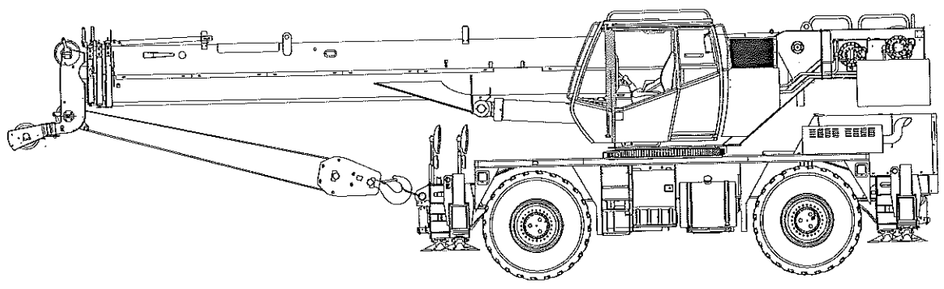
Quality Changes the World

SANY

Rough Terrain Crane

SRC400C



Safety, Operation and Maintenance Manual

SANY

SRC400C Rough Terrain Crane

Safety, Operation and Maintenance Manual

⚠ WARNING

Failure to do so can cause serious injury, death or property damage. Keep this manual with the machine for reading and future reference.

Read and follow the safety precautions and instructions in this manual and on the machine decals.

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Exemption Clauses

Truck crane, all terrain crane and rough terrain crane are designed and manufactured according to existing technology and recognized technical safety regulations. The crane may only be used in flawless technical condition according to its task, as well as with constant awareness of safety and dangers. Any issues that could affect safety must be fixed immediately.

This SOM manual is intended to put you in a position to operate the crane safely and utilize the functions that it provides. The instructions also introduce the function of important components and systems.

This SOM manual has been translated to the best of one's knowledge. Sany assumes no liability for translation errors. The Chinese version is solely applicable for factual accuracy. If you find any errors or any misunderstandings when reading this SOM manual, contact Sany immediately.

Modifications to the crane may only be made with the prior written approval of Sany. Do not weld any crack without permission from Sany. Sany assumes no liability for any accident, damage or injury due to the modifications and welding without authorization.

Only use original spare parts and tools from Sany or approved by Sany or provided by component manufacturer (such as engine, etc.), to maintain or repair the crane. Sany assumes no liability for any accident, damage or injury due to the use of unauthorized spare parts or tools.

This SOM manual provides basic guidelines for safe operations to all authorized personnel. Sany is unable to foresee all risks at the work sites, so workers, operators and owners must confirm if there are other safety concerns that must be addressed in specific job situations.

Sany assumes no liability for any accident, damage or injury due to force majeure like natural or geologic disasters (such as earthquake, tsunami, tornado, typhoon, hurricane, etc.), and social events(such as war, strike, turmoil, etc.).

This machine complies with all applicable regulations and standards of the country to which the machine is shipped.

If this machine was purchased in another country or from someone in another country, it may lack certain safety features and specifications that are necessary for use in your country. Follow and observe superior safety standards between local regulations and this manual.

If you find any questions or any misunderstandings, contact Sany immediately.

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1.Introduction

1.1 About This Manual

This manual provides safety, operation, maintenance and technical specification information. A copy must be kept in the cab at all times. If you sell the machine, a copy of this manual must be provided to the new owner.

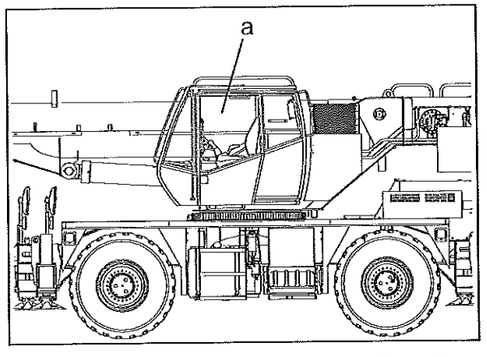

Fig 1-1 A copy must be kept in the cab at all times

a. Operator's cab

It is important to read this manual carefully before beginning any operation or maintenance. All personnel involved with this machine must read this manual periodically to remain knowledgeable about its operation and maintenance.

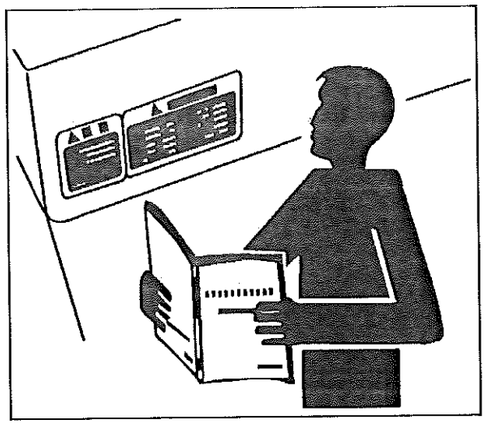

Fig 1-2 It is important to read this manual carefully before beginning any operation or maintenance

Items addressed in this manual are designed to help you:

- Understand the different systems and performance of your machine.
- Reduce improper operation.
- Point out possible hazardous situations when operating and maintaining the machine.
- Increase machine efficiency during operation.
- Prolong the service life of your machine.
- Reduce maintenance costs.

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 dealer for the latest available information on your machine or if you have questions regarding information in this manual.

1.2 Contact Information

Thank you for choosing SANY. In case of any problem, please contact us by:

Our address:

Sany Automobile Hoisting Machinery. Co., Ltd.

Jinzhou Development Zone, Changsha, Hunan, China

Tel: 0086-4006098318

Email: crd@sany.com.cn

Website: www.sanyglobal.com

1.3 Your Documentation Package

This documentation applies only to this machine and should not be used with any other machines. The documentation for this machine includes the following items:

Safety, Operation & Maintenance Manual

A copy of this Safety, Operation & Maintenance manual must always remain in the operator cab at all times. A copy of this manual should be made available to maintenance personnel when maintaining the machine.

Load Charts Manual

The Load charts is found in the crane operator cab. The Load charts contains information, which must be thoroughly understood by the operator. Never remove the Load charts from the crane.

Parts Book

The Parts book consists of parts lists and matching drawings used for ordering spare parts as needed. The Parts book is best left in the workshop area or office. It should always be available to the maintenance and service personnel.

Maintenance Log

The Maintenance Log lists regularly scheduled maintenance to be performed by the operator or maintenance personnel. All maintenance performed upon the machine must be recorded in the Maintenance Log.

Service Troubleshooting Manual

The Service Troubleshooting Manual provides safety and troubleshooting instructions. It also includes hydraulic and electrical schematics.The Service Troubleshooting Manual is best left in the workshop area or office. It should always be available to the maintenance and service personnel.

1.4 Organization of This Manual

Table of Contents

List of the general topics that are contained in this manual along with the page number each starts on.

NOTE :

There is also a table of contents at the start of each section in this manual.

Introduction

Overview of what is covered in the rest of this manual, what is the organization of SOM manual and whole documentation package. It also introduces how to check the serial number information and how to contact with Sany.

Safety

General and product-specific safety information relating to this machine. It describes what the hazard alerts mean that are used throughout the manual. Decals used on the machine by location, type and meaning are also addressed in this section.

System Functions

Overview of all controls and operating systems. It describes the function of operation components on carrier and superstructure, as well as load moment indicator (LMI) system.

Operation

Detailed operating information, including pre-start checks, engine operation procedures, lifting operations (PTO, outrigger, movable counterweight, crane operation, crane preparation, swing away boom extension), travelling operations, storage and transportation information

Maintenance

Described the maintenance work on the carrier and superstructure. Routine maintenance procedures and intervals, lubricant & fluid specifications, and torque values.

Troubleshooting

This section provides some common faults and fault diagnosis procedures on operation system of such crane. Besides, troubleshooting for mechanical, hydraulic and electrical systems are also included.

Specifications

This section provides dimensions and technical parameters of such crane. Continuing improvements in the design of this machine can lead to changes in part of this information.

1.5 Serial Number Location

1.5.1 General

The serial numbers and model numbers on the components are the only numbers that your SANY distributor will need when ordering replacement parts or for requiring assistance. Record this information in this manual for future reference. Below are the locations of the data plates.

1.5.2 Product Identification Plate

Product Data Plate

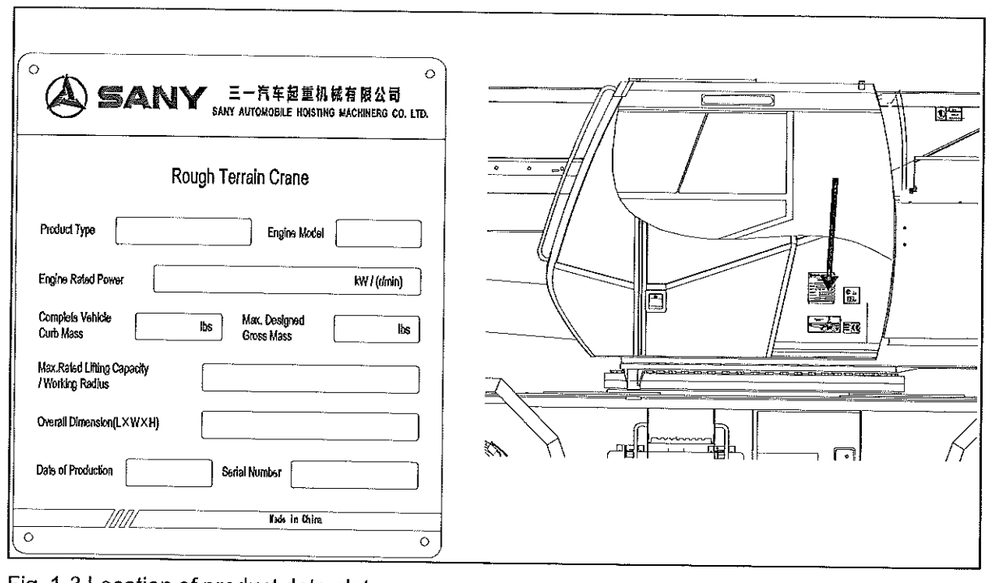

Fig 1-3 Location of product data plate

It is stamped on the left side of the operator's cab.

Product Type: _____

Product Serial Number: _____

Engine Identification Plate

Model: _____

Power (kw): _____

Serial Number: _____

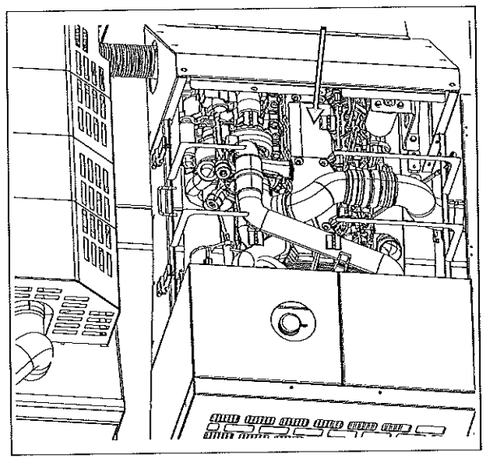

Fig 1-4 Location of engine identification plate

Swing Motor Data Plate

It is stamped on the top of swing motor.

Model: _____

Serial Number: _____

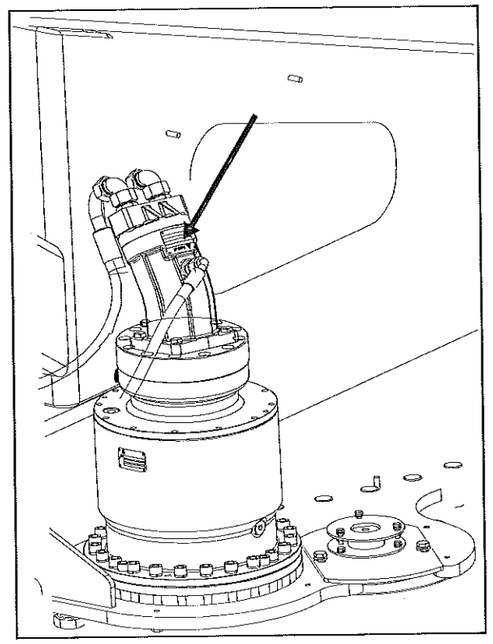

Fig 1-5 Location of swing motor data plate

Hoist Motor Data Plates

Each hoist (Main hoist and Aux hoist) has its own data plate.

Model: _____

Serial Number: Main hoist _____

Serial Number: Aux hoist _____

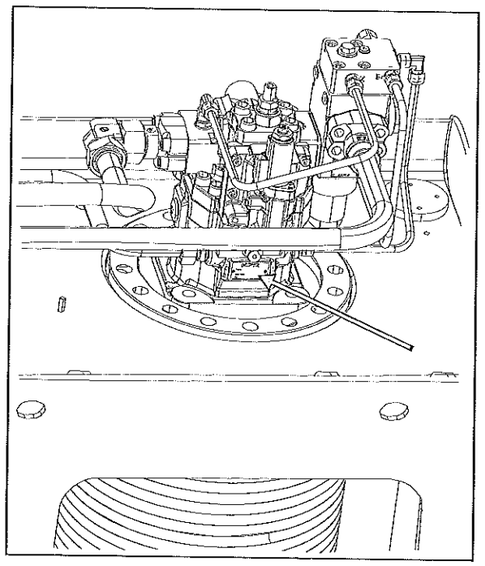

Fig 1-6 Location of hoist motor data plate

Hydraulic Pump Data Plate

They are stamped on the pumps.

Pump 1: Model: _____

Pump 1: Serial Number: _____

Pump 2: Model: _____

Pump 2: Serial Number: _____

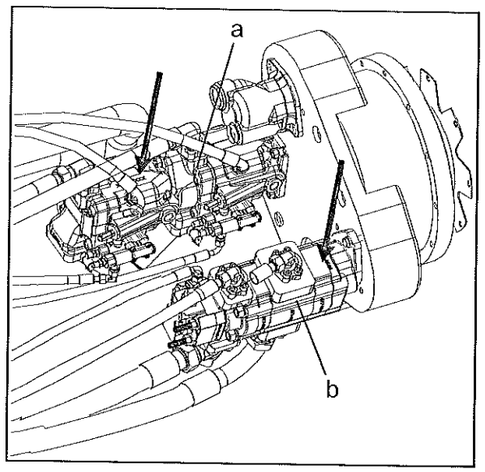

Fig 1-7 Location of hydraulic pump data plate

a. Pump 1
b. Pump 2

1.5.3 Record of Serial Number and Distributor Information

This location is for you to record information relating to your machine. It is advised that you keep this manual with your machine at all times for reference.

Machine Serial No.	
Carrier VIN No.	
Engine Model	
Engine Serial No.	
Swing Motor Model	
Swing Motor ID No.	
Hoist Motor Model	
Main Hoist ID No.	
Aux Hoist ID No.	
Main Pump Model	
Main Pump ID No.	
Gear Pump Model	
Gear Pump ID No.	
Distributor Name: Address:	
Phone Numbers:	

1.6 Correction Request Form

If you find a problem with this manual, please make a copy of this page, fill out the blanks and send it to Sany attention Technical Publications Department.

Date of This Request	
Your Name	
Company Name	
Your Department	
Street Address	
City, State & ZIP	

Phone	
E-mail	
Machine Model & Serial No.	
Description of Problem (wrong information, unclear or erroneous procedure, etc.)	
Correction Suggestion ((if any)	

SANY

Safety

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2.Safety

2.1 General Safety

2.1.1 General

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 and service 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 and service 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.

⚠ WARNING

Make sure the precautions described in this manual and the safety decals on the machine are fully understood before operating or maintaining this machine. Read and follow all safety precautions. Failure to do this could result in death or serious injury.

This manual must be kept on the machine for reference and periodically reviewed by all personnel involved with operation or maintenance of this machine.

Some actions involved in the operation or maintenance of this machine 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 use of this machine. If you use your machine for any unintended use that is 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.

This machine complies with all applicable regulations and standards of the country to which the machine has been shipped. If this machine 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 machine complies with the applicable standards and regulations of your country, contact your SANY distributor before operating this machine.

2.1.2 Hazard Alerts in This Manual

Most accidents are usually caused by the failure to follow fundamental safety rules for the operation and maintenance of the machine. To avoid accidents, it is important that all personnel involved with the operation or maintenance of this machine must read this manual before operating or performing maintenance on this machine.

Improper operation or maintenance of this machine could result in death or serious injury.

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

To alert operators, job supervisors, maintenance staff, and job site workers to hazardous operating practices and maintenance procedures, hazard alerts are used throughout this manual. Each hazard alert contains a hazard 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 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.

Sany cannot foresee every circumstance that might involve a potential hazard in operation or maintenance. Therefore, some hazard alerts in this manual and on the machine may not include all possible safety precautions.

If any procedure or action not specified, recommended or allowed in this manual is used, be sure that such procedures and actions can be safely performed without damaging the machine or causing injury. When unsure about the safety of some procedures, contact your Sany distributor.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

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

2.1.3 Machine Safety

Do the following:

- Be sure all guards and covers are in place, especially after performing maintenance on the machine.
- If guards or covers are damaged, have them repaired or replaced immediately.
- Use all operator aids properly.
- Never remove or modify operator aids. Always keep them in good condition.
- Always secure the machine in a safe location when job operations are done.
- Unauthorized modifications may adversely affect the machine's performance and strength. If this machine is modified without authorization from Sany, there is also a danger that performance and safety problems may occur.
- Select the correct reeving of the hoist wire rope to the load case.

⚠ WARNING

Diesel engine exhaust and some of its constituents could cause cancer, birth defects, and other reproductive harm.
Wash hands after handling. Failure to do these could result in death or serious injury.

2.1.4 Supervisor

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

The supervisor also has overall responsibility for personnel and safety matters. This means they must ensure that:

- Only qualified or properly instructed persons work on or with the machine.

- This Safety, Operation & Maintenance (SOM) manual and other instructions are always available and have been read and understood by the work crew.

In addition, the supervisor is responsible for producing operating procedures unique to the job at hand and which may not be included in this technical publication but are of national import. These procedures must cover the duties involved in supervising and notifying special organizational features, e.g., organization of work, working procedures or the personnel entrusted with the work.

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

Refer to "Personal Protective Equipment".

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

Refer to "Fire safety".

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

2.1.5 Owner and Other Authorized Personnel

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

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

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

2.1.6 Operator

2.1.6.1 General

This individual is trained in and responsible for the safe and correct operation of the machine. The operator reports directly to the supervisor.

The machine can only be operated by:

- An operator who is physically capable, has passed the exam for this machine and holds a valid operator certificate.
- Maintenance and operating personnel needing to operate the machine for their tasks.

2.1.6.2 Responsibilities

It is impossible to compile a list of safety precautions covering every situation. The operator must be followed when operating this machine.

- Reject the work site if they have doubts regarding safety.
- Do not operate a damaged or poorly maintained machine.
- Become familiar with the work area and surroundings before beginning work.
- Read and completely understand the instructions in this manual prior to first-time operation.
- Know and obey the operating procedures, relevant laws, standards and regulations.
- Know and follow the requirements for safe operation.
- Know and use the required safety precautions and protective devices.
- Know basic information about the systems of this machine.
- Know and use the correct hand signals between the machine operator and a signal person.
- Select tackle according to the weight of the load, the type of attachment and the incline angle. Bear in mind the weight and the wind exposure surface of the load.
- The operator must concentrate solely on machine operation when using the machine.
- Stop machine operations in case any defects endangering safety are found.
- The operator must control the machine to protect the personnel or other facilities in the vicinity of the machine.
- Ensure that all control devices are set to neutral or idle position before supplying power to the drive components.
- Ensure that the control devices are set to neutral or idle position and the power supply is shut off before leaving the operator's cab.
- The operator must give warning signals when necessary.
- The operator must be provided with necessary personal protective equipment.

2.1.6.3 Operator is Important

The operator's responsibility is not lessened by the addition of operator aids. The operator must guard against a false sense of security when using them. Operator aids and 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.

NOTE :

The operator's first priority is to ensure his safety and the safety of those around him.
Report all accidents, malfunctions and machine damages to your Sany distributor immediately. Your Sany distributor must be immediately advised of the incident and consulted on necessary inspections and repairs following an accident or damage to machine.

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

2.1.6.4 Operator Qualifications

No one should operate this machine unless they comply with the following:

- They have been trained on this specific machine. Controls and design may vary among models; therefore, it is important that they have specific training on the specific machine they will be operating. Training is essential for proper machine operation and safety.
- They 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 machine, the employer's work rules, and applicable industry standards and government regulations.
- They are sure that the machine is operating properly and has been inspected and maintained in accordance with this manual's stated requirements.
- They are sure that all safety decals, guards, and other operating features are in place and in proper condition.
- They are mentally and physically fit to operate this machine.

Do not operate the crane under the influence of medication, narcotics, or alcohol. Do not operate the machine after taking drugs that could impair physical, visual and mental reactions, and capabilities.

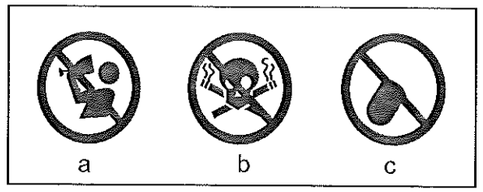


Fig 2-1

a. No alcohol
b. No drug

c. No medicine

2.1.6.5 Operator Safety Information

- Only qualified personnel who have been specially trained are permitted to operate and/or work on this machine.
- Operator aids such as warning lights, horns, or buzzers, along with displays on the monitors are designed to alert the operator to potential problems. Sole reliance on these operator aids, in place of good operating practices, can lead to an accident. Inspect the operator aids of this machine daily and make sure each operator aid is in normal working condition. Any faults found

shall be reported to your Sany distributor. Stop all work immediately if any operator aid is found to not be working properly.

- All accident prevention guidelines, operating instructions, etc., are based on authorized use of the machine.
- SOM 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.
- Review the local and national regulations and standards regarding this machine and its operation. Work practice requirements may vary among government regulations, industry standards, and employer policies. A thorough knowledge of all such relevant work rules is required before operating this machine or performing maintenance on it.
- No one besides the operator is to be anywhere on the machine while it is in operation.

2.1.7 Signal Person

2.1.7.1 Responsibilities

If the crane operator's view is restricted preventing 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. The signal person must:

- 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.

2.1.7.2 Communications Between 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.

1. 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

2. Tips for safe signaling:
- Repeat signal to each other to verify accuracy.

- Maintain a clear load/crane pathway.
- Have the signal person wear distinctive clothing.
- Post the signal chart inside the operator's cab.
- When in doubt, stop and ask for clarification.

3. 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 the signal person.
- 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.
- 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 machine 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.

2.1.7.3 Hand Signals

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 signal person. Be sure to stay a safe distance from hook, block or boom.

At all times use standardized hand signals - previously agreed upon and completely understood by the operator and signal person. If communication with the signal person is lost, crane movement

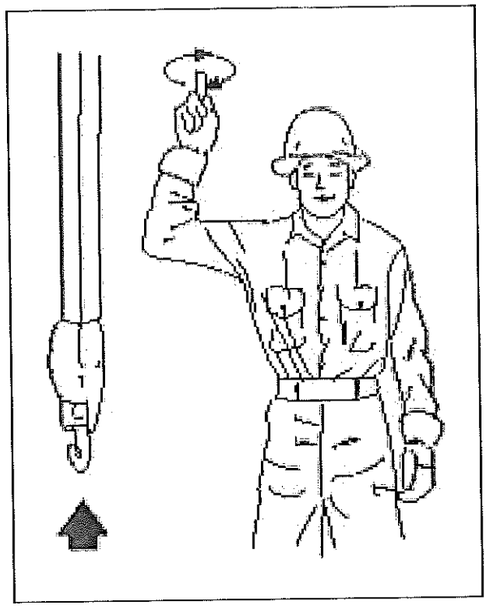
must be stopped until communications are restored. Keep your attention focused on the crane's operation. If for some reason you must look in another direction, stop all crane movement first. Obey a signal to stop from anyone.

⚠ 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 which could cause death, serious injury or equipment damage.

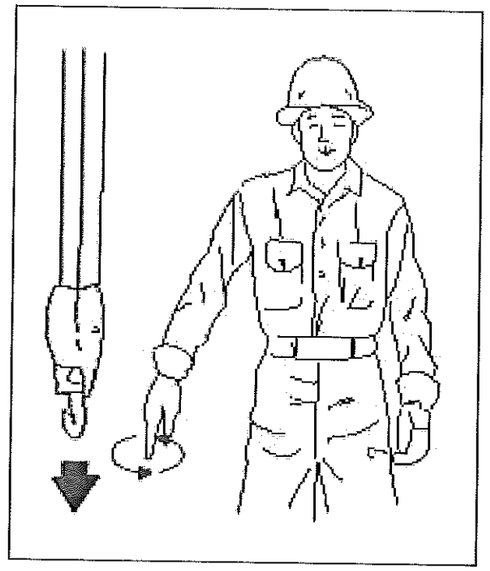
HOIST UP

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



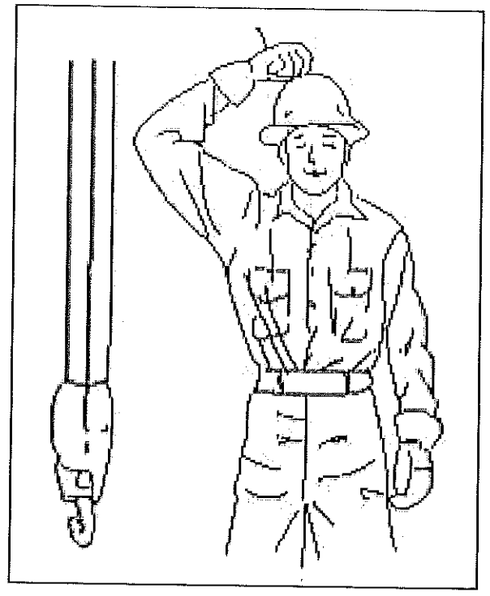
HOIST DOWN

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



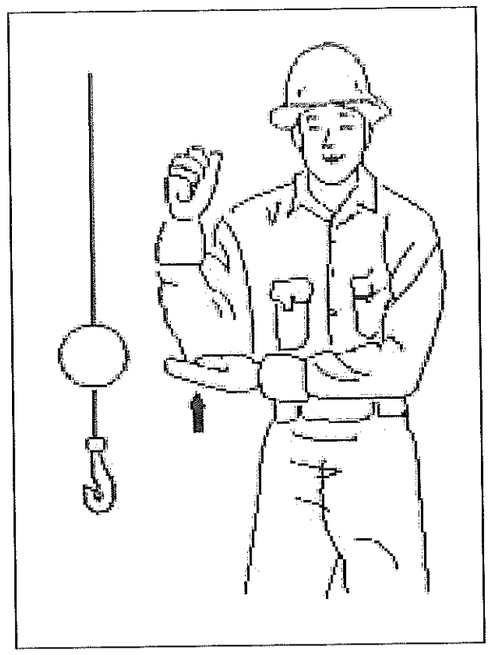
USE MAIN HOIST

Tap fist on the head, then use regular signals.



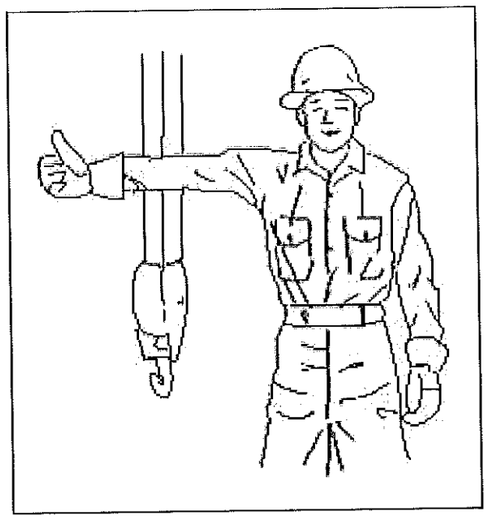
USE WHIP LINE (AUXILIARY HOIST)

Tap the elbow with one hand then use regular signals.



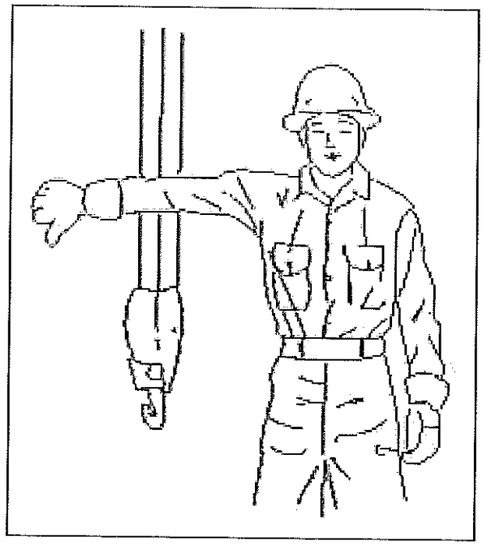
RAISE BOOM

Arm extended, fingers closed and thumb pointing upward.



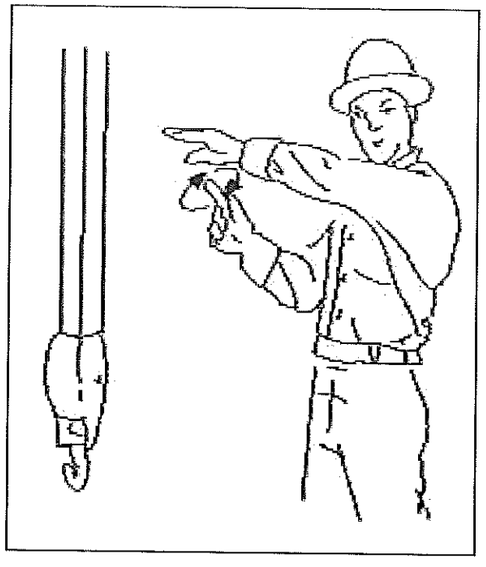
LOWER BOOM

Arm extended, fingers closed, thumb pointing downward.



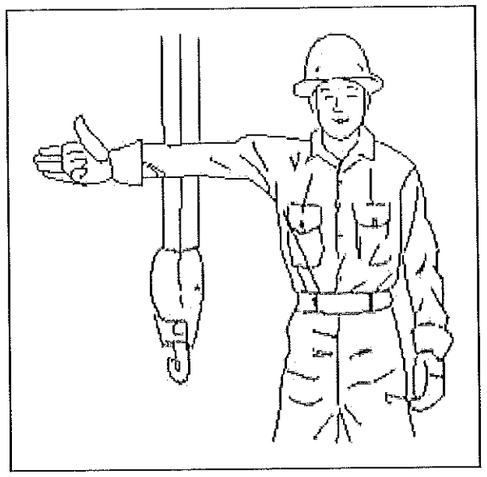
MOVE SLOWLY

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)



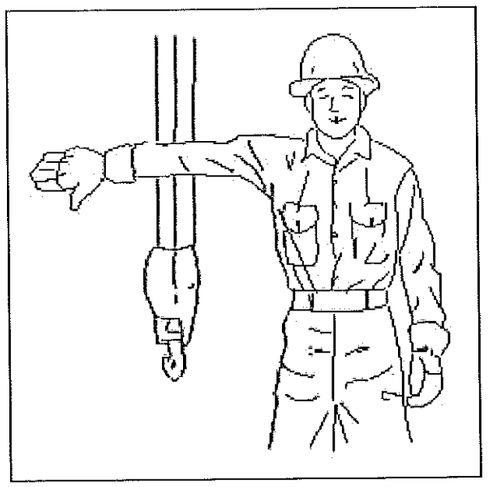
RAISE THE BOOM AND LOWER THE LOAD

With arm extended and thumb pointing up, flex the fingers in and out as long as load movement is desired.



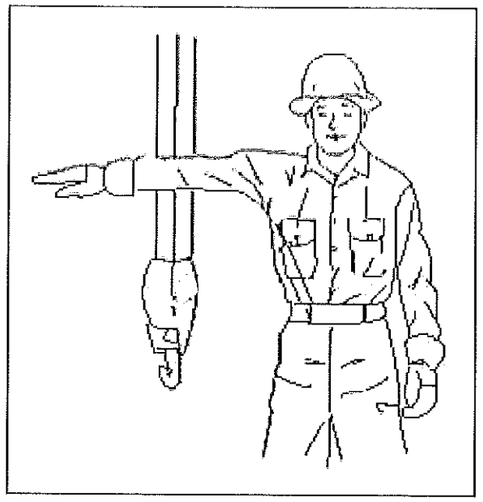
LOWER THE BOOM AND RAISE THE LOAD

With the arm extended and thumb pointing down, flex fingers in and out as long as load movement is desired.



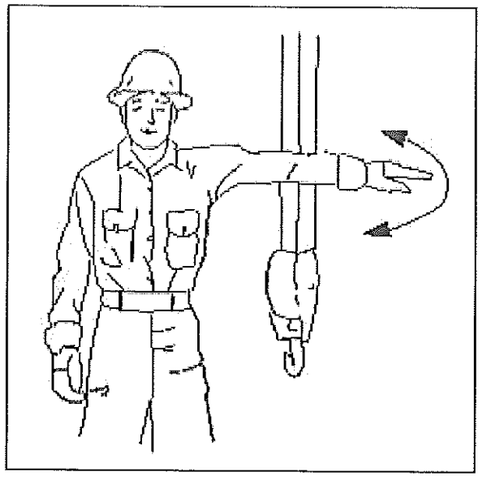
SWING

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



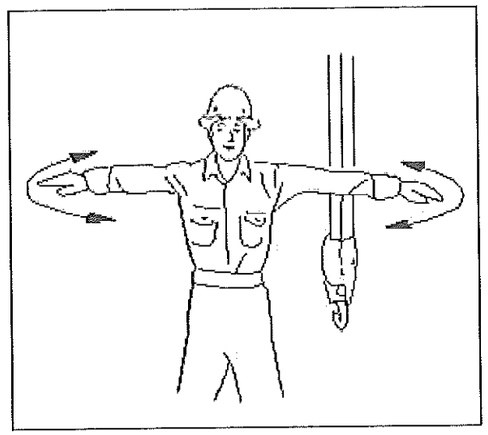
STOP

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



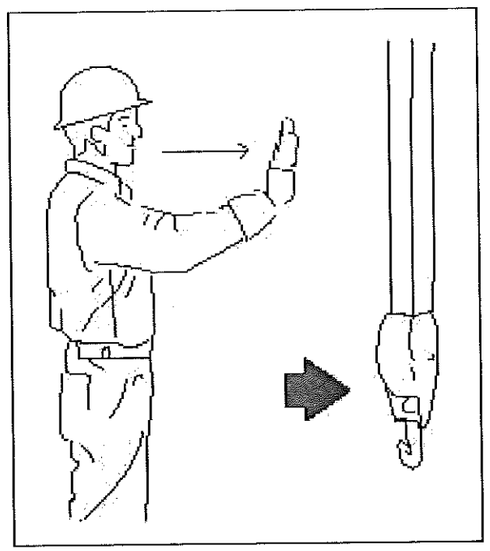
EMERGENCY STOP

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



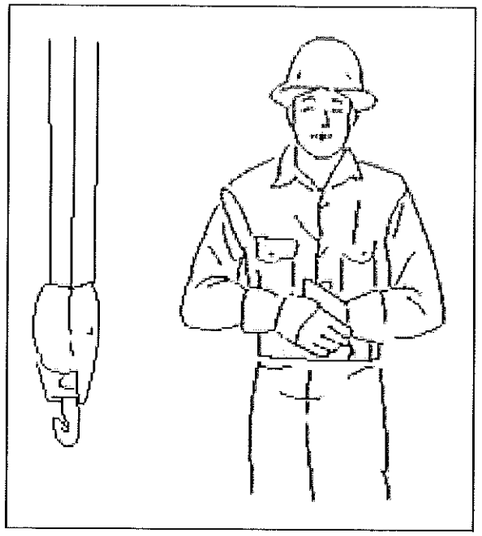
TRAVEL

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



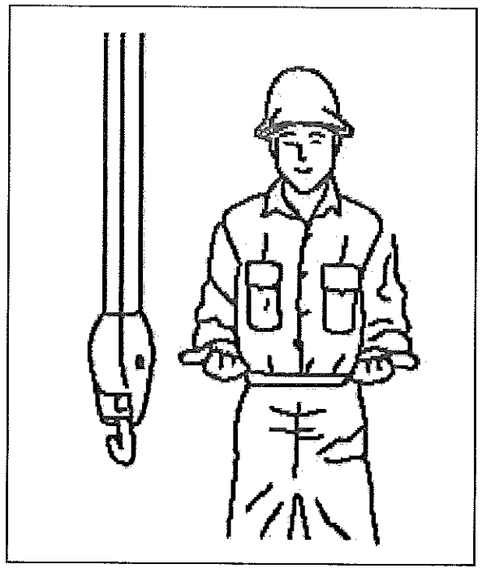
DOG EVERYTHING

Clasp hands in front of body



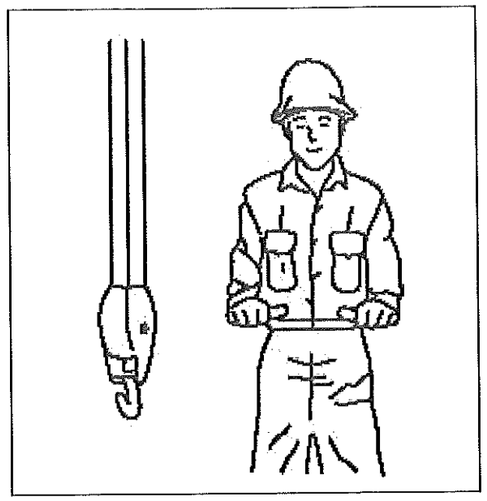
EXTEND BOOM (TELESCOPING BOOMS)

Both fists in front of body with thumbs pointing outward.



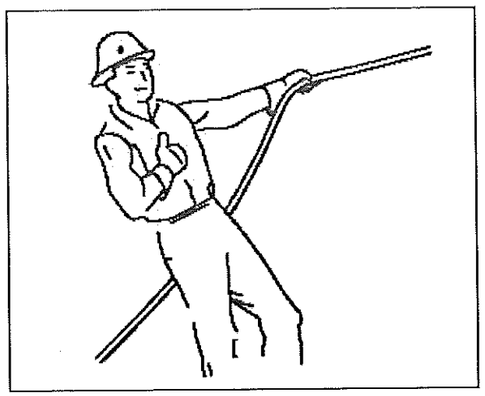
RETRACT BOOM (TELESCOPING BOOMS)

Both fists in front of body with thumbs pointing toward each other.



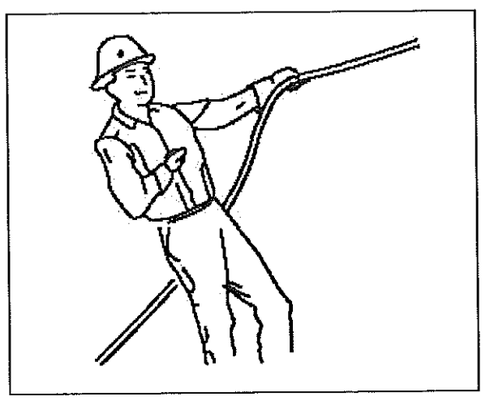
EXTEND BOOM (TELESCOPING BOOMS) - ONE HAND SIGNAL

One fist in front of chest with thumb tapping chest.



RETRACT BOOM (TELESCOPING BOOMS) - ONE HAND SIGNAL

One fist in front of chest, thumb pointing outward and heel of fist tapping chest.



2.1.8 Job Site Safety

2.1.8.1 General

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 or service staff 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.

NOTE :

The safety of all personnel within the work area is the responsibility of the machine operator.
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. Be sure everyone is clear of the crane and hazard areas before making any lifts. If these are 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.

The guard line of hazard area represent obstacles (i.e. buildings, towers, poles, etc.) in the crane's working radius. They are marked by defining points along the outer limits of the working range with the tip of the boom. Always keep a safe working distance to any obstacles. Never make the crane work outside hazard area as defined by common practice, standards, and manuals.

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 machine.

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.

It is very important to choose an appropriate location for crane operation in order to minimize safety risks. When selecting the placement location of the crane, observe the following:

- Be sure there are no obstructions in your working area spaces. Always keep a safety distance of 0.5 m. If this is not possible, secure the danger zone.
- Do not operate where there is a hazard of landslides or falling objects.
- 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.
- Select the placement location in such a way that crane movements can be carried out without collision, and that the outrigger jacks can be extended to the support base stipulated in the Load Charts manual.
- Support the crane correctly and support the outrigger pads according to the load bearing capacity of the ground on the placement location.
- Keep a safety distance to basements or similar. Keep a safety distance to slopes or embankments or similar.
- Keep the radius to a minimum. Never utilize the crane 100%. Select the correct boom length to the load case.
- Keep sufficient distance to electrical overhead wiring.

⚠ DANGER

Risk of accidents due to ground with insufficient load bearing capacity. If the crane is supported on ground with insufficient load bearing capacity, then it can topple over and kill personnel. Support the crane only on ground with sufficient load bearing capacity. Failure to observe and follow this warning could result in death or serious injury.

2.1.8.2 Permissible Ground Pressure

When the crane is supported, the outrigger jacks transmit significant forces to the ground. In certain cases, a single outrigger jack has to transmit almost the entire weight of the crane, plus the load weight, to the ground.

The ground must be able to safely absorb this pressure every time. If the outrigger pad area is inadequate, then it must be supported from below according to the load bearing capacity of the ground.

The required support area can be calculated from the load bearing capacity of the ground and the crane support force. Machine owners and operators should ensure that machine is properly set-up with outrigger pads supported by firm stable footings.

NOTE :

Consider that the support force, due to the counterweight, can be higher without a load than with a load.

⚠ CAUTION

The crane may tip if incorrectly supported from below. Only strong materials may be used for the outrigger pad bases; for example properly dimensioned wooden timbers. In order to ensure that pressure is evenly distributed over the base surface, the outrigger pads must be positioned in the center of the support base.

Permissible Ground Pressure		
Soil Type		N/cm²
1	Organic ground: peat, sludge, muck	0
2	Uncompacted fill: construction debris	0~10
3	Non-cohesive ground: sand, gravel, rocks and mix	20
4	Cohesive soil: a)clayed silt, mixed with topsoil b)silt, consisting of poor clay and coarse clay c)plastic clay, consisting of potter's clay and fill stiff semi-solid solid d)mixed granular ground, clay to sand, gravel and rocky areas stiff semi-solid solid	 12 13 9 14 20 15 22 33
5	Rock in evenly solid condition: a)brittle, with traces of decomposition b)not brittle	 150 400

2.1.8.3 Slopes and Ditches

The crane may not be set up too close to slopes or ditches. Depending on the type of ground, ensure an adequate safety clearance A and safety clearance B as well as a corresponding load entry angle α and slope angle β.

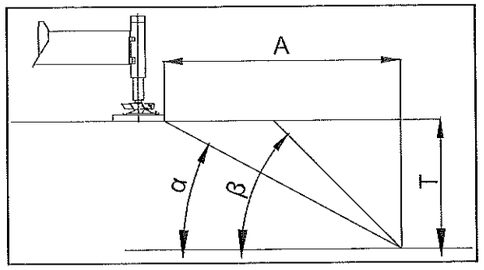


Fig 2-2

A. Distance to bottom of excavation
T. Depth of excavation

α. Load entry angle

β. Slope angle

The minimum safety clearance B from a slope:

Outrigger pressure ≤ 12t, B=1m; Outrigger pressure > 12t, B=2m;

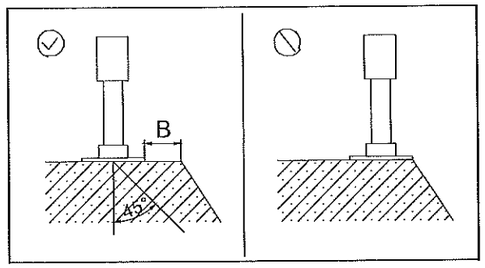


Fig 2-3 Minimum safety clearance B

B. Distance to excavation

NOTE :

Without calculated proof of safe placement, the slope angles of β given in the chart may not be exceeded.

Ground	Slope Angle
for non-cohesive and soft cohesive ground	β=45°
for stiff or semi-sold cohesive ground	β=60°
for rock	β=80°

Calculation Safety Distance A:		
Soil Type	Required Load Entry Angle α	Formula
soft ground	α≤30°	A≥2 x T
solid ground	α≤45°	A≥1 x T

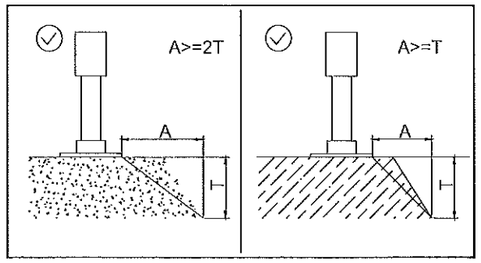


Fig 2-4 Calculation safety distance A

A. Distance to bottom of excavation
T. Depth of excavation

⚠ DANGER

The edge of the slope or excavation can break in if safety distance A or safety distance B is too small. If the edge of the slope or excavation breaks in, the crane can topple over and kill personnel.
An authorized and trained specialist should perform calculations to verify the load bearing capacity of the ground.
Safety distance A and safety distance B should be calculated by an authorized and trained specialist.
Always maintain the calculated safety distance A and safety distance B.
Support the sides of the slope or ditch.

2.1.8.4 Crush or Pinch-Point Precautions

Never place any body part out the windows or door during operation. The movement of the boom or hook could result in injury.

Keep all guards on the machine in place.

Never remove the side window of the machine. If this window becomes damaged or broken, replace it immediately.

Block off the area where the machine is working and keep all unnecessary personnel out of the work area.

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

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

2.1.9 Job Safety

Review each of these carefully:

- Only trained and authorized personnel shall be allowed to operate and service the machine.
- Keep SOM 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 machine.
- 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 machine.
- Never operate equipment that is unsafe or in poor operating condition.
- Always perform a pre-operational check on your machine before operating it. Never operate a machine that is in need of repair, damaged or unsafe.
- Never use your machine for tasks it was not designed for; damage to the machine or injury to the operator and other personnel may result.
- Never leave your machine running and unattended. Instead, always park the machine 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 machine, 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 machine 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.

2.1.10 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 Group recommends that if the wind speed (velocity) is between 32 km/h to 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 Group also recommends that operation of the crane in wind velocities over 48 km/h be prohibited. To assist you in determining prevailing wind conditions.

Wind Velocities and Their Effects:

Wind force		Wind speed		Effect of the wind in the inland
Beaufort	Description	[m/s]	[km/h]	
Zero (0)	Calm	0-0.2	1	No wind, smoke rises straight up
1	Slight air (draft)	0.3-1.5	1-5	Wind direction is shown only by observing the trail of smoke, not by the wind sock
2	Light breeze	1.6-3.3	6-11	Wind can be felt on the face, the leaves rustle, wind sock moves slightly
3	Gentle breeze	3.4-5.4	12-19	Leaves and thin twigs move, wind extends a small breeze flag
4	Moderate breeze	5.5-7.9	20-28	Swirls up dust and loose paper, moves twigs and thin branches
Reduce crane load ratings and operating parameters at 32 km/h.				
5	Fresh breeze	8-10.7	29-38	Small deciduous trees begin to sway, foam forms at sea
6	Strong breeze	10.8-13.8	39-49	Thicker branches move; telephone lines begin to whistle, umbrellas are difficult to use
Cease all craning operations at 48 km/h; lower and retract boom.				

Wind force		Wind speed		Effect of the wind in the inland
Beaufort	Descrip-tion	[m/s]	[km/h]	
7	Stiff wind	13.9-17.1	50-61	Entire trees swaying; difficult to walk into wind
8	Gale force wind	17.2-20.7	62-74	Breaks twigs off trees, walking becomes difficult
9	Gale	20.8-24.4	75-88	Minor damage to property (chimney tops and roofing tile are blown off)
10	Severe gale	24.5-28.4	89-102	Trees are uprooted, significant damage to property
11	Violent storm	28.5-32.6	103-117	Extensive, widespread storm damage
12	Hurricane	32.7-36.9	118-133	Major destruction

2.1.11 High Altitude

The maximum working altitude is 3500m for this crane.

If need this crane to work on a location over this working altitude, specify it in the contract. Sany provide optional design to make the crane working on a place up to 5000m.

The crane power performance is reduced by high altitude as below:

Altitude(m)	Reductions of crane power performance by every 1000 metres altitude increase
0-2500	2%-5%
2500-3500	8%-16%
> 3500	Sharply

2.1.12 Electrocution Hazard

Keep all parts of this machine away from all electrical power lines and other electrical power sources as shown on the following table:

Minimum Distances Between Machine and Power Lines

Cable voltage, kV (kilovolts)	Minimum required clearance, m
350 or less	6.10
Over 350 - 500	7.62
Over 500 - 750	10.67
Over 750 - 1,000	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 any electrical power sources. This machine is not insulated. Treat all overhead power lines as being energized and not insulated, unless reliable information to the contrary from the utility company or owner is available.

NOTE :

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.

NOTE :

The 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 machine.

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

Grounding of the machine 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 job site is often compounded by other factors, such as uneven ground that could cause the machine to weave or bob into power lines, and windy conditions that can make the power lines sway, reducing clearance.

1. To address these risks:

- Identify overhead power lines and mark safe area.
- Operate the machine at a slower-than-normal speed in the vicinity of power lines.
- De-energize and ground overhead power lines or take other protective measures such as guarding or insulating the lines.
- If the power lines are not de-energized, operate the machine 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 machine approaches the limits of safe clearance.
- All personnel should keep away from the machine whenever it is close to power lines.
- Do not touch the machine 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.

2. If the machine or any of its components contacts an energized power source:

- Remain calm and do not panic.
- Immediately warn personnel in the vicinity to stay away.
- 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 machine until the power has been turned off.

Following any contact with an energized electrical source, your 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 Group. The machine must not be returned to operation until it is thoroughly inspected for any damage and all damaged parts are repaired or replaced as authorized by Sany Group or your Sany distributor.

2.1.13 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 machine 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 machine.

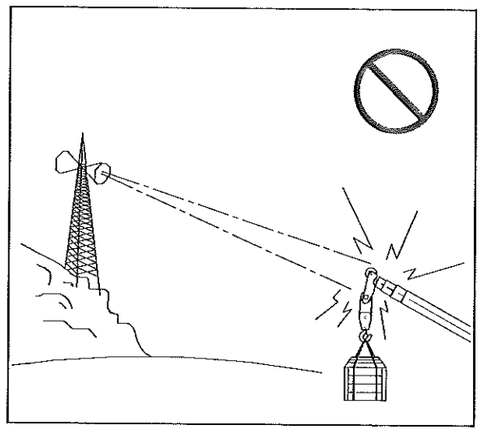
If you must exit the machine, keep both feet and legs together, your arms and hands at your side. Jump clear from the machine; maintain balance and land with both feet, legs, arms and hands still together. Your hands, arms or any part of your body should not touch the machine during the jump. Once on 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.

2.1.14 Transmitter/Communication Towers

When working near transmitter/communication towers where the machine is close enough for an electrical charge to be induced in the machine or materials being handled, the transmitter must be de-energized or the following precautions must be taken:

- The machine must be provided with an electrical ground.
- If tag lines are used, they must be non-conductive.



2.1.15 Fire Safety

2.1.15.1 Fire Safety

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.

⚠ 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.

2.1.15.2 Fuel and Oil Fires

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 machine, always perform these operations in a well-ventilated area.

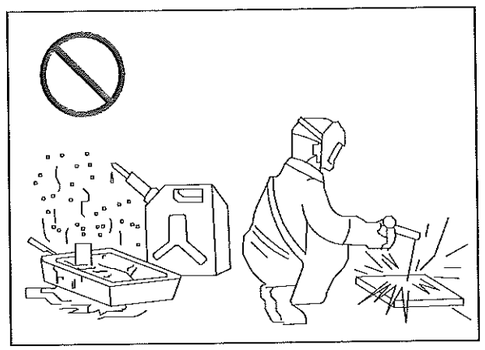


Fig 2-5 Never weld, cut or drill nearby oil and fluid

2.1.15.3 Hydraulic Fires

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

- 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 cause an explosion or a fire.

2.1.15.4 Electrical Fires and Explosions

Short circuits in the Electric 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.

2.1.15.5 Accumulation of Flammable Material

Flammable material can build up within the machine's operating systems. Dry leaves, wood debris and trash could ignite when coming into contact with hot parts.

Listed below is some information to help prevent fires from occurring during continuous operation in areas where the machine is exposed to these types of environments:

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

2.1.15.6 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.
- Have a list of emergency phone numbers available in case of fire or an accident.

2.1.15.7 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 at least a threepound "A, B, C" fire-rated extinguisher (NFPA 10 Standard for Portable Fire Extinguishers).
- 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.

2.1.16 Dust Hazards

⚠ WARNING

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

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

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

2.1.17 Environmental Precautions

When you carry out maintenance work on the crane you will occasionally work with substances which are considered to be harmful to the environment according to the current national and local regulations.

The oil and fluid 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 is illegal.). Recycling used oil, fluid or filters reduces this pollution threat and conserves a natural resource.

NOTE :

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

NOTICE

Always drain oil and fluids from your machine into an appropriate container and dispose of properly. Failure to do so could result in damage to the environment.

NOTICE

Dispose of the used filters & batteries & parts, drained oils & fuel & fluids in accordance with local environmental laws and regulations. Failure to do so could result in damage to the environment.

2.2 Product-Specific Safety

2.2.1 Authorized Use of the Machine

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 aux 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.

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.

To be considered authorized, any use must also comply with the required safety regulations, conditions, preconditions, crane configurations and working steps as noted throughout the Safety, Operation & Maintenance manual.

2.2.2 Unauthorized Use of the Machine

The crane may not be used for the following:

1. Working outside the permissible projection radius and swinging range in the Load Charts manual.
2. Working with load values which do not match the actual crane configuration.
3. Working with LMI settings which do not match the actual crane configuration.
4. Working with load moment indicator or hoist limit switch which is shut off.
5. Increasing the projection radius of the lifted load after a LMI shut-off, for example by diagonally pulling the load.
6. Using equipment or attached parts which are not approved for the crane.
7. Using the crane as sports and recreational events, especially for "Bungee" jumps.

8. Driving on a public road in a non-permissible driving condition (axle load and dimension).

9. Driving with the machine in a place in a non-permissible driving condition.

10.Pushing, pulling or lifting loads with the outrigger jacks or the outrigger beams.

11.Pushing, pulling or lifting loads by actuating the swing motor, the boom lifting cylinder or the telescoping cylinder.

12.Diagonal pulling or lifting loads.

13.Ripping stuck objects loose with the crane.

14.Releasing the crane suddenly (grapple or dumping operation).

15.Putting the crane into service when the weight of the load, which is the suspended load not the crane, is changed, for example by filling a container suspended on the load hook.

16.Moving 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.

17.Transporting personnel in the operator's cab while driving.

18.Transporting personnel with the lifting equipment and on the load.

19.Letting persons ride along outside the operator's cab.

20.Transporting loads on the carrier

21.Two hooks operation without auxiliary equipment.

22.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.

2.2.3 Travel Precautions

2.2.3.1 General

Traveling with the machine may pose some hazards. When traveling with the machine, always travel in a safe, controllable manner and remain alert at all times. Be sure all of your work equipment and areas are clearly visible. Remember a safety-conscious operator is the most important insurance when traveling with the machine.

When traveling over rough ground, travel at low speed and steer carefully since there is a danger of loss of control. Be sure the work equipment does not hit the ground surface and cause a loss of balance or machine damage.

If the machine has an auto-deceleration function, be sure the function is disabled (off). If the auto-deceleration function is enabled, the engine speed may accelerate and the travel speed may suddenly increase.

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

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

Always check to be sure surface areas will support the weight of the machine.

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

2.2.3.2 Snow or Frozen Surfaces

Be careful when traveling or operating the machine on frozen or snowy surfaces. Snow-covered or frozen surfaces are slippery. The ability to maneuver the machine is seriously affected. The machine may not respond as expected when turning:

- Always travel at a slow speed and gently operate the controls.
- Avoid any rapid movement, acceleration or quick stopping. Always be aware of the increased stopping distance required on these surfaces. Allow ample distance to stop the machine.
- Avoid deep snow or frozen bodies of water. The machine could get easily trapped in these areas.
- Keep in mind, even a slight slope may cause the machine to slip out of control. Be extra careful when driving on a sloped surface covered with snow or ice.

2.2.4 Crane Stability and Structural Integrity

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

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

3. Ensure that the load and crane configuration are within capacity as shown in the Load Charts manual and any other notes.

4. Strictly adhere to the guidelines and restrictions in the Load Charts manual for operations.

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

6. Before swinging the superstructure over the side of the crane with the outrigger beams retracted, check the Load Charts manual for backwards stability.

7. 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. 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. Reducing the load radius is the answer to this problem.

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

9. 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.

10.Take boom deflection into account before lifting a load. When a load is raised, the boom will deflect downward increasing the load radius. Ensure the rated loading capacity is not exceeded when this occurs.

11.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.

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

13.Loading capacity is 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.

14.Ensure all boom related pins are properly installed and outrigger beams are properly extended and pinned before lifting on outrigger beams.

15.Carefully follow the procedures in SOM 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.

16.All four outrigger beams must be equally extended to the 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.

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

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

19.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.

2.3 Operational Aids

2.3.1 General

The manuals that Sany Group provides are specific for each crane and must be followed carefully. If an operational aid should stop working properly, the machine 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
- The Load Charts manual
- Load Moment Indicator (LMI)
- Escape tool
- Seat belt
- Anti-Two Block Prevention/Warning Device
- Load Indicator
- Rated Capacity Indicator
- Boom Angle Indicator
- Crane Level Indicator
- Boom Length Indicator
- Radius Indicator

If any operational aid is inoperative or malfunctioning, contact your Sany distributor immediately to resolve the problem.

2.3.2 Escape Tool

Check that the escape tool (a) is located in the cab to the right of the operator.

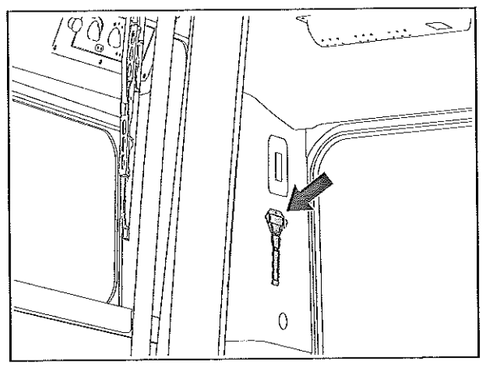


Fig 2-6

2.3.3 Seat Belt

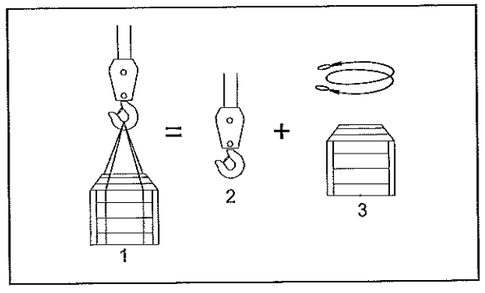
Always wear the seat belt when operating the machine.

⚠ WARNING

The seat belt is designed to protect the operator from danger, especially when the machine is traveling. Failure to wear a seat belt when operating the machine could result in death or serious injury.

2.3.4 Load Charts Manual

Load Charts manual 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 hook block, wire rope, etc., must be kept below the capacity shown on the applicable load chart.



1. Total weight
2. Weight of hook block
3. Lifting weight

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.

2.3.5 Load Moment Indicator (LMI) Systems

Under no condition should an LMI system be relied upon to replace the use of Load Charts manual 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 Charts manual before making any lifts.

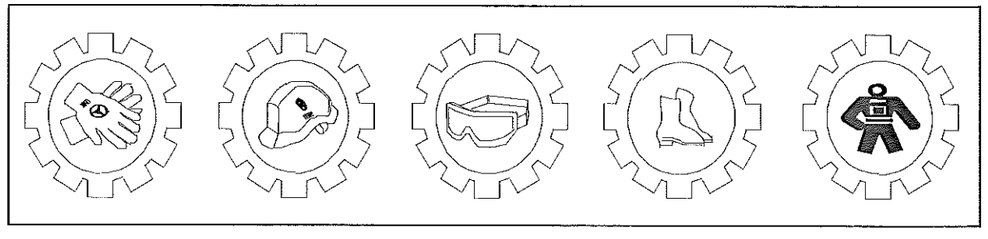
Never exceed the rated capacity shown in the Load Charts manual.

Always check the Load Charts manual to ensure the load to be lifted at the desired radius is within the rated capacity of the crane.

2.4 Personal Protective Equipment

Your safety is important so read and understand the following:

- If your machine is equipped with safety equipment, Sany 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.



2.5 Safety During Operation

2.5.1 Cold Weather Operation

The working range of ambient temperature is -20°C~40°C for this crane.

If need this crane to work in the temperature out of this working range, claim it in the contract. Sany provide optional design to make crane working in an ambient temperature range from -40°C to 60° C.

Cold weather operation requires additional caution:

1. Check operating procedures in SOM manual or the engine manual for cold weather starting.
2. Do not touch metal surfaces that could cause you to be frozen to them.
3. Keep the machine clear of all ice and snow.
4. Allow time for the hydraulic oil to warm up.
5. Park the crane in an area where it cannot become frozen to the ground.
6. Drain moisture from fuel water separator to prevent from freezing.
7. Refill the fuel the maximum level. In case, the fuel level go down with ambient temperature drops off.

2.5.2 Keeping the Cabs Clean

Observe the following:

1. When entering the cabs, 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.
2. Always keep the cabs clean. Never leave tools or obstacles lying in the cabs.
3. Do not stick objects on the window glass. These may restrict your view.
4. Do not use cell phones inside the cabs when traveling or operating the machine.
5. Never bring dangerous objects or fluids into the cabs. These could spill, ignite or explode.
6. Keep the windows clean and free of mud or film build-up. Clean the windows daily before starting your work operations.
7. If the windows are broken or cracked, replace them immediately. Never operate the machine with broken or cracked windows.

8. Never modify any cabs 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.

2.5.3 Mounting and Dismounting the Machine

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

1. 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 help keep your balance, if you will be walking on the deck surface of the crane.

2. 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.

3. 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.

4. 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.

5. 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 or off the machine with tools or similar objects in your hands.

6. Never climb on areas of the machine that are not designated walk areas. You could lose your balance, slip and fall from the machine. Always enter and exit the surface of the crane using the steps (a, typical) provided on the crane.

7. When entering the operator's 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's cab and door while entering or exiting the operator's cab.

8. 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.

2.5.4 Inside the Operator's Cab

Once inside the operator's cab, observe the following:

1. 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.

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

3. Close or latch all doors or windows in place.

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

5. 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.

6. Start the crane, check all gauges and allow the engine ample warm-up time before traveling or performing any type of work operations.

2.5.5 Start-Up Safety

Never start the crane by tampering with or shorting the 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.

⚠ 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 SOM manual and Load Charts manual are inside the cab.
- Walk around the machine and check for nearby and unauthorized personnel and objects.
- Do not start the machine 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 carrier away from the battery.

⚠ WARNING

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

2.5.6 Hoisting a Load Safely

1. 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.

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

3. 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 loading capacity.

4. 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.

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

6. 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.

7. 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.

NOTE :

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

8. Ensure that all slings, ties, and hooks are correctly placed and secured before raising or lowering the load. Use only slings or other rigging devices rated for the lift to be made and use them properly.

9. Be sure the load is secured properly and attached to the hook block with rigging of proper size and in good condition. Check the load slings before lifting.

NOTE :

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

NOTE :

Do not wrap the hoist wire rope around a load.

10.Always maintain control of the load at all times, especially when swinging with a load. Use tag lines (as appropriate) for positioning and restraining loads. Personnel using tag lines must be on the ground.

NOTE :

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.

NOTE :

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.

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

12.For the first 100 hours of crane operation 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.

13.Control the loads within the rated capacity. In order to control the crane properly, there should be no barrier obstructing the passage of the crane and the load. Always keep in mind a crane is designed for lifting objects only. 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.

NOTE :

Dragging or pulling a load with the crane mechanism in any manner may cause the machine to tip or roll-over.

14.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.

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

16.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.

17.Always check weather conditions. Wind speeds in excess of standard ratings and thunderstorms could cause injury or even death. Lower the boom to ground level immediately and take shelter if the stormy weather occurs during lifting operations.

NOTE :

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

NOTE :

Excessive wind speeds can cause loss of control or a roll over.

18.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.

19.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.

20.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.

21.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.

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

23.All crane operations shall be carried out within a radius as small as possible.

24.Avoid multiple operations 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.

25.If the load becomes unstable, leave the area immediately and lower the load back down to the ground. Never stand near the load.

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

27.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)

28.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.

2.5.7 Wire Rope Safety

1. Use only wire rope specified by Sany Group as indicated in the Load Charts manual. Substitution of an alternate wire rope may require the use of a different permissible line pull and, therefore, require different reeving.

2. 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 broken wires in a length of wire rope equal to six times the wire rope diameter, or more than four broken wires in a length of wire rope equal to thirty times the wire rope diameter.
- For running ropes other than rotation resistant, six broken wires in one wire rope lay or three 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 breaks in one wire rope lay in sections beyond the end connection or more than two 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.

3. Operators must not work with worn or damaged wire rope.

4. Never handle the wire rope with bare hands.

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

6. 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 ensure 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.

7. 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.

8. Never overload or shock-load a wire rope.

9. Lubricate the wire rope periodically as the lubricant becomes depleted.

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

11. 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.

2.5.8 Swingaway Boom Extension Safety

Follow the proper procedures during erection, stowage, and use of the swingaway boom extension 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.

2.5.9 Counterweight

To reduce the crushing hazard, which could cause death or serious injury, always clear all personnel from the counterweight and superstructure area before rotating the superstructure.

Do not add material to the counterweight to increase capacity.

Prohibit modification or additions which affect the capacity or safe operation of the machine without the manufacturer's written approval.

2.6 Interruption of Crane Work

If the crane operator leaves the equipped crane during crane operation, then it must be ensured that no danger to crane or surrounding area can occur in case of an unforeseen event.

⚠ DANGER

Situations may occur which could cause the crane to become unsafe if left unsupervised. This could cause the crane to topple over, resulting in major personal injury and property damage. Always keep the crane under full control.

1. Incidents which could occur (for example):
- The ground giving way due to severe rain
- Melting ice under the supports
- Bad weather, storms, thunderstorms
- Landslides
- Wash outs
- Outrigger jack failure
- Boom lift cylinder failure
- Vandalism

2. Make sure that the following prerequisites are met:
- There is no load on the hook
- The crane poses no traffic obstacle

NOTICE

If crane work must be interrupted if the crane is equipped, then it must be ensured that measures are initiated in time by trained, qualified personnel, to bring the crane into a safe condition in case something happens.

⚠ DANGER

If it is not possible to maintain full control over a rigged crane, the machinery and boom must be taken down.

2.7 Resumption of Crane Operation

Upon resumption of crane operation, the crane operator is required to check the state of the crane and its safety systems.

Check operating mode settings and reset, if necessary.

⚠ DANGER

If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset, if necessary, before resuming crane operation.

2.8 Ending Crane Operation

Before the crane operator may leave the crane, the following prerequisites must be met:

- Remove the load on the crane hook or place it on the ground.
- Telescope the telescopic boom all the way in and place the boom down.
- Turn the heater off.
- Apply the parking brake on the crane carrier.
- Turn the engine off and pull the ignition key.
- Bring the control lever or joystick to neutral position.
- Secure the mobile crane to prevent unauthorized use. Close all control platforms with a lock, if they are not used at the time or if they are not occupied.
- Secure the mobile crane to prevent it from rolling off.

2.9 Parking the Crane

Make sure that the following prerequisites are met:

- The vehicle is standing on level ground of sufficient load carrying capacity
- The parking brake is applied

Under the following conditions, the vehicle must be secured against rolling away by using the specified number of wheel chocks or wedges - in addition to the parking brake:

- The vehicle is being parked on an uphill or downhill slope.
- The vehicle is being parked and not guarded.
- The vehicle is defective, especially if the brake system is defective.

⚠ DANGER

Danger of accidents if the vehicle rolls away. If the following points are not observed by the crane operator, personnel can be killed. It is prohibited to park the vehicle at a slope or an incline of more than 18%. The parking brake must always be applied when parking the vehicle. The ground where the vehicle is parked must be of sufficient load carrying capacity and level, so that the wedges will not slip away under load or be pushed into the soil.

⚠ DANGER

Vehicle rolling uncontrollably away. The vehicle may roll away uncontrollably if all the specified chocks are not placed directly behind the wheels. This may result in fatal injuries. All wedges must be placed in such a way that they act against the downdrift force. Place all stipulated wedges tightly directly under the wheel. Place all stipulated wedges tightly so that they have an immediate braking action and keep the vehicle in parking position.

2.10 Lockout/Tagout Procedures

2.10.1 General

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 machine is to be locked-out and tagged-out for service or repair.

2.10.2 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.

2.10.3 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.

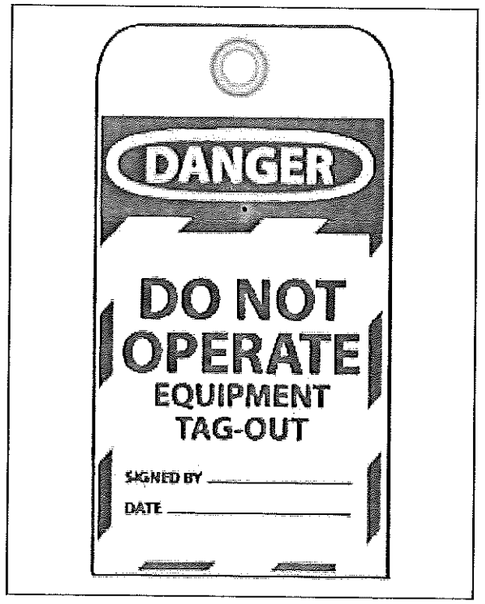


Fig 2-7 Maintenance alert tag

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.

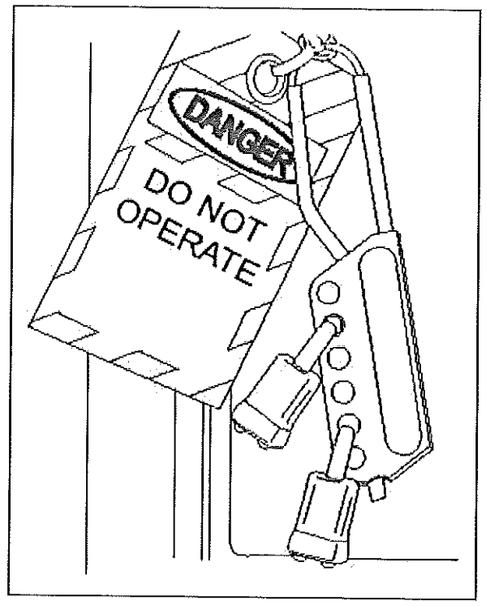


Fig 2-8 Lockout tag

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.

2.11 Maintenance Safety

2.11.1 General

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 maintenances or repairs have been made to ensure proper operation.
- Complete the required maintenance record form.
- Direct any questions to your local authorized Sany distributor.

⚠ WARNING

All maintenance to be performed on this machine 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.

2.11.2 Cold Weather Maintenance

In extremely cold weather (32° F (0° C)), Sany recommends to use only lubricants and materials identified in this manual.

Refer to "Lubricants and fluids"

Prior to starting the engine, ensure that the battery is fully charged and that the battery case and the cables have not cracked.

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.

NOTICE

To prevent damage to the hydraulic system, perform the following warm-up procedure in ambient temperatures below 32° F (0° C): Start the engine and run it at idle speed for 7 - 10 minutes; then increase the engine speed to 1,200 rpm till the hydraulic oil temperature is at least 68° F (20° C). Proceed with normal operation only after completing warm-up as described above or else adjust the warm-up period according to the ambient temperature. During normal construction operation, take care to operate the controls slowly and observe the traveling system for any signs of trouble. Operation with oil temperature of 68° F (20° C) or below may damage the hydraulic system.

