramp into the stowed position and pin it.

Setting the offset (from lesser to higher)

1. Extend and set the outrigger beams. See ““Erecting and Stowing the Swingaway Boom Extension” on page 4-28.

2. Swing the boom over the front of the crane.

NOTICE

Do not overload the swingaway boom extension anchor fittings or the swingaway boom extension itself when lowering the boom. Failure to observe and follow this warning could result in equipment damage.

3. Slowly lower the boom until the pressure on the offset link pins is relieved.

4. Remove the offset link pin clips, then remove the pins.

5. Slowly raise the boom until the holes for the higher degree offset position align with the offset links, then install the offset pins and their clips. See Fig. 4-57.

6. Slowly elevate and telescope the boom at the same time until the offset links take the full weight of the swingaway boom extension.

7. Reeve the wire rope as described under normal erecting procedures.

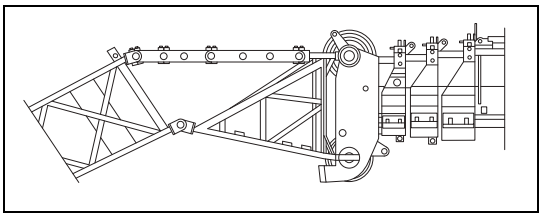


Fig. 4-57

Setting the offset (from higher to lesser)

1. Extend and set the outrigger beams. See ““Erecting and Stowing the Swingaway Boom Extension” on page 4-28.

2. Swing the boom over the front of the crane.

NOTICE

Do not overload the swingaway boom extension anchor fittings or the swingaway boom extension itself when lowering the boom. Failure to observe and follow this warning could result in equipment damage.

3. Slowly lower the boom until the pressure is relieved from the offset links.

4. Remove the offset link pin clips, then remove the pins.

5. Slowly lower the boom until the holes for the lesser degree offset position align with the offset links, then install the offset pins and their clips.

6. Slowly elevate and telescope the boom at the same time until the offset links take the full weight of the swingaway boom extension.

7. Reeve the wire rope as described under normal erecting procedures.

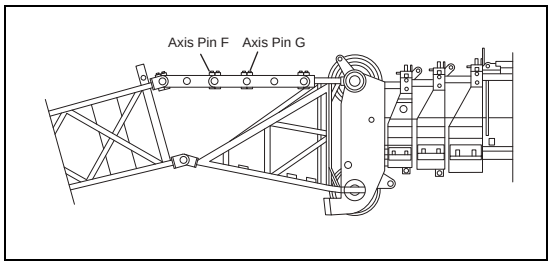


Fig. 4-58

OPERATING PROCEDURES

WARNING

- **Avoid unsafe operation and maintenance.**
- **Ensure that this machine is operated only by personnel who have already been trained and are experienced with it.**
- **Read and understand this manual and the rating plate that accompanies the machine before beginning operation or maintenance procedures.**
- **Keep this manual stored properly inside the cab.**
- **Obtain a replacement copy immediately if either this manual or the load charts are lost or missing.**

Failure to follow this warning may result in serious personal injury or even death.

New Crane Conditioning

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.

NOTE: Do not lift in excess of 75% of rated loads during the first 100 hours.

Fig. 4-59

Properly running-in a new crane 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 and on flat and level surfaces.
- After cold start of the engine, 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.
- Operate to a power requirement 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.
- During the first 1,243 miles (2,000 km) of travel, keep the vehicle speed at each gear as follows:
  - First (low gear range) – 1.5 mph (2.5km/h)
  - Second (low gear range) – 3 mph (5km/h)
  - Third (low gear range) – 7 mph (12km/h)
  - First (high gear range) – 4 mph (6km/h)
  - Second (high gear range) – 9 mph (15km/h)
  - Third (high gear range) – 22 mph (35km/h)
- Shift down to a lower gear down 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 the transmission, rear axle, wheel hub and brake drum 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, especially the cylinder cover bolts. After the first 186 miles (300 km) of travel, retorque the cylinder cover bolts in the specified sequence before the engine has cooled down.
- Check and retorque the wheel bolts as specified after the first 31 miles (50 km) of travel and after wheel replacement.
- After running-in has been completed, have the crane chassis maintenance procedures performed at an authorized SANY service center.

Pre-Starting Checks

Always complete a walk-around visual inspection of the crane with special attention to structural damage, loose equipment, leaks, or other conditions that require immediate correction for safe operation. Ensure that the Daily Maintenance Checks in the Maintenance section of this manual have been performed before operating this crane.

Manuals

Ensure that the Safety, Operation & Maintenance Manual and the Load Charts Manual are in the cab (a).

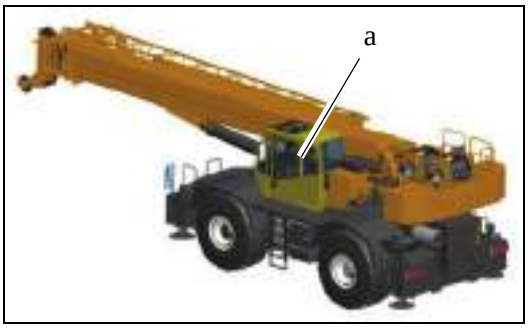


Fig. 4-60

Seats and mirrors

Adjust seat and mirrors for clear vision and safe driving.

Seat belts

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.

Fuel supply

Check the fuel level and make sure the cap is on tight.

Engine oil

Check the oil level in the crankcase and fill to the FULL mark on the dipstick. Do not overfill.

Engine coolant

Check the coolant level in the radiator and fill to the proper level. Do not overfill and check to make sure the cap is secure.

Batteries

Check that the battery cables and clamps are tight and not corroded.

Signal and running lights

Check all signal and running lights for proper operation.

Foot and parking brakes

Check the foot and parking brakes for proper operation.

Daily maintenance

Make certain that all components requiring daily maintenance have been serviced. (Refer to the Maintenance section of this manual.)

Hydraulic reservoir and filter

Check hydraulic fluid level and filter condition indicator. Check breather for cleanliness and security.

Tires

Check for severe cuts, foreign objects embedded in treads, and for correct inflation pressures. A tire inflation chart, providing the correct air pressures, is located in the Load Chart manual in the crane cab and in the Maintenance section of this manual.

Wire Rope

Inspect wire rope in accordance with applicable local, state or federal regulations.

Inspect sheaves, guards, guides, drums, flanges, and any other surfaces that may come in contact with the wire rope for any condition that could cause possible damage to the wire rope.

Hook block

Visually inspect for nicks, gouges, cracks, and evidence of any other damage. Replace any hook that contains cracks or shows evidence of excessive deformation of the hook opening, including twist. Be sure the safety latch is free and aligned.

Boom

Ensure the access covers of the boom base section are in place. The boom should not be operated unless they are installed.

Air cleaner

Check the filter condition indicator. Check filter and tubing for security.

Cold Weather Operation

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

This crane must have appropriate hydraulic oil, lubricants, and other auxiliary items required for operation in sub-zero temperatures. Individual crane functions should be operated to ensure they are sufficiently warmed prior to performing a lift.

Operation of cranes 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. In case of additional questions, see the engine manufacturer's manual and your Sany representative.

Battery disconnect

To disconnect the batteries, turn the battery disconnect switch (a) to OFF. Turn the switch to ON to connect the batteries.

Fig. 4-61

Seat Belts

1. Before fastening a seat belt, always adjust the driver's seat to the position in which you will drive.

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 toward the door to a snug fit so the retractor can take up the slack.

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

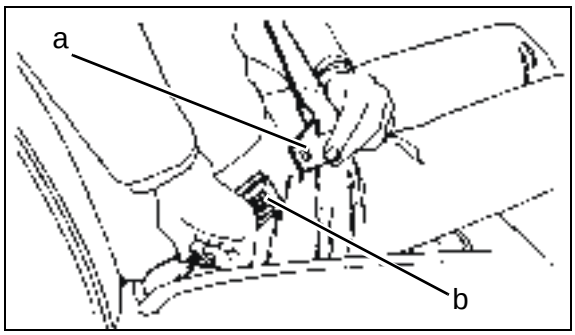


Fig. 4-62

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

   a Pull the shoulder belt out, (A), 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, (B), the least amount needed to ease pressure but no more than 1.0 in. (25 mm) and release it.

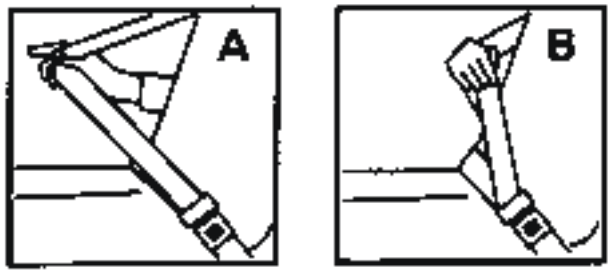


Fig. 4-63

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

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 in the center of the buckle, (b). To store the belt, pull it out about 7 in. (18 cm) and let go. The belt should retract when the buckle is unlatched. To help prevent damage to the seat belt and interior, before closing the door, be sure the belt is fully retracted and the latch plate is out of the way.

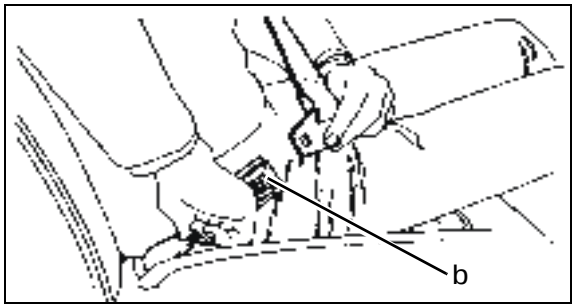


Fig. 4-64

Engine Starting Procedure

Pre-Start

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.)

NOTE: Perform an under-the-hood inspection for fuel, oil, and coolant leaks, worn drive belts, and trash build-up.

NOTE: If the crane was inactive for over 24 hours and the batteries were disconnected, make sure to connect (a) the batteries before proceeding with start-up procedure.

Fig. 4-65

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 outside. Failure to observe and follow this warning could result in personal injury or death.

Starting the Engine

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.

1. Ensure that the parking brake (a) is set

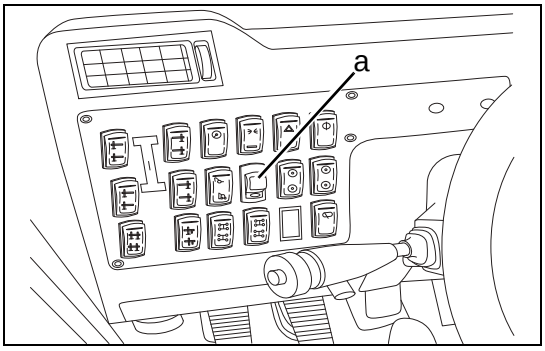


Fig. 4-66

1. Ensure that the swing lock (b) is engaged

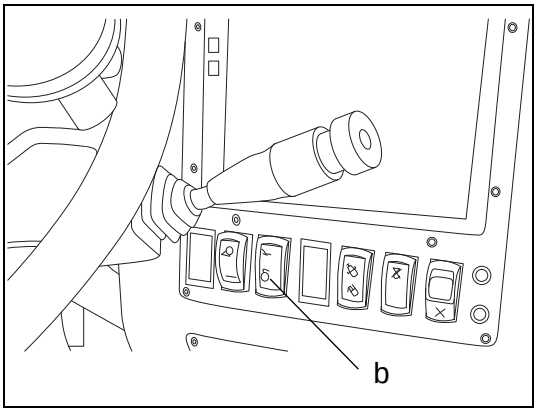


Fig. 4-67

1. Ensure that the transmission is in neutral.

   NOTE: The engine will not crank unless the transmission is in neutral.

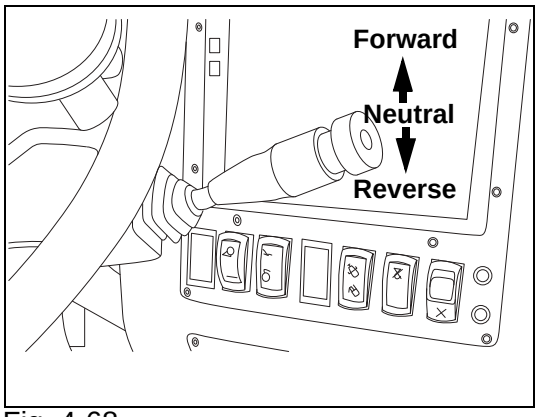


Fig. 4-68

2. Turn the ignition key (d) from OFF to ON and the "Wait to Start" alarm will sound.

3. When the alarm ends, turn the ignition key to START (e) and release it immediately when the engine starts.

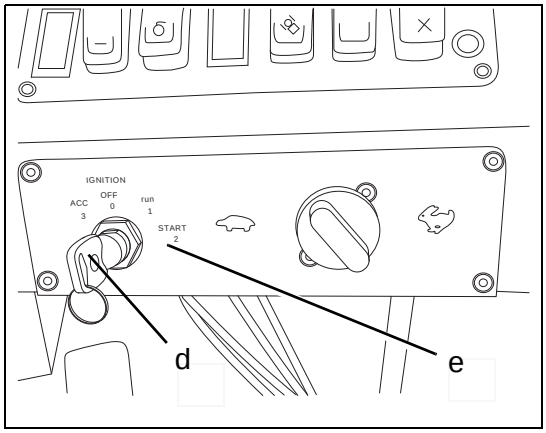


Fig. 4-69

NOTE: Do not push or hold the throttle down. The ECM will automatically provide the proper amount of fuel to start the engine.

NOTICE

Never crank the engine for more than 7 seconds during an attempted start. If the engine fails to start after 7 seconds, stop and allow the starter motor to cool for approximately one minute before attempting another start. Failure to observe and follow this warning could result in equipment damage.

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

4. Immediately check the engine instruments and monitor (a) for proper indications after starting. Shut down the engine if the oil pressure gauge does not reach the proper reading within 15 seconds. See See "Monitor display screen" on page 3-18.

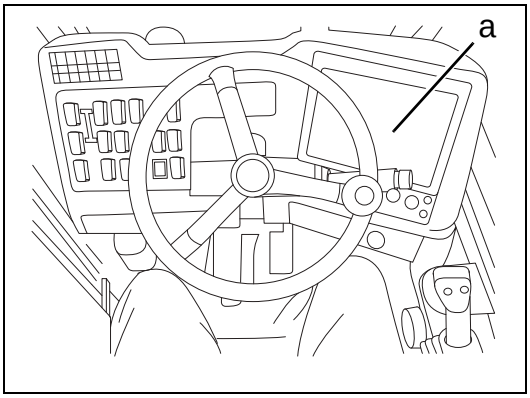


Fig. 4-70

NOTICE

If oil pressure and/or temperature indicator(s) do not display proper readings, shut down the engine and correct the malfunction before resuming operation. Failure to observe and follow this warning could result in equipment damage.

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

Idling 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.

NOTE: When prolonged idling is necessary, maintain at 750 rpm.

Racing the engine

NEVER race the engine during the warm-up period and NEVER operate the engine beyond the governed speed (as might occur in downhill operation or downshifting). Engine bearings, pistons, and valves may be damaged if these precautions are not taken.

Shutdown Procedure

1. Allow the engine to operate at fast idle for about five minutes to avoid increasing internal temperatures and to allow for heat dissipation.

2. Turn the ignition switch (a) to OFF (b).

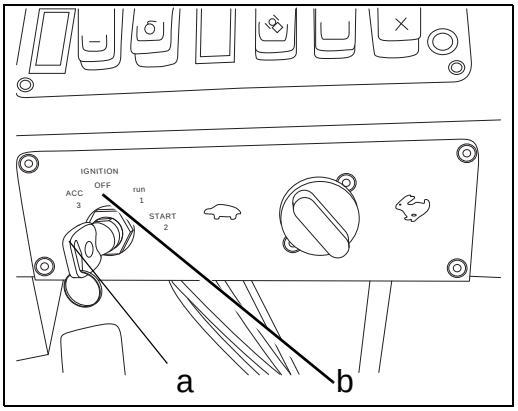


Fig. 4-71

3. If crane is not to be used for over 24 hours, disconnect the batteries by turning the battery disconnect switch (b) to OFF.

   NOTE: To avoid possible engine fault codes and undesirable operation, ensure the ignition switch has been off 2 minutes before disconnecting the batteries.

Fig. 4-72

Outrigger operation

WARNING

When operating the crane on outriggers, the outrigger beams should always be fully extended or else locked in the mid-extend position, depending on the load chart being used before attempting any other operation.

Failure to observe and follow these warnings could result in a tipover situation with major equipment damage, personal injury and even death.

Crane may be operated without the outriggers if done strictly in accordance with the Load Chart guidelines.

Outrigger pads

1. Remove the outrigger pads (a) from their stowed positions

2. Position the outrigger pads and any customer-supplied cribbing to where the outrigger jacks cylinders will be located. Refer to ““Outrigger placement” on page 4-25.

   NOTE: See “Emergency Outrigger Controls” on page 3-6.

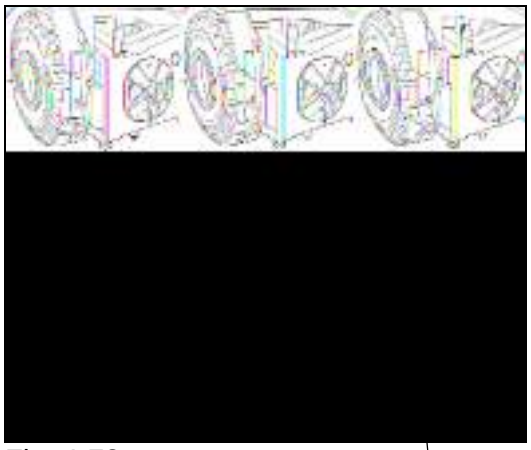


Fig. 4-73

Extend Outrigger Beams

1. Press the correct switch to select the desired outrigger beam to be extended:

   - Use switch (a) to select all four outrigger beams.
   - Use switches (b, c, d or e) to select individual outrigger beams.

2. Press and hold switch (f) at the EXTEND position to begin outrigger beam extension. Release the switch when either:

   - The furthest travel position has been reached.
   - The mid-position has been reached (as required for your application).

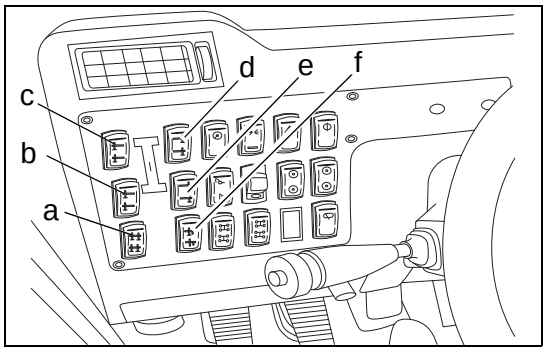


Fig. 4-74

WARNING

Clear all personnel from the outrigger area before extending or retracting the outriggers jacks or beams.

Always ensure that the signal person is visible.

All four outrigger beams must be equally extended to the mid-position or the fully extended position before beginning operation. Crane may be operated without the outriggers if done strictly in accordance with the Load Chart guidelines.

Failure to observe and follow this warning could result in a tipover situation with major equipment damage, personal injury and even death.

NOTICE

See "Engaging the mid-extend lock pin" on page 4-49 if the outrigger beam will not be fully extended.

3. To ensure that the outrigger beams are at their fully extended travel positions, repeat steps 1 and 2 if the fully extended mode is desired.

Extend Outrigger Jacks

1. After all four outrigger beams are properly extended, press the correct switch to select the desired outrigger jack to be extended:

   - Use switch position (g) to select all four jacking cylinders.
   - Use switch position (h, i, j or k) to select individual jacking cylinders.

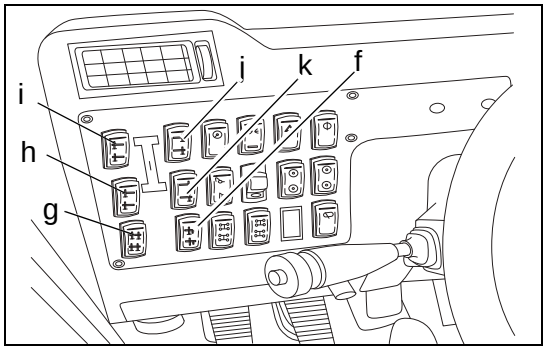


Fig. 4-75

2. Press and hold switch f at the EXTEND position to begin outrigger jack operation. Release the switch when the jacking cylinders engage the locking pins in their respective outrigger pads.

   NOTE: Ensure that any customer-supplied cribbing (a) is centered under the jacking cylinders and their outrigger pads.

Fig. 4-76

   NOTE: With all 4 jacking cylinders firmly on the ground, use switch (h) to select the "Left Rear Outrigger" position.

3. Press and hold switch (h) at the EXTEND position to extend the left rear outrigger jack approximately 3 - 4 in. (8 - 10 cm), then release the switch.

4. Using switch (i), repeat step 3 to extend the left front outrigger jack the same distance.

5. Using switch (j), repeat step 3 to extend the right front outrigger jack the same distance.

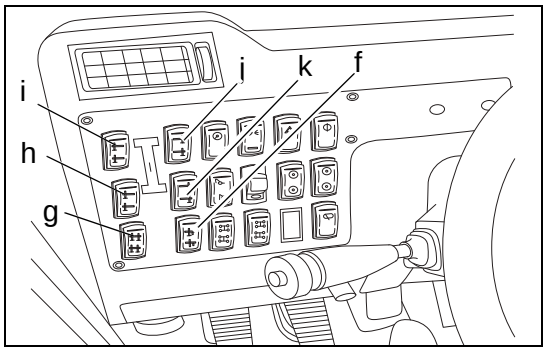


Fig. 4-77

6. Using switch (k), repeat step 3 to extend the right rear outrigger jack the same distance.

7. Repeat steps 3 through 6 until all four wheels of the machine are clear of the ground and the machine is level as indicated by the bubble level indicator (l).

   NOTE: If a faulty bubble level is suspected, perform the following procedure.

Fig. 4-78

Checking/adjusting the bubble level indicator

1. Use the outrigger beams and jacks switches (see previous procedures) to level the crane as indicated by the bubble level indicator (l).

2. Place a carpenter level or similar device on a machined surface such as the turntable bearing or bearing mounting surface.

3. If necessary, use the outrigger jacks to level the crane in all directions as indicated by the carpenter level or similar device.

4. Use the bubble level indicator mounting screws to adjust the bubble level indicator to show “level”.

Engaging the mid-extend lock pin

1. Turn the locking pin 90° from its stowed position (m) and allow the pin to rest on top of the outrigger beam.

2. Slowly extend or retract the outrigger beam, allowing the locking pin to drop into the hole in the top of the outrigger beam and engage the outrigger beam at the desired length.

   NOTE: It may be necessary to use the appropriate outrigger extension switch and then “jog” the OUTRIGGERS EXTEND/RETRACT switch slightly to ensure proper pin engagement. See ““Extend Outrigger Beams” on page 4-47

Fig. 4-79

Stowing the outriggers

WARNING

Always ensure that the signal person is visible.

Do not continue with this procedure until the swingaway boom extension has been stowed, and the boom has been retracted and in its travel position. Failure to observe and follow this warning could result in a tipover situation with major equipment damage, personal injury and even death.

1. Use switch (b) to select the "Left Rear Outrigger Jack" position.

2. Press and hold switch (f) at the RETRACT position to retract the left rear outrigger jack approximately 3 - 4 in. (8 - 10 cm), then release the switch.

3. Using switch (c), repeat step 2 to retract the left front outrigger jack the same distance.

4. Using switch (d), repeat step 2 to retract the right front outrigger jack the same distance.

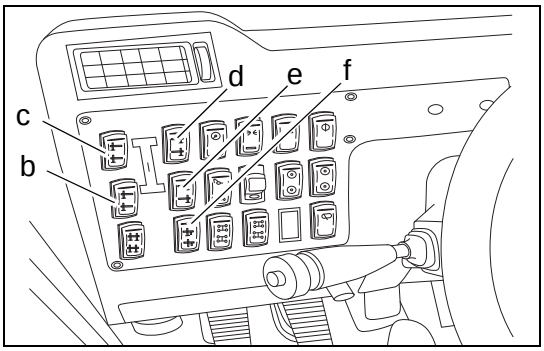


Fig. 4-80

5. Using switch (e), repeat step 2 to retract the right rear outrigger jack the same distance.

6. Repeat steps 1 through 5 until all four wheels of the machine are on the ground and the outrigger pads are several inches from the ground.

7. Repeat steps 1 through 5 until all four jacking cylinders are fully retracted.

8. Press the correct switch to select the desired outrigger beam to be retracted:

   - Use switch (a) to select all four outrigger beams.
   - Use switches (b, c, d or e) to select individual outrigger beams.

9. Press and hold switch (f) at the RETRACT position until the outrigger beams are fully stowed, then release the switch.

   NOTE: More than one outrigger beam may be retracted at one time.

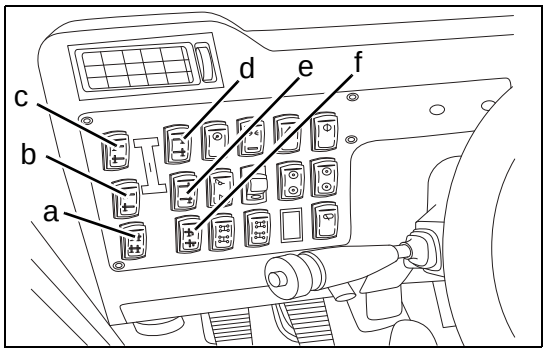


Fig. 4-81

10. After all outrigger beams have been fully retracted use the locking levers to release the outrigger pads (g) and allow them to drop to the ground.

CAUTION

Keep feet and hands clear of the outrigger pad areas when unlocking the pads from their jacking cylinders. Failure to observe and follow this warning could result in personal injury if an outrigger pad strikes someone as it drops from the outrigger jack.

Fig. 4-82

11. Stow the outrigger pads by attaching them to their front and rear stowing points (h) with quick-release pins.

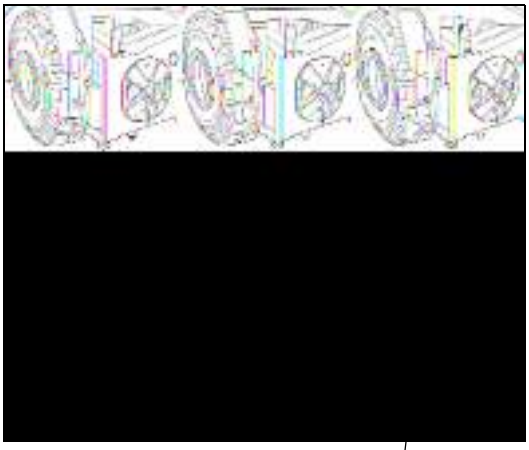


Fig. 4-83

Stowing the outrigger beam mid-extend lock pin

1. Make sure the outrigger jacks and beams are retracted.

   NOTE: If any of the lock pins (m) are wedged in the hole in the outrigger beam, it may be necessary to jog the OUTRIGGERS EXTEND/RETRACT switch slightly while pulling upward on the pin. See ““Extend Outrigger Beams” on page 4-47

2. Lift the lock pin (m) and turn it 90° to its stowed position.

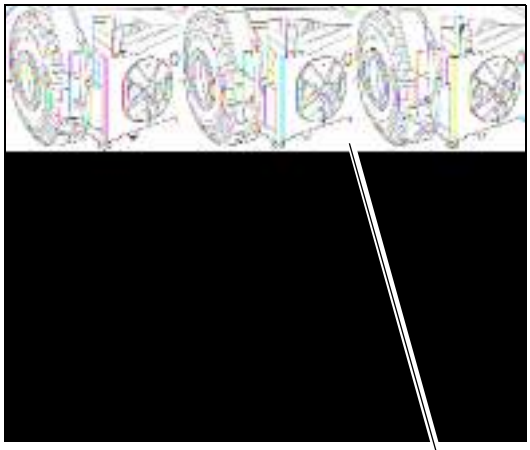


Fig. 4-84

Boom Operation

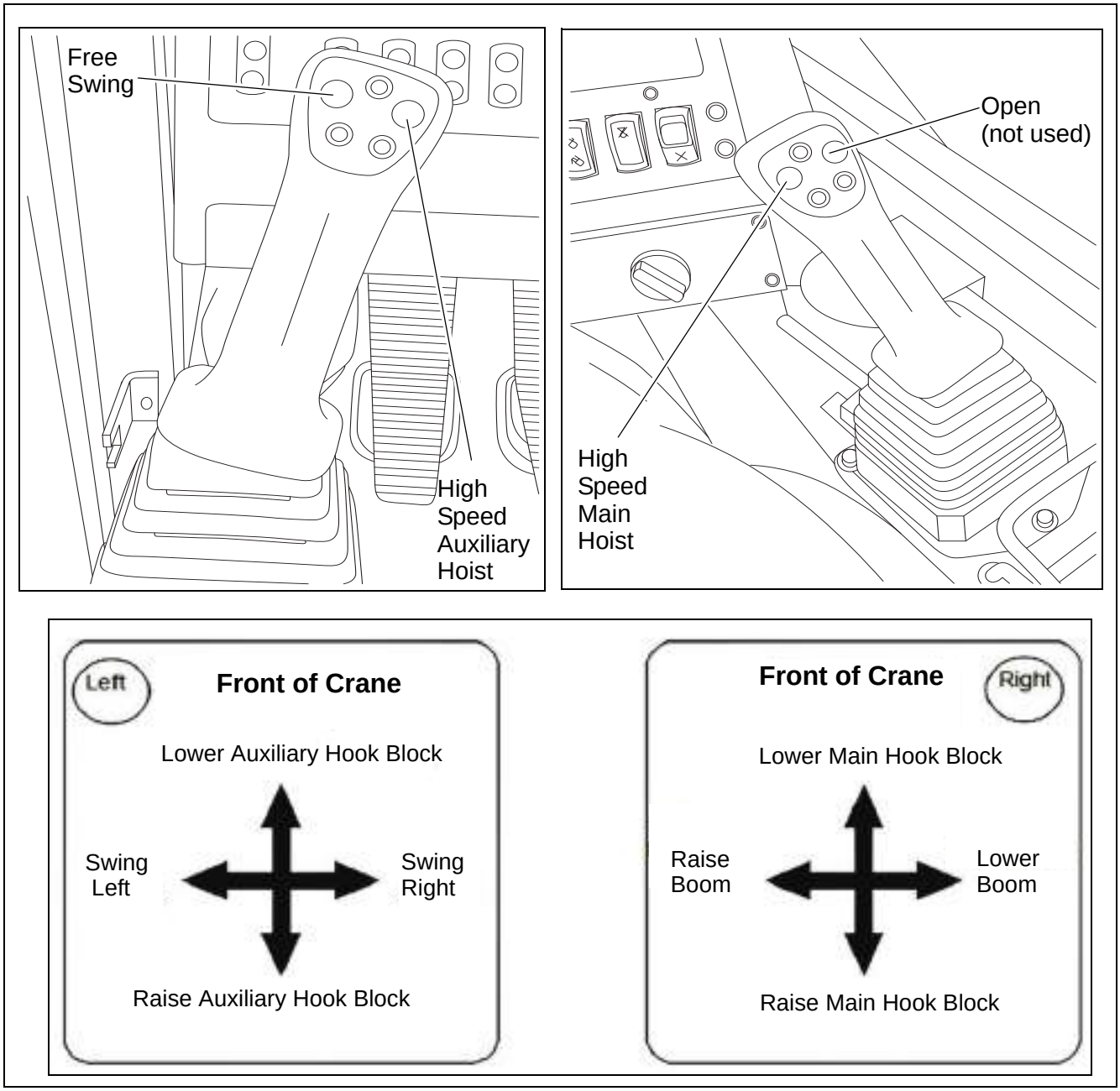


Fig. 4-85

The two hydraulic control handles on the superstructure handle box are the most important control devices of the crane. They control the hydraulic motors of main hoist and auxiliary hoist to lift or lower the load vertically, the luffing cylinder to lift or lower the boom and change its angle, and the slewing hydraulic motor to swing the turntable.

Swinging the boom

WARNING

To prevent a crushing hazard, sound the horn and ensure that no personnel remain in the swing area before proceeding with this procedure.

No personnel or obstructions are allowed beneath the boom, especially with a load attached.

Failure to observe and follow these warnings may result in personnel injury or death.

NOTICE

It is the responsibility of the machine operator to use the correct load chart and LMI program for proper crane configuration.

Do not pull or push the joystick through neutral and to the opposite position to stop or slow boom swing. Instead, use the swing brake foot pedal.

Always use a slow, even pressure when moving the joystick.

Failure to observe and follow these warnings may result equipment damage.

1. Ensure the swing lock pin (a) is in the up position.

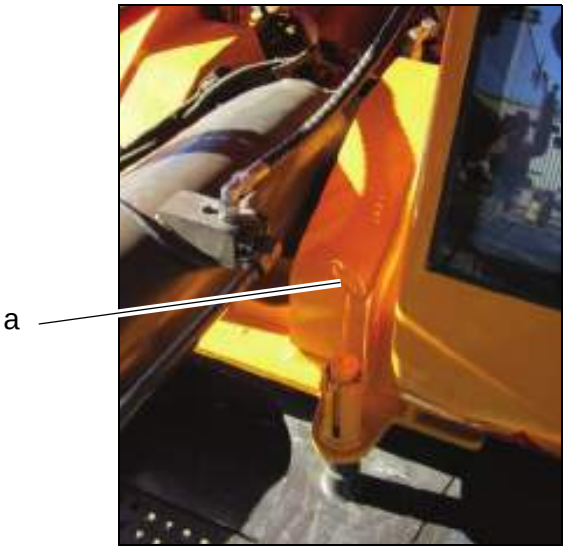


Fig. 4-86

2. Ensure the 360° mechanical house lock (c) is released. This device is standard for securing the superstructure in place.

   NOTE: The free swing button toggles the free swing on and off. The display has an indicator to show when the free swing is on.

Fig. 4-87

3. Use the left joystick to move the boom.

   - **Swing left** — Smoothly and evenly move the left joystick to the left and hold it until the boom is at the desired position, then place the joystick at the neutral position.

   - **Swing right** — Smoothly and evenly move the left joystick to the right and hold it until the boom is at the desired position, then place the joystick at the neutral position.

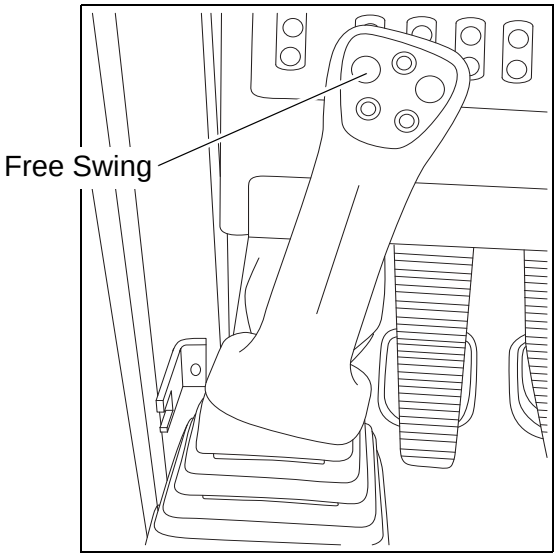


Fig. 4-88

4. Press the swing brake foot pedal (a) to stop boom rotation.

5. After the boom is stationary, set the SWING BRAKE switch to ON to prevent further rotation.

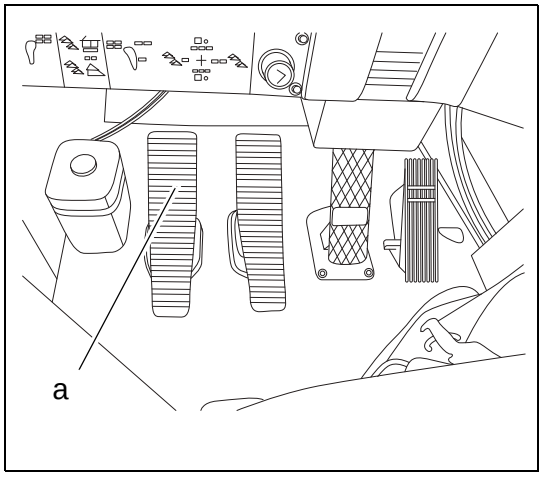


Fig. 4-89

Raising and lowering the boom

WARNING

No personnel or obstructions are allowed beneath the boom, especially with a load attached.

Failure to observe and follow this warning may result in personnel injury or death.

NOTICE

Do not pull or push the joystick quickly through neutral and to the opposite position to stop or slow boom movement.

Always use a slow, even pressure when moving the joystick.

Failure to observe and follow this warning may result equipment damage.

Raise boom — Smoothly and evenly move the right joystick to the left and hold it until the boom is at the desired position, then place the joystick at the neutral position.

Lower boom — Smoothly and evenly move the right joystick to the right and hold it until the boom is at the desired position, then place the joystick at the neutral position.

NOTE: Let out the wire rope while the boom is being lowered to prevent the hook block from ramming the boom head. See “Raising and lowering the hook blocks” on page 4-58.

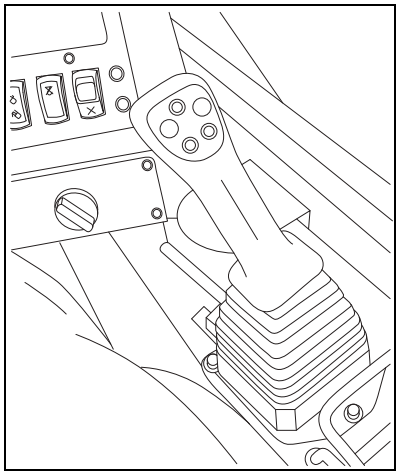


Fig. 4-90

Telescoping and retracting the main boom

WARNING

No personnel or obstructions are allowed beneath the boom, especially with a load attached.

Failure to observe and follow this warning may result in personnel injury or death.

WARNING

It is the responsibility of the machine operator to use the correct load chart and LMI program for proper crane configuration and before telescoping or retracting the boom.

It is the responsibility of the machine operator to check the load chart for the maximum load at a given radius, boom angle and length prior to extending the boom with a load attached.

Always use a slow, even pressure when pressing the foot pedal.

Failure to observe and follow these warnings may result in equipment damage.

Failure to observe and follow these warning may result in personnel injury or death.

Telescoping (extending) the main boom

1. Activate the boom cylinder switch for cylinder one.

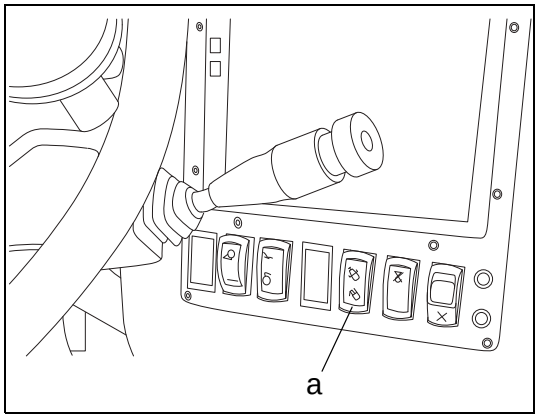


Fig. 4-91

2. Smoothly and evenly press the top of the foot pedal (b) until the boom is in an extended position, then move the foot pedal to the neutral (center) position.

   NOTE: Once cylinder one is fully extended, activate the boom cylinder switch for cylinder two if additional extension is required.

   NOTE: To prevent the hook block from ramming the boom head, let out the hoist wire rope while the boom is being extended. See "Raising and lowering the hook blocks" on page 4-58.

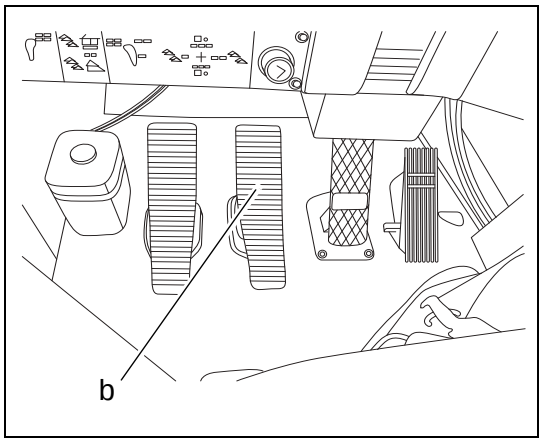


Fig. 4-92

Retracting the main boom

1. Activate the boom cylinder switch for cylinder two if boom is extended that far.

   NOTE: If boom is not extended beyond cylinder one's length; activate the boom cylinder switch for cylinder one.

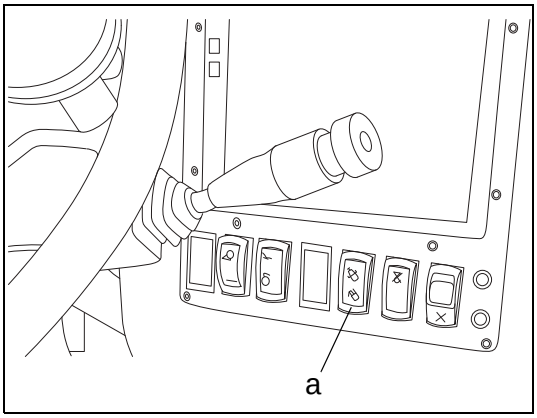


Fig. 4-93

2. Smoothly and evenly press the top of the foot pedal (b) until the boom is in the desired position, then move the foot pedal to the neutral (center) position.

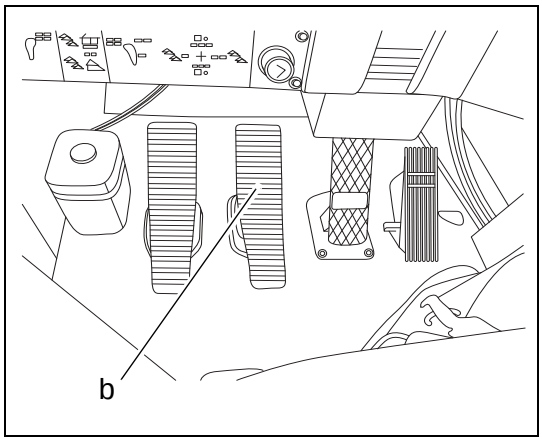


Fig. 4-94

Raising and lowering the hook blocks

WARNING

No personnel or obstructions are allowed beneath the boom, especially with a load attached.

Failure to observe and follow this warning may result in personnel injury or death.

NOTICE

It is the responsibility of the machine operator to check the load chart for the maximum load at a given radius, boom angle and length prior to extending the boom with a load attached.

Do not pull or push the joystick through neutral and to the opposite position to stop or slow hoist operation.

Always use a slow, even pressure when moving the joystick.

Failure to observe and follow these warnings may result equipment damage.

NOTE: The automatic brake will hold the suspended load at the stopped position as long as the joystick remains at the neutral position.

Lower main hook block — Smoothly and evenly push and hold the right joystick to the forward position until the main hook block is at the desired position, then move the joystick to the neutral position.

Raise main hook block — Smoothly and evenly pull and hold the right joystick back to the rear position until the main hook block is at the desired position, then move the joystick to the neutral position.

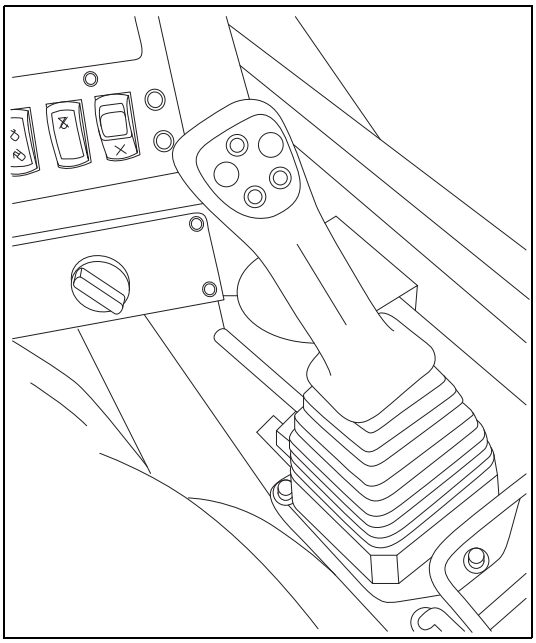


Fig. 4-95

Lower auxiliary hook block — Smoothly and evenly push and hold the left joystick to the forward position until the auxiliary hook block is at the desired position, then move the joystick to the neutral position.

Raise auxiliary hook block — Smoothly and evenly pull and hold the left joystick back to the rear position until the auxiliary hook block is at the desired position, then move the joystick to the neutral position.

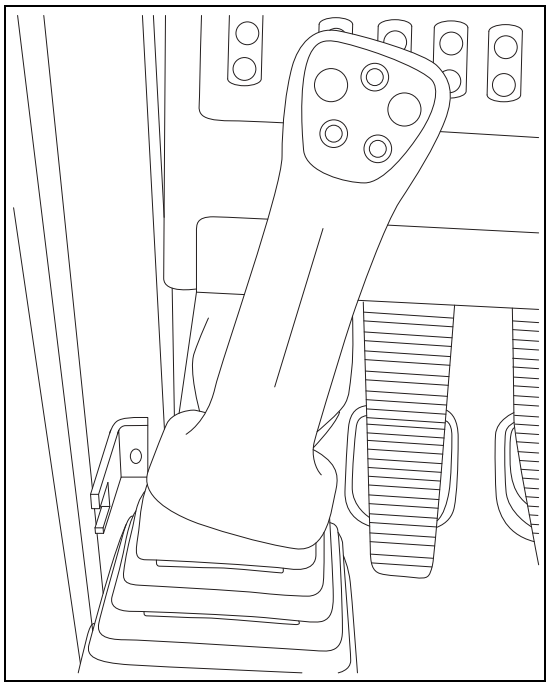


Fig. 4-96

Hoist speed selection

NOTICE

Do not change the hoist hi/low speed selection while the hook block is being raised or lowered. Failure to observe and follow this warning may result equipment damage. Follow these instructions to activate high hoist speed operations.

Main hook block — Press and hold the left button (a) in the right joystick for high-speed operation before raising or lowering the main hook block.

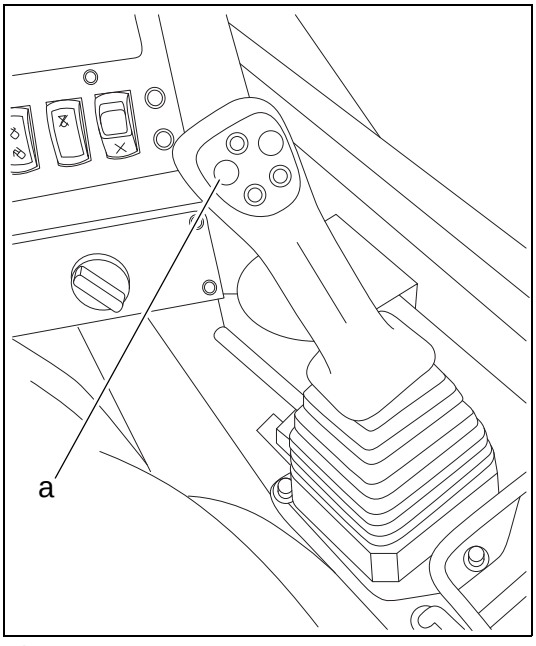


Fig. 4-97

Auxiliary hook block — Press and hold the right button (b) in the left joystick for high-speed operation before raising or lowering the auxiliary hook block.

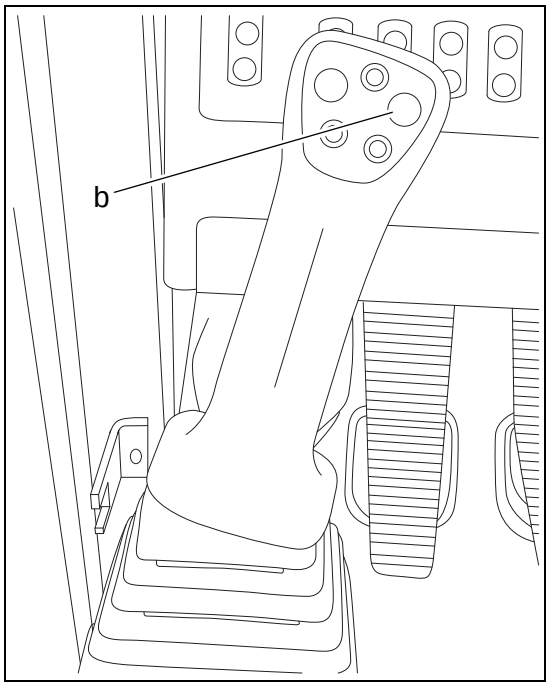


Fig. 4-98

Indicators and Operational Aids

WARNING

The devices listed in here are to assist the operator with safe and efficient operation of this machine. They are not meant to replace either the operational procedures provided in this manual or the load charts. Never rely only on these devices. Failure to observe and follow this warning may cause an accident which can result in equipment damage, personal injury or even death.

Item No.	Device Name	Purpose of Safety Protection	Location	Remarks
1	Load Moment Indicator	Audible and visual alarms of impending overload weight condition. Locks out boom lowering, boom telescoping, and main or auxiliary hoist wire rope raising functions. Present overload limit value preset during programming/ setup.	In dashboard of operator's cab.	Operates with the main controller
2	Main controller	If the moment is overloaded, action is prohibited	Exterior electrical box	
3	Length/angle sensor	Measuring the current boom length and current angle	Middle part of the main boom	

Item No.	Device Name	Purpose of Safety Protection	Location	Remarks
4	Swing Angle Set Limiter	Allows left and right swing angles to be preset. Audible warning when either preset angle reached.		
5	Weight-measuring pressure sensor 1	Measuring the current lifting pressure	Rod-side of luffing cylinder	
6	Weight-measuring pressure sensor 2	Measuring the current lifting pressure	Piston-side of luffing cylinder	
7	Height limit switch for main hoist (A2B)	Preventing hook block from contacting the boom nose	Boom head of main boom and boom extension	Anti-two block
8	Height limit switch for auxilliary hoist (A2B)	Preventing hook block from contacting the boom nose	Auxilliary boom sheave or swingaway boom extension top	Anti-two block
9	Third-wrap indicator for main hoist	Prevents damage or loss of wire rope on the main hoist	Main hoist	
10	Third-wrap indicator for auxiliary hoist	Prevents damage or loss of wire rope on the auxiliary hoist	Auxiliary hoist	
11	Oil temperature switch	Checking if the oil temperature of the hydraulic system is too hot	Hydraulic oil cooler	
12	Pressure switch	Preventing the air conditioning system operates with super-high pressure	Air conditioner pipeline	
13	Water level switch	Indicates low water level	Overflow tank of the carrier engine	
14	Fuel level sensor	Indicates low fuel level	Superstructure fuel tank	
15	ECU unit of gearbox	Gearbox fault and check alarm	Control box of operator’s cab	
16	ECU unit of engine	Engine fault and check alarm	engine	
17	Fuse	Short circuit protection	Control box of operator’s cab	
18	Water temperature sensor	Indicates high water temperature of the engine	Engine	Attached
19	Oil pressure sensor	Indicate low oil pressure of the engine	Engine	Attached
20	Grounding line	Protecting the personal and equipment safety	engine	

Item No.	Device Name	Purpose of Safety Protection	Location	Remarks
21	Anti-Two Block Device	Provides audible and visual alarms if either hook block or overhaul ball reaches a preset distance from the boom head or swingaway boom extension. Locks out hoist up, boom down, and telescope out functions.		
22	Joystick lockout system	System used with anti-two-block system or LMI system. Hydraulic solenoid valves in-line between hydraulic remote control valves in cab and pilot-operated directional control valves. When actuated, the valves prevent pilot flow between the hydraulic remote control valve in the cab and appropriate directional control valve; this prevents boom down, telescope out, or hoist up.		

Stowing and Parking

CAUTION

Never park the crane near holes or on rocky or extremely soft surfaces where a tipover hazard exists. Failure to observe and follow this caution may result in equipment damage or personal injury.

When parking the crane, do the following:

1. Park the crane on a stable surface.
2. Remove the load from the hook.
3. Stow the swingaway boom extension, if erected.
4. Fully retract the boom and position it in the normal travel position.
5. Engage the swing brake and/or swing lock pin.
6. Retract all jack cylinders and outrigger beams.
7. Apply the parking brake.
8. Put all operating controls in the neutral position.

Fig. 4-100

9. Position the CRANE FUNCTION switch (a) to the center position.

10. Shut down the engine following the proper procedures specified in this manual and the applicable engine manual.

11. Remove the keys.

12. Disconnect batteries if machine will be inactive for over 24 hours.

    NOTE: See “Battery disconnect” on page 4-41

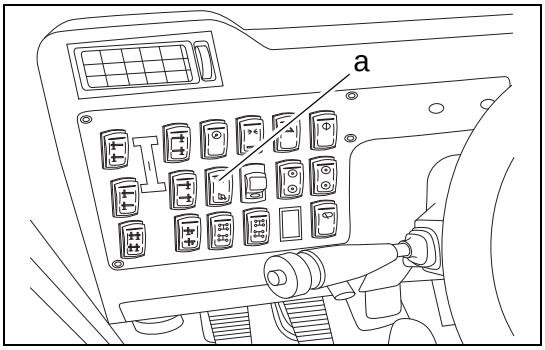


Fig. 4-101

NOTICE

To avoid possible engine fault codes and undesirable operation, ensure that the engine has been shut off for at least 2 minutes before disconnecting batteries.

13. Close and lock all windows, covers, and doors.

Crane Travel Operation

General precautions

This machine is subject to the same road regulations as any truck, regarding gross weight, width, and length limitations.

Although this machine is specifically designed for rough terrain, the operator should be extremely cautious and aware of the terrain at the job site.

Use four-wheel drive only when greater traction is necessary. See “Steering” on page 4-67.

WARNING

Before traveling, set the crane function switch to the center position. This will prevent inadvertent operation of craning functions due to bumping of the controllers while travelling

Do not drive the crane with the boom off center. Doing so may subject the crane to tipover on uneven surfaces.

Avoid holes, rocks, extremely soft surfaces, and any other obstacles which might subject the crane to undue stresses or possible tipover.

Failure to observe and follow these warnings may result in equipment damage, personal injury or even death.

CAUTION

Do not travel with an empty hook in a position where it can swing freely. Failure to observe and follow this caution may result in equipment damage or personal injury.

NOTICE

Do not drive the crane with the lift cylinder bottomed. Elevate the boom slightly above horizontal.

Use only a tow truck or tractor and not any other kind of vehicle to free this machine if it becomes mired down. Severe damage to the transmission or axles may occur if the operator attempts to free the crane unassisted.

Whether on open ground or if this machine becomes mired down, use only the tow/tie-down lugs to pull or tow.

Failure to observe and follow these warnings may result in equipment damage.

Traveling with swingaway boom extension erected

Travel with the swingaway boom extension erected is allowed only under the following conditions.

- The swingaway boom extension shall be erected at minimum offset with the fly section.
- Travel only at the job site on firm, level ground.
- Main boom shall be fully retracted.
- Main boom angle: 0° minimum, 20° maximum.
- Maximum travel speed: 4 km/h (2.5 mph).
- Boom over the front with the turntable lock pin in the “down” position.
- Hookblock may be reeved over main boom head, hanging 3 ft (0.9 m) below the boom head sheaves. Or it may be secured to the chassis.
- The overhaul ball may be reeved over the swingaway boom extension, hanging 3 ft (0.9 m) below sheave. Or it may be secured to the chassis.

Moving the Crane After Lifting is Complete

The following superstructure conditions should be strictly adhered to before moving the crane. Procedures for accomplishing the following can be found in the various sections of this manual.

1. Fully retract the boom (a). “Boom Operation” on page 4-52

Fig. 4-102

2. Ensure the swingaway boom extension (b) is properly stowed and secured. See “Erecting and Stowing the Swingaway Boom Extension” on page 4-28

3. Swing the boom to over-the-front and lower it to slightly above horizontal. See “Swinging the boom” on page 4-53

Fig. 4-103

4. Turn the SWING BRAKE switch (c) on the front console to ON.

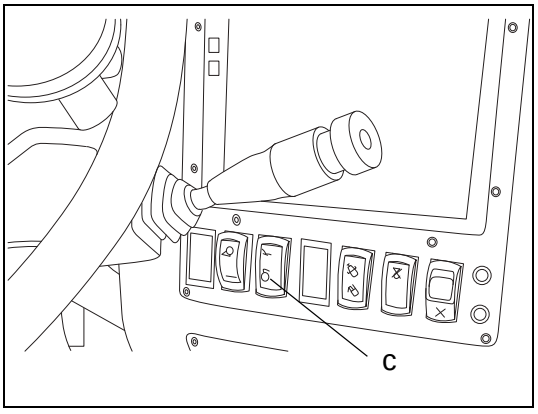


Fig. 4-104

5. Engage the swing lock pin (d).

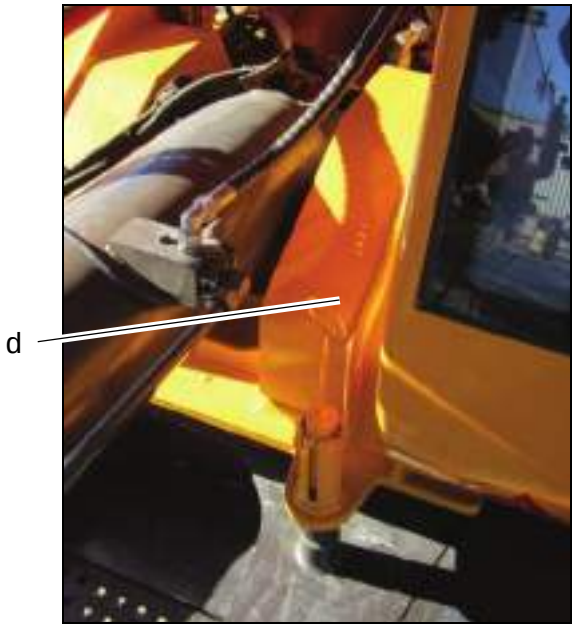


Fig. 4-105

6. Ensure that the Hook block and/or overhaul ball is secured to the tie-down (e) provided for that purpose.

   NOTE: Option is to remove the hook block and/or overhaul ball from the hoist wire rope(s) and stow securely before traveling or ensure the hook block or overhaul ball is properly

Fig. 4-106

7. Fully retract the outrigger jacks and remove the pads (f). See “Stowing the outriggers” on page 4-50

8. Properly store the Pads (g).

Fig. 4-107

Direction of travel

Use the selector on the right side of the steering column to determine the direction of travel.