2.11.3 Preparing for Maintenance

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

1. Before performing any work on the machine:
- 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, Lock-out/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.
- Recognize and avoid pinch-points while performing maintenance.

2. After maintenance or repairs:
- Fill out the required maintenance record form. See maintenance section of SOM 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.

2.11.4 Using the Correct Tools

Always use the proper tools for the job. Using tools that are incorrect, defective or damaged could cause serious injury.

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.

NOTE :
Be careful when working in tight areas to prevent injury to yourself.
Always put shop tools back in there proper storage location when finished.

2.11.5 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:

1. Always be aware of rotating components.

2. During maintenance operations while the engine is running, one worker must remain in the operator seat of the machine with clear contact with the person performing the repairs on the machine at all times.

3. If equipped, all lock levers must be in the LOCK position or the parking brake must be in the PARK position.

4. 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.

2.11.6 Jacking up the Machine

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. It is also necessary to place woods to support the machine for secondary protection.

NOTE :
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.

2.11.7 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.

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. Be sure the attachment is stable on a solid surface and clear of all walkways or fire exits.

2.11.8 Weld, Drill, Cut or Grind on the Machine

Contact your Sany distributor for proper guidance on any welding being attempted.

Personnel welding on the machine must be fully qualified and certified to use the processes and equipment they may operate in making these repairs. Owners are responsible for the structural integrity of any completed repair.

Sany strongly recommends against welding on connectors and fine grain hi-strength steels. Components should be replaced if they are damaged.

NOTE :
Contact with your Sany distributor for proper guidance on any welding being attempted.

⚠ CAUTION
Disconnect the battery prior to welding. Failure to do it could result in damage to the machine, personal property, or cause the machine to operate improperly.

2.11.9 High-pressure Fluid Lines

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

Always do as follows:

1. 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.

2. Never perform inspections or replace items while the system is under pressure. Working on a system still under pressure could lead to serious injury.

3. 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.

4. If high-pressure fluids penetrate your skin or get into your eyes, seek medical attention immediately.

2.11.10 Accumulator

This machine is equipped with an accumulator charged with high-pressure nitrogen gas. Do not disassemble the accumulator.

- Never expose the accumulator to high heat or open flames.

- Never weld on the accumulator.
- Never drill or cut on the accumulator.
- Never strike the accumulator.

If the accumulator should need maintenance, contact your Sany distributor.

2.11.11 Refueling

Before adding fluids, shut the machine 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:

1. Refueling the machine could pose some hazards. Grease, fuel, oil or coolant spills pose a hazard if not cleaned up immediately.

2. 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.

3. Never mix gasoline with diesel fuel. Gasoline is extremely flammable and could cause an explosion.

4. Always allow room for the fuel to expand when filling the fuel tank.

2.11.12 Adding Fluids to the Machine

Before adding fluids, shut the machine 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 machine during operation, always be aware that these systems are under high pressure and hot.

2.11.13 Battery Safety

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

When working with batteries, always work in a well-ventilated area. Batteries pose a hazard, especially when they have been in use for a long period of time. Listed below are some basic precautions to be aware of when working around batteries:

1. Always wear personal protective equipment.

2. Battery gases are extremely explosive. Smoking, sparks or open flames could cause an explosion. When opening a battery compartment always allow ample time for the gases to escape.

3. If the battery is corroded, flush the area with a baking soda and warm water mix.

4. If battery acid gets on skin or in eyes, flush the area immediately with fresh water and seek medical attention.

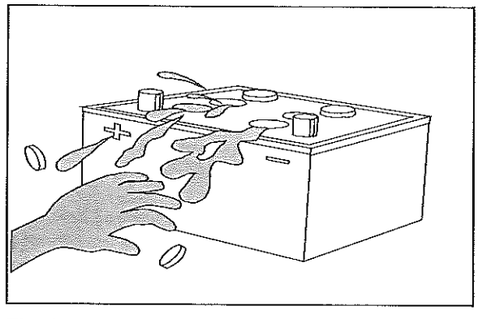


Fig 2-9 Prevent skin and eyes from battery acid

Check battery condition only with proper test equipment. Batteries should be charged in an open, well-ventilated area that is free of flame, smoking, sparks, and fire.

⚠ WARNING

The battery posts, terminals, and related accessories contains chemical lead and lead compounds, chemicals could cause cancer, birth defects or other reproductive harm. Wash hands after handling. Failure to do these could result in death or serious injury.

2.12 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.
- Be sure the transmission is in the neutral and release the parking brake during towing operation.
  • 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.

2.13 Decals

Ensure that all personnel working around the crane are thoroughly familiar with the location and content of all placards and decals on the crane. Decals provide important instructions and warnings and must be read prior to any operational or maintenance function.

Sany reminds crane owners to ensure that all safety decals are in place and legible. Do not remove any decal from this crane.

Refer to the Parts Manual for this crane for the locations of all safety decals.

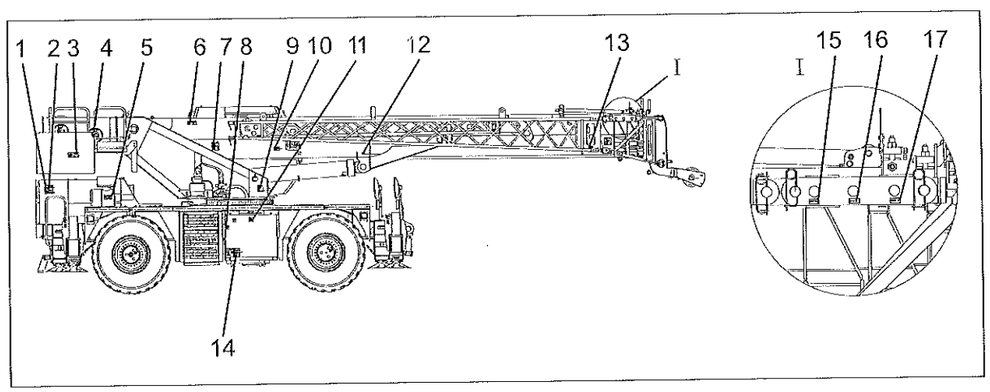


Fig 2-10 Decals arrangement 1

1. Decal, Warning, Keep Hands Clear of Moving Parts
2. Decal, Warning, Hot Pressurized Oil
3. Decal, Danger, Counterweight Crush Hazard
4. Decal, Danger, Entanglement Hazard
5. Decal, Danger, Explosion Hazard
6. Decal, Warning, Do Not Walk
7. Decal, Danger, Boom Hazard
8. Decal, Hydraulic Oil Level
9. Decal, Danger, Pressurized Oil Leak
10. Decal, Warning, Boom Extension Installation
11. Decal, Hydraulic Oil
12. Decal, Grease
13. Decal, Danger, Boom Extension Hazard
14. Decal, Danger, Lifting Height
15. Decal, Boom Extension Offset
16. Decal, Boom Extension Offset
17. Decal, Boom Extension Offset

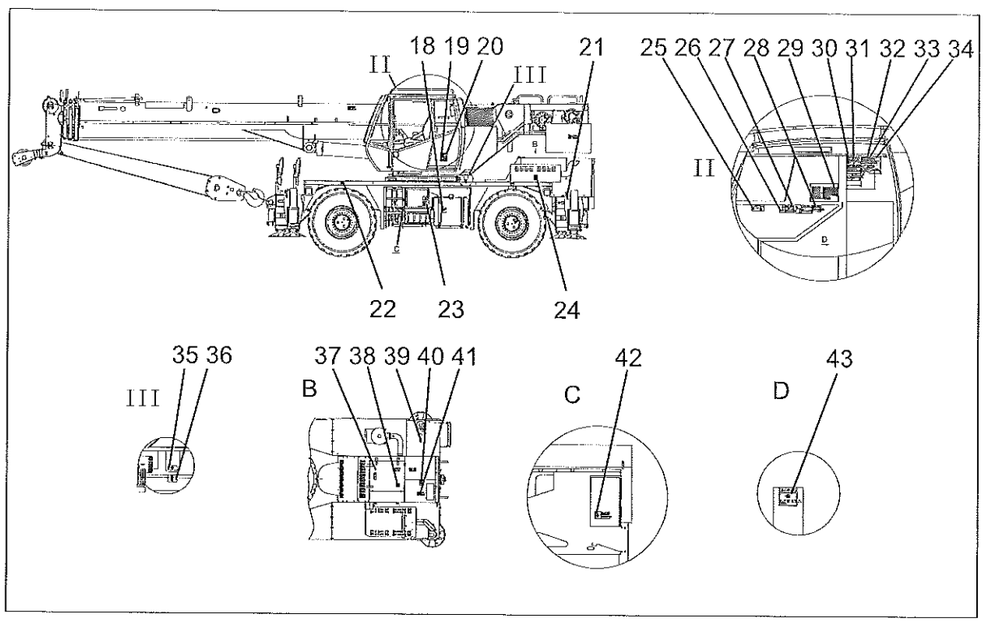


Fig 2-11 Decals arrangement 2

18. Decal, Notice, Diesel Fuel Only
19. Nameplate, Crane
20. Rivet
21. Decal, Lifting Operation
22. Decal, Tire Pressure
23. Decal, Caution, Welding Forbidden
24. Decal, Caution, Hot Surface
25. Decal, Caution, Swing Lock
26. Decal, Danger, Tipping Hazard
27. Decal, Danger, Electrocution Hazard
28. Decal, Caution, Neutral Travel
29. Decal, Load Chart
30. Decal, Safety Instruction
31. Decal, Safety Instruction
32. Decal, Safety Instruction
33. Decal, Safety Instruction
34. Decal, Caution, Read Operation Manual
35. Decal, Lock Pin Alignment
36. Decal, Lock Pin Alignment
37. Decal, Warning, Fall Hazard
38. Decal, Warning, Engine Oil Fill
39. Decal, Lifting Lug, Counterweight
40. Decal, Warning, Coolant Fill
41. Decal, Caution, Fill Coolant Reservoir
42. Decal, Battery Disconnect
43. Decal, Warning, LMI Bypass

All safety, alert and warning decals are safety signs, which warn of a risk or danger. For that reason, all warning signs on the crane must be complete and always legible.

Your SANY distributor can supply new replacement decals if needed. Never modify or change existing decal information unless authorized by your SANY. Additional safety decals may be added to the machine if necessary.

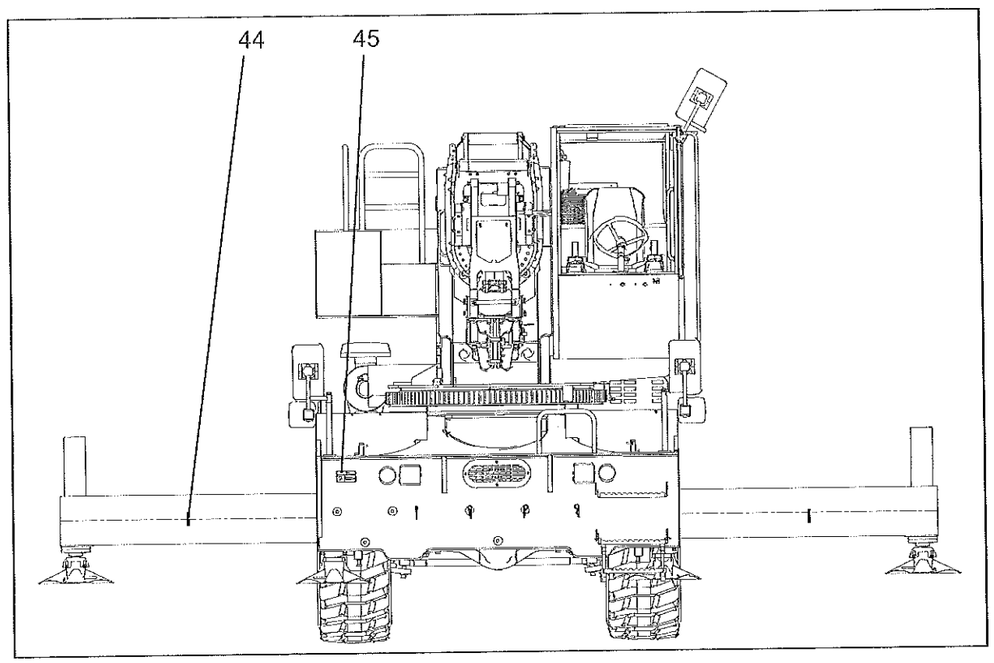


Fig 2-12 Decals arrangement 3

44. Decal, Outrigger Mid Extend

45. Decal, Notice, Towing Lug

SANY

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3.System Functions

3.1 Directional Positions of the Machine

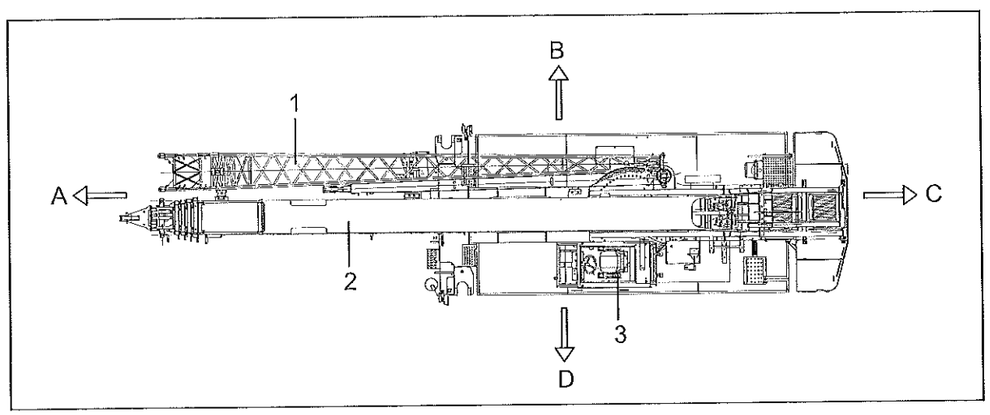


Fig 3-1 Directional positions of the machine

1. Swingaway boom extension
2. Boom
3. Operator's cab

A. Front – The end of the carrier without the engine.

B. Rear – The end of the carrier with the engine.

C. Left – The side of the carrier with the operator's cab.

D. Right – The side of the carrier without the operator's cab.

3.2 General Description of Rough Terrain Crane

3.2.1 Exterior Components

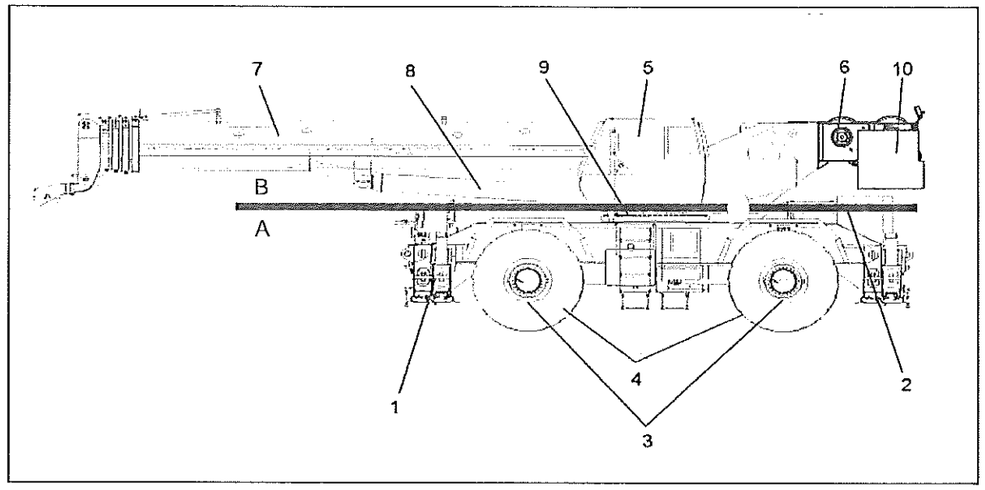


Fig 3-2

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	Counterweights

3.2.2 General Description of Carrier

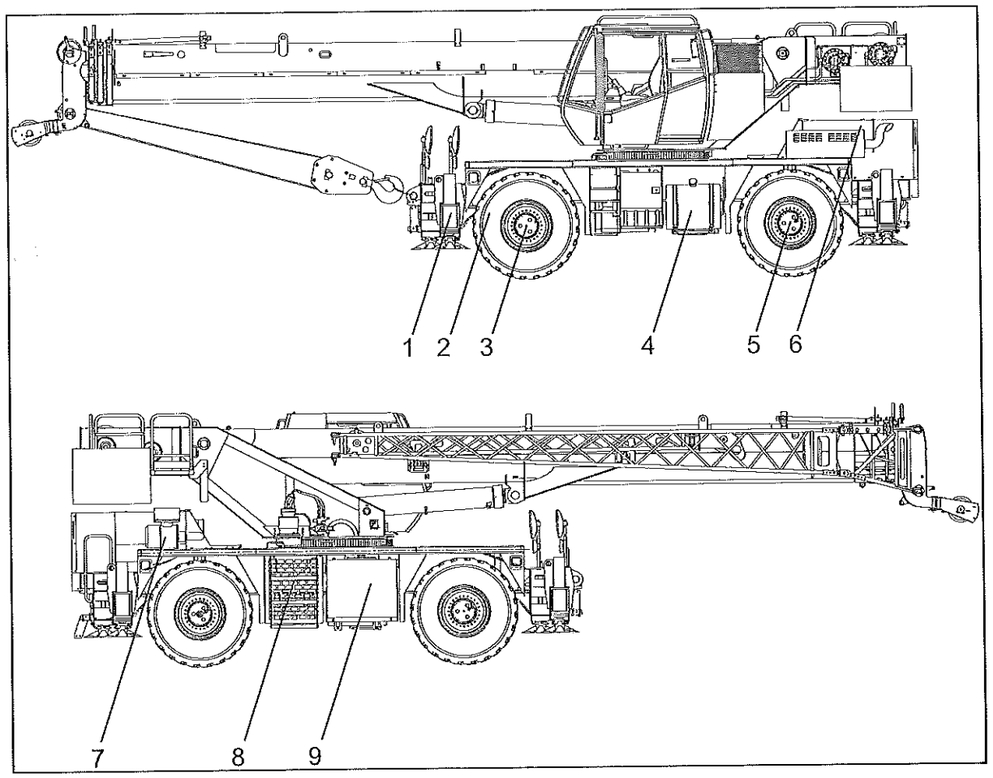


Fig 3-3 General description of carrier

1. Outrigger
2. Tire
3. Front axle
4. Fuel reservoir
5. Rear axle
6. Engine system
7. Air filter
8. Transmission system
9. Hydraulic reservoir

3.2.3 General Description of Superstructure

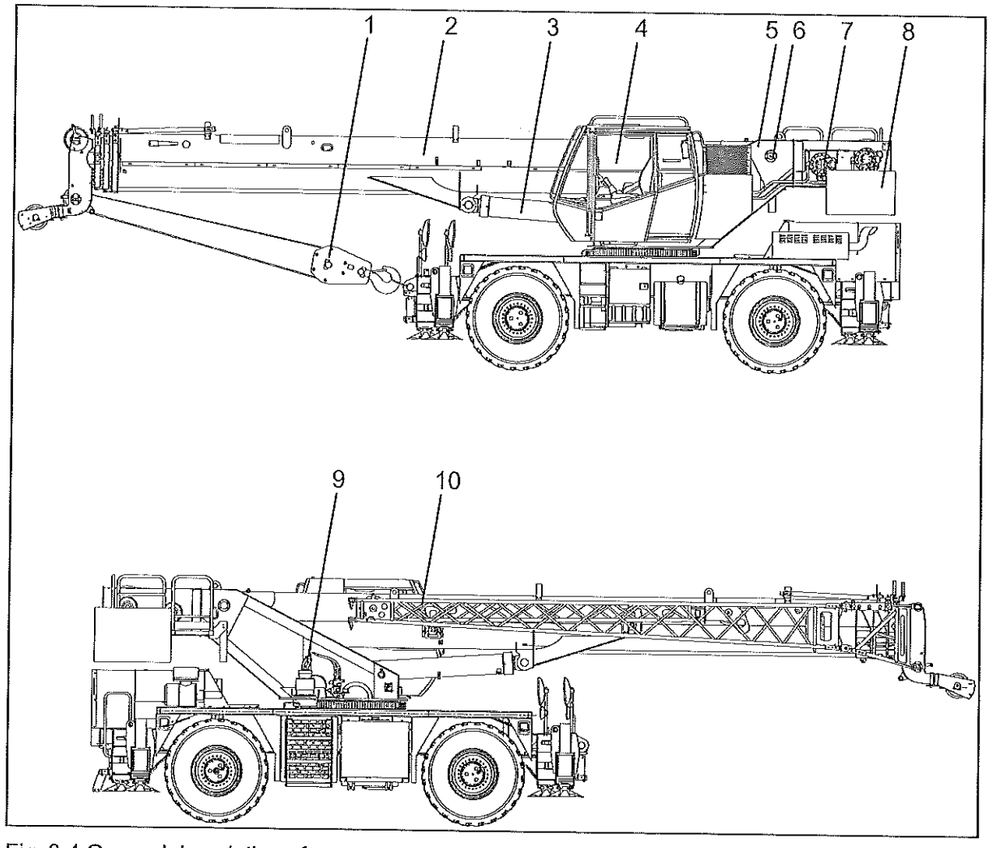


Fig 3-4 General description of superstructure

1. Main hook block
2. Main boom
3. Boom lift cylinder
4. Operator's cab
5. Turn table
6. Boom pivot pin
7. Hoist and wire rope
8. Counterweight
9. Swing motor
10. Swingaway boom extension

3.3 Description of the Carrier

3.3.1 Description of the Carrier

The Sany-designed, four-wheel drive and four-wheel steering (4x4) carrier 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.

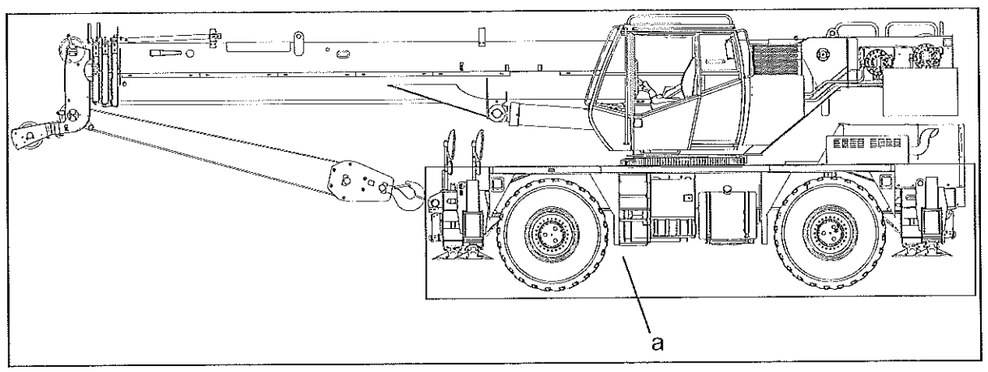


Fig 3-5 Carrier

3.3.2 Outriggers

3.3.2.1 Outriggers

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

Refer to “Outrigger controls”.

The extending & retracting of outrigger is controlled by electronical controls in the cab, and maintained by integrated holding valve design.

The outriggers are stowed during travel and when lifting on tires.

3.3.2.2 Beams and Jacks

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

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.

NOTE :
Check the "On tire" load charts before lifting.

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

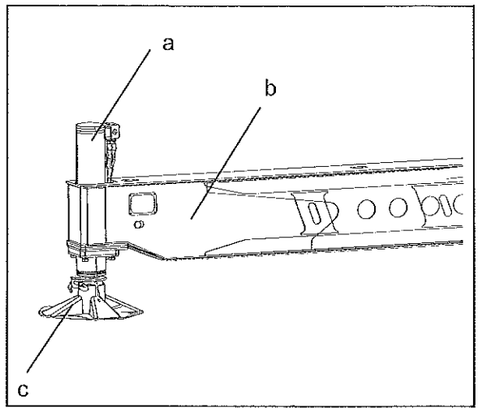


Fig 3-6 Outrigger

a. Outrigger jack cylinder
b. Outrigger beam

c. Outrigger float

Easily removable outrigger floats, each with an area of 2826 cm^2, are stowed on the outrigger boxes.

Outrigger pins are used to ensure beams are in the correct locations.

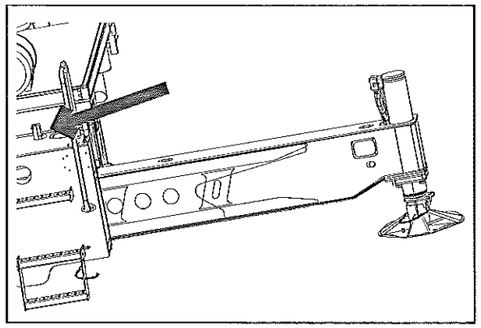


Fig 3-7 Outrigger pin

3.3.2.3 Outrigger Controls

The outrigger controls are located on the left dashboard.

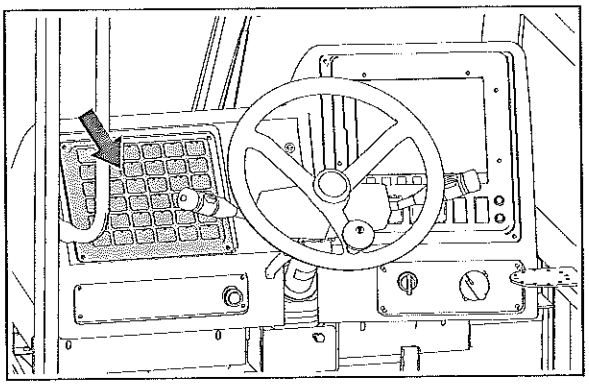


Fig 3-8 Left dashboard

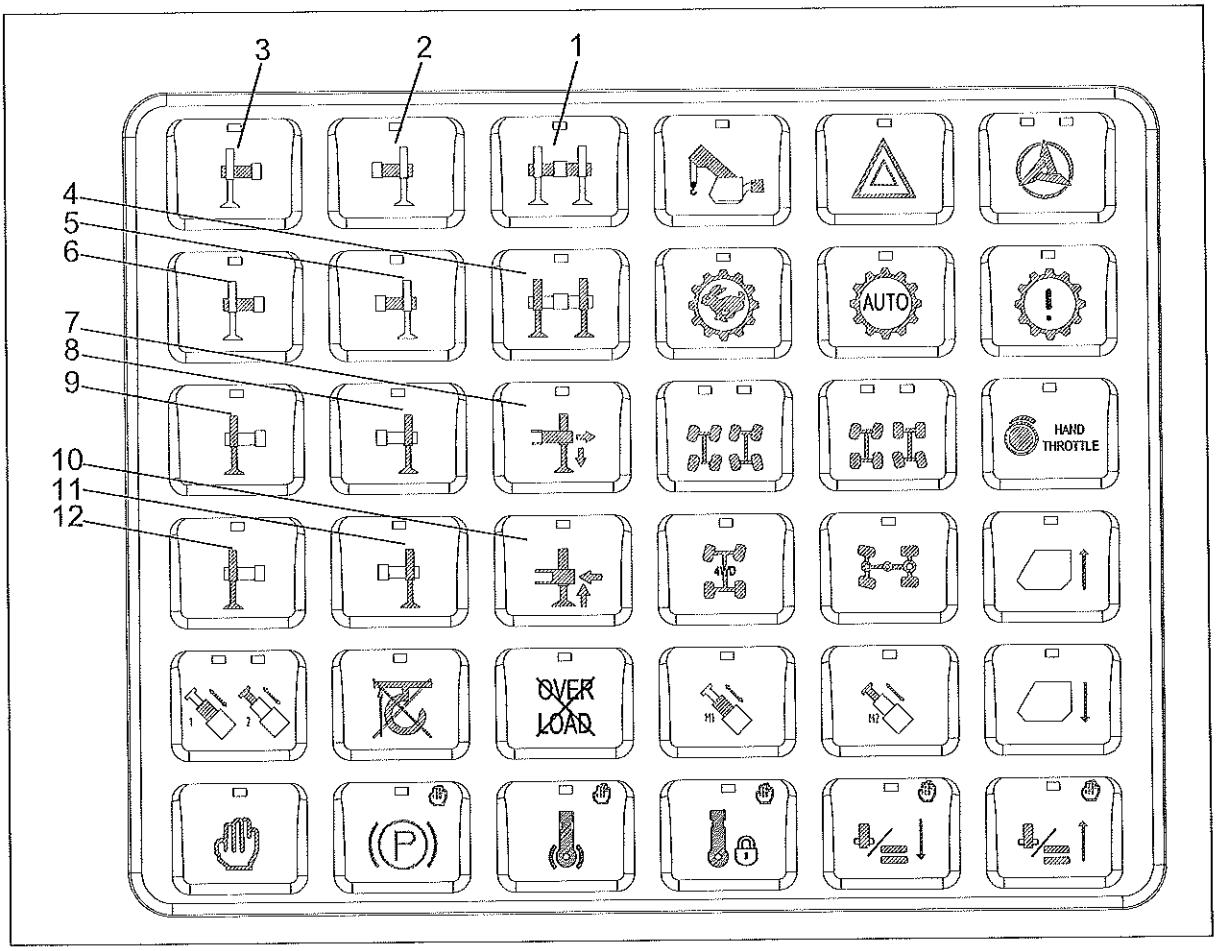


Fig 3-9 Outrigger controls

1. Simultaneous Outrigger Beam Operation

Press the simultaneous outrigger beam operation button 1 to activate all four beam cylinders. The operation of the beam cylinders is controlled by buttons 7 & 10.

2. Right Front Outrigger Beam Selection

Press the right front outrigger beam selection button 2 to activate the right front outrigger beam cylinder. The operation of the beam cylinders is controlled by buttons 7 & 10.

3. Left Front Outrigger Beam Selection
Press the left front outrigger beam selection button 3 to activate the left front outrigger beam cylinder. The operation of the beam cylinders is controlled by buttons 7 & 10.

4. Simultaneous Outrigger Jack Operation
Press the simultaneous outrigger jack operation button 4 to activate all four jack cylinders. The operation of the jack cylinders is controlled by buttons 7 & 10.

5. Right Rear Outrigger Beam Selection
Press the right rear outrigger beam selection button 5 to activate the right rear outrigger beam cylinder. The operation of the beam cylinders is controlled by buttons 7 & 10.

6. Left Rear Outrigger Beam Selection
Press the left rear outrigger beam selection button 6 to activate the left rear outrigger beam cylinder. The operation of the beam cylinders is controlled by buttons 7 & 10.

7. Extend Beam/Jack
Press the extend beam/jack button 7 to extend the selected beam or jack cylinder. The beam or jack to operate is selected by pressing of buttons 1, 2, 3, 4, 5, 6, 8, 9, 11 or 12.

8. Right Front Outrigger Jack Selection
Press the right front outrigger jack selection button 8 to activate the right front outrigger jack cylinder. The operation of the jack cylinders is controlled by buttons 7 & 10.

9. Left Front Outrigger Jack Selection
Press the left front outrigger jack selection button 9 to activate the left front outrigger jack cylinder. The operation of the jack cylinders is controlled by buttons 7 & 10.

10.Retract Beam/Jack
Press the retract beam/jack button 10 to retract the selected beam or jack cylinder. The beam or jack to operate is selected by pressing of buttons 1, 2, 3, 4, 5, 6, 8, 9, 11 or 12.

11.Right Rear Outrigger Jack Selection
Press the right rear outrigger jack selection button 11 to activate the right rear outrigger jack cylinder. The operation of the jack cylinders is controlled by buttons 7 & 10.

12.Left Rear Outrigger Jack Selection
Press the left rear outrigger jack selection button 12 to activate the left rear outrigger jack cylinder. The operation of the jack cylinders is controlled by buttons 7 & 10.

3.3.3 Engine System

The engine system is made up of the following component assemblies:

- Cooling system
- Exhaust system
- Air intake system
- Engine
- Fuel supply system

NOTE :
Refer to the original equipment manufacturer (OEM) engine manual for complete details of the engine.

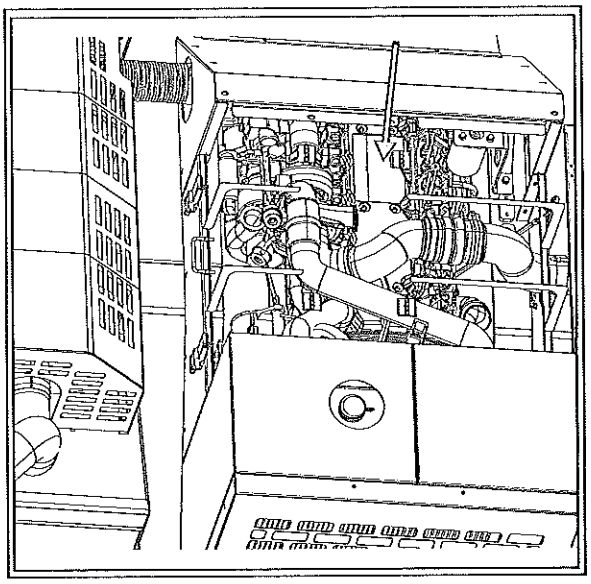


Fig 3-10 Engine system

a. Engine

3.3.4 Transmission

3.3.4.1 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).

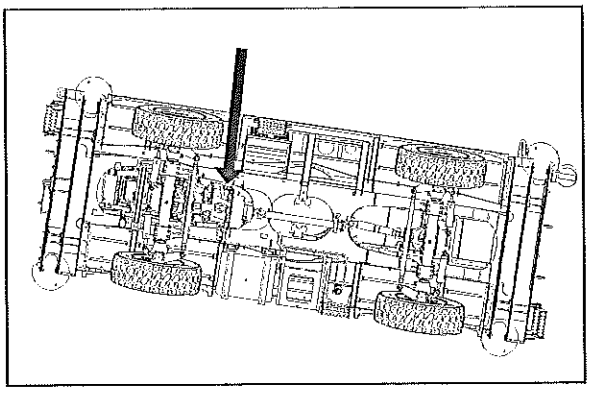


Fig 3-11 Transmission

3.3.4.2 Transmission 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

Gear selection is made via a selector button switch (enable / disable transmission high gear switch) mounted on the dashboard to the left of the steering wheel.

NOTE :

This switch changes the gear low/high as required: low gear for slower travel speed but more power; high gear for faster travel speed but less power.

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

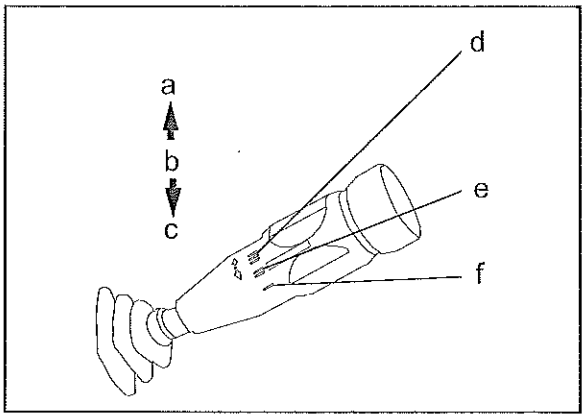


Fig 3-12 Right multipurpose switch

a. Forward
b. Neutral

c. Reverse

d. 1st gear

e. 2nd gear

f. 3rd gear

Low Gear	Speed (km/h)	High Gear	Speed (km/h)
1st	5.8	1st	\
2nd	9.5	2nd	9.5
3rd	13	3rd	13
4th	21	4th	21
5th	\	5th	29

To override the limit of transmission issue as well as make transmission work in low gear only, press the "Transmission Emergency" button switch on the panel to the left of the steering wheel.

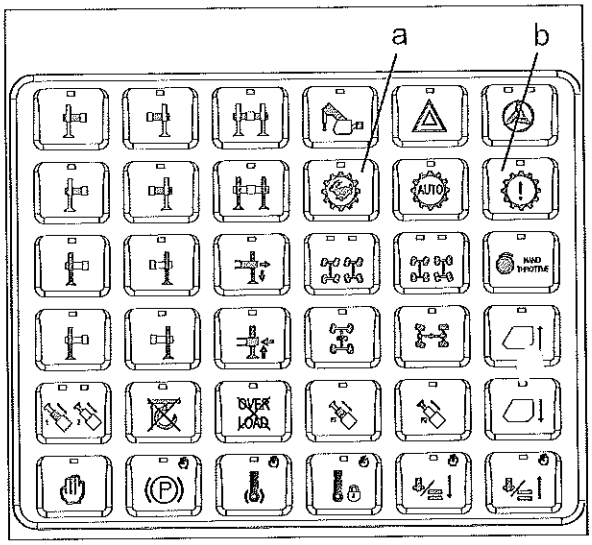


Fig 3-13 Transmission controls

a. Enable / disable transmission high gear switch
b. Transmission emergency switch

3.3.5 Axles and Suspension

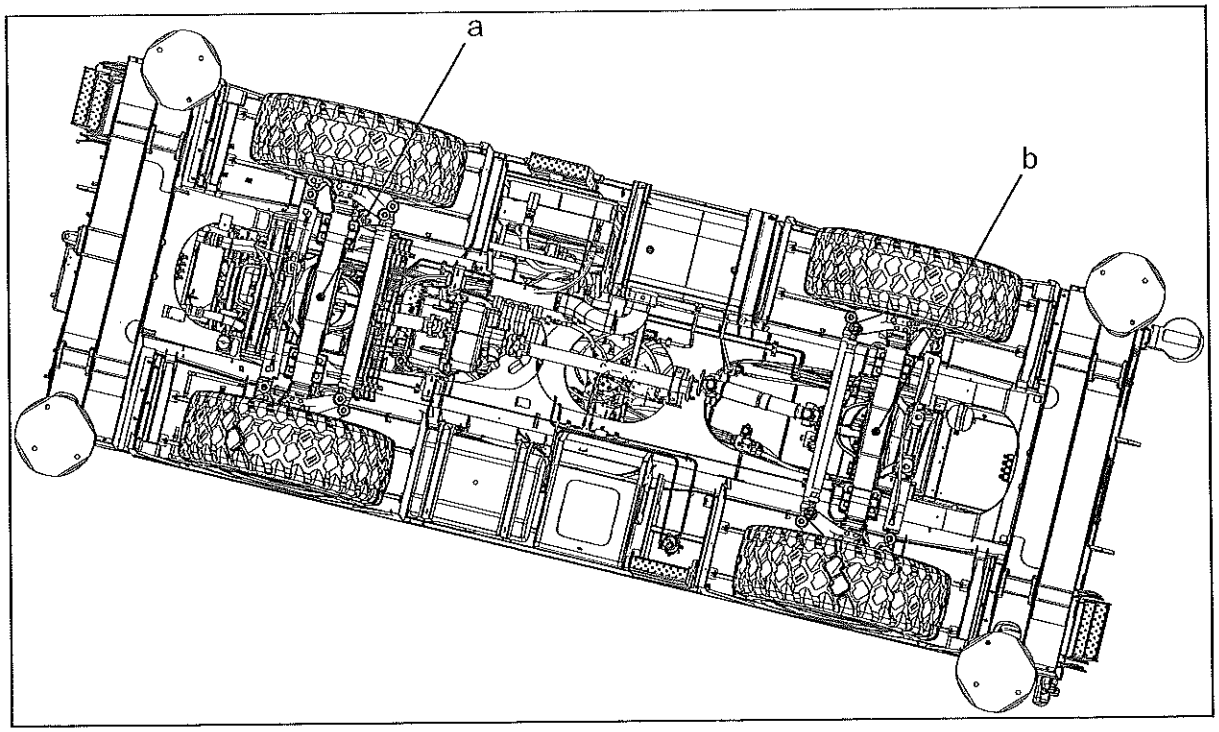


Fig 3-14 Axles

a. Rear axle
b. Front axle

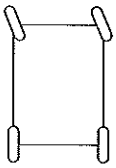
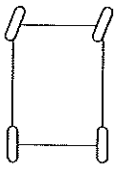
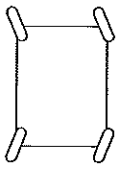
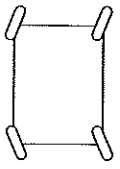
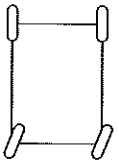
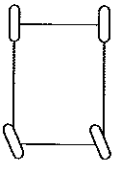
The rear axle is a planetary drive/steer type with 102 mm of total oscillation. Automatic oscillation lockouts engage when the superstructure is rotated + 6° from the travel position (boom over the front).

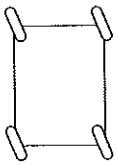
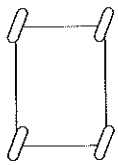
The front axle is a planetary drive/steer type rigid-mounted to the carrier for increased stability.

3.3.6 Steering

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

Four steering modes are available as shown below:

Front axle steering		Left turn
		Right turn
Four-wheel(Cordinated) steering		Left turn
		Right turn
Rear axle steeing		Left turn
		Right turn

Four-wheel(Crab) steeing		Left turn
		Right turn

The desired steering mode is selected by Front Axle Steering / Rear Axle Steering Four-Wheel (Coordinated) Steering / Four-Wheel (Crab) Steering on the dashboard to the left of the steering wheel.

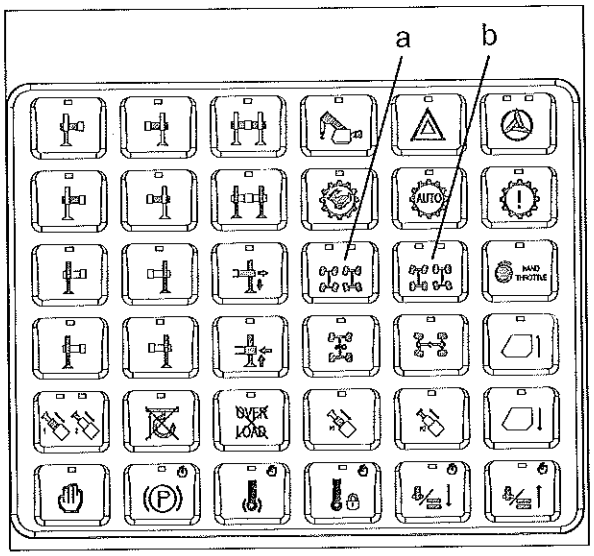


Fig 3-15 Steering controls

a. Four-wheel (coordinated) steering/ Four-wheel (crab) steering
b. Front axle steering / rear axle steering

3.3.7 Brake System

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 inside the operator's cab.

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.

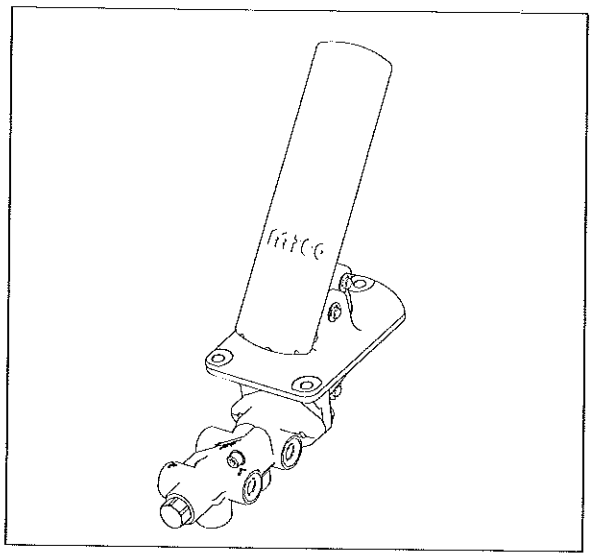


Fig 3-16 Foot pedal

The parking brake disc is mounted to the front axle differential and is activated by a parking brake button switch on the dashboard to the left of the steering wheel. This button switch has a unlocking button to prevent accidental activation.

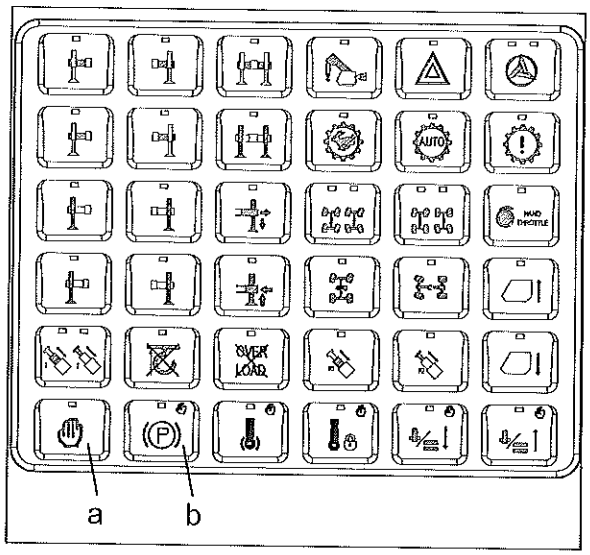


Fig 3-17 Brake controls

a. Unlocking button switch
b. Parking brake

3.3.8 Electrical System

3.3.8.1 Electrical Box

The electrical control box is located between the diesel fuel tank and the rear wheel on the left side of the carrier.

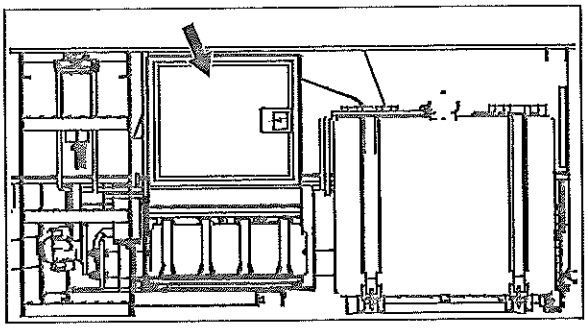


Fig 3-18 Carrier electrical control box

3.3.8.2 Battery

The batteries are located below the electrical cabinet on the left side of the carrier.

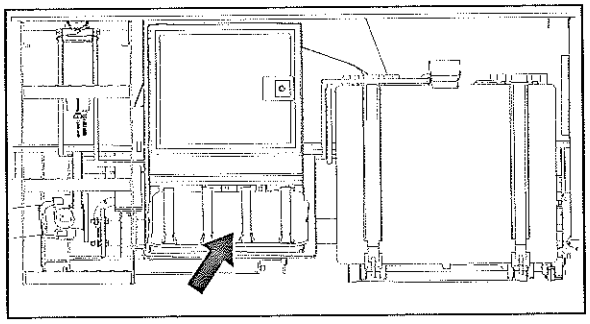


Fig 3-19 Battery

3.3.8.3 Battery Disconnect Switch

The battery disconnect switch is located on the left side of the electrical cabinet above the battery compartment. Turn the switch to the off position when securing the machine for the day or as-needed for maintenance tasks.

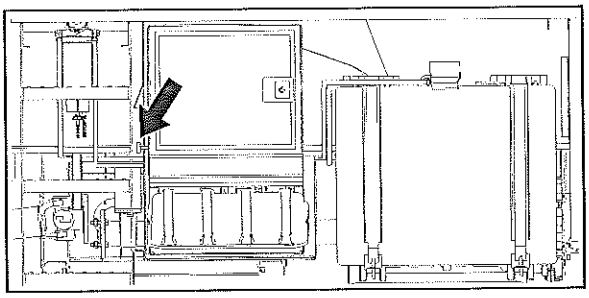


Fig 3-20 Power disconnect switch

3.3.8.4 Carrier Fuse and Relay Panel

Most carrier electrical circuits are protected by the components of the fuse and relay panel located in carrier electrical control box. Access to all the fuses may be gained by removing the small plastic cover on the front of the panel. Inside the small plastic fuse cover, a fuse decal can be found.

The fuse and relay panel contains fuses, relays and diode.

⚠ WARNING

Failure to heed this notice can result in damage to the machine or cause the machine to operate improperly.

A fuse should be replaced if it is corroded, produces white powder or becomes loose in the fuse panel.

Before replacing a fuse, make sure that the ignition switch is in the OFF position and the battery is disconnected.

Always replace a fuse with one of the same capacity. Never replace a fuse with one of a higher capacity.

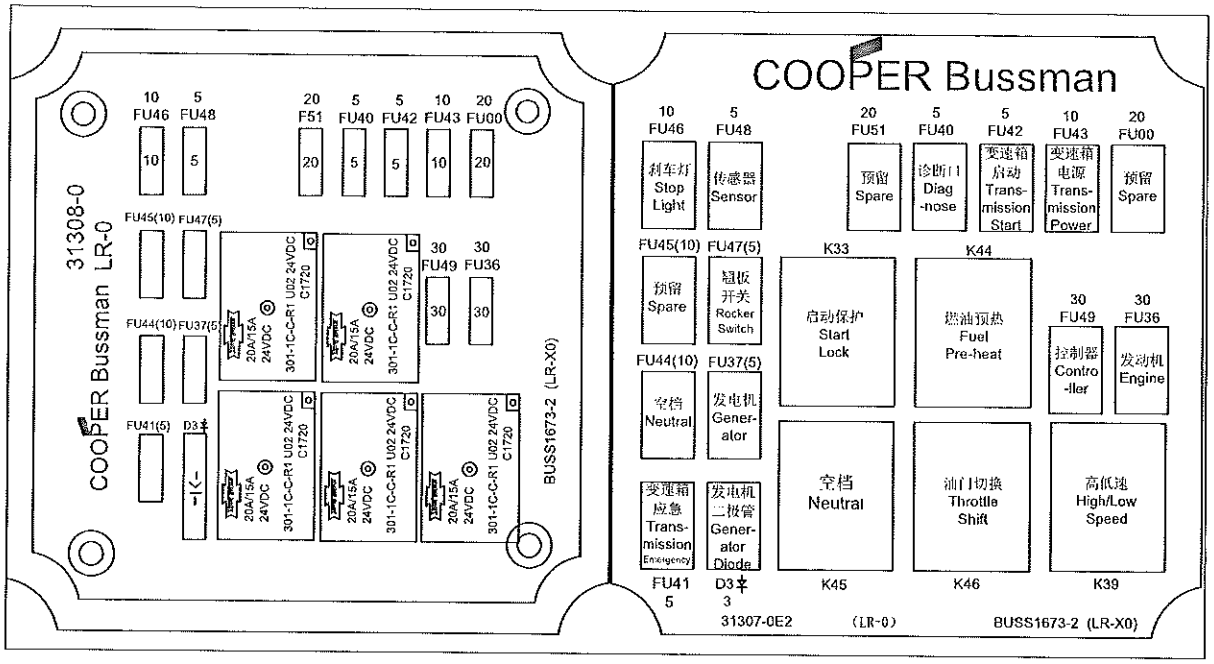


Fig 3-21 Carrier fuse and relay panel

Fuses

- FU36 (30A) is a fuse which protects the electrical circuit supply power to the engine.
- FU40 (5A) is a fuse which protects the electrical circuit of the transmission diagnose plug.
- FU41 (5A) is a fuse which protects the electrical circuit of transmission emergency system.
- FU42 (5A) is a fuse which protects the electrical circuit of transmission starting.
- FU43 (10A) is a fuse which protects the electrical circuit supply power to transmission.
- FU44 (10A) is a fuse of neutral gear.
- FU45 (10A) is a fuse which protects the electrical circuit supply power to dryer.
- FU46 (10A) is a fuse which protects the electrical circuit of brake light.
- FU47 (5A) is a fuse which protects the electrical circuit of rocker switches.
- FU48 (5A) is a fuse which protects the electrical circuit of sensors.

- FU49 (30A) is a fuse which protects the electrical circuit supply power to the controller.
- FU37 (5A), FU51 (20A), FU00 (20A) are spare fuses.

Relays

The relay's contacts will close providing power to the circuits mentioned above when its coil is energized.

- K33 is starting protection relay.
- K39 is rapid/turtle shifting relay.
- K44 is fuel cooler relay.
- K45 is neutral gear relay.
- K46 is spare relay.

Diode

D3 is engine alternator diode.

3.3.9 Tires

The wide earthmover-style tread tires provide good service life and high load ratings.

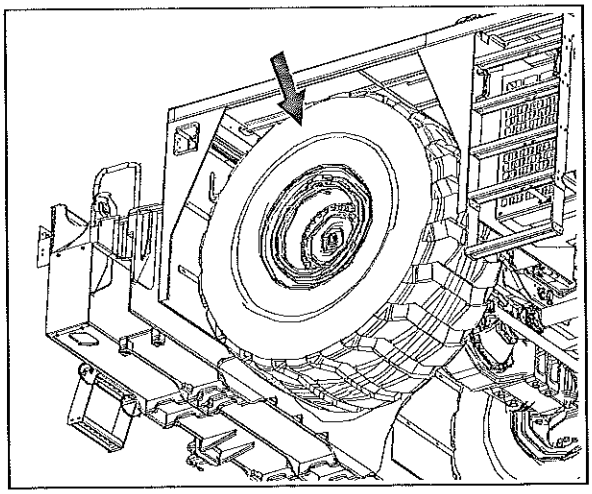


Fig 3-22 Tire

3.4 Description of the Superstructure

3.4.1 Description of the Superstructure

The superstructure includes everything above the turntable bearing.

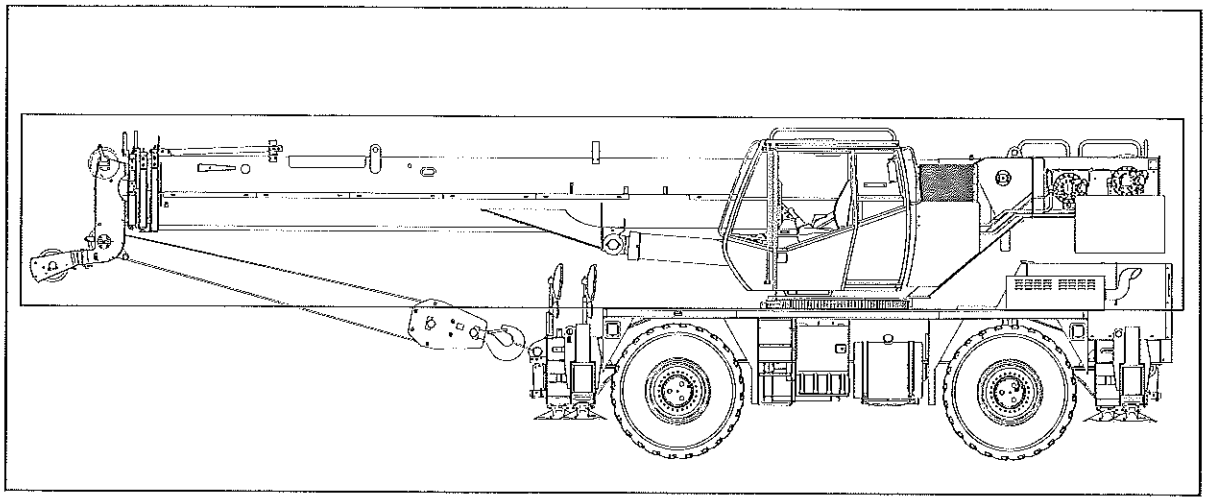


Fig 3-23 Superstructure

3.4.2 Operator's Cab

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

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

A framed sliding window on the right side and a top hatch are included for optimum visibility. Foam padding insulates against sound and weather.

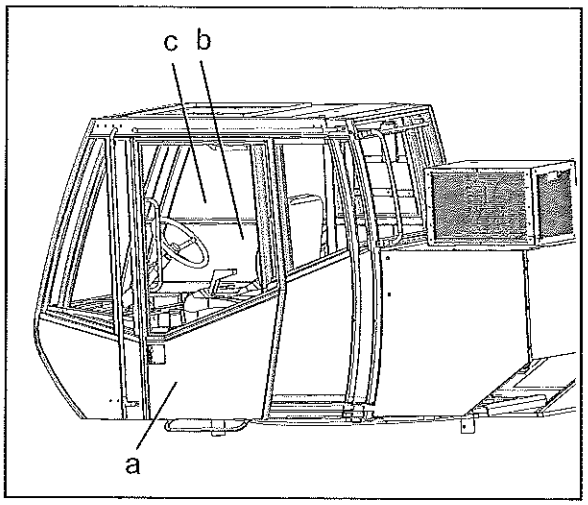


Fig 3-24 Operator's cab

a. Sliding door
b. Sliding window

c. Top hatch

To tilt up/down the cab: Press cab tilt button switches on left dashboard to extend/retract cab tilt cylinder.

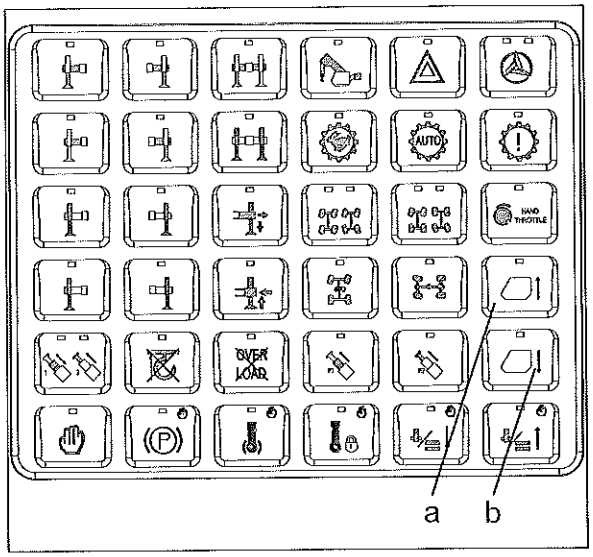


Fig 3-25 To tilt up/down the cab

a. Cab tilt up
b. Cab tilt down

3.4.3 Operator's Seat and Seat Belt

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

The seat has two armrests.

The seat belt keeps the operator securely in the operator's seat.

Refer to "Seat belt".

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

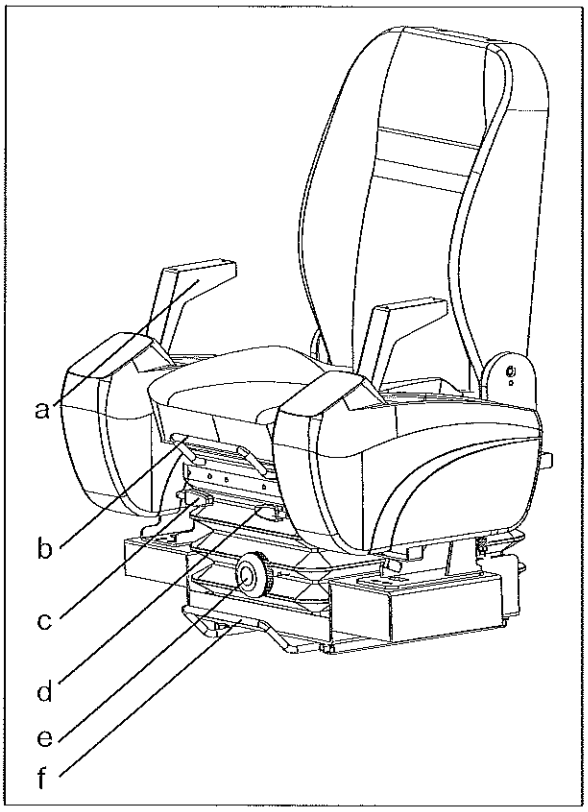


Fig 3-26 Operator's seat

a. Armrest
b. Move the seat forward or backward

c. Adjust angle of seat back

d. Adjust angle of seat base

e. Seat's air suspension controller

f. Move the seat base forward or backward

To adjust the angle of the seat back, pull up on the seat back adjusting knob.

To move the seat forward or backward in relationship to the joysticks, pull up on the adjusting lever and slide the seat forward or backward until the desired position is reached.

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

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

The seat has an interlock switch in the cushion that disables the hydraulic system when the operator gets up or leaves the seat.

3.4.4 Controls & Switches

3.4.4.1 Joystick Controls

High-speed auxiliary hoist, high-speed main hoist, free swing and horn buttons are mounted on joysticks on the armrests.

To activate the joystick function, click the trigger on the back side of either joystick. Then if keeping the joystick on the neutral position, the joysticks are activated for a short while; If keeping operation of joystick, the joystick are activated in its whole operation time.

Each armrest can be raised and locked in place for improved access and operator comfort.

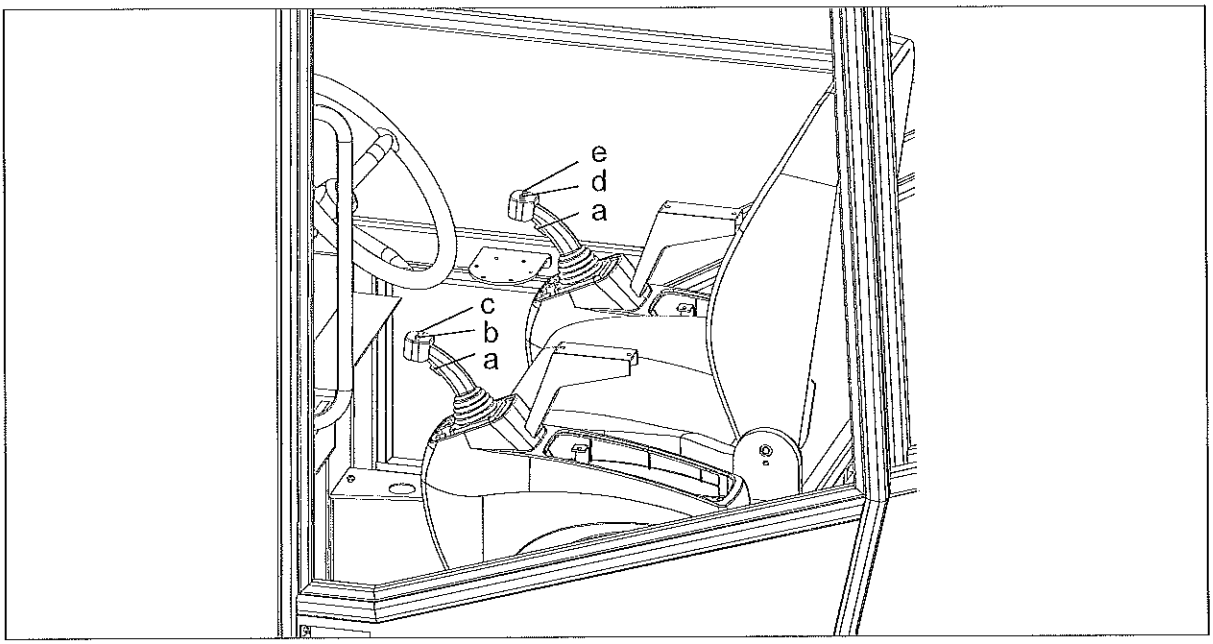


Fig 3-27 Operator's cab

a. Joystick activation switch
b. Free Swing
c. Auxiliary hoist, high/low speed
d. Main hoist, high/low speed
e. Horn

The hook blocks are controlled by moving the joysticks forward or backward. The main hook is raised and lowered using the right joystick. The auxiliary hook is raised and lowered using the left joystick.

The swing of the boom is controlled by moving the left joystick to the left or right.

The boom is raised or lowered by moving the right joystick to the left or right.

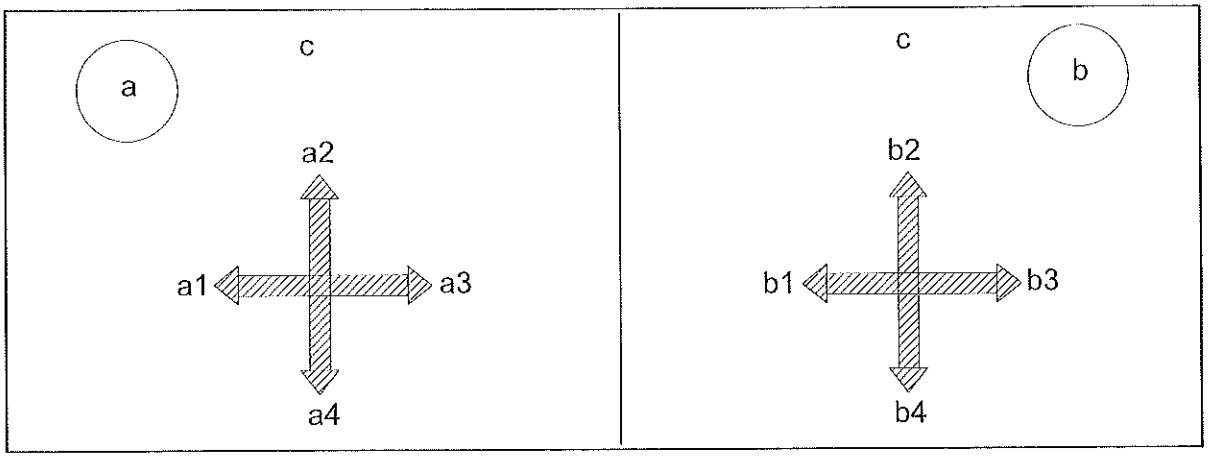


Fig 3-28 Joystick controls

a. Left

a1. Swing left

a2. Lower the auxiliary hook block

a3. Swing right

a4. Raise the auxiliary hook block

c. Front of crane

b. Right

b1. Raise the boom

b2. Lower the main hook block

b3. Lower the boom

b4. Raise the main hook block

3.4.4.2 Left Multipurpose Switch

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

- Windshield wiper speed

- Windshield washer

- Horn

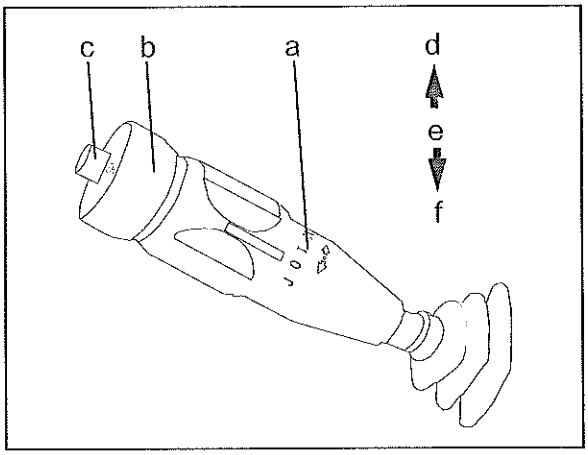


Fig 3-29 Left multipurpose switch

a. Windshield wiper speed
b. Windshield washer

c. Horn

d. Right turn

e. off

f. Left turn

3.4.4.3 Right Multipurpose Switch

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

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

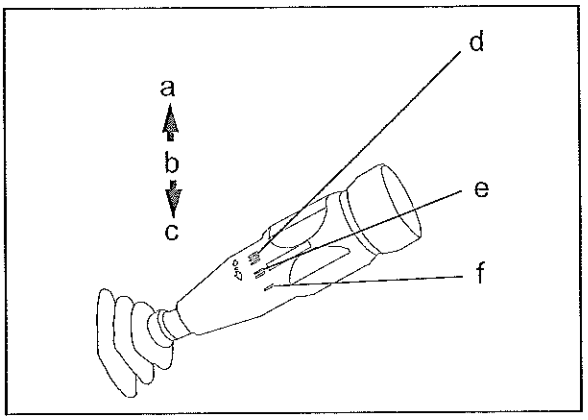


Fig 3-30 Right multipurpose switch

a. Forward
b. Neutral

c. Reverse

d. 1st gear

e. 2nd gear

f. 3rd gear

Low Gear	Speed (km/h)	High Gear	Speed (km/h)
1st	5.8	1st	\
2nd	9.5	2nd	9.5
3rd	13	3rd	13
4th	21	4th	21
5th	\	5th	29

3.4.4.4 Foot Pedals

The foot control pedals are as shown here:

- Boom telescoping operation pedal
- Travel brake pedal
- Throttle pedal

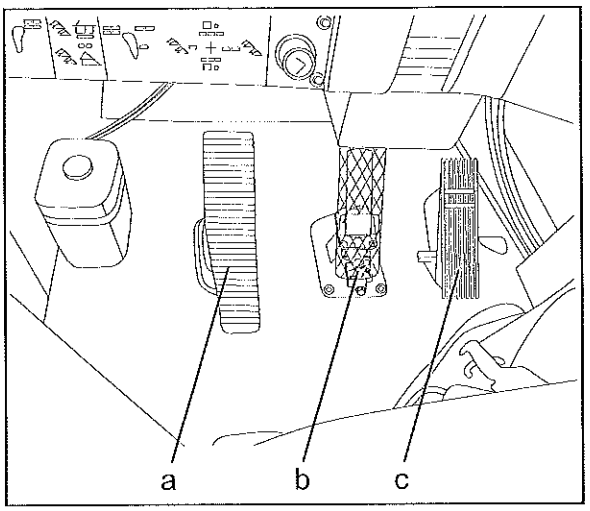


Fig 3-31 Pedals

a. Boom telescoping operation pedal
b. Travel brake pedal
c. Throttle pedal

3.4.4.5 Left Dashboard Switches

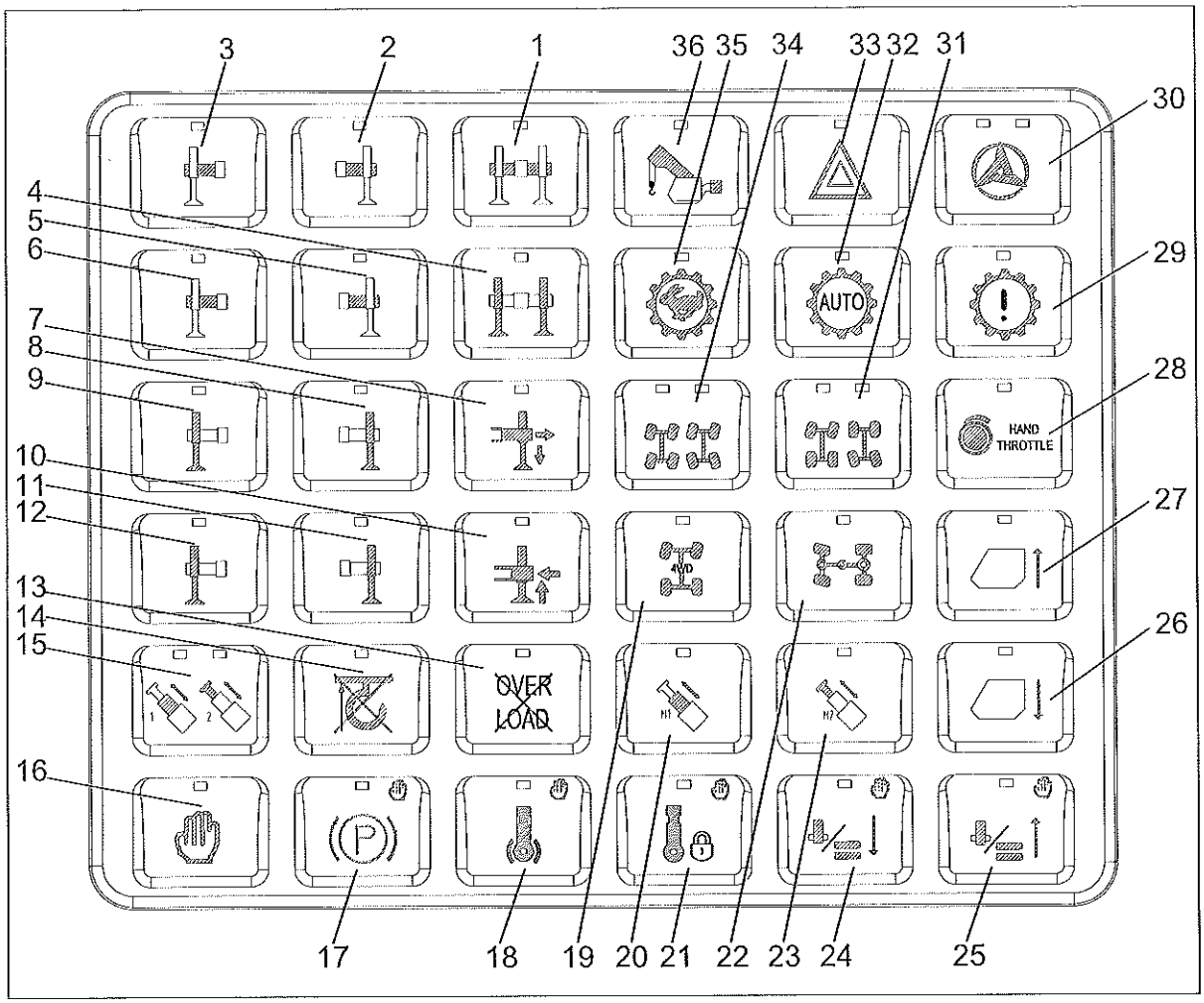


Fig 3-32 Left dashboard switches

1. Simultaneous outrigger beam operation
2. Right front outrigger beam selection
3. Left front outrigger beam selection
4. Simultaneous outrigger jack operation
5. Right rear outrigger beam selection
6. Left rear outrigger beam selection
7. Extend beam/jack
8. Right front outrigger jack selection
9. Left front outrigger jack selection
10. Retract beam/jack
11. Right rear outrigger jack selection
16. Unlocking button switch
17. Parking brake
18. Swing brake button switch
19, 20, 21, 22. 23, 24, 25. Blank (not used)
26. Cab tilt down
27. Cab tilt up
28. Constant engine speed (Cruise control)
29. Transmission emergency
30. Instrument cluster lights
31. Steering: front wheel / rear wheel
32. Enable / disable automatic transmission control

12. Left rear outrigger jack selection
13. Override LML lockout
14. Override anti-two block
15. Boom telescoping cylinder #1 / #2
33. Emergency /4-way flashers on/off
34. Steering: 4-wheel coordinated, 4-wheel crabbing, 2-wheel only
35. Enable / disable transmission high gears
36. Enable / disable crane function

1. Simultaneous Outrigger Beam Operation

Press the simultaneous outrigger beam operation button 1 to activate all four beam cylinders. The operation of the beam cylinders is controlled by buttons 7 & 10.