- Up - Forward
- Center - Neutral (no travel motion)
- Down - Reverse

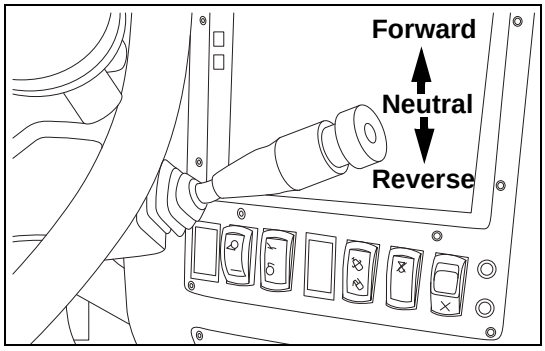


Fig. 4-108

Steering

Steering is accomplished by following:

1. Using the steering wheel.
2. Pressing the switch on the left dashboard for the desired steering mode.

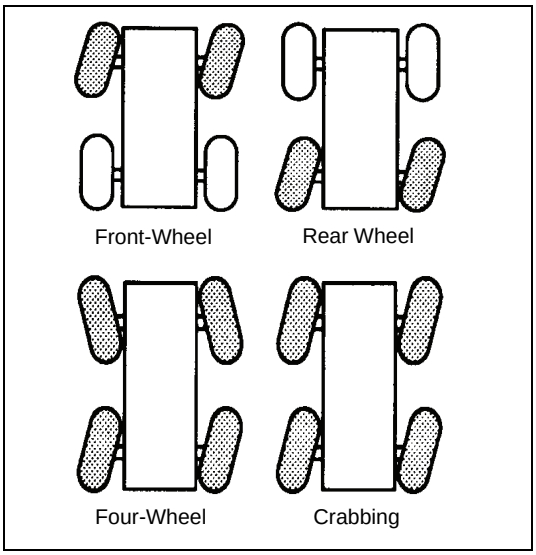


Fig. 4-109

- Front-wheel steering — Set switch (a) to mid-position (front or rear wheel steering), then press the top portion of switch (b) (front wheel mode).
- Rear-wheel steering — Set switch (a) to mid-position (front or rear wheel steering), then press the bottom portion of switch (b) (rear wheel mode).
- Four-wheel coordinated steering — Press the top portion of switch (a).
- Four-wheel crab steering — Press the bottom portion of switch (a).

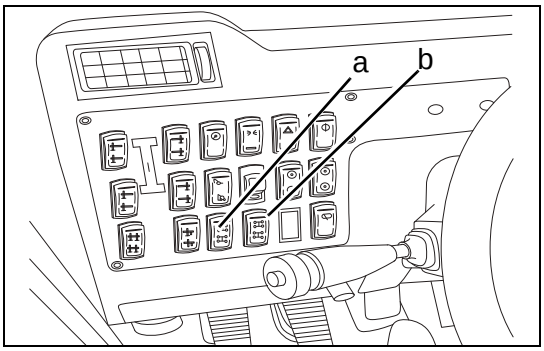


Fig. 4-110

Travel on slopes

Observe the following when operating a crane on a slope:

- The slope – side to side or fore and aft – must not exceed 15% (8.5°).
- Travel must be on an improved surface or on hard-packed, dry earth having a minimum 0.5 coefficient of adhesion.
- Travel must only be forward.
- Travel speed must not exceed 1 mph.
- All boom sections must be fully retracted.
- The swingaway boom extension must be in the stowed position or removed from the crane.
- The boom must be lowered to horizontal and positioned over the front of the crane.
- The swing brake and turntable lock pin must be engaged and in the “down” position.
- The main hook block may be reeved over the main boom head; the overhaul ball may be reeved over either the main boom head or auxiliary boom head. Each hook block must be secured at the tiedown on the carrier to prevent swinging.
- Tires must be inflated to the recommended pressure for pick and carry operations.
- The hydraulic tank must be filled to the specified level.
- The fuel tank must be over half full.
- No loads may be supported by the boom (for instance, no pick and carry loads) while traveling on a slope.
- All cribbing and other nonstandard accessories must be removed from the crane.
- Avoid holes, rocks, extremely soft surfaces, and other obstacles that might subject the crane to undue stresses and possible tipover.
- Travel must be conducted with the assistance of a signal person to warn the operator of any changing conditions of the terrain being traversed.

Preload check

Perform an operational check of all crane functions (with no load applied) after the crane has been readied for service as follows:

NOTE: Carefully read and become familiar with all crane operating instructions before attempting a preload check or operating the crane under load.

NOTE: Run the engine at or near governed rpm during preload check of crane functions.

1. Extend and set all four outrigger beams. See “Outrigger operation” on page 4-46

   NOTE: When operating certain crane functions with the crane elevated from the ground on outriggers at high engine speeds, the rear wheels may begin rotating due to a small amount of drag in the hydraulic clutch. Do the following to prevent this:

   - Check the gear shift on the right side of the steering column to ensure that the transmission is in neutral.

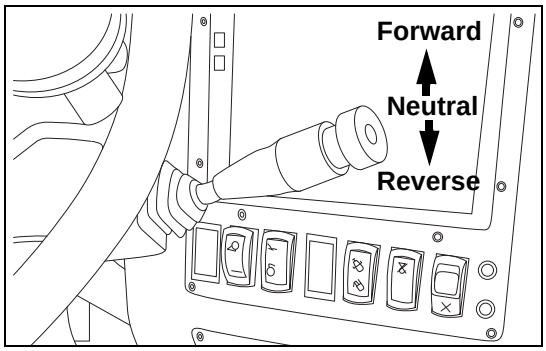


Fig. 4-111

   - Use switch (a) to set the parking brake ON.

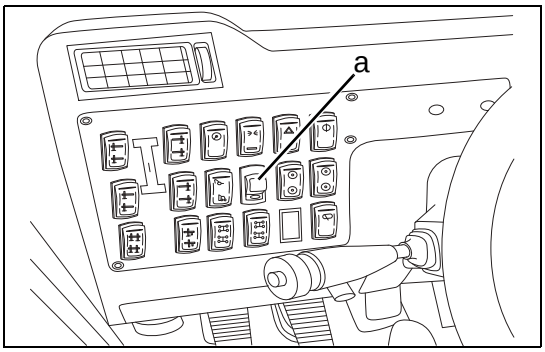


Fig. 4-112

2. Raise, lower, and swing the boom at least 45° to the right and to the left. See “Raising and lowering the boom” on page 4-55 and See “Swinging the boom” on page 4-53

3. Telescope the boom sections in and out. See “Telescoping and retracting the main boom” on page 4-56

4. Raise and lower the wire rope several times at various boom lengths and ensure there is no kinking. See “Raising and lowering the hook blocks” on page 4-58

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Maintenance

WARNING

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

MAINTENANCE INFORMATION

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

Hour Meter Reading

Always 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

Always 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

Always use clean **EP** (extreme pressure) grease when greasing the machine. Avoid using low viscosity greases. 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)

Use only approved grease for lubrication of wire rope. For details and specifications on wire rope lubrication, contact your SANY distributor.

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

Never weld, cut, drill or grind on the work equipment, hydraulic system or engine system. Doing so could cause premature component failure.

- Disconnect all electronic controllers, monitors and computer controlled systems that could be damaged during the welding process.
- Turn off the engine and ignition switch.
- Set the battery disconnect switch to the **OFF** position.
- Never apply more than 300A continuously.
- Connect the ground cable of the welder no further than 3.3 ft (1 m) away from the place being welded. If the ground cable is near an electrical component, remove or disconnect the component before welding on the machine.
- Avoid welding near bearings, bushings, seals or sliding surfaces. The possibility of damage to these components could result.
- Never use hydraulic cylinder components, cables or hydraulic lines as a grounding point. Never weld on hydraulic cylinders, components or lines or cables.
- Never connect ground on opposite side of the turntable bearing (Ground on carrier and welding on the boom or superstructure).

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, always do as follows:

- Clean the radiator and oil cooler core to avoid any clogging.
- Clean or replace the fuel filters and air filter 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.

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

If any hydraulic components have been replaced or removed, always bleed the air from the system before resuming operation. Be sure there are no leaks and the hoses or lines do not rub on any other components.

Wire Ropes and Hoist Drums

Inspect the wire ropes for signs of wear or damage, be sure they are clean, coated with the proper lubricant and free from rust or corrosion. Be sure all wire ropes spool properly when winding the drums. Check for any entanglement or abnormality with the sheaves.

Checks After Maintenance or Repairs

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

With the engine **OFF**:

- Be sure you have completed all the steps in the maintenance or repair of the machine you have worked on.
- 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 completed repairs or maintenance on.
- Be sure there are no abnormal sounds coming from the engine or hydraulic system and nothing is loose.

Third Party Inspection Requirements

OSHA law requires, the employer shall designate a competent person who shall inspect all machinery and equipment prior to each use, and during use, to make sure it is in safe operating condition. Any deficiencies shall be repaired, or defective parts replaced, before continued use.

A thorough, annual inspection of the crane shall be made by a competent person, or by a government or private agency recognized by the U.S. Department of Labor. The owner shall maintain a record of the dates and results of inspections for each crane and piece of equipment used.

Wire Rope

Wire rope shall be taken out of service when any of the following conditions exist:

- In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.
- Wear of one-third the original diameter of outside individual wires. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure.
- Evidence of any heat damage from any cause.
- Reductions from nominal diameter of more than one-sixty-fourth inch for diameters up to and including five-sixteenths inch, one-thirty-second inch for diameters three-eighths inch to and including one-half inch, three-sixty-fourths inch for diameters nine-sixteenths inch to and including three-fourths inch, one-sixteenth inch for diameters seven-eighths inch to one and one-eighth inches inclusive, three-thirty-seconds inch for diameters 1 1/4 to 1 1/2 inches inclusive.
- Wire rope safety factors shall be in accordance with ASME B 30.5-2007 or SAE J959-1966.

Torque Values

Always refer to this chart if the tightening torque value is not listed or specified in the procedure.

Table 5-1: Nuts, Bolts and Fittings

Bolt	Grade	Tightening Torque Value		Hose Fitting	Tightening Torque Value	
		N•m	lbf•ft or (lbf•in.)		N•m	lbf•ft or (lbf•in.)
M6	10.9	13.2 ± 1.4	(117 ± 12)	M14	24.5 ± 5	(217 ± 35)
M8	10.9	31 ± 3	(274 ± 27)	M18	51 ± 8	38 ± 6
M10	10.9	66 ± 7	49 ± 5	M22	74 ± 14	55 ± 10
M10	12.9	78 ± 7	58 ± 5	M26	105 ± 20	77 ± 15
M12	10.9	113 ± 10	83 ± 7	M30	135 ± 20	100 ± 15
M12	12.9	137 ± 10	101 ± 7	M36	166 ± 26	122 ± 19
M14	10.9	177 ± 19	130 ± 14	M42	240 ± 30	177 ± 22

Table 5-1: Nuts, Bolts and Fittings

M16	10.9	279 ± 30	206 ± 22	
M16	12.9	339 ± 30	250 ± 22	
M18	10.9	382 ± 39	282 ± 29	
M20	10.9	383 ± 39	282 ± 29	
M20	12.9	549 ± 59	405 ± 44	
M27	10.9	1,320 ± 140	974 ± 103	
M30	10.9	1,720 ± 140	1,265.8 ± 103	
M33	10.9	2,210 ± 140	1,627.4 ± 103	

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			

LUBRICANTS, COOLANT AND FILTERS

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.

Ambient Temperature Chart

Reservoir	Fluid Type	Ambient Temperature									Recommended Sany Fluids
		-22	-4	14	32	50	68	86	140	122F °	
		-30	-20	-10	0	10	20	30	40	50C°	
Engine oil pan	Engine oil	0W30	5W30	10W30	5W40 or 15W40						SHELL Rimula M
				10W30 and API CI-4 or API CJ-4							
Rotary Reducer	Gear oil	85W140									
Hydraulic system	Hydraulic oil	ISO 32			ISO 46			ISO 68			SHELL Tellus Premium
Grease	Lubricant	EP LF #2									SHELL Alvania

Reservoir	Fluid Type	Ambient Temperature								Recommended Sany Fluids
		-22	-4	14	32	50	68	86	140	122F °
		-30	-20	-10	0	10	20	30	40	50C°
Hoist drives	Axle Oil	85W140								SHELL Spirax
Cooling system	Ethylene glycol	ASTM 4985 ASTM D6210 ASTM D6211								Fleet Charge
Differentials front/rear	Gear oil	80W/90GL-5								SHELL Hypoid
Axle ends front/rear	Gear oil	80W/90GL-5								SHELL Hypoid
Converter	ATF Fluid	DONEX TD 5W-30								SHELL
Transmission	ATF Fluid	DONEX TD 5W-30								SHELL
Fuel tank	Diesel fuel	No. 2-D								ASTM No.2-D

API: American Petroleum Institute

ASTM: American Society for Testing and Materials

SAE: Society of Automotive Engineers

ISO: International Standards Organization

Capacities

Never overfill when adding fluids to these systems.

	Quantity	Machine Model	Engine Oil	Rotary Reducer	Front Differential	Rear Differential	Front Axle End	Rear Axle End	Trans. Unit
Specified Capacity	US gal	SRC865	4	1.59	16	16	2.38	2.38	5.3
	Liter		15	6	60	60	9	9	20

	Quantity	Machine Model	Converter	Hydraulic System	Main Hoist	Aux. Hoist	Cooling System	Washer Fluid	Batteries
Specified Capacity	US Gal	SRC865	1.3	140	2.64	2.64	10.1	1	as needed
	Liter		5	530	10	10	38	3.7	as needed

Engine Coolant

Cummins® 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 service interval

- A small amount of coolant can leak when servicing the coolant filter (if equipped) with the shutoff valve in the **OFF** position. To reduce the possibility of personal injury, avoid contact with hot coolant. Always allow the engine time to cool down to outdoor temperatures before servicing the cooling system.
- Coolant is toxic. Keep it away from children and pets. If not re-used, dispose of it 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.
- Add liquid SCA (Supplemental Coolant Additive) at each filter change as necessary.
- Test coolant every 250 hours for liner-pitting protection (nitrite and molybdate levels).
- Test coolant for replacement limits every 2,000 hours of service.
- Replace coolant only if replacement limits have been exceeded.

SCA (Supplemental Coolant Additives) levels

- Test the SCA level a minimum of 250 hours of service.
- If the SCA concentration level is between 1.2 and 5.0 units/gallon (0.3 and 1.3 units/liter), either install a chemical filter containing the appropriate dosage of SCA or add the equivalent liquid SCA dosage and install a chemical free filter.
- If the SCA concentration level is less than 1.2 units/gallon (0.3 units/liter), add 5 ounces (0.15 liters) of Fleetguard® DCA4 or Fleetcool liquid per 1 gallon (3.8 liters) of cooling system capacity and install a chemical filter.
- If the SCA concentration level is greater than 5.0 units/gallon (1.3 units/liter), install a chemical-free filter. Do not install a chemical coolant filter or add liquid Extender/SCA.
- Test the SCA level at each oil change. When SCA units drop below 5.0 units/gallon (1.3 units per liter), resume installing chemical filters or using the equivalent liquid SCA dosage and installing chemical-free filters.
- Consult your SANY distributor or Fleetguard® Technical Assistance for detailed Fleetguard® product information and assistance at 800-223-4583 or http://www.fleetguard.com.
- For cleaning and flushing the cooling system, Cummins® recommends using (Restore or Restore Plus) by Fleetguard. Follow the instructions on the flushing solution label.

Lubricants

The SANY recommended lubricants are listed in the “AMBIENT TEMPERATURE CHART” on page 5-7. Commercially available lubricants and additives may cause harm. SANY does not recommend commercially available lubricants or additives other than what is listed in this chart.

Always use the oils recommended according to the Ambient Temperature Chart.

“Specified Capacity” is the total amount of oil including the oil in the tank, the filter and the piping. “Refill Capacity” is the amount of oil needed to refill the system during an inspection and maintenance.

Do not use straight-weight oils when starting an engine at ambient temperatures below 32°F (0°C), even if the daytime temperatures rise to 50°F (10°C). Always use multigrade oils such as the recommended oils in the Ambient Temperature Chart.

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.

Fuel

Do not use gasoline, kerosene or any unapproved fuels in the fuel system. If fuel waxing or bacteria should occur in the fuel system, contact your SANY distributor for help. Never dilute fuels. Damage to the injection system may result.

Engine oil change intervals will vary according to the amount of sulfur in the fuel. Change oil according to the following table below.

Fuel Sulfur Content	Engine Oil Change Interval
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

CRANE MAINTENANCE LOCATIONS

The following view is a general guide for service or maintenance locations on the crane. Failure to perform the outlined maintenance listed in this maintenance section will result in shortened service life of the machine or a system failure during operation.

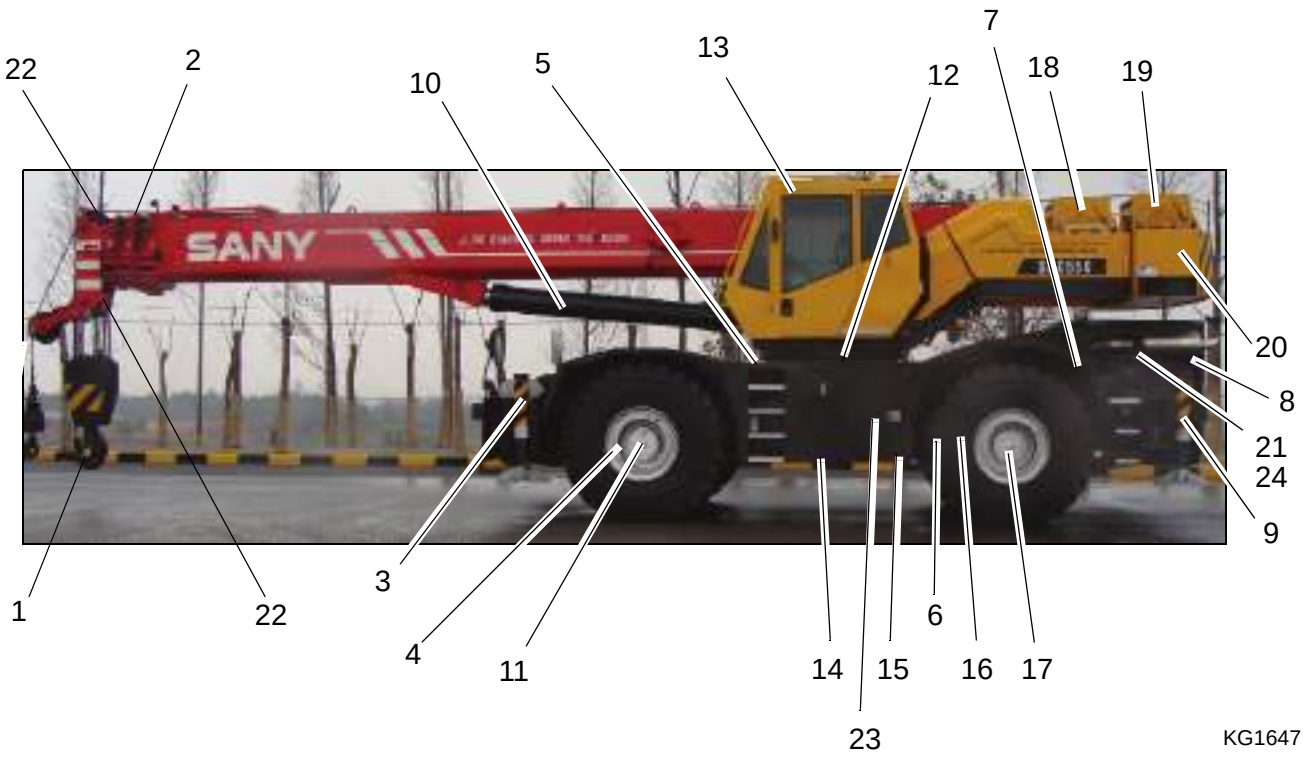

Fig. 5-1

1. Hook block	7. Power plant	13. Cab	19. Auxiliary hoist
2. Boom segments	8. Cooling system	14. Drive line	20. Counterweight
3. Front outriggers	9. Rear outriggers	15. Transmission	21. Air cleaner
4. Front axle end	10. Boom lift cylinders	16. Torque converter	22. Boom sheaves
5. Hydraulic tank	11. Front differential	17. Rear axle end	23. Battery
6. Rear differential	12. Swing system	18. Main hoist	24. Radiator

DAILY MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

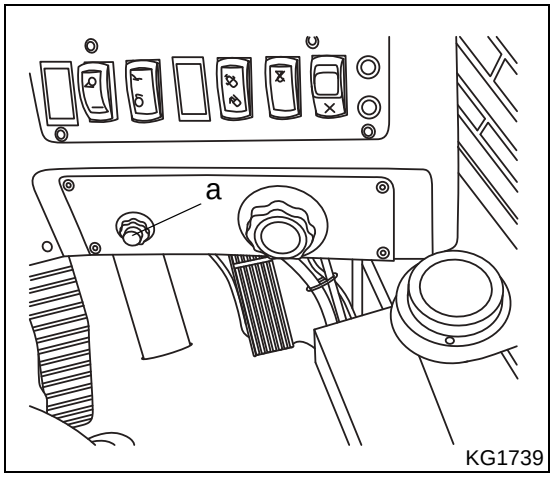

Fig. 5-2

2. Set the parking brake switch (b) in the ON position.

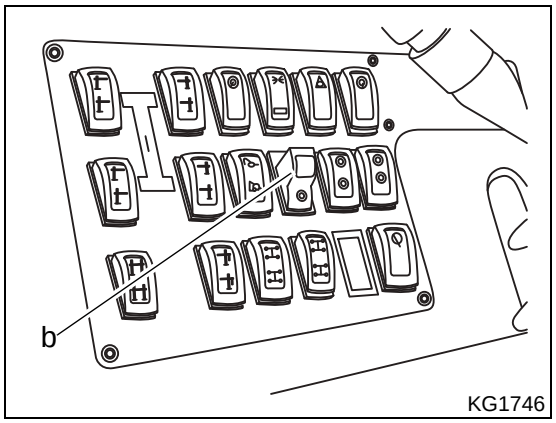

Fig. 5-3

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

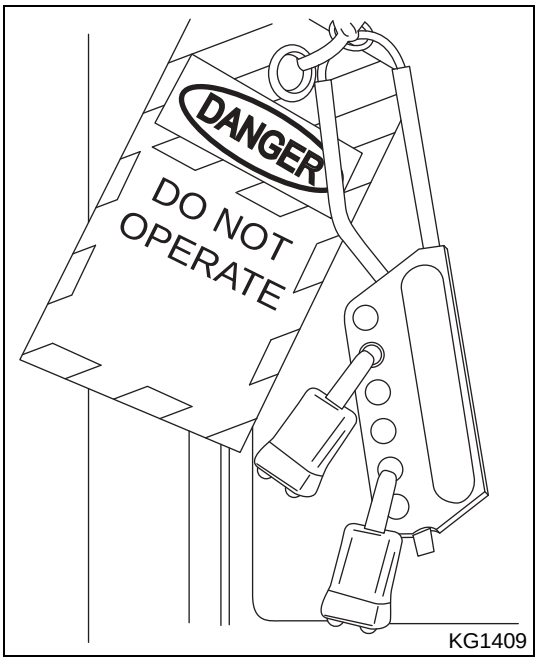

Fig. 5-4

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.

Fig. 5-5

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. See “Controls & Switches” on page 3-14.

NOTE: If any component is damaged or inoperable, contact your SANY distributor.

Back-up Alarm

Be sure the back-up alarm works when the engine is running and the crane is place in reverse direction. See “Right Steering Column Lever” on page 3-15.

NOTE: If damaged or inoperable, contact your SANY distributor.

Brakes (Swing, Foot and Parking and Emergency Stop)

Check all equipment braking systems for proper operation. Be sure they hold the machine or equipment in place when applied. See “Foot Pedals” on page 3-15 and See “Left Dashboard Switches” on page 3-16 item (j).

NOTE: If any system is inoperable or shows signs of poor performance, contact your SANY distributor.

Level Indicator

Check the level indicator (a) to be sure it is not missing, damaged or stuck in place.

Be sure it is operational and moves when the machine position changes. See “Checking/adjusting the bubble level indicator” on page 4-49.

NOTE: If it is damaged, stuck or missing, contact your SANY distributor for repair.

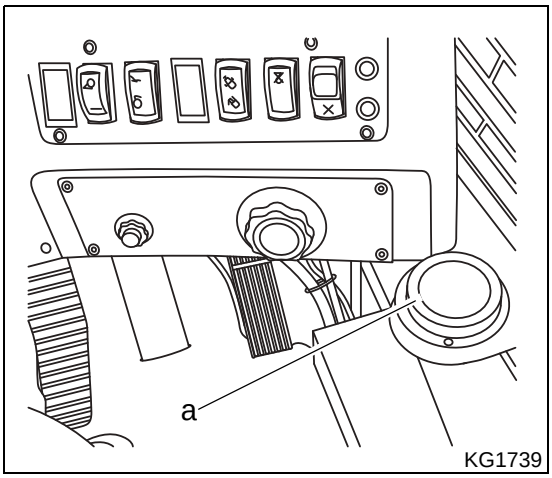

Fig. 5-6

Load Moment Indicator

Check to be sure the load moment indicator is functional when the system is operating.

Be sure all displays work properly and are not damaged. See “Monitor display screen” on page 3-18.

NOTE: If damaged or inoperable, contact your SANY distributor.

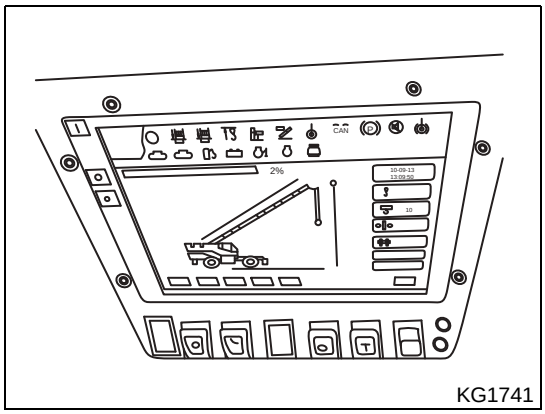

Fig. 5-7

Anti-Two Block System

Raise the hook block to the top of the boom and check to see if the hook block stops at the anti-two block weight setting position (a). See “Raising and lowering the hook blocks” on page 4-58.

NOTE: If the hook block does not stop when coming into contact with the anti-two block weight, an adjustment or repair is required. Contact your SANY distributor.

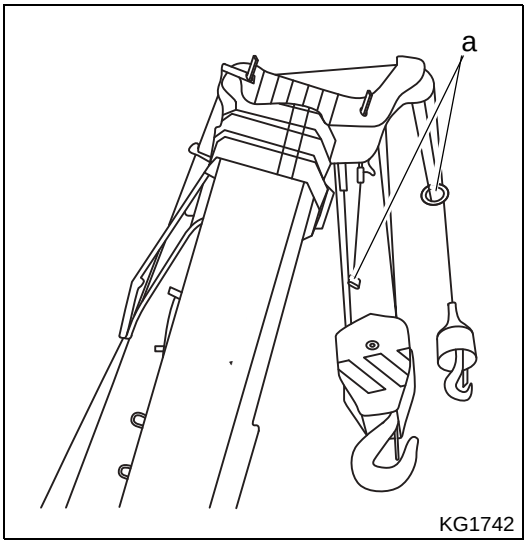

Fig. 5-8

Hourmeter

Be sure the hourmeter display (a) on the main screen is operational when the ignition key is turned to the ON position.

NOTE: If the hourmeter is defective, damaged or not functioning, contact your SANY distributor for repairs.

Fig. 5-9

Main and Auxiliary Hoist

Check all hoist systems to be sure there are no leaks, cracking or damage. See “Main and Auxiliary Hoists” on page 3-19

NOTE: If damaged or inoperable, contact your SANY distributor.

Be sure the hoist functions properly in both directions. See “Raising and lowering the hook blocks” on page 4-58

Be sure the wire rope falls lay parallel to each other on the hoist drums.

NOTE: If inoperable or not correct, contact your SANY distributor.

Fig. 5-10

Boom and Attachments

Check the boom (a) to be sure all systems are properly working. Check for excess dirt, grease or foreign matter. Check the operation to be sure all boom segments extend and retract properly. See “Boom Operation” on page 4-52.

NOTE: If any malfunction is found, contact your SANY distributor for repairs.

Fig. 5-11

Swing System Lock

Inspect the swing system locks to be sure they are working properly and not damaged. Look for cracks, bending or any type of damage to the locking system. Check for smooth operations of the controls. See “Swing Drive” on page 3-22.

NOTE: If the system is inoperable or sluggish, contact your SANY distributor for repairs.

Draining the 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 filter (a) behind the left front wheel as shown in the illustration.

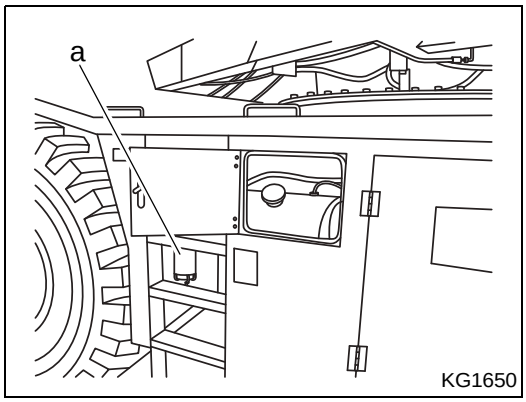

Fig. 5-12

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

   NOTE: Avoid draining the fuel filter completely, air could enter the fuel system.