2. Right Front Outrigger Beam Selection

Press the right front outrigger beam selection button 2 to activate the right front outrigger beam cylinder. The operation of the beam cylinders is controlled by buttons 7 & 10.

3. Left Front Outrigger Beam Selection

Press the left front outrigger beam selection button 3 to activate the left front outrigger beam cylinder. The operation of the beam cylinders is controlled by buttons 7 & 10.

4. Simultaneous Outrigger Jack Operation

Press the simultaneous outrigger jack operation button 4 to activate all four jack cylinders. The operation of the jack cylinders is controlled by buttons 7 & 10.

5. Right Rear Outrigger Beam Selection

Press the right rear outrigger beam selection button 5 to activate the right rear outrigger beam cylinder. The operation of the beam cylinders is controlled by buttons 7 & 10.

6. Left Rear Outrigger Beam Selection

Press the left rear outrigger beam selection button 6 to activate the left rear outrigger beam cylinder. The operation of the beam cylinders is controlled by buttons 7 & 10.

7. Extend Beam/Jack

Press the extend beam/jack button 7 to extend the selected beam or jack cylinder. The beam or jack to operate is selected by pressing of buttons 1, 2, 3, 4, 5, 6, 8, 9, 11 or 12.

8. Right Front Outrigger Jack Selection

Press the right front outrigger jack selection button 8 to activate the right front outrigger jack cylinder. The operation of the jack cylinders is controlled by buttons 7 & 10.

9. Left Front Outrigger Jack Selection

Press the left front outrigger jack selection button 9 to activate the left front outrigger jack cylinder. The operation of the jack cylinders is controlled by buttons 7 & 10.

10. Retract Beam/Jack

Press the retract beam/jack button 10 to retract the selected beam or jack cylinder. The beam or jack to operate is selected by pressing of buttons 1, 2, 3, 4, 5, 6, 8, 9, 11 or 12.

11. Right Rear Outrigger Jack Selection

Press the right rear outrigger jack selection button 11 to activate the right rear outrigger jack cylinder. The operation of the jack cylinders is controlled by buttons 7 & 10.

12. Left Rear Outrigger Jack Selection

Press the left rear outrigger jack selection button 12 to activate the left rear outrigger jack cylinder. The operation of the jack cylinders is controlled by buttons 7 & 10.

13. Override LML Lockout

The override LML lockout button 13 is used to override the LML lockout feature.

14. Override Anti-two Block

The override anti-two block button 14 is used to override the Anti-two block feature.

15. Boom Telescoping Cylinder #1 / #2

The boom telescoping cylinder #1/#2 button 15 is used to activate either the #1 or #2 boom telescoping cylinder.

16. Unlocking Button Switch

The unlocking button 16 is used to unlock the function of buttons 17, 18, 21, 24 or 25. Press unlocking button and function button at the same time to activate its function.

17. Parking Brake

The parking brake button 17 is used to engage or disengage the parking brake.

18. Swing Brake Button Switch

The swing brake button 18 is used to engage or disengage the swing brake.

19, 20, 21, 22, 23, 24, 25. Blank

Spare button location not used.

26. Cab Tilt Down

The button 26 is used to tilt the cab down.

27. Cab Tilt Up

The button 27 is used to tilt the cab up.

28. Constant Engine Speed (Cruise Control)

The enable/disable hand throttle button 28 is used to select either the hand throttle or the foot throttle to control the engine speed.

29. Transmission Emergency

The transmission emergency button 29 is used to override transmission issue and remain transmission function in only low gear.

30. Instrument Cluster Lights

The instrument cluster lights button 30 is used to turn the instrument cluster lights on and off.

31. Steering: Front Wheel / Rear Wheel

The front/rear steering button 31 is used to select front or rear wheel steering when 2-wheel only steering mode is selected using button 34.

32.Enable / Disable Automatic Transmission Control

The transmission control button 32 is used to select either automatic or manual transmission setting.

33. Emergency/4-way Flashers

The emergency/4-way flashers button 33 is used to turn the emergency flashers on and off.

34. Steering: 4-Wheel Coordinated, 4-Wheel Crabbing, 2-Wheel Only

The steering mode button 34 is used to select the steering mode. To press the button repeat could shift among three options, as well as green indicator illuminated. The three options are: 4-wheel coordinated, 4-wheel crabbing, or 2- wheel only.

35.Enable / Disable Transmission High Gear

This selection button 35 changes the transmission gear high/low as required: low gear for slower travel speed but more power; high gear for faster travel speed but less power.

36. Enable / Disable Crane Function

The crane function button 36 is used to enable or disable the crane operation.

3.4.4.6 Right Dashboard Switches

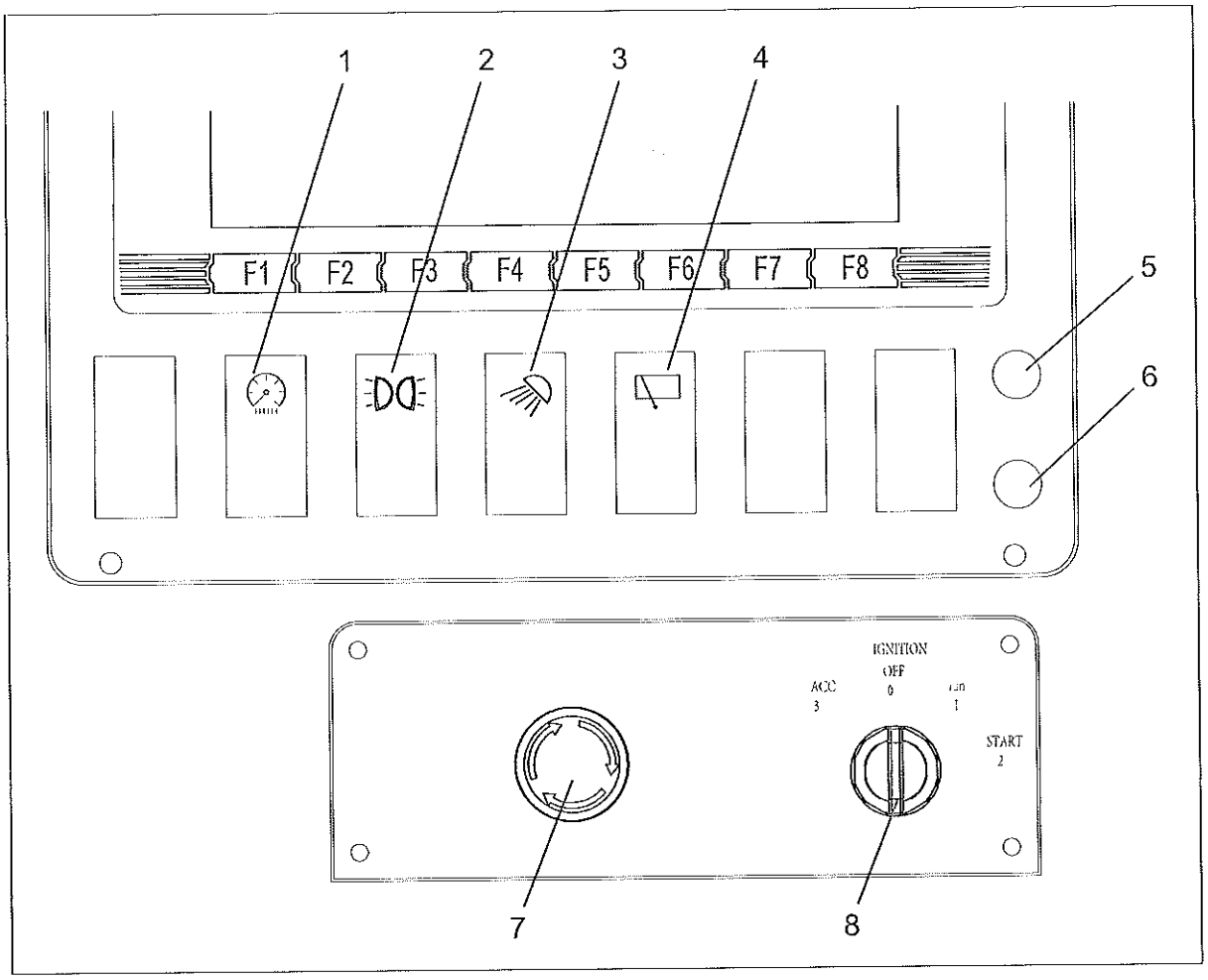


Fig 3-33 Right dashboard switches

1. Instrument cluster lights & headlamps
2. Marker lights
3. Boom & Cab-front work lamps
4. Top hatch window wiper
5. Yellow caution lamp
6. Red warning lamp
7. Emergency stop button switch
8. Ignition switch

1. Instrument Cluster Lights & Headlamps

The instrument cluster lights & headlamps switch 1 is used to turn on/off the instrument cluster lights and headlamps.

2. Marker Lights

The marker lights switch 2 is used to turn the marker lights on and off.

3. Boom & Cab-Front Work Lamps

The boom & cab-front work lamps switch 3 is used to turn on/off the boom work lamps and cab-front work lamps.

4. Top Hatch Window Wiper

The top hatch window wiper switch 4 is used to turn the top hatch window wiper on and off.

5. Yellow Caution Lamp

The yellow caution lamp 5 is used to turn the yellow caution lamp on and off.

6. Red Warning Lamp

The red warning lamp 6 is used to turn the red warning lamp on and off.

7. Emergency stop button switch

The emergency stop button switch 7 is used to shut down the engine in emergency situation.

8. Ignition Switch

The ignition switch 8 is used for the following functions:

- OFF - This position allows you to insert and remove the key. The engine is shut down (or remains off) and there is no electrical current to any of the electrical system switches (except for work lamps).
- HEAT - Hold the key at this position to preheat the engine for cold-weather starting as required. The key returns to the OFF position when released.
- ON - This position allows the engine to remain running (if already started) and also allows electrical current to all of the various electrical system switches.
- START - Hold the key at this position to start the engine, then immediately release it after the engine has started. The key returns to the ON position when released.

3.4.4.7 Monitor Display Screen

The touch-screen enables the operator to quickly and efficiently use the Load Moment Indicator (LMI).

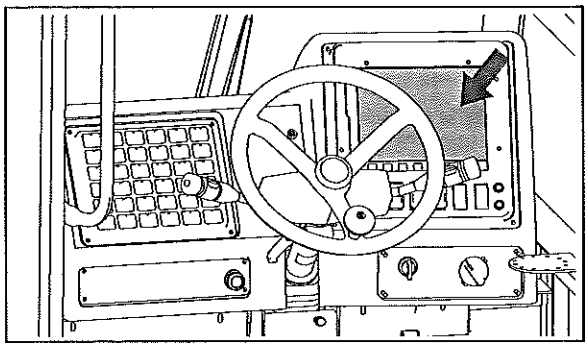


Fig 3-34 Touch-screen of LMI

3.4.4.8 Climate Control

3.4.4.8.1 Climate Control

The heating and air conditioning systems, in the operator's cab, are designed to provide a comfortable environment.

The air conditioning control is located on the cabinet behind the operator's seat.

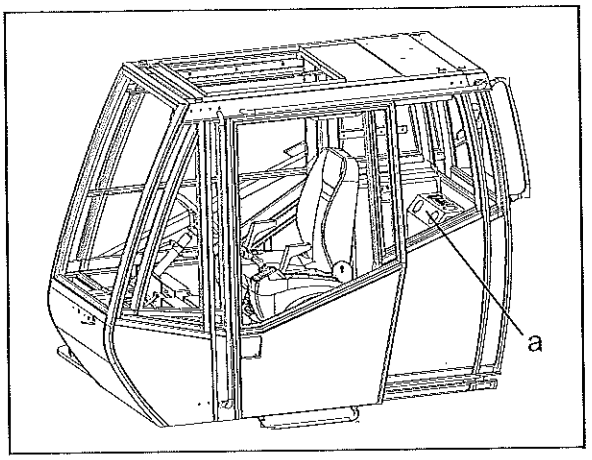


Fig 3-35 Operator's cab

a. The air conditioning control

The heating control knob is located on the cabinet behind the operator's seat on the right side.

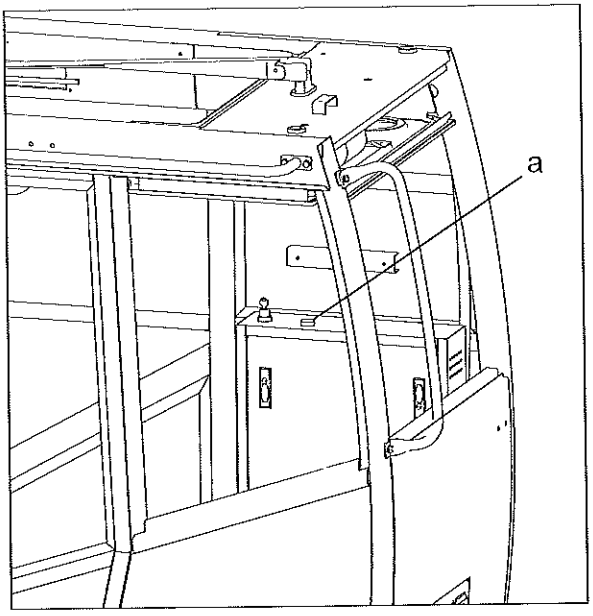


Fig 3-36 Operator's cab

a. Heating control knob

3.4.4.8.2 Air Conditioning

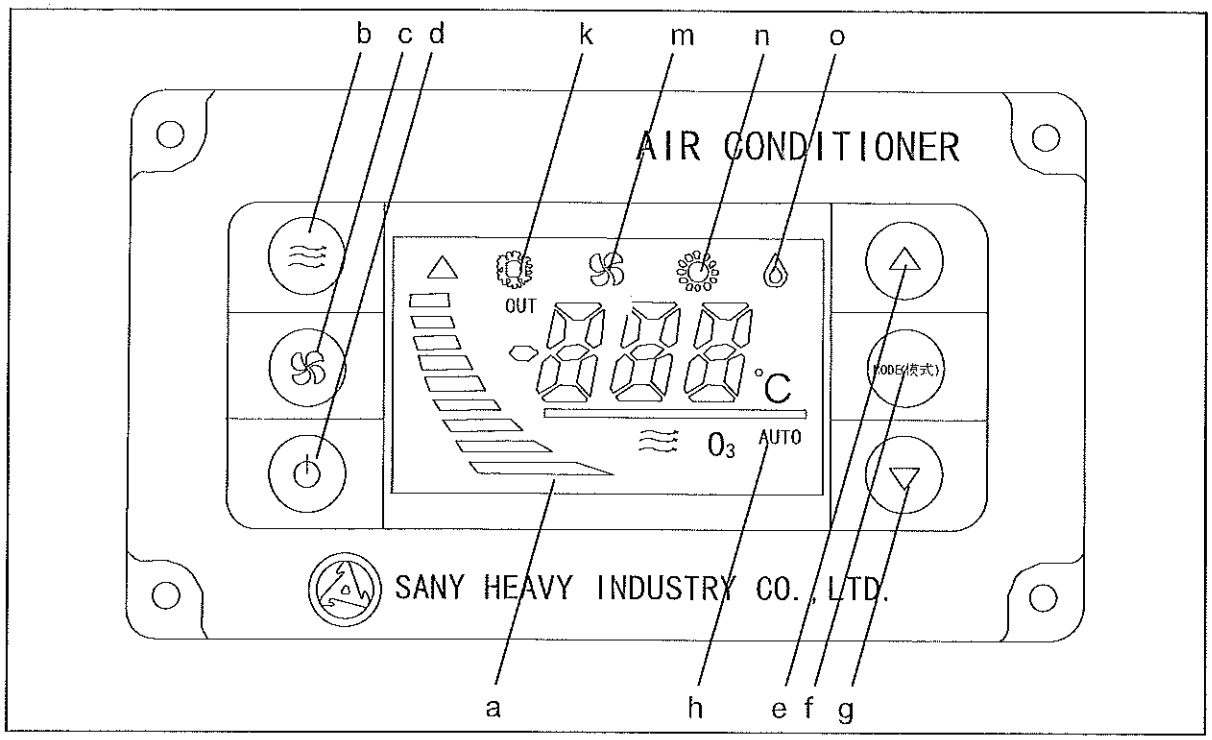


Fig 3-37 Overview of air condition system control panel

a. LED display	b. Fresh air switch	c. Fan switch
d. Power switch	e. Switch for temperature regulate up	f. Mode switch
g. Switch for temperature regulate down	h. Auto mode indicator	k. Cooling mode indicator
m. Fan switch indicator	n. heating mode indicator	o. Drying mode indicator

3.4.4.8.3 Heating

Turn the heating control knob and make its arrow moved from "OFF" to "ON" position to start the heater in continuous operation heater mode.

NOTE :
When the heater is activated, it will take approximately 30-45 seconds before the fan and heater start. Do not turn the heater on and off repeatedly

Turn the heating control knob, make its arrow moved among "10°C", "30°C" and "MAX" position to control pre-select temperature.

Turn the heating control knob, make its arrow moved back in "OFF" position to turn the heater off.

NOTE :
When the heater is no longer needed, turn the heater off at least five minutes before shutting off the crane.

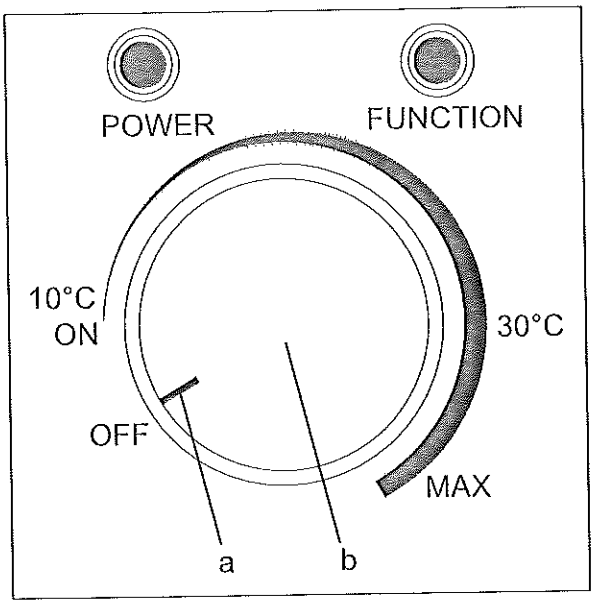


Fig 3-38 The heating control knob

a. Arrow
b. Heating control knob

3.4.4.9 Multimedia Control Panel

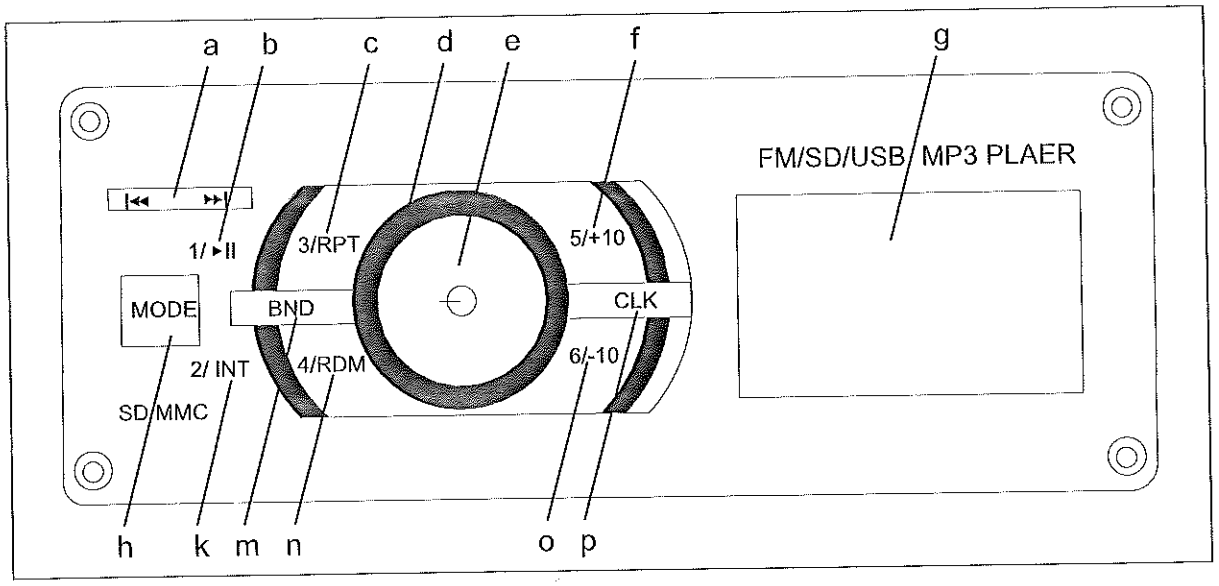


Fig 3-39 Multimedia control panel

a. TUNING	b. 1/▸II	c. 3/ RPT
d. VOL	e. Power	f. 5/+10

g. LCD	h. MODE	k. 2/ INT
m. BND	n. 4/ RDM	o. 6/-10
p. CLK		

a. TUNING

- To change the radio station, press |◀◀ ▶▶|.

b. 1/▶II

- To change the radio station, press |◀◀ ▶▶|.
- Click the button on "RADIO" mode: Load radio station stored at this button with 1/▶II.
- Press the button on "RADIO" mode: Press and hold this button for 3 seconds after the radio station is selected. The selected radio station will be in store at this button with 1/▶II.
- Click the button on "USB" mode: Pause / Play.

c. 3/ RPT

- Click the button on "RADIO" mode: Load radio station stored at this button with 3/ RPT.
- Press the button on "RADIO" mode: Press and hold this button for 3 seconds after the radio station is selected. The selected radio station will be in store at this button with 3/ RPT.
- Click the button on "USB" mode: Turn on/off "Repeat" function.

d. VOL

- To increase or decrease the multimedia volume, turn control knob left or right.

e. Power

- Press the power button to turn the multimedia on or off.

f. 5/+10

- Click the button on "USB" mode: Jump 10 songs forward.

g. LCD

- The LCD panel (g) displays the mode, band, radio frequency, preset number, and time.

h. MODE

- To select three option among Radio, USB or SD/MMC, press the "MODE" button.

k. 2/ INT

- Click the button on "RADIO" mode: Load radio station stored at this button with 2/ INT.
- Press the button on "RADIO" mode: Press and hold this button for 3 seconds after the radio station is selected. The selected radio station will be in store at this button with 2/ INT.
- Click the button on "USB" mode: Introductory play.

m. BND

- Press the "BND" button to select the desired band.

n. 4/ RDM

- Click the button on "RADIO" mode: Load radio station stored at this button with 4/ RDM.
- Press the button on "RADIO" mode: Press and hold this button for 3 seconds after the radio station is selected. The selected radio station will be in store at this button with 4/ RDM.
- Click the button on "USB" mode: Random play.

o. 6/-10

- Click the button on "USB" mode: Jump 10 songs backward.

p. CLK

- When the radio station frequency is displayed in the LCD panel, press the "CLK" button to show local time for 5 seconds. The LCD displays frequency after 5 seconds.

3.4.5 Superstructure Fuse and Relay Panel

Most superstructure electrical circuits are protected by the components of the fuse and relay panel located in superstructure electrical control box. Access to all the fuses may be gained by removing the small plastic cover on the front of the panel. Inside the small plastic fuse cover, a fuse decal can be found.

The fuse and relay panel contains fuses, intermediate relays and diodes, as shown in the picture.

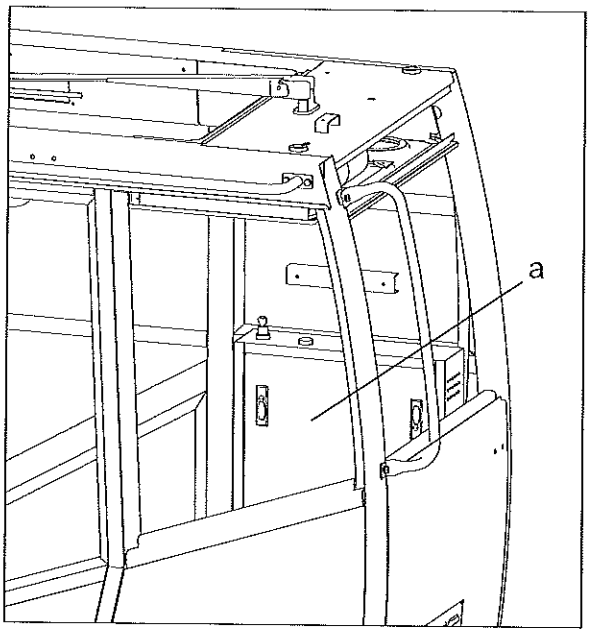


Fig 3-40 Operator's cab

a. Superstructure electrical control box

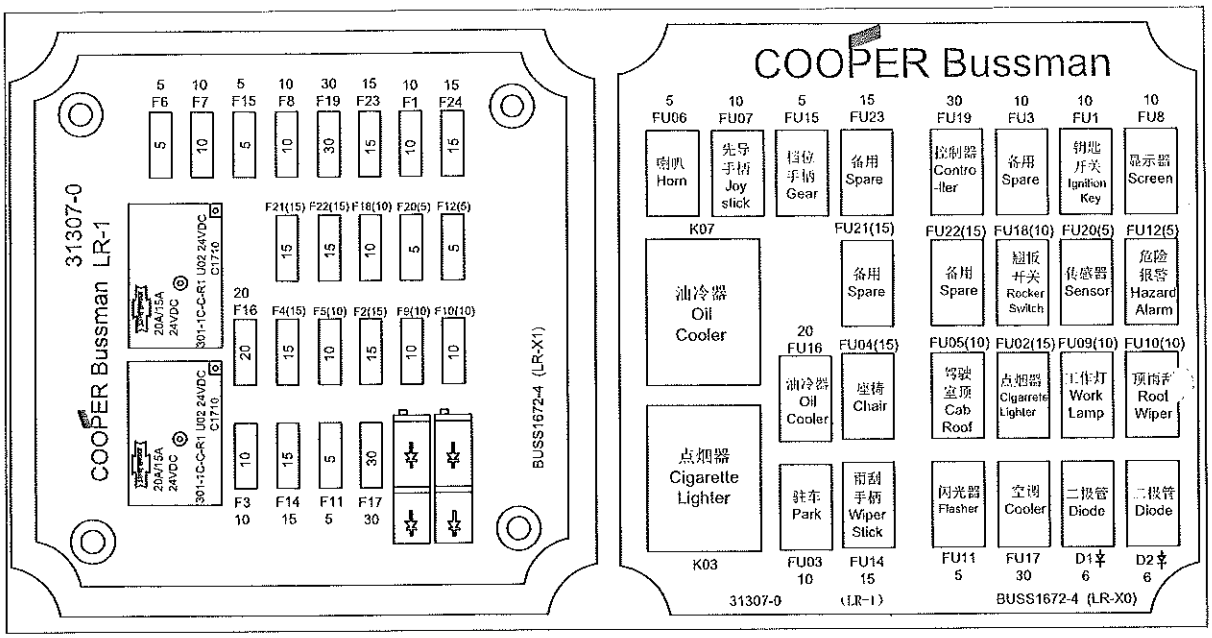


Fig 3-41 Superstructure fuse and relay panel

1. Fuses

FU1 (10A) is a fuse which protects the electrical circuit of ignition key switch.

FU2 (15A) is a fuse which protects the electrical circuit of cigarette lighter.

FU4 (15A) is a fuse which protects the electrical circuit of seat switch.

FU5 (10A) is a fuse which protects the electrical circuit of cab roof light and fan.

FU6 (5A) is a fuse which protects the electrical circuit of horn

FU7 (10A) is a fuse which protects the electrical circuit of joystick button switch.

FU8 (10A) is a fuse which protects the electrical circuit of display.

FU9 (10A) is a fuse which protects the electrical circuit of work light.

FU10 (10A) is a fuse which protects the electrical circuit of skylight wiper.

FU11 (5A) is a fuse which protects the electrical circuit of flasher.

FU12 (5A) is a fuse which protects the electrical circuit of hazard alarm.

FU14 (15A) is a fuse of wiper lever (left steering column lever).

FU15 (5A) is a fuse of range shift (right steering column lever).

FU16 (20A) is a fuse which protects the electrical circuit of oil cooler.

FU17 (30A) is a fuse which protects the electrical circuit of air conditioner system.

FU19 (30A) is a fuse which protects the electrical circuit supply power to controller.

FU20 (5A) is a fuse which protects the electrical circuit of sensor.

FU3 (10A), FU18 (10A), FU21 (15A), FU22 (15A), FU23 (15A), FU24 (15A) are spare fuses.

2. Relays

K03 is horn relay.

K07 is oil cooler relay.

3. Diode

D1, D2 are diodes.

3.4.6 Gauges

Hydraulic pressure gages are located in the cab behind the operator's seat.

- Main system (hoists, boom, telescope circuit) pressure (a)
- Swing system pressure (b)
- Pilot system pressure (c)

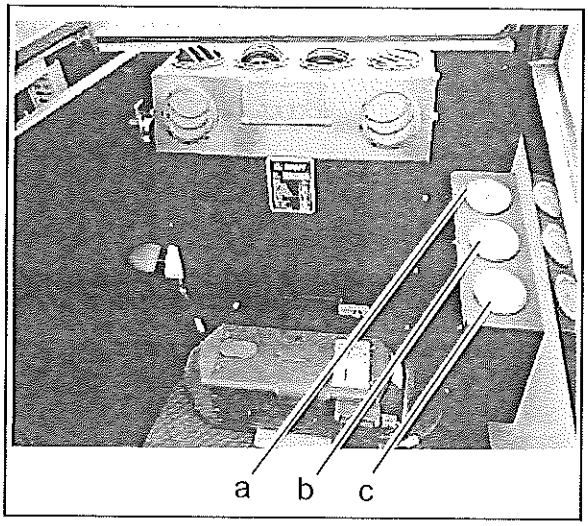


Fig 3-42 Gauges

a. Main system pressure gauge
b. Swing system pressure

c. Pilot system pressure

3.4.7 Main and Auxiliary Hoists

Each hoist consists of a hydraulic piston motor and planetary reduction gearing for 2-speed operation with equal speeds for power-up and power-down.

The hoist speed is controlled by the mode selector button on the joystick.

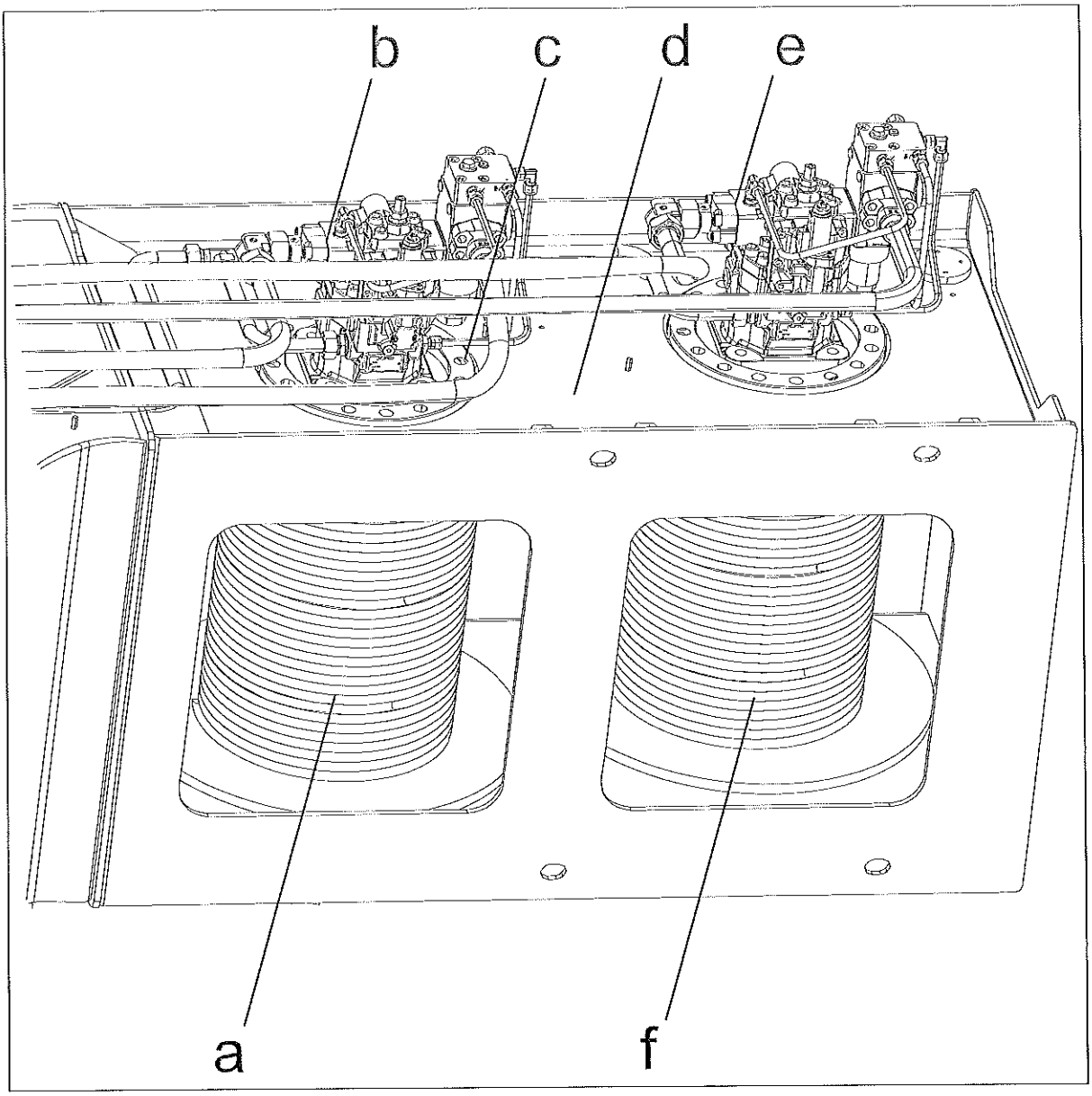


Fig 3-43 Main and auxiliary hoists

a. Main hoist drum
b. Main hoist motor
c. Hoist mounting capscrews
d. Hoist box of turntable
e. Auxiliary hoist drum
f. Auxiliary hoist motor

Each hoist is equipped with an integral automatic brake, grooved drum, tapered flanges, standard wire rope roller on drum, electronic drum rotation indicator, and a third-wrap left on drum shutdown with buzzer notification in the cab and indication on the LMI screen.

3.4.8 Wire Rope

3.4.8.1 Wire Rope

⚠ WARNING

Failure to heed this warning could result in death or serious injury
Never use a worn or damaged wire rope.

3.4.8.2 Environmental Conditions

The life expectancy of a wire rope may vary due to the degree of environmental conditions and other factors: Exposure to corrosive chemicals, subjecting it to abrasive material, or if coming into contact with a power line.

Frequent inspections and maintenance of your wire rope is required for preventing premature wear and to insure long-term satisfactory performance.

Refer to the Maintenance section of this manual for lubrication requirements.

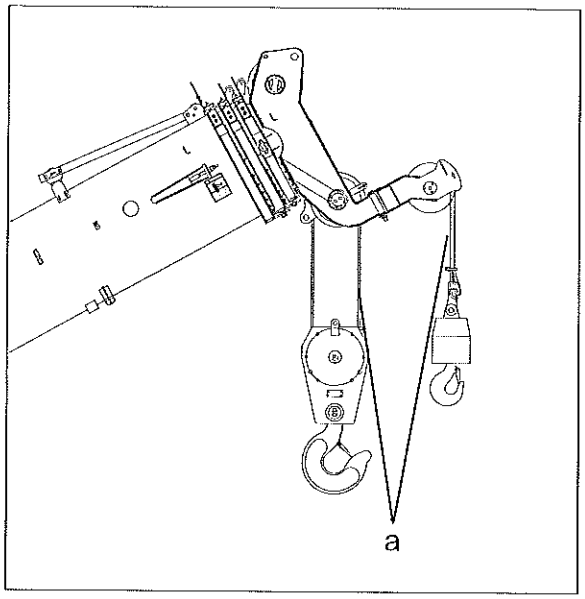


Fig 3-44

a. Wire rope

3.4.8.3 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.

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

3.4.9 Boom

3.4.9.1 Boom

The machine is equipped with a fully powered five-section boom.

3.4.9.2 Boom Sections

The boom has a base section, boom tele 1 section, boom tele 2 section and boom tele 3 section. The boom sections are made of two high strength steel plates, formed into a U-type section. Each boom section has greasable anti-friction slide pads.

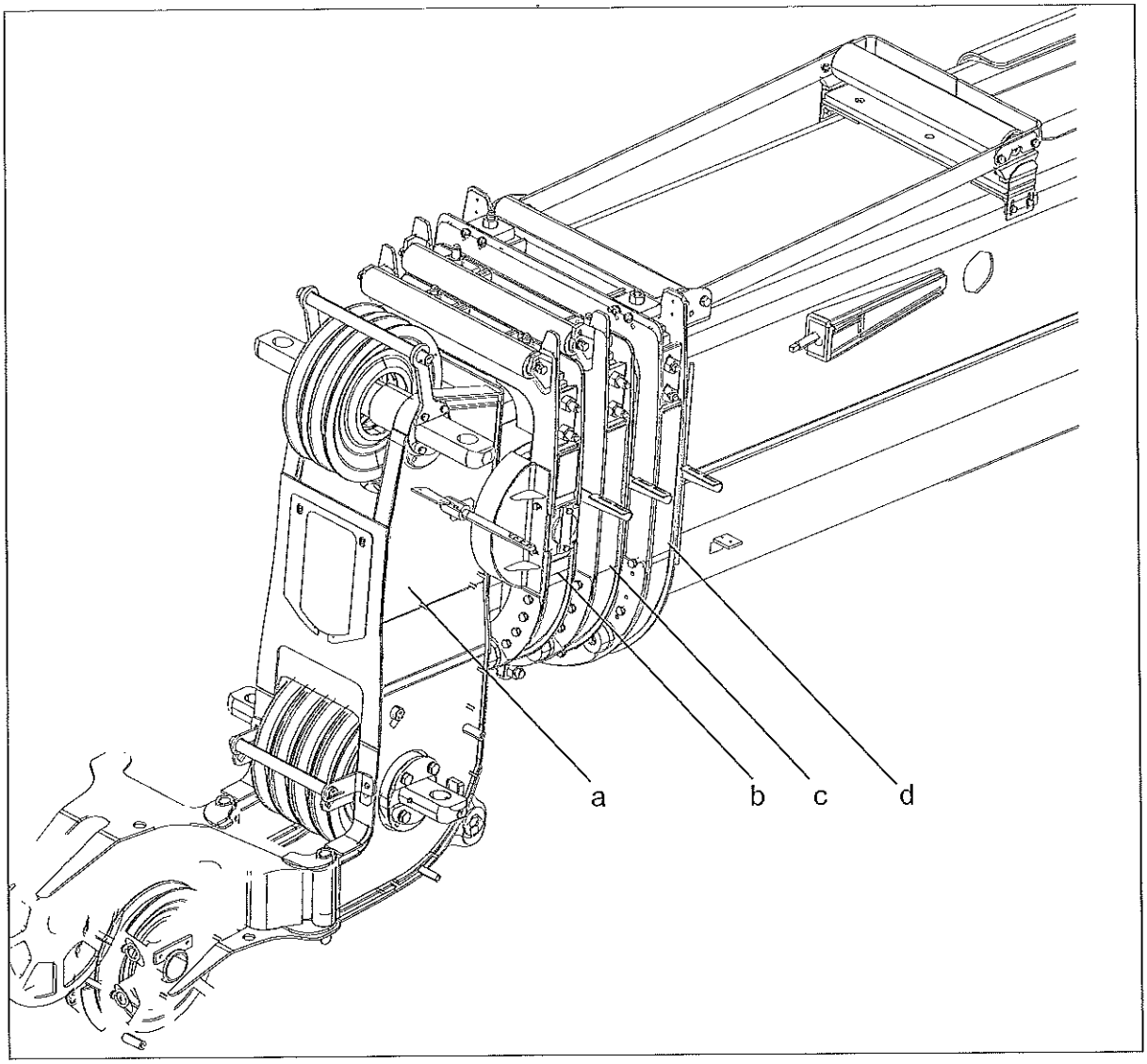


Fig 3-45

a. Boom tele 3 section
b. Boom tele 2 section
c. Boom tele 1 section
d. Base section

3.4.9.3 Synchronization

Refer to "Left dashboard switches" and "Foot pedals".

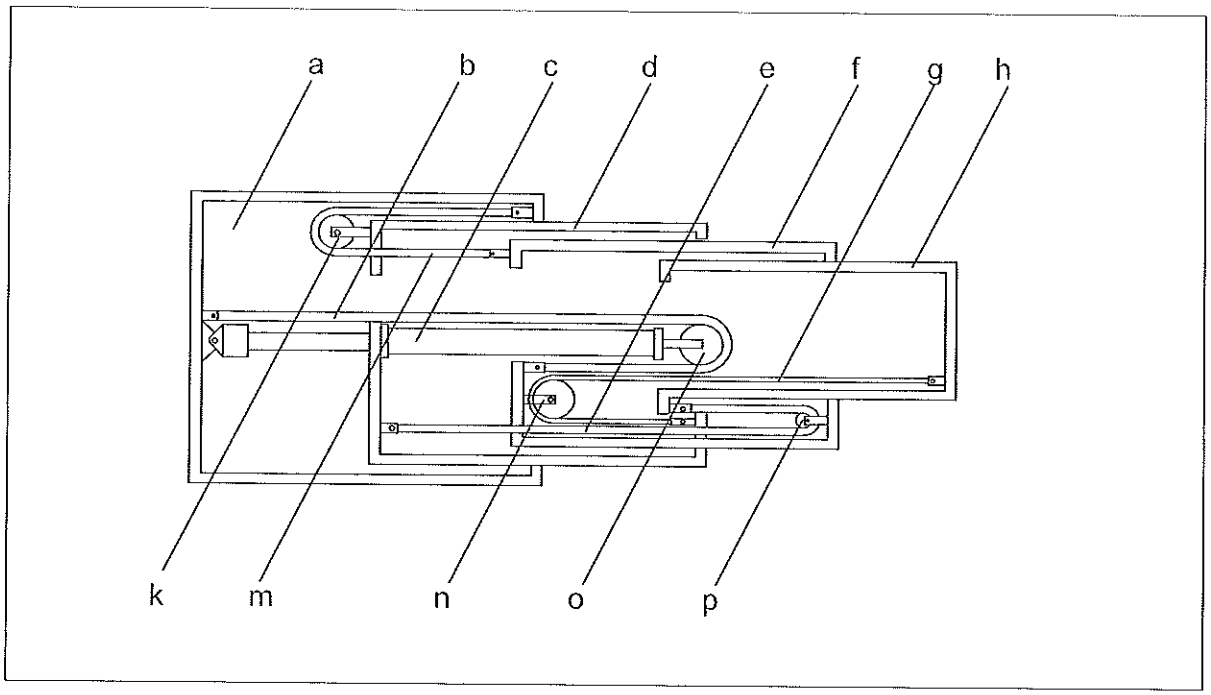


Fig 3-46

a. Base section	b. Boom tele 2 section extend rope	c. Tele cylinder
d. Boom tele section 1	e. Boom tele 3 section extend rope	f. Boom tele 3 section
g. Boom tele 3 section retract wire rope	h. Boom tele 3 section	k. Pully support 1
m. Boom tele 2 section retract wire rope	n. Pully support 2	o. Pully 1
p. Pully 2		

3.4.9.4 Anemometer and Aircraft Warning Light (Optional)

The anemometer is used to measure wind speed. It will give an alarm when the wind speed is more than 8.3m/s. Read the wind speed on LMI main screen.

The aircraft warning light is used to give an alarm to aircraft in the sky for boom head location.

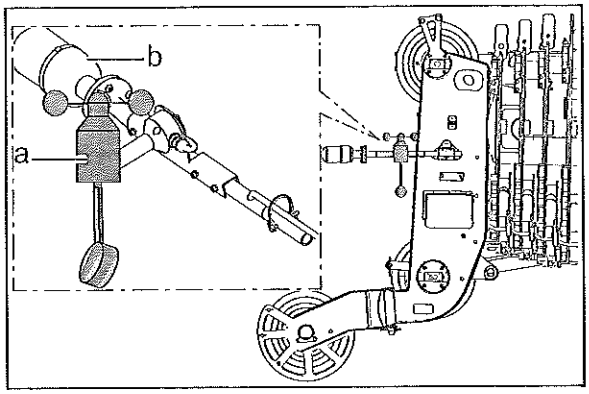


Fig 3-47

a. Anemometer
b. Aircraft warning light

3.4.10 Main Boom Head

The main boom head is welded to the end of boom tele 3 section. It has 6 nylon load sheaves and an aircraft warning beacon. Provisions include mounting for the side-stow swingaway boom extension.

3.4.11 Auxiliary Boom Nose

The removable auxiliary boom nose sheave installs on the main boom head only. It has a single nylon sheave mounted on an anti-friction bearing and a removable tie pin for quick reeving.

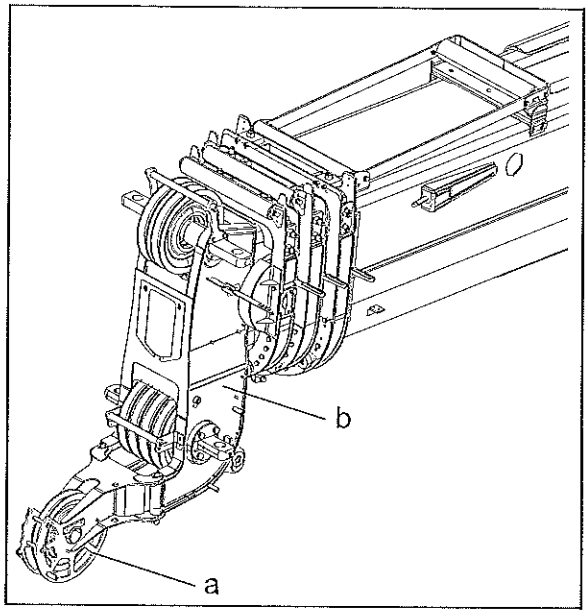


Fig 3-48

a. Auxiliary boom nose sheave
b. Main boom head

3.4.12 Swingaway Boom Extension

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

NOTE :

The length of swingaway boom extension is 10.7 m and 18 m.

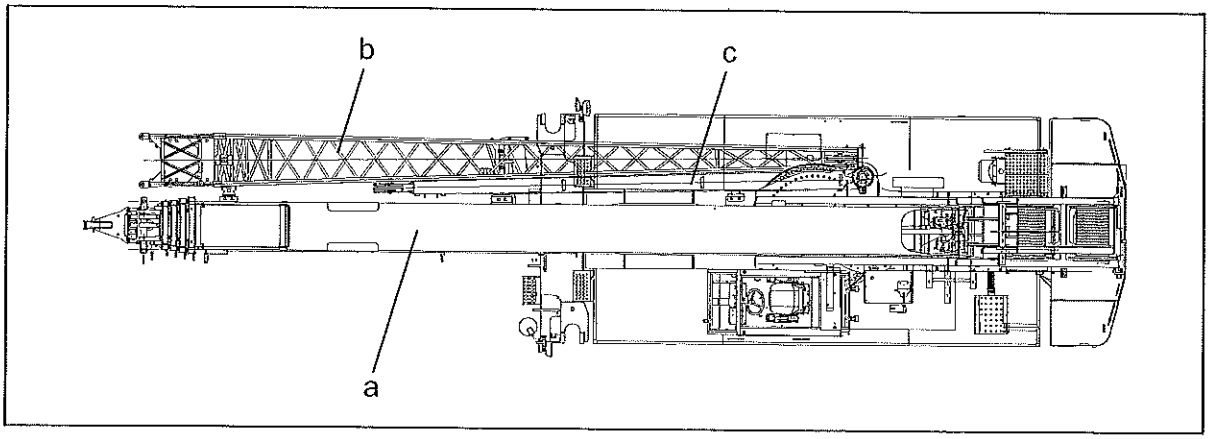


Fig 3-49

a. Main boom b. Swingaway boom extension c. Swingaway boom extension fly section

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 swingaway boom extension (b) is provided with a swing-out section and offset angle:

NOTE :
The swingaway boom extension may be set to 0°, 20° or 40°. Maximum lifting height with the boom extension is 67.4 m.

3.4.13 Boom Lift Cylinder

The boom lift cylinder controls the up-and down boom movement. A single boom-lift-cylinder provides for boom elevation of -2° to 76°.

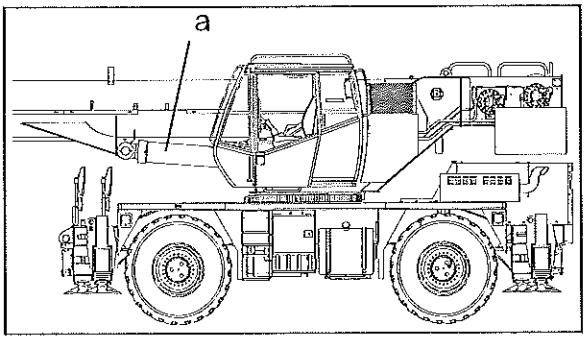


Fig 3-50

a. Boom lift cylinder

The right joystick 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.

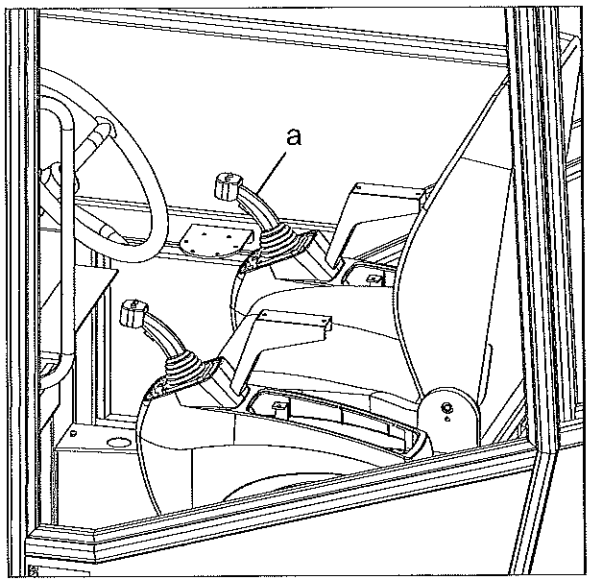


Fig 3-51

a. Right joystick

3.4.14 Counterweights

The counterweight is secured to the superstructure by bolts and nuts, mounting pins and clips.

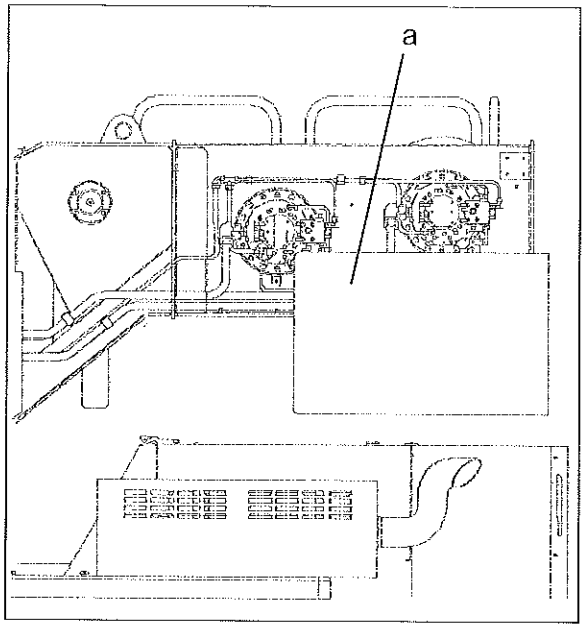


Fig 3-52

a. Counterweight

⚠ WARNING

Failure to heed this warning could result in death or serious injury.
Do not walk on the counterweight. If work must be performed on the counterweight use a ladder or other appropriate safety alternative.

3.4.15 Swing Drive

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

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

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

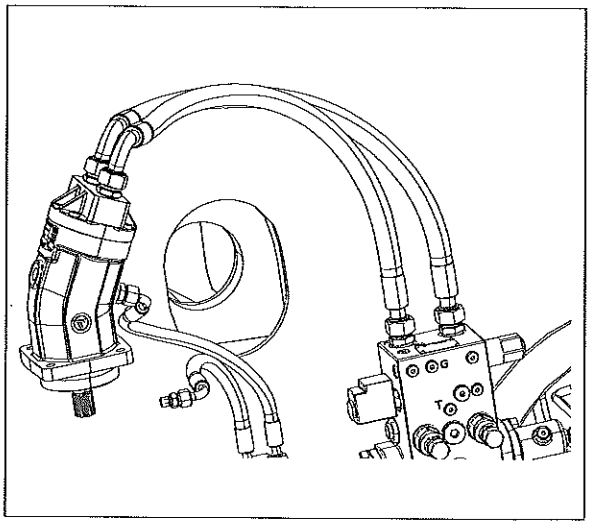


Fig 3-53 Swing motor

NOTE :

The swing brake button switch is on the left switch panel. Refer to "Left dashboard switches" for button switch location.

A 360° mechanical swing lock may be used to secure the superstructure in place.

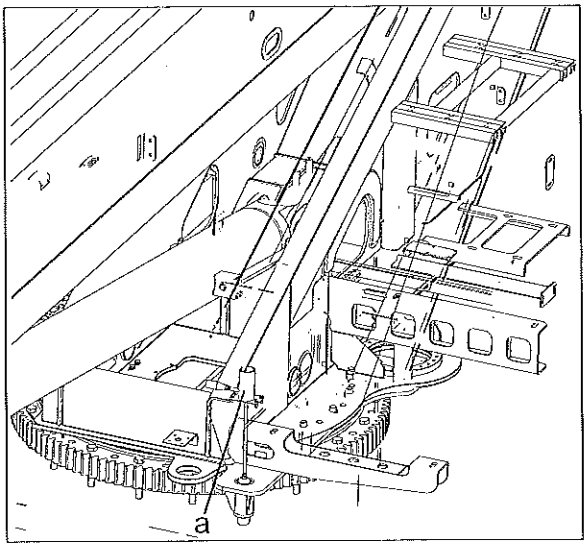


Fig 3-54 Swing lock pin

⚠ CAUTION

When hydraulic oils are changed or added, ensure that hydraulic oils of different manufacturers are of the same specifications, otherwise discoloration (milkiness) may occur.

The left joystick is used to swing the boom.

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

NOTE :

Free swing is activated by the left button on the top of the joystick.

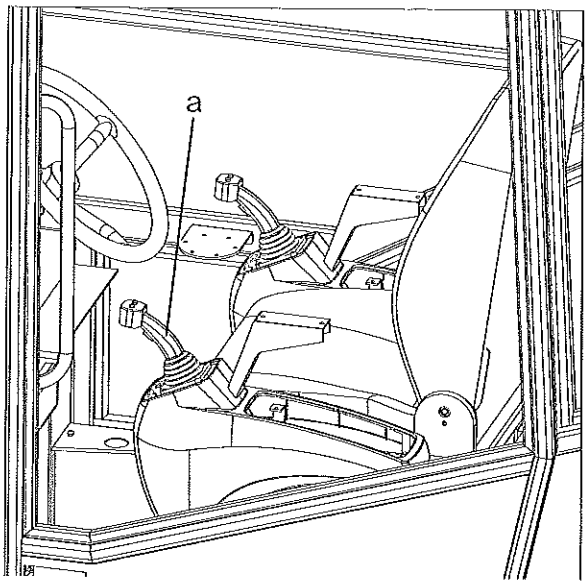


Fig 3-55 Left joystick

3.5 Indicators and Operational Aids

⚠ WARNING

Failure to heed this warning could cause an accident which could result in death or serious injury or equipment damage.

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.

Item No.	Device Name	Purpose of Safety Protection	Location	Remarks
1	Upper controller	If the moment is overloaded, action is prohibited	Cab electrical box	Operates with the main controller. See Load Moment Limiter (LML) System on page 3-54.
2	Length/angle sensor	Measuring the current boom length and current angle	Middle part of the main boom	See "Information Screens" on page 3-68.
3	Swing Angle Set Limiter	Allows left and right swing angles to be preset. Audible warning when either preset angle reached.		See "Information Screens" on page 3-68.
4	Weight-measuring pressure sensor 1	Measuring the current lifting pressure	Rod-side of luffing cylinder	See "Information Screens" on page 3-68.

Item No.	Device Name	Purpose of Safety Protection	Location	Remarks
5	Weight-measuring pressure sensor 2	Measuring the current lifting pressure	Piston-side of luffing cylinder	See "Information Screens" on page 3-68.
6	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
7	Height limit switch for auxiliary hoist (A2B)	Preventing hook block from contacting the boom nose	Auxiliary boom sheave or swing-away boom extension top	Anti-two block
8	Third-wrap indicator for main hoist	Prevents damage or loss of wire rope on the main hoist	Main hoist	See "Main Screen 1 Alarms" on page 3-60.
9	Third-wrap indicator for auxiliary hoist	Prevents damage or loss of wire rope on the auxiliary hoist	Auxiliary hoist	See "Main Screen 1 Alarms" on page 3-60.
10	Oil temperature switch	Checking if the oil temperature of the hydraulic system is too hot	Hydraulic oil cooler	
11	Pressure switch	Preventing the air conditioning system operates with super-high pressure	Air conditioner pipeline	
12	Water level switch	Indicates low water level	Overflow tank of the carrier engine	See "Main Screen 1 Alarms" on page 3-60.
13	Fuel level sensor	Indicates low fuel level	Fuel tank	See "Main Screen 1 Alarms" on page 3-60.
14	ECU unit of gearbox	Gearbox fault and check alarm	Control box of operator cab	
15	ECU unit of engine	Engine fault and check alarm	Engine	See "Main Screen 1 Alarms" on page 3-60.
16	Fuse	Short circuit protection	Control box of operator cab	See "Carrier Fuse and Relay Panel" on page 3-19 and see "Superstructure Fuse and Relay Panel" on page 3-40
17	Water temperature sensor	Indicates high water temperature of the engine	Engine	See "Main Screen 1 Alarms" on page 3-60.

Item No.	Device Name	Purpose of Safety Protection	Location	Remarks
18	Oil pressure sensor	Indicate low oil pressure of the engine	Engine	See "Main Screen 1 Alarms" on page 3-60.
19	Grounding line	Protecting the personal and equipment safety	Engine	
20	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 swing .way boom extension. Locks out hoist up, boom down, and telescope out functions.		See "Main Screen 1 Alarms" on page 3-60 and "Anti-Two Block Installation" on page 4-36.
21	Joystick lock-out 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.	Main hoist	See "Main Screen 1 Alarms" on page 3-60.

3.6 Load Moment Indicator (LMI) System

3.6.1 Alarms and Limiting Functions

NOTE :

If any of these alarms occur; the alarm information will displays on the main screen and specific systems will be disabled.

Alarm	Cause	System Action
Overload	The weight of the actual load to be lifted exceeds the rated lifting capacity of the machine	Boom will not lower or telescope out-ward; hoist will not take up rope
Anti-two block	The hook ball or hook block reaches the boom head	Boom will not lower or telescope out-ward; hoist will not take up rope
Third-wrap indicator	The rope on the hoist reaches the third wrap of the drum	Hoist will not release rope but will take up rope
Fault	Incorrect setting or faulty hardware	All systems disabled

NOTICE

The rated lifting capacity of telescoping a load will be restricted by the LML when the actual lift reaches 90% of the rated lifting capacity.

3.6.2 Override

The anti-two block alarm can be overridden by pressing the "Override anti-two block" button.

The LMI alarm can be overridden by pressing the "Override LMI lockout" button.

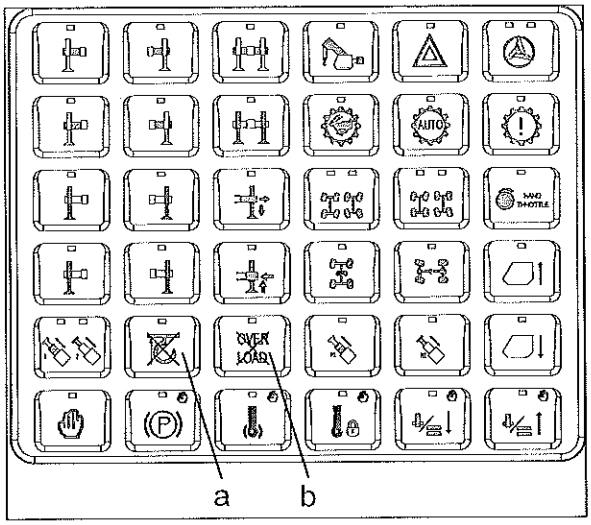


Fig 3-56

a. "Override anti-two block" button
b. "Override LMI lockout" button

NOTE :
Turning the master override key switch activates the "Override anti-two block" switch and the "Override LMI lockout" switch.

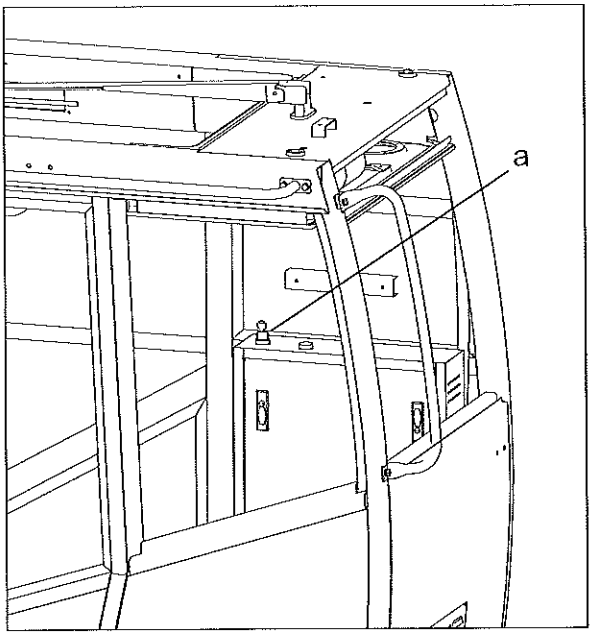


Fig 3-57 Master override key switch

a. Master override key switch

3.6.3 Screen Navigation

There are two LMI screen navigation configurations that may be on a Sany rough terrain crane:

1. Touch screen navigation blue boxes.

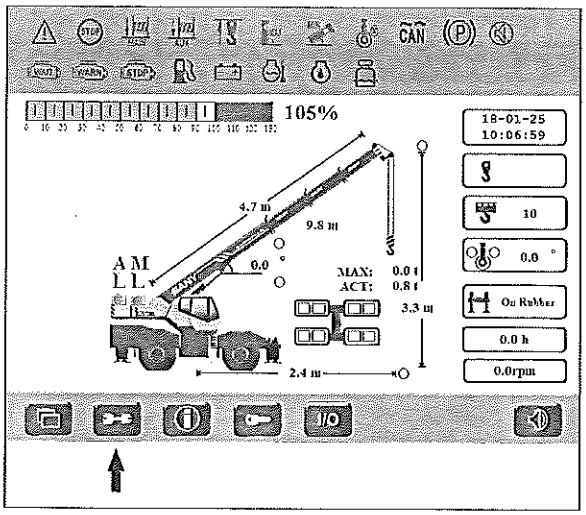


Fig 3-58 Touch screen

NOTE :

In addition to navigation, any blue box on the screen is activated by touch.

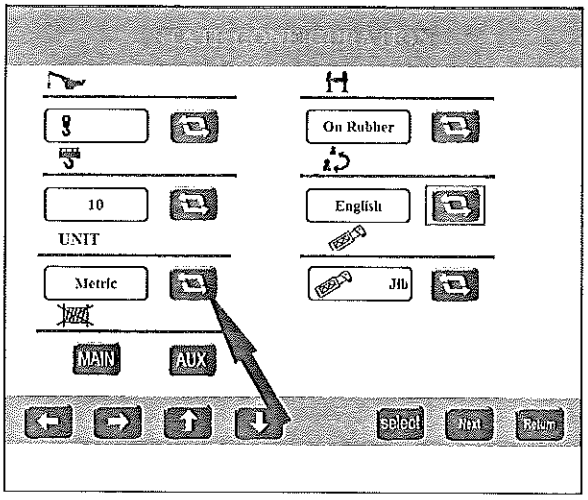


Fig 3-59 Blue box

2. F-Keys with touch screen.

NOTE :

By pressing an F-key that is below a blue box (touch screen) the blue box item is activated.

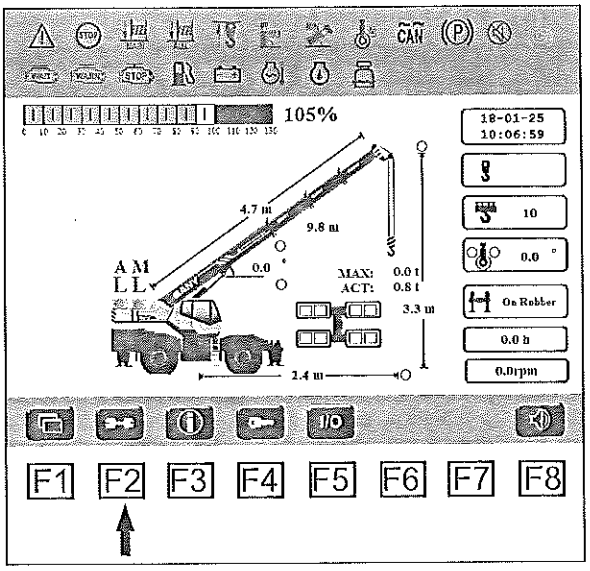


Fig 3-60 F-Keys

NOTE :

By pressing directional arrows you can move the highlighted part of the screen to a different location. You may also press a F-key directly below a directional arrow.

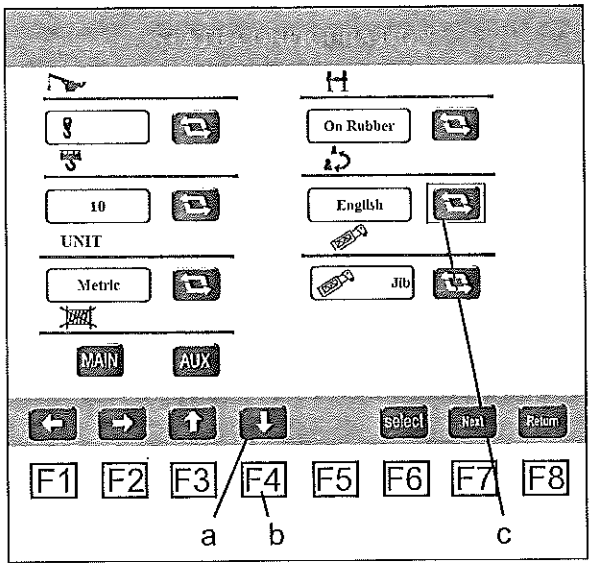


Fig 3-61

a. Directional arrows

b. F-key

c. Highlighted part

3.6.4 Screens and Icons

3.6.4.1 Screens and Icons

NOTICE

The rated lifting capacity of telescoping a load will be restricted by the LMI when the actual lifting capacity reaches 90% of the rated lifting capacity.

Main Screen 1 and Main Screen 2 are each divided into three sections:

- Alerts and warnings
  Refer to "Main screen 1 alarms".
  Refer to "Main screen 2 alarms".
- Operating information (screen 1) or Traveling information (screen 2)
- Function icons

Refer to the following sections for more information:

- "Main screen toggle icon".
- "Working condition setup".
- "Information screens".
- "Sensor screen set-up".
- "IO screen (navigation)".
- "IO screen 3".

3.6.4.2 Main Screen 1 (Operating)

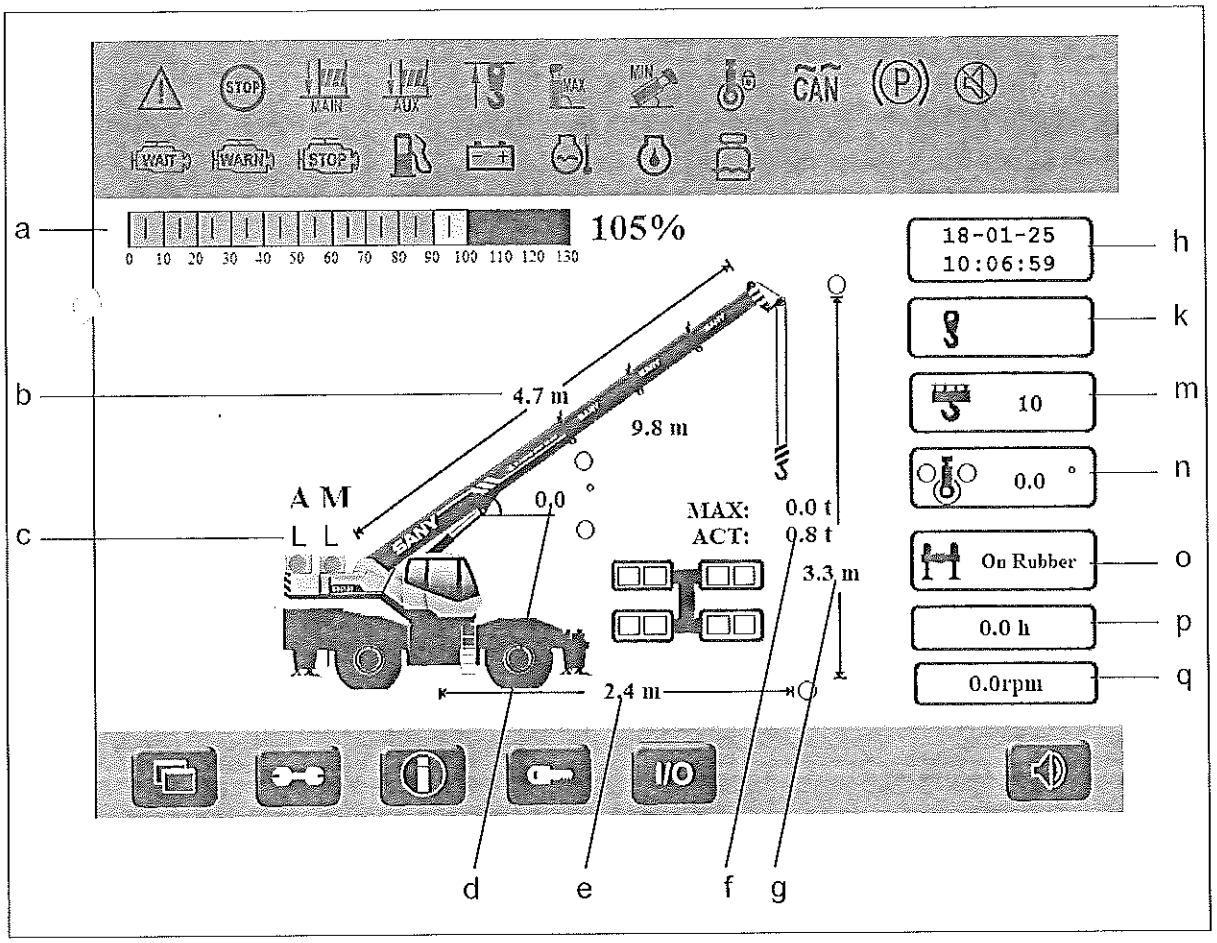


Fig 3-62

a. Capacity

b. Length

c. Hoist speed (high / low)

d. Angle

e. Radius

f. Max. rated weight / actual weight

g. Height

h. Date time

k. Boom selection

m. Parts of line

n. Swing angle

o. Outrigger selection

p. Hourmeter

q. Engine speed

NOTE :

Date is displayed as year-month-day.

3.6.4.3 Main Screen 2 (Traveling)

Refer to "Main screen toggle icon".

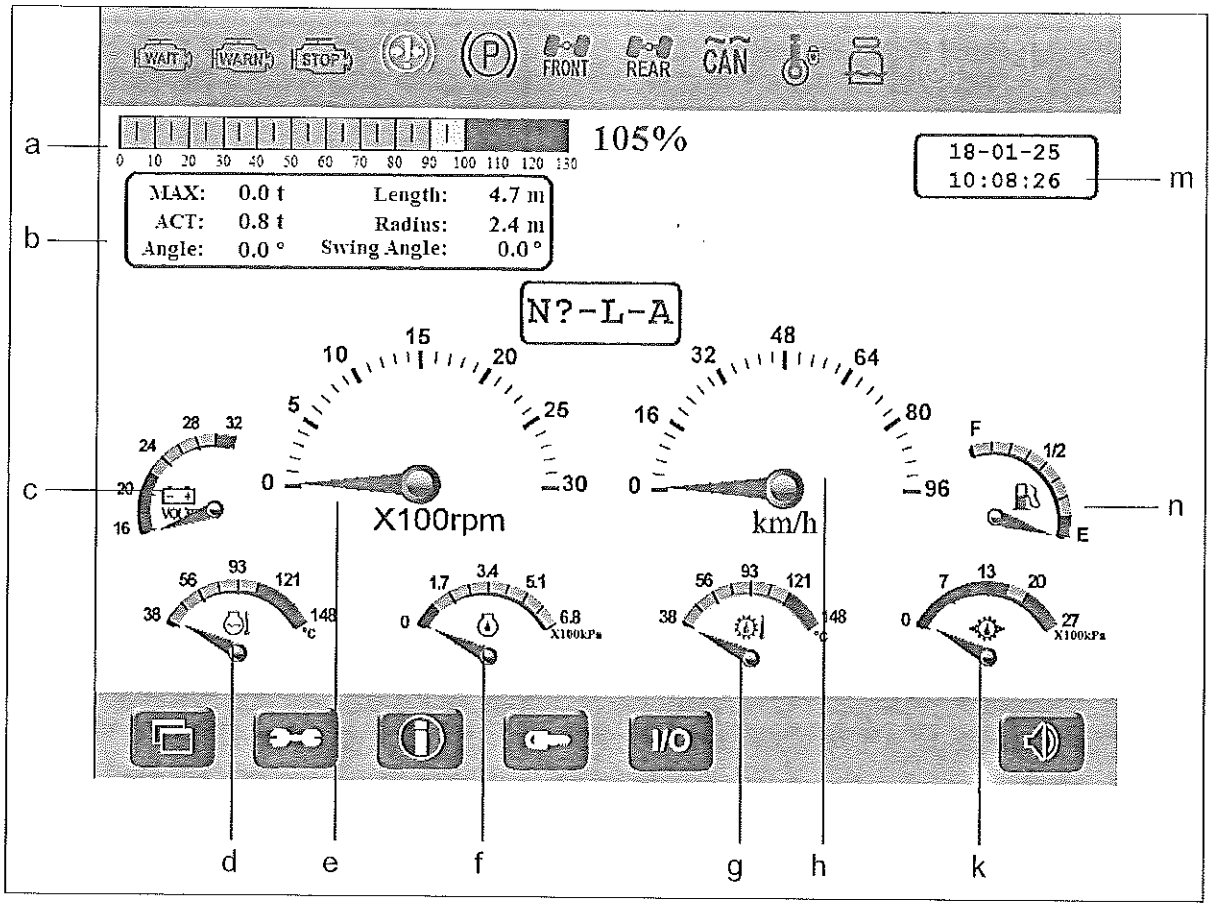


Fig 3-63

a. Capacity
b. Reach
c. Battery
d. Engine coolant temperature
e. Engine speed
f. Engine oil pressure
g. Transmission oil temperature
h. Machine speed
k. Transmission oil pressure
m. Date time
n. Fuel

Date is displayed as year-month-day.

Main screen 2 should be kept on the LMI screen during travel as it displays important information.

3.6.4.4 Main Screen 1 Alarms

Alarm icons displayed along the top of a main screens will blink red if an error condition occurs. The blinking stops when this error condition is removed. Information lights such as "Free swing" illuminate green when the condition occurs.

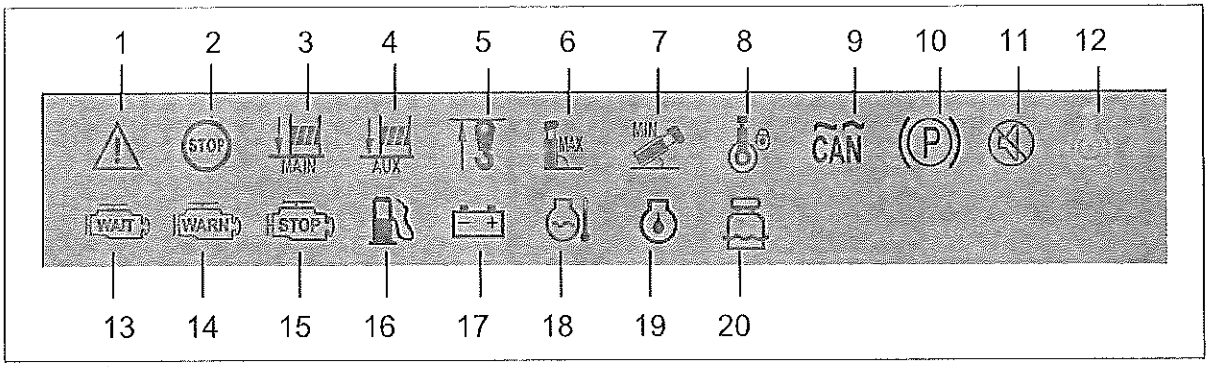


Fig 3-64

1. Pre-warning icon
2. Warning icon
3. Main Hoist Third Wrap icon
4. Auxiliary Hoist Third Wrap icon
5. Anti-Two Block icon
6. Maximum Angle icon
7. Minimum Angle icon
8. Blank
9. CAN BUS Fault icon
10. Parking Brake icon
11. Mute icon
12. Free Swing icon
13. Engine Waiting icon
14. Engine Warning icon
15. Engine Stopped icon
16. Fuel icon
17. Battery icon
18. Engine Coolant Temperature icon
19. Engine Oil Pressure icon
20. Engine Coolant Level icon

1. Pre-warning

Illuminates when machine is close to an overload situation.

2. Warning

Illuminates when overload situation has occurred. Determine and correct the cause of overload.

3. Main Hoist Third Wrap

Illuminates when there are only three wraps of wire rope remaining on the drum. Drum rotation stops. The ability to lower the hook block is disabled.

4. Auxiliary Hoist Third Wrap

Illuminates when there are only three wraps of wire rope remaining on the drum. Drum rotation stops. The ability to lower the hook block is disabled.

5. Anti-Two Block

Illuminates when anti-two block height limit has been reached. The ability to raise the hook block is disabled.

6. Maximum Angle

Illuminates when boom is at maximum angle. The ability to extend the boom or telescope out is disabled.

7. Minimum Angle

Illuminates when boom is at minimum angle. The ability to extend the boom or telescope out is disabled.

8. Blank

Spare location not used.

9. CAN BUS Fault

Illuminates when fault detected in the controller area network. Contact your Sany distributor.

10.Parking Brake
Illuminates when parking brake is engaged.

11.Mute
Illuminates when LMI audible alarms are silenced.

12.Free Swing
Illuminates green indicator when free swing is engaged.

13.Engine Waiting
Illuminates when the intake air heater needs to warm the intake air prior to starting. Wait until the indicator goes off before starting the engine.

14.Engine Warning
Illuminates when the engine needs to be serviced. Contact your Sany distributor.

15.Engine Stopped
Stop the engine as soon as it can be safely done. Contact your Sany distributor.

NOTICE
Failure to heed this notice could result in engine damage. The engine must remain shut down until the engine can be repaired.

16.Fuel
Illuminates when fuel level is low. Add fuel as needed.
Refer to "Fuel supply".

17.Battery
Illuminates when batteries are not adequately charged. Charge or replace the batteries.

18.Engine Coolant Temperature
Illuminates when temperature is high.

19.Engine Oil Pressure
Illuminates when pressure is low.
Refer to "Check engine oil level and quality".

20.Engine Coolant Level
Illuminates when coolant level is low.
Refer to "Check engine coolant level and quality".

3.6.4.5 Main Screen 2 Alarms

Alarm icons, displayed along the top of main screen, will illuminate or blink red if an error condition occurs. The illumination or blinking stops when the error condition is removed. Information lights such as "Free swing" illuminate green when the condition occurs

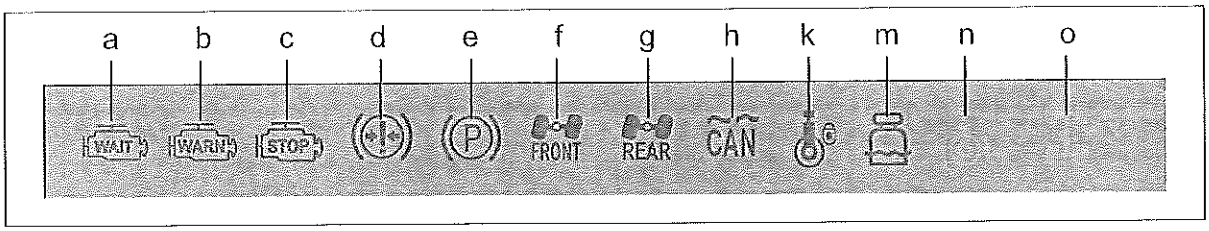


Fig 3-65

a. Engine Waiting
b. Engine Warning
c. Engine Stopped
d. Brake Pressure
e. Parking Brake
f. Front Wheels Misaligned
g. Rear Wheels Misaligned
h. CAN BUS Fault
k. Blank
m. Engine Coolant Level
n. Free Swing
o. Steering

a. Engine Waiting

Illuminates when the intake air heater needs to warm the intake air prior to starting. Wait until the indicator goes off before starting the engine.

b. Engine Warning

Illuminates when the engine needs to be serviced. Contact your Sany distributor.

c. Engine Stopped

Stop the engine as soon as it can be safely done. Contact your Sany distributor.

NOTICE

Failure to heed this notice could result in engine damage.
The engine must remain shut down until the engine can be repaired.

d. Brake Pressure

Illuminates when pressure is low.

e. Parking Brake

Illuminates when parking brake is engaged.

f. Front Wheels Misaligned

Illuminates when the front wheels are off-center.

g. Rear Wheels Misaligned

Illuminates when the rear wheels are off-center.

h. CAN BUS Fault

Illuminates when fault detected in the controller area network. Contact your Sany distributor for more information.

k. Blank

Spare location not used.

m. Engine Coolant Level

Illuminates when coolant level is low.

Refer to "Check engine coolant level and quality".

n. Free Swing

Illuminates green indicator when free swing is engaged.

o. Steering

Indicates which steering mode has been selected.

3.6.4.6 Main Screen Toggle Icon

Pressing the first icon, of either main screen, switches between main screen 1 and main screen 2.

Some LMI systems have an F-key navigation feature. Refer to "Screen navigation".

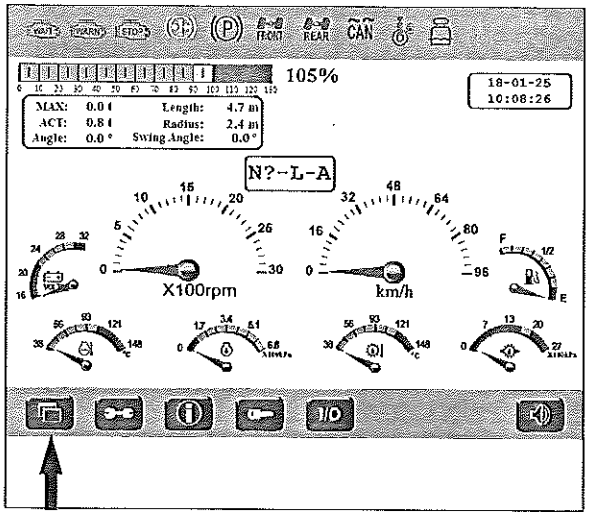


Fig 3-66 The first icon

3.6.4.7 Working Condition Setup

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

The setup procedures is started by pressing the second icon, on either main screen, to access the working condition setup screen.

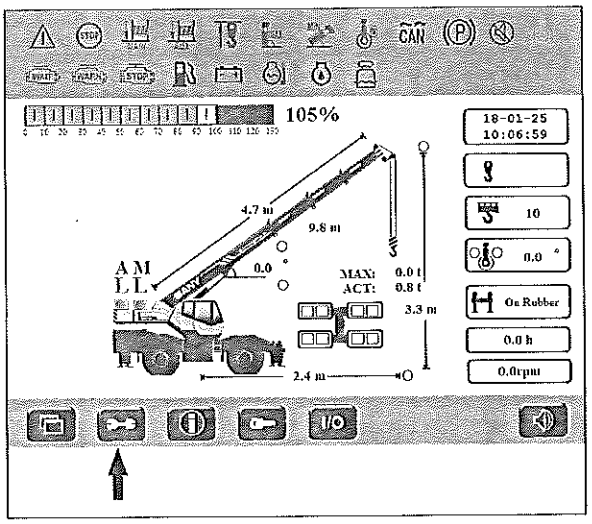


Fig 3-67 The second icon

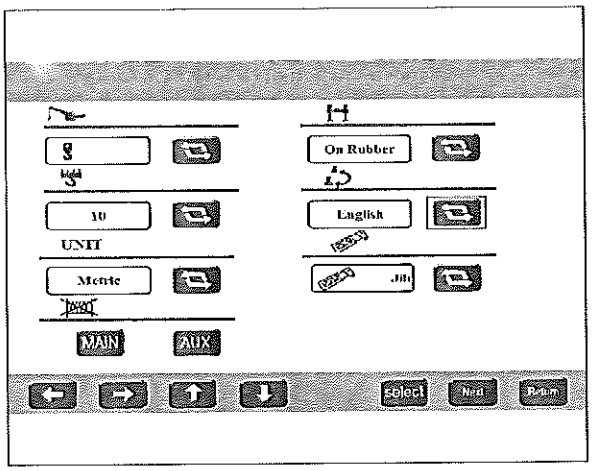


Fig 3-68 Working condition setup screen

Boom Selection

Pressing boom selection icon provides a choice among the options.

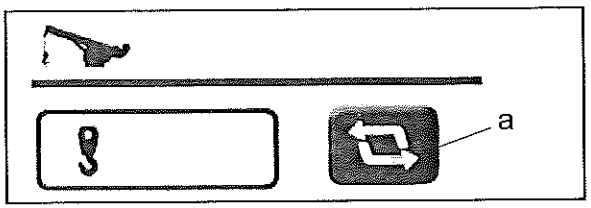


Fig 3-69 Boom selection icon

a. Boom selection icon

Outrigger Selection

Pressing outrigger selection icon to access the outrigger selection screen.

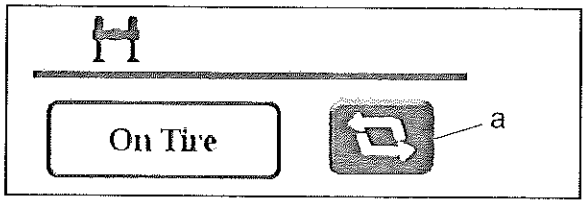


Fig 3-70 Outrigger selection icon

a. Outrigger selection icon

It provides a choice between the following options:

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

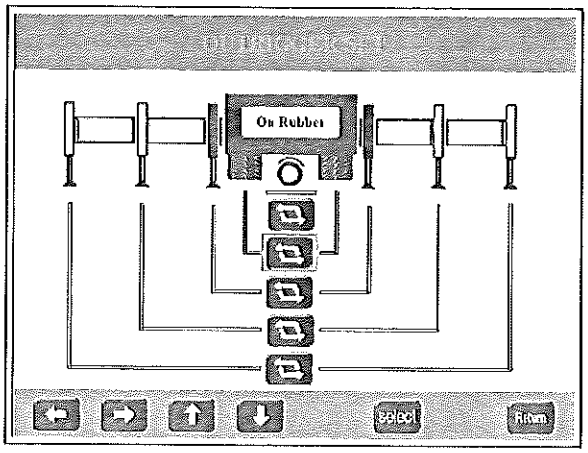


Fig 3-71 Outrigger selection screen

Parts of Line Selection

Pressing this icon provides a choice of the desired parts of line (1 through 12).

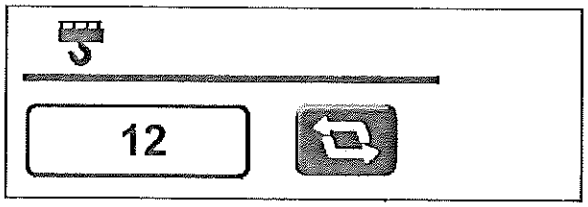


Fig 3-72 Parts of line selection

Display Language Selection

Pressing this icon provides a choice between English and Chinese display language.

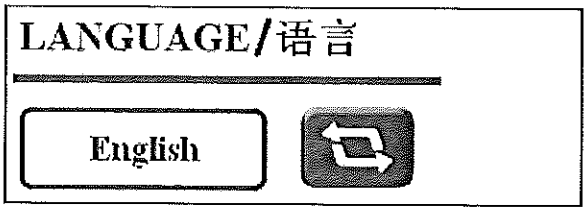


Fig 3-73 Display language selection

Display Unit Selection

Pressing this icon provides a choice between metric and imperial display units.

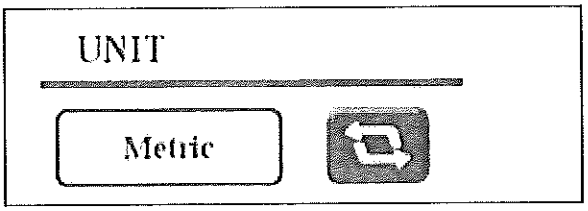


Fig 3-74 Display unit selection

Boom Extension Selection

Pressing this icon provides a choice between with jib installed or without jib installed.

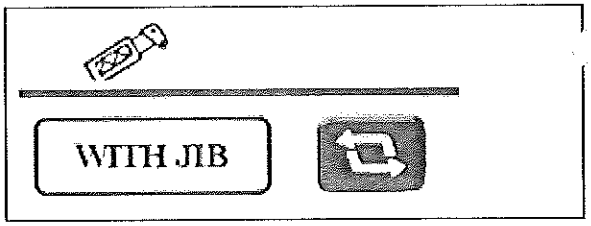


Fig 3-75 Boom extension selection

Hoist Selection

Pressing this icon provides a choice to shut off the main hoist or auxiliary hoist.

The hoist icon highlights when set to the off position.

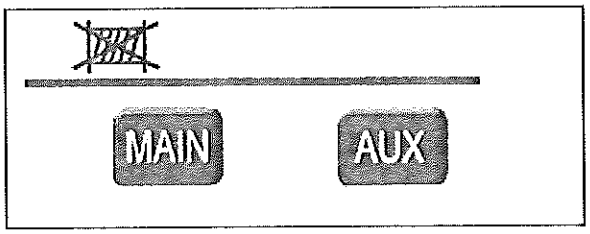


Fig 3-76 Hoist selection

Next Selection

Pressing this icon changes the screen to the next page.

Refer to "Limits screen".

Some LMI systems have an F-key navigation feature. Refer to "Screen navigation".

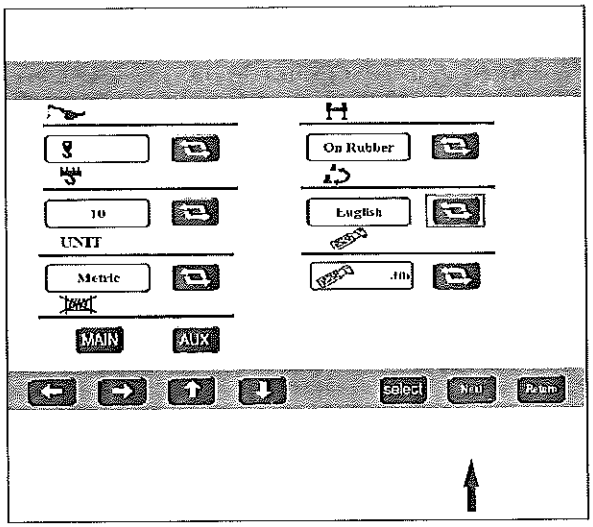


Fig 3-77 Next selection

Limits Screen

Some LML systems have navigation arrows and F-keys. Refer to "Screen navigation".

If the crane exceeds the set values, the system will sound an alarm signal. However, the actual action of the crane will not be stopped.

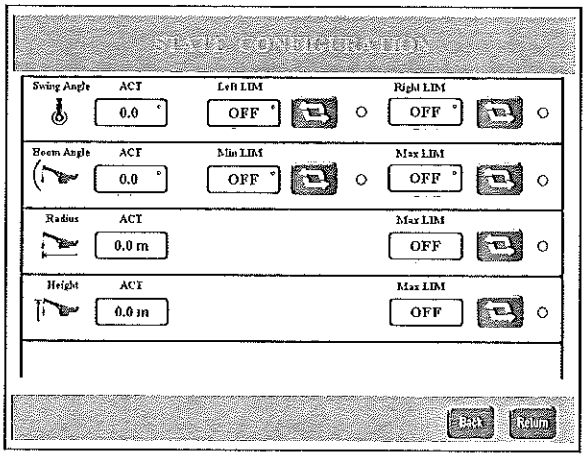


Fig 3-78 Limits screen

Light on Screen

When the small green circle becomes red the crane is operating beyond the limits set.

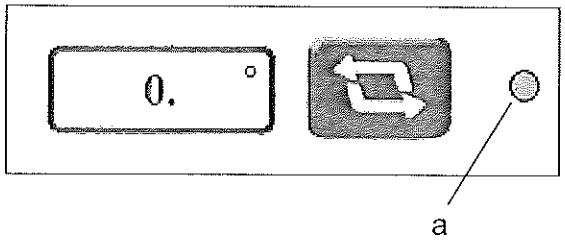


Fig 3-79 Light on screen

a. Green circle

3.6.4.8 Information Screens

Pressing the third icon at the lower left of either main screen provides access to two informational screens.

Some LMI systems have an F-key navigation feature. Refer to "Screen navigation".

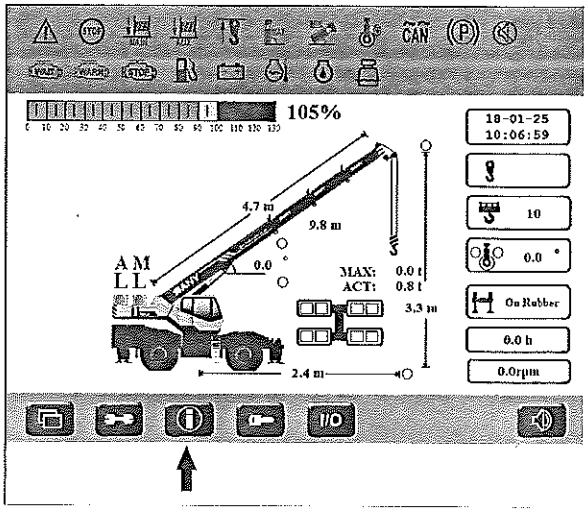


Fig 3-80 The third icon

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.

Some LMI systems have different screen content.

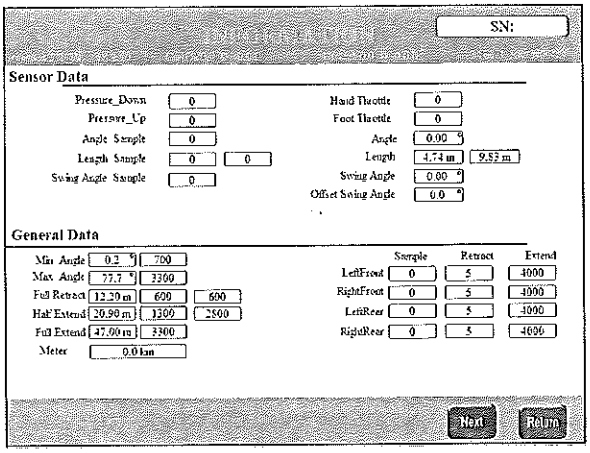


Fig 3-81 Information screen 1

Information Screen 2

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

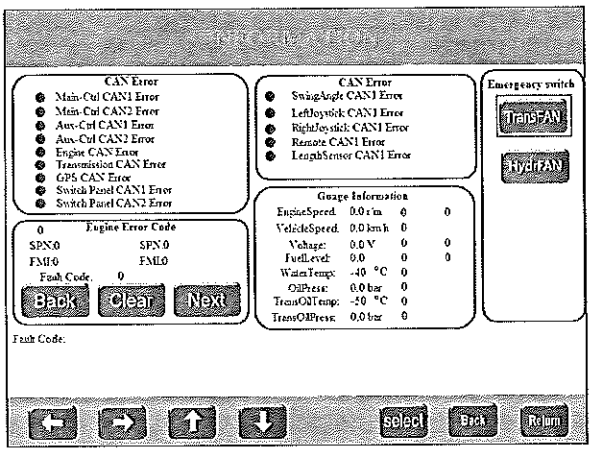


Fig 3-82 Information screen 2

3.6.4.9 Sensor Screen Set-Up

Pressing the fourth icon, on either main screen, will provide access to a password screen. After the password is entered, the sensor set-up screen displays.

Some LMI systems have an F-key navigation feature. Refer to "Screen navigation".

Only a qualified Sany technician is authorized to access this section of the LMI.

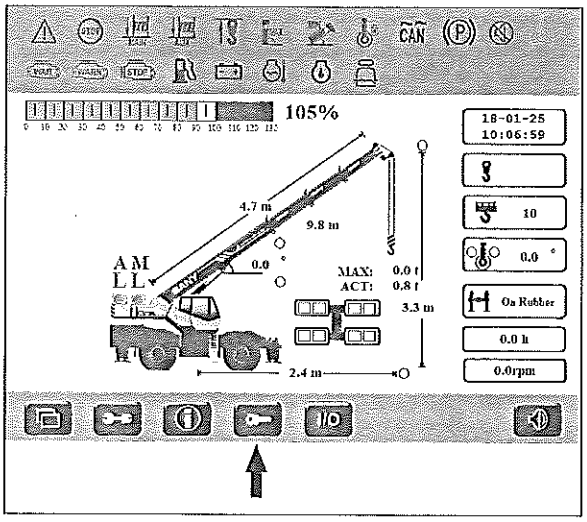


Fig 3-83 The fourth icon

3.6.4.10 IO Screen (Navigation)

Pressing the fifth icon, on either main screen, provides access to two informational screens. Some LMI systems have an F-key navigation feature.

Refer to "Screen navigation".

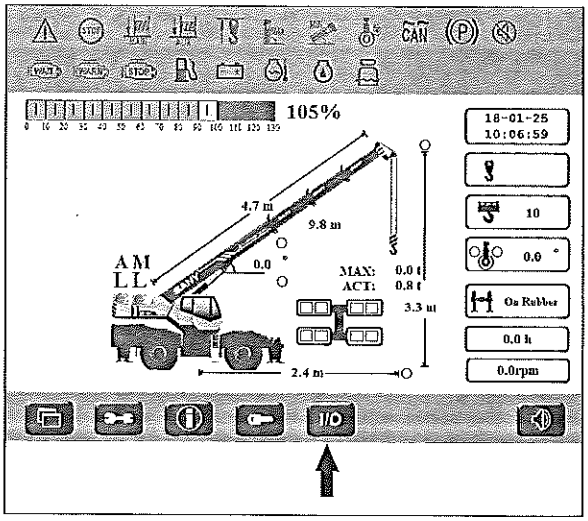


Fig 3-84 The fifth icon

IO Screen 1

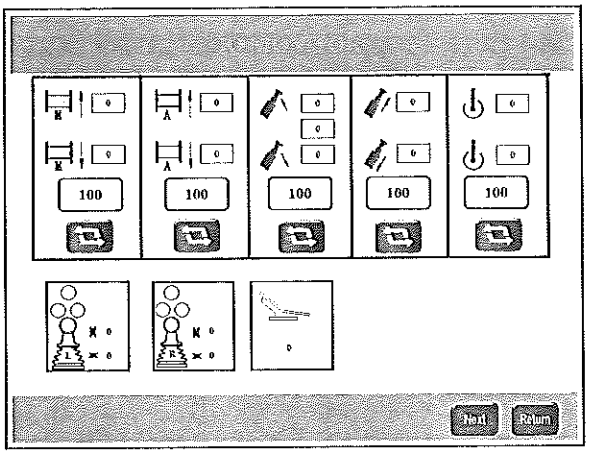


Fig 3-85 IO screen 1

IO Screen 2

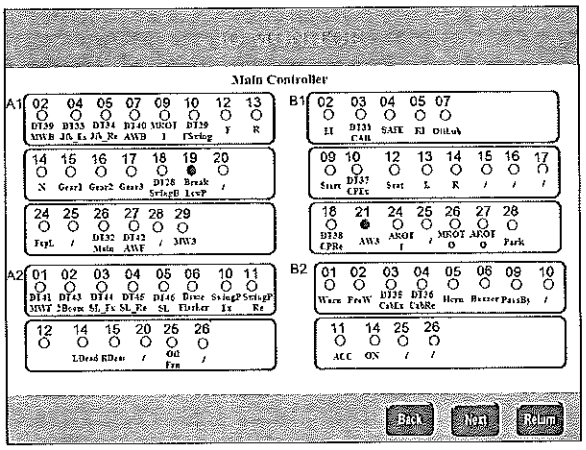


Fig 3-86 IO screen 2

IO Screen 3

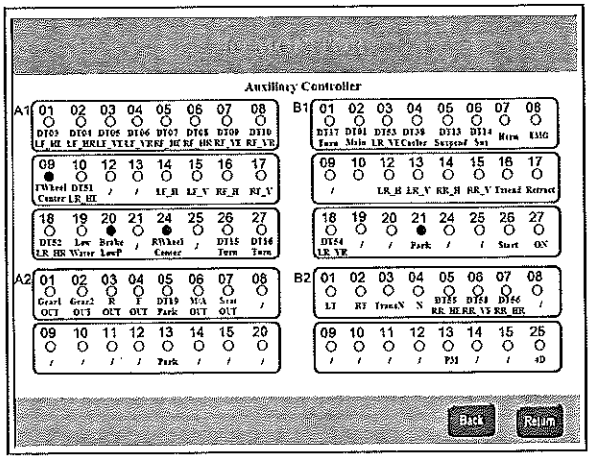


Fig 3-87 IO screen 3

3.6.4.11 Mute

Pressing the sixth icon, on either main screen, silences the audible alarms.

Some LMI systems have an F-key navigation feature. Refer to "Screen navigation".

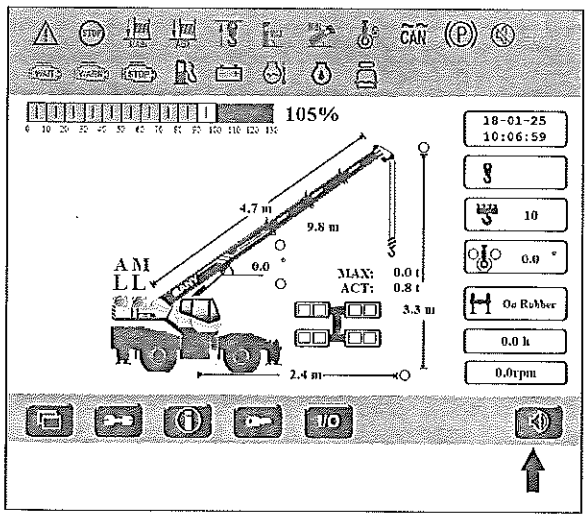


Fig 3-88 The sixth icon

SANY

Operation

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4.Operation

4.1 Basic Lifting Terminology

4.1.1 Boom Length

The axial distance between the boom pivot pin and the center line of the lower boom head load sheaves.

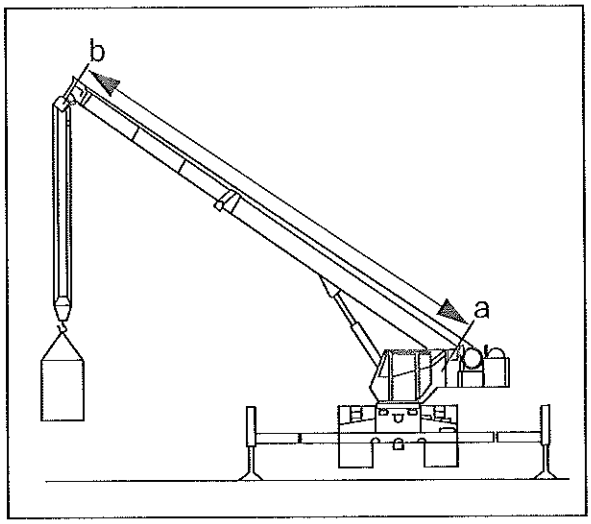


Fig 4-1 Boom length

a. Boom pivot pin
b. Boom head load sheaves

4.1.2 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.

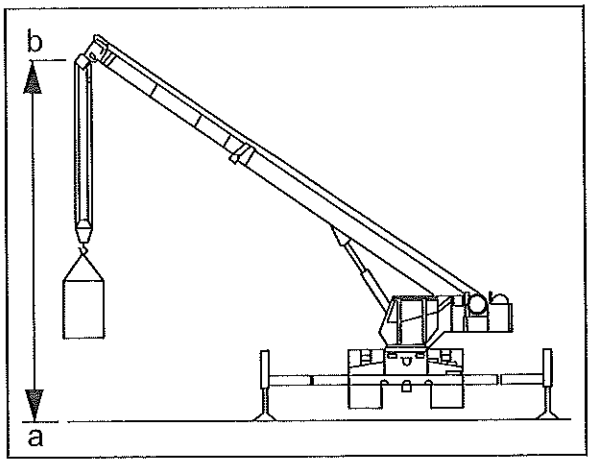


Fig 4-2

a. Surface
b. Center line of the boom head load sheaves

4.1.3 Boom Angle

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

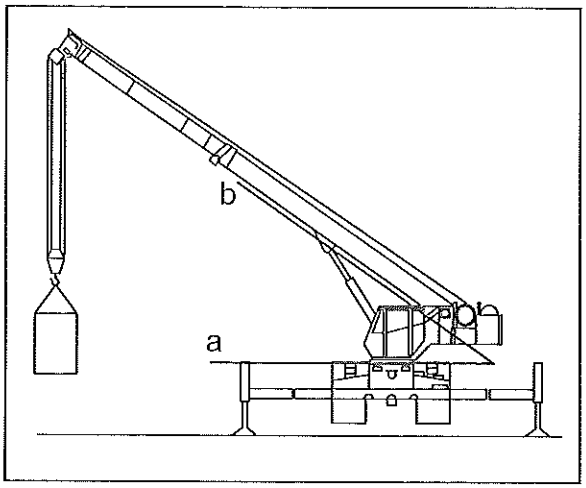


Fig 4-3

a. Horizontal plane
b. The bottom of the boom section 1

4.1.4 Working Radius

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

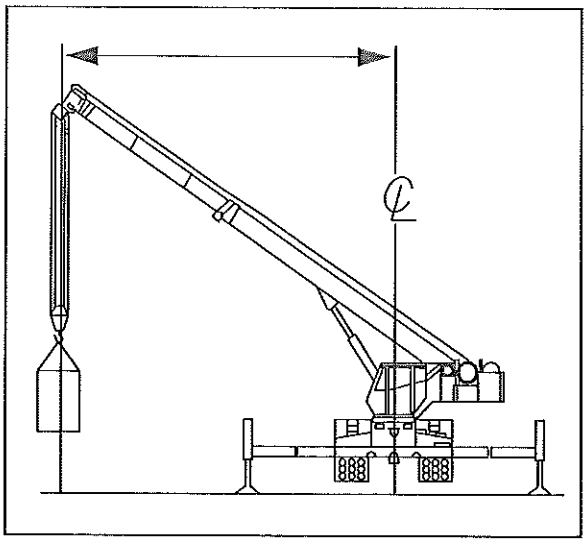


Fig 4-4

4.1.5 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.).

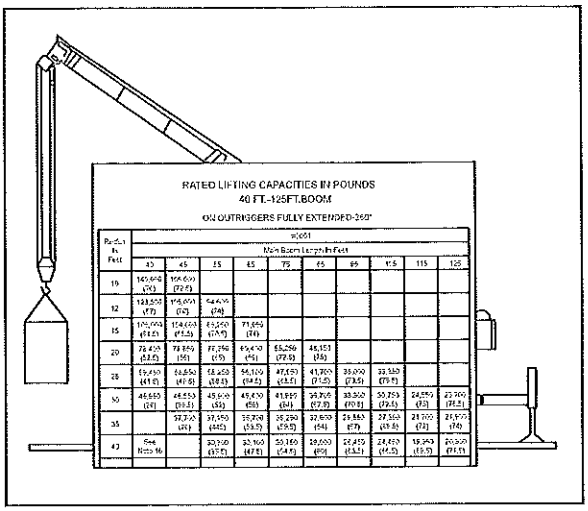


Fig 4-5 Rated load

4.1.6 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.).

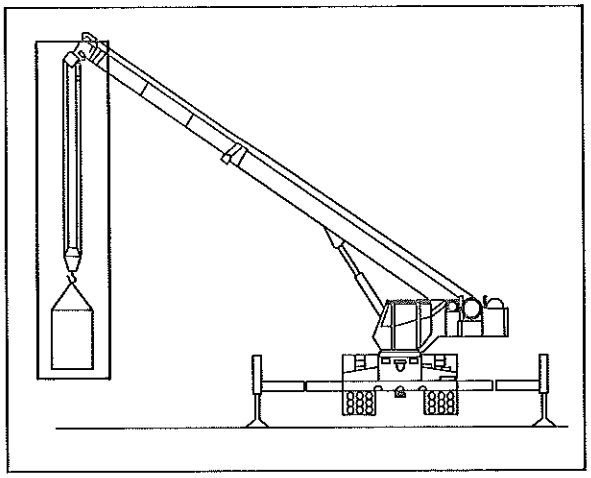


Fig 4-6

4.2 Using a Load Chart

4.2.1 Introduction

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

Refer to "Load charts manual"

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.

Boom (m) / Radius (m)	Load Chart, Main Boom, Outriggers 100% Extended, 360° Unit: (kg)							
	10	12.19	15.24	18.29	21.34	24.38	27.43	31.5
2.5	40000							
3	35000	23000	22000					
3.5	31500	23000	22000	21500				
4	29200	23000	22000	20600				
4.5	26200	22000	22000	20200	18500			
5	23800	20500	20300	19000	17500			
5.5	21800	19500	18500	17600	16200			
6	19000	17500	17000	16200	15000	14200	13200	
6.5	17300	16000	15600	15200	14200	13500	12300	
7	15800	14700	14400	14200	13500	12700	11500	9000
7.5	14300	13500	13400	13300	12700	12000	10800	8600
8		12600	12500	12400	12000	11400	10200	8400
9		11000	10800	10700	10600	10200	9200	8000
10			8800	9350	9450	9250	8300	7500
12			6700	7150	7300	7250	6600	6400
14				5300	5500	5550	5600	5500
16				4050	4250	4300	4400	4500
18					3300	3350	3400	3450
20						2600	2650	2700
22							2150	2200
24							1650	1700
26								1350
28								1050
Min. angle (empty load)	0°							
Load (0°)	11300	8200	5100	3400	2300	1600	1000	500
Parts of Line	8	6	6	4	4	4	4	3

Fig 4-7 Load chart

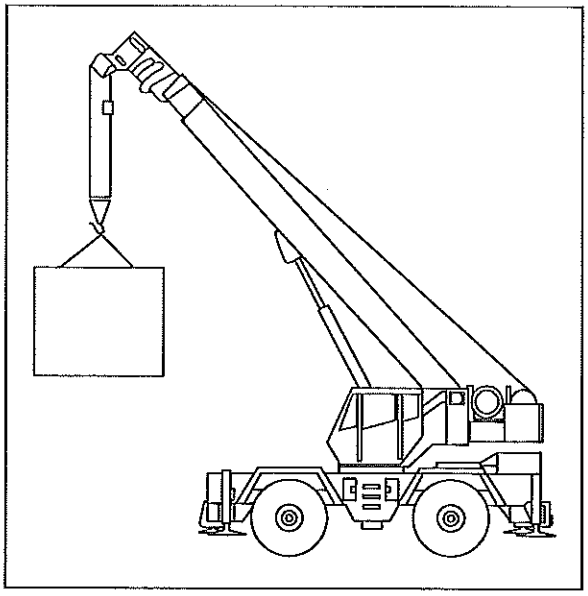


Fig 4-8 Lifting loads on tire

4.2.2 The Principle of Radius

The radius is changed by the load on hook blocks because deflection of the boom.

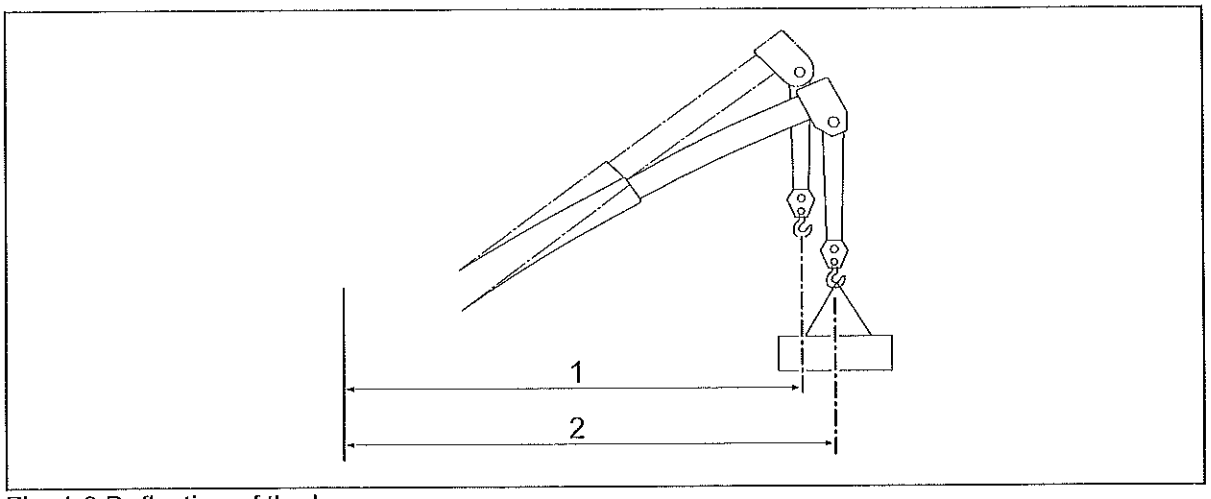


Fig 4-9 Deflection of the boom

1. Load radius without load on hook
2. Load radius with load on hook

4.2.3 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.

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

Lifting more weight is achieved by moving the load closer to the fulcrum point.

Lifting more weight is achieved by adding more removable counterweights

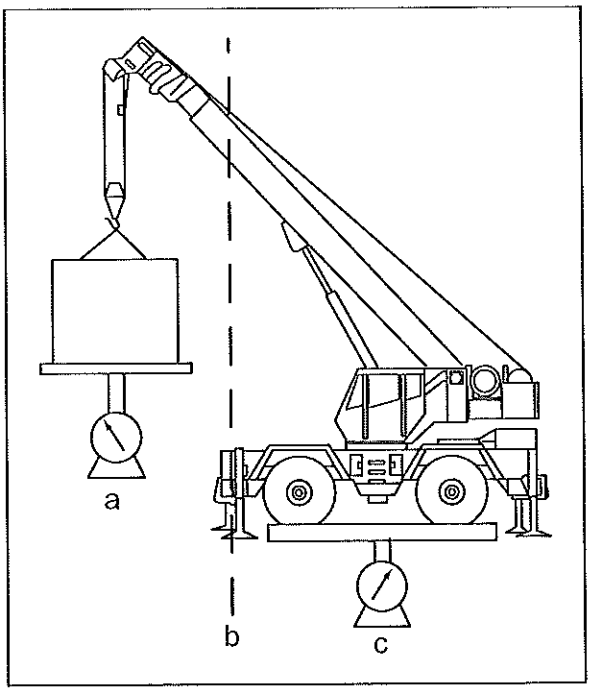


Fig 4-10 Fulcrum point for the crane

a. Weight of load
b. Fulcrum point

c. Weight of machine

Lifting more weight is achieved by increasing the outrigger beam span. As the outrigger beam span is increased, the counterweight is moved further from the fulcrum point, making it possible to lift more than its own weight.

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

Thus greater load capacities are limited by five elements above, especially outrigger beam span and strength of material.

For example, 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, the strength of the machine and the strength of the machine's components becomes a vital part of the design process. Thus greater capacities are limited by two elements: the stability of the machine and the strength of the machine components.

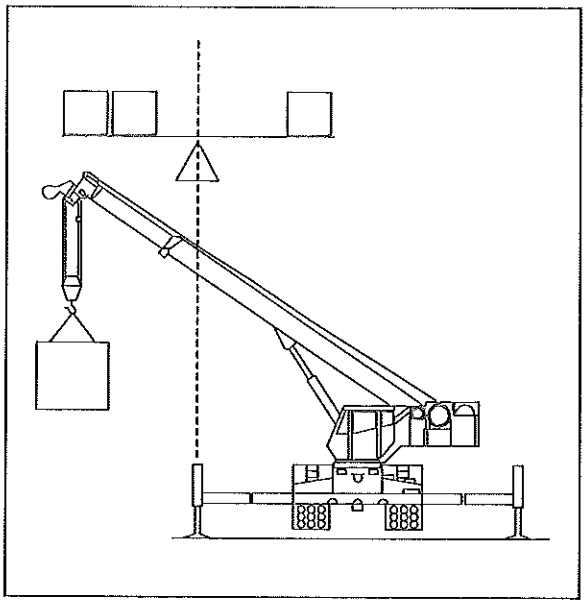


Fig 4-11 Counterbalancing the load

4.2.4 Load Chart Understanding

Refer to your Load Charts Manual for the actual load capacity of this specific crane.

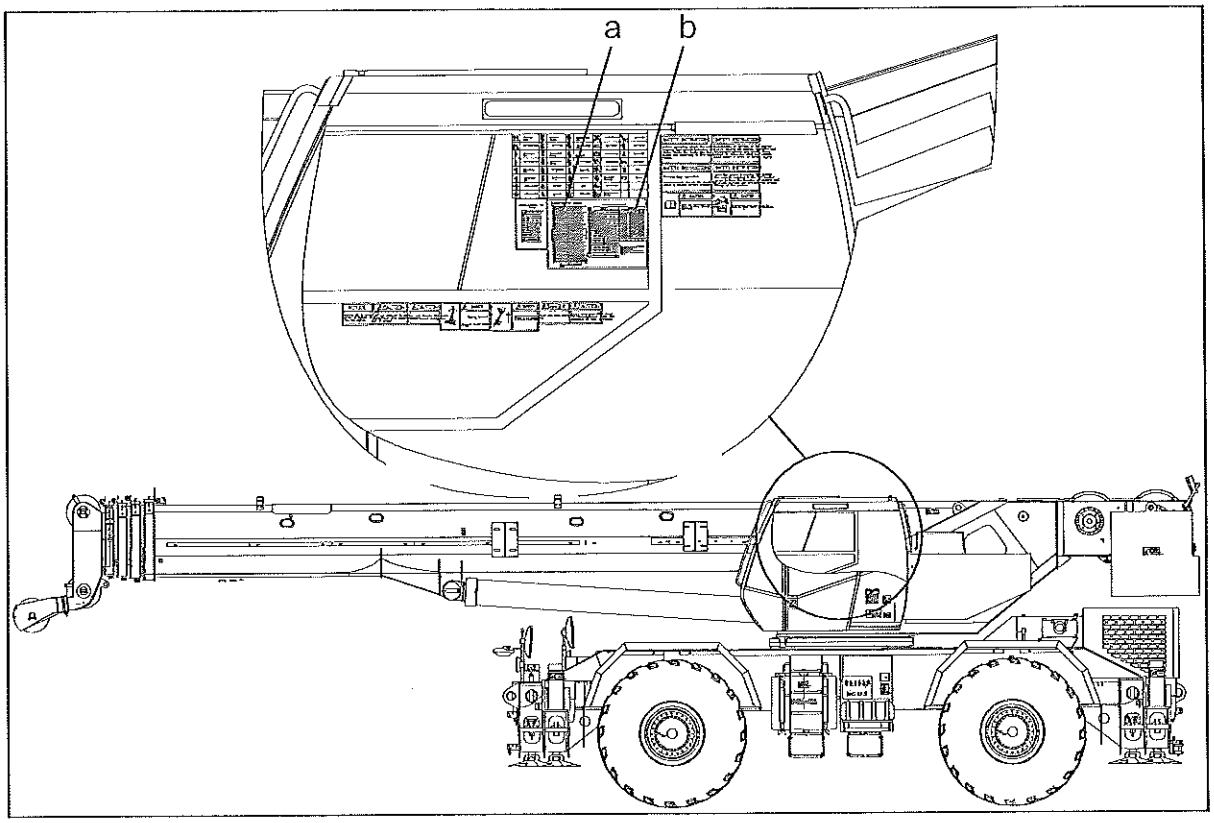


Fig 4-12

a. Working range diagram b. Load charts

Load charts provide operators with a lot of vital information. The load 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. Capacities for on fully extended outriggers are 1.25 P + 0.1 F of the rated load and on tires, 1.33 P of the rated load.

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

Boom (m) / Radius (m)	Load Chart, Main Boom, Outriggers 100% Extended, 360° Unit: (kg)							
	10	12.19	15.24	18.29	21.34	24.38	27.43	31.5
2.5	40000							
3	35000	23000	22000					
3.5	31500	23000	22000	21500				
4	29200	23000	22000	20800				
4.5	26200	22000	22000	20200	18500			
5	23800	20500	20300	19000	17500			
5.5	21800	19500	18500	17600	16200			
6	19000	17500	17000	16200	15000	14200	13200	
6.5	17300	16000	15600	15200	14200	13500	12300	
7	15800	14700	14400	14200	13500	12700	11500	9000
7.5	14300	13500	13400	13300	12700	12000	10800	8600
8		12600	12500	12400	12000	11400	10200	8400
9		11000	10800	10700	10600	10200	9200	8000
10			9800	9350	9450	9250	8300	7500
12			6700	7150	7300	7250	6600	6400
14				5300	5500	5550	5600	5500
16				4050	4250	4300	4400	4500
18					3300	3350	3400	3450
20						2600	2650	2700
22							2150	2200
24							1650	1700
26								1350
28								1050
Min. angle (empty load)	0							
Load (0)	11300	8200	5100	3400	2300	1600	1000	500
Parts of Line	8	6	6	4	4	4	4	3

Fig 4-13 Load chart

lengths between increments should always be treated as if it were the next longer length.

Another important tool for determining capacity is the working range diagram. The working range diagram shows the relationship among the working radius, tip height, boom length and boom angle. If the operator knows the radius and tip height required for a specific load, the boom angle and length can be quickly determined from the range diagram. Equally, if the boom length and angle are known, the tip height and working radius can be quickly determined.

The working range diagram and parts of load charts are also located on the right window in operator's cab.

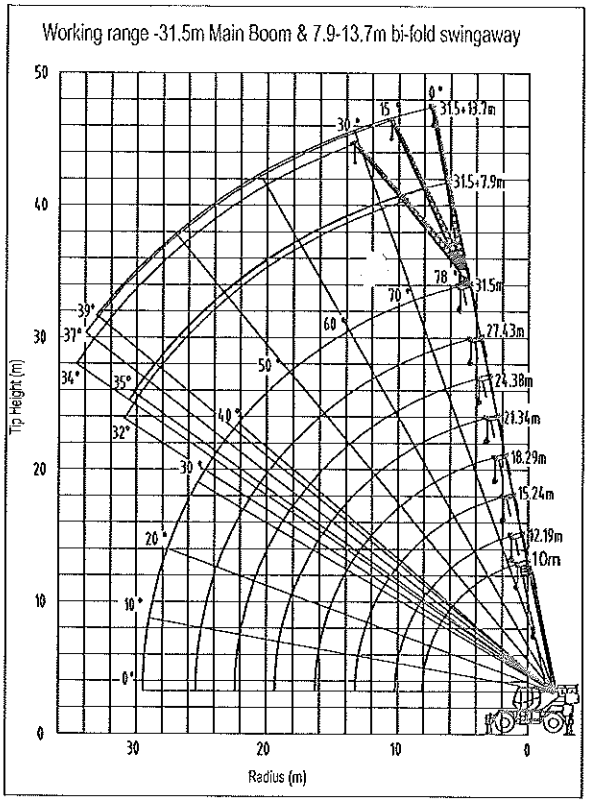
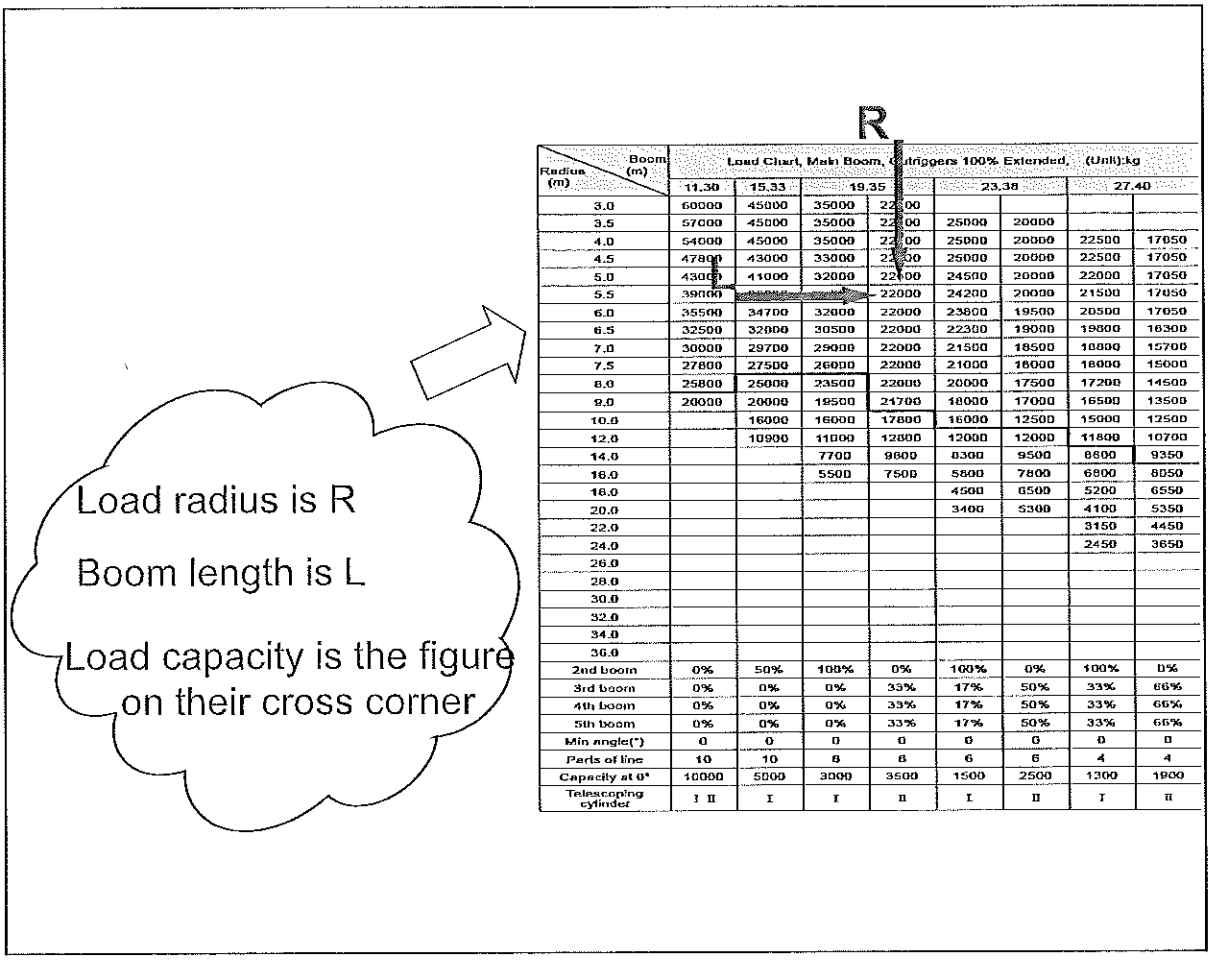


Fig 4-14 Working range diagram

Load charts based on boom length and working radius.



Radius (m) \ Boom (m)	Load Chart, Main Boom, Outriggers 100% Extended, (Unit):kg							
	11.30	15.33	19.35		23.38		27.40	
3.0	60000	45000	35000	22000				
3.5	57000	45000	35000	22000	25000	20000		
4.0	54000	45000	35000	22000	25000	20000	22500	17050
4.5	47800	43000	33000	22000	25000	20000	22500	17050
5.0	43000	41000	32000	22000	24500	20000	22000	17050
5.5	39000			22000	24200	20000	21500	17050
6.0	35500	34700	32000	22000	23800	19500	20500	17050
6.5	32500	32000	30500	22000	22300	19000	19800	16300
7.0	30000	29700	29000	22000	21500	18500	18800	15700
7.5	27800	27500	26000	22000	21000	18000	18000	15000
8.0	25800	25000	23500	22000	20000	17500	17200	14500
9.0	20000	20000	19500	21700	18000	17000	16500	13500
10.0		16000	16000	17800	16000	12500	15000	12500
12.0		10900	11000	12800	12000	12000	11800	10700
14.0			7700	9800	8300	9500	8800	9350
16.0			5500	7500	5800	7800	6800	8050
18.0					4500	6500	5200	6550
20.0					3400	5300	4100	5350
22.0							3150	4450
24.0							2450	3650
26.0								
28.0								
30.0								
32.0								
34.0								
36.0								
2nd boom	0%	50%	100%	0%	100%	0%	100%	0%
3rd boom	0%	0%	0%	33%	17%	50%	33%	66%
4th boom	0%	0%	0%	33%	17%	50%	33%	66%
5th boom	0%	0%	0%	33%	17%	50%	33%	66%
Min angle(°)	0	0	0	0	0	0	0	0
Parts of line	10	10	6	6	6	6	4	4
Capacity at 0°	10000	5000	3000	3500	1500	2500	1300	1900
Telescoping cylinder	I II	I	I	II	I	II	I	II

Fig 4-15 Load charts

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

The load chart also gives weight reductions for Sany load handling devices which must be taken into consideration as part of the load.

The weight of any load handling devices 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. If you are unsure how to figure a lifting weight contact your supervisor before attempting a lift.

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 jacks (stabilizers) in the full extended position are used to mark the boundaries of the lifting areas.

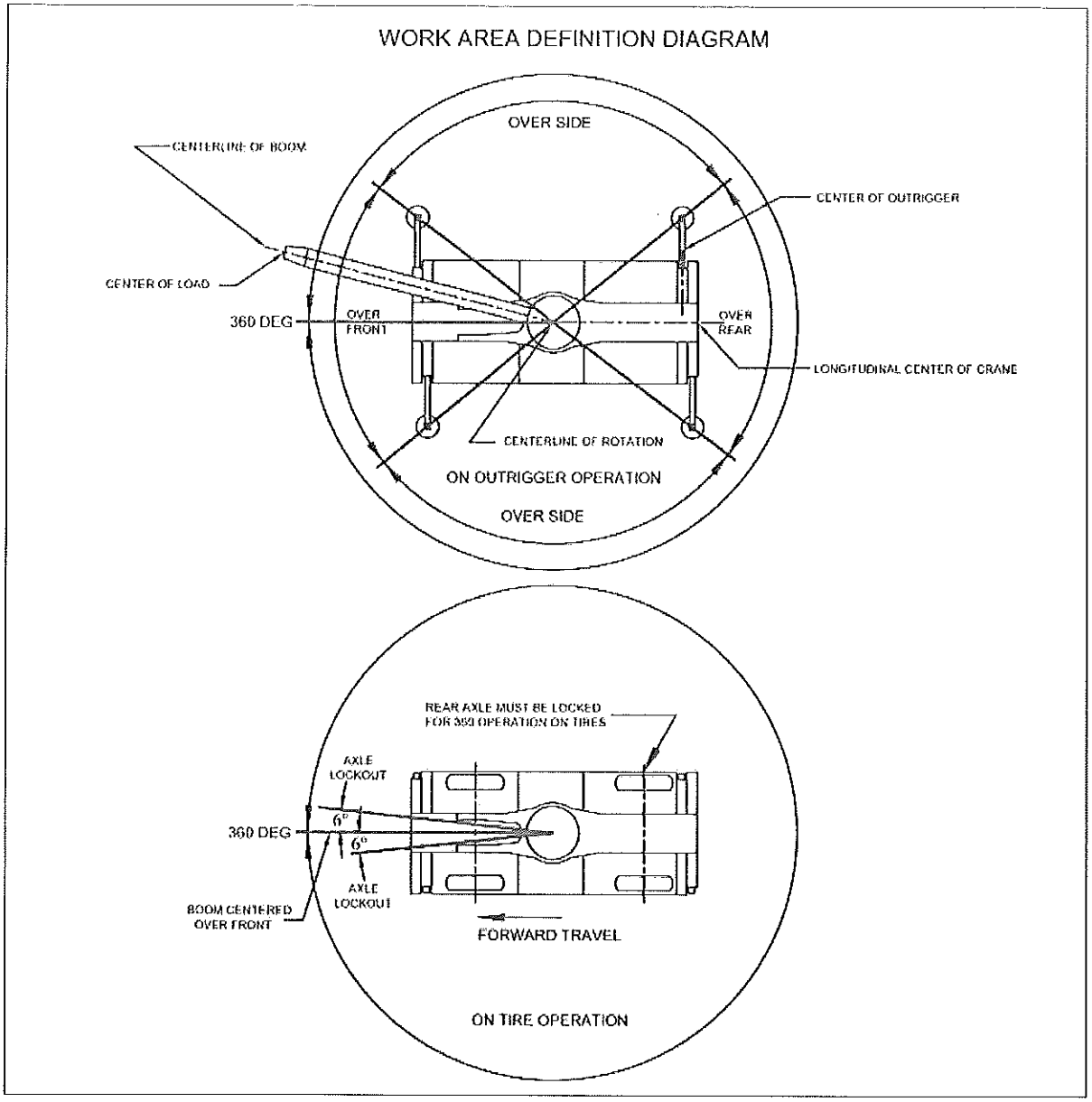


Fig 4-16 Work area definition diagram

4.3 New Machine Run-In

Your machine has been thoroughly tested and adjusted 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 crane operation hours for a new machine.

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

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

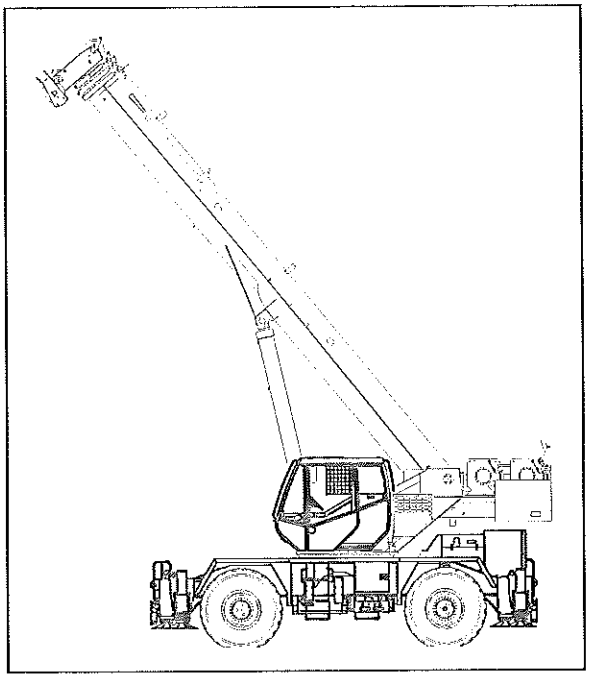


Fig 4-17 Allow a run-in period of 100 crane operation hours for a new machine

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

The following points are not limitations but instead guidelines for the machine run-in period:

- Operate as much as possible in the half to three-quarters throttle or load range.
- Keep the engine speed at or near idle until the engine reaches its normal operating temperature.
- Avoid long periods of operation with the engine at idle or continuous maximum horsepower levels.
- Avoid sudden starts, movements or stops.
- Manage engine power to a point that allows acceleration to governed speed when conditions require more power. Do not over rev the engine.
- Monitor the instruments frequently — especially the engine oil and engine coolant temperatures. Shut down the engine at the first indication of an abnormal reading.
- During the run-in period of 100 crane operation hours, keep the crane speed at each gear as follows:

Low Gear	Speed (km/h)	High Gear	Speed (km/h)
1st	5.8	1st	\
2nd	9.5	2nd	9.5
3rd	13	3rd	13
4th	21	4th	21
5th	\	5th	29

- Shift down to a lower speed setting, to keep the engine speed elevated, before climbing up a slope.
- Check all components frequently for proper operation, unusual noises, and excessive heating.
- Frequently check all operating temperatures. Determine the cause if overheating occurs and perform adjustments or repairs immediately.
- Always let the engine cool down before shutting off the engine at the end of the working day.
- Frequently check the bolts and screws for tightness.
- Check and retorque the wheel lugs as specified after the first 50 km of travel for the new machine or new wheel replacement.
- After running-in has been completed, have the crane chassis maintenance procedures performed at an authorized Sany service center.

4.4 Pre-start Checks

4.4.1 General

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

4.4.2 Manuals

Ensure that the Safety, Operation & Maintenance manual and the Load Charts manual are in operator's cab.

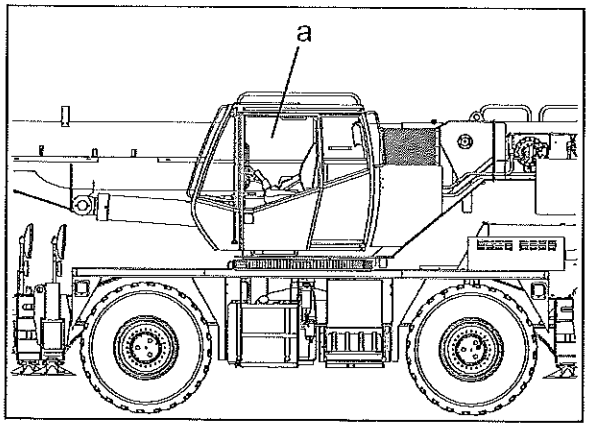


Fig 4-18 Operator's cab

⚠ CAUTION

Failure to observe and follow this caution could result in minor or moderate injury.
Perform this inspection and have needed issues resolved before operation.

4.4.3 Daily Maintenance Record

Check the maintenance section in this manual to verify that all required maintenance checks have been performed before operating the machine. If these checks and actions have not been performed, notify your supervisor.

Checking oils and fluids level and quality is an operator's daily duty.

- Engine oil, refer to "Check engine oil level and quality"
- Engine coolant, refer to "Check engine coolant level nd quality"
- Hydraulic oil, refer to "Check the hydraulic oil level and quality"
- Windshield washer fluid, refer to "Windshield washer fluid"
- Fuel water separator, refer to "Drain moisture from fuel water separator"
- Fuel, refer to "Check fuel level and quality"

4.4.4 Exterior

4.4.4.1 Mirrors

Adjust seat and mirrors for clear vision and safe driving.

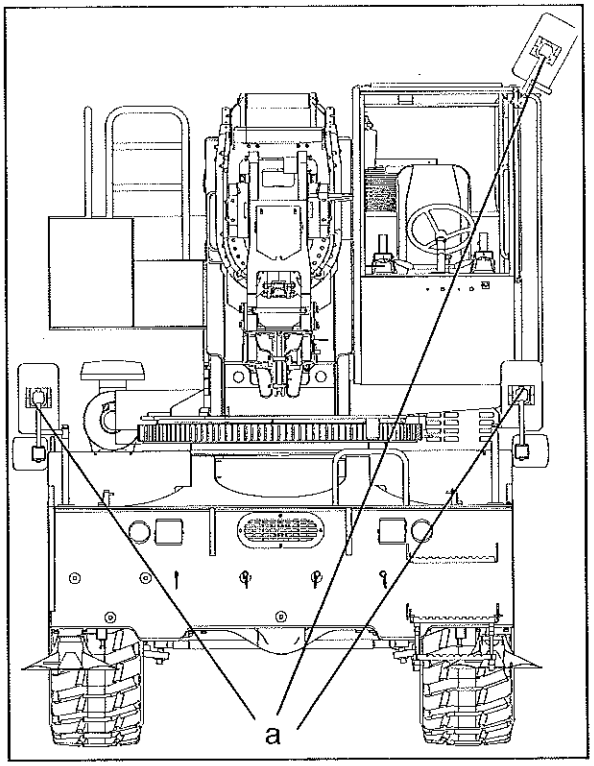


Fig 4-19 Mirrors

4.4.4.2 Power Disconnect

Turn the switch to ON to connect the batteries.

Turn the power disconnect switch to OFF to disconnect the batteries.

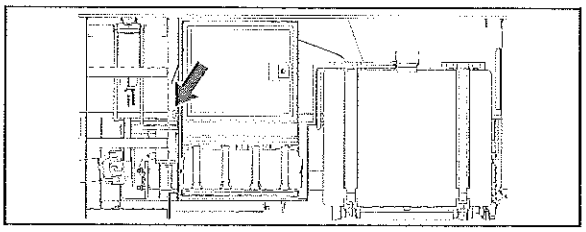


Fig 4-20 Battery disconnect switch

4.4.4.3 Fuel Supply

Check the fuel level and make sure the filler cap is tightened on the fuel tank.

If fuel level is low, refer to "Add fuel".

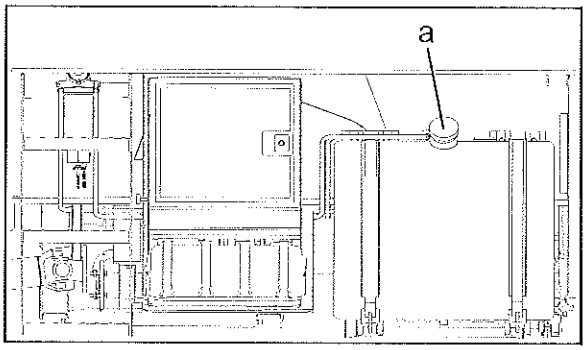


Fig 4-21 Filler cap

a. Filler cap

4.4.4.4 Cab and Deck Area

Clean thoroughly after each shift:

- Windows
- Mirrors

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

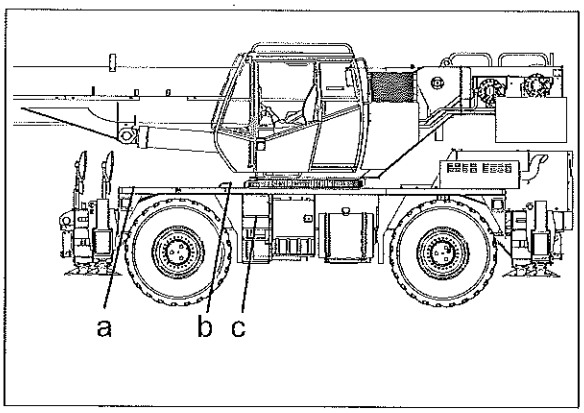


Fig 4-22

a. Decking
b. Handrails

c. Steps

- Ladders all around the crane.
- Decking all around the crane.