3. When the flow from the primary fuel filter is free of water or contamination, close the drain valve (a) and dispose of the contaminated fuel in container (b) properly. See "Environmental Precautions" on page 2-26

4. Start the engine and allow it to run at an idle speed, then check for leaks in the primary fuel system. See "Starting the Engine" on page 4-43

5. If no leaks are present, close and lock the left service door. If any leakage is found, have it repaired immediately.

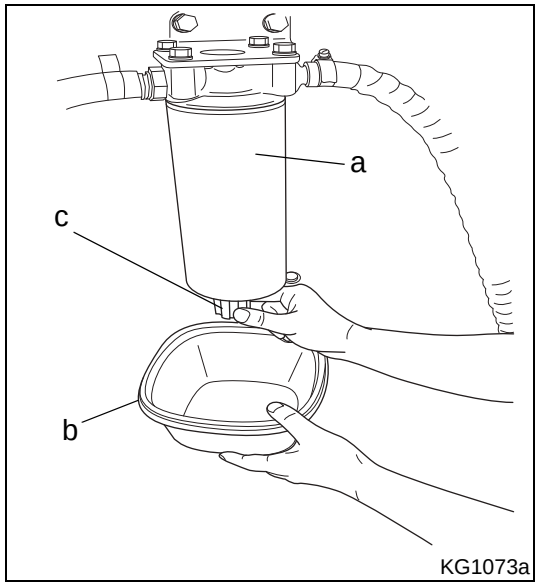

Fig. 5-13

Engine Air Filtration System

The engine air filtering system has two areas that require attention especially if the machine will be operating in unusually dusty conditions or conditions where debris could clog the system.

- A screen-type pre-filter (a) located on top of the air filter housing intake stack.
- A dual-element air filter system located inside the filter housing (b).

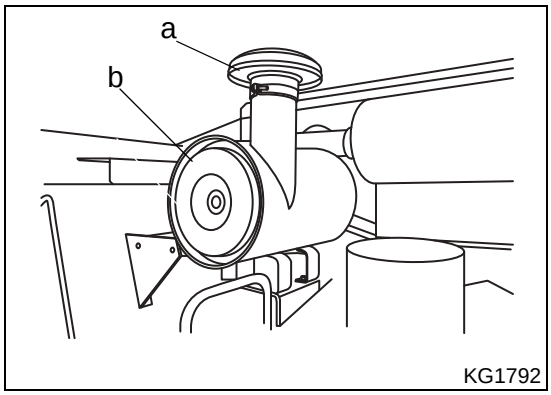

Fig. 5-14

Servicing the air pre-filter

Inspect the inlet holes (a) for any accumulation of dirt or debris build-up. If dirt or debris is found, remove the pre-filter and clean it using the proper cleaning solvent.

Be sure the mounting clamp (b) is tight and the pre-cleaner is not loose on the stack after re-installation.

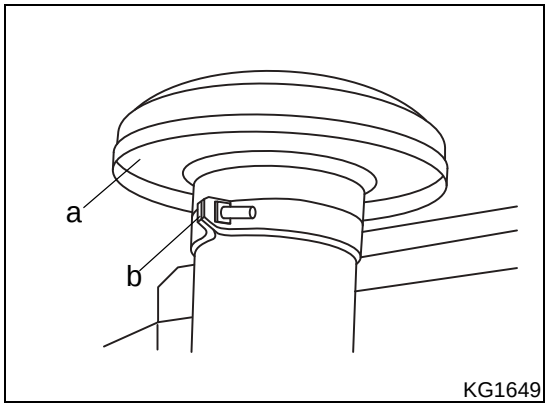

Fig. 5-15

Primary air filter element

To inspect or replace the primary air filter element:

1. Loosen and remove the center star nut (c) to remove the front housing cover (d).

   NOTE: Note the position of the evacuator tube (e) before removing the housing cover (d). Be sure it is facing in a downward position when reinstalled.

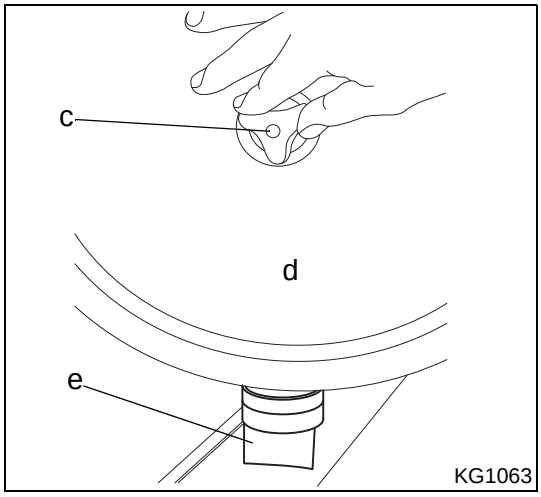

Fig. 5-16

2. Remove the housing cover (d) and clean the inside of the cover, place it in a safe place for reinstallation.

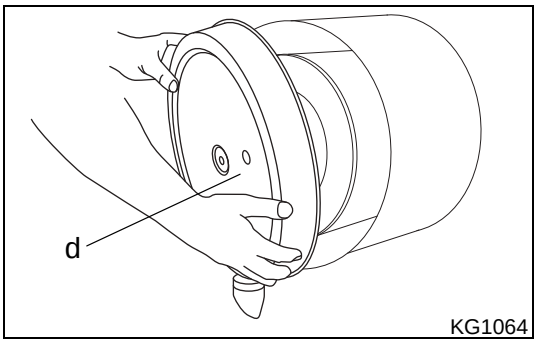

Fig. 5-17

3. Visually inspect the outside condition of the primary air filter element.

   If the element shows signs of excess dirt or any abnormality, the primary air filter element is at the end of its service life. Remove the center star nut (c) completely and lay it in the housing cover (d) for safe keeping.

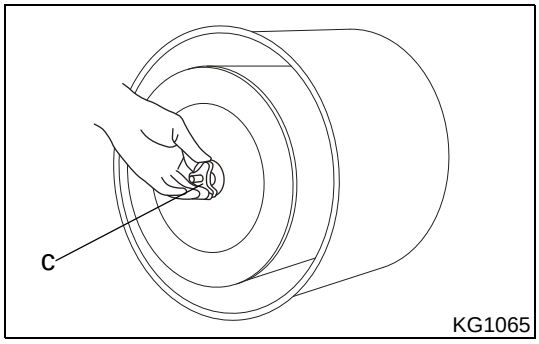

Fig. 5-18

4. Carefully pull the dirty primary air filter element out of the air cleaner housing, then discard the dirty primary air filter element properly.

   NOTE: Do not strike the element against anything or clean with pressurized air. Doing so will damage the element and reduce the efficiency of the air cleaner system. If the air cleaner element is dirty or looks abnormal, it is at the end of its service life. Replace the element with a new one. Always read and follow the air cleaner manufactures instructions on the air cleaner when servicing the air cleaner.

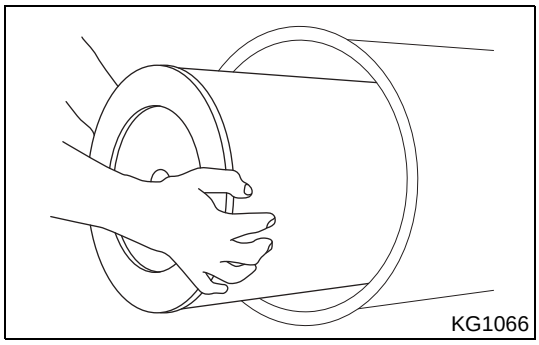

Fig. 5-19

5. If the primary air cleaner element shows no signs of excess dirt accumulation or if no abnormalities are found, leave the primary air cleaner element in place.

6. Reinstall the outer cover (d) and center star nut (c) that hold the outer cover in place. Be sure the dust evacuator (e) is facing downwards as shown in the illustration.

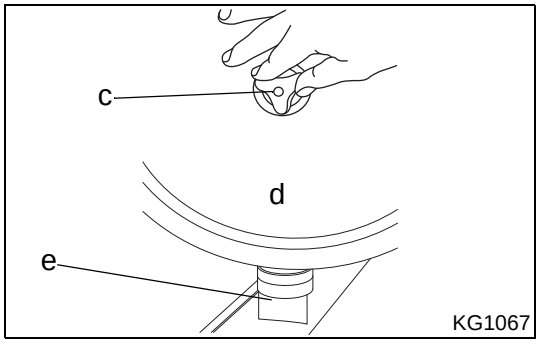

Fig. 5-20

Secondary air filter element

Always inspect the secondary air filter element for any excess accumulation of dust if the primary air cleaner element is removed.

If excess accumulation of dust or any abnormality is found, perform these steps to replace the secondary air filter element:

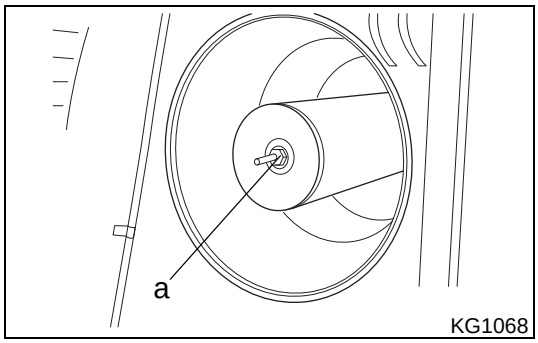

Fig. 5-21

1. Remove the hex nut (a) that secures the secondary air filter in place.

2. Remove and replace the secondary air cleaner element with a new one.

3. Reinstall the hex nut (a).

4. Install a new primary air filter element, then reinstall the outer cover (d) and star nut (c). Fig. 5-20

Checking the Engine Oil Level

It is important to check the engine oil level on a daily basis.

NOTE: Be sure the engine is off and has cooled down before checking the engine oil level.

1. Locate the engine oil dipstick (a) on the right side of the engine inside the engine hood door.

2. Remove dipstick.

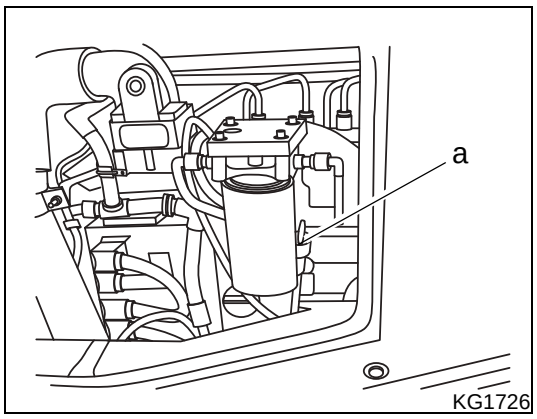

Fig. 5-22

3. Be sure the oil level falls between the marks (b) indicated on the dip stick surface.

4. If the engine oil level does not fall between the marks (b), the oil must be added to the engine.

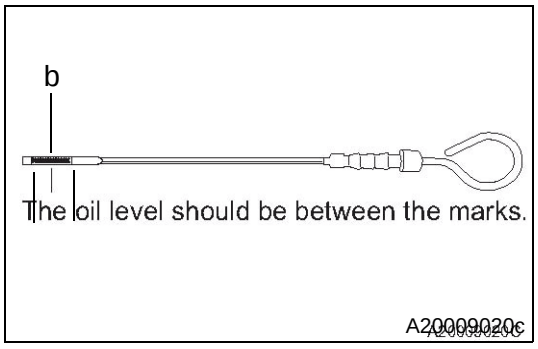

Fig. 5-23

5. Remove the oil fill cap (c) and add oil as needed, then reinstall the cap.

   See “SANY-Approved Lubricants” on page 5-5 for details on engine oil types.

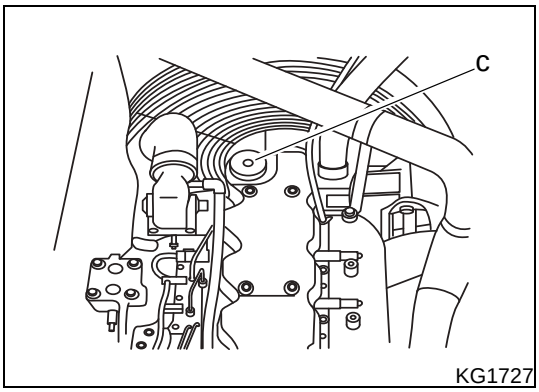

Fig. 5-24

Checking the Engine Coolant Level

WARNING

Do not remove the radiator 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 radiator cap. Failure to follow this warning could result in serious injuries.

Remove cap (a) and inspect the coolant level, be sure the coolant is up to the bottom of the radiator surge tank neck.

NOTE: If coolant needs to be added, see "lubricants, Coolant and Filters" on page 5-10 for details.

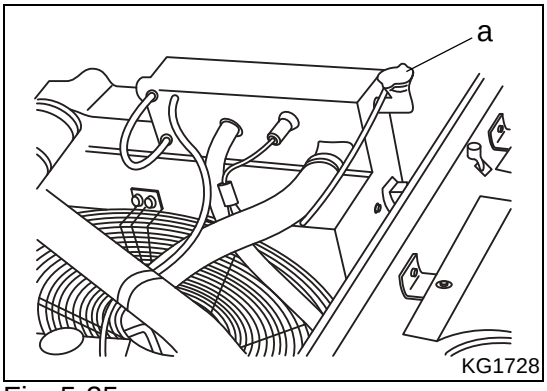

Fig. 5-25

Checking the Hydraulic Oil Level

CAUTION

Hydraulic oil is hot and under pressure. Always wait for the machine to cool down. Failure to do so could result in possible injury.

The oil level indicator (b) is on the left side of the tank behind a door.

NOTE: To add hydraulic oil, access the fill door on the top of the tank cover.

Fig. 5-26

Locate the fill under a cover (a) on the deck and add hydraulic oil as required. See “lubricants, Coolant and Filters” on page 5-10

Fig. 5-27

Transmission/Converter Oil Level

The transmission converter system has a fluid level check plug on the side of the housing. To check the fluid level, be sure the machine is sitting on level ground and the engine is off. Locate the level plug on the side of the housing and remove the plug.

If oil needs to be added, add oil until the level is within 0.4 in. (10 mm) of the bottom of the viewing plug hole. For fluid levels and types, “lubricants, Coolant and Filters” on page 5-10 for details.

Tires and Rims

Check all tires for proper inflation, excessive wear, damaged or cut surface and foreign matter penetration.

Check the rims for loose or missing lug nuts and damaged surfaces.

NOTE: If any problems with the tires or rims are found, contact your SANY distributor for repairs.

The specified tire pressure during lifting is 94.3 psi (0.65 MPa).

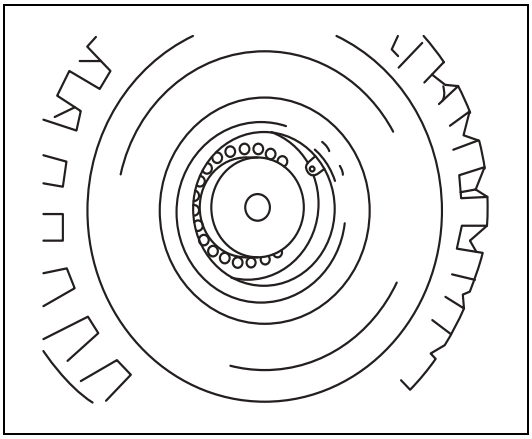

Fig. 5-28

Wire Rope Inspection

All wire ropes will eventually wear out and gradually lose there working capability throughout there service life. Periodic inspections of wire rope are critical for the safety of the crane. Industry standards such as ASME B30.5 for cranes specify inspection criteria for varied applications of wire rope. Below is a list of some basic inspections that must be performed on a monthly basis.

CAUTION

Always wear leather gloves when handling wire rope.

In addition to regular monthly wire rope inspections, wire rope and equipment should be inspected:

- Daily - Visual observations should be concerned towards the discovery of gross damage that may be an immediate hazard.
- If the ropes condition indicates the need for replacement.
- Deterioration that indicates the most suitable type of rope for the application may not be used.
- Defective, worn equipment or improper operation can cause costly accelerated rope wear.

Inspections should be carried out by a person who has learned through special training and practical experience on what to look for and how to judge the importance of any abnormal conditions they may discover. It is the inspector's responsibility to obtain and follow the proper inspection criteria for each application inspected.

It is the owners responsibility to maintain records of each inspection. These inspection records must be kept with the crane for quick reference if necessary.

Measuring the rope diameter

The correct diameter of a wire rope is the diameter of a circumscribed circle that encloses all the strands. This is the largest cross-sectional measurement.

Measure wire rope sections every 2 ft (610 mm) with calipers. Wire rope is normally made slightly larger than its catalog (or nominal) size. Always refer to the wire rope charts and instructions from the manufacture of the wire rope for measuring procedures and proper nominal size you are using.

Shown in the illustration on the right is the proper way to measure the wire rope sections. If the wire rope is found to be below the manufactures specifications, the wire rope has reached the end of its service life or has been overstressed. The wire rope must be replaced.

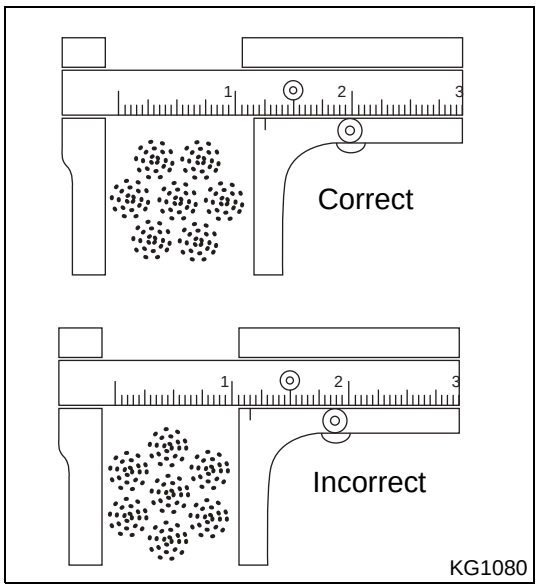

Fig. 5-29

Wire rope condition inspection

When inspecting the wire rope, it is important to look for the following general conditions listed below. If any of these conditions are found the wire rope needs to be replaced.

Fatigue failure, subjected to heavy loads over small pulleys. The breaks in the valleys of the strands are caused by “strand nicking.” There may be crown breaks as well.

NOTE: If this should occur, check to see if the proper rope size is installed on the crane hoists.

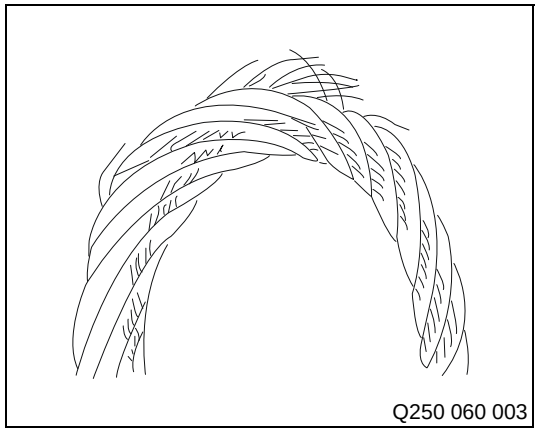

Fig. 5-30

Deformation of wire rope section caused by sudden kinking under stress. The wire rope twists will be deformed or spread due to excess pressure.

NOTE: This is usually caused by careless handling when reeving boom pulleys during the Assembly/Disassembly and Transport process.

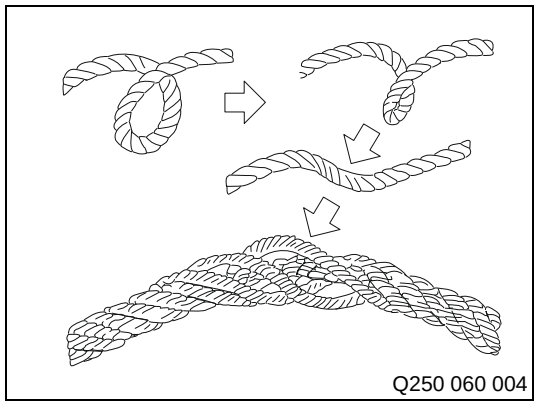

Fig. 5-31

Spiral deformation were you see a single strand removed from a wire rope subjected to “strand nicking.”

This condition is a result of adjacent strands rubbing against one another. While this is normal in a rope's operation, the nicking can be accentuated by high loads, small pulleys or loss of core support in the rope.

The ultimate result will be individual wire breaks in the valleys (X) of the strands.

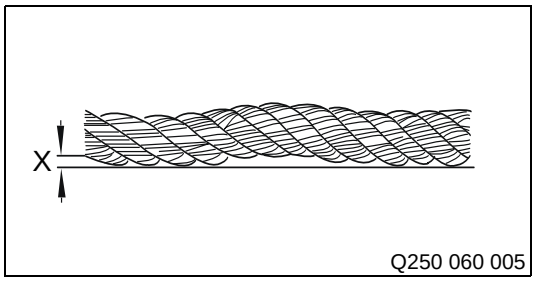

Fig. 5-32

A “birdcage” is caused by sudden release of tension and the resulting rebound of rope. These strands and wires will not be returned to their original positions.

NOTE: This is usually caused by careless handling when reeving boom pulleys during the Assembly/Disassembly and Transport process.

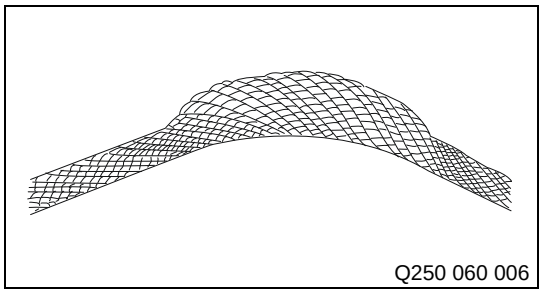

Fig. 5-33

Wire looping is caused by wires of a group being pulled or bent at an extreme angle. This could be caused by sheaves being too small or a wire being pulled around a sharp angle.

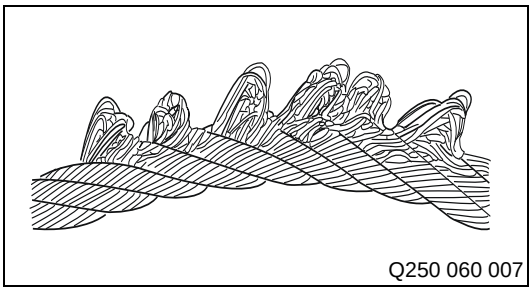

Fig. 5-34

Overstress signs caused by excess loads or extreme shock loads. The wire strands are stretched beyond there normal length and unable to return to normal.

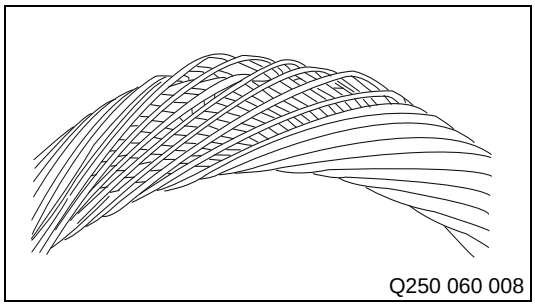

Fig. 5-35

Wire rope that has been subjected to repeated bending over sheaves under normal loads. This results in fatigue breaks in individual wires, these breaks are square and usually in the crown of the strands.

Broken wires:

- In non-rotation resistant ropes, six randomly distributed broken wires in one rope lay or three broken wires in one strand in one lay.

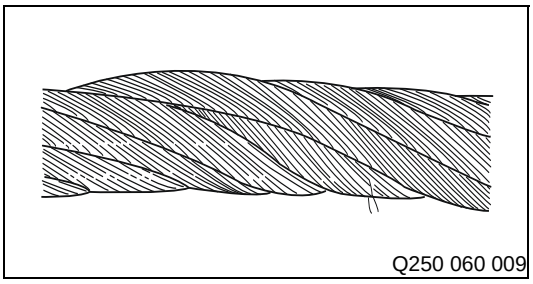

Fig. 5-36

- In rotation resistant ropes, two randomly distributed broken wires in six rope diameters or four randomly distributed broken wires in 30 rope diameters.

This is localized wear over an equalized sheaves. The danger here is that it's invisible during the rope's operation, and that's why you need to inspect this portion of an operating rope regularly.

See “Measuring the rope diameter” on page 5-27 for details regarding this condition.

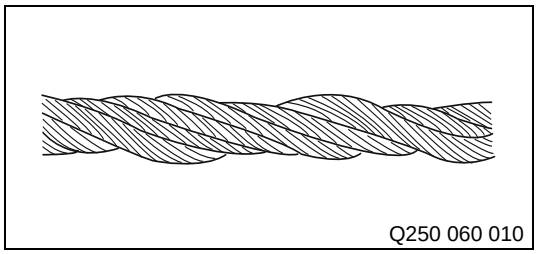

Fig. 5-37

Crushing, caused by small hoist drums, high loads and multiple winding conditions. Always use SANY- approved parts when making repairs and follow the operating procedures in the operator manual for the machine.

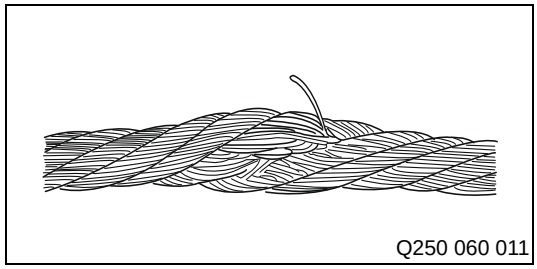

Fig. 5-38

Extreme twisting under stress has caused the wire strands to stretch and fray.

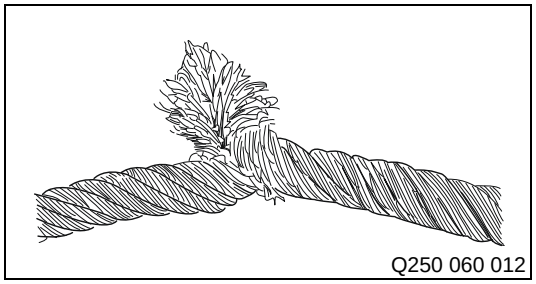

Fig. 5-39

Extreme bending under pressure has caused the rope sections to stretch and bend beyond there limits.

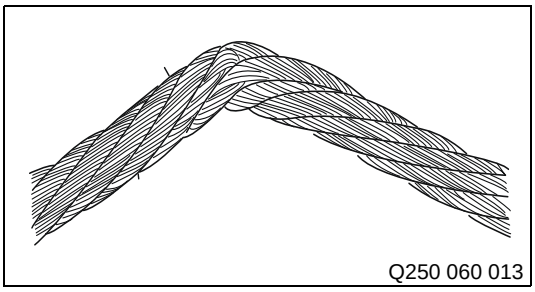

Fig. 5-40

Signs of rust or corrosion. Under normal use over time, the grease coating on the wire will wear off exposing the surface to moisture and the elements.

To prevent rust or corrosion, clean and coat the rope surface with the proper grease.

NOTE: If any abnormal conditions are found as described above, contact your SANY distributor for repair.

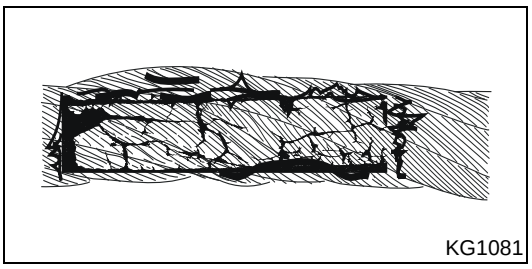

Fig. 5-41

Cleaning and lubricating wire rope

During the manufacturing process the wire rope is normally lubricated to protect it from rust, corrosion or normal ware. However, the wire rope may need re-coating or touching up if mishandled or exposed to severe conditions.

If the wire rope should need cleaning or servicing, use a stiff wire brush to clean the dirt off the surface of the wire rope.

Use a cotton cloth to remove any traces of left over dirt. If necessary, dampen the cloth with mineral spirits to help pick up all the dirt and wash the rope surface clean.

Using another cotton cloth, apply a coating of fresh clean grease to the cleaned surface. See “Grease” on page 5-5 for proper type of lubricant.

If the wire rope is found to be damaged or excessively worn, the rope must be replaced.