NOTE :

Clean all mud and debris from the steps and decking to help ensure safe entrance and exit from the cab.

- Handrails all around the crane.

NOTE :

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

4.4.5 Interior

4.4.5.1 Seat Belt

1. Check the seat belt by fastening it snuggly around your waist.

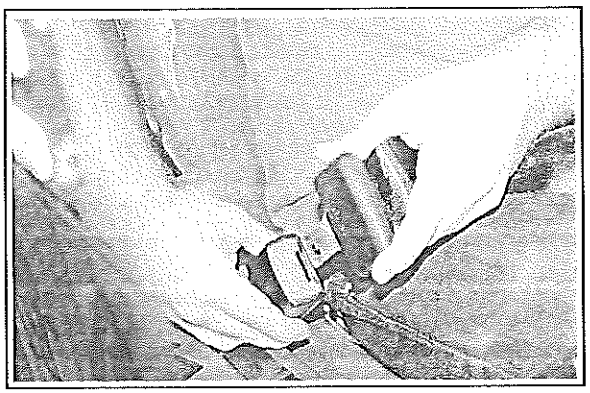


Fig 4-23

2. Ensure the latch plate and the buckle connect together and click.

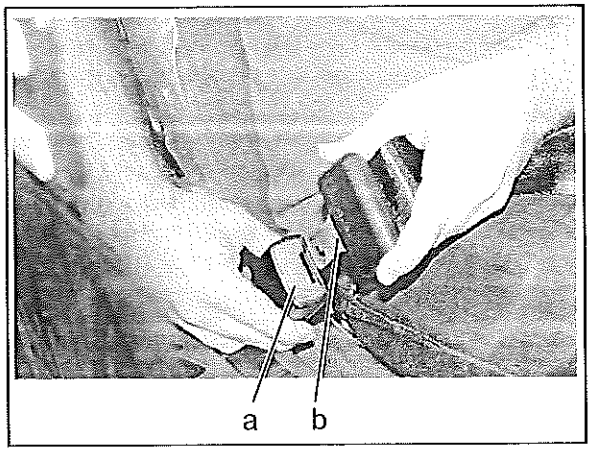


Fig 4-24

a. Latch plate
b. Buckle

3. Check that the belt fits securely and that there is no slack in the belt .

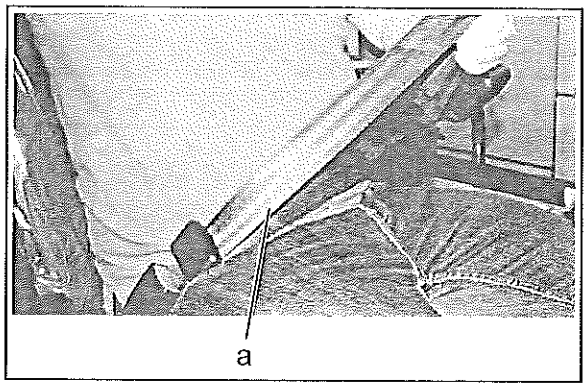


Fig 4-25 Belt

a. Belt

⚠ WARNING

Keep any belt slack to no more than 1 in. (25 mm). Belt slack beyond this amount could significantly reduce your protection in an accident. Failure to heed this warning could result in death or serious injury.

4. Ensure that the belt releases when the red button is pressed at the end of the buckle.

NOTE :

Seat belt assemblies are maintenance-free; however, they should be inspected every 500 hours to ensure that they are not damaged and are in proper operating condition, especially if they have been subjected to severe stress.

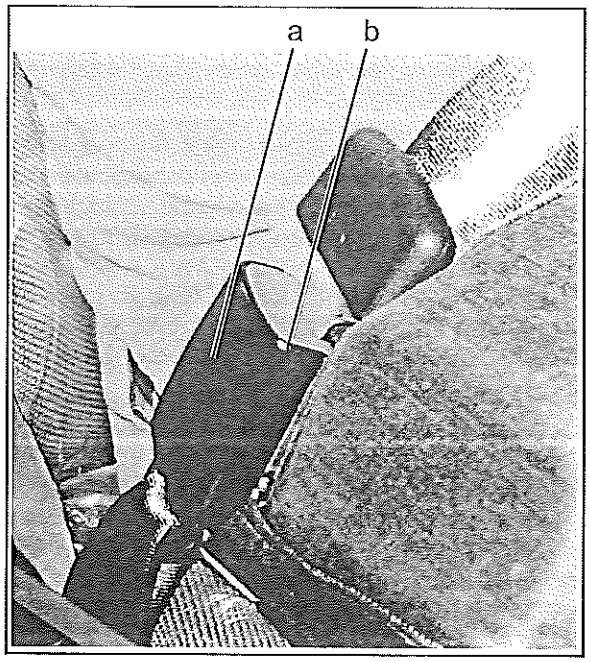


Fig 4-26

a. Buckle
b. Red button

⚠ WARNING

Contact your Sany dealer if the seat belt fails any of these checks or fails to fasten or unfasten. Failure to heed this warning could result in death or serious injury.

4.4.5.2 Signal, Running Lights and Warning Devices

With ignition key in the "On" position. Check all functions for proper operation.

Refer to "Operator's cab"

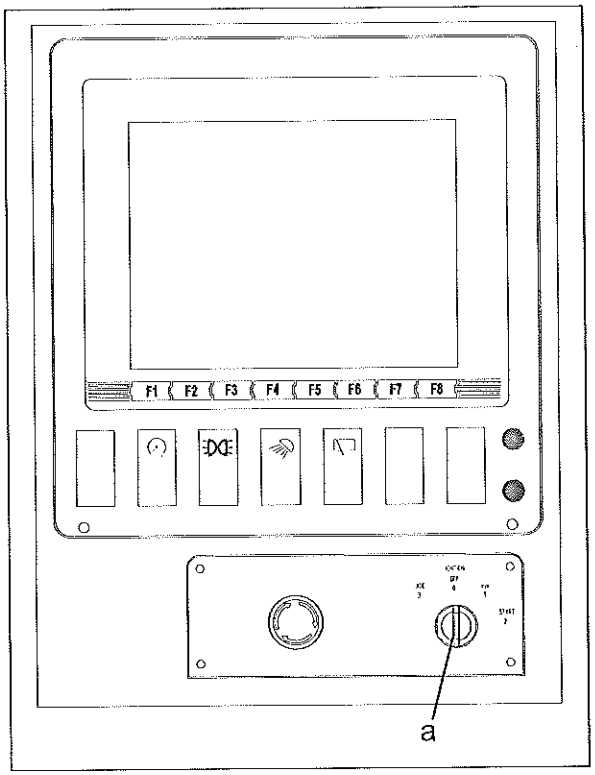


Fig 4-27 Ignition key in the "On" position

a. Ignition key

4.4.5.3 Foot and Parking Brakes

With ignition key in the "On" position. Check the foot and parking brakes for proper operation.

Refer to "Foot pedals"and "Left dashboard switches".

4.4.5.4 Joystick Controls

With ignition key in the "Off" position. Check the joystick controls for smooth operation.

Joystick should return to neutral freely. There should not be any excessive play in the joystick.

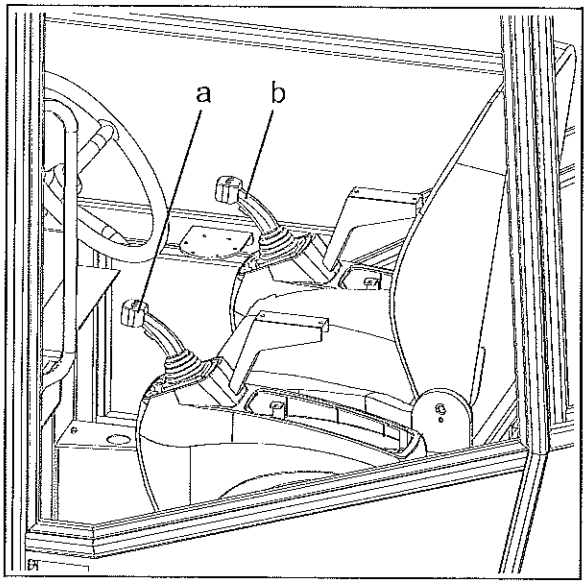


Fig 4-28 Joystick controls

a. Left joystick
b. Right joystick

4.4.5.5 Fire Extinguisher

Check that the fire extinguisher (a) is mounted on the stanchion on the right behind the operator seat in the cab.

NOTE :
Be sure the fire extinguisher is a minimum of a three pound "A, B, C" fire-rated extinguisher.

NOTE :
Refer to "Extinguisher and first aid kit"

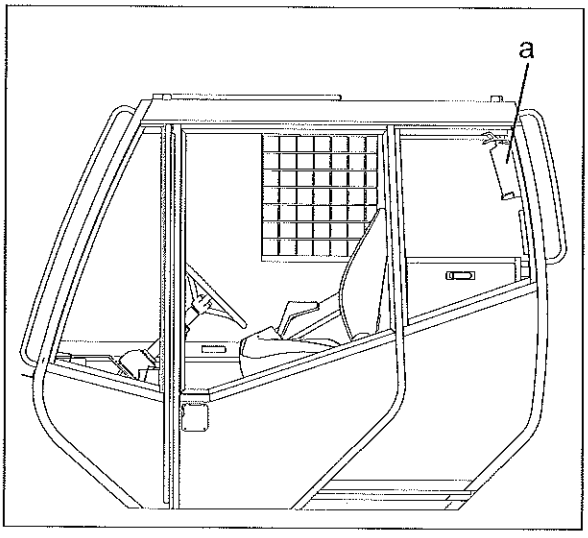


Fig 4-29 Fire extinguisher

a. Fire extinguisher

4.5 Engine Procedures

4.5.1 ENGINE PROCEDURES

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 going to start the machine.

Start-up and shut-down procedures for most diesel engines are generally the same. Therefore, use the following procedures except where specific differences are noted.

Refer to the engine manual for more details.

NOTE :

If the crane is inactive for over 24 hours and the batteries are disconnected, make sure to connect the batteries before proceeding with start-up procedure.

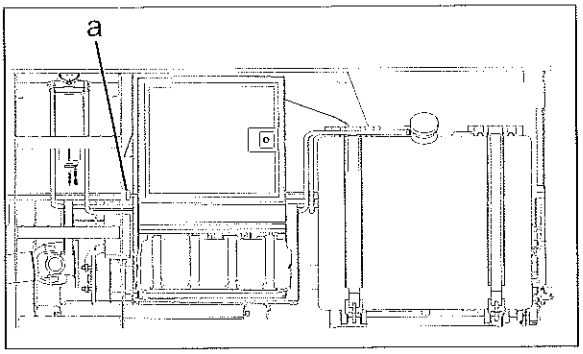


Fig 4-30 Battery disconnect switch

a. Battery disconnect switch

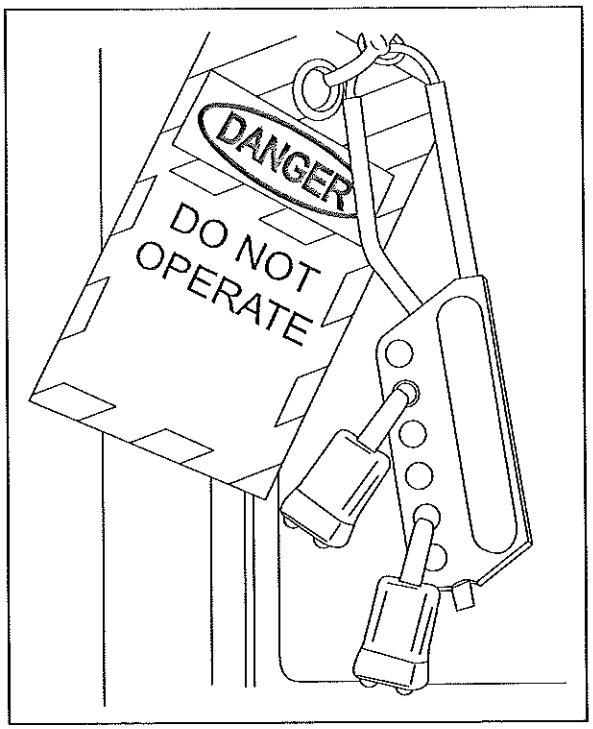


Fig 4-31 Do not operate

⚠ WARNING

Failure to follow this can cause damage to the machine, and could result in death or serious injury.

Never attempt to start the machine if it has been locked-out by maintenance personnel. If in doubt, contact the maintenance supervisor.

⚠ WARNING

Failure to heed this warning could result in death or serious injury.
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.

4.5.2 Cold-Weather Operation

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

NOTE: Refer to "Right dashboard switches" for details on using the ignition switch to preheat the engine for cold-weather starting.

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

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

Refer to "Engine oil viscosity/temperature data" and "Fuel".

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

Operation of machine at full-rated capacities in temperatures between -18° C and -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.

Cold weather operation requires additional cautions:

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

4.5.3 Engine Start Procedure

⚠ CAUTION

Failure to observe and follow this caution could result in minor or moderate injury.
Do not spray starting fluid into the air inlet. The spray will contact the heater elements and could explode.

⚠ WARNING

Failure to follow this warning could result in death or serious injury.
Do not attempt to start the engine if a lockout tag has been place on the machine control.

1. Ensure that the parking brake is engaged as well as red indicator illuminated.

NOTE :
The button switch has a unlocking button to prevent accidental activation.

NOTE :
The parking brake must be released before attempting to put the crane into a traveling gear. Refer to "Gear selection"

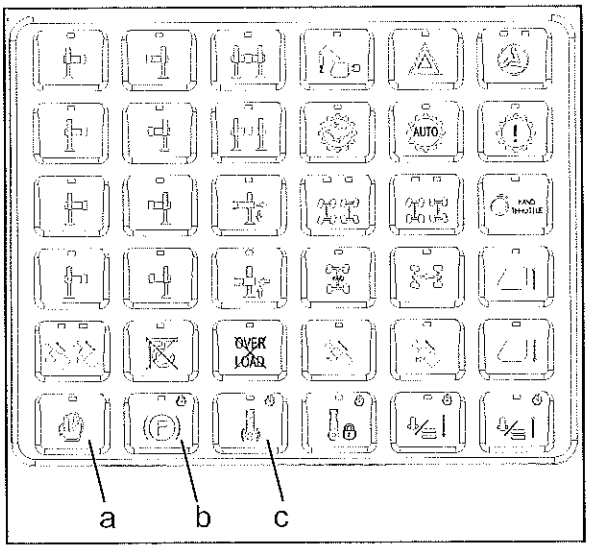


Fig 4-32

a. Unlocking button
b. Parking brake button
c. Swing brake button

2. Ensure that the transmission control is in the neutral position.

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

3. Ensure that the swing brake button switch is engaged.

NOTE :

The swing brake button switch has a unlocking button to prevent accidental activation.

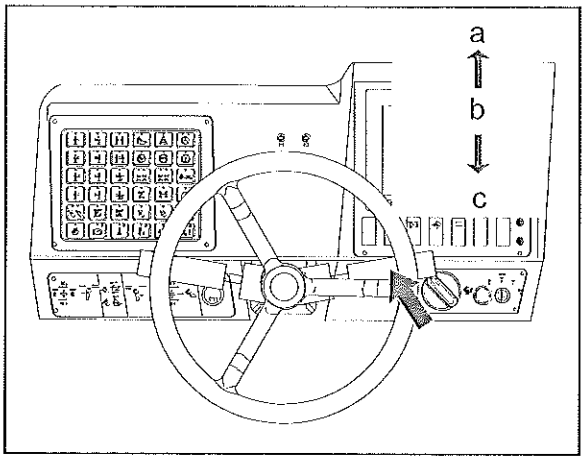


Fig 4-33 Transmission control

a. Forward

b. Neutral

c. Reverse

NOTICE

Failure to observe and follow this notice can cause damage to the machine or cause the machine to operate improperly.

Never crank the engine for more than 15 seconds. If the engine fails to start after 15 seconds, stop and allow the starter motor to cool for at least 10 seconds before attempting another start. If the engine fails to start after five attempts, contact your Sany dealer.

NOTICE

Failure to observe and follow this notice can cause damage to the machine or cause the machine to operate improperly.

If engine oil pressure and/or temperature indicator(s) do not display proper readings, shut down the engine and correct the malfunction before resuming operation.

4. Insert the key into the ignition switch and turn from off to on.

NOTE :
The "Wait to start" alarm will sound.

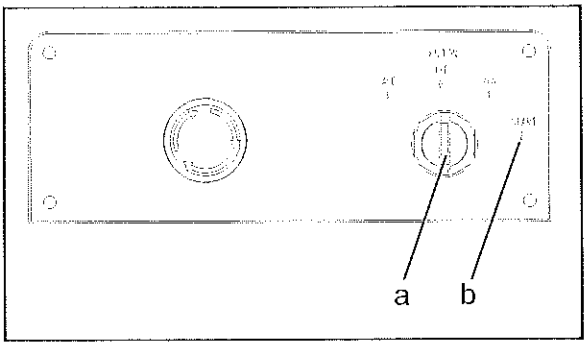


Fig 4-34

a. Ignition switch
b. Start position

5. Wait for the alarm to end.

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

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

NOTE :
If the engine fails to start after five attempts, contact your Sany dealer

7. Immediately check the engine instruments and monitor for proper indications after starting.

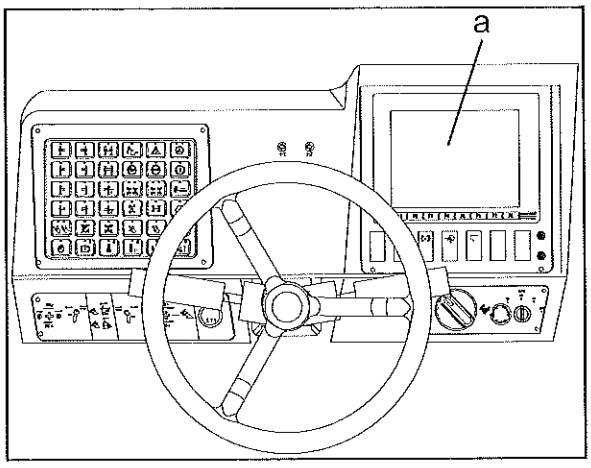


Fig 4-35 Monitor

a. Monitor

8. Shut down the engine if the oil pressure gauge does not reach the proper reading within 15 seconds.

NOTE :
Refer to "Load moment indicator (LMI) system"

4.5.4 Idle the Engine

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

NOTICE

Never race the engine during the warm-up period and never operate the engine beyond its design levels. Engine bearings, pistons, and valves may be damaged if these precautions are not taken. Failure to heed this notice can cause damage to the machine or cause the machine to operate improperly.

4.5.5 Engine Shutdown Procedure

NOTICE

Except for emergencies, never shut down the engine while it is running at high speed. Stopping the engine at high speed can cause damage to the machine or cause the machine to operate improperly.

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.

NOTICE

Failure to follow this notice can cause damage to the machine, personal property and/or the environment.

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

1. Park the machine on a flat, level, stable surface away from people, traffic or other machines.

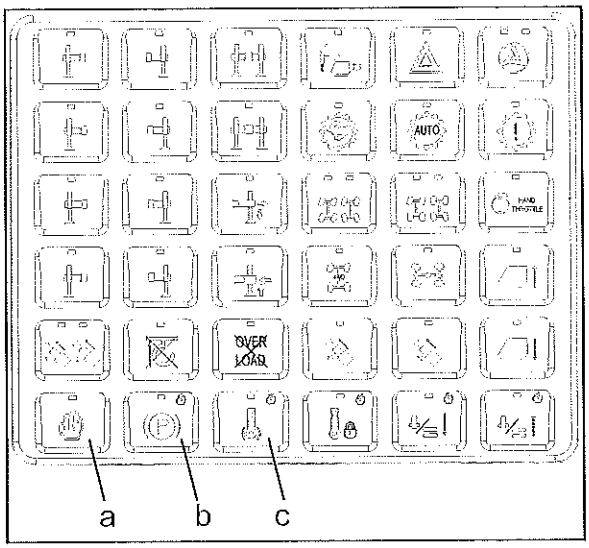


Fig 4-36

a. Unlocking button
b. Parking brake button
c. Swing brake button

2. Ensure that the parking brake is engaged as well as red indicator illuminated.

NOTE :
The button switch has a unlocking button to prevent accidental activation.

3. Remove all loads from the hooks.

4. Lower the boom.

5. Ensure that the swing brake button switch and swing locks are engaged.

NOTE :
The swing brake button switch has a unlocking button to prevent accidental activation.

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

7. Turn the ignition switch to OFF.

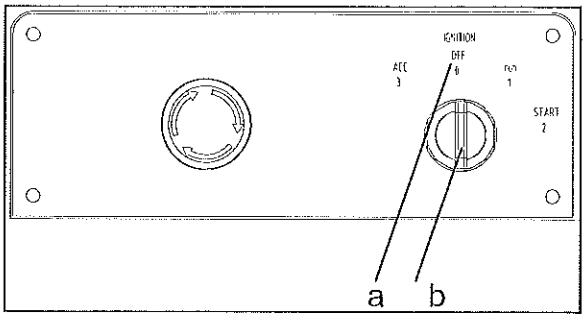


Fig 4-37

a. OFF position
b. Switch

8. If crane is not to be used for over 24 hours, disconnect the batteries by turning the power disconnect switch to OFF.

NOTE :
Wait for at least 2 minutes before disconnecting the batteries to avoid possible engine fault codes and undesirable operation.

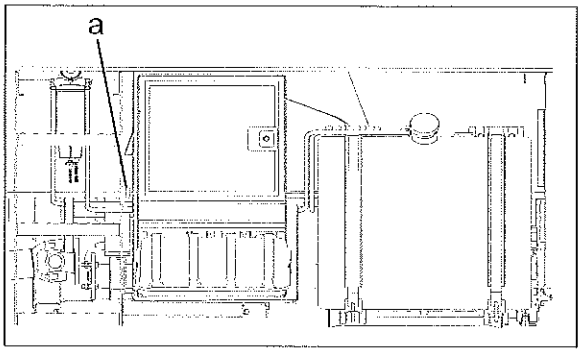


Fig 4-38 Battery disconnect switch

4.6 Crane Set-Up

4.6.1 Install Wire Rope onto a Hoist

NOTE :
Straighten the wire rope before installing it onto the hoist drum.
Refer to "Wire rope safety".

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

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

NOTE :
Figure is shown in the completed stage.

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

Insert the wire rope through the wire rope anchor slot and wrap it around the anchor wedge .

NOTE :

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

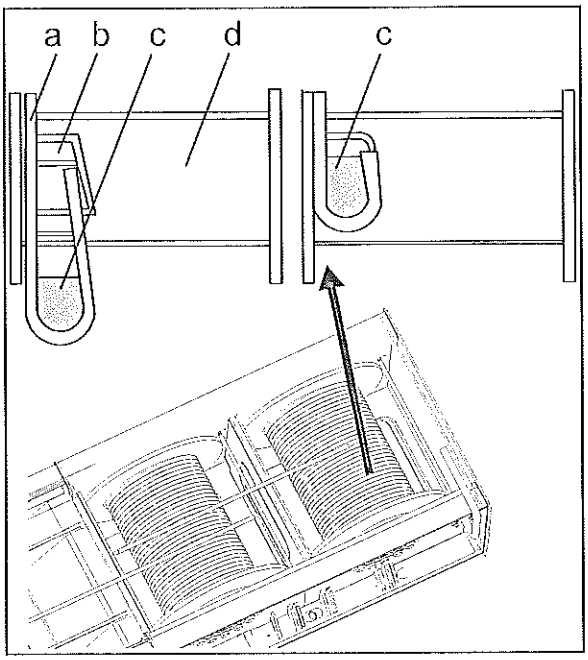


Fig 4-39 The hoist drum

a. Wire rope
b. Wire rope anchor slot

c. Anchor wedge

d. Hoist drum

3. Position the anchor wedge in the anchor slot, then pull firmly on the free end of the wire rope to secure the wedge in place.

Carefully tap the wedge with a mallet if the wedge does not seat securely in the slot. Slowly rotate the drum, ensuring the first layer of wire rope is evenly wound onto the drum.

4. Keep tension on the wire rope as it is wound onto the drum. Carefully read and heed the recommendations of the wire rope manufacturer. Failure to heed this caution could result in minor or moderate injury.

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

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

4.6.2 Reeve Wire Rope

4.6.2.1 Parts of Line

Select the number of parts of line that ensures the most efficient operation, consider the boom length, load weight, hoisting speed and other conditions such as wire rope capacity.

Refer to load chart for further information.

NOTE :

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

4.6.2.2 Reeving Procedure

⚠ WARNING

Non qualified personnel performing this function could result in major equipment damage, death or serious injury.
Only a qualified Sany technician, or a qualified rigger, should reeve this crane.

1. Place a piece of 4 m^2 rubber plate beneath the hook block to prevent the wire rope; then lower the boom to let the hook block fall onto the center of rubber plate.

NOTE :

Do not lower the hook block on the ground with the operation of hoist.

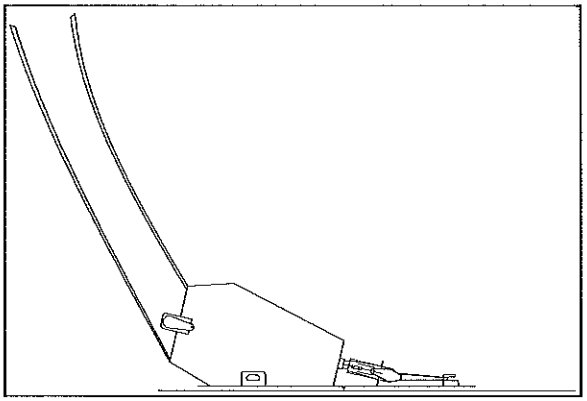


Fig 4-40 Let the hook block fall onto the center of rubber plate

2. Dismantle the rope socket:

A. Odd number parts of line: on the hook block.

B. Even number parts of line: on the boom head.

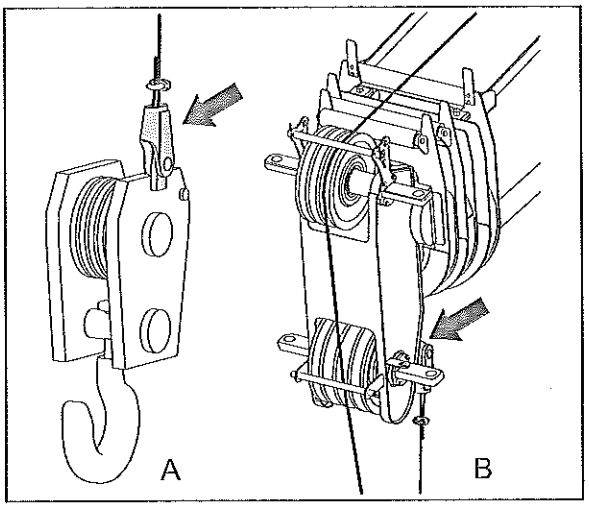


Fig 4-41 Rope socket

3. Separate the wire rope from the rope socket:

• Loosen and remove the clamps (c).

• Remove the additional short section of wire rope (d).

• Pull out the shorter end of wire rope (e) from rope socket (a).

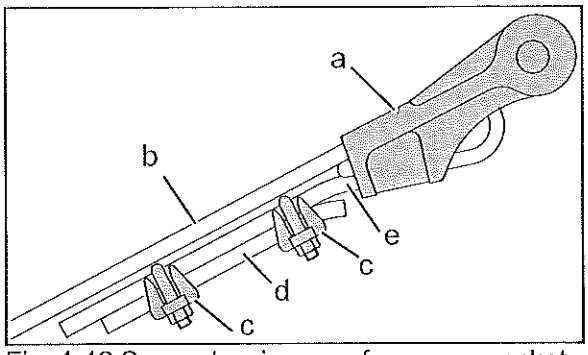


Fig 4-42 Separate wire rope from rope socket

a. Rope socket
b. Longer wire rope
c. Clamp
d. Additional wire rope
e. Shorter wire rope

Fig 4-43 Separate wire rope from rope socket

4. Pull out the wire rope from the anti-two block weight.

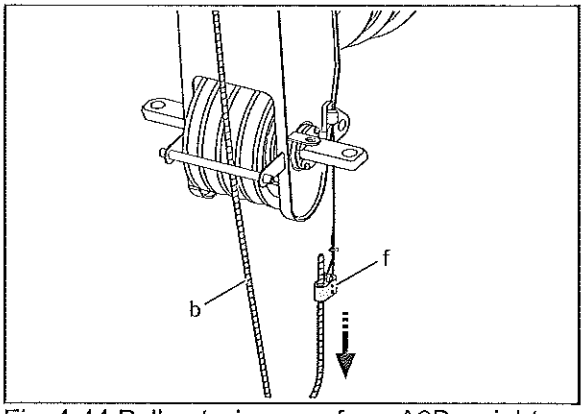


Fig 4-44 Pull out wire rope from A2B weight

b. Wire rope f. A2B weight

Fig 4-45 Pull out wire rope from A2B weight

5. Reeve the wire rope through the boom head sheave.

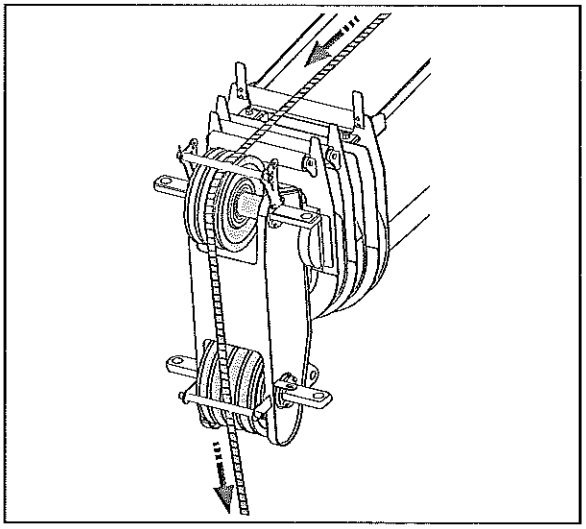


Fig 4-46 Reeve the wire rope through the boom head sheave

6. Reeve the wire rope through hook block as per appropriate parts of line.

The parts of line should ensure the most efficient operation, consider the boom length, load weight, hoisting speed and other conditions like wire rope capacity.

Refer to Lad Chart Manual for further information.

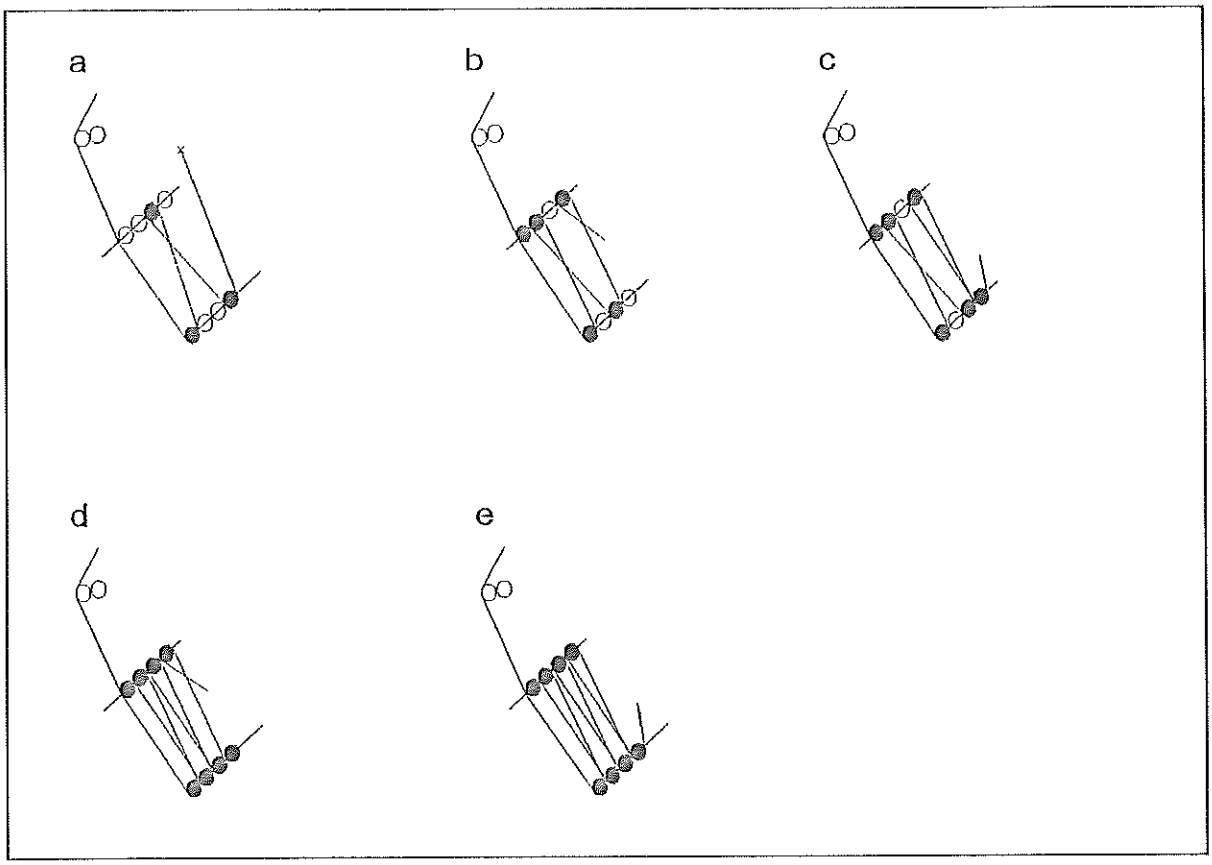


Fig 4-47 Parts of line

Parts of line for hook block with 6 sheaves

a	b	c	d	e
4 Parts of Line	5 Parts of Line	6 Parts of Line	7 Parts of Line	8 Parts of Line
4 Sheaves Lower Boom Nose	4 Sheaves Lower Boom Nose	4 Sheaves Lower Boom Nose	4 Sheaves Lower Boom Nose	4 Sheaves Lower Boom Nose
4 Sheaves Hook Block	4 Sheaves Hook Block	4 Sheaves Hook Block	4 Sheaves Hook Block	4 Sheaves Hook Block
Anchor to Boom	Anchor to Boom	Anchor to Hook	Anchor to Boom	Anchor to Hook

NOTE :

Due to the possibility of creating extreme fleet angles, care should be taken when reeving this arrangement. Raising the hook block close to the boom head may cause excessive wear on the sheave flanges.

NOTICE

Failure to do this could result in damage to the machine and personal property, or cause the machine to operate improperly.

Do not lower the hook block on the ground with the operation of hoist.

7. Reeve the wire rope through the anti-two block weight.

8. Mount rope socket and rope clamp onto the wire rope.

• Route wire rope (b) through socket (a).

• Pull the shorter end of wire rope (e) as per the picture.

• Put the additional short section of wire rope (d) together with shorter end of wire rope (e)

• Secure clamp (c) onto additional wire rope (d) with shorter wire rope (e).

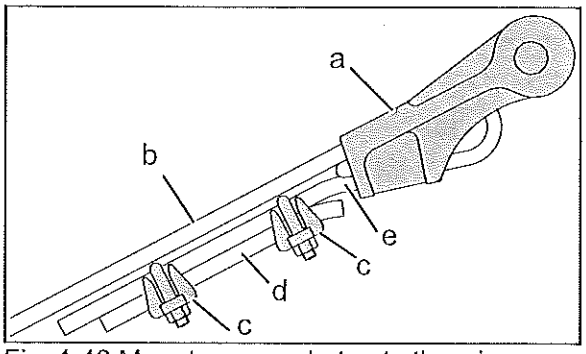


Fig 4-48 Mount rope socket onto the wire rope

a. Rope socket
b. Longer wire rope
c. Clamp
d. Additional wire rope
e. Shorter wire rope

Fig 4-49 Mount rope socket onto the wire rope

9. Attach the rope socket to the boom head or hook block.

10. Raise the boom to get the hook block be off the ground.

4.6.2.3 Anti-Two Block Installation

The cable length from anti-two block weight to the main boom head should be set so that the weight contacts the hook block when the hook block is 2.8m from the center of the lower boom head sheave. The cable length from the anti-two block weight to the swingaway boom extension head or auxiliary boom nose should be set so that the weight contacts the headache ball when the ball hook is 1.7m from the center of the sheave.

4.6.3 Set Up Outrigger

4.6.3.1 Outrigger Operation

⚠ WARNING

When operating the crane on outriggers, the outrigger beams may be fully extended and locked/pinned in position, or locked/pinned in the mid-extend position or fully retracted position. Always consult the appropriate load chart for the outrigger position being used before attempting any other operation.
Crane may be operated without the outriggers if done according to the Load Chart guidelines.
Failure to heed these warnings could result in a tipover situation with major equipment damage, death or serious injury.

4.6.3.2 Outrigger Cribbing Support

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

An example of a two-layer customer-supplied cribbing 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 "Permissible ground pressure"

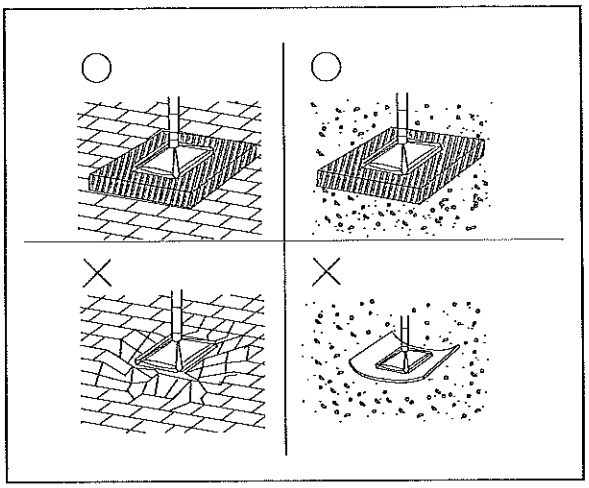


Fig 4-50 Ground surfaces

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

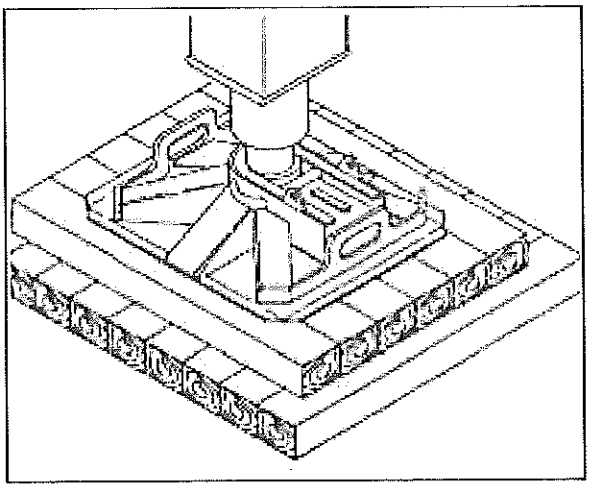


Fig 4-51 Two-layer customer-supplied cribbing

⚠ WARNING

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

4.6.3.3 Outrigger Placement

1. The minimum distance A from a slope:

Outrigger pressure ≤ 12t, A=1m;

Outrigger pressure > 12t, A=2m;

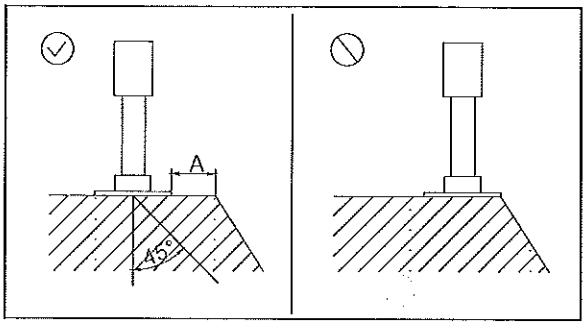


Fig 4-52 The minimum distance A from a slope

A. Minimum distance

2. Safe distance A from a scallop:

Loose and backfilling ground, A ≥ 2T (T is depth of pit);

Solid ground, A ≥ T (T is depth of pit)

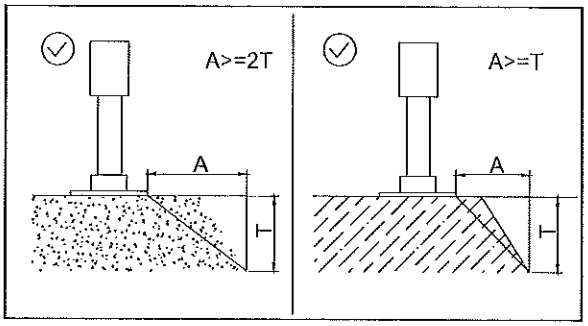


Fig 4-53 Safe distance A from a scallop

A. Safe distance
T. Depth of pit

3. No matter what the ground condition is, the supporting ground must be horizontal. If necessary, the user must make a horizontal supporting surface and make sure it is not supported on a cavity.

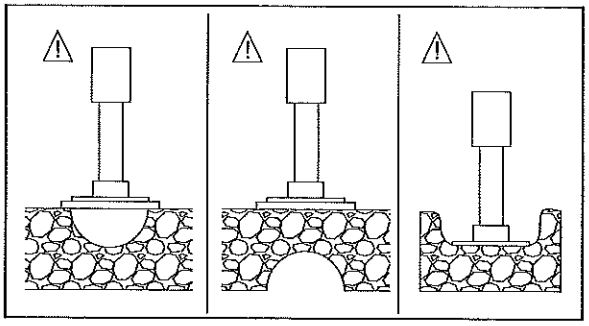


Fig 4-54 Make sure it is not supported on a cavity

4. The maximum gradient of the horizontal surface around crane should not exceed ±0.5%. The stability of the supporting ground should be checked during crane operation.

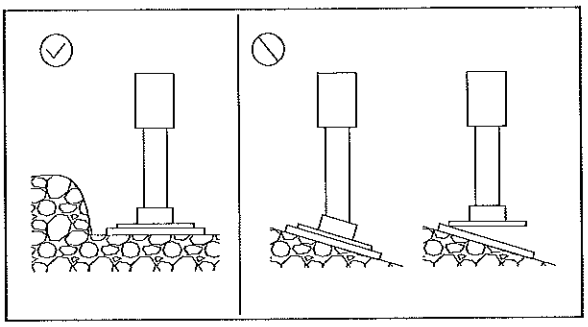


Fig 4-55 Maximum gradient of the horizontal surface

5. If any factor of reducing stability appears on the ground, the boom bracket must be retracted in time. Re-support it according to the requirements after the factors are eliminated. Main factors of reducing stability are:

- Rain, snow and other water sources that cause ground condition to change.
- Ground sinking at one side of the outriggers.
- Leakage of supporting cylinders.
- Not checking if there is a barrier or not before setting the outriggers.
- Not observing the bubble tube on the chassis when setting the outriggers to make sure the working crane has been adjusted horizontal. The swing support plane gradient exceed over ±0.5%.

4.6.4 Outrigger Operation

4.6.4.1 Outrigger Operation

⚠ WARNING

When operating the crane on outriggers, the outrigger beams may be fully extended and locked/pinned in position, or locked/pinned in the mid-extend position or fully retracted position. Always consult the appropriate load chart for the outrigger position being used before attempting any other operation.
Crane may be operated without the outriggers if done according to the Load Chart guidelines.
Failure to heed these warnings could result in a tipover situation with major equipment damage, death or serious injury.

4.6.4.2 Outrigger Floats

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

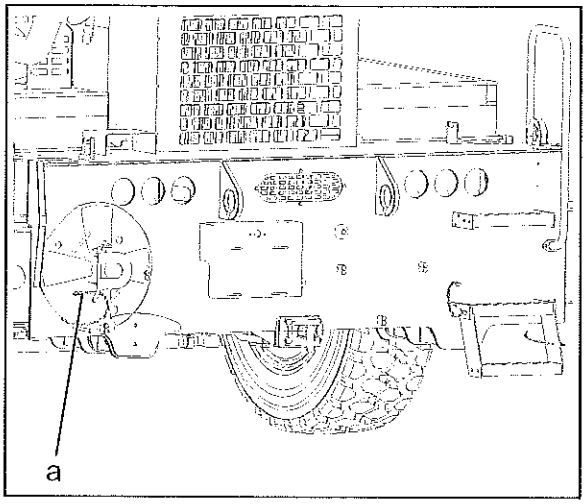


Fig 4-56 Outrigger float

a. Outrigger float

2. Position the outrigger pads on the end of the outrigger jacks and secure in place with the retaining clips.

3. Position cribbing where the outrigger jack cylinders will be located.

NOTE :

Before extending the outrigger beams and jacks read the following sections of this manual to ensure correct outrigger pad placements.

- "Outrigger general location"
- "Outrigger cribbing support"
- "Outrigger placement"

4.6.4.3 Extend Outrigger Beams

⚠ 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.
When operating the crane on outriggers, the outrigger beams may be fully extended and locked/pinned in position, or locked/pinned in the mid-extend position or fully retracted position. Always consult the appropriate load chart for the outrigger position being used before attempting any other operation.
Crane may be operated without the outriggers if done strictly in accordance with the Load Chart guidelines.
Failure to heed this warning could result in a tipover situation, which could result in death or serious injury or equipment damage.

1. Press and hold the appropriate button switch to select the desired outrigger beam to be extended:

NOTE :
Use button switch (f) to select all four outrigger beams.

NOTE :
Use button switches (a, b, c or d) to select individual outrigger beams.

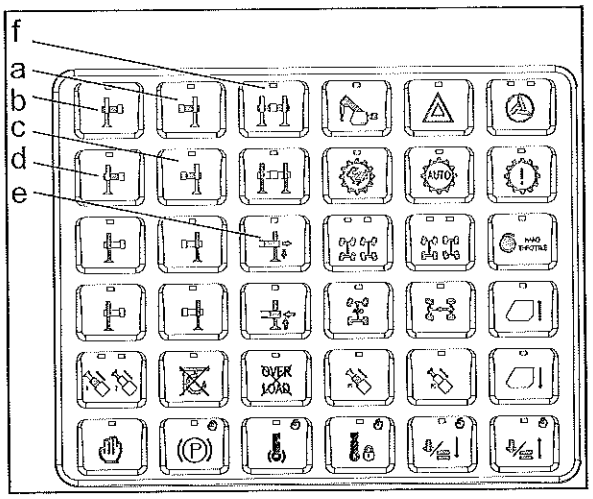


Fig 4-57 Extend outrigger beam

a. Right front outrigger beam selection
b. Left front outrigger beam selection
c. Right rear outrigger beam selection
d. Left rear outrigger beam selection
e. Extend beam/Jack
f. Simultaneous outrigger beam operation

2. Press and hold button switch (e) to begin outrigger beam extension.
3. Release the button switches when either of the following occur:

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

Refer to "Engage the mid-extend lock pin" if the outrigger beam will not be fully extended.

4.6.4.4 Extend Outrigger Jack

NOTE :
Perform this procedure after all four outrigger beams are properly extended.

1. Press and hold the appropriate button switch to select the desired outrigger jack to be extended:

NOTE :
Use button switch (f) to select all four jacking cylinders.

NOTE :
Use button switches (a, b, c or d) to select individual jacking cylinders.

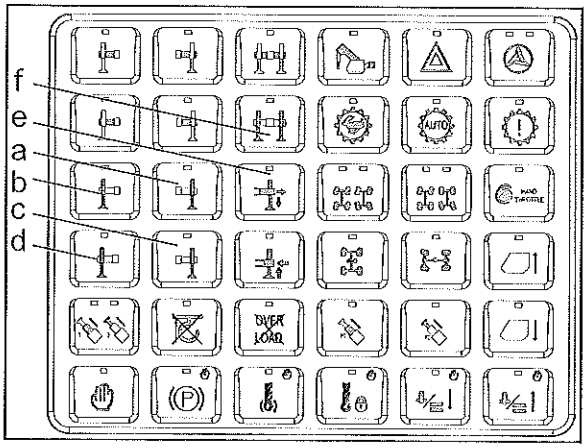


Fig 4-58 Extend outrigger jack

a. Right front outrigger jack selection
b. Left front outrigger jack selection

c. Right rear outrigger jack selection

d. Left rear outrigger jack selection

e. Extend beam/jack

f. Simultaneous outrigger jack operation

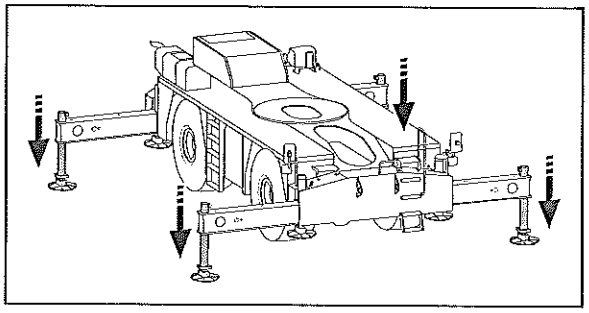


Fig 4-59 Raise the wheels off the ground

2. Press and hold button switch (e) to begin outrigger beam extension.

NOTE :
Ensure that any customer-supplied cribbing is centered under the outrigger jacks and their outrigger floats.

3. Release the switch when the outrigger floats are firmly seated on the cribbing.

4. To raise the wheels off the ground, press and hold button switch (a) and button switch (e) to extend the right front outrigger jack approximately 8~10 cm, then release the buttons.

5. Using button switch (b) and button switch (e), repeat step 4 to extend the left front outrigger jack the same distance.

6. Using button switch (c) and button switch (e), repeat step 4 to extend the right rear outrigger jack the same distance.

7. Using button switch (d) and button switch (e), repeat step 4 to extend the left rear outrigger jack the same distance.

8. Repeat the steps above to extend outrigger jacks at the same time until all four wheels are off ground.

9. Adjust the outrigger jacks to level the machine as indicated by the bubble level indicator.

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

4.6.4.5 Check/Adjust the Bubble Level Indicator

1. Adjust the outrigger jack to level the crane as indicated by the bubble level indicator.

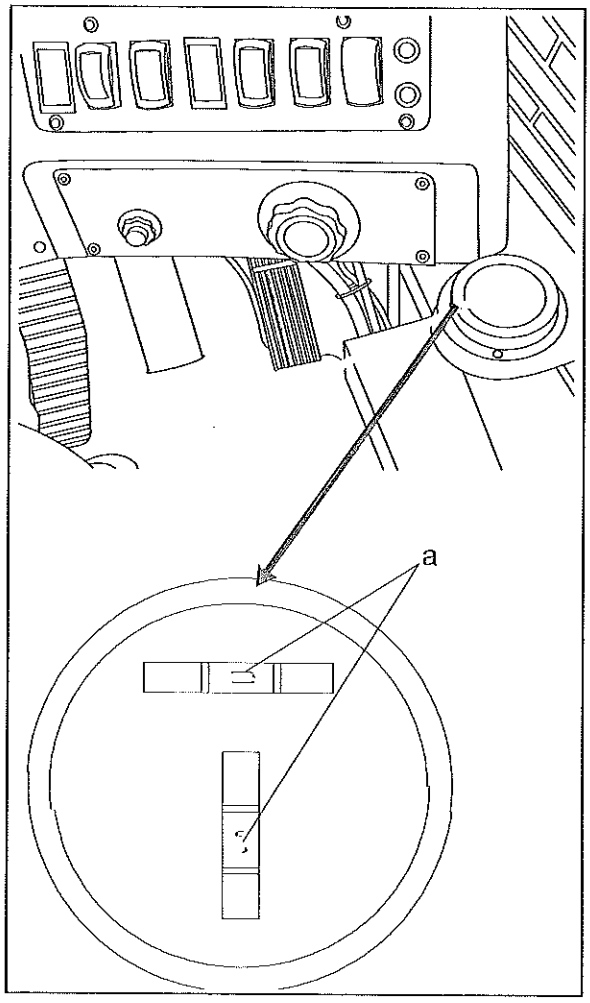


Fig 4-60 Bubble level indicator

a. Air bubble

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

3. Adjust the outrigger jack to level the crane in all directions as indicated by the carpenter level or similar device.

4. Adjust the bubble level indicator mounting screws to adjust the bubble level indicator to show "level".

4.6.4.6 Engage the Mid-extend Lock Pin

1. Locate the locking pin.

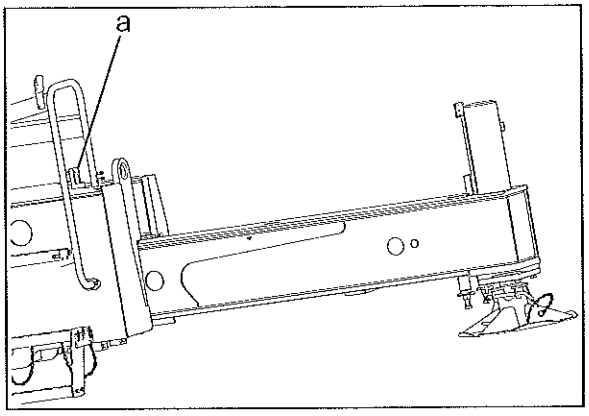


Fig 4-61 Outrigger lock pin

a. Outrigger lock pin

2. Turn the outrigger lock pin 90° from its stowed position and allow the pin rest on top of the outrigger beam.

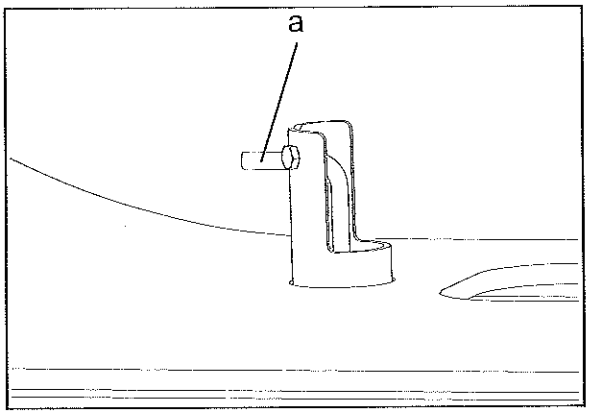


Fig 4-62 Stowed position

a. Outrigger lock pin

3. Extend or retract the outrigger beam slowly.

4. Allow the outrigger lock pin to drop into the hole on 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.

NOTE :
Refer to "Extend outrigger beam"

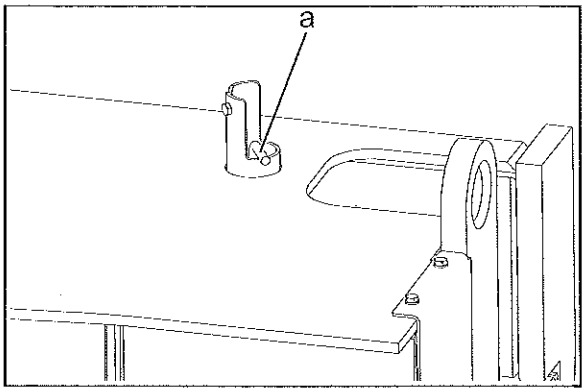


Fig 4-63 Allow the outrigger lock pin to drop into the hole

a. Outrigger lock pin

4.6.4.7 Stow the Outriggers

⚠ WARNING

Always ensure that the signal person is visible.
Do not perform this procedure until the swingaway boom extension has been stowed, and the boom has been retracted and in its travel position. Failure to heed this warning could result in a tipover situation with major equipment damage, death or serious injury.

1. To retract the outrigger jacks, press and hold the button switch (e) and button switch (k) to retract the right front outrigger jack approximately 8~10 cm, then release the buttons.

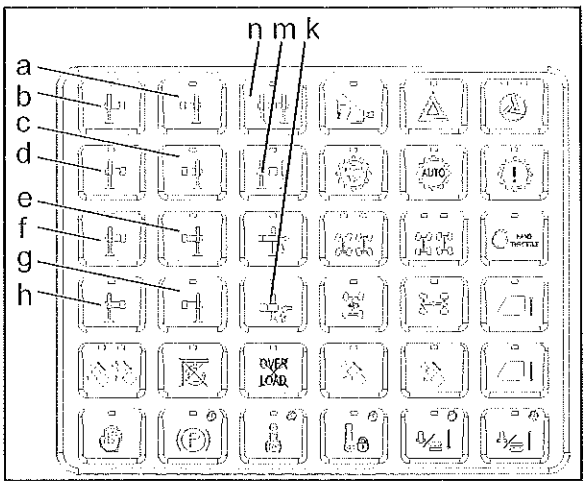


Fig 4-64 Stow the outrigger

a. Right front outrigger beam selection
b. Left front outrigger beam selection
c. Right rear outrigger beam selection
d. Left rear outrigger beam selection
e. Right front outrigger jack selection
f. Left front outrigger jack selection
g. Right rear outrigger jack selection
h. Left rear outrigger jack selection
n. Simultaneous outrigger beam operation
m. Simultaneous outrigger jack operation
k. Retract beam/jack.

2. Using button switch (f) and button switch (k), repeat step 1 to retract the left front outrigger jack the same distance.

3. Using button switch (g) and button switch (k), repeat step 1 to retract the right rear outrigger jack the same distance.

4. Using button switch (h) and button switch (k), repeat step 1 to retract the left rear outrigger jack the same distance.

5. Repeat the steps above until all four wheels of the machine are on the ground and the outrigger floats are several centimeters from the ground.

6. Press and hold the button switch (m) and button switch (k) until all four outrigger jacks are fully retracted.

7. Press and hold the appropriate button switch to select the desired outrigger beam to be retracted:

NOTE :

Before retracting the outriggers, perform "Stow the outrigger beam mid-extend lock pin" if outriggers are in the mid-extend position.

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

8. To retract the outrigger beams, press and hold button switch (k) until the outrigger beams are fully stowed, then release the buttons.

NOTE :

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

9. Remove the lock pins and retaining clips securing the outrigger floats to the outrigger jacks

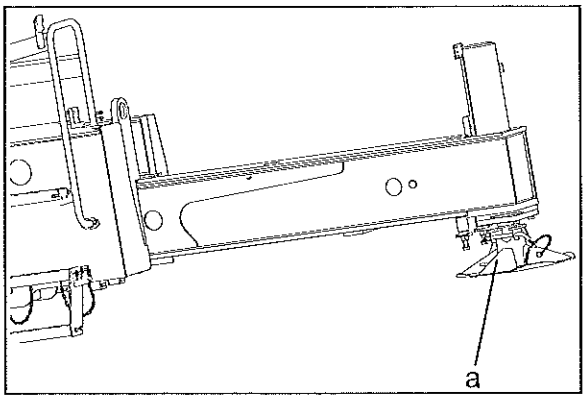


Fig 4-65 Remove the outrigger float

a. Outrigger float

10. Remove the outrigger floats from the outrigger jacks.

⚠ CAUTION

The outrigger pads are heavy. Use caution when handling them. Failure to heed this caution could result in minor or moderate injury.

11. Stow the outrigger floats in their front and rear stowed positions securing them with clips.

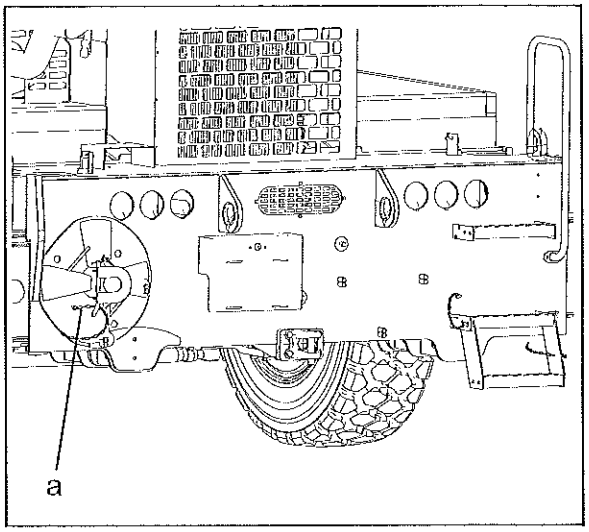


Fig 4-66 Stow the outrigger floats

a. Outrigger float

4.6.4.8 Stow the Outrigger Beam Mid-extend Lock Pin

1. Locate and lift the outrigger lock pins.

NOTE :

If any of the lock pins 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.

NOTE :

Refer to "Extend outrigger beams"

.

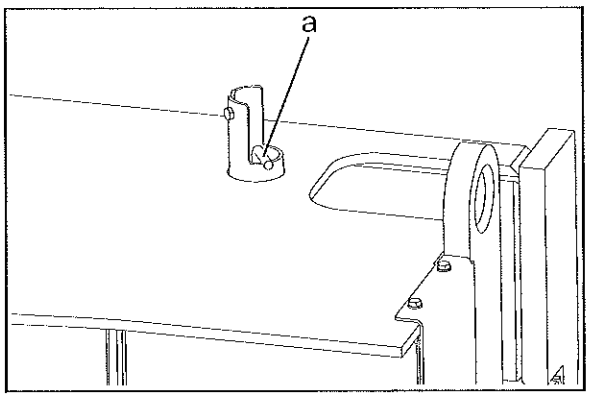


Fig 4-67 Lift the outrigger lock pin

a. Outrigger lock pin

2. Turn outrigger lock pin 90° to its stowed position.

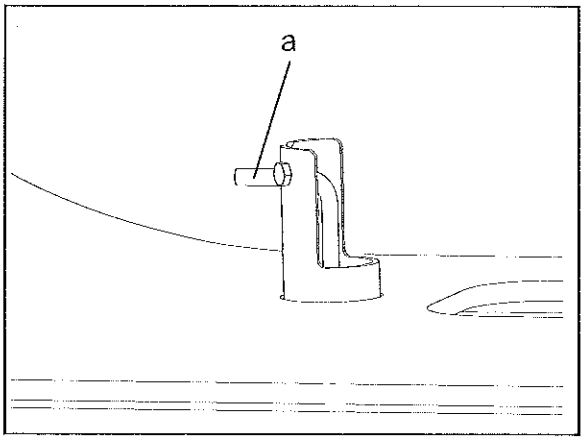


Fig 4-68 Stowed position

a. Outrigger lock pin

4.6.5 Erect and Stow the Swingaway Boom Extension

4.6.5.1 General Warnings

⚠ WARNING

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 the swingaway boom extension during the erecting and stowing procedures using a tag line.

Failure to heed these warnings could result in death or serious injury or equipment damage.

4.6.5.2 Erect the Swingaway Boom Extension

1. Start the engine.

2. Fully extend and set the outriggers.

Refer to "Outrigger operation" .

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.

Refer to "Boom operation".

NOTE :

The auxiliary boom nose may remain installed. However, if reeved, the hoist wire rope must be removed from the sheave.

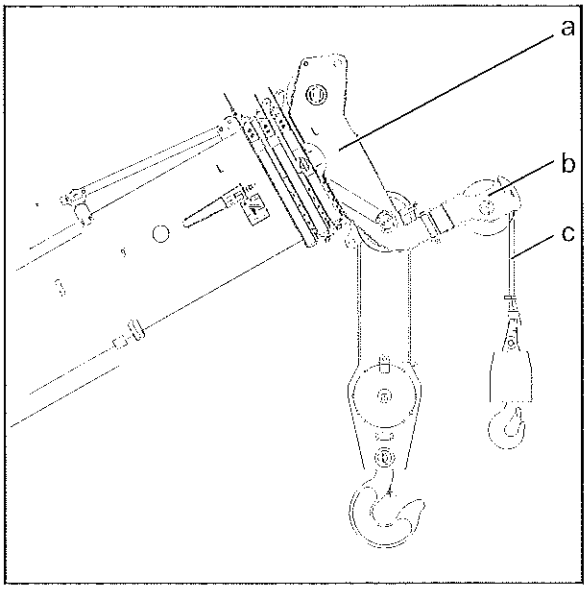


Fig 4-69

a. Main boom head
b. Auxiliary boom nose

c. Wire rope

⚠ WARNING

Non-qualified personnel performing this function could result in major equipment damage, death or serious injury.
Only a qualified Sany technician, or a qualified rigger, should operate the swingaway boom extension.

⚠ WARNING

Failure to observe and follow these warnings could result in death or serious injury or equipment damage.
Always wear personal protective equipment, including a hard hat, eye protection, gloves and work shoes as required.

⚠ WARNING

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

4. Position the boom so that there is clearance in the front and sides of boom to complete the swingaway boom extension erecting operation.

Refer to "Boom operation".

5. 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.

6. Ensure that the boom section alignment plates are each fully engaged

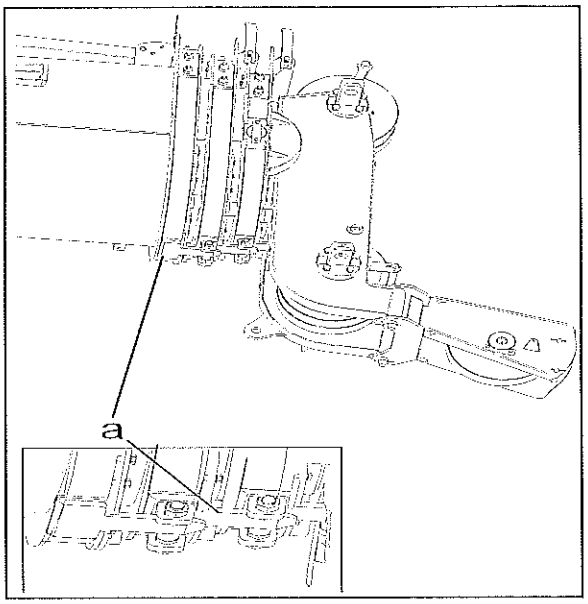


Fig 4-70 Ensure that the boom section alignment plates are each fully engaged

a. Boom section alignment plate

NOTICE

Ensure that the boom section alignment plates are fully engaged. Failure to ensure that all plates are engaged could cause damage to the boom.

7. Attach a tag line to the tip of the swing-away boom extension to control its movement.

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

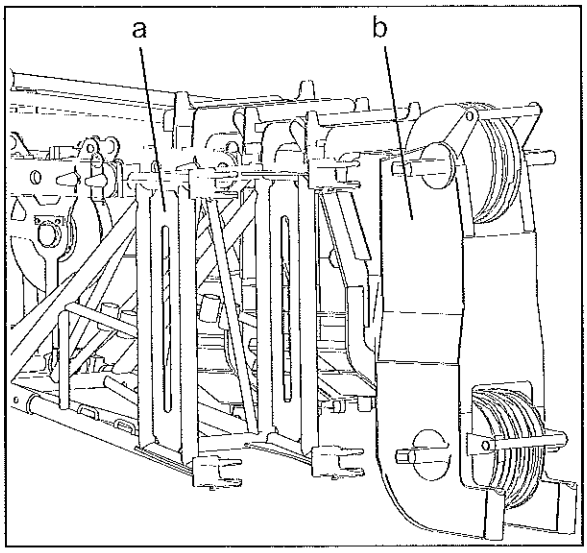


Fig 4-71 Be sure to secure the swingaway boom extension before proceeding

a. Swingaway boom extension
b. Main boom

⚠ CAUTION

• Always secure the swingaway boom extension with a tag line (rope) on the main boom before removing any connections.
• Always maintain control of the swingaway boom extension with the tag line (rope). This will prevent the swingaway boom extension from swinging around which could result in minor or moderate injury.

8. Direct a helper hold the tag line (rope) taught while the connections are removed.

NOTE :

If no helper is available, secure the tag line (rope) on the crane (for example, on the steps of the access ladder or on 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.

9. Swing the mid-position ramp into "out" position, and pin it in place.

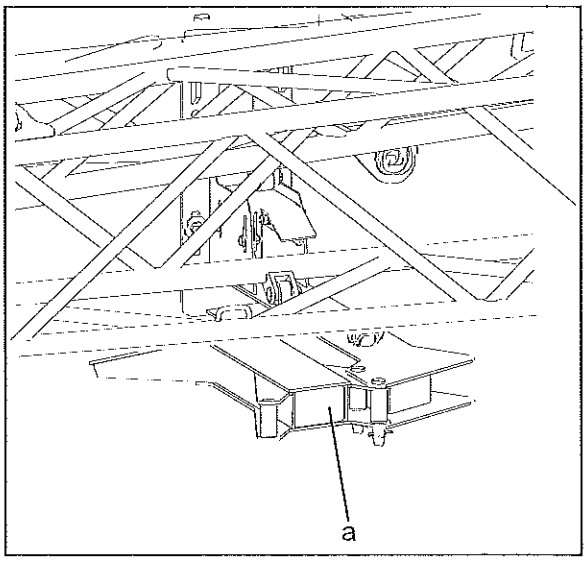


Fig 4-72 Mid-position ramp

a. Mid-position ramp

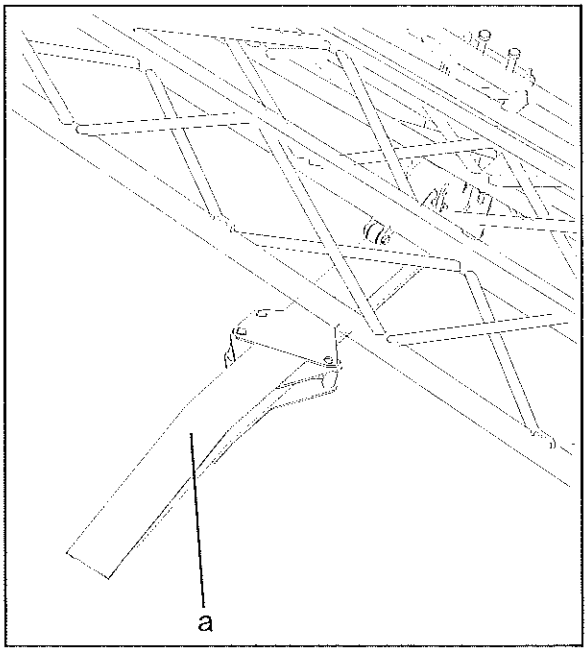


Fig 4-73 Swing the mid-position ramp into "out" position

a. Mid-position ramp

⚠ 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 lug when removing the pins.

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

⚠ WARNING

Failure to observe and follow this warning could result in death or serious injury

Ensure that all personnel and equipment are kept clear of the swing path.

10. Remove the pins, unlocking the swing-away boom extension from the rear stowage lug, as well as the stowage bracket of mid-position ramp.

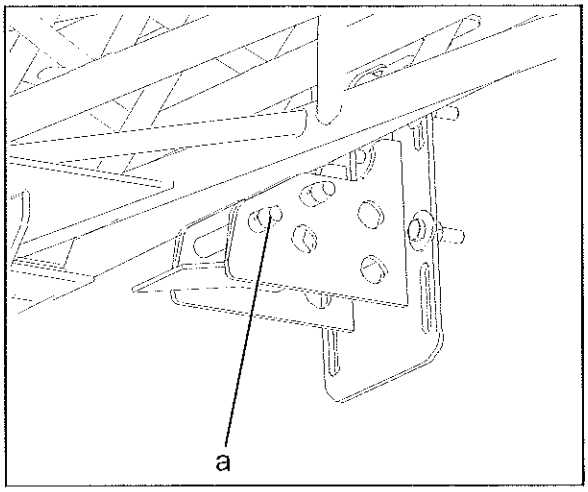


Fig 4-74 Remove the pins from the rear stowage lug

a. Pin

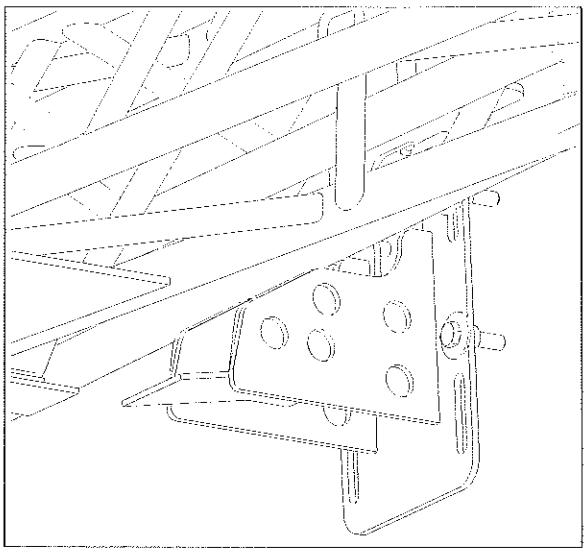


Fig 4-75 Rear stowage lug without pins

11. Pull the tag line attached to the tip of the swingaway boom extension and pivot the swingaway boom extension at the front stowage lug.