WEEKLY OR 50 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

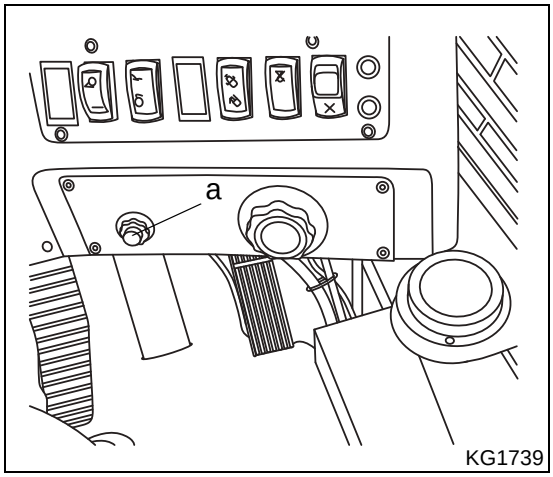

Fig. 5-42

2. Set the parking brake switch (b) in the ON position.

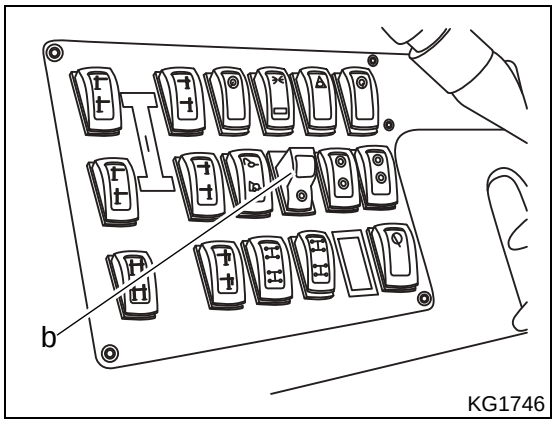

Fig. 5-43

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

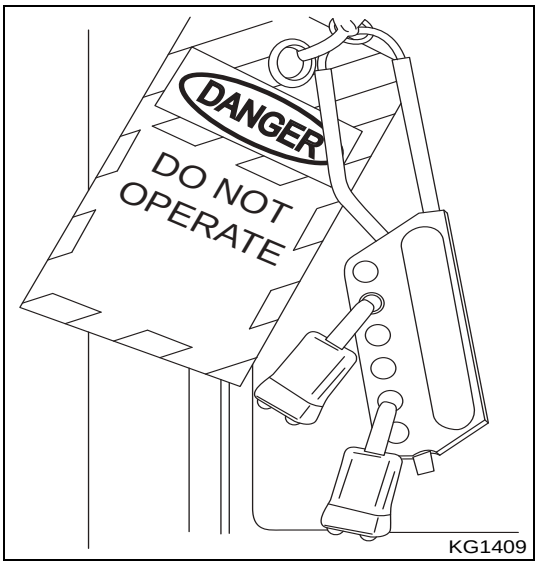

Fig. 5-44

Swing System

Check the swing drive for proper fluid level. Remove plug (a) and inspect for proper oil level. If necessary, top-off oil level, See “Lubricants” on page 5-13 for lubricant type.

NOTE: Torque plug to 50 lbf•ft (68 N•m).

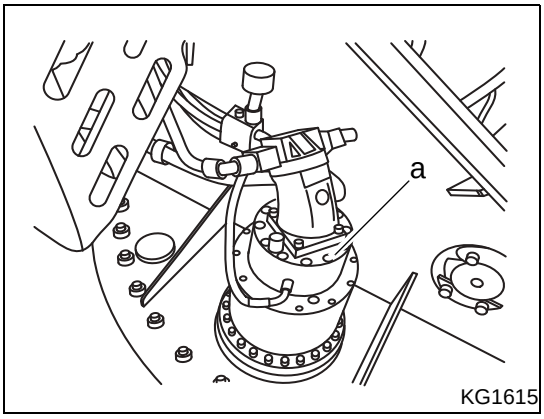

Fig. 5-45

Sheaves

Inspect the condition of the wire rope to sheave contact. Check all sheaves for damage, dents, ware rust or any abnormality.

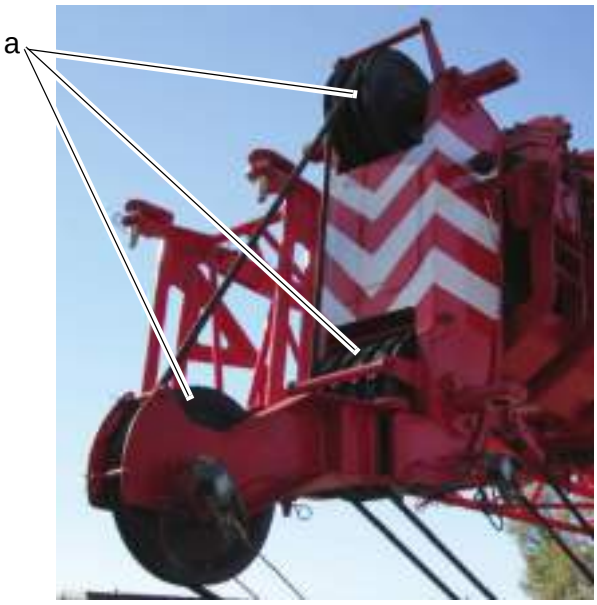

Fig. 5-46

Periodic inspections and overall conditions must be performed and record. After a visual inspection of the sheave is performed a grove gage inspection for the actual wire size being used on the machine must be performed. As shown in the illustration, the grove gage must contact 150° of the arc to be correct.

Too small a sheave or too large a wire rope will cause undo stress on the sheave and will damage the wire rope strands. Daylight under the grove gage is unacceptable.

A grove that is too large will cause the wire rope to flatten under a load. This type of condition will not offer full support of the wire rope thereby restricting the free sliding action of the wire rope strands.

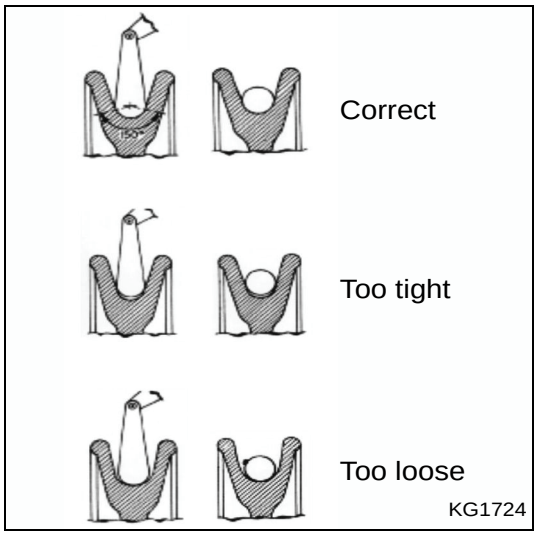

Fig. 5-47

Inspecting the Engine Serpentine Belt

Unlock (a) and open the engine service door to access the serpentine belt.

Fig. 5-48

1. **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.

2. **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 primary contributors.

3. **Pulling**: Belt material is sheared off from the ribs. Lack of tension, misalignment, worn sheaves or a combination of these are factors.

4. **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.

5. **Improper installation**: A belt rib begins separating from the strands. If left unattended, the cover will often separate, causing the belt to unravel.

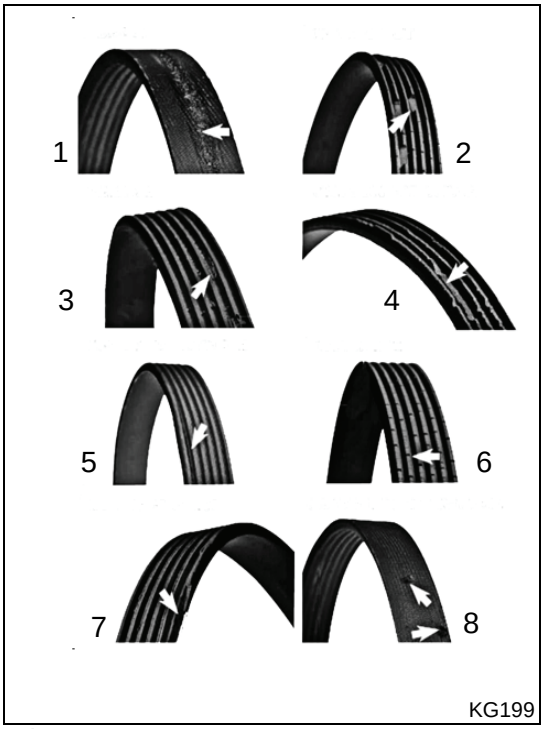

Fig. 5-49

6. **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.

7. **Misalignment**: Sidewalls of the belt may appear glazed or the edge-cord may become frayed. A noticeable noise may result.

8. **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.

NOTICE

Replace the belt with a new one if any of these abnormalities are found. Failure to do so may result in engine damage.

Hydraulic Pumps and Motors

Check the mounting points (a) on all hydraulic pumps and motors. Check for cracks, leakage, loose or missing bolts.

- Main pumps (a)
- Hoist drive motors (b)
- Swing motor (c)

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

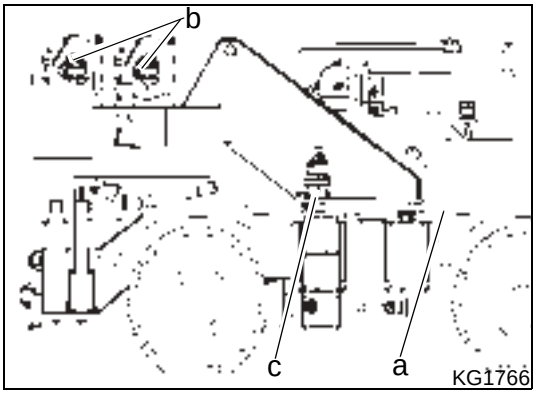

Fig. 5-50

Wheel Lugs

Inspect the wheels for missing or loose lug nuts (a). If the wheel or lugs are damaged, replace them.

NOTE: Torque: 380 - 400 lbf•ft (515 - 542 N•m)

NOTE: If a repair is needed, contact your SANY distributor for repair.

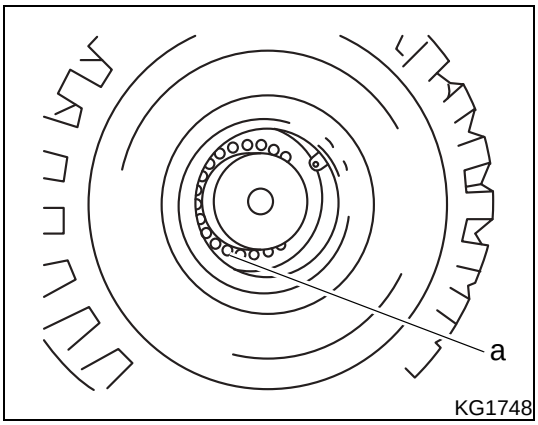

Fig. 5-51

Transmission Filters

Replace the transmission filters (a) at the first 50 and 100 hours of service. See “Environmental Precautions” on page 2-26

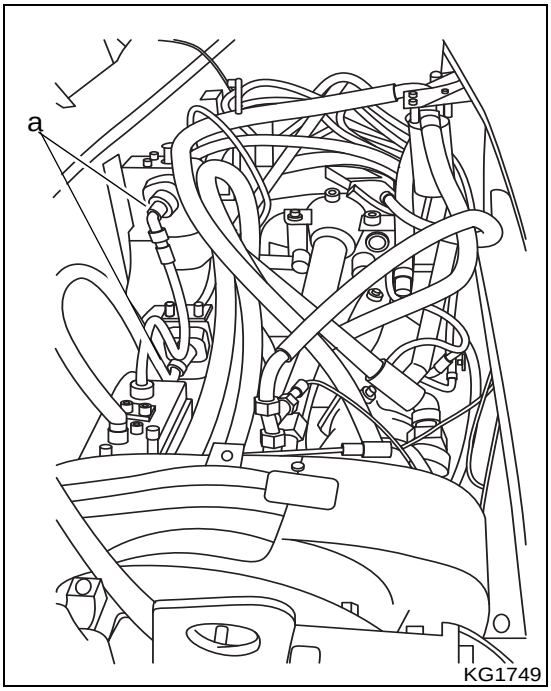

Fig. 5-52

Boom Upper and Lower Wear Pads

Lubricate the upper and lower wear pads (a) on the boom system. See “Lubricants” on page 5-13 for details.

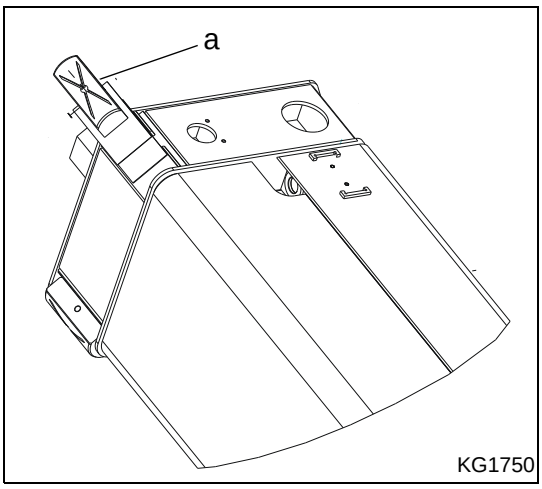

Fig. 5-53

Wiring

Inspect crane system wiring for damage, wear or corrosion.

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

Battery Maintenance

Before proceeding with any battery maintenance procedures, follow and remember these points:

- Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames.
- Always wear personal protective equipment when working with batteries.
- Always 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
- Review Safety Section of this manual: See “Battery Safety” on page 2-25.

CAUTION

Failure to observe and follow these points may result in equipment damage or possible injury.

1. To access the batteries, unlock and open the battery service door (a) of the machine and allow several minutes for any accumulated battery gases to clear before servicing the batteries. Remove the covers to service the batteries.

   NOTE: There are two batteries (b) installed on this machine as shown in the illustration.

Fig. 5-54

2. Set the battery disconnect switch (b Fig. 5-54 to the **OFF** position as shown in the illustration.

Fig. 5-55

3. Check the battery connections (a) and top surfaces (b) for signs of corrosion or dirt build-up. Be sure there is no trash, tools parts or debris in the battery compartment. If the battery is corroded, flush the area with a mix of baking soda and warm water. See “Battery Safety” on page 2-25.

   NOTE: If the batteries are of the serviceable type, follow the battery manufactures instructions for servicing the battery.

4. Once the battery service procedures are complete, set the battery disconnect switch shown in to the (opposite) or **ON** position.

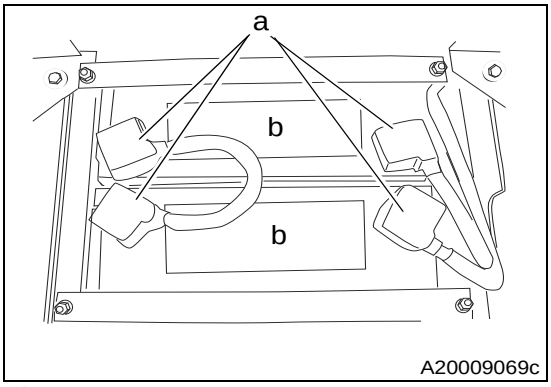

Fig. 5-56

Outrigger System

Extend each outrigger and inspect the outrigger pads (a) beams and support (b) and the cylinders (c) for damage, excessive wear, leakage, cracks or bending. See “Outrigger operation” on page 4-46.

NOTE: If any of these conditions exist contact your SANY distributor for repairs.

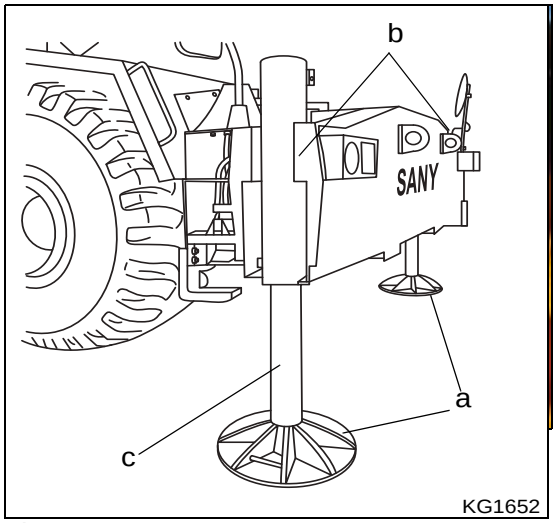

Fig. 5-58

Counterweight System

Inspect the counterweight mounting locations (a) for loose or missing bolts. If any bolts are missing or damaged, replace them, if they are loose, re-torque them using the torque chart in “Torque Values” on page 5-8 for details.

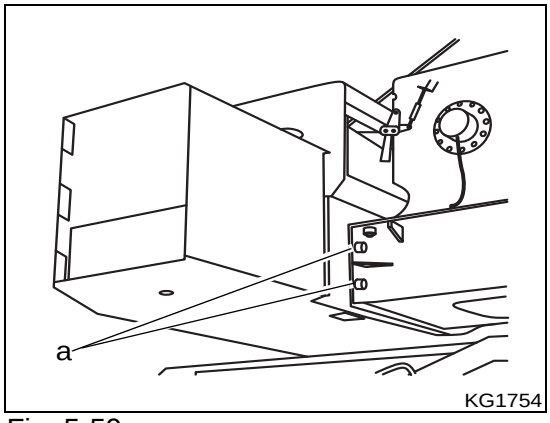

Fig. 5-59

Hydraulic Hoses

NOTE: See “High-Pressure Fluid Lines” on page 2-24

Inspect all hydraulic hoses for leakage, damage, deterioration or any abnormal wear. If any of these conditions are found during the inspection, replace the hose.

MONTHLY OR 250 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

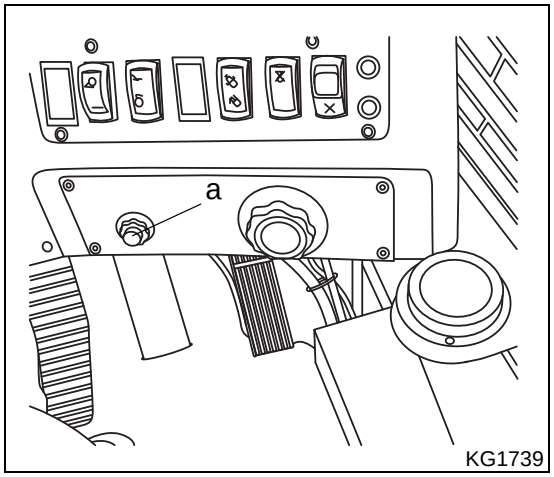

Fig. 5-60

2. Set the parking brake switch (b) in the ON position.

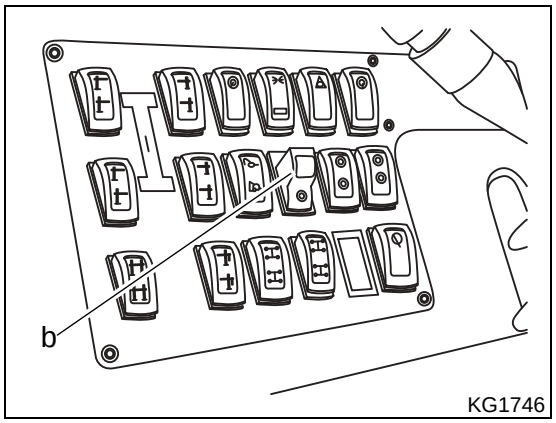

Fig. 5-61

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

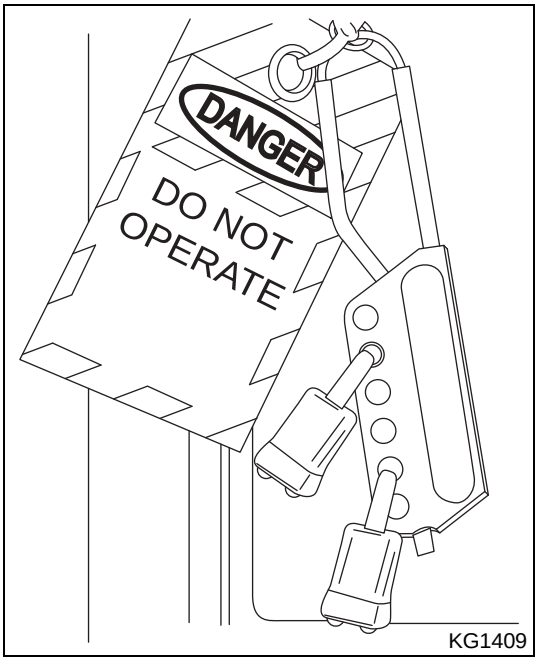

Fig. 5-62

Inspecting Cooling System Cores

To inspect or clean the radiator, charge air cooler or condenser cores as shown in the illustration. See “Crane Maintenance Locations” on page 5-14 for location.

Inspect the condition of the core fins, be sure there is no damage, leakage or blockage. If necessary, use mild soap and low pressure water 40 psi (276 kpa) to clean the core fins.

NOTE: If leaking or damaged, contact your SANY distributor for repairs.

NOTICE

Never use a steam cleaner or high pressure water to clean the cooling system cores. Damage to the cores will result.

Fig. 5-63

Hose Clamps Guards and Shields

Check the condition of all hose clamps, guards and shields. Be sure they are not damaged, missing or interfering with the hose system. If any problems are found, contact your SANY distributor for repairs.

Lubrication Points

Lubricate all pivot points on the machine on a monthly basis or every 250 hours of service. See “Grease” on page 5-5 for the correct type of grease to use.

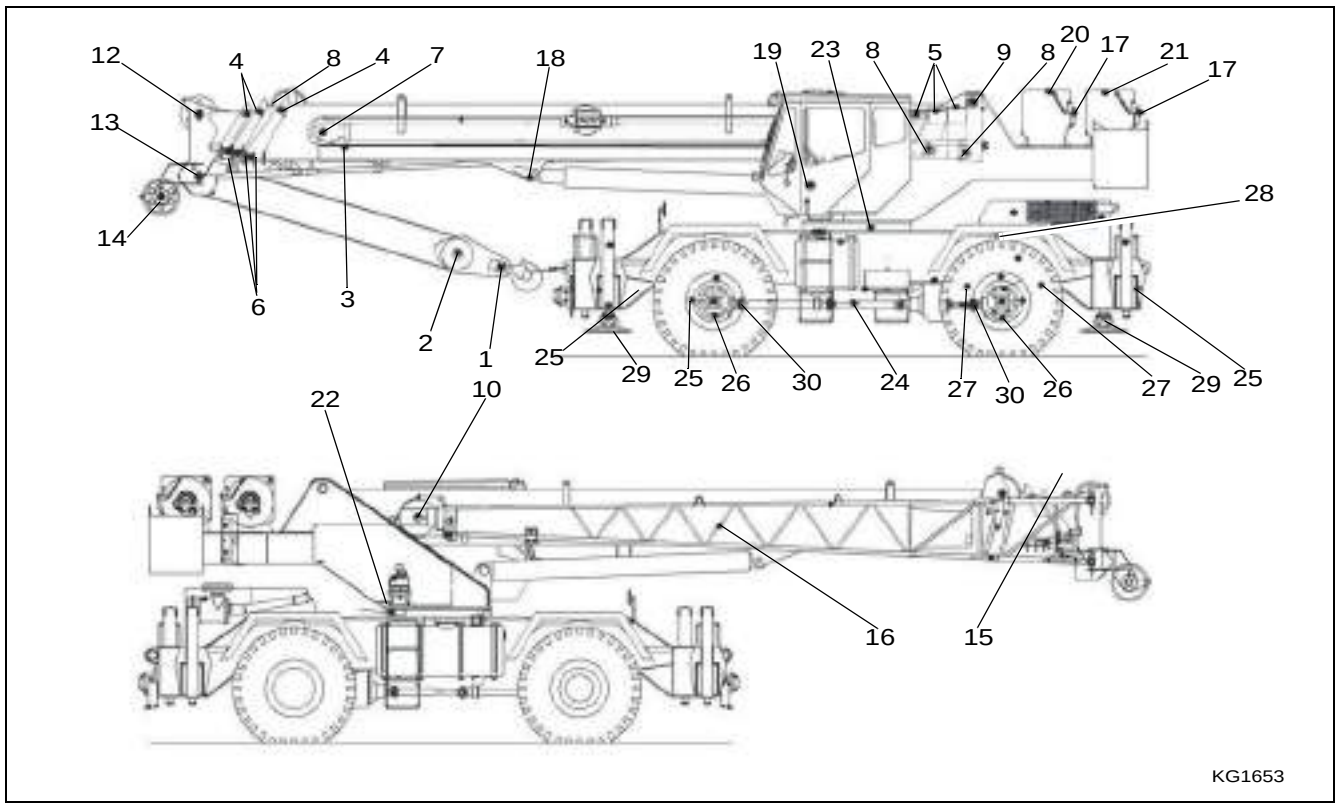

Fig. 5-64

Item No.	Description	Item No.	Description
1	Hook block bearing	16	Swing-away hanger wear pads
2	Hook block sheaves	17	Cable follower arms
3	Telescopic cylinder wear pads	18	Upper lift cylinder pivot points
4	Side wear pads	19	Lower lift cylinder pivot points
5	Boom section upper wear pads	20	Main hoist
6	Boom section lower wear pads	21	Auxiliary hoist (Optional)
7	Extension cable sheaves	22	Rotary drive pinion
8	Retractor cable sheaves	23	Rotary bearing
9	Boom pivot shaft	24	Drive line - slip joint
10	Off set sheave	25	Steering cylinder pivot pins
11	Not Used	26	Upper and lower king pins
12	Upper boom head sheave	27	Rear axle center pivot pins
13	Lower boom head sheave	28	Lockout cylinder pivot pins
14	Aux. boom nose sheave	29	Outrigger pad ball
15	Offset boom extension mast sheave	30	U- joints

Swing System Bolts

Check the swing system mounting bolt torque the first 300 hours of service. Check for damage, loose or missing bolts. Look for signs of cracking.

- Swing motor mounting (a): 72 - 78 lbf•ft (97 - 105 N•m)
- Turn table bolts (b): 857 - 929 lbf•ft (1,162 - 1,260 N•m)

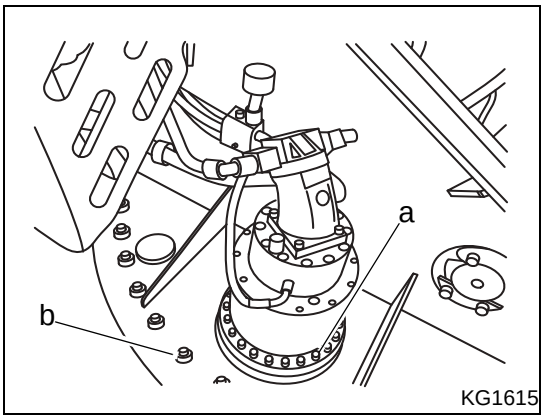

Fig. 5-65

Swing System Oil Drain

At the first 250 hours of service, drain and fill the swing drive unit. Remove plug (a) to relieve system pressure. Place a 2 gal (8 L) container under plug port (b) and remove the drain plug (b). See "Environmental Precautions" on page 2-26

Once the system is fully drained, install plug (b) and fill system with the proper oil. See "Lubricants" on page 5-13 for oil. Once full, install plug (a).

NOTE: Torque both plugs to 50 lbf•ft (68 N•m)

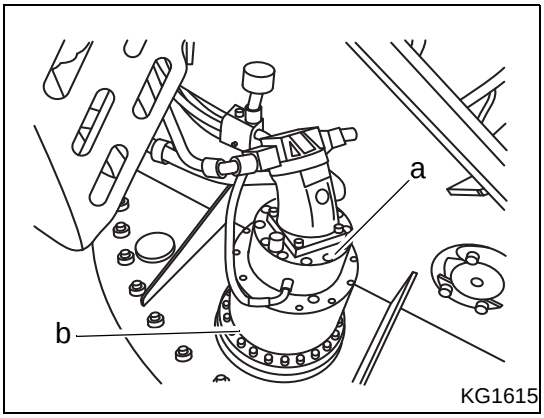

Fig. 5-66

Replacing the Engine Oil and Filter

See "Crane Maintenance Locations" on page 5-14 item 7.

WARNING

Always allow the engine ample cool down time before draining the engine oil or removing the engine oil filter. Failure to do so could result in serious burns.

Place a container able to hold 10 gal (38 L) of fluid under the engine oil pan drain port (a), then remove the drain plug.

NOTE: Do not drain oil on the ground. Environmental laws require the proper recovery and disposal of fluids and filters. Failure to do so may result in fines or punishment. See "Environmental Precautions" on page 2-26

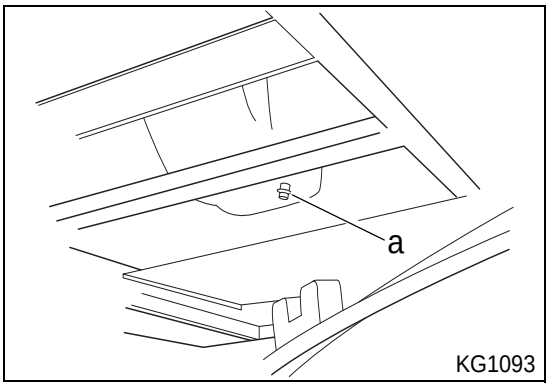

Fig. 5-67

Accessing the engine oil filter

The oil filter should be changed each time the engine oil is changed.

1. To access the engine oil filter.

2. Place a container under the oil filter cartridge (a) and remove the oil filter by rotating it in a counterclockwise direction.

   NOTE: Do not drain oil on the ground. Environmental laws require the proper recovery and disposal of fluids and filters. Failure to do so may result in fines or punishment. See "Environmental Precautions" on page 2-26

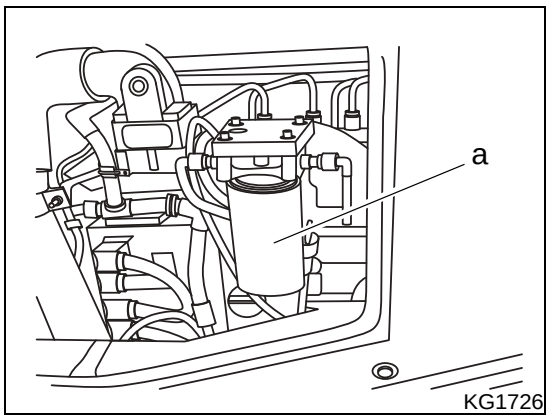

Fig. 5-68

3. Clean the oil filter mounting surface, then follow the instructions on the new oil filter cartridge (a).

4. Refill with the correct oil through the "engine oil fill" port (a) on the top of the valve cover as specified on the "Ambient Temperature Chart" on page 5-10 and table of "Capacities" on page 5-12.

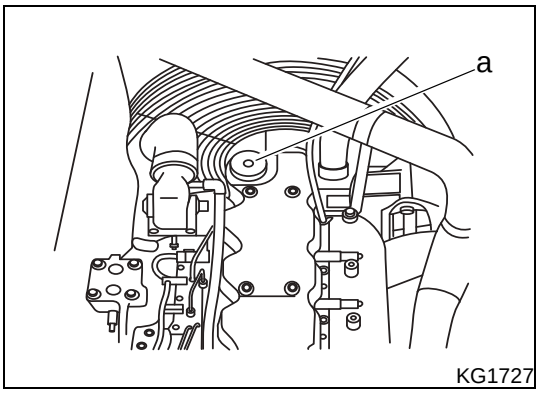

Fig. 5-69

NOTICE

Do not overfill the engine oil pan. Oil foaming inside the engine or damage to the engine seals may result.

5. 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. See “Engine Starting Procedure” on page 4-43 in the operation manual for details.

Shut the engine down, wait for several minutes, then check the oil level on the dip stick. Be sure the oil level falls between the (H) and (L) marks on the dip stick. Add more oil only if required. See “Shutdown Procedure” on page 4-46 in the operation manual for details.

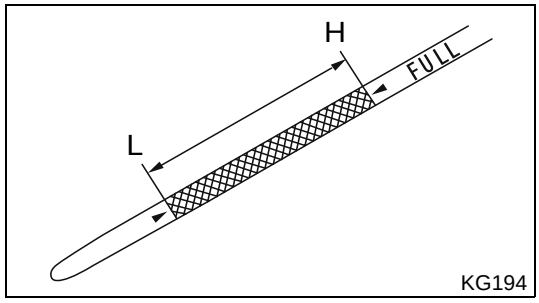

Fig. 5-70

Fire Extinguisher and First Aid Kit

Check to be sure the fire extinguisher is installed on the machine and in proper working order. Follow the instructions on the extinguisher to test the operation and condition. See “Extinguisher and First Aid Kit” on page 2-14

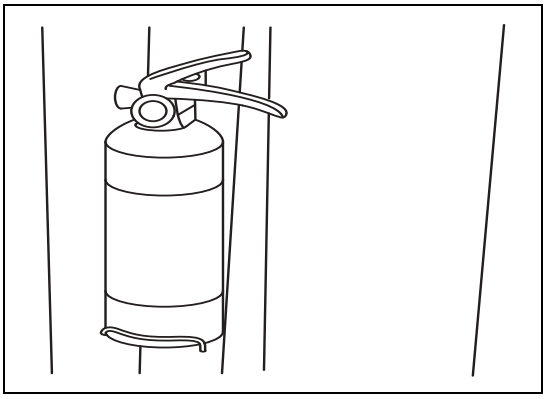
Fig. 5-71

Boom

Extend the boom and inspect it for signs of abnormal ware, damage, dents, cracks or bending.

NOTE: If any abnormal condition is found with the boom system, do not use the crane and contact your SANY distributor for repairs.

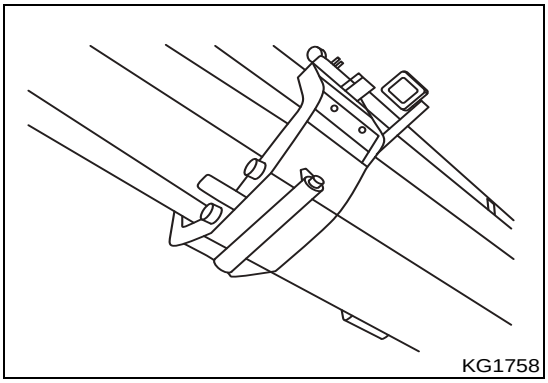

Fig. 5-72

Boom Extension

Check the condition of all sections of the boom extension. Check the pin locations for excessive wear, check the structure for damage, cracks or signs of excessive rust damage.

NOTE: If any abnormal condition is found, do not use the crane and contact your SANY distributor for further evaluation and service.

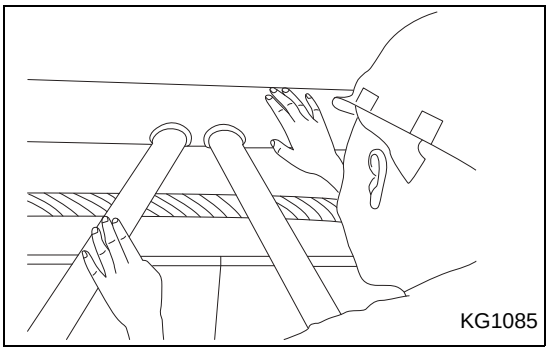

Fig. 5-73

Main Valve Body

Check the condition of the main valve body to be sure it is not leaking, damaged, loose or cracked.

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

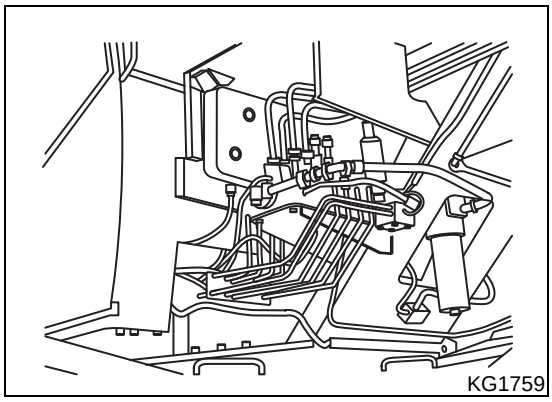

Fig. 5-74

3 MONTHS OR 500 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

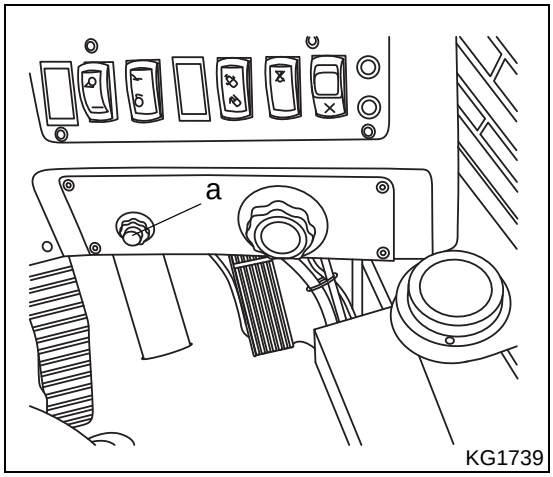

Fig. 5-75

2. Set the parking brake switch (b) in the ON position.

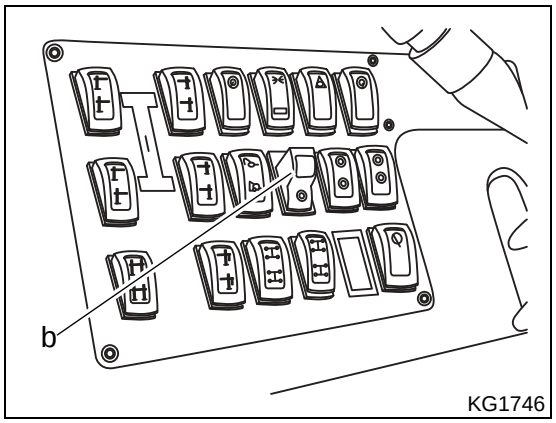

Fig. 5-76

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

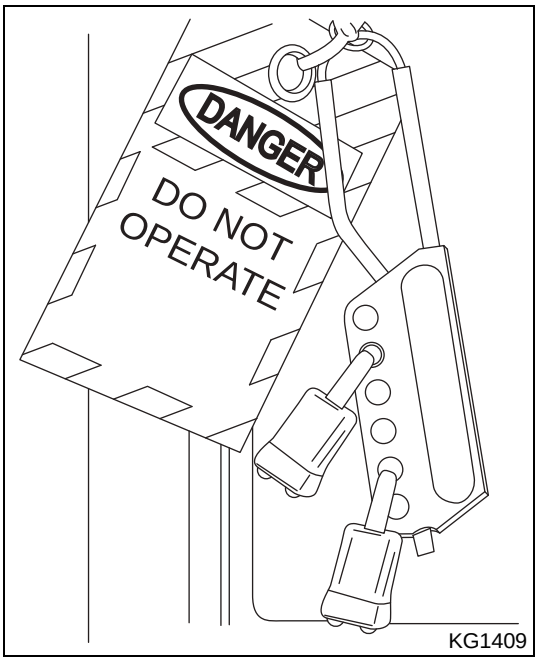

Fig. 5-77

Turntable Bolts

Check the turntable mounting bolt torque. Check for damage, loose or missing bolts. Look for signs of cracking.

Torque the turn table bolts (a): 857 - 929 lbf•ft (1,162 - 1,260 N•m)

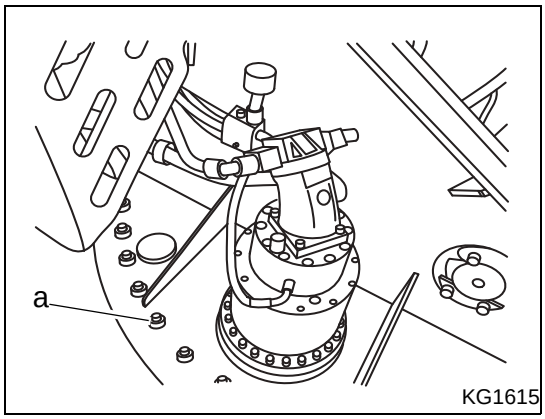

Fig. 5-78

Hoist Mounting Bolts

Inspect the main and auxiliary hoist mountings (a) for loose or missing bolts, cracks or any abnormal condition. See “Crane Maintenance Locations” on page 5-14 items 18 and 19.

- Torque bolts (a):1,047 - 1,134 lbf•ft (1,420 - 1,538 N•m)

NOTE: If any abnormality is found, contact your SANY distributor for repairs.

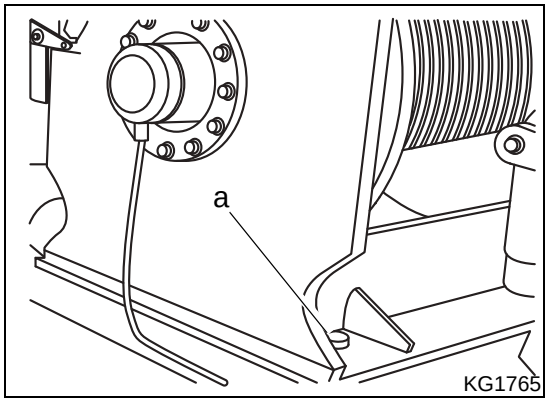

Fig. 5-79

Muffler and Exhaust System

Inspect the condition of the muffler (a). See "Crane Maintenance Locations" on page 5-14 for location of exhaust system.

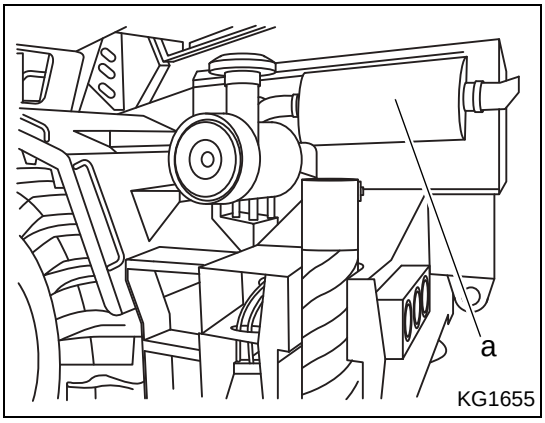

Fig. 5-80

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 possible injury.

NOTE: If any problems are found, contact your SANY distributor for repairs.

Replacing the Engine Oil and Filter

For details on replacing the oil and filter: See "Replacing the Engine Oil and Filter" on page 5-41 for details.

Replacing the 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 filter (a) behind the left front wheel as shown in the illustration.

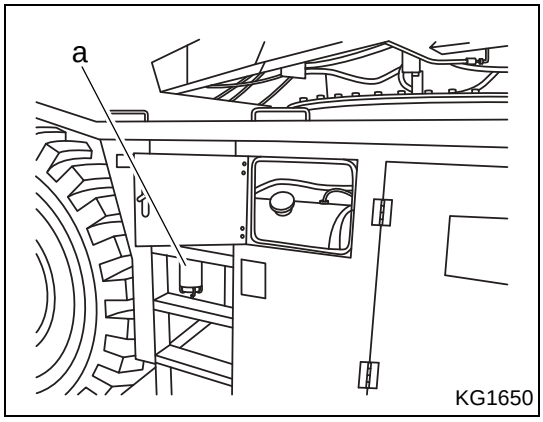

Fig. 5-81

2. Place an appropriate size container (b) below the fuel filter (a), then open the drain valve (c) to allow all the fuel to drain from the filter.

3. Remove the primary filter (a) and dispose of it properly.

   NOTE: Always avoid draining fuel on the ground or disposing of used filters improperly. Environmental laws require the proper recovery and disposal of fluids and filters. Failure to do so may result in fines or punishment. See “Environmental Precautions” on page 2-26

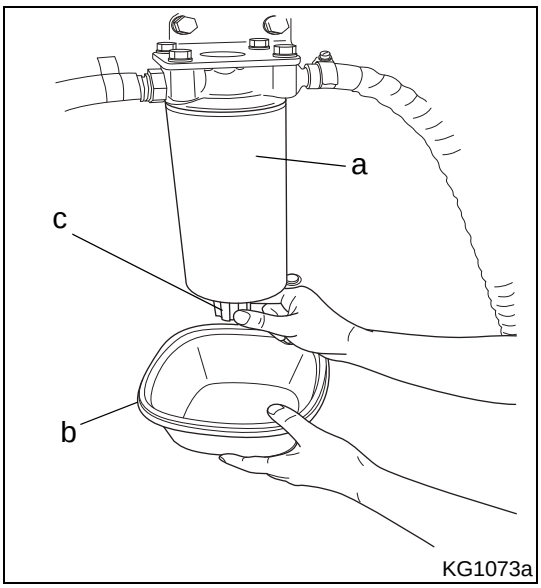

Fig. 5-82

4. With the new primary fuel filter upright as shown in the illustration and plug (d) in the center hole of the filter, fill the filter with fresh clean diesel fuel through inlet holes (e) until the filter is completely full.

   NOTE: Leave plug (d) in place until the filter has been filled with fresh fuel and you are ready to install it on the filter support.

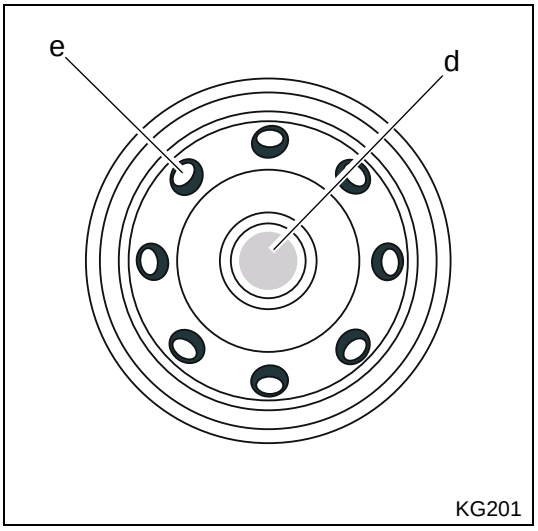

Fig. 5-83

5. Remove plug (d) from the center hole of the new filter, then install the new filter on the filter support as shown in the illustration. Following the directions on the fuel filter body when installing the filter.

6. Once the filter is installed, start the engine and allow it to run at an idle speed. See “Engine Starting Procedure” on page 4-43

7. Check the system for leaks.

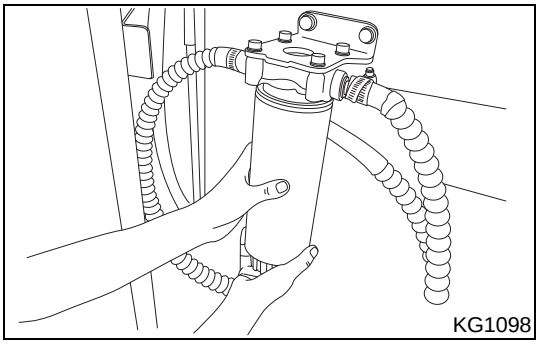

Fig. 5-84

Steering and Suspension System

Inspect all steering connection locations for looseness, damage or excessive wear. Inspect the suspension system for damage, loose components.

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

Lubricate all steering and pivot locations. See “Grease” on page 5-5 for the type of grease to use and “Lubrication Points” on page 5-40 for details.

Fig. 5-85

Drive Shaft Slip Joint

Inspect the drive shaft slip joint for loose conditions, rust, damage or extensive wear.

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

Lubricate all sliding areas of the drive shaft slip joint. See “Grease” on page 5-5 for the type of grease to use and “Lubrication Points” on page 5-40 for details.

Fig. 5-86

Boom Lift Cylinder Pins

Inspect and lubricate the main boom lift cylinder mounting locations (a). See “Grease” on page 5-5 for the type of grease to use and “Lubrication Points” on page 5-40 for details.

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

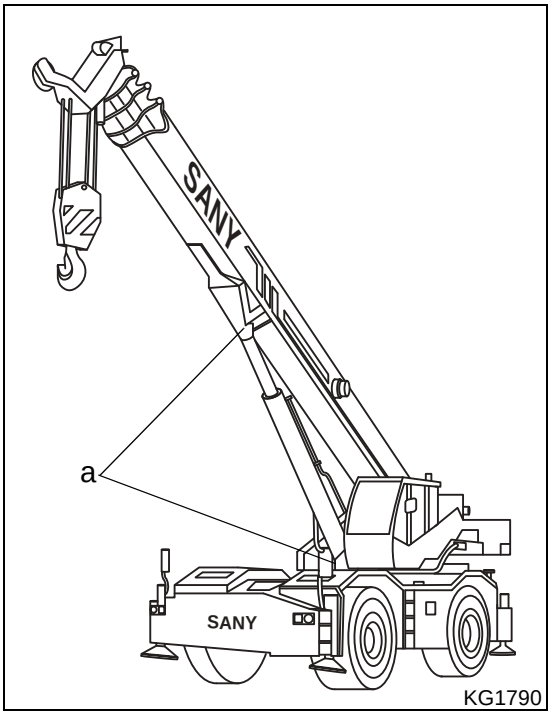

Fig. 5-87

Boom

For details in inspecting the boom system: See “Boom” on page 5-43.

Crane Structure

Check the complete crane chassis for any damage, missing components, broken welds or any abnormal condition. If any of these conditions are found, contact your SANY distributor for repairs.

6 MONTHS OR 500 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

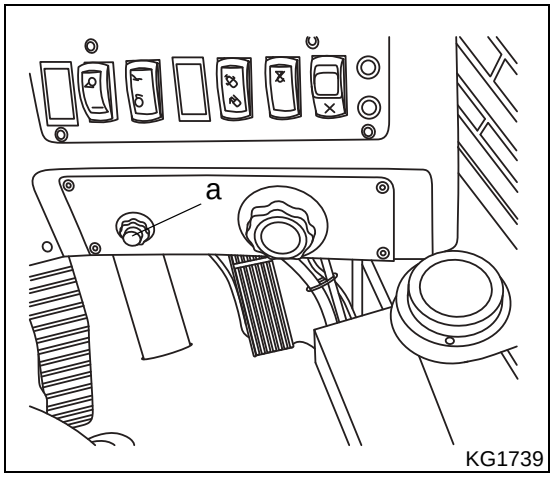

Fig. 5-88

2. Set the parking brake switch (b) in the ON position.

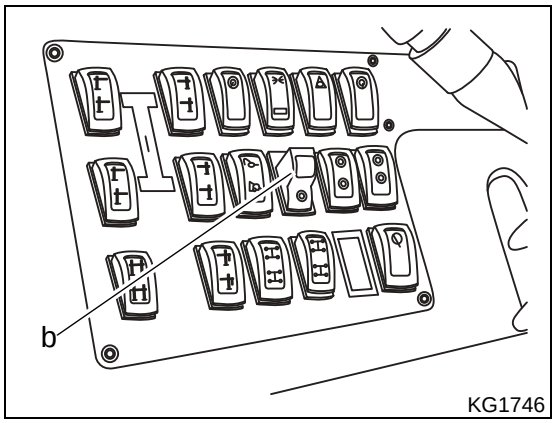

Fig. 5-89

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

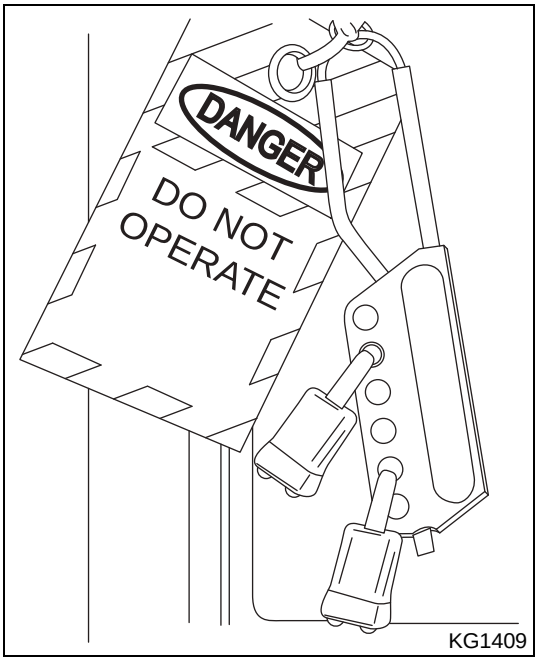

Fig. 5-90

Replacing the Engine Oil and Filter

For details on replacing the engine oil: See “Replacing the Engine Oil and Filter” on page 5-41.

Replacing the Secondary 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. Remove and discard the old secondary fuel filter (a).

   NOTE: Do not drain fuel on the ground or disposing of used filters improperly. Environmental laws require the proper recovery and disposal of fluids and filters. Failure to do so may result in fines or punishment. See “Environmental Precautions” on page 2-26

2. With the new secondary fuel filter upright as shown in the illustration and plug (b) in the center hole of the filter, fill the filter with fresh clean diesel fuel through inlet holes (c) until the filter is completely full.

   NOTE: Leave plug (b) in place until the filter has been filled with fresh fuel and you are ready to install it on the filter support.

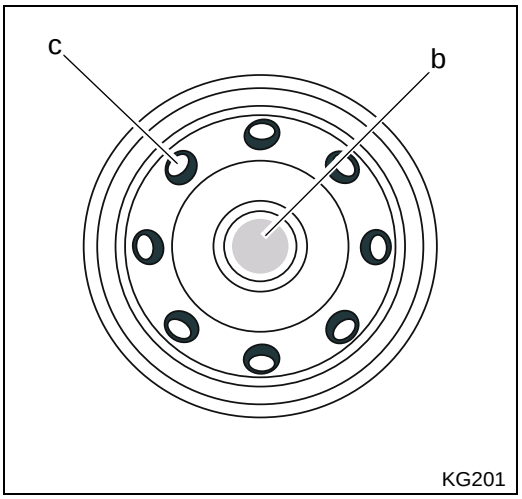

Fig. 5-91

3. Remove plug (b) from the center hole of the filter, then install the filter on the filter support as shown in the illustration. Following the directions on the fuel filter body when installing the filter.

4. Once the filter is installed, start the engine and allow it to run at an idle speed. See “Engine Starting Procedure” on page 4-43

5. Check the system for leaks.

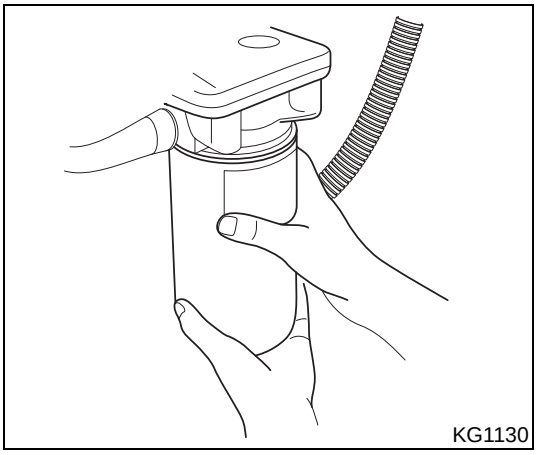

Fig. 5-92

Swing Gear System

Inspect and lubricate the swing gear and pinion system. See “Grease” on page 5-5 for the correct grease to use and “Lubrication Points” on page 5-40 for details.

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

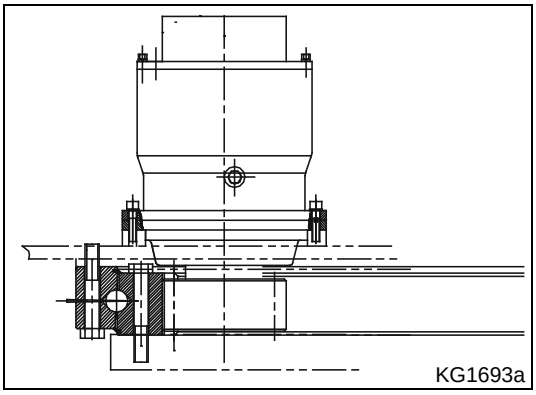

Fig. 5-93

Cable Reel

Inspect the cable reel (a) for damage, excessive wear or missing parts.

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

If required, lubricate all movable areas. See “Grease” on page 5-5 for the correct type of grease to use and “Lubrication Points” on page 5-40 for details.

Fig. 5-94

6 MONTHS OR 1,000 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

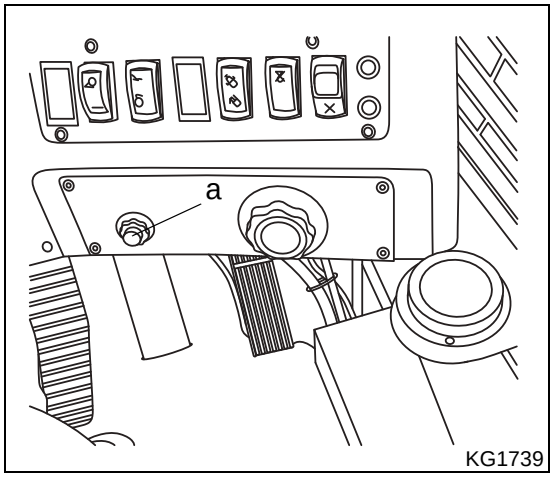

Fig. 5-95

2. Set the parking brake switch (b) in the ON position.

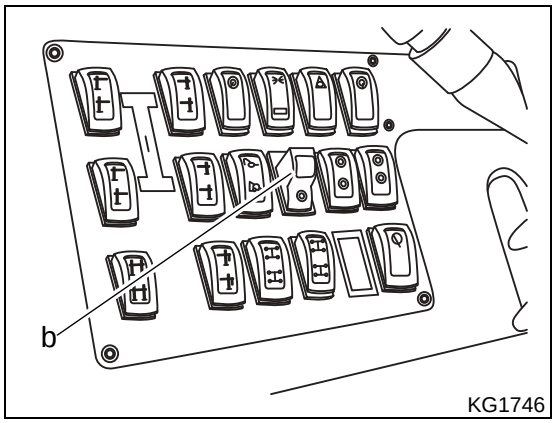

Fig. 5-96

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

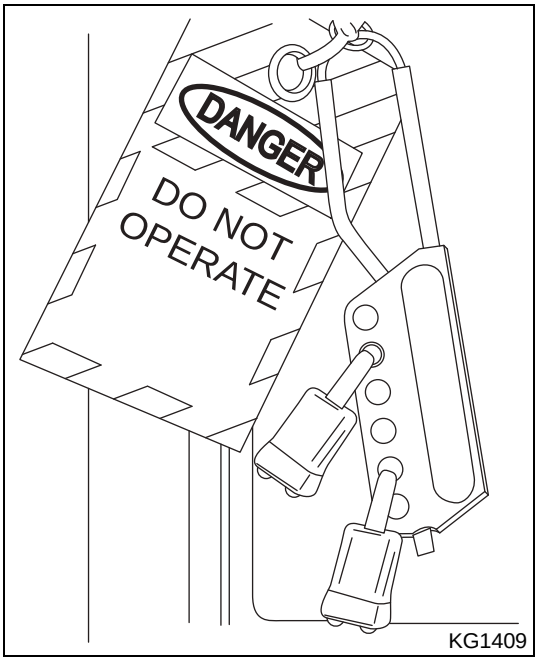

Fig. 5-97

Transmission Torque Converter

See “Transmission/Converter Oil Level” on page 5-25 for service details.

Swing Drive System

Inspect the swing drive system for leaks, damage, cracks loose or missing bolts. If any abnormal condition is found, contact your SANY distributor for repairs.

Drain and fill the swing system. See “Swing System Oil Drain” on page 5-41 for details.

Boom Wear Pads

For details See “Boom Upper and Lower Wear Pads” on page 5-35 for details.

Brake Lines

Inspect all brake lines for damage, leakage or any abnormal condition.

NOTE: If any abnormal condition is found, contact your SANY distributor for repairs.