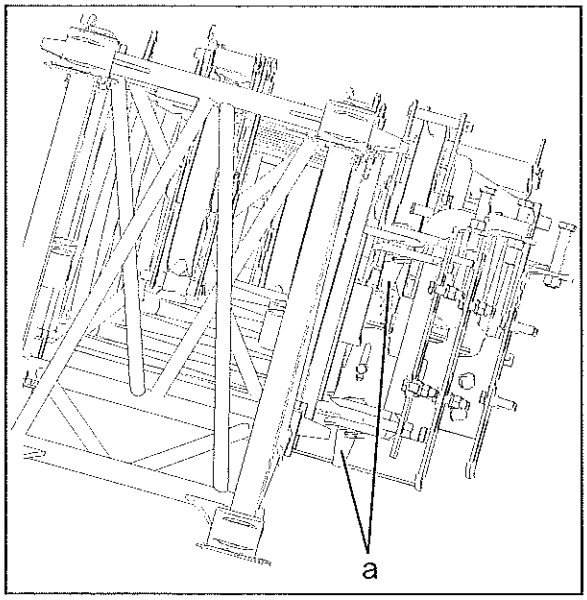


Fig 4-76 Front stowage lug

a. Front stowage lug

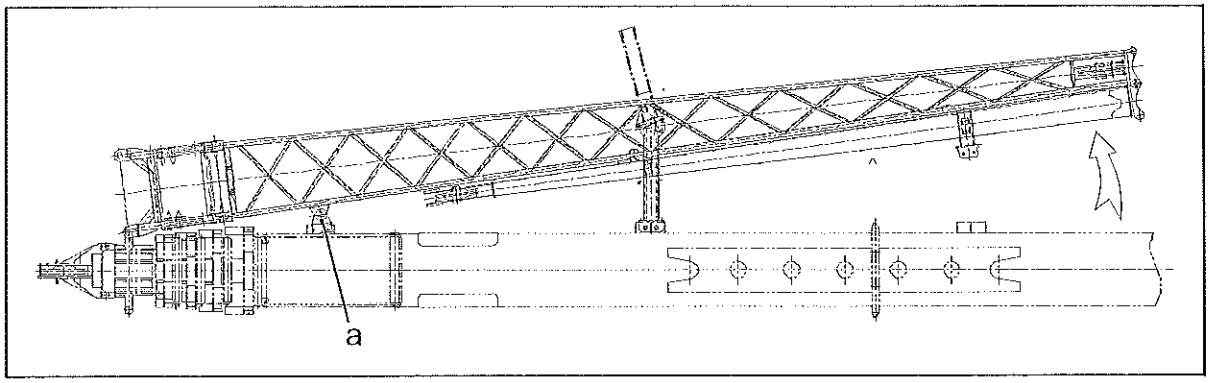


Fig 4-77 Pull the tag line and pivot the swingaway boom extension at the front stowage lug

a. Front stowage lug

NOTE :

Slightly raise and/or lower the boom to help control the swingaway boom extension as necessary. The swingaway boom extension will pull dislodge from the rear stowage lug.

12. Remove the right side attachment pins from the swingaway boom extension

13. Align the attachment fittings with the anchor fittings on the right side of the boom head.

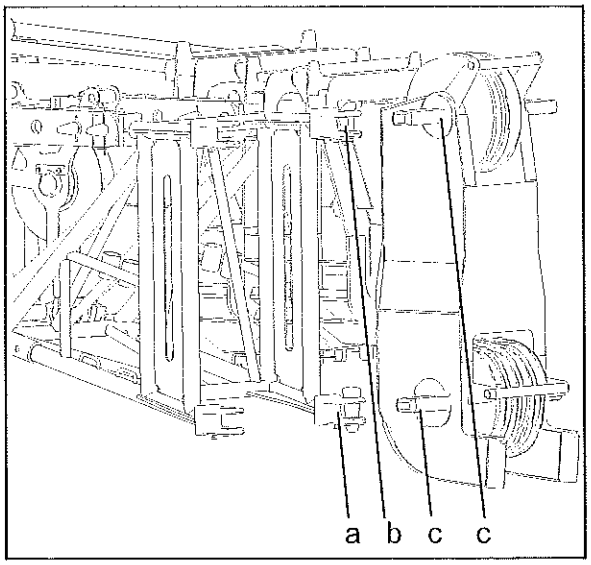


Fig 4-78

a. Attachment fittings

b. Pins

c. Anchor fittings

⚠ WARNING

Failure to observe and follow this warning could result in failure of the swingaway boom extension, death or serious injury.

Do not modify the attachment points to permit the installation of the attachment pins.

14. Install the top right side attachment pin and retainer clip into the upper anchor and attachment fitting at the boom head.

15. Install the bottom right side attachment pin and retainer clip into the lower anchor and attachment fitting at the boom head.

16. Remove the pins and disconnect the swingaway boom extension at the front stowage lug

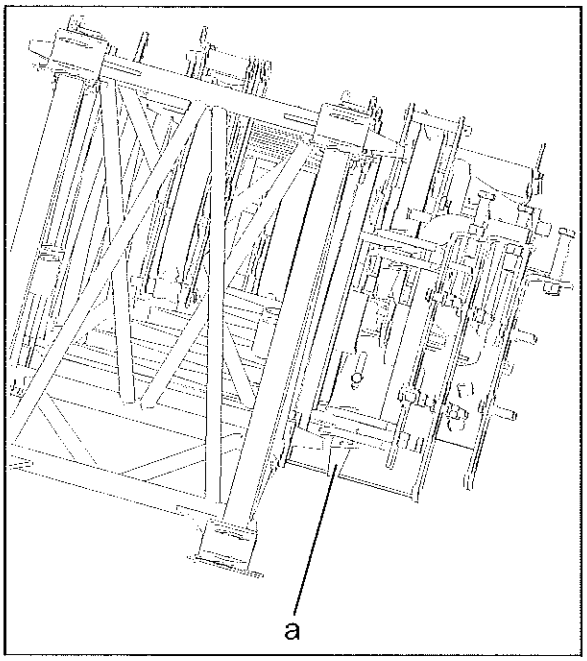


Fig 4-79 Disconnect the swingaway boom extension at the front stowage lug

a. Pin

17. Continue pulling the tag line and pivot the swingaway boom extension at the right side attachment pins.

Swing the swingaway boom extension to front of the boom head, aligning the top left attachment fitting with the top left anchor point.

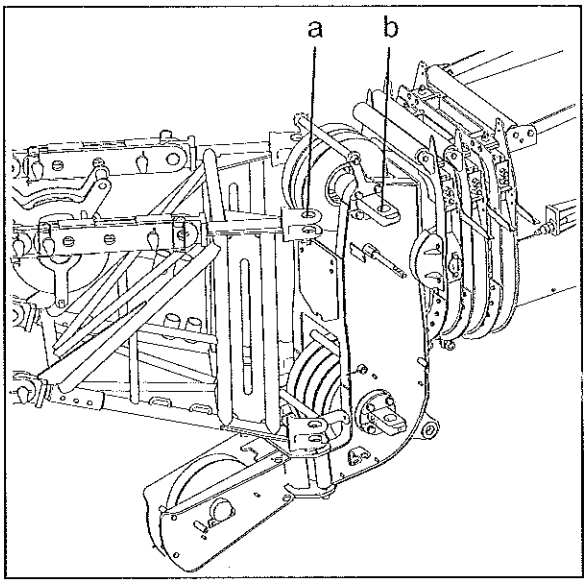


Fig 4-80 Align the top left attachment fitting

a. Top left attachment fitting
b. Top left anchor point

18. Extend boom head about 50 mm.

Refer to "Extend the main boom".

19. Install the top left side attachment pin and retainer clip into the top left anchor and attachment fitting of the boom head.

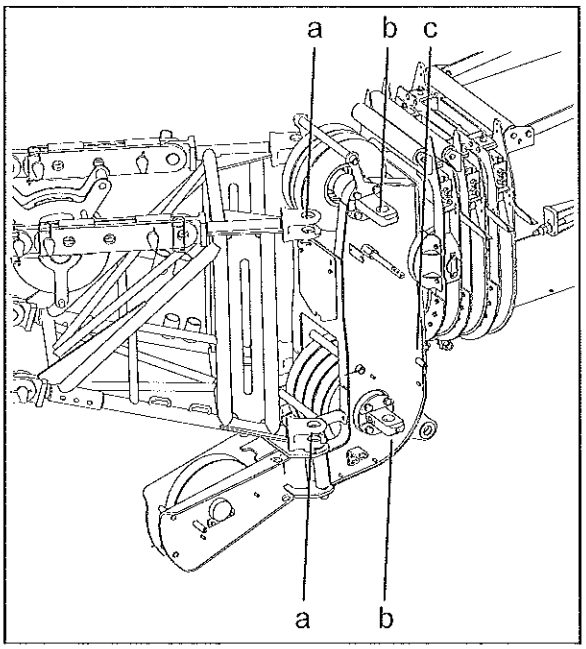


Fig 4-81

a. Attachment fitting
b. Alignment bolt

c. Location of anchor fittings

20. Fully retract the boom head.

21. Engage the attachment fittings with the anchor fittings on the bottom left side of the boom head and install the pin and clip.

NOTE :

With the alignment bolt adjusted correctly the bottom pin will slip into place.

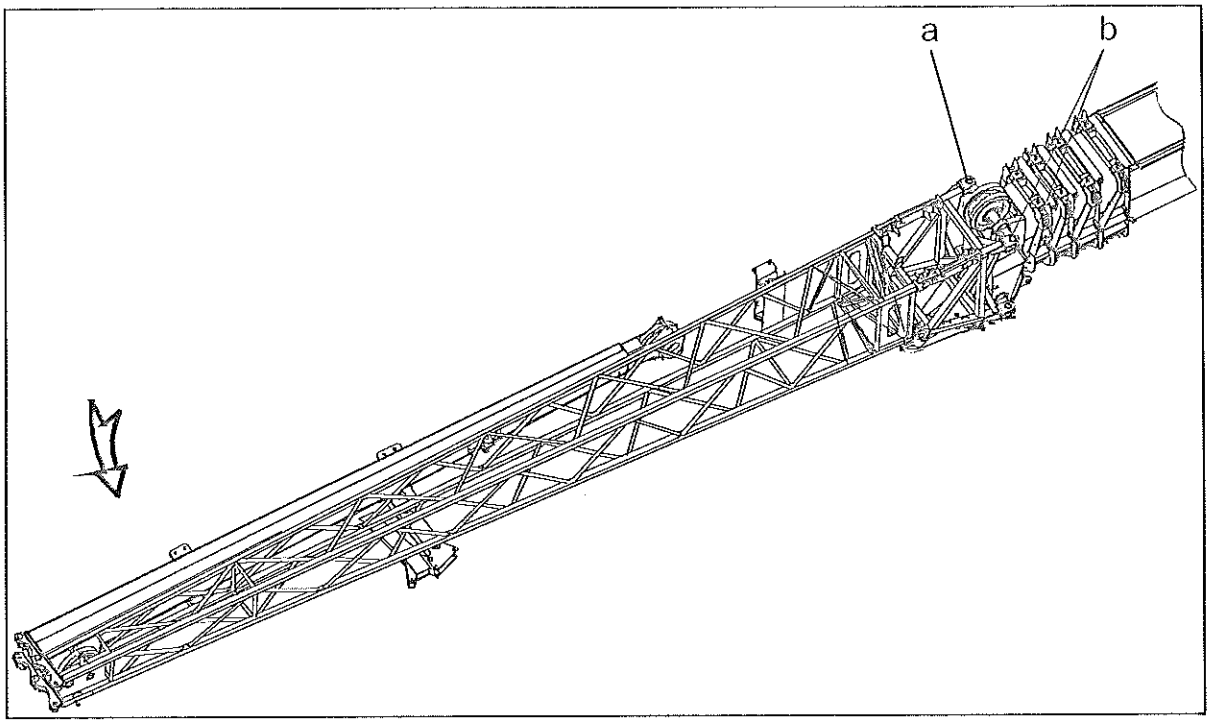


Fig 4-82 Install the left side attachment pins

a. Right side attachment pins

b. Left side attachment pins

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

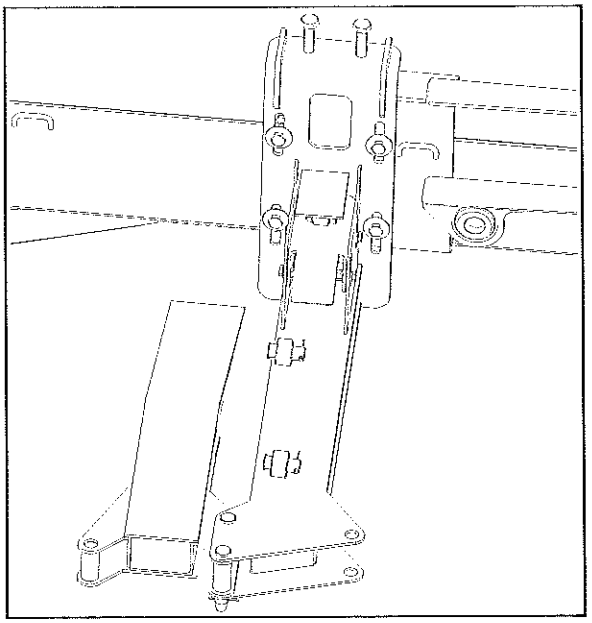


Fig 4-83 Swing the mid-position ramp into the stowed position

⚠ WARNING

Pay particular attention to the load limits as noted in the load charts while using the boom extension.
Failure to heed this warning could result in failure of the swingaway boom extension, death or serious injury.

Fly Section

23. Secure the fly section with a tag line (rope) before disconnecting the fly section from the swing-away boom extension.

⚠ WARNING

Before performing the next step, Ensure that the tag line can control the fly section from swinging outward.
Failure to observe and follow this warning could result in death or serious injury.

24. Disconnect fly section from stowage bracket on the swingaway boom extension.

25. Continue pulling the tag line and pivot the fly section at the right side attachment pins.

Swing the fly section to front of the head of swingaway boom extension, aligning the top attachment fitting with the top left anchor points.

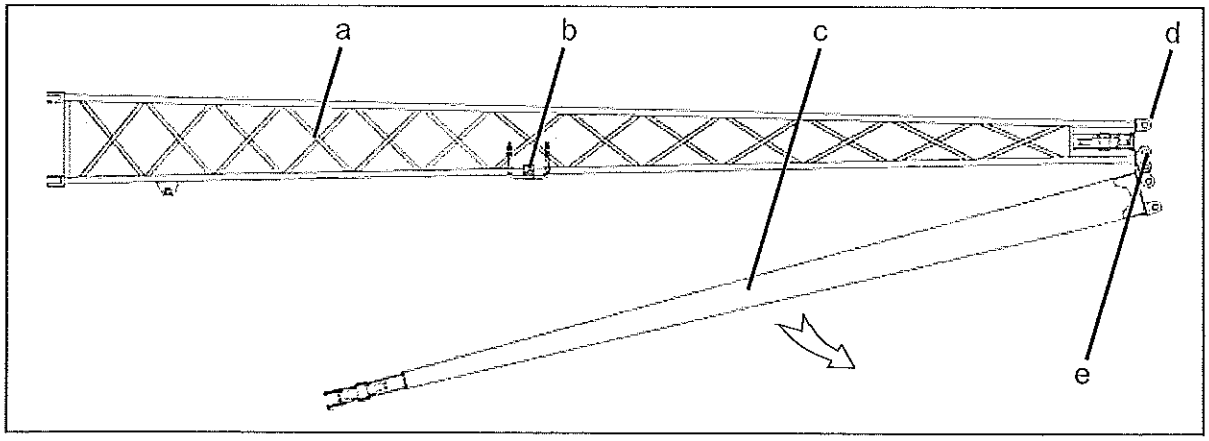


Fig 4-84 Pull the tag line and pivot the fly section at the right side attachment pins

a. Swingaway boom extension
b. Stowage bracket
c. Fly section
d. Left side attachment pins
e. Right side attachment pins

⚠ WARNING

Ensure that all personnel and equipment are kept clear of the swing path.
Failure to observe and follow this warning could result in death or serious injury.

26. Fasten fly section to the swingaway boom extension with the left side attachment pins.

27. On the LMI, select the proper "Boom" configuration.

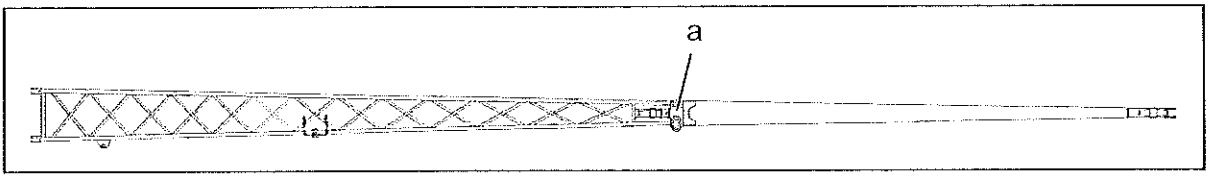


Fig 4-85 Fasten fly section to the swingaway boom extension

a. Fly section

4.6.5.3 Rig Swingaway Boom Extension

Only the auxiliary hoist should be used for lifting on the swingaway boom extension.

NOTE :

The wire rope must be released from the tie bar on upper boom head sheaves.

NOTE :

The wire rope must be routed over the guide sheave that is on the top of adapter piece of boom extension, and secured with tie bar.

⚠ WARNING

Always wear personal protective equipment, including a hard hat, eye protection, gloves and work shoes as required. Failure to observe and follow these warnings could result in death or serious injury or equipment damage.

1. Lower the boom to its zero degrees elevation.

2. Remove the lower mounting pin on the guide sheave bracket.

3. Rotate the guide sheave bracket over the sheave base plate, to make the guide sheave move from stowed position to erect position.

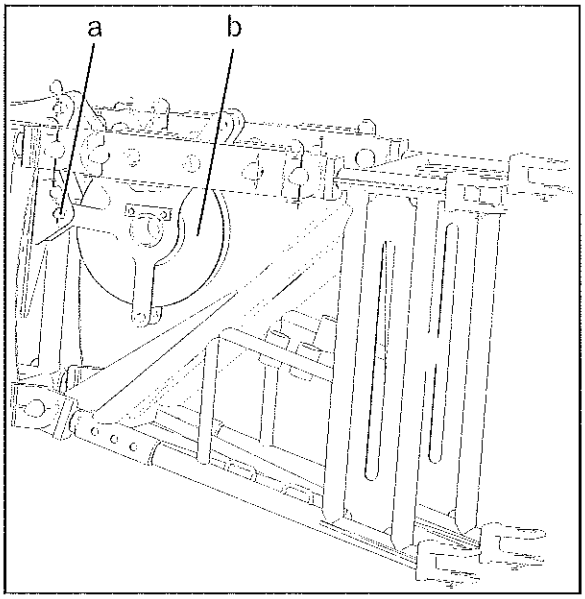


Fig 4-86 Stowed position of guide sheave

a. Lower mounting pin
b. Guide sheave

4. Install the upper mouting pin securing the guide sheave in erect position

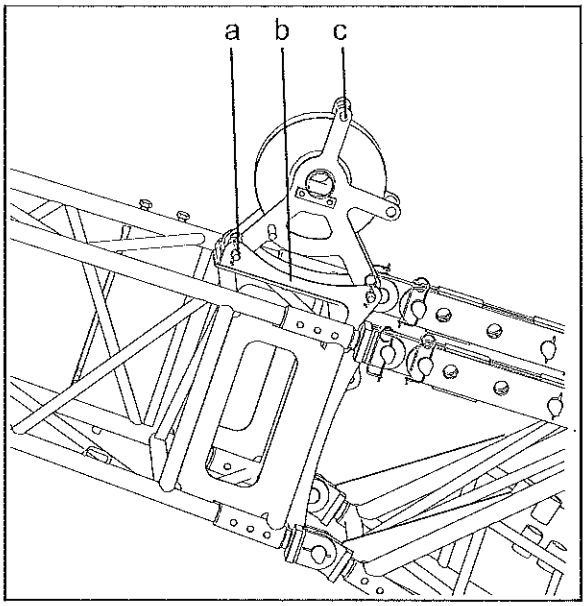


Fig 4-87 Erect position of guide sheave

a. Upper mounting pin
b. Sheave base plate

c. Tie bar

⚠ WARNING

Only a qualified Sany technician, or a qualified rigger, should operate the swingaway boom extension. Non-qualified personnel performing this function could result in major equipment damage, death or serious injury.

5. . Remove the tie bar on upper boom head sheaves. This tie bar must be removed to prevent the wire rope from rubbing on the bar.

6. Remove the tie bar from the guide sheave on the top of swingaway boom extension. Route the wire rope over the guide sheave and secure it with tie bar.

7. Remove the tie bar and roller from the head sheave of swingaway boom extension. Route the wire rope over the head sheave and secure it with tie bar and roller.

8. Rig the auxiliary hoist wire rope and connect with headache ball.

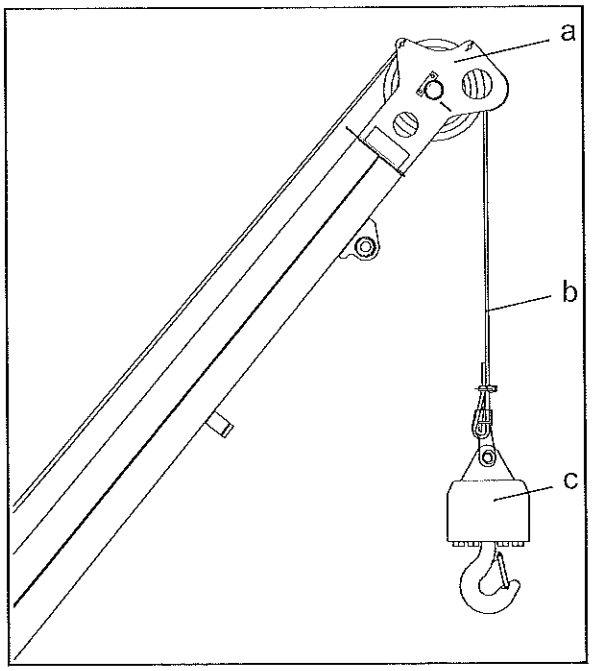


Fig 4-88 Rig the auxiliary hoist wire rope

a. Swingaway boom extension
b. Auxiliary wire rope
c. Headache ball

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

10. On the LMI, select the proper "Boom" configuration.

4.6.5.4 Stow Swingaway Boom Extension

1. Adjust the swingaway boom extension to its minimum offset.

Refer to "Adjust the offset (from higher to lesser)".

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

Refer to "Boom operation".

3. Lower the boom to minimum elevation to permit ease of installation of pins and access to the boom head and swingaway boom extension.

Refer to "Boom operation".

⚠ WARNING

Only a qualified Sany technician, or a qualified rigger, should operate the swingaway boom extension. Non-qualified personnel performing this function could result in major equipment damage, death or serious injury.

⚠ WARNING

Always wear personal protective equipment, including a hard hat, eye protection, gloves and work shoes as required. Failure to observe and follow these warnings could result in death or serious injury or equipment damage.

4. Disconnect the headache ball and all electrical plugs. Make sure the anti-two block is removed.
5. Remove the tie bar and roller from the head sheave of swingaway boom extension.
6. Remove the hoist wire rope from the sheaves and wedge socket. Slowly rotate the hoist drum to reeve wire rope onto the drum evenly.

NOTE :

Never make the wire rope end out of the surface of the hoist drum.

NOTE :

Keep the wire rope orderly on the hoist drum.

⚠ WARNING

Before performing the next step, Ensure that the tag line can control the fly section from swinging inward.
Failure to observe and follow this warning could result in death or serious injury.

7. Secure the fly section with a tag line (rope) before disconnecting the fly section.

8. . Disconnect fly section from the swingaway boom extension at the left side attachment pins.

9. Pull the tag line and pivot the fly section at the right side attachment pins.

Swing fly section to the side of swingaway boom extension and attach it with stowage bracket.

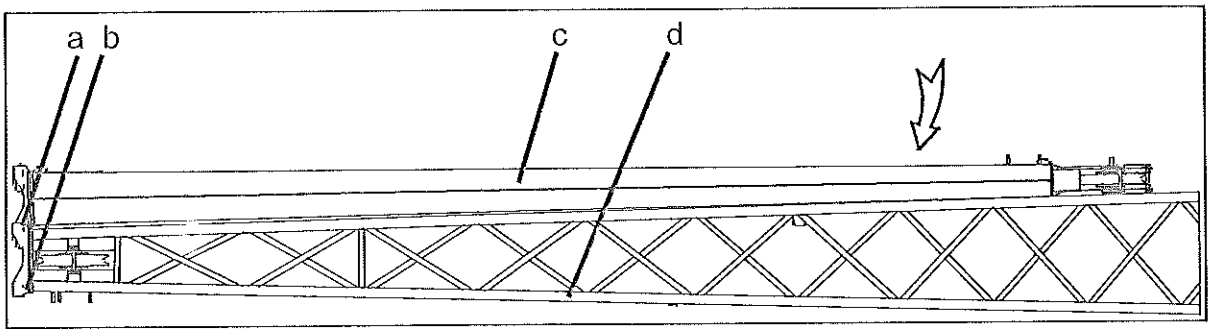
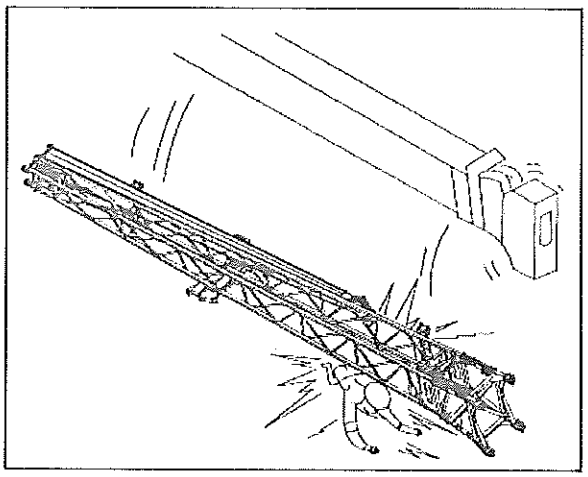


Fig 4-89 Pull the tag line and pivot the fly section at the right side attachment pins

a. Right side attachment pins
b. Left side attachment pins
c. Fly section
d. Swingaway boom extension

⚠ WARNING

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



10. Remove the upper mouting pin on the guide sheave bracket.

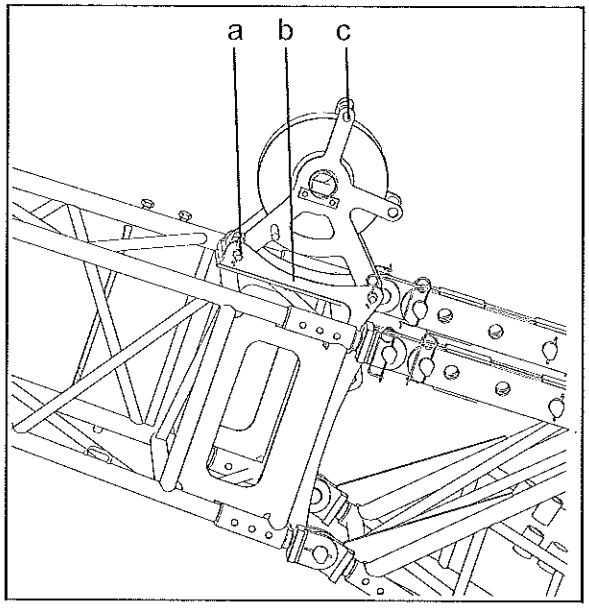


Fig 4-90 Erect position of guide sheave

a. Upper mounting pin
b. Sheave base plate

c. Tie bar

11. Rotate the guide sheave bracket to make the guide sheave move from erect position to stowed position.

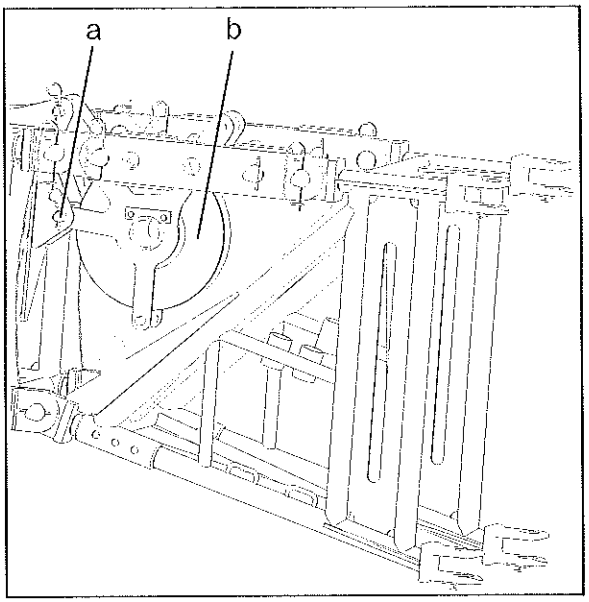


Fig 4-91 Stowed position of guide sheave

a. Lower mounting pin
b. Guide sheave

12. Install the lower mouting pin securing the guide sheave in stowed position.

13. Ensure that the boom section alignment plates are each fully engaged.

14. Attach a tag line to the tip of the swingaway boom extension to control its movement.

⚠ WARNING

Before performing the next step, Ensure that the tag line can control the swingaway boom extension from swinging inward. Failure to observe and follow this warning could result in death or serious injury.

15. Disconnect swingaway boom extension from the boom head at the left side attachment pins.

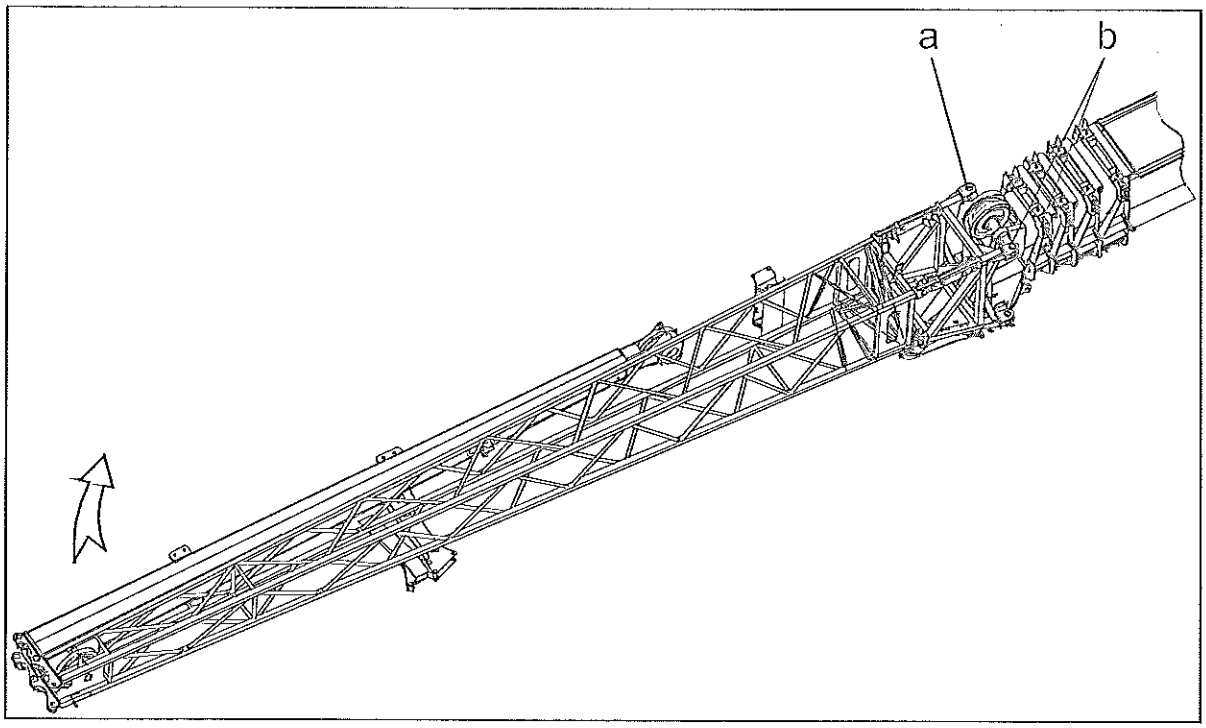


Fig 4-92 Disconnect swingaway boom extension from boom head at left side attachment pins

a. Right side attachment pins

b. Left side attachment pins

16. Swing the mid-position ramp into "out" position, and pin it in place.

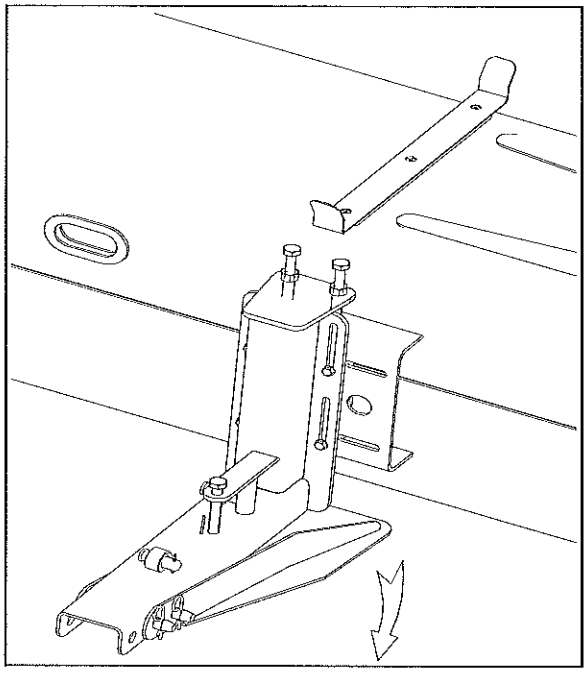


Fig 4-93 Swing the mid-position ramp into "out" position

⚠ CAUTION

• Always secure the swingaway boom extension with a tag line (rope) on the main boom before removing any connections.
• Always maintain control of the swingaway boom extension with the tag line (rope). This will prevent the swingaway boom extension from swinging around which could result in minor or moderate injury.

17. Pull the tag line and pivot the swingaway boom extension at the right side attachment pins.

⚠ WARNING

Ensure that all personnel and equipment are kept clear of the swing path. Failure to observe and follow this warning could result in death or serious injury.

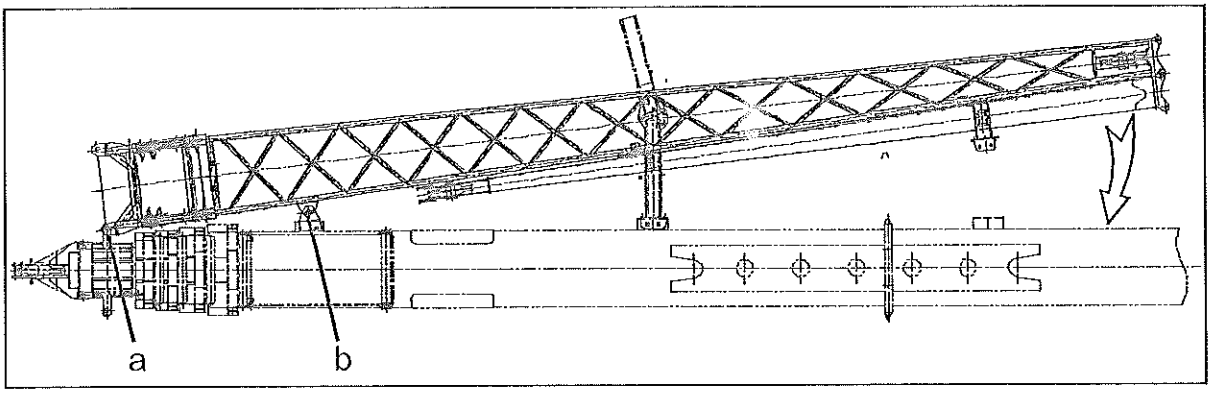


Fig 4-94 Pull the tag line and pivot swingaway boom extension at the right side attachment pins

a. Right side attachment pins b. Front stowage lug

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 notice could result in equipment damage.

18. Align the front stowage lug on the swing-away boom extension with the front mounting bracket and install the pins.

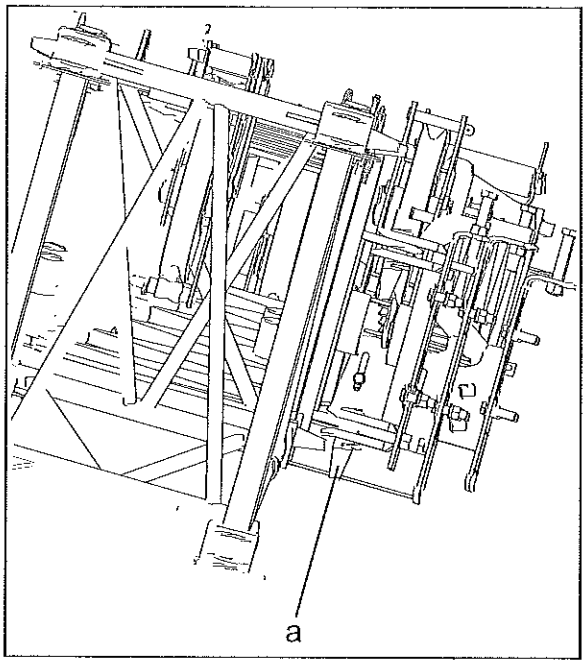


Fig 4-95 Align the front stowage lug

a. Pins at the front stowage lug

19. Disconnect swingaway boom extension from the boom head at the right side attachment pins.

20. Pull the tag line and pivot the swingaway boom extension at the front stowage lug. Continue pulling the swingaway boom extension onto mid-position ramp till get into the stowage brackets and attach the pins.

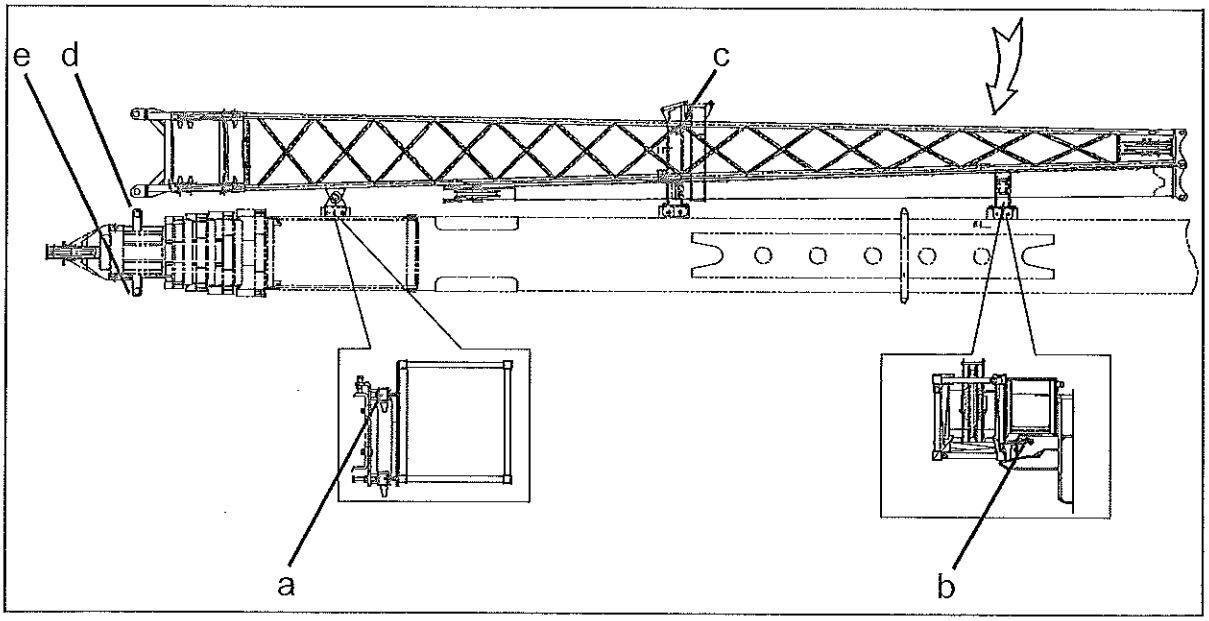


Fig 4-96 Pull the tag line and pivot the swingaway boom extension at the front stowage lug

a. Front stowage lug

b. Rear stowage lugs

c. Mid-position ramp

d. Right side attachment pins

e. Left side attachment pin

21. Install the pins securing the swingaway boom extension to the rear stowage bracket.

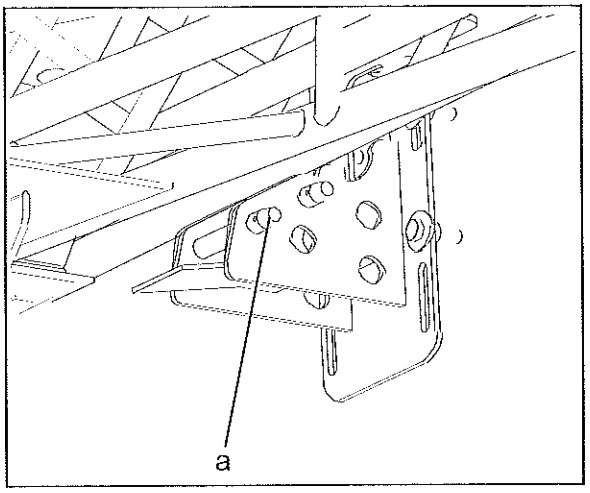


Fig 4-97 Install the pins to the rear stowage bracket

a. Pin

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

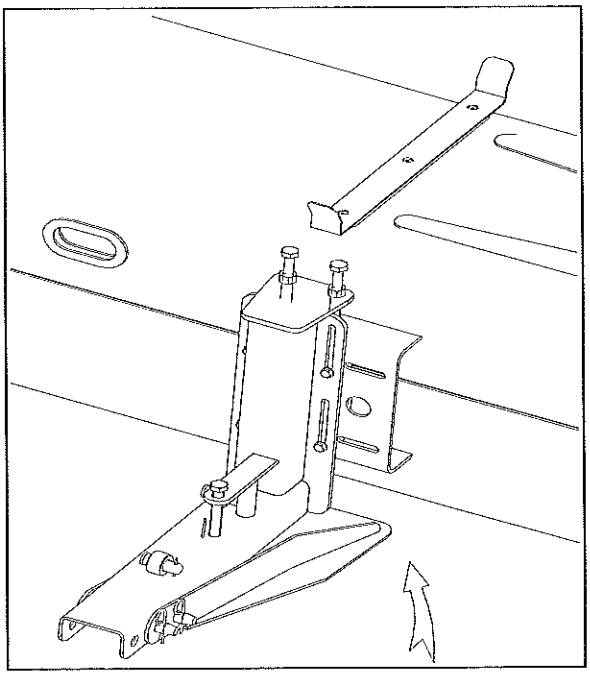


Fig 4-98 Swing the mid-position ramp into the stowed position

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

Refer to "Reeve wire rope".

24. On the LMI, select the proper "Boom" configuration.

4.6.6 Adjust the Offset (From Lesser to Higher)

1. Extend and set the outrigger beams.
Refer to "Outrigger operation".

2. Swing the boom over the front of the crane.
Refer to "Swing the boom".

3. Slowly lower the boom until the swingaway boom extension head rests on the ground and the pressure on the offset link pins is relieved.
Refer to "Raise and lower the boom".

⚠ WARNING

Only a qualified Sany technician, or a qualified rigger, should operate the swingaway boom extension. Non-qualified personnel performing this function could result in major equipment damage, death or serious injury.

⚠ WARNING

No personnel or obstructions are allowed beneath the boom.
Failure to observe and follow this warning could result in death or serious injury.

4. Remove the offset link pins and clips.

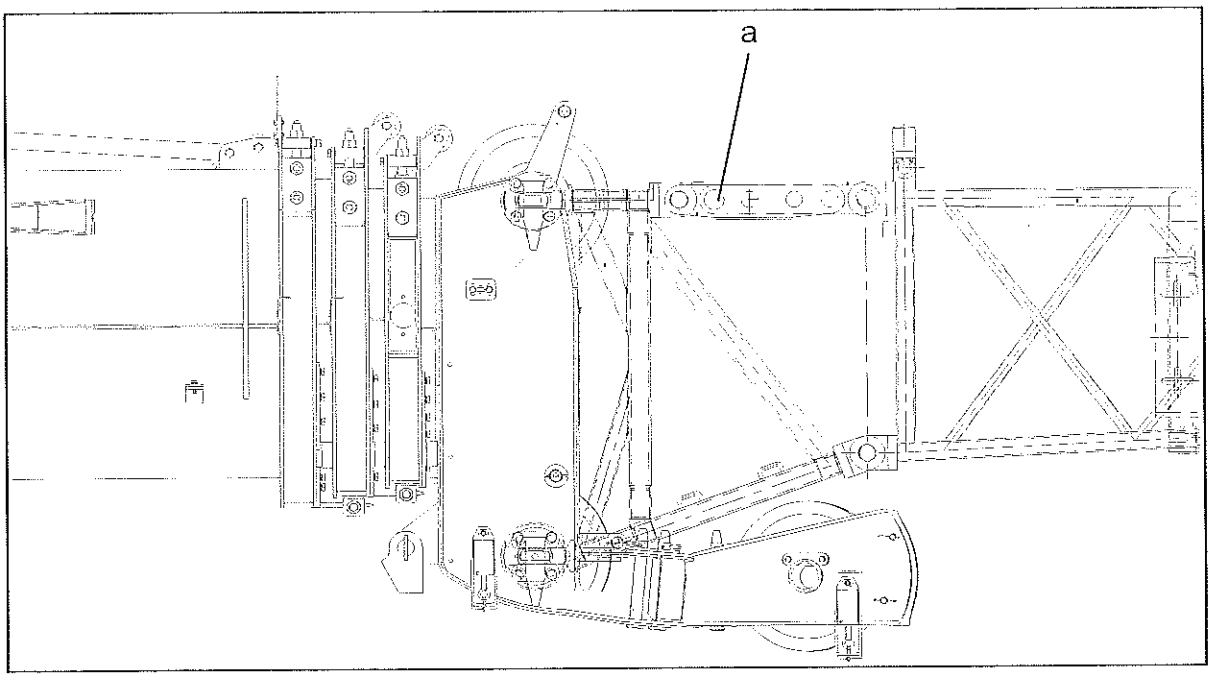


Fig 4-99 Remove the offset link pins and clips

a. Offset link pins

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 notice could result in equipment damage.

NOTICE

Failure to observe and follow this notice could result in equipment damage.
Do not raise the boom until ensure the offset link pins removed.

5. Slowly raise the boom until the holes for the higher degree offset position align with the offset links.

NOTE :

There are three different swingaway boom extension offset angles: 0°, 15°, 30°.

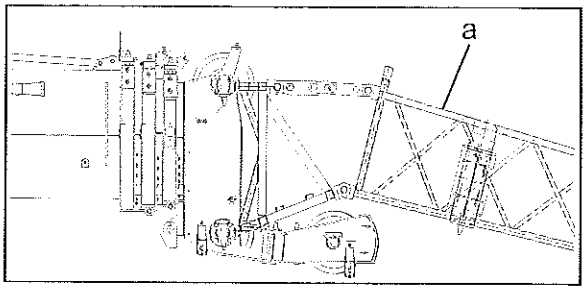


Fig 4-100 15 degree offset position

a. Swingaway boom

6. Install the offset pins and their clips.

7. Slowly raise the boom until the offset links take the full weight of the swingaway boom extension.

8. Reeve the wire rope as described under erecting procedures.
Refer to "Reeve wire rope".

9. On the LMI, select the proper "Boom" configuration.

4.6.7 Adjust the Offset (From Higher to Lesser)

1. Extend and set the outrigger beams.
Refer to "Outrigger operation".

2. Swing the boom over the front of the crane.
Refer to "Swing the boom".

3. Slowly lower the boom until the swingaway boom extension head rests on the ground and pressure is relieved from the offset links.
Refer to "Raise and lower the boom".

⚠ WARNING

No personnel or obstructions are allowed beneath the boom.
Failure to observe and follow this warning could result in death or serious injury.

⚠ WARNING

Only a qualified Sany technician, or a qualified rigger, should operate the swingaway boom extension. Non-qualified personnel performing this function could result in major equipment damage, death or serious injury.

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 notice could result in equipment damage.

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
There are three different swingaway boom extension offset angles: 0°, 15°, 30°.

NOTICE

Do not lower the boom until ensure the offset link pins removed.
Failure to observe and follow this notice could result in equipment damage.

⚠ WARNING

Always wear personal protective equipment, including a hard hat, eye protection, gloves and work shoes as required. Failure to observe and follow these warnings could result in death or serious injury or equipment damage.

6. Install the offset pins and their clips.

7. Slowly raise the boom until the offset links take the full weight of the swingaway boom extension.

8. Reeve the wire rope as described under erecting procedures.
Refer to "Reeve wire rope".

9. On the LMI, select the proper "Boom" configuration.

4.7 Boom Operation

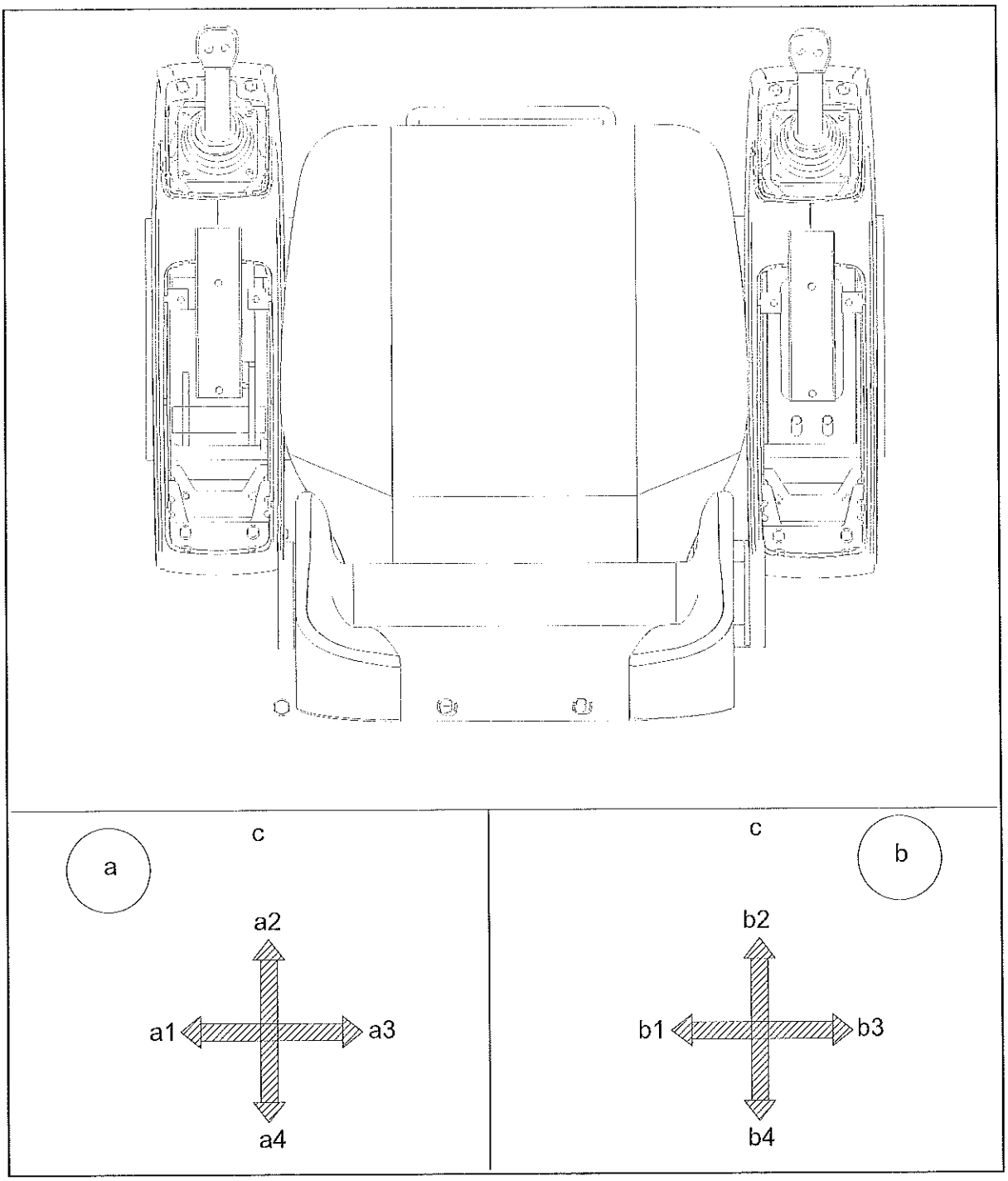
4.7.1 Boom Operation

Control buttons are mounted on joystick controllers on the armrests.

Move the joysticks forward or backward to control the hook blocks.

Move the left joystick to the left or right to control the swing of the boom.

Move the right joystick to the left or right to raise or lower the boom.



a. Left

a1. Swing left

a2. Lower the auxiliary hook block

a3. Swing right

a4. Raise the auxiliary hook block

b. Right

b1. Raise the boom

b2. Lower the main hook block

b3. Lower the boom

b4. Raise the main hook block

c. Front of crane

4.7.2 Raise and Lower the Hook Blocks

⚠ WARNING

No personnel or obstructions are allowed beneath the boom, especially with a load attached.
Failure to heed this warning could result in death or serious injury.

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 heed these notices 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.

NOTE :
Refer to "Crane stability and structural integrity"

1. Press the "Crane Function" switch to make green indicator illuminate.

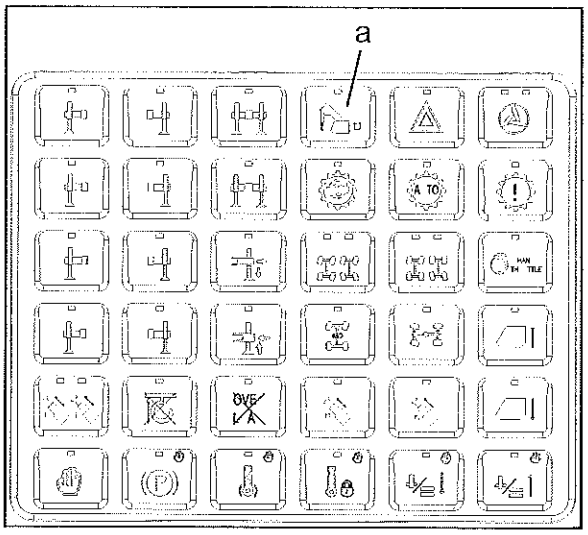


Fig 4-101 Crane Function switch

a. Crane Function switch

2. Click the trigger on the back side of either joystick. Move the right joystick to raise or lower the main hook block.

- **Lower main hook block** —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** — 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.

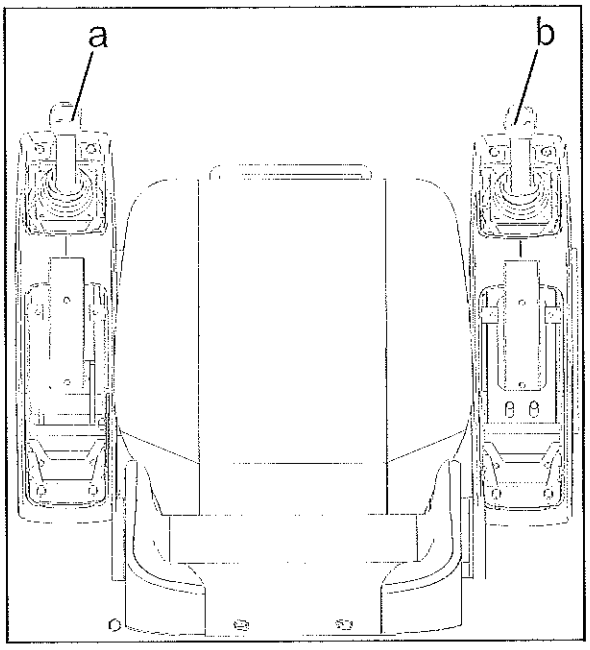


Fig 4-102

a. Left joystick
b. Right joystick

3. Click the trigger on the back side of either joystick. Move the left joystick to raise or lower the auxiliary hook block.

- **Lower auxiliary hook block** — Push and hold the left joystick to the forward position until the auxiliary hook block is at the desiredposition, then move the joystick to the neutral position.
- **Raise auxiliary hook block** —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.

4.7.3 Hoist Speed Selection

Buttons on the left and right joysticks are used to select high speed hoist operation.

Buttons on the left and right joysticks are used to select high speed hoist operation.

- **Main hoist** — Press the left button at the right joystick for high-speed operation before raising or lowering the main hook block.
- **Auxiliary hoist** — Press the right button at the left joystick for high-speed operation before raising or lowering the auxiliary hook block.

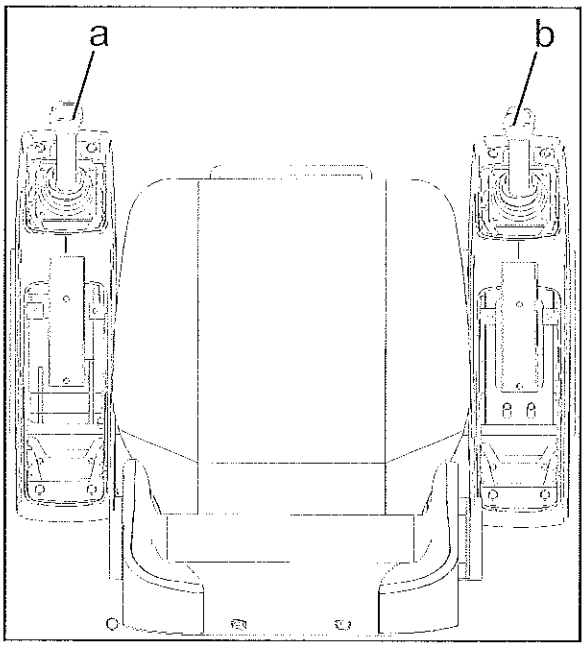


Fig 4-103

a. Right button at the left joystick
b. Left button at the right joystick

NOTICE

Do not change the hoist hi/low speed selection while the hook block is being raised or lowered. Failure to heed this notice may result equipment damage.

4.7.4 Swing the Boom

⚠ WARNING

To prevent a crushing hazard, sound the horn and ensure that no personnel are 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 heed these warnings could result in death or serious injury.

NOTICE

It is the responsibility of the machine operator to use the correct load chart and LML program for current crane configuration.
Do not pull or push the joystick through neutral and to the opposite position to stop or slow boom swing.
Always use a slow, even pressure when moving the joystick.
Failure to heed these notices may result in equipment damage.

1. Ensure that the 360° mechanical swing lock is released.

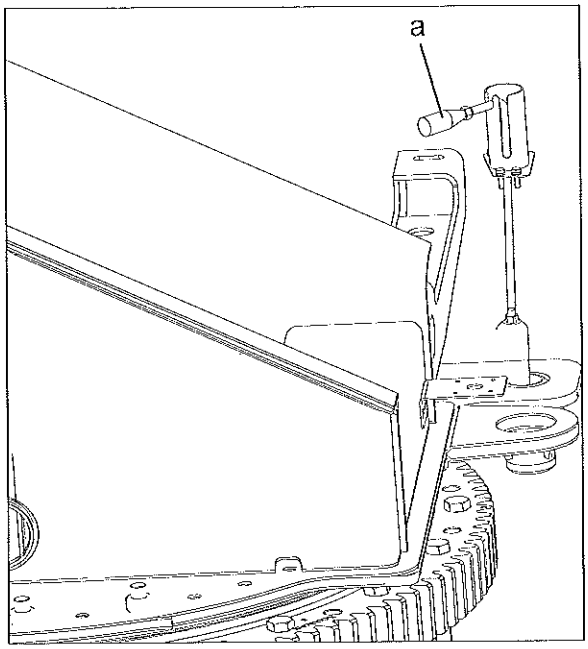


Fig 4-104

a. Swing lock pin in unlock position

2. Ensure that the swing brake button switch is disengaged.

NOTE :

The swing brake button switch has a unlocking button to prevent accidental activation.

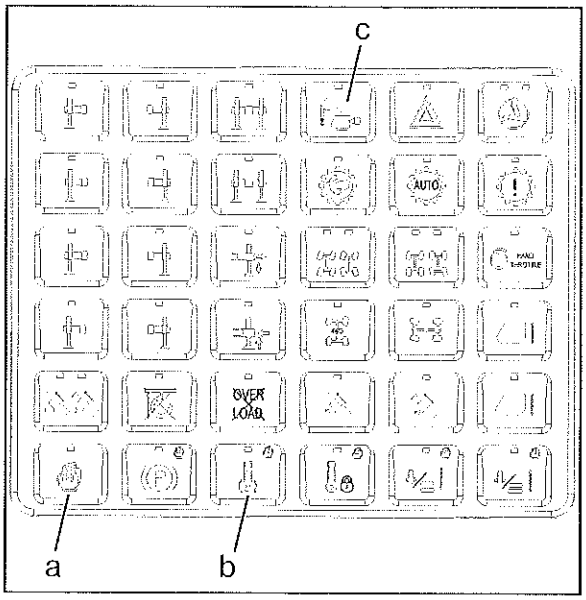


Fig 4-105

a. Swing brake unlocking button
b. Swing brake button

c. Crane function button

3. Press the "Crane Function" button switch to make green indicator illuminate.

4. Click the trigger on the back side of either joystick. Move the left joystick to swing the machine.

- **Swing left** — 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** — 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.

NOTE :
Free swing is controlled by the button on the joystick.

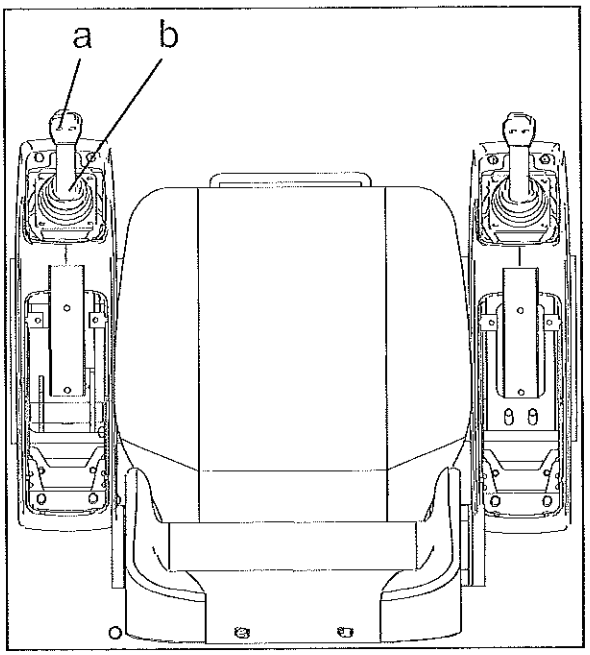


Fig 4-106

a. Control button for free swing
b. Left joystick

5. Press the swing brake button switch to prevent further movement.

NOTE :
Engage single-position swing lock pin before engaging the swing brake switch when it is to be used.

4.7.5 Raise and Lower the Boom

⚠ WARNING

No personnel or obstructions are allowed beneath the boom, especially with a load attached.
Failure to heed this warning could result in death or serious injury.

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 heed this notice may result equipment damage.

1. Press the "Crane Function" switch to make green indicator illuminate.

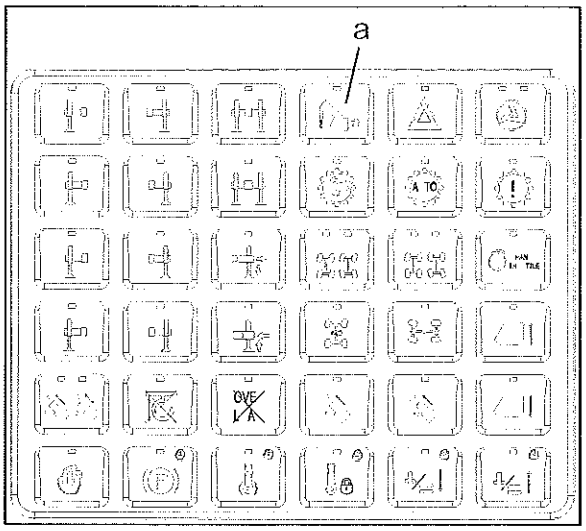


Fig 4-107 Crane function switch

a. Crane Function switch

2. Click the trigger on the back side of either joystick. Move the right joystick to raise and lower the boom.

- **Raise boom** — 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** — 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.

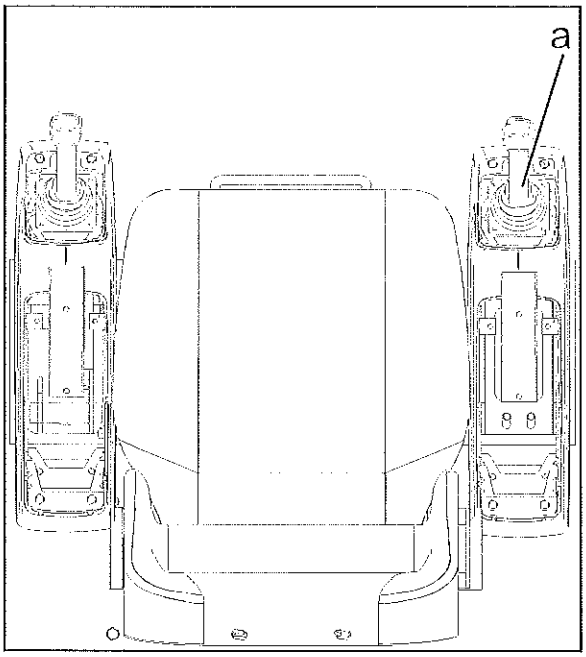


Fig 4-108 Right joystick

a. Right joystick

4.7.6 Extend and Retract the Main Boom

4.7.6.1 General

⚠ WARNING

No personnel or obstructions are allowed beneath the boom, especially with a load attached.
Failure to heed this warning could result in death or serious injury.

⚠ 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 heed these warnings may result in equipment damage.
Failure to heed these warnings could result in death or serious injury.

4.7.6.2 Extend the Main Boom

Refer to "Crane stability and structural integrity"

1. Press the "Crane Function" button switch to make green indicator illuminate.

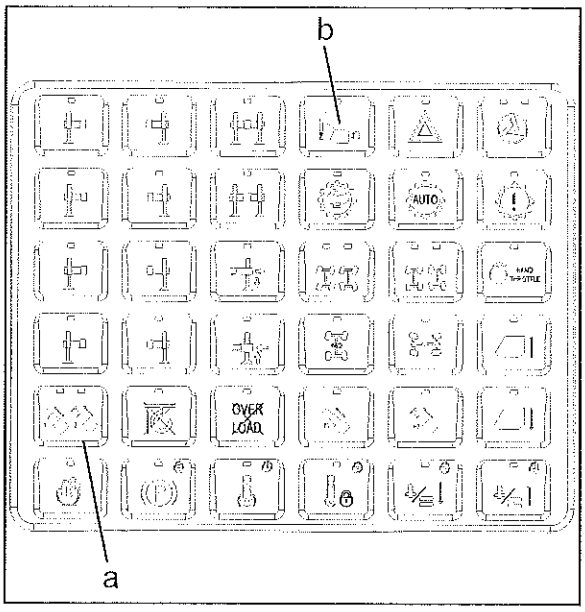


Fig 4-109

a. Button switch for boom telescoping cylinder #1 / #2
b. Crane function button

2. Press the button switch for boom telescoping cylinder #1 / #2 to select the desired cylinder.

NOTE :
Make left green indicator illuminate to extend cylinder #1; Make right green indicator illuminate to extend cylinder #2.

NOTE :
Always extend cylinder #1 first then cylinder #2 if needed.

3. Press the top of the foot pedal until the boom has been extended to the desired position.

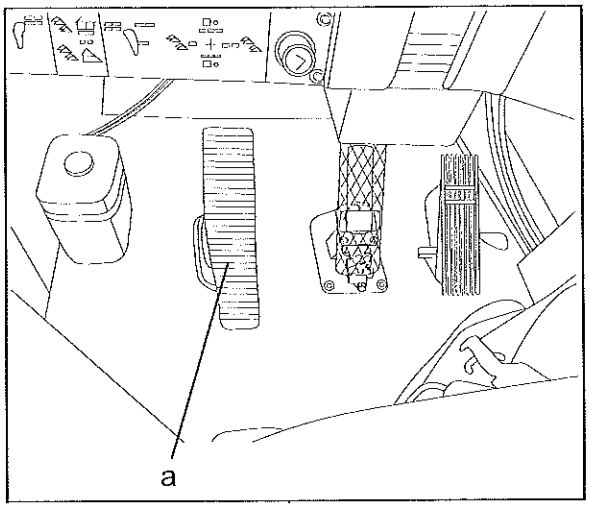


Fig 4-110 Boom telescoping operation pedal

a. Boom telescoping operation pedal

4. Move the foot pedal to the neutral (center) position to stop boom extension.

To prevent the hook block from ramming the boom head, let out the hoist wire rope while the boom is being extended.

Refer to "Raise and lower the hook blocks".

4.7.6.3 Retract the Main Boom

Refer to "Crane stability and structural integrity".

1. Press the button switch for boom telescoping cylinder #1 / #2 to select the desired cylinder.

NOTE :

Make left green indicator illuminate to extend cylinder #1; Make right green indicator illuminate to extend cylinder #2.

NOTE :

Always retract cylinder #2 first and then cylinder #1.

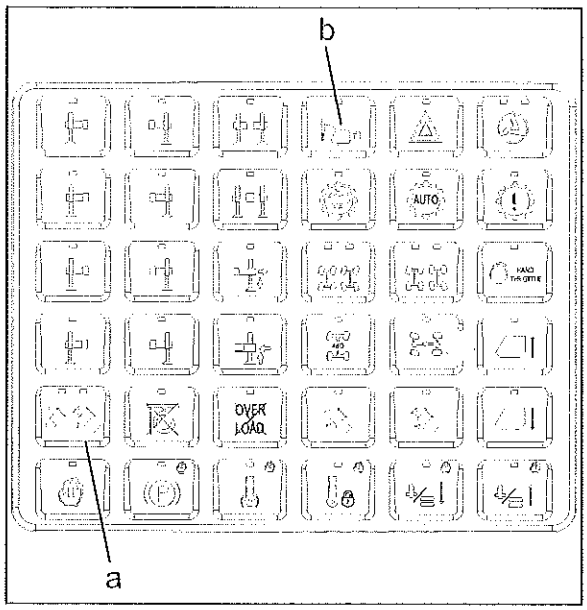


Fig 4-111

a. Button switch for boom telescoping cylinder #1 / #2

b. Crane function button

2. Press the bottom of the foot pedal until the boom has retracted to the desired position

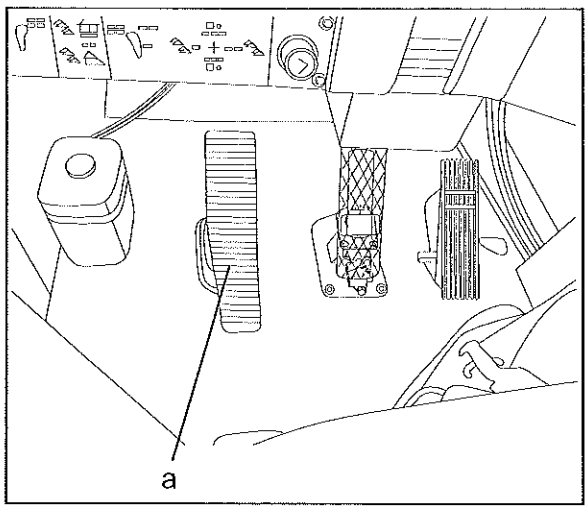


Fig 4-112 Boom telescoping operation pedal

a. Boom telescoping operation pedal

3. Move the foot pedal to the neutral (center) position to stop boom retraction.

4.7.7 Preload Check

NOTE :

Carefully read and become familiar with all crane operating instructions before attempting a pre-load 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 outriggers.

Refer to "Outrigger operation" .

2. Ensure that the transmission control is in neutral.

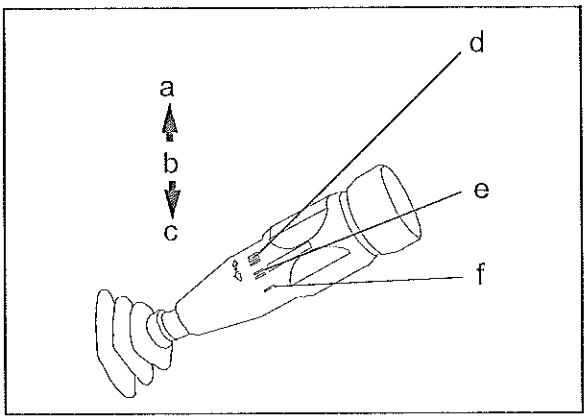


Fig 4-113 Right multipurpose switch

a. Forward
b. Neutral

c. Reverse

d. 1st gear

e. 2nd gear

f. 3rd gear

3. Press the parking brake button switch to engage parking brake as well as red indicator illuminated.

NOTE :

The button switch has a unlocking button (c) to prevent accidental activation.

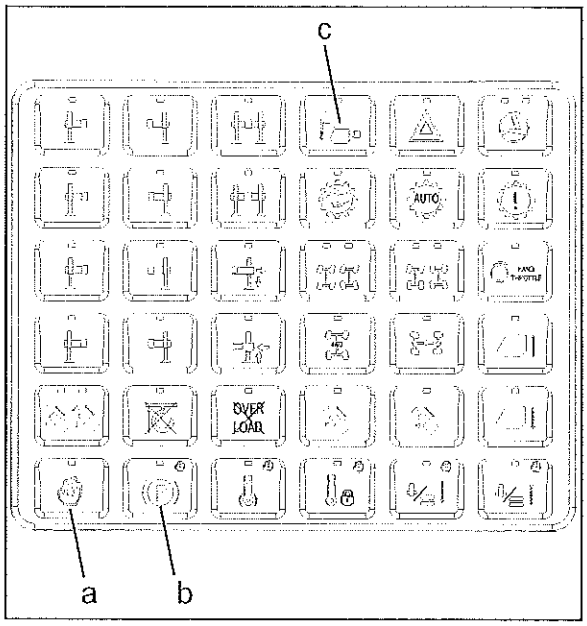


Fig 4-114

a. Unlocking button switch
b. Parking brake button

c. Crane function button

4. Press the parking brake button switch to engage parking brake as well as red indicator illuminated.

5. Raise the boom at least 45° and lower the boom to level.

Refer to "Raise and lower the boom".

6. Swing the boom at least 45° to the right, then same angle to the left.

Refer to "Swing the boom".

7. Telescope the boom sections in and out.

Refer to "Extend and retract the main boom".

8. Raise and lower the wire rope several times at various boom lengths and ensure there is no kinking.

Refer to "Raise and lower the hook blocks".

4.8 Travel Operation

4.8.1 General Precautions

NOTE :

Refer to "Travel precautions" and "Steering".

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.

⚠ 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 traveling.
Avoid holes, rocks, extremely soft surfaces, and any other obstacles which might subject the crane to undue stresses or possible tipover.
Failure to heed these warnings may result in equipment damage and could result in death or serious injury.

⚠ CAUTION

Do not travel with an empty hook in a position where it can swing freely. Failure to heed this caution could result in equipment damage or minor or moderate 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 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.
Use only the tow/tie-down lugs to pull or tow.
Failure to heed these notices may result in equipment damage.

Travel is only allowed under the following conditions

Refer to "Travel precautions".

- Travel only on firm, level ground.
- Main boom shall be fully retracted.
- Main boom angle: 25° minimum, 40° maximum.
- Boom over the front with the turntable lock pin in the "down" position.
- Hookblock may be reeved over main boom head, hanging 0.9 m below the boom head sheaves. Or it may be secured to the carrier.
- The headache ball may be reeved over the swingaway boom extension, hanging 0.9 m below sheave. Or it may be secured to the carrier.

4.8.2 Prepare to Move the Machine

The following superstructure conditions should be strictly adhered to before moving the crane.

1. Fully retract the boom.

Refer to "Boom operation".

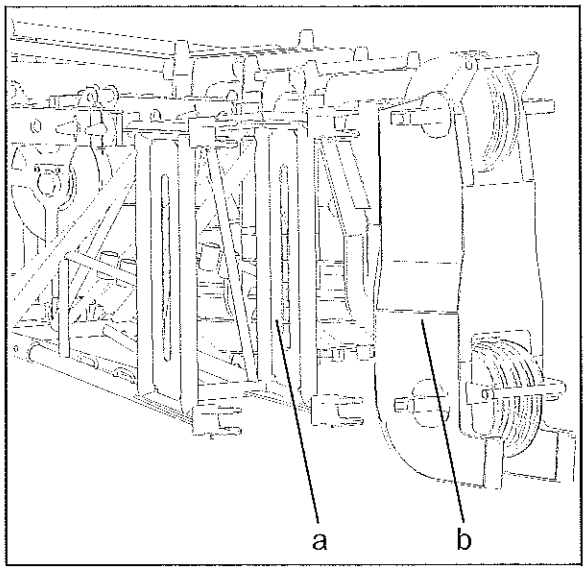


Fig 4-115

a. Swingaway boom extension
b. Main boom

2. Ensure the swingaway boom extension is properly stowed and secured.

Refer to "Erect and stow the swingaway boom extension".

3. Swing the boom to over-the-front and lower it to 25°~40° of boom angle slightly.

Refer to "Boom operation" .

4. Engage the 360° mechanical swing lock.

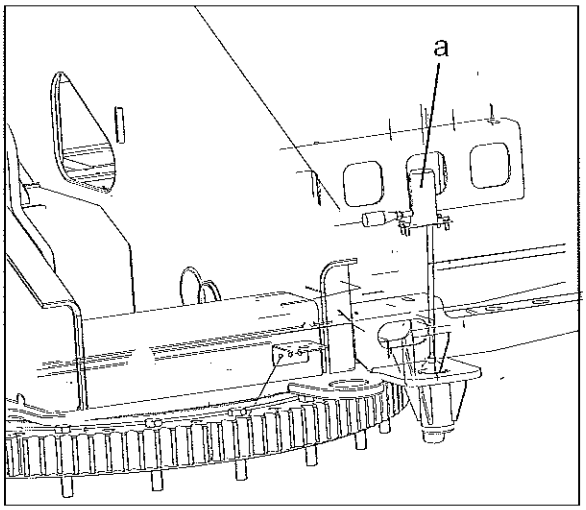


Fig 4-116

a. Swing lock pin

5. Engage the swing brake: press button switch to make red indicator illuminate.

NOTE :

The swing brake button switch has a unlocking button to prevent accidental activation.

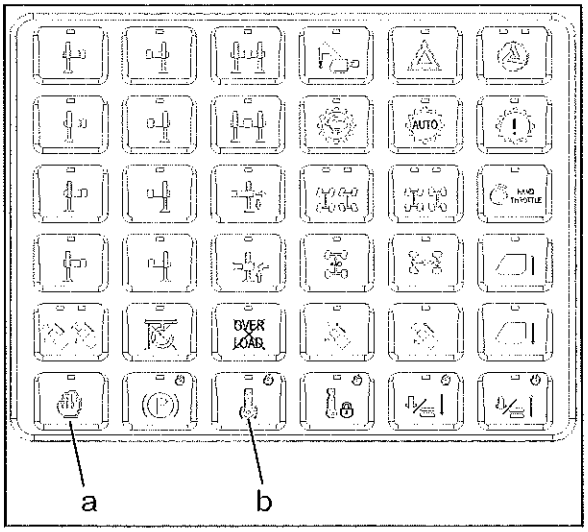


Fig 4-117

a. Unlocking button switch

b. Swing brake button

6. Remove the headache ball from the hoist wire rope and stow it securely in stowing point on the deck before traveling

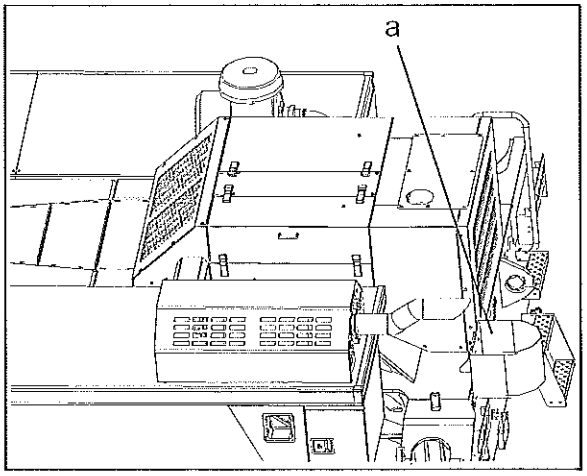


Fig 4-118 Headache ball stowage barrel

a. Headache ball stowage barrel

7. Ensure that the hook block is secured to the tie-back on coupling lugs at the head of carrier.

NOTE :

Option is to remove the hook block from the hoist wire rope and stow it securely before traveling.

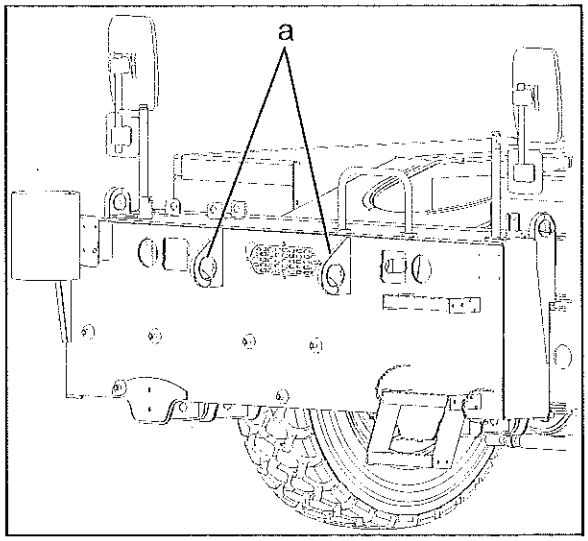


Fig 4-119

a. Lugs

8. Fully retract the outrigger jack cylinders.

Refer to "Stow the outriggers".

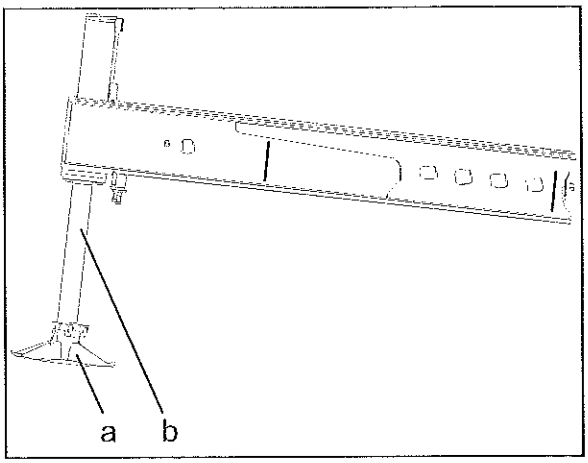


Fig 4-120

a. Outrigger float
b. Outrigger jack

9. Remove and stow the outrigger floats properly.

4.8.3 Move the Machine

4.8.3.1 General

Refer to "Travel precautions".

4.8.3.2 Direction of Travel

1. Set the right steering column lever to the proper position for the desired direction of travel.

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

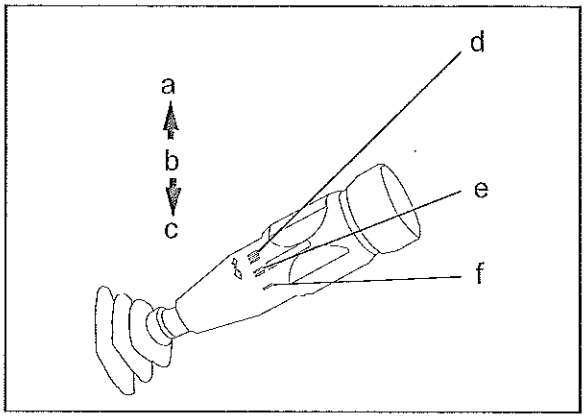


Fig 4-121 Right multipurpose switch

a. Forward
b. Neutral

c. Reverse

d. 1st gear

e. 2nd gear

f. 3rd gear

2. Press the parking brake button switch (c) to disengage parking brake as well as red indicator is off.

NOTE :
The parking brake button switch has a unlocking button (b) to prevent accidental activation.

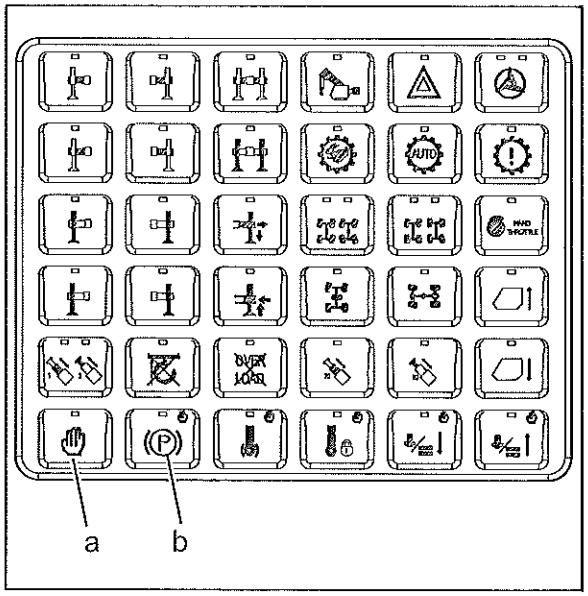


Fig 4-122

a. Switch unlocking button
b. Parking brake button

3. Use the foot control pedals to move and stop the crane.

- Service brake pedal
- Throttle pedal

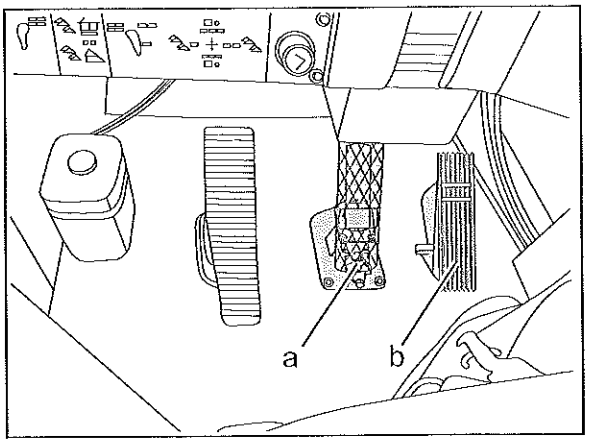


Fig 4-123

a. Service brake pedal
b. Throttle pedal

4.8.3.3 Gear Selection

Select the correct gear for traveling by using the threeposition rotating collar on the arm on the right steering column lever.

Low Gear	Speed (km/h)	High Gear	Speed (km/h)
1st	3.1km/h	1st	8.9km/h
2nd	6.4km/h	2nd	18.2km/h
3rd	18.2 km/h	3rd	40km/h

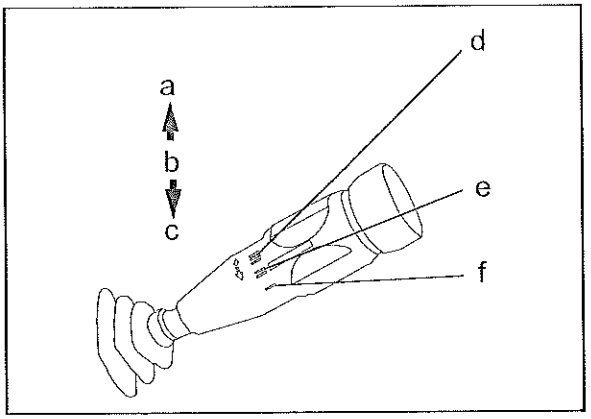


Fig 4-124 Right multipurpose switch

a. Forward
b. Neutral

c. Reverse

d. 1st gear

e. 2nd gear

f. 3rd gear

4.8.3.4 Steering

Steering is accomplished by following:

1. Using the steering wheel.

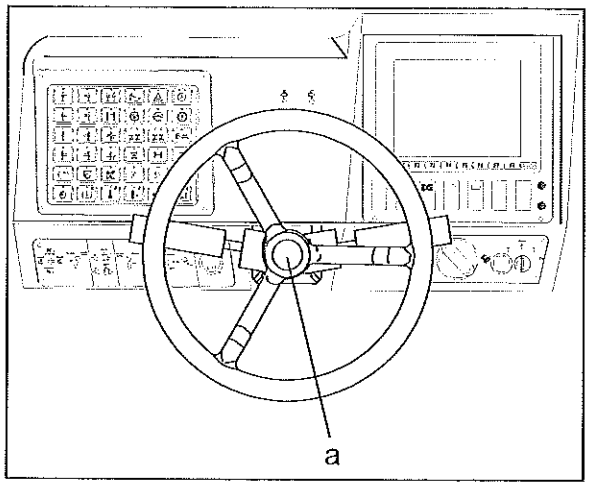


Fig 4-125 Steering wheel

a. Steering wheel

2. Press the button switches on the left dashboard for the desired steering mode.

- **Front-wheel steering** — Press button a repeatedly to turn off its green indicator, then press button b to make its left green indicator illuminate.
- **Rear-wheel steering** — Press button a repeatedly to turn off its green indicator, then press button b to make its right green indicator illuminate..
- **Four-wheel coordinated steering** — Press button a to make its left green indicator illuminate.
- **Four-wheel crab steering** — Press button a to make its right green indicator illuminate.

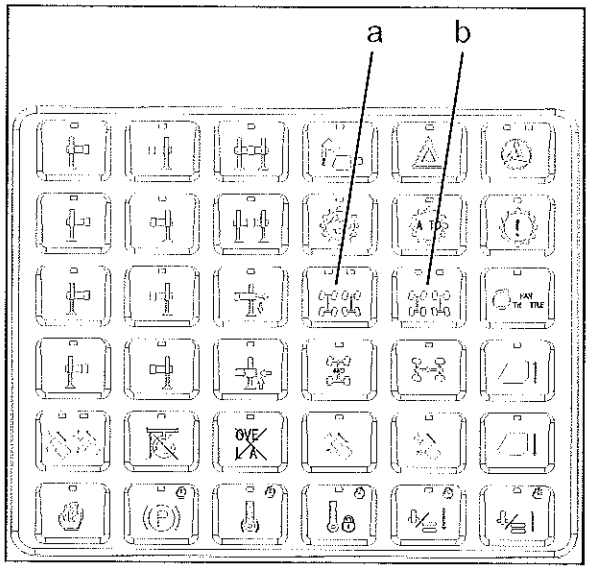


Fig 4-126

a. Steering: 4-wheel coordinated, 4-wheel crabbing,2-wheel only
b. Steering: front wheel / rear wheel

4.8.3.5 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°).
- No loads may be supported by the boom (no pick and carry loads) while traveling on a slope.

- 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 and not exceed 1.5 km/h.
- All boom sections must be fully retracted and the boom lowered to horizontal and positioned over the front of the crane.
- The swingaway boom extension must be in the stowed position or removed from the crane.
- The swing brake and single position swing lock must be engaged.
- 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 and the fuel tank must be over half full.
- All cribbing and all 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 changing conditions of the terrain being traversed.

4.9 End-of-Workday Operation

4.9.1 End-of-workday Checks

1. Collect any trash or debris from the cab and deposit it into a trash can.

2. Remove all built-up mud or debris on the crane exterior.

3. Inspect the work equipment and crane for signs of fluid leaks or damage.

4. Near ocean (salt air) environments, thoroughly wash away any salt residue, apply grease where rust is found and carefully perform maintenance on the electrical components to prevent corrosion.

4.9.2 End-of-workday Operation

1. Make sure the crane get ready for travel.
Refer to "Prepare to move the machine".

2. Drive the crane to a flat, level, stable surface away from people, traffic or other machines.

⚠ 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 could result in minor or moderate injury or machine damage.

3. Shut down the engine.
Refer to "Engine shutdown procedure".

4. Close and properly lock all windows, covers and the operator's cab door.

5. If crane is not to be used for over 24 hours, turn the master switch off.

6. Fill the fuel tank to the maximum level.
Refer to "Fuel" .

⚠ CAUTION
Do not attempt to shut the door by holding it at the end. Failure to observe and follow this caution could result in Your fingers may be pinched.

4.10 Park and Store the Machine

4.10.1 Overnight Storage

⚠ 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 could result in minor or moderate injury or machine damage.

When parking the crane, do the following:

1. Park the crane on a flat, level stable surface away from people, traffic or other machines.

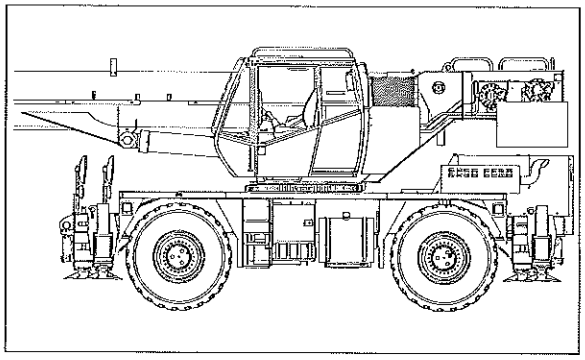


Fig 4-127

2. Remove the load from the hook.

3. Stow the swingaway boom extension, if erected.

Refer to "Erect and stow the swingaway boom extension"

4. Fully retract the boom and position it in the normal travel position.

Refer to "Boom operation".

5. Engage the swing brake and/or swing locks.

Refer to "Swing drive".

6. Retract all jack cylinders and outrigger beams.

Refer to "Outrigger operation".

7. Apply the parking brake.

Refer to "Brake system".

8. Put all operating controls in the neutral position.

9. Press the "Crane Function" button switch to turn green indicator off.

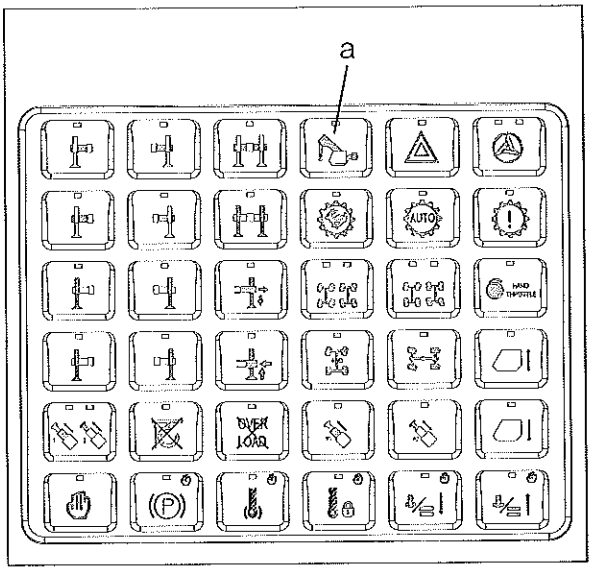


Fig 4-128 Crane function button

10. Shut down the engine.

Refer to "Engine shutdown procedure".

11. Remove the keys.

NOTICE

Always remove the ignition key and take it with you, even if you are leaving the machine for only a moment. Keep it with you to prevent unauthorized operation of the machine. Failure to heed this notice can cause damage to the machine, personal property and/or the environment.

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.

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

Refer to "Power disconnect".

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

Refer to "Mounting and dismounting the machine"

14. Fill the fuel tank to the maximum level.

Refer to "Refueling" for safety information and "Add fuel" if fuel level is low.

4.10.2 Short-Term Storage

Complete the procedures in "Overnight Storage" above, and then:

- Clean the machine.
- Keep it dry.
- Keep it fully lubricated.
- Cover it to protect from dust.

NOTE :
Short-term storage is defined as a storage period of 30 days or less.

4.10.3 Long-Term Storage

4.10.3.1 General

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

NOTE :
Long-term storage is defined as a storage period of more than 30 days.

4.10.3.2 Preparation

1. Park the machine in a secure location.

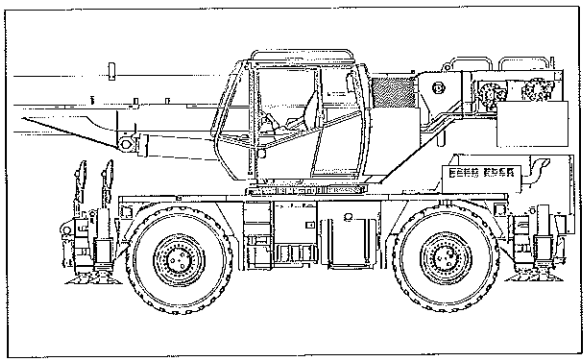


Fig 4-129

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

3. Shut down the engine.

Refer to "Engine shutdown procedure".

4. Turn the ignition key to the off position.

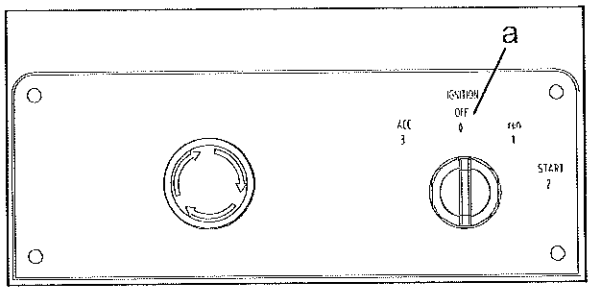


Fig 4-130 Turn the ignition key to the off position

5. Remove the ignition key.

Refer to "Lockout/Tagout procedures".

6. Close and lock the windows.

NOTICE

Always remove the ignition key and take it with you, even if you are leaving the machine for only a moment. Keep it with you to prevent unauthorized operation of the machine. Failure to heed this notice can cause damage to the machine, personal property and/or the environment.

7. Exit the operator's cab and lock the cab door.

Refer to "Mounting and dismounting the machine".

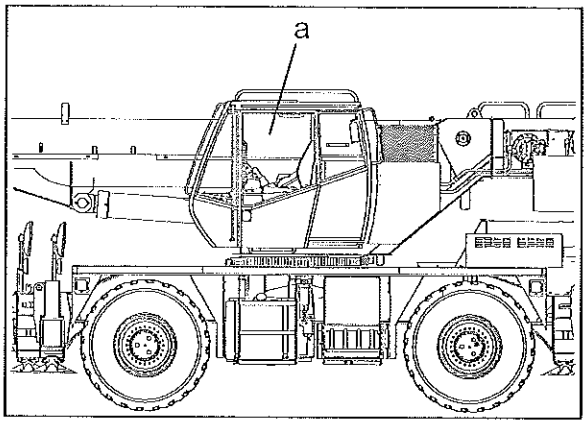


Fig 4-131 Operator's cab

8. Turn the outside mirrors inward so that they are within the perimeter of the machine.

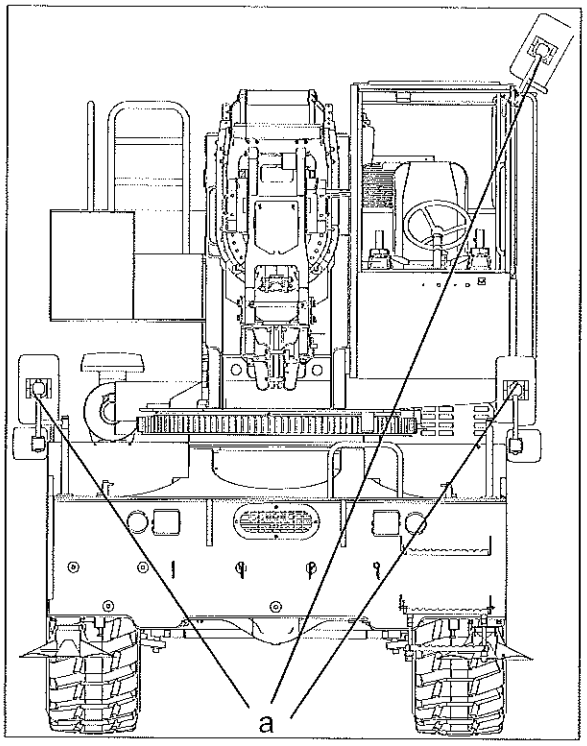


Fig 4-132 Mirrors

9. Fill the fuel tank to the maximum level.

Refer to "Add fuel" if fuel level is low.

10. Apply spray lubricant to any exposed cylinder rods.

11. Change the engine oil.

Refer to "Engine oil and filter".

12. Turn the battery disconnect switch to the off position.

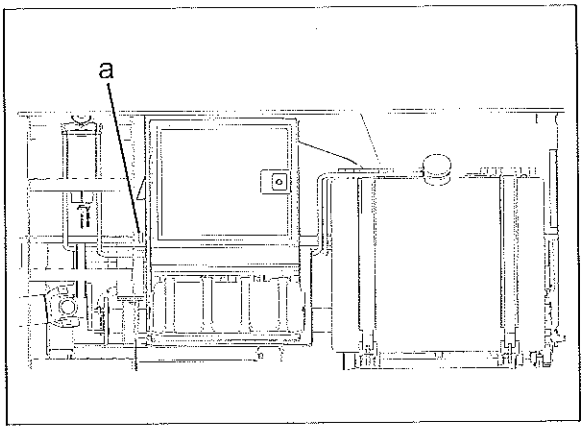


Fig 4-133 Turn the battery disconnect switch off.

a. Battery disconnect switch

4.10.3.3 During Storage

⚠ WARNING

When operating the machine inside a building and to prevent asphyxiation, it is necessary to open doors and windows to provide adequate ventilation. Failure to heed this warning could result in death or serious injury.

Once a month:

1. Start the machine.
Refer to "Engine start procedure" .

2. Drive the machine a short distance.

3. Cycle each cylinder a few times to coat cylinder rods with oil and exercise the seals.
Refer to "Boom operation" .

4. Coat the exposed parts of the cylinder rods with spray lubricant to prevent corrosion.

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

6. Return the machine to the proper storage location and condition.
Refer to "Preparation".

4.10.3.4 Return to Operation

1. Check the fuel and engine oil for water contamination. Drain water or replace fluids as necessary.
Refer to "Drain moisture from fuel water separator".

Refer to "Engine oil and filter".

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

3. Examine the exterior of the machine for signs of rust or damage and repair as necessary.
Refer to "Pre-start checks".

Refer to "Engine start procedure".

Refer to "Preload check".

4.11 Transport

4.11.1 General

Follow all local, state, and federal regulations and laws regarding transporting the machine.

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

Follow all local regulations and laws regarding transporting the machine.

Refer to "General Machine Dimensions" for further information.

Refer to "Travel precautions" for further information.

⚠ WARNING

To avoid a machine tip-over condition, do the following when loading or unloading:.
•Select a location that is firm and level on the ground,a safe distance from any structure.
• Ensure that the trailer is properly chocked to prevent any movement.
• Use an access ramp with enough length, strength, and width to properly support the machine. The ramp grade should not exceed 15°.
• Drive slowly at the junction of the ramp and the trailer. The machine may shift suddenly due to change in center of gravity. • Use a signal person to observe and alert the operator of any potential hazards.
Failure to heed these warnings could result in death or serious injury

4.11.2 Load the Machine

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

1. Lower the boom, and then remove the anemometer (if this machine equipped with anemometer).

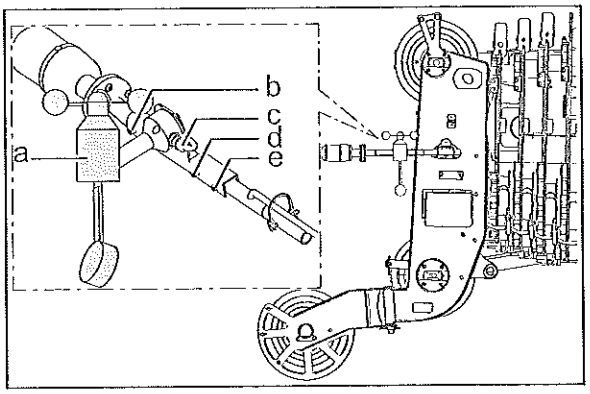


Fig 4-134

a. Anemometer
b,d,e.Screws

c. Electrical leads

NOTE :

Steps of anemometer removal.

- Shut down the engine. Turn off the ignition switch for two minutes before proceeding to the next step.
- Turn the battery switch to OFF position.
- Remove the screws securing the anemometer and aircraft light braket.
- Disconnect the Electrical leads to the anemometer.
- Remove the anemometer.

NOTE :

Steps of anemometer installation.

- Put the anemometer in place and secure it with screws.
- Connect the electrical leads to the anemometer.
- Turn the battery switch to ON position.
- Start the engine and verify that if the anemometer works.

2. Lower swing lock pin: press swing lock pin lower switch after switch being unlocked.

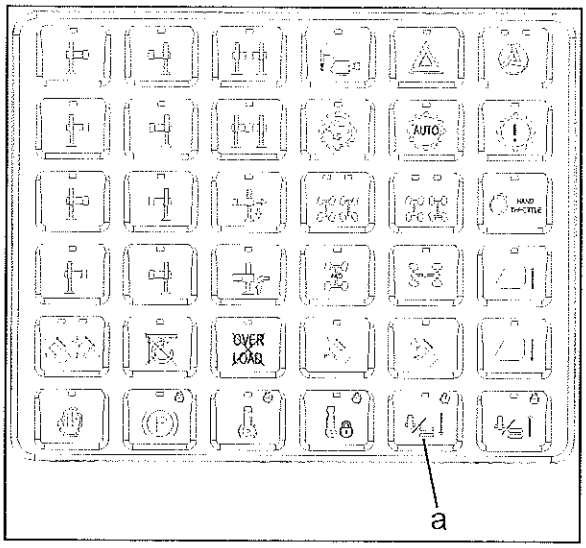


Fig 4-135 Swing lock pin lower switch

3. Remove the headache ball from the hoist wire rope and stow it securely in stowing point on the deck before loading.

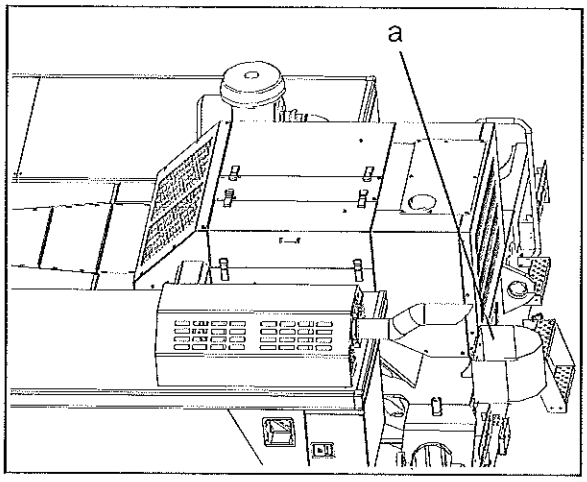


Fig 4-136 Headache ball stowage barrel

4. Ensure that the hook block is secured to the tie-back on coupling lugs at the head of carrier.

NOTE :

Option is to remove the hook block from the hoist wire rope and stow it securely before loading.

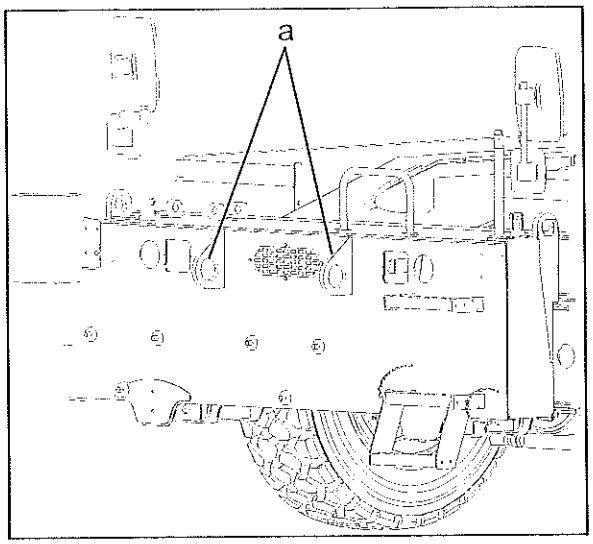


Fig 4-137 Coupling lugs

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

Refer to "Move the Machine".

6. Drive the machine slowly until the frame almost comes into contact with the trailer.

7. Place timbers in front of the machine wheels large enough to raise the machine frame above the trailer.

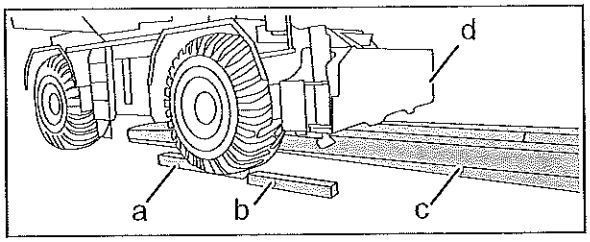


Fig 4-138 Position crane and put timbers

a. Timber b. Timber c. Trailer d. Crane

8. Drive the machine forward into proper position on the trailer.

NOTE :

It may be necessary to place more timbers under the wheels as the machine is driven forward so that the frame will clear the trailer.

9. Extend the outriggers and raise the machine on the outrigger jacks enough to place cribbing between the machine frame and the trailer.

NOTE :
It may be necessary to place cribbing under the jacks to raise the machine high enough.

Refer to "Outrigger operation".

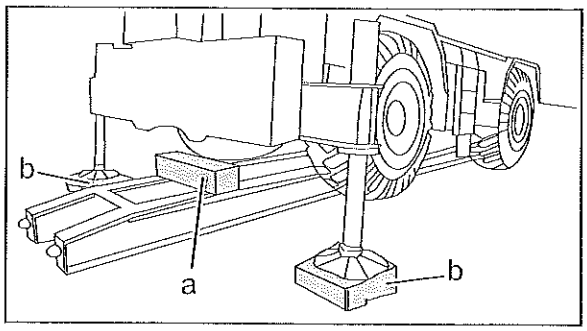


Fig 4-139 Place cribbing

a. Cribbing between the crane carrier and the trailer
b. Cribbing under the outrigger floats

10. Retract and properly stow the outrigger jacks, outriggers, and outrigger floats.

NOTE :
Make sure the machine frame land at the cribbing properly while retracting.

11. Shut down the machine.

Refer to "Engine shutdown procedure".

12. Close and lock the windows.

13. Exit the cab.

Refer to "Mounting and dismounting the machine"

14. Close and lock all doors and covers.

15. Turn the outside mirrors inward so that they are within the perimeter of the machine.

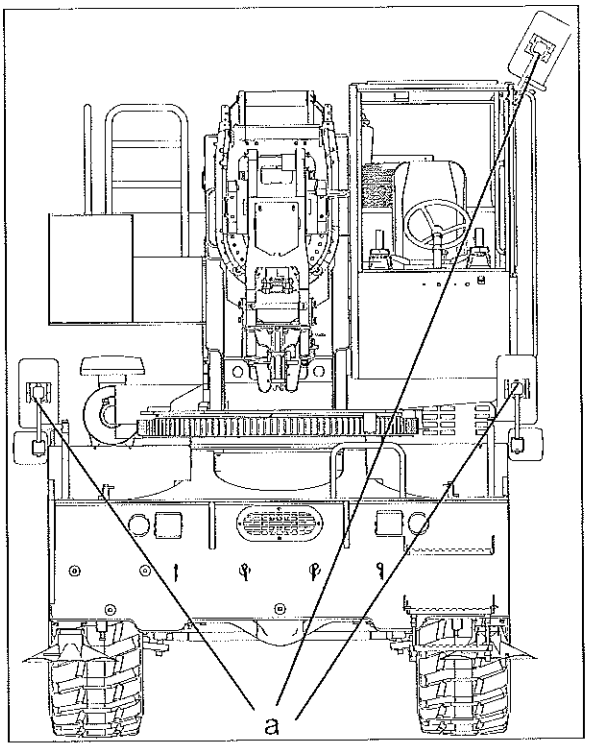


Fig 4-140 Mirrors

16. Secure the machine to the trailer with suitable tie-downs in accordance with all applicable laws and regulations.

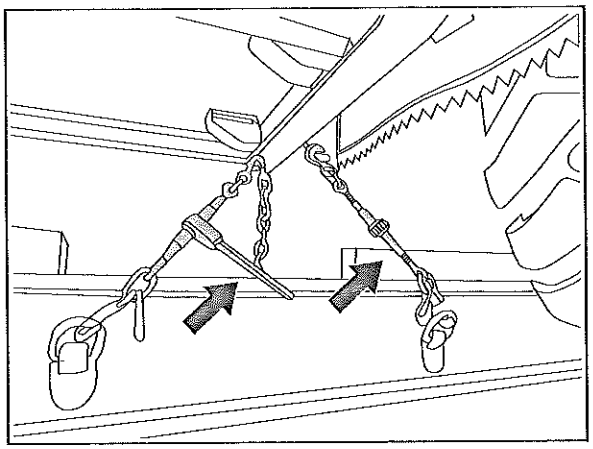


Fig 4-141 Tie-downs

4.11.3 Unload the Machine

1. Chock the trailer wheels to ensure that the trailer will not move during unloading.

2. Remove all tie-downs and blocks securing the machine to the trailer

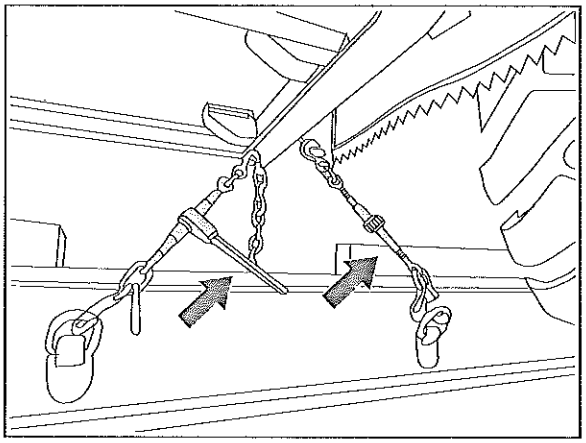


Fig 4-142 Tie-downs

3. Turn the exterior rear view mirrors so that the operator has a clear view to the front and rear of the machine.

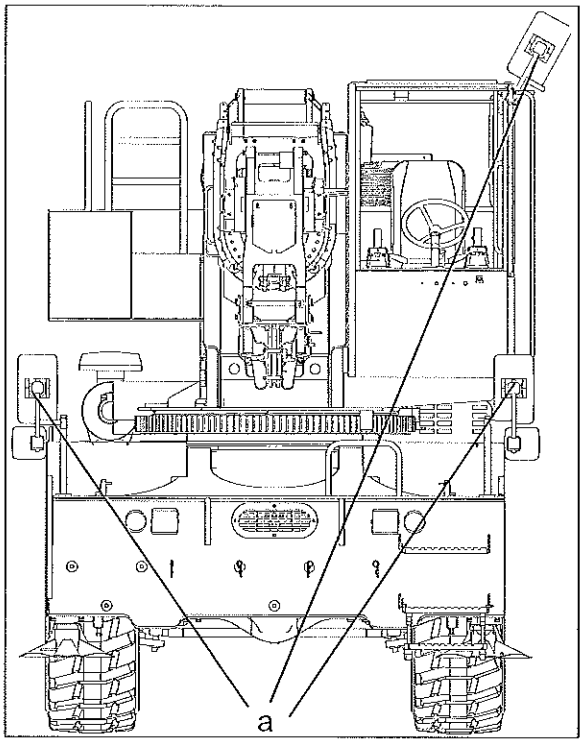


Fig 4-143 Mirrors

4. Unlock and start the machine and allow it to warm-up fully.

Refer to "Engine start procedure".

5. Extend the outriggers and raise the machine on the outrigger jacks enough to remove the cribbing between the machine frame and the trailer..

NOTE :
It may be necessary to place cribbing under the jacks to raise the machine high enough.

Refer to "Outrigger operation".

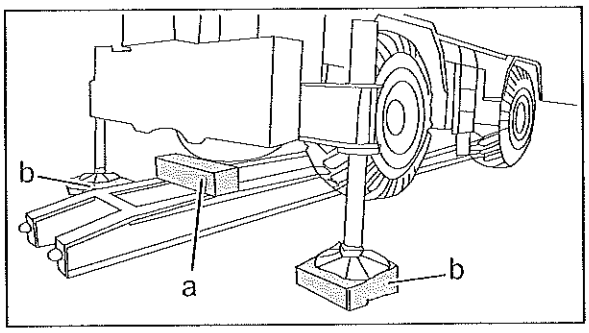


Fig 4-144 Remove cribbing

a. Cribbing between the crane carrier and the trailer
b. Cribbing under the outrigger floats

6. Place timbers under the machine wheels large enough to keep the machine frame above the trailer.

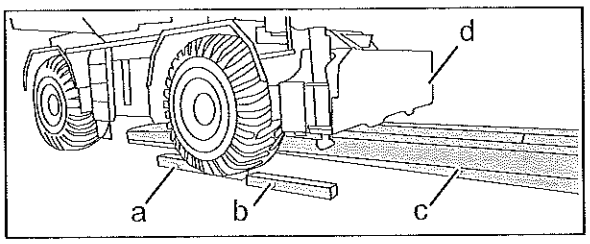


Fig 4-145 Put timbers

a. Timber b. Timber c. Trailer d. Crane

7. Retract and properly stow the outrigger jacks, outriggers, and outrigger floats.

NOTE :
Make sure the machine wheels land at the timbers properly while retracting.

8. Drive the machine back off the trailer.

NOTE :
It may be necessary to place more timbers under the wheels as the machine is driven backwards so that the frame will clear the trailer.

9. Park the machine at the desired location.

10. Shut down the engine.

Refer to "Engine shutdown procedure".

SANY

Maintenance

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5.Maintenance

5.1 Maintenance Information

5.1.1 General

Do not perform any maintenance and/or repairs not authorized in this Safety, Operation & Maintenance manual. Always observe and follow all safety precautions.

NOTICE

Failure to perform the safety rules when and how directed could result in machine damage and improper machine operation.

5.1.2 Checks Before Maintenance

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

Review the maintenance log and follow these points to ensure your safety:

- Do not perform any maintenance not authorized in this manual. If maintenance is required that is not listed in this manual, contact your Sany dealer before proceeding.
- Avoid working on the machine while the engine is running unless required to do so in the procedure. If the engine must remain running during a procedure, always have a person in the cab who can correctly operate the machine and who is in clear contact with you at all times.
- Contact your Sany dealer if you are unable to perform the procedures listed in this manual or if additional procedures are required.
- Always use the proper tools when performing any maintenance procedures.

5.1.3 Checks After Maintenance or Repairs

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

1. With the engine off:

- Ensure all steps listed in this book have been followed.
- If necessary, have a coworker inspect your work for correct and proper completion.
- Complete the maintenance log for this machine and return it to its storage location.
- Follow the Lockout/Tagout procedure for returning the unit to operation.

2. With the machine running:

- Check for leaks in the system you have maintained.
- Be sure there are no abnormal sounds coming from the engine or hydraulic system.
- Check for any loose or abnormal movement in the system you have maintained.

- Check for any overheating in the system you have maintained

5.1.4 Hours and Mileage Reading

1. Keep track of the crane operation hours reading on a daily basis. This hour meter is on the LMI main screen in operator's cab.

2. Keep track of the mileage reading on a daily basis. This odometer is on the status display in driver's cab.

3. Keep track of the engine hours reading on a daily basis. This hour meter is on the status display in driver's cab.
Confirm meter readings with the required maintenance intervals listed in this manual.

5.1.5 Genuine Sany Replacement Parts

Use genuine Sany replacement parts when repairing or replacing a part on the machine. Failure to do so may result in premature system or part failure.

5.1.6 Sany-Approved Lubricants

Always use Sany-approved lubricants and materials. Never mix lubricants of different types. The use of unapproved lubricants and materials or mixing different types of lubricants may result in shortened service life or system failure of the machine. Refer to "Lubricants and fluids".

5.1.7 Inventory Your Tools and Parts

After performing maintenance or repairs to the machine, always take time to inventory your tools, parts used (including 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.

5.1.8 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.

5.1.9 Hydraulic Fluid Inspection

Inspect hydraulic fluid for any signs of contamination. Contact your SANY dealer for an oil analysis or replacement if any abnormality is found. Inspect the filters for signs of metal particles and foreign material and replace the abnormal ones.

NOTICE

Failure to inspect hydraulic fluid for contamination may damage the hydraulic system or cause the machine to operate improperly.

5.1.10 Inspection and Maintenance in Adverse Environments

5.1.10.1 General

If the machine will be operating under adverse conditions:

- 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.

5.1.10.2 Mud, Rain or Snow Conditions

Before operating the machine, inspect each connector for looseness.

After operating the machine, clean the machine, inspect for missing or loose bolts and nuts. Add oil and lubricating grease as needed.

Refer to "Driving precautions".

5.1.10.3 Near Ocean (Salt Air) Environments

Before operating the machine, inspect each plug and pin for looseness. Apply grease where rust is found, especially at cylinder rods and control levers.

After operating the machine, thoroughly wash away the salt residue, apply grease where rust is found, and perform maintenance carefully on the electric components to prevent corrosion.

5.1.10.4 Dusty Environments

- Clean the following components: Refer to "Clean or replace air filter elements" in this manual.
- Clean the radiator core frequently to prevent blockage.
- Replace the filters frequently.
  Refer to filters replacing procedure in this manual.

5.1.10.5 Rocky Ground Surface

Inspect the wheels and tires for damage, such as cracks, abrasions, scars, and loose or missing bolts or nuts.

5.1.10.6 Cold Environments

In extremely cold environments (32° F (0° C)), Sany recommends to use only lubricants and materials identified in this manual. Refer to "Lubricants and fluids".

Prior to starting the engine, ensure that the battery is fully charged and that the battery case and the cables have not cracked.

Contact your Sany dealer for assistance if the machine will be operated in subzero temperatures where the aid of an auxiliary heating device is needed.

NOTICE

Dispose of the used filters, drained oil and fluid in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

5.1.10.7 Other Weather Environments

NOTE :

If there is evidence of overheating of bearings or bushings, loose parts or rust during regular inspection, increase the frequency of lubrication.

Based on past experience and suggestions by lubricating oil suppliers, the lubricating intervals listed in the following tables apply only to normal operating conditions. In harsh environments, including dusty and corrosive air, abnormal external temperature, extremely heavy overload, frequent operating times, longtime duty cycle, etc., lubricating intervals should be shortened.

5.2 Environmental Protection

When you carry out maintenance work on the crane you will occasionally work with substances which are considered to be harmful to the environment according to the current national and local regulations.

NOTICE

Failure to do so could result in damage to the environment.

Dispose of the used filters, drained oil and fluid in accordance with local environmental regulations.

5.3 Maintenance Overview

5.3.1 Maintenance Intervals

5.3.1.1 Maintenance Interval for Carrier

Carry out the maintenance interval for carrier according to the crane operation hours as below.

NOTE :

The long-term maintenance interval always include the short-term ones.

NOTE :

The maintenance more than 1200 h follows the regulation of maintenance interval table as below. Refer to "Hours and mileage reading".

Always proceed with maintenance tasks when the machine is secured.

Refer to "Secure machine for maintenance".

⚠ WARNING

Do not remove the Lockout/Tagout tags from the machine when you connect the battery. These tags notify others that the machine is not to be used during maintenance. Failure to keep the tags in place could create a hazardous situation that could result in death or serious injury.

NOTICE

Dispose of the drained oil or fluid in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

NOTICE

Clean the oil inlet and outlet port before changing oil; Replace the filters after changing oil; Clean grease fitting before lubrication; Clean the surface of the parts to avoid the dust or dirt after lubrication. Failure to do this could result in damage to the machine or cause the machine to operate improperly.

Maintenance interval for each components of carrier/ crane operation hours

	Reference	Daily	Initial 100h	3 mon./ 300h	6 mon./ 600h	9 mon./ 900h	12 mon./ 1,200h
Overall Condition							
Check machine identification	"Check Engine Model and Serial Number" on page 5-25	Check machine identification (include crane model, serial number, etc.) before contacting with local Sany dealer					

	Reference	Daily	Initial 100h	3 mon./ 300h	6 mon./ 600h	9 mon./ 900h	12 mon./ 1,200h
Clean the machine	"Crane – Clean" on page 5-26	•					
Engine							
Check fuel level and quality, refill or change it if needed	"Fuel Level and Quality – Check" on page 5-28	•					
Check engine oil level and quality, refill or change it if needed	"Check Engine Oil Level and Quality" on page 5-38	•					
Check engine coolant level and quality, refill or change it if needed	"Replace Engine Oil Filter" on page 5-44	•					
Drain and change fuel	"Fuel – Drain and Change " on page 5-29	Whenever finding serious deterioration, dilution, etc					
Drain moisture from fuel water separator	"Fuel Water Separator – Drain Moisture" on page 5-35	•					
Check air cleaner	"Air Cleaner –	•					

	Reference	Daily	Initial 100h	3 mon./ 300h	6 mon./ 600h	9 mon./ 900h	12 mon./ 1,200h
	Check" on page 5-47						
Drain and change engine oil	"Drain and Change Engine Oil" on page 5-41		•	•	•	•	•
Replace engine oil filter	"Replace Engine Oil Filter" on page 5-44		•	•	•	•	•
Replace fuel filters	"Replace Fuel Filters" on page 5-32		•	Every 500h			
Replace fuel water separator	"Fuel Water Separator – Replace " on page 5-36	Every 500h					
Clean or replace air filter elements			•	Clean it every 300h; Replace it every 1,500h. Clean it more frequently in dusty area.			
Drain and change engine coolant	"Engine Coolant – Drain and Change" on page 5-53	Every 2,000h					
Check engine belt	"Check Engine belt" on page 5-56	•					
Adjust engine belt			•	•		•	

	Reference	Daily	Initial 100h	3 mon./ 300h	6 mon./ 600h	9 mon./ 900h	12 mon./ 1,200h
Lubricate alternator bearing							•
Axles							
Check the axles	"Axles – Check" on page 5-60			•	•	•	•
Check the gear oil levels and quality in the axle centre drives, refill or change it if need	"Level and Quality of the Axle Center Drive – Check" on page 5-61			•	•	•	•
Check the gear oil levels and quality in the axle final drives, refill or change it if need	"Level and Quality of the Axle Center Drive – Check" on page 5-61			•	•	•	•
Drain and change gear oil in axle centre drives	"Axle Center Drive Gear Oil – Drain and Change" on page 5-63		•	Every 1,000h or 1 year whichever comes first			
Drain and change gear oil in axle final drives	"Drain and Change Gear Oil" on page 5-68		•	Every 1,000h or 1 year whichever comes first			
Lubricate axles	"Axles – Lubricate"		•	Every 500h			

	Reference	Daily	Initial 100h	3 mon./ 300h	6 mon./ 600h	9 mon./ 900h	12 mon./ 1,200h
	on page 5-70						
Check wheels and tires	"Check Wheels and Tires" on page 5-71	•					
Steering System							
Check steering function	"Steering Function – Check" on page 5-73	•					
Lubricate steering system	"Lubricate Steering System" on page 5-74	Every 100h					
Transmission							
Check gear oil level and quality in the transmis-sion, refill or change it if need	"Check Gear Oil Level and Quality" on page 5-75	•					
Drain and change gear oil in transmis-sion	"Drain and Change Gear Oil" on page 5-77	Every 1,000h					
Replace transmis-sion filter	"Transmis-sion Filter" on page 5-80		•	Every 500h			
Driveline							
Check drivelines	"Drivelines – Check" on page 5-82	•					

	Reference	Daily	Initial 100h	3 mon./ 300h	6 mon./ 600h	9 mon./ 900h	12 mon./ 1,200h
Lubricate drivelines	"Drivelines – Lubricate" on page 5-83	Every 100h					
Electrical System							
Check the function for electrical compo-nents of carrier	"Function for Electrical Compo-nents of Carrier – Check" on page 5-84	●					
Check the batteries	"Batteries – Check" on page 5-85			●	●	●	●
Other Maintenance Work							
Check the oil and fluid leaks		●					
Lubricate outrigger beams	"Outrigger Beams – Lubricate" on page 5-87	Every 100h					
Lubricate suspension	"Suspen-sion System – Lubricate" on page 5-87	Every 100h					

NOTE :
Mark "●" stands for maintenance demanded.

5.3.1.2 Maintenance Interval for Superstructure

Carry out the maintenance interval for superstructure according to the crane operation hours as below.

NOTE :
The long-term maintenance interval always include the short-term ones.

NOTE :
The maintenance more than 1000h follows the regulation of maintenance interval table as below.

Refer to "Hours and mileage reading".

Always proceed with maintenance tasks when the machine is secured.

Refer to "Secure machine for maintenance".

⚠ WARNING

These tags notify others that the machine is not to be used during maintenance.
Failure to keep the tags in place could create a hazardous situation which, could result in death or serious injury.
Do not remove the Lockout/Tagout tags from the machine when you connect the battery.

NOTICE

Failure to do so could result in damage to the environment.
Dispose of the drained oil or fluid in accordance with local environmental regulations.

NOTICE

Clean the oil inlet and outlet port before changing oil; Replace the filters after changing oil; Clean grease fitting before lubrication; Clean the surface of the parts to avoid the dust or dirt after lubrication. Failure to do this could result in damage to the machine or cause the machine to operate improperly.

Maintenance interval for each components of superstructure/ crane operation hours

	Reference	Daily	Initial 1 month/ 100h	3 month/ 250h	6 month/ 500h	9 month/ 750h	12 month/ 1,000h
Wire Ropes							
Inspect hoist wire ropes	"Wire Rope (Hoist Wire Ropes) –	•					

	Reference	Daily	Initial 1 month/ 100h	3 month/ 250h	6 month/ 500h	9 month/ 750h	12 month/ 1,000h
	Inspect" on page 5-90						
Inspect boom extend and retract wire ropes	"Wire Rope (Boom Extend and Retract Wire Ropes) – Inspect" on page 5-91	•					
Lubricate wire ropes	"Wire Ropes – Lubricate" on page 5-93		•	•	•	•	•
Adjust extend wire ropes				•	•	•	•
Adjust retract wire ropes				•	•	•	•
Hook Blocks							
Check main hook block	"Main Hook Block – Check" on page 5-95	•					
Check headache ball	"Headache Ball – Check" on page 5-96	•					
Lubricate hook block	"Hook Block – Lubricate" on page 5-97		•	•	•	•	•
Main Boom and Boom Extension							
Check boom and boom extension	"Boom and Boom Extension –	•					

	Reference	Daily	Initial 1 month/ 100h	3 month/ 250h	6 month/ 500h	9 month/ 750h	12 month/ 1,000h
	Check" on page 5-98						
Align boom sections	"Boom Sections – Align" on page 5-99			•	•	•	•
Lubricate main boom and boom extension	"Main Boom and Boom Extension – Lubricate" on page 5-106	Every 100h					
Swing Mechanism							
Check the gear oil level and quality in swing drive, refill or change it if needed	"Check the Gear Oil Level and Quality" on page 5-113		•	•	•	•	•
Drain and change the gear oil in swing drive	"Drain and Change the Gear Oil" on page 5-114			•	•	•	•
Check swing system mounting bolts	"Check Swing System Mounting Bolts" on page 5-116			•	•	•	•
Check the swing gear and drive pinion				•	•	•	•
Check the swing brake					•		•

	Reference	Daily	Initial 1 month/ 100h	3 month/ 250h	6 month/ 500h	9 month/ 750h	12 month/ 1,000h
Lubricate swing mechanism	"Swing Mechanism – Lubricate" on page 5-119	Every 100h					
Hoist							
Check hoist mounting bolts	"Hoist Mounting Bolts – Check" on page 5-120			•	•	•	•
Check the gear oil level and quality in hoist drive, refill or change it if needed	"Gear oil level and quality – Check" on page 5-120		•	•	•	•	•
Drain and change the gear oil in hoist drive	"Gear Oil – Drain and Change" on page 5-122			•	•	•	•
Lubricate hoist bearing carrier		Every 100h					
Hydraulic System							
Check the hydraulic oil level and quality, refill or change it if needed	"Hydraulic Oil Level and Quality – Check" on page 5-125	•					
Drain and change the hydraulic oil	"Hydraulic Oil – Drain and Change" on page 5-126		•	Every 24 months or 2,000h			

	Reference	Daily	Initial 1 month/ 100h	3 month/ 250h	6 month/ 500h	9 month/ 750h	12 month/ 1,000h
Replace reservoir breather	"Reservoir Breather – Replace" on page 5-134	Every 24 months or 2,000h					
Replace hydraulic filter	"Hydraulic Filter – Replace" on page 5-135		•	Every 6 months or 500h			
Check main valve	"Main Valve Body – Check" on page 5-138			•	•	•	•
Check hydraulic lines	"Check Hydraulic Hoses" on page 5-138	•					
Electrical System							
Check the function for electrical components of superstructure	"Electrical Components of Superstructure – Check" on page 5-140	•					
Air Conditioner							
Check refrigerant				•	•	•	•
Check cooling fan				•	•	•	•
Check hoses and connections				•	•	•	•
Check the refrigerant compressor				•	•	•	•
Check cooling function		Run the A/C in cooling mode for 10 minutes every month					

	Reference	Daily	Initial 1 month/ 100h	3 month/ 250h	6 month/ 500h	9 month/ 750h	12 month/ 1,000h
Other Maintenance Work							
Check the oil and fluid leaks, and A/C refriger-ant leaks		●					
Check wind-shield wash-ing fluid level		●					
Check wind-shield washer		●					

NOTE :
Mark "●" stands for maintenance demanded.

5.3.2 Lubricants and Fluids

5.3.2.1 Lubricants and Fluids

Always use Sany-approved lubricants, fluids and filters. Sany is not responsible for damage caused by using unauthorized lubricants, fluids and filters.

NOTICE

Failure to follow these standards can cause damage to the machine or cause the machine to operate improperly.
Never mix fluids of different brands or viscosities (weights) and never overfill the system you are servicing.

Location	Approximate Capacity*	Lubricant/Coolant
Fuel system	300 L	No. 0 diesel or No. –10/ No. –20 diesel in cold weather conditions.
Engine oil	15 L	Sany recommends CF-4 (GB III), CH-4 (GB IV), CI-4 (GB V) and CK-4 (GB VI) 15W40 engine oil, or 0W40, 5W40 and 10W40 engine oil in cold weather conditions.
Engine cooling system	12.5kg	Sany recommends –45°C ethanediol coolant.

Location	Approximate Capacity*	Lubricant/Coolant
Hydraulic reservoir	405 L	Sany recommends long-acting and antiwear HM46 hydraulic oil or equivalent.
Hydraulic system	486 L	Sany recommends long-acting and antiwear HM46 hydraulic oil or equivalent.
Swing drive	4.5 L	Sany recommends L-CKD 220 (85W-140 GL-5) gear oil or equivalent.
Main hoist drive	1.5 L ea.	Sany recommends L-CKD 220 (85W-140 GL-5) gear oil or equivalent.
Auxiliary hoist drive		
Front axle centre drive	18 L ea.	Sany recommends 80W-90 GL-5 gear oil or equivalent.
Rear axle centre drive		
Front axle final drive	4.5 L ea.	Sany recommends 80W-90 GL-5 gear oil or equivalent.
Rear axle final drive		
Transmission unit (include torque converter)	35 L	SANY recommends ATF DEXRON III transmission oil or equivalent for DANA3410FTMG14601.
Grease	N/A	Sany recommends lithium-based grease (-Extreme Pressure) EP 2 or equivalent.
Mineral spirits	N/A	Type II odorless mineral spirits and/or Class 1 (-high flashpoint)
Windshield washer fluid	2 L	Automotive windshield washer fluid.

NOTE :

The capacities in the above table are approximations. For exact capacities, use the inspection points, inspection plugs, dipsticks, and sight gauge.

5.3.2.2 Fuel

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to heed this danger will result in death or serious injury.

Sany recommends the use of No. 0 fuel for all normal operations. Use of No. –10/No. –20 diesel fuel is permitted in cold weather environments (below 32°F (0°C)).

NOTE :

Sany does not recommend the use of any diesel fuel with a cetane level less than 40.

NOTE :

Do not use gasoline, kerosene or any unapproved fuels in the fuel system.
Be sure that there is no water or any foreign material in the fuel.

Take appropriate precautions to prevent fuel contamination during refueling.

NOTE :

Never dilute fuels. Damage to the injection system can result which causes the machine to operate improperly.

5.3.2.3 Engine Oil Viscosity/Temperature Data

Temperature °f (°C) Oil Type	–22 (–30)	–4 (–20)	5 (–15)	32 (0)	50 10.	68 (20)	86 (30)	104 (40)	122 (50)
SAE 15W-40									
SAE 10W-30									
SAE 5W-30									
SAE 5W-40									
SAE 40W									

NOTE :

Due to its comparatively better lubricating characteristics (including improved oil consumption, engine operation in frigid climates, and continued lubrication in high temperatures), SAE 5W-40 is recommended for a majority of climates. In some circumstances, short-term use of low-viscosity engine oil in cold temperatures (below 23°F/–5°C) is acceptable; however, long- term use can reduce engine life.

5.3.2.4 Lubricating Grease/Temperature Data

Temperature °f (°C) Oil Type	–58 (–50)	–40 (–40)	–22 (–30)	–4 (–20)	14 (–10)	32 (0)	50 10.	68 (20)	86 (30)	104 (40)	122 (50)
NGLI #2 molybdenum disulfide lithium-based grease											
FT-2269A lithium-based grease											

NOTE :

Always use clean EP (extreme pressure) grease when greasing the machine. Avoid using low viscosity greases. Selection of the proper lubricating grease is based on local operating climate and conditions.

5.3.2.5 Gear Oil (Swing, Main&Aux Hoist Drive)/Temperature Data

Temperature °f (°C) Oil Type	–22 (–30)	–4 (–20)	14 (–10)	32 (0)	50 10.	68 (20)	86 (30)	104 (40)	122 (50)
L-CKD 220 (85W-140)									
L-CKT 220									

NOTE :
Any brand meeting AGMA standard 9005-D94, ISO 3448 grade 220 is acceptable. Selection of the proper gear oil is based on local operating climate and conditions.

5.3.2.6 Gear Oil (Axle)/Temperature Data

Temperature °f (° C) Oil Type	–22 (–30)	–4 (–20)	14 (–10)	32 (0)	50 10.	68 (20)	86 (30)	104 (40)	122 (50)
80W90									
75W/90GL-5									

NOTE :
Selection of the proper gear oil is based on local operating climate and conditions.

5.3.2.7 Hydraulic Oil/Ambient Temperature Data

Temperature °F (°C) Oil Type	–22 (–30)	–4 (–20)	14 (–10)	32 (0)	50 10.	68 (20)	86 (30)	104 (40)	122 (50)
L-HM46 antiwear hydraulic oil									
TellusArctic 32 low temperature antiwear hydraulic oil									

Temperature °F (°C) Oil Type	–22 (–30)	–4 (–20)	14 (–10)	32 (0)	50 10.	68 (20)	86 (30)	104 (40)	122 (50)
L-HV68 high temperature antiwear hydraulic oil									

NOTE :

Selection of the proper hydraulic oil is based on local operating climate and conditions:

- Use L-HM46 antiwear hydraulic oil in generally temperate climates.
- Use TellusArctic 32 low-temperature antiwear hydraulic oil (pour point is –43.6°F (–42°C)) in generally arctic areas where ambient temperatures can reach – 22° F (– 30° C) during operation.

  Use L-HV68 high temperature antiwear hydraulic oil in tropical zone, such as the Middle East or India.

NOTICE

To prevent damage to the hydraulic system, perform the following warm-up procedure in ambient temperatures below 32°F (0°C):

Start the engine and run it at idle speed for 7–10 minutes; then increase the engine speed to 1,200 rpm and perform only no-load traveling for at least 30 minutes or until the hydraulic oil temperature is at least 68°F (20°C).

Proceed with normal operation only after completing warm-up as described above or else adjust the warm-up period according to the ambient temperature. During normal construction operation, take care to operate the controls slowly and observe the traveling system for any signs of trouble. Operation with oil temperature of 68°F (20°C) or below may damage the hydraulic system.

5.3.3 Secure Machine for Maintenance

1. Obtain the maintenance log for this machine and complete it at the close of all maintenance tasks.

2. Read and understand the tasks for the maintenance interval.

3. Follow the Lockout/Tagout procedure.
Refer to "Lockout/Tagout procedure" in Chapter 2.

NOTE :

Allow the systems to cool down before proceeding with any maintenance.

NOTE :

If you need to start the engine for a maintenance task, follow the procedures in Operation section for safety precautions.
Refer to "Engine Start Procedure".

4. When the machine is secured, precede with the maintenance tasks.

⚠ WARNING

Do not remove the Lockout/Tagout tags from the machine when you connect the battery. These tags notify others that the machine is not to be used during maintenance. Failure to keep the tags in place could create a hazardous situation which, could result in death or serious injury

5.4 Description of Maintenance Work on the Carrier

5.4.1 General

⚠ WARNING

Failure to keep the tags in place could create a hazardous situation which, could result in death or serious injury.
Do not remove the Lockout/Tagout tags from the machine when you connect the battery. These tags notify others that the machine is not to be used during maintenance.

5.4.2 Carrier Overall Condition

5.4.2.1 Check Engine Model and Serial Number

1. Open the engine access covers on the rear deck.

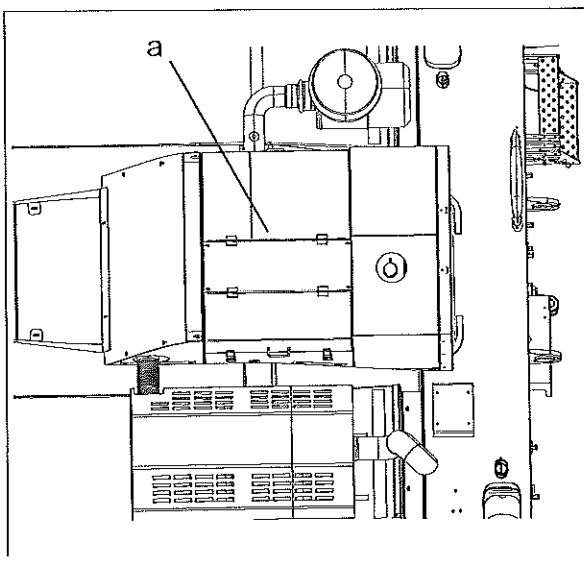


Fig 5-1 Open the engine access covers

a. Engine access covers

2. Check the engine model and serial number on the top of engine.

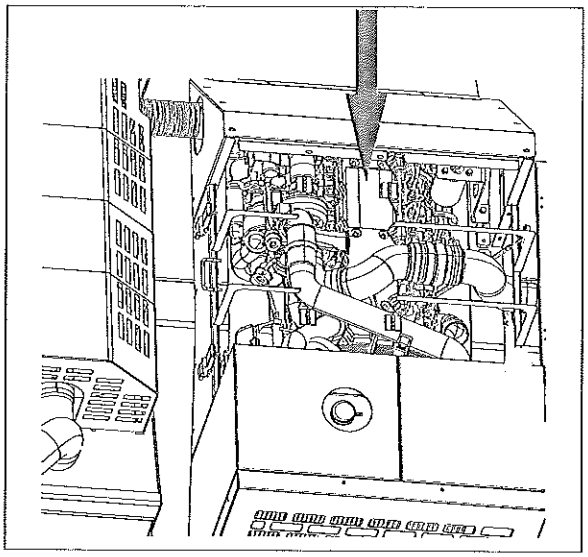


Fig 5-2 Check the engine model and serial number

3. Close the engine access covers.

5.4.2.2 Crane – Clean

Clean the machine at the end of workday.

Refer to "Maintenance interval for overall condition of carrier" before proceeding with this procedure.

Secure the machine before clean the machine.

Refer to "Secure machine for maintenance" in this manual..

Refer to "Environmental precautions" before proceeding with this procedure.

1. Avoid flushing the electrical terminals, electrical components, electronic equipment, plugs and horns directly with high pressure water. Failure to do this will cause the electrical issues.

2. Do not spray water to an electrical components and air intake of the engine. Failure to do this will cause engine starting failed or electrical components damaged.

3. Do not clean the inside of cab by spraying water. Failure to do this will cause electrical components damaged.

4. Do not clean the inside of the cab with organic solvent, and never bleach or colorize it; Some common cleaning fluid may contain organic solvent.

5. Clean the machine immediately after driving on the road with salt water or chemicals.

6. Do not clean the machine with sharp tools. Failure to do this will cause the paint damaged.

7. Check the service brake and electrical components after cleaning the machine.

NOTICE

Failure to protect the electrical system when cleaning the machine may damage the machine or cause it to operate improperly.