12 MONTHS OR 500 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

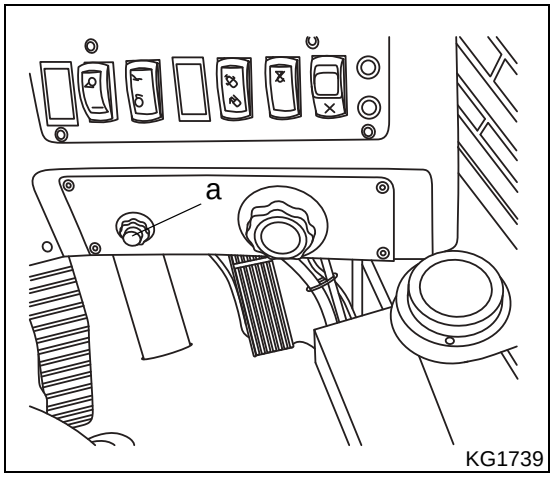

Fig. 5-98

2. Set the parking brake switch (b) in the ON position.

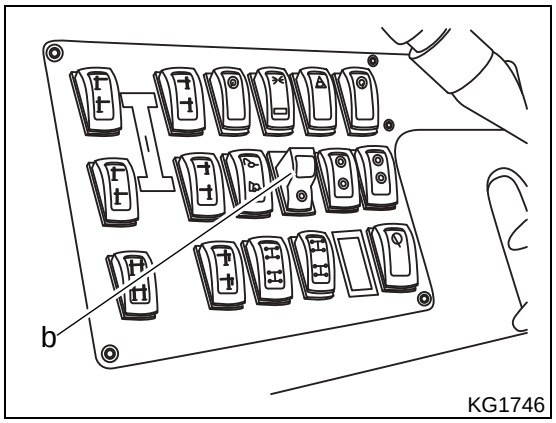

Fig. 5-99

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

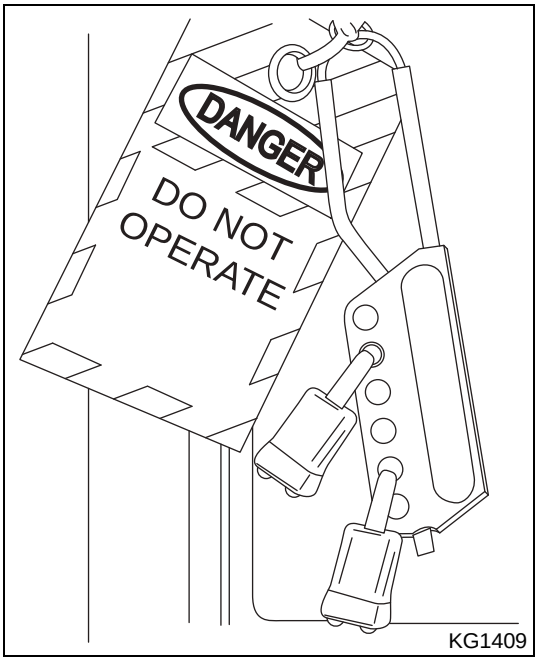

Fig. 5-100

Swing Drive System

For details on inspecting the swing drive system: See “Swing Drive System” on page 5-55 for details.

Sheaves

For details on inspecting the sheaves: See “Sheaves” on page 5-32.

12 MONTHS OR 1,000 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

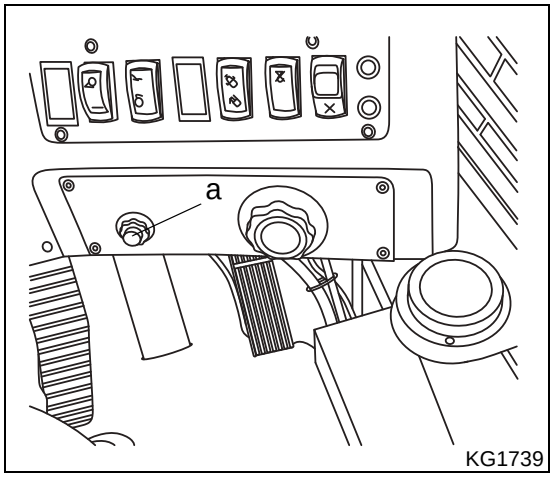

Fig. 5-101

2. Set the parking brake switch (b) in the ON position.

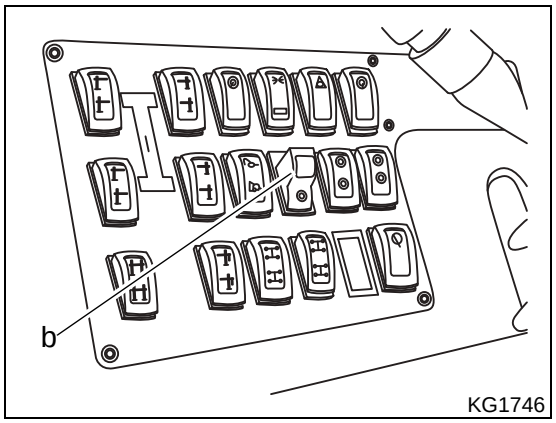

Fig. 5-102

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

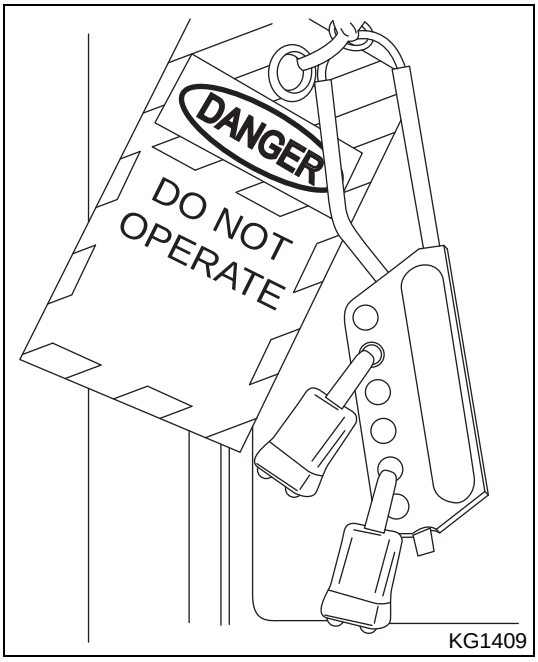

Fig. 5-103

Main and Auxiliary Hoist

The service points (a) for lubricating and inspecting the main and auxiliary hoist drives are indicated in the illustration.

See “lubricants, Coolant and Filters” on page 5-10 for details.

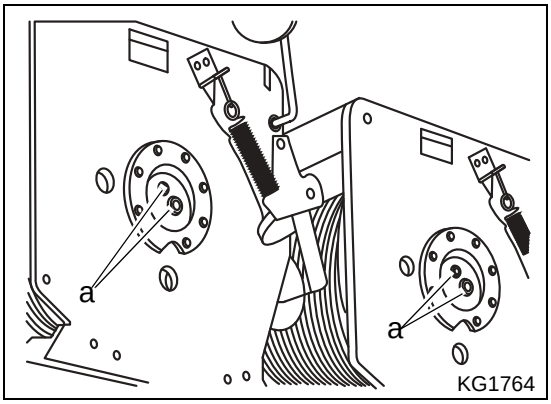

Fig. 5-104

12 MONTHS OR 2,000 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

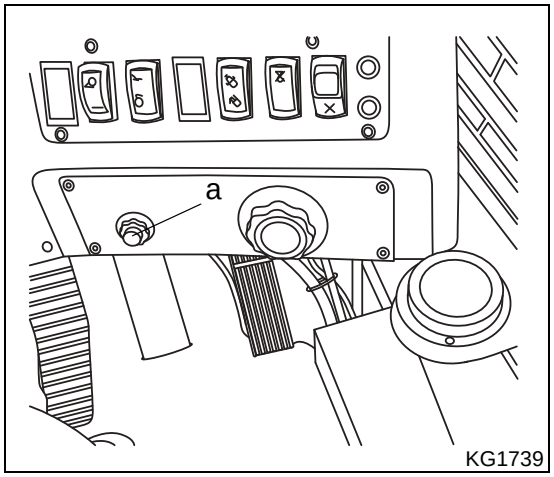

Fig. 5-105

2. Set the parking brake switch (b) in the ON position.

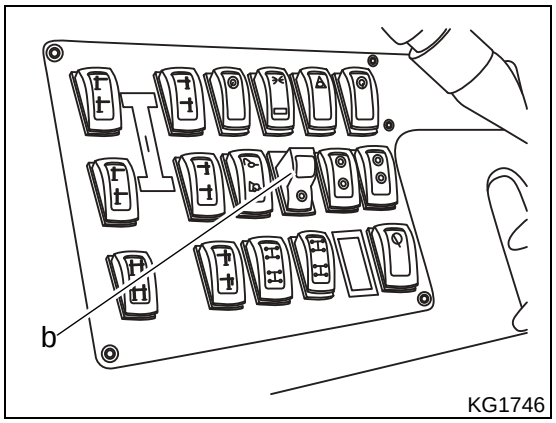

Fig. 5-106

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

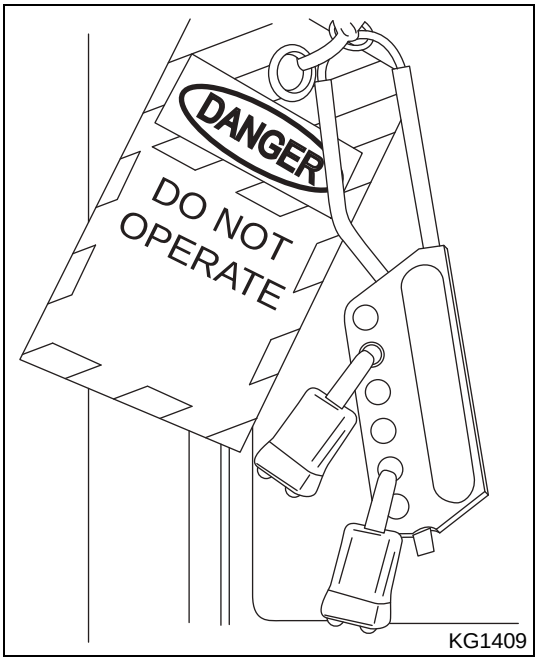

Fig. 5-107

Flushing the Cooling System

WARNING

Do not tamper with the cooling system 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 servicing the cooling system. Failure to follow this warning could result in serious injuries.

NOTE: For procedures and information on flushing the engine cooling system, contact your SANY distributor for details.

See “Capacities” on page 5-12 and “Engine Coolant” on page 5-12 for amount and type of coolant. See “Environmental Precautions” on page 2-26

Changing the Hydraulic Oil and Filters

See “Crane Maintenance Locations” on page 5-14 for location.

WARNING

This system is under pressure when hot. Always allow the hydraulic system ample time to cool down to ambient outdoor temperature before servicing the hydraulic system. Failure to do so could result in unexpected spurting of hot hydraulic oil which could result in serious injury.

NOTE: If a component has been changed because of a failure that might allow metal or abrasive particles to enter the system, all systems must be thoroughly checked, drained, and flushed.

1. Remove the reservoir drain plug. Allow about three minutes after hydraulic oil stops flowing from the drain port for the side walls to drain.

   NOTE: See “Environmental Precautions” on page 2-26

2. Clean and install the reservoir plug and fill the reservoir with a mineral spirits.

3. Remove the reservoir drain plug and drain the reservoir.

   NOTE: See “Environmental Precautions” on page 2-26

4. Clean and install the drain plug and fill the reservoir with clean hydraulic oil. See “Capacities” on page 5-12. Fill the reservoir to the full mark on the reservoir sight gauge. See “Checking the Hydraulic Oil Level” on page 5-24

   NOTE: The system must be filled with all cylinders retracted.

5. After the reservoir is filled, operate all circuits and recheck the reservoir sight gauge.

   NOTE: When hydraulic oils are changed, recheck the reservoir hydraulic oil level after brief system operation and add hydraulic oil as required. See “Checking the Hydraulic Oil Level” on page 5-24

6. Add additional hydraulic oil as required. See “Checking the Hydraulic Oil Level” on page 5-24

   NOTE: Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

Removing Air From the Hydraulic System

Air entering the hydraulic oil will normally be removed automatically by passage of the hydraulic oil over the baffles in the hydraulic reservoir. If a component has been replaced, the reservoir level is too low, or a leak develops in the suction lines to the pumps, air can enter the system. If air becomes entrapped in the hydraulic oil, it may be detectable in pumps and motor operated components such as the swing mechanism and hoist(s), because it can cause these units to become noisy during operation. If noisy operation occurs, first check the level of the hydraulic reservoir and replenish as necessary. Then inspect for leaks in the suction lines leading to the pumps.

Minute leaks may be hard to locate. If a leak is not readily detectable, use the following way to check for it:

Seal all normal openings in the hydraulic system and the reservoir. Using a positive means to control the pressure (like a regulator), pressurize the hydraulic system to 13.8 to 27.6 kPa (0.14 to 0.28 bar) (2 to 4 psi) and inspect all joints and fittings for evidence of leaks. A soap solution applied to the fittings and joints may also prove helpful in detecting minute leaks while the system is pressurized. Remove the pressure, repair any leaks found, and reopen any openings (such as a vent) closed for inspection. Refill the reservoir after completing any repairs or service. Operate all hydraulic circuits several times in both directions.

This action should return any entrapped air to the reservoir where it can be removed from the hydraulic oil by the baffles.

To remove entrapped air from telescope cylinders, lower the boom to below horizontal and fully telescope the boom in and out several times.

If the air is not readily removed, lower the boom to below horizontal, extend the telescope cylinders as far as practicable, and allow the boom to remain in this position overnight. This should allow entrapped air to find its way to the holding valve so that telescoping the boom IN the next morning should force the air back to the reservoir. Ensure the boom is first telescoped IN (not OUT) in the morning. Telescoping OUT may cause air to be forced back into a cylinder.

Entrapped air may be removed from cylinders having wet rods by cycling. On certain cylinders, a plugged port is provided on the rod end to bleed off entrapped air.

In the event that air entrapment should persist, bleeding of air by loosening various clamp and screw type fittings may become necessary.

NOTE: If the above procedures fail to eliminate air entrapment, contact your authorized SANY Distributor.

Rotary Reducer (Swing System)

Below is the procedure outlining how to test the performance of the braking function for the rotary reducer.

1. Set up the machine in a clear area for normal operations. See “Outrigger Set-Up” on page 4-23

2. Extend the boom. See “Boom Operation” on page 4-52

3. Carefully slew the boom in both directions while monitoring the brake function stopping distance. See “Swinging the boom” on page 4-53

   NOTE: Use the swing brake pedal to stop rotation. See “Brake Systems” on page 3-11

   - If the stopping distance is unusually long or slow to stop, the rotary reducer braking system may be at the end of its life cycle.

   - If the stopping distance is normal the rotary reducer braking system is functioning properly.

4. After testing procedures are complete, retract the boom. See “Boom Operation” on page 4-52

5. Remove the drain plug (a) from the rotary reducer and inspect the drained fluid condition.

   - Dark colored fluid with a strong, unusual odor indicates the fluid is probably burned. As a result, the braking system has been overheated and should be replaced.

   - Chunks or small fragments of braking material in the fluid indicates that the braking material is failing or the brakes are simply worn out and in need of replacement.

   NOTE: Contact your SANY distributor if the braking system needs repair.

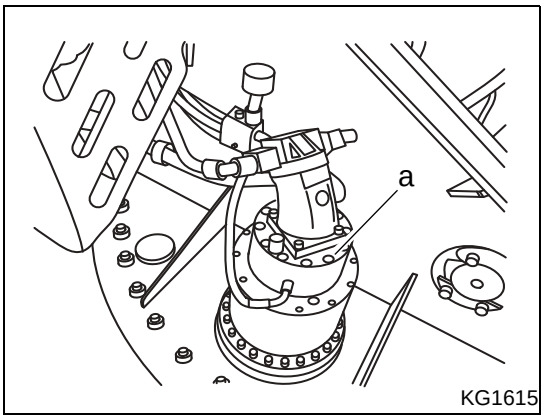

Fig. 5-108

Sheaves

For information on inspecting the sheaves: See “Sheaves” on page 5-32 for details.

Hoist Drums

For information on inspecting the hoist: See “Main and Auxiliary Hoist” on page 5-18 for details.

Wire Rope Inspection

For wire rope inspection: See “Wire Rope Inspection” on page 5-26 for details.

24 MONTHS OR 4,000 HOUR MAINTENANCE CHECKS

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.

Securing Machine for Maintenance

1. Park the machine on a level flat surface, shut the engine down and remove the ignition key (a).

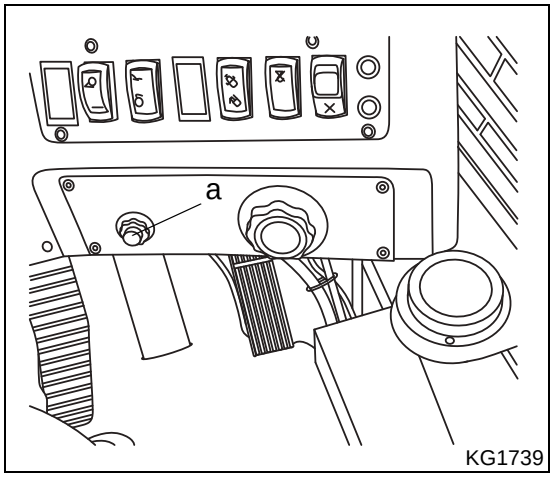

Fig. 5-109

2. Set the parking brake switch (b) in the ON position.

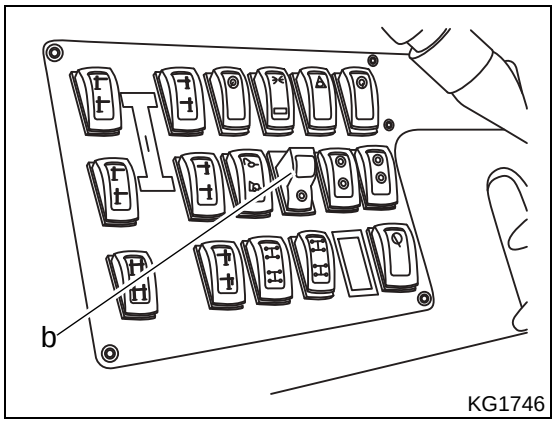

Fig. 5-110

3. Follow the Lock-out Tag-out procedure in the Safety section of this manual and always allow the systems time to cool down before proceeding with any service. See “Lockout/Tagout Procedures” on page 2-40 for details.

   NOTE: For locations of service components, see “Crane Maintenance Locations” on page 5-14 for details.

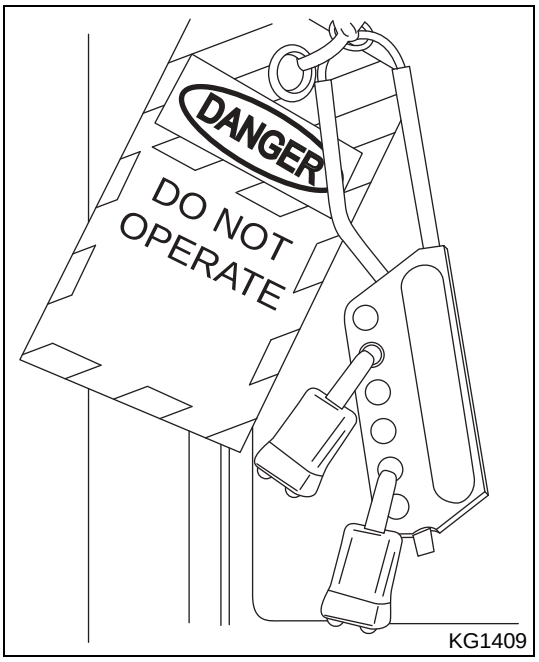

Fig. 5-111

Changing the Hydraulic Oil and Filters

For information on changing the hydraulic filters and draining the hydraulic tank: See “Changing the Hydraulic Oil and Filters” on page 5-62 for details.

MACHINE STORAGE

Before placing the machine in storage, it is important to follow these basic storage procedures listed below. When storing a machine, be sure the machine is stored in an area where access to the machine is restricted from the public and unauthorized personnel. Failure to do so may result in vandalism or unauthorized access to the machine. Always keep in mind that you are responsible for the machine.

Storage Preparation

- Slewing Ring System: Inspect, clean and lubricate the gear teeth. See “lubricants, Coolant and Filters” on page 5-10.
- Wire Rope (hoist): Inspect and grease the wire rope before retracting it on to the drums. See “Grease” on page 5-5.
- Hydraulic System: Check the hydraulic system for any leaks or damage. Be sure the hydraulic tank is full. See “lubricants, Coolant and Filters” on page 5-10.
- Machine: Inspect the service doors for damage or missing parts. Be sure all service doors are locked and secured to prevent unauthorized access or vandalism.
- Engine: Check the engine for leaks or excess build up of oil residue. Pressure wash the engine and pump to remove any build up if necessary.
- Cooling System: Top off the engine coolant and fuel tank to prevent any condensation from forming. See “lubricants, Coolant and Filters” on page 5-10.
- Lighting: Check to be sure all the lighting systems work properly and are not damaged.
- Tires: Be sure the tires are fully inflated and lifted off the ground.
- Boom and Boom Systems: Inspect the boom, sheaves and hook block for damage. Lubricate all grease points available. See “Lubrication Points” on page 5-40 for details.
- Disconnect and remove the batteries from the machine.

NOTE: If you will be storing the machine near the sea side it is important to be aware of salt damage. Contact your SANY distributor for additional storage procedures in this case.

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Troubleshooting

WARNING

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

JUMP-STARTING THE ENGINE

General Information

- The starting system voltage and the battery voltage in the booster machine should be no more than 24 volts.
- 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 the functional and disabled 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 functional machine battery and the disabled 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 jumping-starting an engine.
- Use a jumper cable to connect the negative (-) terminal on the functional machine battery to the engine block of the disabled 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. This could cause a spark.

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.
- Always wear personal protective equipment when working with batteries.
- Always 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 may result in equipment damage or possible injury.

To access the batteries, unlock and open the battery service door (a) of the machine and allow several minutes for any accumulated battery gases to clear before servicing the batteries. Remove the covers to expose the batteries.

Fig. 6-1

Connecting the Jumper Cables

Ensure that the key switches of both the functional and the disabled machines are in the **OFF** position. See Fig. 4-71 on page 4-46 for key switch location.

1. Clamp one end of jumper cable “A” to the positive terminal (+) of the disabled engine.
2. Clamp the other end of jumper cable “A” to the positive terminal (+) of the functional engine.
3. Clamp one end of jumper cable “B” to the ground terminal (-) of the functional engine.
4. Clamp the other end of jumper cable “B” to the engine cylinder block of the disabled engine.

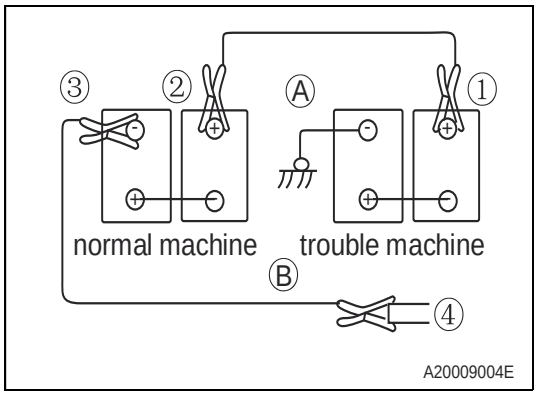

Fig. 6-2

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 “Starting the Engine” on page 4-43

1. Start the engine of the good machine and run it at a medium speed.
2. Attempt to start the engine of the disabled 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 disabled engine has started as described here:

1. Unclamp jumper cable “B” from the disabled engine cylinder block.
2. Unclamp the other end of jumper cable “B” from the ground terminal (-) of the functional engine.
3. Unclamp jumper cable “A” from the positive terminal (+) of the functional engine.
4. Unclamp the other end of jumper cable “A” from the positive terminal (+) of the disabled engine
5. Install the covers over the batteries. Close the battery service door (a).

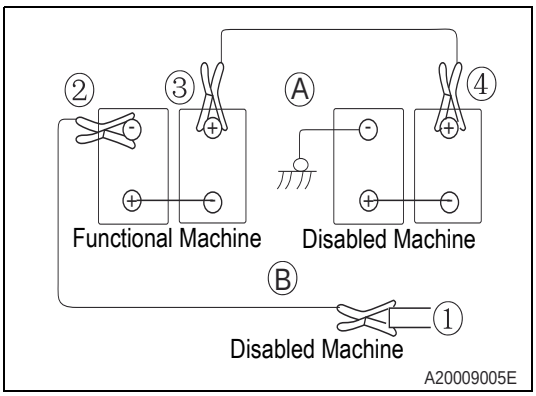

Fig. 6-3


Fig. 6-4 a

FUSEBOX LOCATION

The crane's fuse panel is protected securely within the electrical cabinet inside the battery service compartment on the left side of the machine.

Fig. 6-5

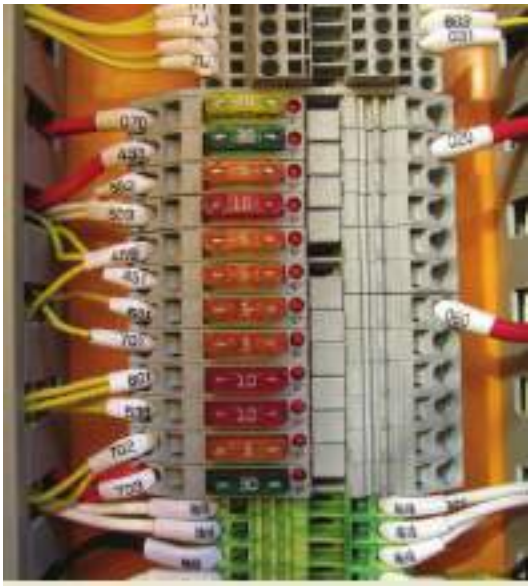

Fig. 6-6

ENGINE TROUBLESHOOTING PROCEDURES

Symptom	Possible Cause	Suggested Action
Engine does not crank (turn over) when ignition key turned	1. Failed (open) fuse.	1. Replace fuse.
	2. Failed starter motor.	2. Replace starter motor.
	3. Fault with contactors.	3. Check electrical system.
	4. Low battery voltage.	4. Charge or replace battery.
Engine cranks (turns over) but will not start or is difficult to start (with white smoke)	1. Low fuel level.	1. Add fuel and purge air from fuel system.
	2. Low battery voltage.	2. Check battery and power supply circuit; charge battery or install a new one.
	3. Low engine idle speed.	3. Refer to engine symptom tree if engine idle speed is less than 150 rpm.
	4. Vehicle additional power is too high.	4. Check if engine starts with load.
	5. Fuel leakage.	5. Check for leakage at fuel pipe, fuel pipe connector, or fuel filter.
	6. Blocked or restricted (dirty) air cleaner.	6. Clean or replace air filter and air inlet pipe.
	7. Wrong fuel grade or dirty fuel.	7. Drain fuel tank, then refill with clean fuel of correct type.
	8. Blocked fuel filter.	8. Replace fuel filter.
	9. Insufficient fuel supply.	9. Check fuel flow through filter to locate fuel blockage.
	10. Fuel pump fault.	10. Check if fuel pump runs normally; check output pressure of the pump. If necessary, replace fuel pump.
Engine cranks (turns over) but will not start or is difficult to start (with white smoke) (Continued)	1. Cannot work normally due to cold weather.	1. Check, repair or replace starting assisting device for cold weather. (if equipped)
	2. Air in fuel system.	2. Purge air from fuel system, check fuel suction pipe for air leakage.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Engine cranks (turns over) but will not start (no smoke emitted)	1. No or too little fuel in tank.	1. Refuel.
	2. Wrong fuel grade or dirty fuel.	2. Drain fuel tank, then refill with clean fuel of correct type.
	3. OEM engine protection system fault. (if equipped)	3. Isolate OEM engine protection system. (if equipped)
	4. Low battery voltage.	4. Check battery and circuit; charge battery or install a new one.
	5. Fault with ignition switch circuit.	5. Check ignition switch circuit.
	6. Abnormal power supply to the ECM (Electronic Control Module).	6. Check EMC circuits.
	7. Moisture in wire harness.	7. Use electric cleaner to dry connector.
	8. Air in fuel system.	8. Purge air from fuel system.
	9. Fault with ECM.	9. Disconnect battery cable for 30 seconds, then reconnect battery cable and start engine.
	10. Blocked or restricted fuel filter.	10. Replace fuel filter.
	11. Fuel pump fault.	11. Check if fuel pump runs normally; check output pressure of the pump. If necessary, replace fuel pump.
	12. Blocked fuel return pipe.	12. Clear blockage in fuel return pipe.
Engine runs roughly or stops	1. Air in fuel system.	1. Purge air from fuel system.
	2. Blocked fuel filter.	2. Replace fuel filter.
	3. Fuel gelling (solidification) due to cold weather.	3. Either allow fuel filter to thaw or replace fuel filter with new one, then drain fuel system and replace with winter-grade fuel.
	4. Water or dirt in fuel system	4. Drain fuel tank, then refill with clean fuel of correct type.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Engine cannot be shut off normally (ignition key at off position)	1. Fuel leakage.	1. Check for location of leak (fuel pipe, fuel pipe connector or fuel filter) and repair/replace as required.
	2. Short circuit (breakdown)	2. Check electrical system.
	3. Oil seepage into combustion chamber via turbocharger.	3. Contact SANY distributor.
Considerable black exhaust smoke	1. Incorrect fuel type.	1. Drain fuel tank, then refill with clean fuel of correct type.
	2. Leakage in air inlet or exhaust.	2. Check for loose or damaged pipeline connector or lost pipe plug; check turbocharger and exhaust manifold; repair/replace as required.
	3. Blocked or clogged (dirty) air intake.	3. Clean/ replace air filter and air inlet pipe.
	4. Air intercooler damaged or blocked.	4. Check for blocked or leaking air intercooler.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Considerable white exhaust smoke	1. Incorrect starting procedure.	1. Verify correct engine startup procedure being followed.
	2. Engine is too cold.	2. Run engine under load until it is warmed up.
	3. Extremely cold ambient air temperature.	3. Run engine under load until it is warmed up.
	4. Fault with engine preheater.	4. Confirm that engine preheater is working correctly; repair/replace as required.
	5. Coolant temperature too low.	5. Replace engine thermostat.
	6. Incorrect fuel type.	6. Drain fuel tank, then refill with clean fuel of correct type.
	7. Leakage in air inlet or exhaust.	7. Check for loose or damaged pipeline connector or lost pipe plug; check turbocharger and exhaust manifold; repair/replace as required.
	8. Blocked or clogged (dirty) air intake.	8. Clean or replace air filter and air inlet pipe.
	9. Air intercooler damaged or blocked.	9. Confirm blocked or leaking air intercooler; repair/replace as required.
Turbocharger joint leaks oil or fuel	1. Blockage at turbocharger oil return pipe.	1. Disassemble turbocharger oil return pipe and check for blockage; repair/replace as required.
	2. Engine oil supply pipe of turbocharger loose or leaking.	2. Check and tighten engine oil supply pipe connector.
Dirty coolant	Incorrect coolant used, resulting in rusty soot.	Drain, flush and refill cooling system with correct grade of coolant.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Fuel or engine oil inside exhaust manifold	1. Blocked or clogged (dirty) air intake.	1. Clean or replace air filter and air inlet pipe.
	2. Blockage at turbocharger oil return pipe.	2. Disassemble turbocharger oil return pipe and check for blockage; repair/replace as required.
	3. Leakage at turbocharger oil seal.	3. Check for oil in air inlet and exhaust pipes; replace turbocharger oil seal if necessary.
Engine idle speed varies	1. Blocked or clogged (dirty) air intake.	1. Clean or replace air filter and air inlet pipe.
	2. Air intercooler damaged or blocked.	2. Confirm blocked or leaking air intercooler; repair/replace as required.
	3. Electric fault codes active.	3. Refer to instructions on reading fault codes; contact SANY distributor.
	4. No or too little fuel in tank.	4. Add fuel as required.
	5. Air in fuel system.	5. Purge air from fuel system.
	6. Fuel filter restricted or blocked.	6. Replace fuel filter.
	7. Insufficient fuel supply.	7. Check fuel pump and lines; repair/replace as required.
	8. Excessive load at idle.	8. Use PTO feature if attaching load with engine at low speed.
	9. Incorrect fuel grade.	9. Drain fuel tank, then refill with clean fuel of correct type.
Coolant temperature too high	1. Coolant level too low.	1. Add coolant as required.
	2. Radiator fins damaged or blocked.	2. Repair/replace radiator as required.
	3. Loose fan belt.	3. Adjust belt tension pulley as required.
	4. Damaged temperature sensor.	4. Check temperature sensor and cable; replace damaged sensor and/or cable.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Coolant level drops	1. Leak in radiator or heater core.	1. Check coolant reservoir, heater core, heater hoses for leakage; repair/replace as required.
	2. Leakage on exterior of engine (freeze plug, hoses, water pump, or cracked engine block).	2. Check items for leakage; repair/replace as required.
Dirty engine oil	Interval between engine oil changes too long.	Perform engine oil change procedures according to frequency in this manual.
Excessive exhaust smoke when engine under load	1. Excessive load on engine.	1. Reduce engine load.
	2. Dirty/faulty fuel injector(s)).	2. Repair/replace fuel injectors as required.
Engine cannot reach rated speed under load	1. Excessive load on engine.	1. Reduce load.
	2. Faulty engine speed sensor.	2. Replace sensor.
	3. Insufficient fuel supply.	3. Check fuel pump and lines; repair/replace as required.
	4. Blocked or clogged (dirty) air intake.	4. Clean or replace air filter and air inlet pipe.
Fuel knock	1. Excessive load on engine.	1. Reduce load.
	2. Engine is too cold.	2. Run engine under load until it is warmed up.
	3. Air in fuel system.	3. Purge air from fuel system.
	4. Wrong fuel type or dirty fuel.	4. Drain fuel tank, then refill with clean fuel of correct type.
	5. Blocked fuel filter.	5. Replace fuel filter.
	6. Insufficient fuel supply.	6. Check fuel pump and lines; repair/replace as required.
	7. Faulty fuel pump.	7. Verify fuel pump operation; check output pressure of the pump; replace fuel pump as required.
	8. Damaged engine damper.	8. Replace engine damper.
	9. Moisture in wiring harness.	9. Use electric cleaner to dry connector.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Engine stalls	1. Wrong fuel type or dirty fuel.	1. Drain fuel tank, then refill with clean fuel of correct type.
	2. Air in fuel system.	2. Purge air from fuel system.
	3. Fault with engine controller power supply.	3. Check and replace fuses, replace or reconnect wiring as required.
Engine lacks power	1. Excessive load on engine.	1. Reduce load or shift to lower speed range.
	2. Air in fuel system.	2. Purge air from fuel system.
	3. Wrong fuel type or dirty fuel.	3. Drain fuel tank, clean outlet filter net, then refill tank with clean fuel of correct type.
	4. Incorrect valve clearance.	4. Adjust valve clearance.
	5. Dirty/faulty fuel injector(s)).	5. Replace faulty fuel injector(s).
Engine fuel consumption excessive	1. Electric fault codes active.	1. Refer to instructions on reading fault codes; contact SANY distributor.
	2. Fuel leakage.	2. Check and repair fuel system.
	3. Leakage in air inlet or exhaust.	3. Check for loose or damaged pipeline connector or lost pipe plug; check turbocharger and exhaust manifold; repair/replace as required.
	4. Blocked or clogged air intake system.	4. Replace air filter element, clean air intake system.
	5. Wrong fuel type or dirty fuel.	5. Drain fuel tank, clean outlet filter net, then refill tank with clean fuel of correct type.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Engine noise too loud	1. Fan belt loose, too tight or misaligned.	1. Adjust fan belt.
	2. Engine oil too thin.	2. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	3. Diluted oil.	3a. Check if engine oil dipstick, rainproof cap, or filling cap is missing; replace as required. 3b. Check/replace fuel injector(s), then drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	4. Vibration damper damaged.	4. Replace damper.
	5. Leakage in air inlet or exhaust.	5. Check for loose or damaged pipeline connector or lost pipe plug; check turbocharger and exhaust manifold; repair/replace as required.
	6. Blocked or clogged air intake system.	6. Replace air filter element, clean air intake system.
	7. Coolant temperature too high.	7. See “Coolant temperature too high” in this table.
	8. Noisy fan, hydraulic pump or compressor.	8. Isolate noisy component(s) and replace as required.
	9. Fan loose or damaged, hub axial clearance excessive.	9. Replace fan assembly.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Excessive engine oil consumption	1. Crankcase ventilation system blocked.	1. Check / clean respirator and crankcase ventilating pipe.
	2. Incorrect oil type.	2. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	3. Interval between engine oil changes too long.	3. Perform engine oil change procedures according to frequency in this manual.
	4. Oil leakage at oil drain plug.	4. Tighten bolt, pipe plug and pipe connector; replace gasket when required.
	5. Leakage at seal of turbocharger.	5. Replace turbocharger.
	6. Piston ring broken overlap in open direction.	6. Replace piston ring(s); perform engine overhaul.
Engine oil contaminated	1. Sludge in engine oil.	1. See “Oil sludge in crankcase” in this table.
	2. Contamination by coolant.	2. Cracked engine block, failed cylinder head gasket and/or cylinder liner; perform engine overhaul.
	3. Contamination by excessive fueling.	3. Check/replace fuel injector(s), then drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	4. Faulty fuel pump.	4. Verify that fuel pump output pressure is within specs; replace fuel pump if outside of specs; then drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	5. Defective oil from supplier.	5. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Engine oil level drops	1. Oil leakage at drain plug.	1. Tighten bolt, pipe plug and pipe connector; replace gasket when required.
	2. Incorrect oil type.	2. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	3. Faulty engine oil pressure switch, engine oil pressure gauge, engine oil pressure sensor or incorrect installations.	3. Isolate faulty component and replace; correct components not installed as specified.
	4. Electric fault codes active.	4. Refer to instructions on reading fault codes; contact SANY distributor.
	5.Leakage at engine oil cooler.	5. Verify cracked engine oil cooler; replace as required.
	6. Excessive blow-by.	6. Check for excessive blow-by; replace piston rings as required (engine overhaul).
	7. Leakage at seal in turbocharger.	7. Confirm leaky seal; replace turbocharger.
Oil sludge in crankcase	1. Defective oil from supplier.	1. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	2. Coolant temperature too low.	2. Avoid idling for extended time in very cold weather.
	3. Crankcase ventilation system blocked.	3. Check / clean respirator and crankcase ventilating pipe.
	4. Wrong fuel type or dirty fuel.	4. Drain fuel tank, then refill with clean fuel of correct type.
	5. Incorrect oil type.	5. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
Engine oil pressure is high	1. Coolant temperature too low.	1. Avoid extended engine idling in very cold weather.
	2. Wrong oil type or dirty oil.	2. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	3. Faulty engine oil pressure switch, engine oil pressure gauge, engine oil pressure sensor or incorrect installations.	3. Isolate faulty component and replace; correct components not installed as specified.
	4. Electric fault codes active.	4. Refer to instructions on reading fault codes; contact SANY.
Engine oil pressure is low	1. Wrong oil type.	1. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	2. Diluted oil.	2a. Check if engine oil dipstick, rainproof cap, or filling cap is missing; replace as required. 2b. Check/replace fuel injector(s), then drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	3. Blocked engine oil filter.	3. Drain engine oil, replace oil filter, refill with clean engine oil of correct grade.
	4. Engine oil contaminated.	4. See “Engine oil is contaminated” in this table.
	5. Oil leakage at drain plug.	5. Tighten bolt, pipe plug and pipe connector; replace gasket when required.
	6. Engine oil level is too low/too high.	6. Add or drain oil as required.
	7. Electric fault codes active.	7. Refer to instructions on reading fault codes; contact SANY distributor.
	8. Faulty engine oil pressure switch, engine oil pressure gauge, engine oil pressure sensor or incorrect installations.	8. Isolate faulty component and replace; correct components not installed as specified.

ENGINE TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
AC compressor fails to charge properly	1. Loose AC electrical connector.	1. Clean and tighten connector.
	2. Loose AC compressor belt.	2. Check and adjust belt tension.
	3. Faulty ground circuit/connection.	3. Check/repair ground circuit/ connection.
	4. Damaged AC compressor.	4. Replace AC compressor.
	5. Low refrigerant.	5. Add refrigerant as required.

ELECTRICAL SYSTEM TROUBLESHOOTING PROCEDURES

Symptom	Possible Cause	Suggested Action
No power to crane with ignition switch on	1. Battery switch is off.	1. Set switch to on.
	2. Battery voltage is low or does not hold charge.	2. Replace battery.
	3. Fault with power supply.	3. Check and repair circuit.
	4. Failed (open) fuse.	4. Replace fuse.
	5. Damaged connector.	5. Replace or repair connector.
	6. Damaged relay.	6. Replace relay.
	7. Damaged ignition switch.	7. Replace switch.
Starter motor does not work	Open circuit.	Check circuit.
Engine cranks very slowly	1. Faulty/failing battery.	1. Charge or replace battery as required.
	2. Faulty starter motor.	2. Repair/replace starter as required.
Engine speed cannot be controlled/adjusted	Throttle not calibrated or incorrectly calibrated.	Recalibrate throttle.

CRANE FUNCTION TROUBLESHOOTING PROCEDURES

Symptom	Possible Cause	Suggested Action
Crane functions do not work	1. Crane function switch set to carrier mode	1. Select crane mode.
	2. Pilot pressure is low.	2. Adjust pilot pressure as-needed.
	3. Seat switch is bad.	3. Replace switch.

BOOM TROUBLESHOOTING PROCEDURES

Symptom	Possible Cause	Suggested Action
Boom vibration during operation	1. Inappropriate adjustment of the clearance between the slide blocks. 2. Slide blocks need lubricating grease applied. 3. Loose telescopic boom cable.	1. Adjust it. 2. Coat it with lubricating grease. 3. Adjust as required.
Boom vibration during luffing	1. Cylinder pins requires lubrication. 2. Damaged pin bushing on the hydraulic cylinder.	1. Lubricate cylinder pin. 2. Replace with new parts.
Boom does not extend/retract	1. Deformed boom. 2. Pilot pressure too low. 3. Faulty telescopic mechanism, such as broken telescopic boom, rope jumped over the groove or damaged sheave. 4. LMI not working properly.	1. Check and repair it. 2. Check / adjust pilot pressure. 3. Check and repair it. 4. Repair / replace LMI.
No upward luffing action	1. Pressure too low in main relief valve. 2. Pilot pressure too low. 3. Damaged main pump.	1. Disassemble and clean. 2. Check / adjust pilot pressure. 3. Check and replace.
No downward luffing action	1. Pressure too low in main relief valve. 2. Main valve not functioning. 3. Damaged main pump. 4. Blocked counterbalance valve. 5. Blockage in counterbalance valve.	1. Disassemble and clean. 2. Check and repair. 3. Check and replace. 4. Clean or replace. 5. Clean system.
Boom vibration downward luffing	1. Defective counterbalance valve. 2. Too high secondary relief pressure.	1. Clean or adjust. 2. Replace with new parts.

BOOM TROUBLESHOOTING PROCEDURES (CONTINUED)

Symptom	Possible Cause	Suggested Action
No extension of boom	1. Pressure too low in main relief valve. 2. Main valve not functioning. 3. Damaged main pump. 4. Low pressure of secondary relief valve for boom extension. 5. Faulty telescopic control valve, 6. LMI has locked out extension	1. Disassemble and clean. 2. Check and repair. 3. Check and replace. 4. Clean or replace. 5. Clean system. 6. Reduce load
Unintentional action of boom	1. Failure of counterbalance valve. 2. Internal leakage in cylinder.	1. Disassemble and clean. 2. Repair.
No hook lowering action	1. Pressure set too low in relief valve in the superstructure hydraulic valve. 2. Faulty hydraulic motor. 3. Excessive leakage in hydraulic motor. 4. Excessive leakage in main pump. 5. Blockage in counterbalance valve. 6. Faulty LMI. 7. Faulty brake or oil circuit in main valve.	1. Adjust. 2. Check and repair. 3. Check and repair. 4. Clean system. 5. Clean system. 6. Check and repair. 7. Check and repair.

OUTRIGGER TROUBLESHOOTING PROCEDURES

Symptom	Possible Cause	Suggested Action
Out-of-sync extending of outrigger beams	Deformation of outrigger boxes.	Correct clearances between outriggers beams and frame.
Abnormal noise and vibration during outrigger beam retraction	Deformation of outrigger boxes.	Correct clearances between outrigger beams and frame.
No outrigger action	1. Pressure too low in outrigger relief valve. 2. Relief valve element blocked or contaminated. 3. Relief valve defective. 4. Damaged coil on outrigger relief valve.	1. Adjust. 2. Disassemble and clean. 3. Replace. 4. Replace.
Slow outrigger action	1. Failure inside control valve. 2. Pressure set too low in relief valve.	1. Replace it. 2. Adjust.
Unintentional action of outrigger	1. Failure of bi-directional hydraulic lock. 2. Internal leakage in cylinder. 3. External leakage of hydraulic cylinder.	1. Disassemble and clean. 2. Repair. 3. Repair.

SWING (SLEWING) TROUBLESHOOTING PROCEDURES

Symptom	Possible Cause	Suggested Action
No slewing action of swing system	1. Damaged hydraulic motor. 2. Faulty slewing system, reducer or brake. 3. Pressure too low in relief valve. 4. Failure in slewing control pilot valve.	1. Repair or replace. 2. Repair. 3. Disassemble and clean. 4. Test and repair.
Slow slewing action	1. Pressure too low in relief valve. 2. Excessive leakage in hydraulic motor. 3. Excessive leakage in slewing control valve.	1. Disassemble and clean. 2. Replace or repair. 3. Disassemble clean or replace.
Unstable slewing action	1. Faulty slewing counterbalance valve. 2. Faulty one-way throttle valve. 3. Faulty slewing brake. 4. Excessive wear on slewing system.	1. Adjust and check dampening valve. 2. Check dampen and accumulator pressure. 3. Check and repair. 4. Check and repair.
No slewing lock action	1. Solenoid valve defective. 2. Insufficient pressure in hydraulic brake circuit.	1. Check and repair. 2. Adjust pressure in system.
Abnormal noise from hydraulic pump	1. Insufficient oil supply. 2. Air in oil intake line 3. Loose mounting bolts 4. Contaminated hydraulic oil 5. Vibration of drive shaft 6. Worn universal joint	1. Check and fill. 2. Correct air leak. 3. Tighten bolts. 4. Replace the hydraulic oil. 5. Repair 6. Repair.

HYDRAULIC SYSTEM TROUBLESHOOTING PROCEDURES

Symptom	Possible Cause	Suggested Action
No or low hydraulic flow or pressure	1. Faulty relief valve. 2. Damaged or worn hydraulic pump. 3. Faulty swivel joint. 4. Faulty pilot valve. 5. Load sensor contaminated.	1. Drain flush and adjust. 2. Check and repair. 3. Check and repair. 4. Check and repair. 5. Clean.
Hydraulic oil overheating	1. Main pump internal leakage. 2. Hydraulic motor internal leakage. 3. Cooler core blocked.	1. Check and repair. 2. Check and repair. 3. Check and clean.

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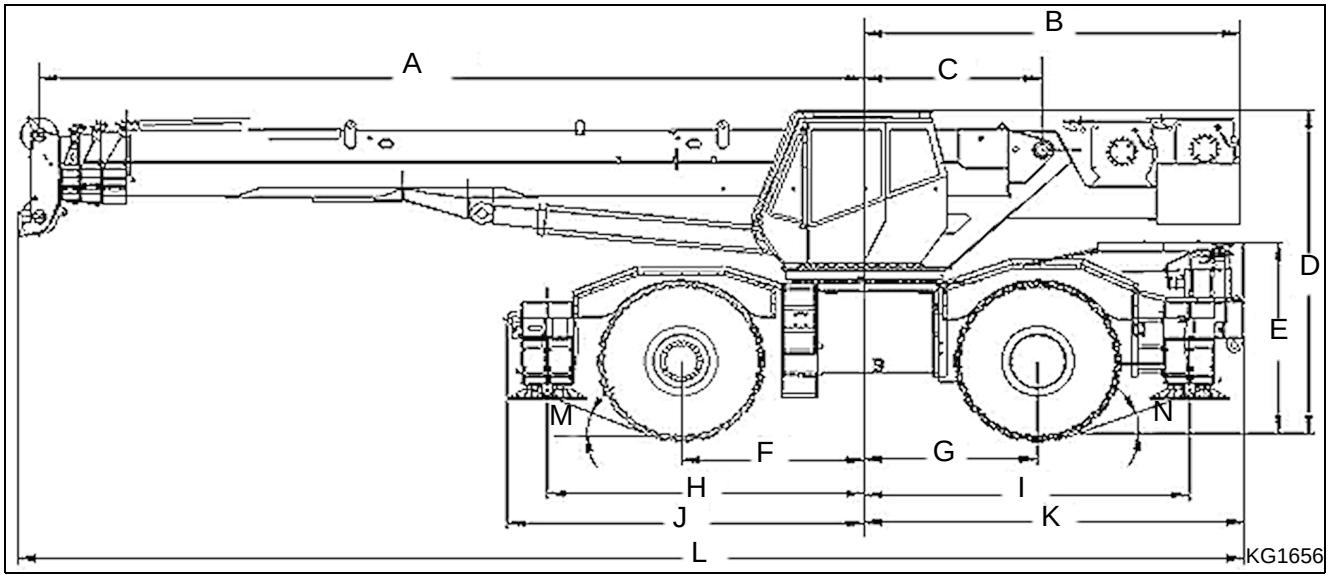
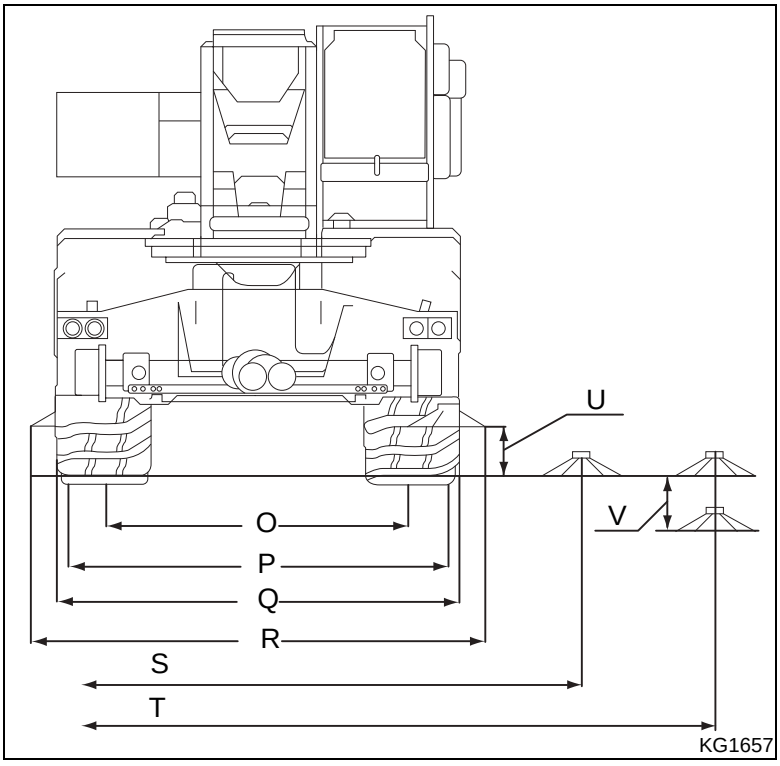
Specifications

GENERAL MACHINE DIMENSIONS (STANDARD MACHINE; 29.5R25 TIRES)

The data presented here are the dimensions and weights necessary for general operating procedures with only the standard boom and work equipment.

This data is not for shipping purposes.





Callout Letter	Location	Dimension in ft (m)	
		SRC865	SRC865XL
A	Main boom length (retracted for travel mode)	30.35 (9.3)	31.17 (9.5)
B	Counterweight end to center line of rotation	13.82 (4.2)	
C	Boom pivot to center line of rotation	6.56 (2.0)	
D	Machine height from ground to cab roof	12.4 (3.8)	
E	Chassis (rear) top to ground	7.72(2.4)	
F	Front axle end center to center line of rotation	6.73 (2.1)	
G	Rear axle end center to center line of rotation	6.40 (2.0)	
H	Front outrigger center to center line of rotation	11.65 (3.6)	
I	Rear outrigger center to center line of rotation	11.98 (3.7)	
J	Front of chassis frame to center line of rotation	13.12 (4.0)	
K	Rear of chassis frame to center line of rotation	13.98 (4.3)	
L	Overall length of machine (from chassis rear to boom tip)	45.1 (13.7)	45.93'(14.0)
M	Front approach angle	23°	
N	Rear departure angle	20°	
O	Axle end to axle end (width)	8.21 (2.5)	
P	Outrigger fully retracted	10.20 (3.1)	
Q	Tire to tire outside edge (width)	10.83 (3.3)	
R	Outrigger pad outside edge to outrigger outside edge	12.20 (4.0)	
S	Outrigger center to center (mid position)	17.20 (5.2)	
T	Outrigger center to center (fully extended position)	23.62 (7.2)	
U	Outrigger to ground (retracted for travel)	0.83 (0.25)	
V	Outrigger ground penetration	1.7 (0.5)	

PERFORMANCE DIMENSIONS

System	Items	Dimension	
		SRC865	SRC865XL
Machine	Weight [lb (kg)]	89,760 (40,800)	98,340 (44,606)
	Machine swing radius [ft (m)]	13.8 (4.2)	
	*Front axle loads [lb (kg)] (see * on page 7-6)	47,800 (21,730)	49,500 (22,453)
	*Rear axle loads [lb (kg)] (see * on page 7-6)	41,960 (19,070)	48,840 (22,153)
	Maximum travel speed [mph (km/h)]	25 (40)	
	Minimum turning radius (2 wheel/4 wheel) [ft (m)]	41.7/22.0 (12.7/6.7)	
	Braking distance with no load traveling at 12.4 mph (20 km/h) [ft (m)]	21.3 (6.5)	
	Maximum gradability with no load	75%	
	Tires, standard and (optional)	29.5R25 standard (29.5x25-28PR optional)	
Boom System	No. of boom sections	4	5
	Main boom length [ft (m)]	37.0 to 113.0 (11.28 to 34.5)	37.3 to 139.4 (11.28 to 42.5)
	Main boom elevation	- 2° to 78°	
	Main boom tip height [ft (m)]	117.5 (35.8)	142.7 (43.3)
	Boom extended length	113 ft (34.4 m)	139.4 (42.5)
	Jibs, side stow [ft (m)]	30.2 to 53.8 (9.2 to 16.4)	30.2 to 52.5 (9.2 to 16.0)
	Jib offset	0° / 20° / 40°	0° / 15° / 30°
	Maximum jib tip height [ft (m)]	172 (52.4)	197.2 (60.1)
	Hook Block: 8.3 T (7.5 mT) China-manufactured overhaul ball		
	Hook Block: 50 T (45 mT) China-manufactured 4-sheave		
	Hook Block: 60 T (55 mT) China-manufactured 5-sheave		
	Hook Block: 8.3 T (7.5 mT) Gunnebo-Jonson overhaul ball		
	Hook Block: 25 T (22 mT) Gunnebo-Jonson 1-sheave quick reeve		
	Hook Block: 50 T (45 mT) Gunnebo-Jonson 3-sheave quick reeve		
	Hook Block: 60 T (55 mT) Gunnebo-Jonson 5-sheave quick reeve		

System	Items	Dimension	
		SRC865	SRC865XL
Boom operating parameters	Maximum lifting speed, single rope main hoist, no load [ft/min (m/min)]	410 (125)	
	Maximum lifting speed, single rope auxiliary hoist, no load [ft/min (m/min)]		
	Full extension/retraction time of boom, no load	85/100 seconds	
	Luffing time of boom, no load	45/55 seconds	
	Swing speed, no load	2.5 rpm	
	Maximum rated lifting capacity [USt (mt)]	65 (59)	
	Boom lifting height, base [ft (m)]	43.0 (13.1)	43.6 (13.3)
	Boom length, longest main boom [ft (m)]	113.2 (34.5)	143.7 (43.8)
	Boom length, longest main boom plus jib [ft (m)]	164.1 (50.9)	197.2 (60.1)
Outriggers	Outrigger beam extension/retraction time	20/25 seconds	
	Outrigger lifting/lowering time		
	Outrigger span, vertical x longitude [ft (m)]	24.0 x 24.0 (7.2 x 7.2)	
	Outrigger pad area [$in.^2$ (cm^2)]	450 (2,900)	
Main hoist Low range	Main hoist max. line, first layer, no load [ft/min (m/min)]	176 (54)	
	Main hoist max. line, sixth layer, no load [ft/min (m/min)]	277 (84)	
	Main hoist max. line, pull-first layer, no load [lb (kg)]	18,210 (8,277)	
	Main hoist max. line, pull-fifth layer, no load [lb (kg)]	11,590 (5,268)	
	Main hoist, permissible line pull [lb (kg)]	14,189 (6,436)	
Main hoist High range	Main hoist max. line, first layer [ft/min (m/min)]	360 (110)	
	Main hoist max. line, sixth layer [ft/min (m/min)]	538 (164)	
	Main hoist max. line, pull-first layer [lb (kg)]	7,586 (3,441)	
	Main hoist max. line, pull-fifth layer [lb (kg)]	4,820 (2,191)	
	Main hoist, permissible line pull [lb (kg)]	14,189 (6,436)	
Hoist drums	Hoist drum diameter [in. (mm)]	15.0 (381)	
	Hoist drum length [in. (mm)]	18.37 (466.7)	
	Hoist drum flange diameter [in. (mm)]	25.5 (647.7)	
	Maximum drum capacity, storage [ft (m)]	906 (276.0)	
	Maximum drum capacity, usable [ft (m)]		
	Maximum hoist line speed, no load [ft/min (m/min)]	492 (150)	
	Maximum hoist line pull [lbs (kg)]	18,210 (8,277)	
Hydraulic Pumps	Main/aux. hoist, boom hoist, telescope pumps [gpm (lpm) @ psi (bar)]	77.7 @ 4,060 (2,941 @ 280)	
	Power steering and swing pump [gpm (lpm) @ psi (bar)]	21.4 @ 3,625 (80.8 @ 250)	
	Brake, outrigger and suspension [gpm (lpm) @ psi (bar)]	18.1 @ 3,625 (68.6 @ 250)	
	Combined system capability [gpm (lpm)]	117 (443)	

System	Items	Dimension	
		SRC865	SRC865XL
Engine	Cummins QSB6.7 Tier III A	Diesel	
	Maximum horsepower	250 hp @ 2,500 rpm	
	Maximum torque	728 lbf•ft @ 1,500 rpm	
	Displacement	6.7 L	
	Aspiration	Turbocharged and charge air cooled	
	Electrical	24V	
	Fuel tank capacity [gal.(L)]	80 (300)	

* Equipped with boom extension, two hoists, wire rope, auxiliary boom head, 60T hook block and 8.3 overhaul ball.