5.4.3 Maintenance for Engine

5.4.3.1 Fuel

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

⚠ DANGER

Risk of fire or explosion!

Failure to follow these rules will get fire or explosion, result in death or serious injury.

- Do not use a match or a cigarette lighter in the gas station.
- Leave the crane far away and follow safety directions if get a fire during the fueling process.
- Shut down the engine before fueling.

⚠ WARNING

Risk of personal injury!

Failure to do so could get fire or explosion and result in burns or other serious injury.

- Read and observe all the warning items at the gas station.
- Before touching the fuel tank, touch other metal parts of the crane and keep a certain distance from the neck of the fuel filler, petrol nozzle, or other gas sources.
- Once starting the filling operation, do not return into the crane, and do not touch, rub, or glide over any article or textile (polyester, damask, nylon, etc.).
- Make the fuel container touch on the ground first when using a portable fuel container.
- Do not use any cellular mobile phone when fueling.

5.4.3.2 Fuel Level and Quality – Check

1. Turn the ignition switch to the on position.

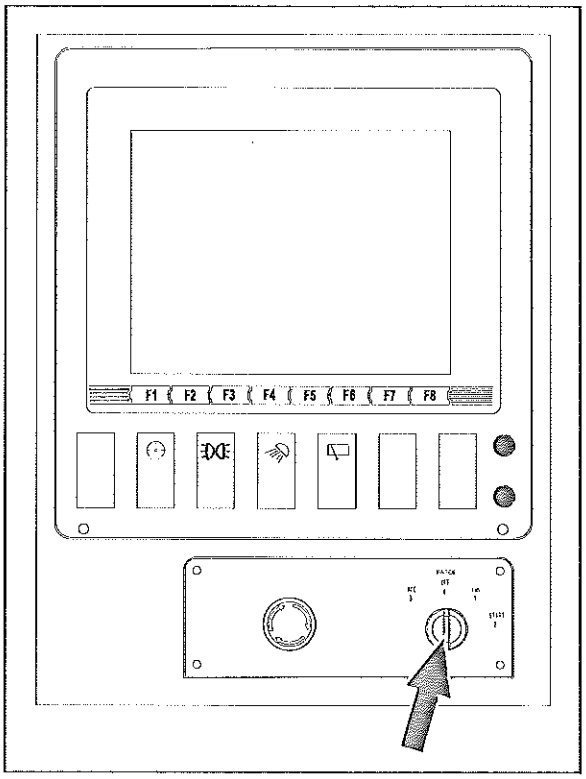


Fig 5-3 Ignition switch

2. Check the fuel level display on main screen

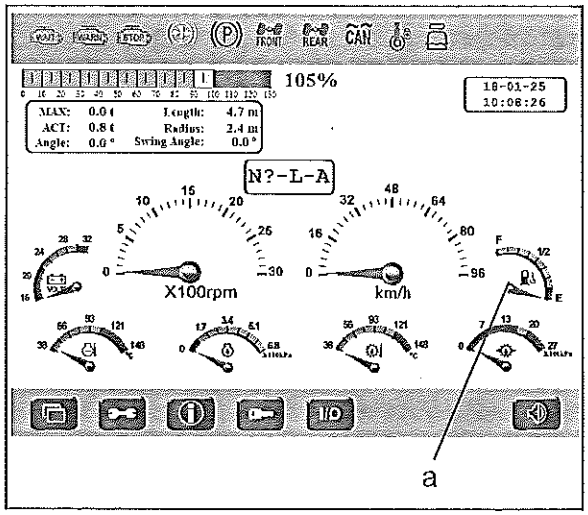


Fig 5-4 Open the filler cap of fuel tank

a. Fuel level display

3. Add fuel as necessary.

Refer to "Refueling"for safety information.

⚠ DANGER

Never open the filler cap of fuel tank near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

5.4.3.3 Fuel – Add

1. Locate the fuel tank on the left side of the machine.

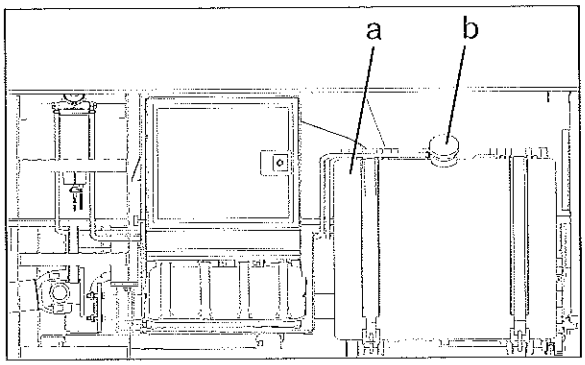


Fig 5-5

a. Fuel tank
b. Fuel tank cap

2. Remove the fuel tank cap.

3. Add fuel as necessary.

4. Close the fuel tank cap tightly.

⚠ CAUTION

• The fuel is toxic, always keep it away from children and pets.
• The fuel may harm physical health and environment, so it should be avoided to let fuel into eyes or onto skin. If any fuel comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with fuel, wash the clothes immediately; If eat fuel by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

5.4.3.4 Fuel – Drain and Change

Drain and change the fuel if finding serious deterioration, dilution, etc.

Choose the specified type of fuel according to ambient temperature in different seasons.

Refer to "Lubricants and fluids".

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

If the fuel filter has been blocked because metal or abrasive particles entered the system, all fuel systems must be thoroughly checked, drained, and flushed.

1. Shut down the engine. Turn the ignition switch off two minutes before proceeding to the next step.

2. Set the battery disconnect switch to the OFF position.

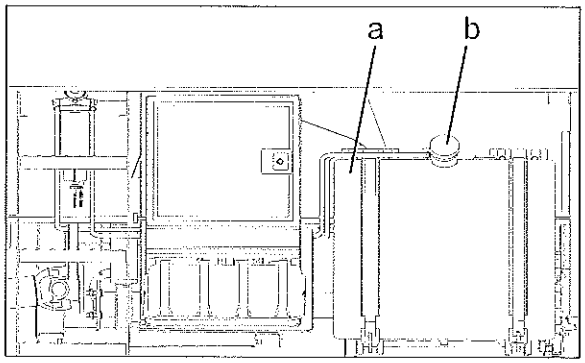


Fig 5-6 Remove the fuel tank cap

a. Fuel tank
b. Fuel tank cap

3. Remove the filler cap from the top of the fuel tank.

4. Place a suitable container under the drain plug at the bottom of fuel tank.

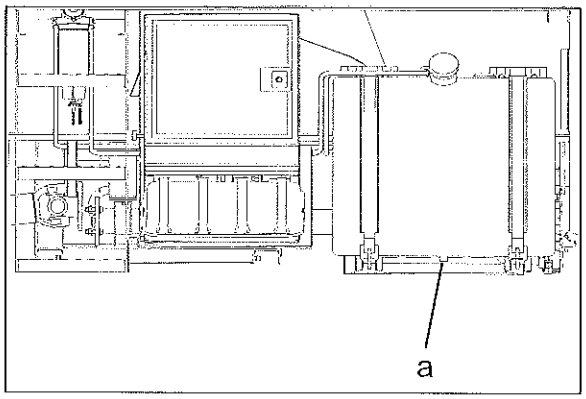


Fig 5-7 Remove the drain plug at bottom of fuel tank

a. Drain plug

5. Remove the drain plug. Allow about three minutes after water and contaminants stops flowing from the drain port for the side walls to drain.

NOTE :
Do not drain any fuel on the ground.

NOTE :
Dispose of the contaminated fuel in accordance with local environmental regulations.

6. Clean and install the drain plug.

7. Fill the fuel tank with a mineral spirits, to clean and flush the tank.

Choose the mineral spirits refer to "Lubricants and fluids"

8. Agitate the fluid inside the tank to loosen and remove any remaining residue.

9. Remove the drain plug of fuel tank, to drain the mineral spirits into a suitable container.

10. Replace the seals and install the drain plug.

11. Fill fuel to the fuel tank as necessary.

⚠ CAUTION

• The fuel is toxic, always keep it away from children and pets.
• The fuel may harm physical health and environment, so it should be avoided to let fuel into eyes or onto skin. If any fuel comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with fuel, wash the clothes immediately; If eat fuel by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

NOTICE

Dispose of the contaminated fuel and mineral spirits in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

12. Replace the fuel filter.

Refer to "Replace fuel filter".

13. Replace the fuel filter.

Refer to "Replace fuel water separator".

14. Loosen the priming pump of fuel water separator. Use the priming pump to fill both fuel filters with diesel and remove the air. Then tighten the priming pump.

15. Start the engine and keep it running at an idle speed.

16. Check for fuel leaks in the primary fuel system.

5.4.3.5 Replace Fuel Filters

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

1. Open the engine access covers on the rear deck.

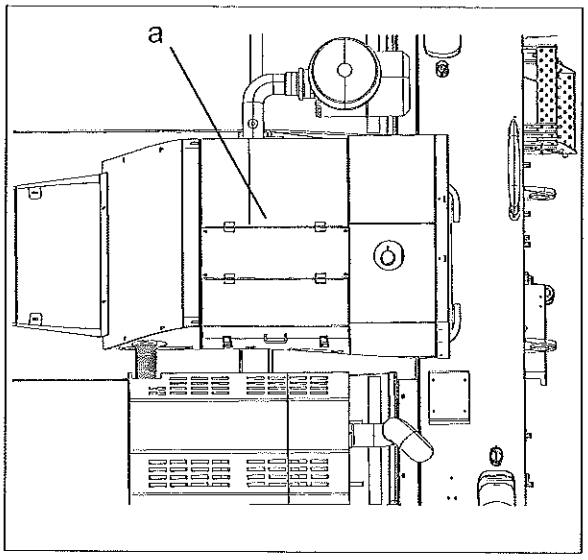


Fig 5-8 Open the engine access covers

a. Engine access covers

2. Place a fuel collection container with appropriate size below the fuel filter.

3. Using the belt wrench, remove and discard the used fuel filters.

NOTE :

Do not drain fuel on the ground or dispose of used filters improperly.

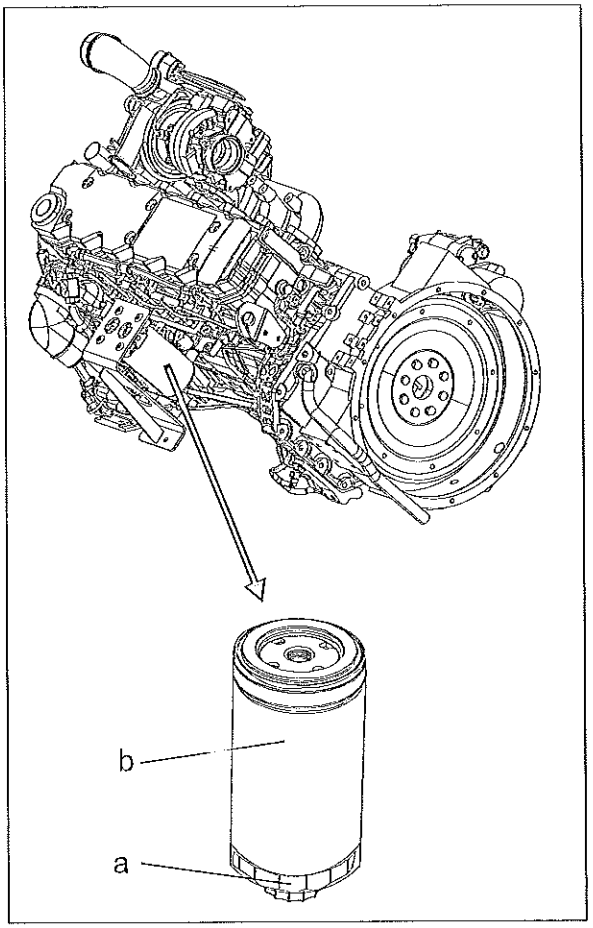


Fig 5-9 Replace the fuel filter

a. Filter cup
b. Filter

NOTICE

Dispose of the used filters and fuel in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

4. Position the new fuel filter upright as shown in the illustration and plug in the center hole of the filter, fill the filter with fresh clean diesel fuel through inlet holes until the filter is completely full.

NOTE :

Leave plug in place until the filter has been filled with fresh fuel and you are ready to install it on the filter support.

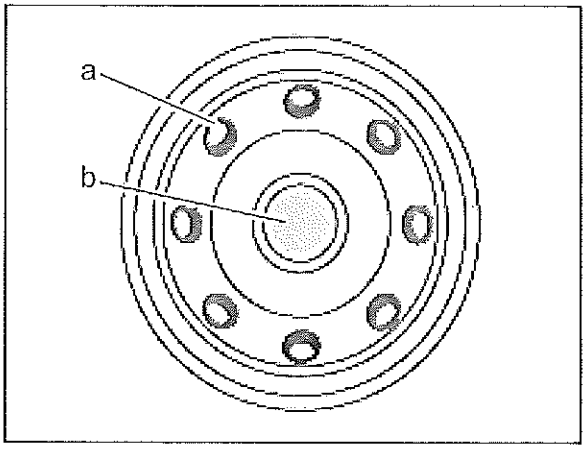


Fig 5-10 The center hole of filter

a. Inlet holes
b. Plug

5. Remove plug from the center hole of the filter, then install the filter on the filter support as shown in the illustration.

6. Follow the directions on the fuel filter body when installing the new fuel filter onto the filter bracket.

7. Start the engine and allow it to run at an idle speed.

"Engine procedures"

NOTE :

Check for fuel leaks in the primary fuel system.

⚠ DANGER

Never replace the fuel filters near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

⚠ CAUTION

•The fuel is toxic, always keep it away from children and pets.
•The fuel may harm physical health and environment, so it should be avoided to let fuel into eyes or onto skin. If any fuel comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with fuel, wash the clothes immediately; If eat fuel by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

5.4.3.6 Fuel Water Separator – Drain Moisture

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

An fuel water separator is an equipment to separate moisture from the fuel system, which can avoid engine failure caused by moisture contained in fuel.

Drain and change the fuel if finding serious deterioration, dilution, etc while draining fuel water separator.

Refer to "Drain and change fuel".

1. Place a fuel collection container with appropriate size below the fuel water separator.

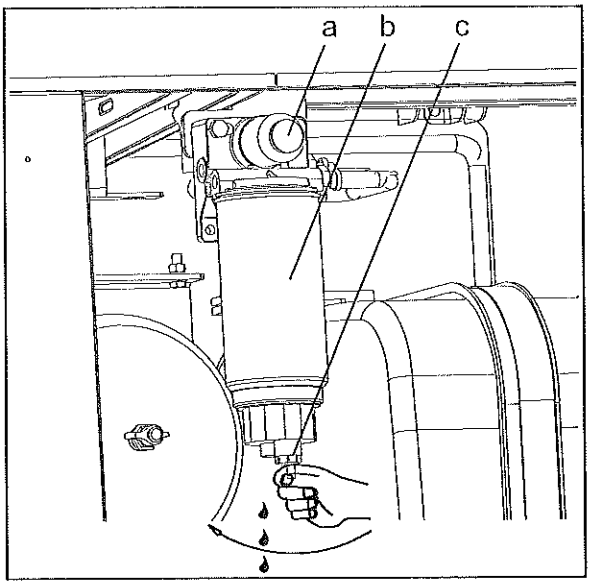


Fig 5-11 Open the drain cock to allow all water or contaminated fuel to drain

a. Priming pump
b. Fuel water separator

c. Drain cock

2. Open the drain cock to allow all water or contaminated fuel to be drained from the fuel water separator.

NOTE :
Do not drain any fuel on the ground.

3. Close the drain cock when the flow from fuel water separator is free of water and contamination.

4. Properly dispose of the contaminated fuel.

5. Loosen the priming pump of fuel water separator.

Use the priming pump to fill both fuel filters with diesel and remove the air.

Tighten the priming pump.

6. Start the engine and allow it to run at an idle speed.

Refer to "Engine start procedure".

NOTICE

Avoid draining the fuel water separator completely to prevent air entering the fuel system.
Failure to do this could result in damage to the machine and personal property, or cause the machine to operate improperly.

5.4.3.7 Fuel Water Separator – Replace

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

⚠ DANGER

Never replace the fuel water separator near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

1. Locate the fuel/water separator at the left side of the crane.

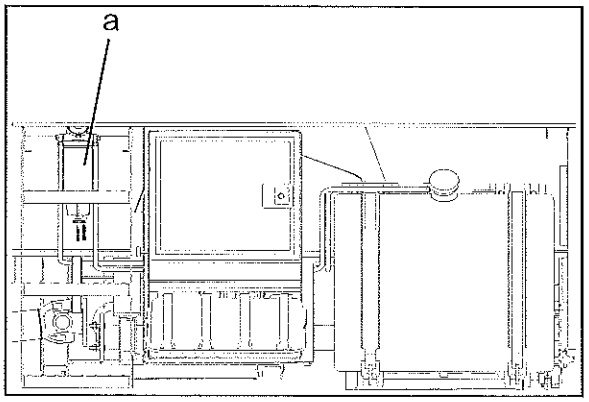


Fig 5-12

a. Fuel/water separator

2. Place an appropriate size container under the primary fuel/water separator.

3. Open the drain cock and drain the fuel level below the collar (see the fuel level at bottom bowl), then close the drain cock.

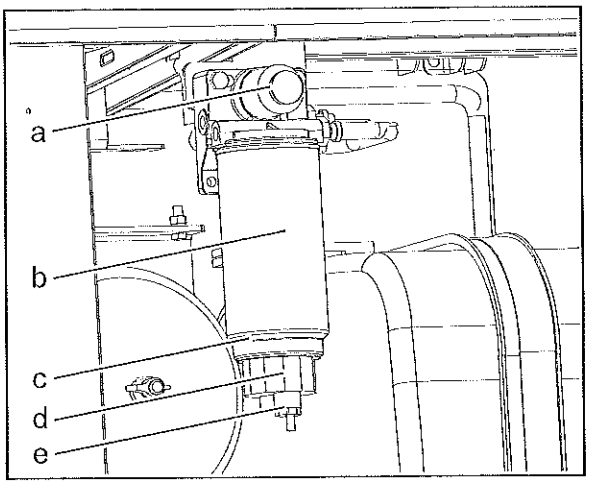


Fig 5-13 Replace the fuel water separator

a. Priming pump
b. Fuel water separator
c. Collar
d. Bottom bowl
e. Drain cock

4. Loosen the priming pump.

5. Disconnect the electrical leads of water-in- fuel (WIF) sensor.

6. Using the belt wrench, remove and discard the used fuel water separator.

NOTE :

Do not drain fuel on the ground or dispose of used filters improperly.

NOTICE

Dispose of the used fuel water separator in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

7. Fill the fuel water separator with fresh clean fuel through inlet holes until the filter is completely full.

NOTE :
Leave plug in place until the fuel water separator has been filled with fresh fuel, then you are ready to install it.

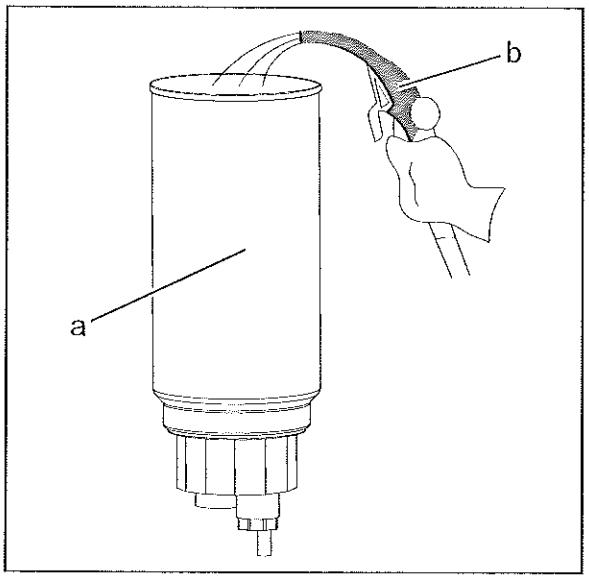


Fig 5-14 Fill the fuel water separator with fresh clean fuel

a. Fuel water separator
b. Fueling nozzle

8. Install the new fuel water separator on the filter bracket.

9. Plug the electrical leads of WIF sensor.

10. Loosen the priming pump of fuel water separator.

Use the priming pump to fill both fuel filters with diesel and remove the air. Tighten the priming pump.

11. Start the engine and keep it running at an idle speed.

Refer to "Engine start procedure".

12. Check for fuel leaks in the primary fuel system.

5.4.3.8 Check Engine Oil Level and Quality

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure. .

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

Park the machine on a flat ground. Keep the engine running up to normal working temperature. Check the warning lamp for engine oil pressure in driver's cab. Then check the engine oil as following steps.

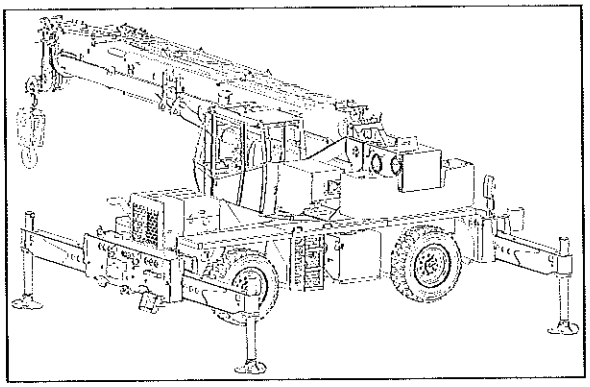


Fig 5-15 Rotate the superstructure so that the boom is over the side

a. Superstructure
b. Outriggers

1. Rotate the superstructure so the boom is over the side.

2. Shut down the engine and wait for a few minutes (about 5min) till oil returns to the oil pan.

Refer to "Engine shutdown procedure".

3. Open the engine access covers on the deck.

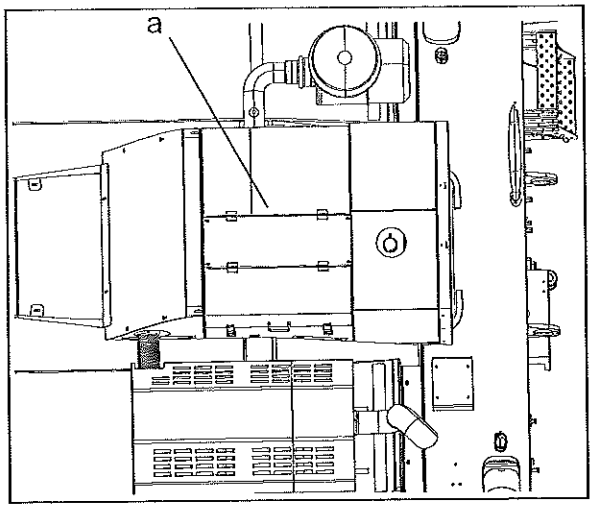


Fig 5-16 Open the engine access covers

a. Engine access covers

4. Pull out engine oil dipstick, then check the quality of engine oil.

Drain and change the engine oil if finding badly black color or serious deterioration, dilution, etc while checking.

Refer to "Drain and change engine oil" .

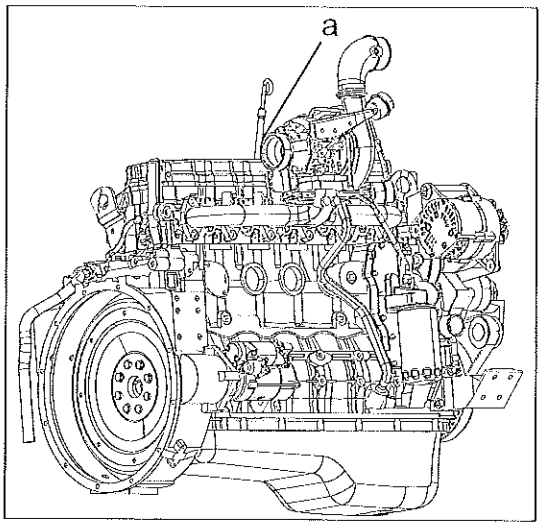


Fig 5-17 Pull out engine oil dipstick

a. Engine oil dipstick

5. Reinsert engine oil dipstick after wiping it up with a clean rag.

6. Pull out the level dipstick again, and check the oil level.

The oil level must be between the Min. and Max. marks on the engine oil dipstick.

- • If less, refill engine oil via the oil filling inlet;
- If more, drain out engine oil via the oil drain plug.

NOTICE

Do not overfill the engine with oil. This could result in machine damage and improper machine operation.

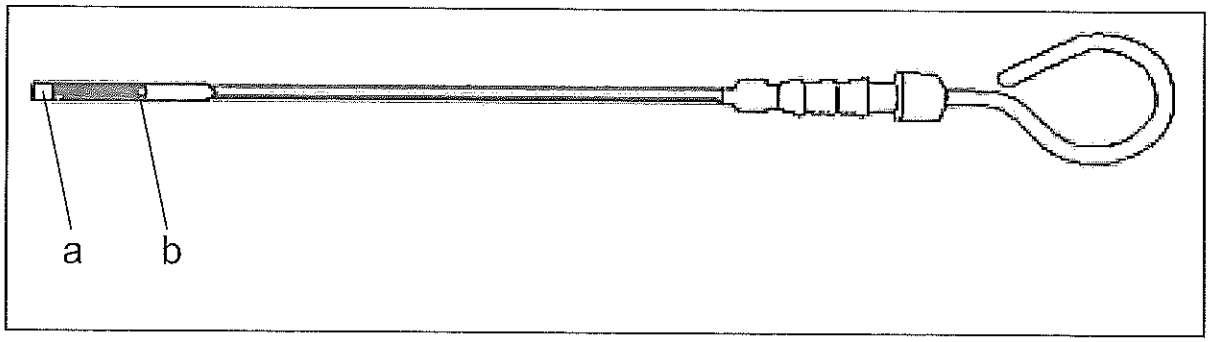


Fig 5-18 Engine oil dipstick

a. MIN. mark
b. MAX. mark

7. Close the engine access covers.

5.4.3.9 Drain and Change Engine Oil

Drain and change the engine oil if finding badly black color or serious deterioration, dilution, etc, or in accordance with regular maintenance interval.

Choose the specified type of engine oil according to ambient temperature in different seasons.

Refer to "Lubricants and fluids" .

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

1. Extend the outriggers and lower the jacks.

Refer to "Set up outrigger".

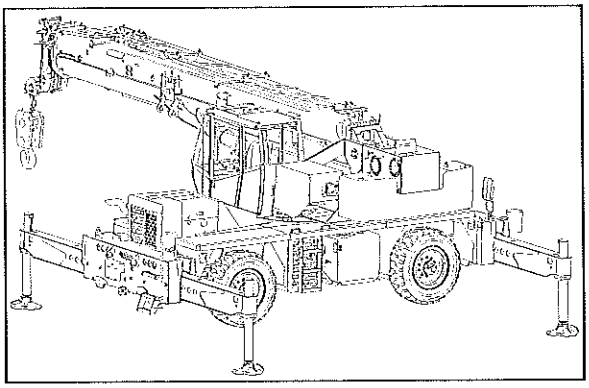


Fig 5-19 Rotate the superstructure so that the boom is over the side

2. Rotate the superstructure so that the boom is over the side.

3. Shut down the engine and wait for a few minutes (about 5min) till oil returns to the oil pan.

Refer to "Engine shutdown procedure".

4. Open the engine access covers.

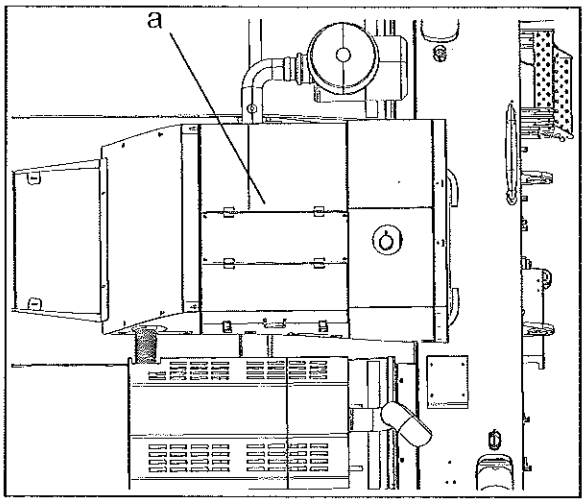


Fig 5-20 Open the engine access covers

a. Engine access covers

⚠ WARNING

Do not drain or change engine oil when the engine is hot. Wait for the engine cooling down to outdoor ambient temperature before proceeding. Failure to do so could result in burns or other serious injury.

5. Open the filler cap on the top of engine.

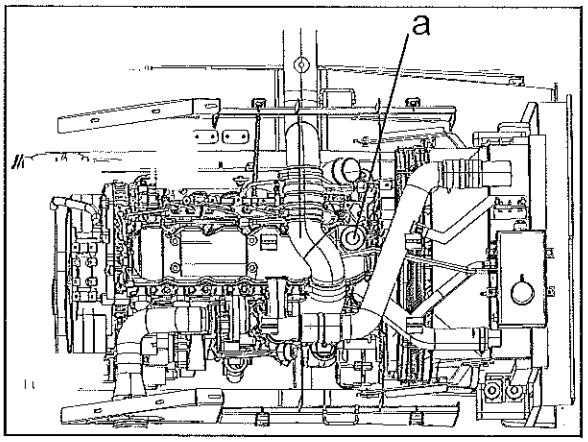


Fig 5-21 Open the filler cap on the top of engine

a. Engine oil filler cap

6. Place a engine oil collection container with appropriate size below the drain plug.

7. Remove the drain plug at the bottom of engine oil pan to drain the engine oil into container.

NOTE :
Do not drain any engine oil on the ground.

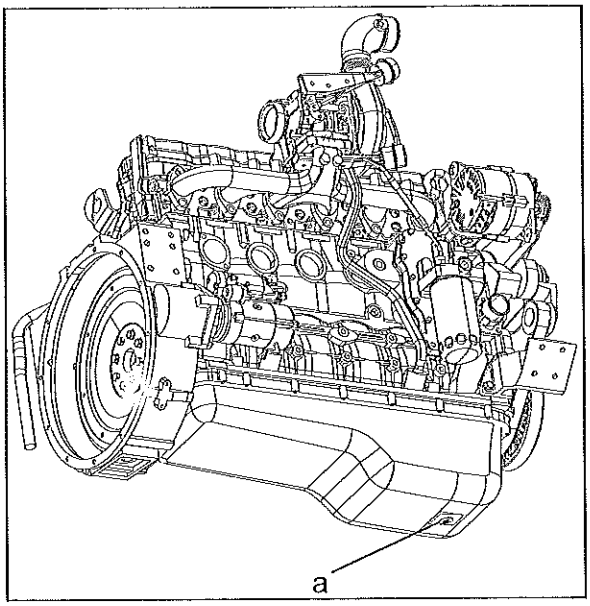


Fig 5-22 Remove the drain plug to drain the engine oil

a. Drain plug
b. Engine oil pan

8. Clean and reinstall the drain plug after the engine oil is completely drained. Replace a new seal on the plug.

NOTICE

Dispose of the contaminated engine oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

⚠ CAUTION

• The engine oil is toxic, always keep it away from children and pets.
• The engine oil may harm physical health and environment, so it should be avoided to let engine oil into eyes or onto skin. If any engine oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with engine oil, wash the clothes immediately; If eat engine oil by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

9. Fill engine oil as need via oil filling inlet by the engine oil filling nozzle or the funnel. Then secure the filler cap.

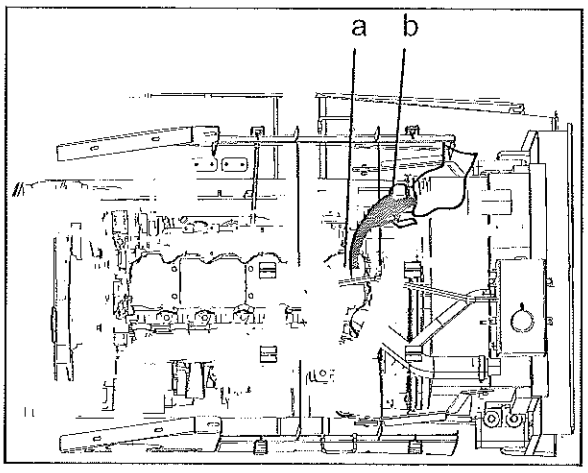


Fig 5-23 Fill engine oil as need via oil filling inlet by the engine oil filling nozzle

a. Engine oil filling inlet
b. Engine oil filling nozzle

10. Start the engine.

Refer to "Engine start procedure".

11. Check the engine oil level again.

Refer to "Check engine oil level and quality".

12. Close the engine access covers.

NOTICE

Do not overfill the engine oil. Failure to do this could result in machine damage and improper machine operation.

5.4.3.10 Replace Engine Oil Filter

Replace the engine oil filter whenever changing the engine oil, or in accordance with regular maintenance interval.

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

1. Locate Engine oil filter.

Place a oil collection container with appropriate size below the engine oil filter.

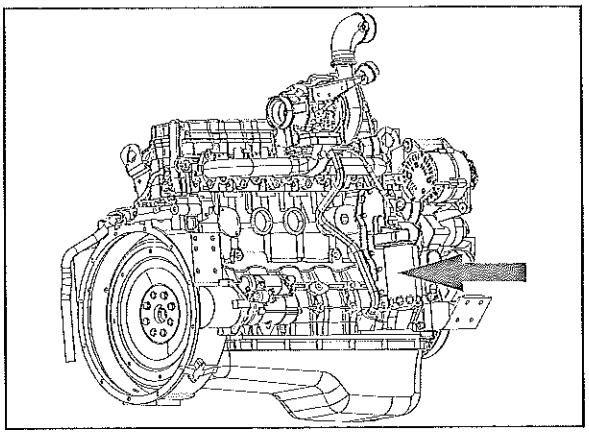


Fig 5-24 Locate engine oil filter

a. Engine oil filter

⚠ WARNING

Do not replace engine oil filter when the engine is hot. Wait for the engine cooling down to outdoor ambient temperature before proceeding. Failure to do so could result in burns or other serious injury.

2. Using the belt wrench, remove and discard the used engine oil filter.

NOTE :

Do not drain engine oil on the ground or dispose of used filters improperly.

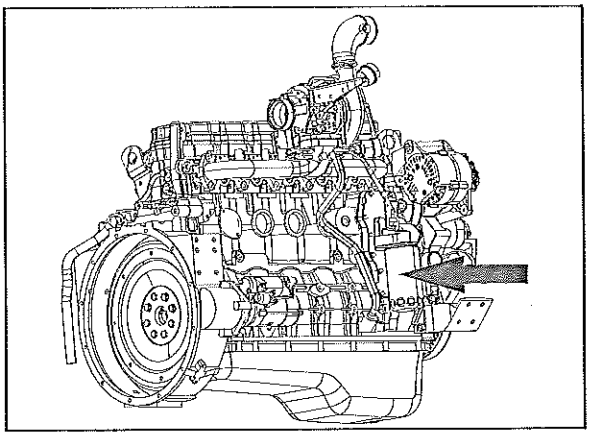


Fig 5-25 Engine oil filter

NOTICE

Dispose of the used filter and engine oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

3. Position the new engine oil filter upright and the plug in the center hole of filter.

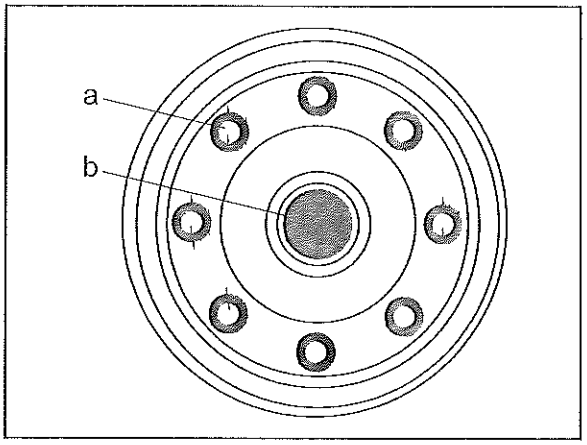


Fig 5-26 The center hole of filter

a. Inlet holes
b. Plug

4. Fill the filter with fresh clean engine oil through inlet holes until the filter is completely full.

NOTE :
Leave plug in place until the filter has been filled with fresh engine oil, then you are ready to install it.

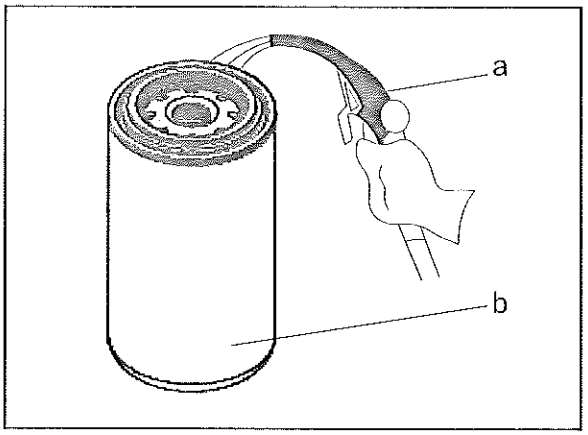


Fig 5-27 Fill the filter with fresh clean engine oil

a. Engine oil filling nozzle
b. Engine oil filter

5. Install the new engine oil filter onto the filter bracket.

NOTICE

Commercially available filters may cause harm. Only use authorized filters by SANY. Failure to do this could cause damage to the machine, and improper operation.

⚠ CAUTION

• The engine oil is toxic, always keep it away from children and pets.
• The engine oil may harm physical health and environment, so it should be avoided to let engine oil into eyes or onto skin. If any engine oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with engine oil, wash the clothes immediately; If eat engine oil by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

6. Start the engine and keep it running at an idle speed.

Refer to "Engine start procedure".

7. Check for engine oil leaks in the engine lubrication system.

Refer to "High-pressure fluid lines".

5.4.3.11 Air Cleaner

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

- A screen-type prefilter located on top of the air cleaner housing intake stack.
- A dual-element air filter system located inside the air cleaner housing.

5.4.3.12 Air Cleaner – Check

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

1. Inspect the inlet holes under the air cleaner cap for any accumulation of dirt or debris build-up.

NOTE :

If dirt or debris is found, remove the air cleaner cap and clean it using the proper cleaning solvent.

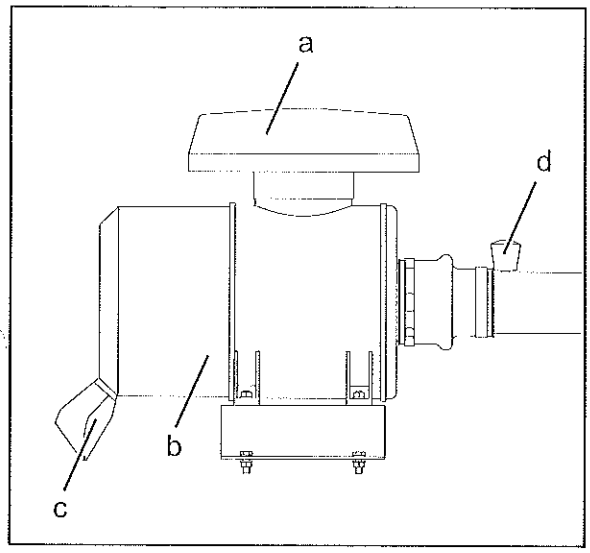


Fig 5-28 Air cleaner

a. Air cleaner cap
b. Dual-element air cleaner

c. Dust evacuator

d. Air cleaner condition indicator

2. Ensure the mounting clamps of the air cleaner are tight and the air cleaner cap is not loose on the stack after re-installation.

3. Open the dust evacuator by pinching the sides and releasing any dirt.

4. Check the condition of the dust evacuator and replace if required.

5. Check the air cleaner condition indicator. Make sure it is not plugged.

Clean or replace air cleaner elements if a red prompt appears in the indicator.

6. Check all mounting hardware for security to eliminate possible vibration of intake piping. Such vibration leads to early failure of hoses, clamps, and mounting parts, and can cause hoses to slip off the connecting pipes, allowing non-filtered air into the engine air intake.

7. Ensure all inlet accessories are the correct size and are not plugged by any foreign object.

8. Check hoses for cracks, chafing, or deterioration, and replace at the first sign of probable failure.

5.4.3.13 Service the Air Cleaner Cap

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

1. Inspect the inlet holes for any accumulation of dirt or debris build-up.

2. Remove the air cleaner cap and clean using the proper solvent as necessary.

Ensure that the mounting clamps are tight and the air cleaner cap is not loose on the stack.

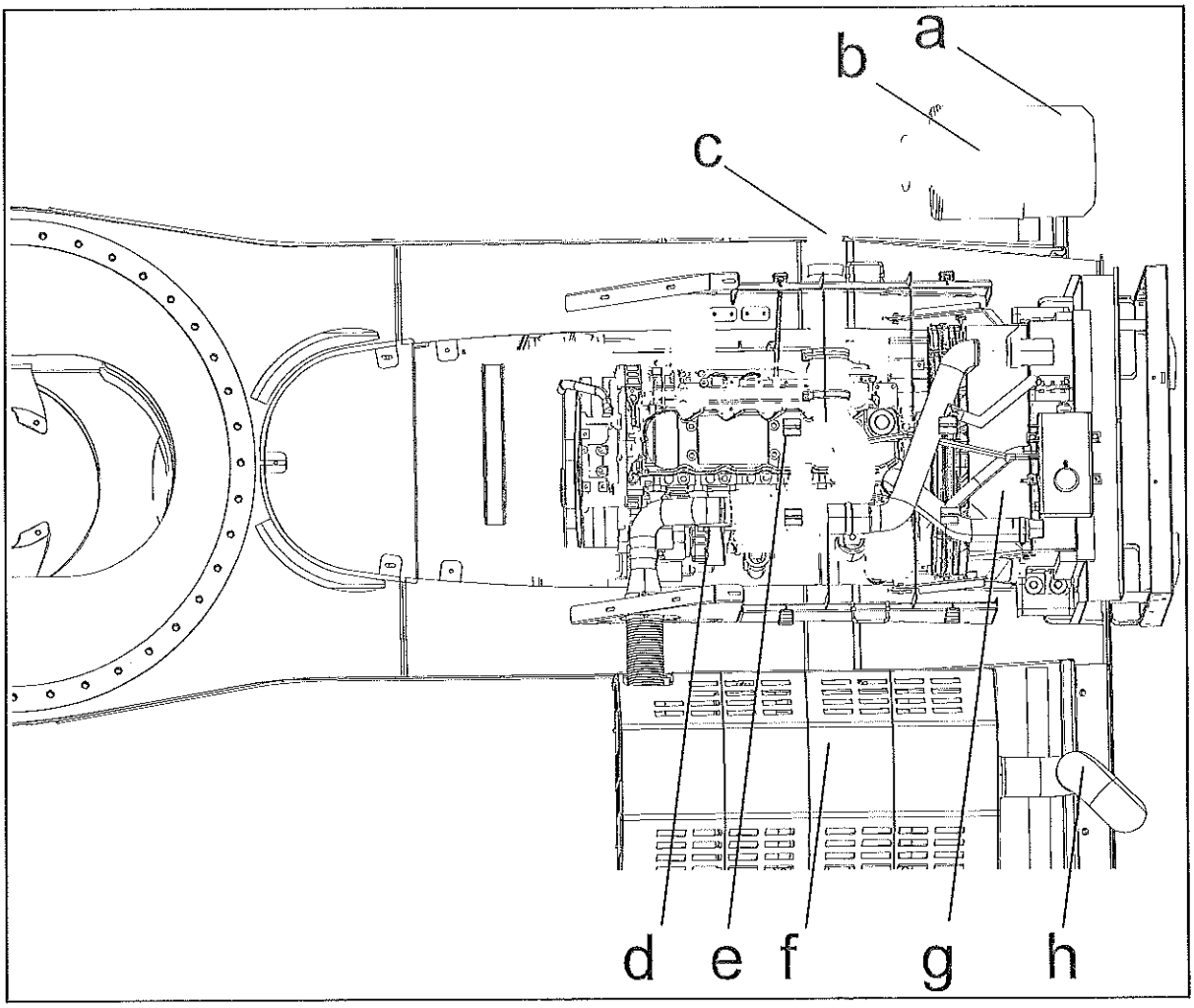


Fig 5-29

a. Air cleaner	b. Air cleaner cap	c. Filter restriction indicator gauge	d. Turbocharger
e. Engine	f. Muffler	g. Engine cooling module	h. Exhaust tail pipe

5.4.3.14 Primary Air Filter Element – Service

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

engine of carrier" before proceeding with these procedures.

To inspect or replace the primary air filter element:

1. Loosen the mounting clamps of the filter housing.

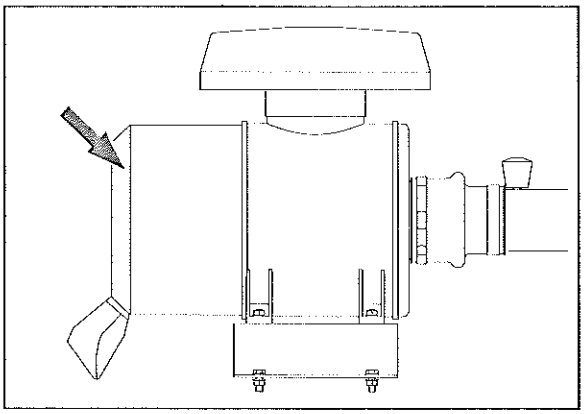


Fig 5-30 Filter housing

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

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

4. Pull the dirty primary air filter element out of the air cleaner housing.

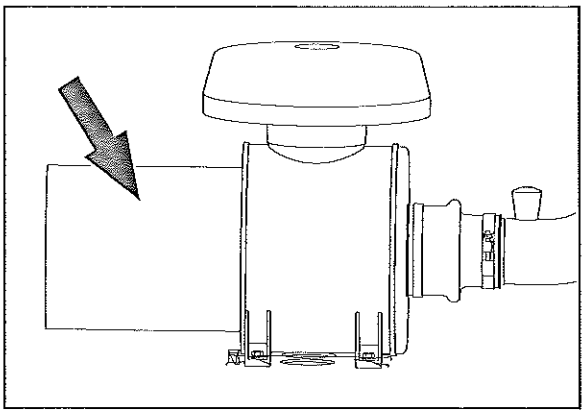


Fig 5-31 Pull the dirty primary air filter element out of the air cleaner housing

5. 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 manufacture instructions on the air cleaner when servicing the air cleaner.

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

6. Clean the inside of the air cleaner housing and cover.

7. Install new primary air filter element if the old one needs to be replaced.

8. Open the dust evacuator by pinching the sides and releasing any dirt.

9. Check the condition of the dust evacuator and replace if required.

NOTE :
If the dust evacuator is cracked, torn, remains open or is missing, dust particles that are normally expelled can deposit themselves onto the filter and will shorten air cleaner service life.

10. Install the front housing cover and secure the mounting clamps.

5.4.3.15 Secondary Air Filter Element – Service

Service the secondary air filter element refer to the maintenance procedure of primary air filter element.

Refer to "Service the primary air filter element" .

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

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

1. Remove the primary air filter element.

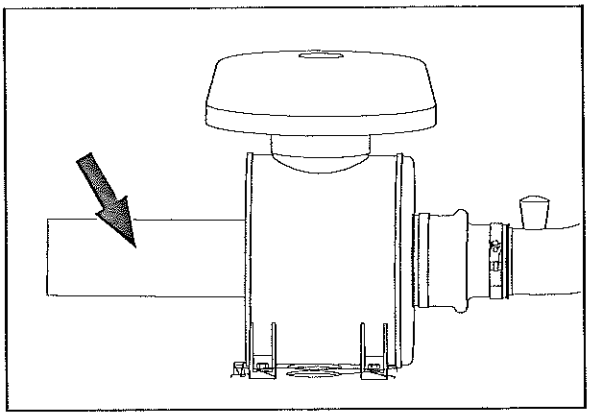


Fig 5-32 Remove the secondary air filter element

2. Remove the secondary air filter element.

3. Install a new secondary air cleaner filter element.

4. Install new primary air filter element.

5. Install the front housing cover and secure the mounting clamps.

5.4.3.16 Check Engine Coolant Level and Quality

Check the engine coolant level and quality before engine start-up.

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

1. Park the machine on a flat ground.

2. Extend the outriggers and lower the jacks.

Refer to "Set up outrigger".

3. Rotate the superstructure so the boom is over the side.

4. Shut down the engine and wait for a few minutes till the engine cools down.

Refer to "Engine shutdown procedure".

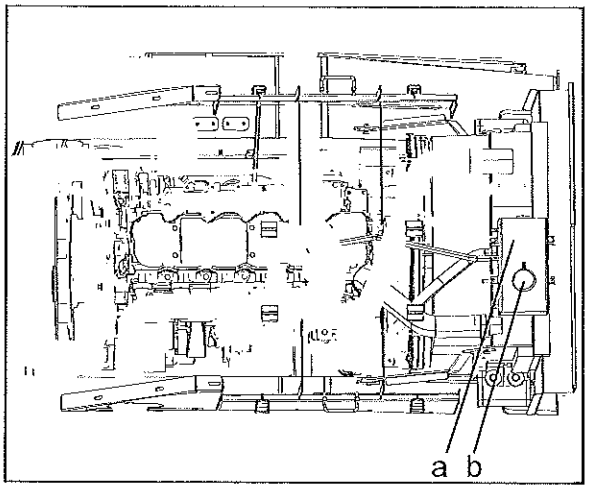


Fig 5-33 Locate the surge tank

a. Surge tank
b. Filler cap

5. Locate the surge tank.

6. Check the engine coolant level and quality.

Drain and change the engine coolant if finding serious deterioration, dilution, etc while checking.

Refer to "Drain and change engine coolant".

5.4.3.17 Engine Coolant – Drain and Change

Drain and change the engine coolant if finding serious deterioration, dilution, etc, or in accordance with regular maintenance interval.

Choose the specified type of engine coolant according to ambient temperature in different seasons.

Refer to "Lubricants and fluids" .

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

⚠ DANGER

• Never drain or change engine coolant near an open flame or while smoking because engine coolant is inflammable.
• Shut down the engine before draining or filling;
Failure to follow these rules will get fire or explosion, result in death or serious injury.

1. Park the machine on a flat ground.

2. Extend the outriggers and lower the jacks.
Refer to "Set up outrigger".

3. Rotate the superstructure so the boom is over the side.

4. Shut down the engine and wait for a few minutes till the engine cools down.
Refer to "Engine shutdown procedure".

⚠ WARNING

Do not remove the filler cap while the engine is hot. Wait for the engine to cool down to outdoor ambient temperature before proceeding. Failure to do so could result in burns or other serious injury.

5. Remove the filler cap of surge tank.

6. Place a engine coolant collection container with appropriate size below the radiator.

7. Disconnect a clamp and hose on the bottom of radiator, and drain engine coolant.

NOTE :

Do not drain any engine coolant on the ground.

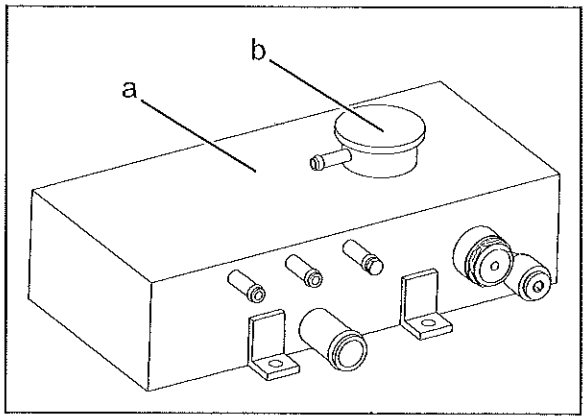


Fig 5-34 Remove the filler cap of surge tank

a. Surge tank
b. Filler cap

8. Close the opening hose after the fluid is drained completely.

⚠ CAUTION

- The engine coolant is toxic, always keep it away from children and pets.
- The engine coolant may harm physical health and environment, so it should be avoided to let engine coolant into eyes or onto skin. If any engine coolant comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with engine coolant, wash the clothes immediately; If eat engine coolant by mistake, get medical help immediately.

Failure to do this could result in minor or moderate injury.

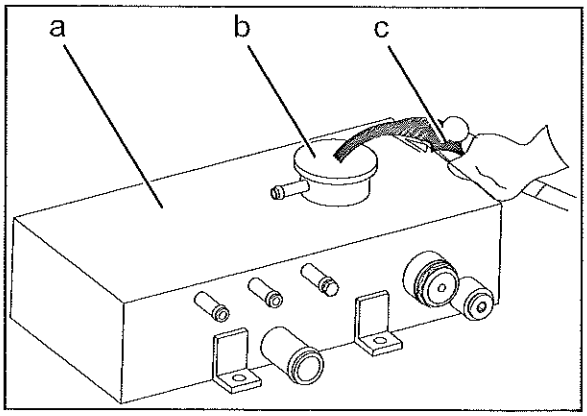


Fig 5-35 Fill engine coolant

a. Surge tank
b. Filler capc. Engine coolant filling nozzle

9. Fill engine coolant slowly to prevent air entering, via the filling inlet of reservoir by the engine coolant filling nozzle or the funnel.

10.Start the engine and wait for a few minutes till engine coolant reaches normal working temperature range. It is going to push out air from the engine cooling system.
Refer to "Engine start procedure"

11.Check the engine coolant level again.
Refer to "Check engine coolant level and quality".

12.Secure the filler cap of surge tank.

13.Check for engine coolant leaks in the engine cooling system.

NOTICE

Dispose of the contaminated engine coolant in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

5.4.3.18 Check Engine Shock Pads

1. Check the condition of the shock pads, mounting brackets and bolts.

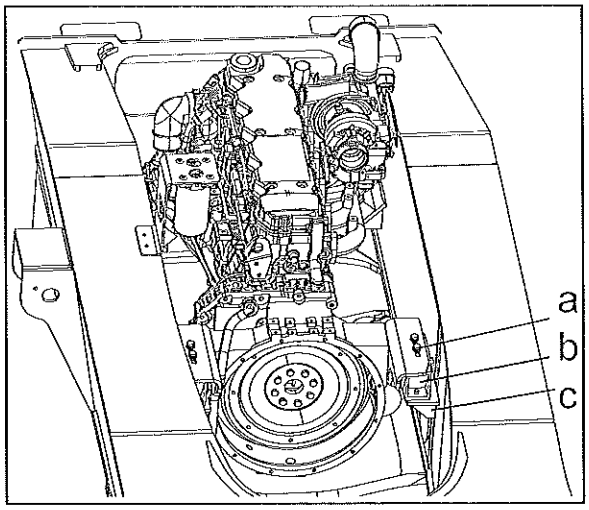


Fig 5-36 Check the engine shock pads

a. Bolt
b. Shock pads

c. Mounting bracket

2. Check that bolts are torqued to specifications.

"Torque Values".

5.4.3.19 Check Engine belt

Engine belt damage can be caused by various factors such as incorrect tension, incorrect belt size, misaligned engine pulleys, incorrectly installed belts, or by oil, grease, or hydraulic oil on the belt.

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

1. Extend the outriggers and lower the jacks.

Refer to "Set up outrigger".

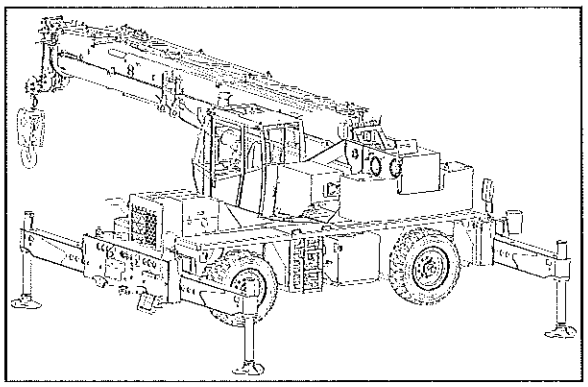


Fig 5-37 Rotate the superstructure so that the boom is over the side

2. Rotate the superstructure so that the boom is over the side.

3. Shut down the engine.

Refer to "Engine shutdown procedure".

4. Open the engine access covers to access the serpentine belt.

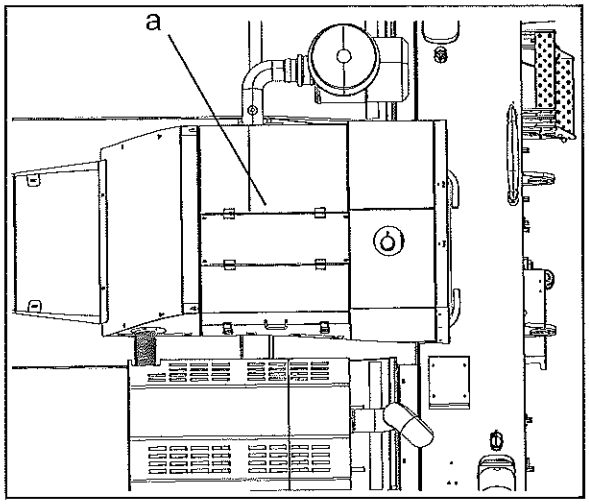


Fig 5-38 Open the engine access covers

a.Engine access covers

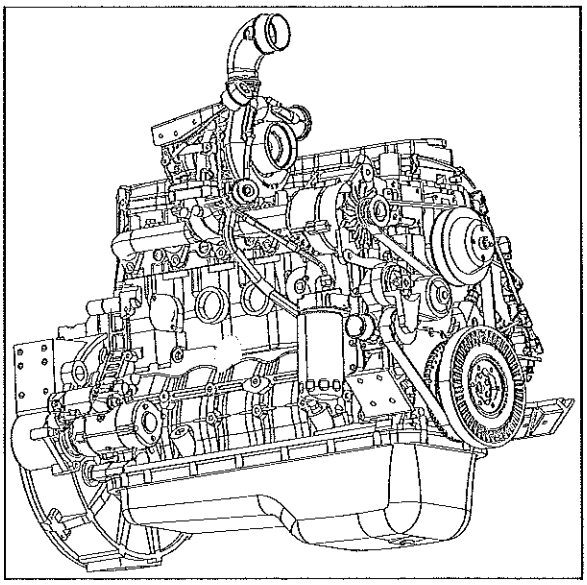


Fig 5-39 Engine

5. Check the condition of the belt for the following conditions:
   - **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.
   - **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.
   - **Pulling:** Belt material is sheared off from the ribs. Lack of tension, misalignment, worn sheaves or a combination of these are factors.
   - **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.

- **Improper installation:** A belt rib begins separating from the strands. If left unattended, the cover will often separate, causing the belt to unravel.
- **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.
- **Misalignment:** Sidewalls of the belt may appear glazed or the edge-cord may become frayed. A noticeable noise may result.
- **Gravel penetration:** Small pinholes are visible on the backside of the belt. Bumps may be visible and fabric around the holes

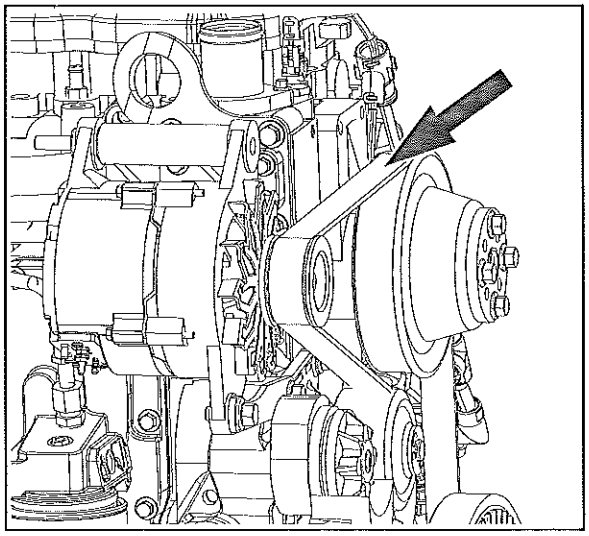


Fig 5-40 Engine belt

can be frayed, indicating damage from foreign objects such as dirt, gravel or similar debris.

6. Check the belt tensioner for looseness and tighten or adjust it as-needed.

NOTE :

Contact Sany for any belt or belt tensioner adjustment or replacement details.

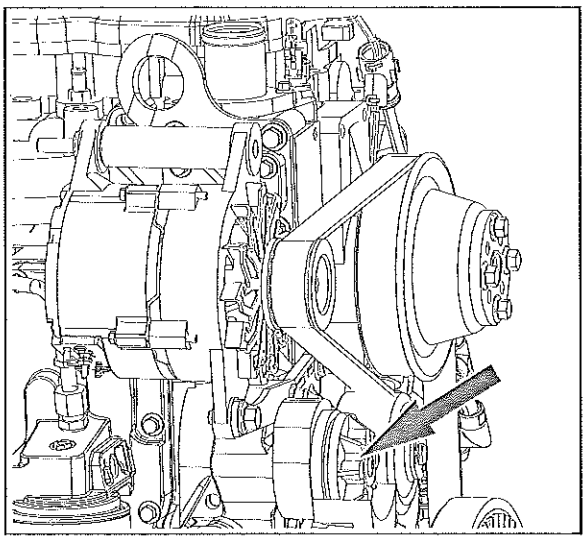


Fig 5-41 Engine tensioner

7. Close the engine access cover.

NOTICE

Replace the belt with a new one if any of these abnormalities are found. Failure to do so can cause damage to the machine, personal property and/or the environment, or cause the machine to operate improperly.

5.4.3.20 Engine Belt – Adjust

NOTICE

Risk of property damage!

Pivoting in the wrong direction can result in damage to the belt tensioner.

The belt tensioner is spring-loaded and must be pivoted away from the drive belt. The belt tensioner winds in the direction that the spring tang is bent over the tensioner body.

The proper operation of engine belt-driven components such as the alternator, Refrigerant compressor and fan clutch depend on the proper tension of the engine belt.

NOTE :

Belt tension is maintained with an automatic belt tensioner.

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Maintenance interval for engine of carrier" before proceeding with these procedures.

1. To loosen the tensioner on the belt, rotate the tensioner to wind the spring tighter.

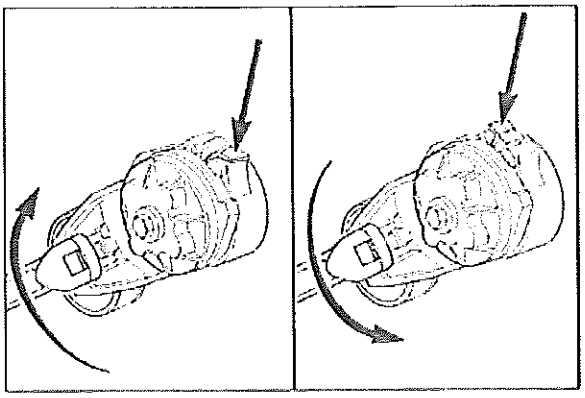
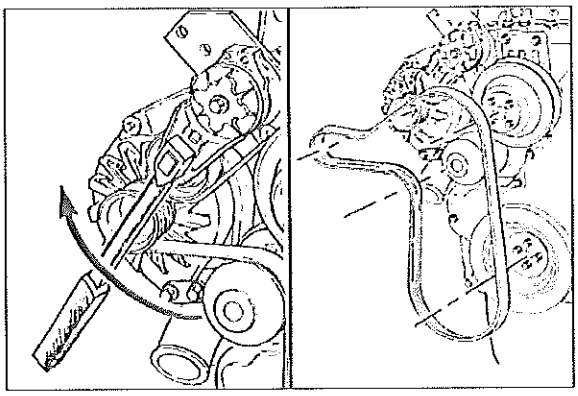


Fig 5-42

2. Pivot the tensioner in the direction of the spring tang, to remove the engine belt.

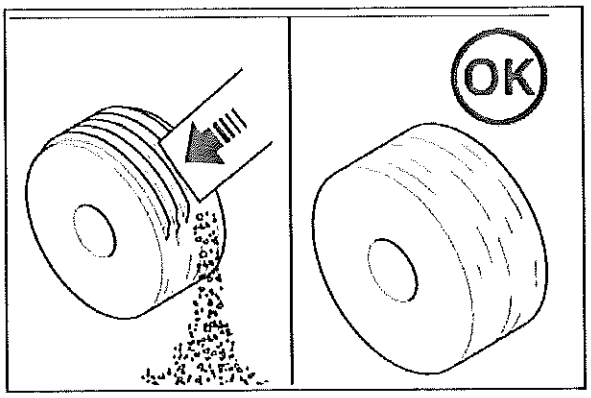


3. Remove the dirt with a suitable tool.

4. Remove the debris from the grooves of the pulley.

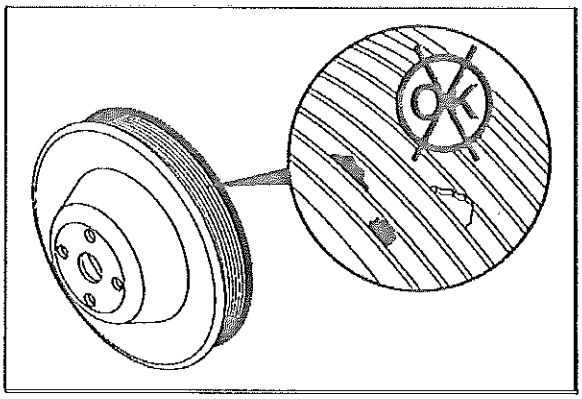
NOTE :

If the pulley has been deformed as a result of embedded foreign material, the pulley must be replaced.



5. Pivot the tensioner in the direction of the spring tang and install the drive belt, slipping the belt over the coolant pump pulley last. Slowly release the tensioner to apply tension to the drive belt.

6. Check the alignment of the belt with the tensioner and the rest of the front end accessory drive.



7. Close the engine access door

8. Set the battery disconnect switch to the ON position.

5.4.4 Maintenance for Axles

5.4.4.1 Axles – Check

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Maintenance interval for axles of carrier" before proceeding with these procedures.

1. Clean away mud and dust from the plugs of the axle drives.

2. Check the oil filling bolts and the drain plugs. The seals should be replaced if oil leakage exists.

3. Clean the vent plugs.

4. Inspect the front and rear axle mounting bolts for loose or missing bolts, cracks or any abnormal condition.
Refer to "Torque values".

5. Inspect the front and rear axle mounting bolts for loose or missing bolts, cracks or any abnormal condition.

NOTE :
If any abnormal condition is found, contact your Sany dealer for repairs.

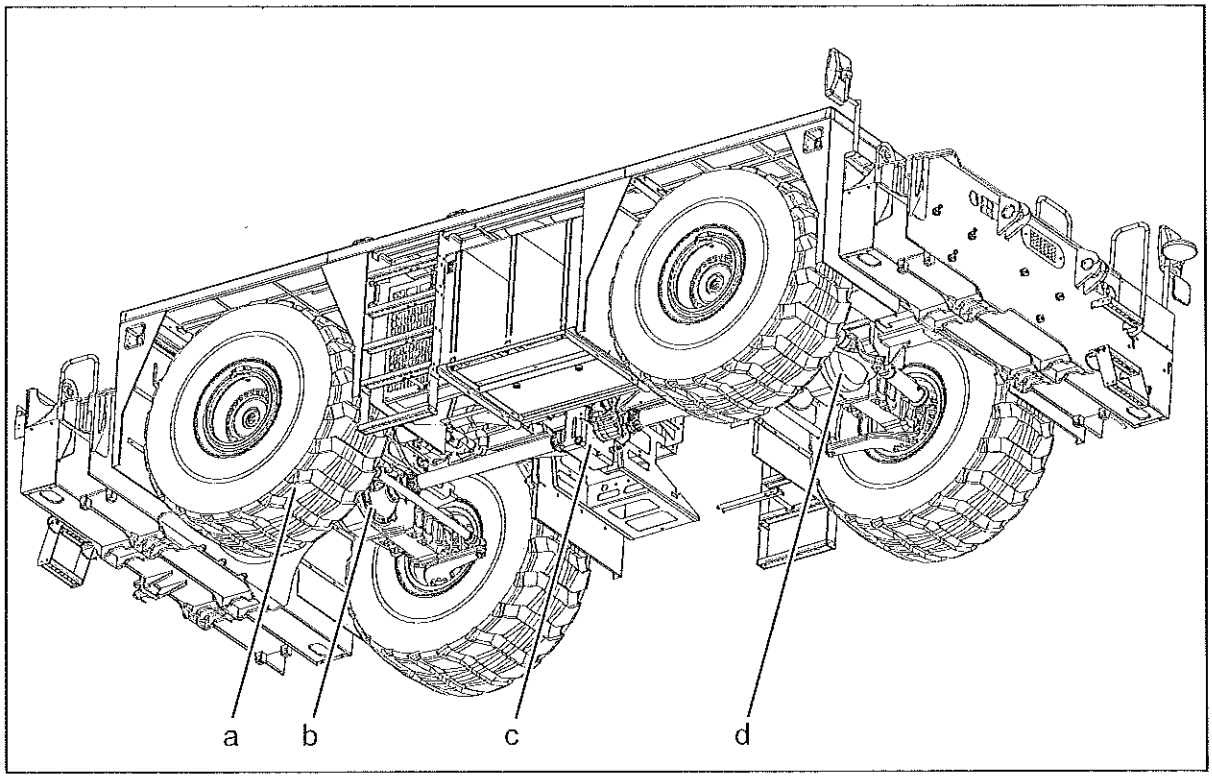


Fig 5-43 Check the axles

a. Wheel and tire	b. Rear axle assembly	c. Transmission gearbox	d. Front axle assembly

5.4.4.2 Level and Quality of the Axle Center Drive – Check

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for axles of carrier" before proceeding with these procedures.

Park the machine on a flat ground. Then check the gear oil as following steps.

1. Shut down the engine.
: Refer to "Engine shutdown procedure" .

2. Place a gear oil collection container with appropriate size below the oil level plug.

3. Remove the oil level plug.

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

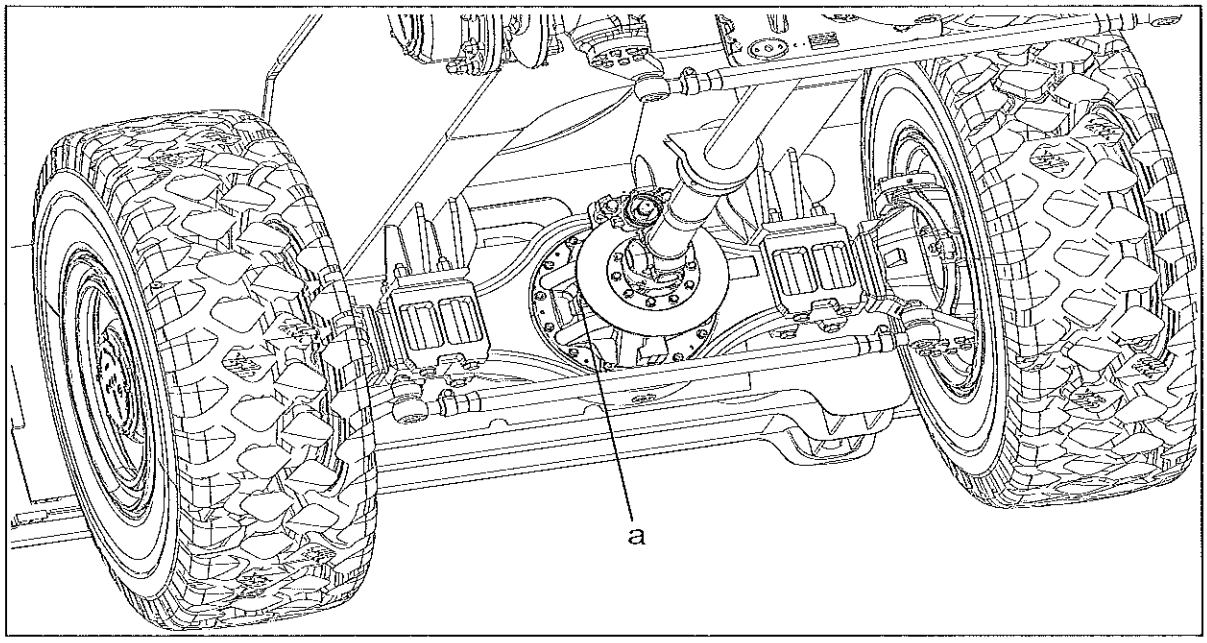


Fig 5-44 Remove the oil level plugs at center drive of front axle

a. Oil level plug

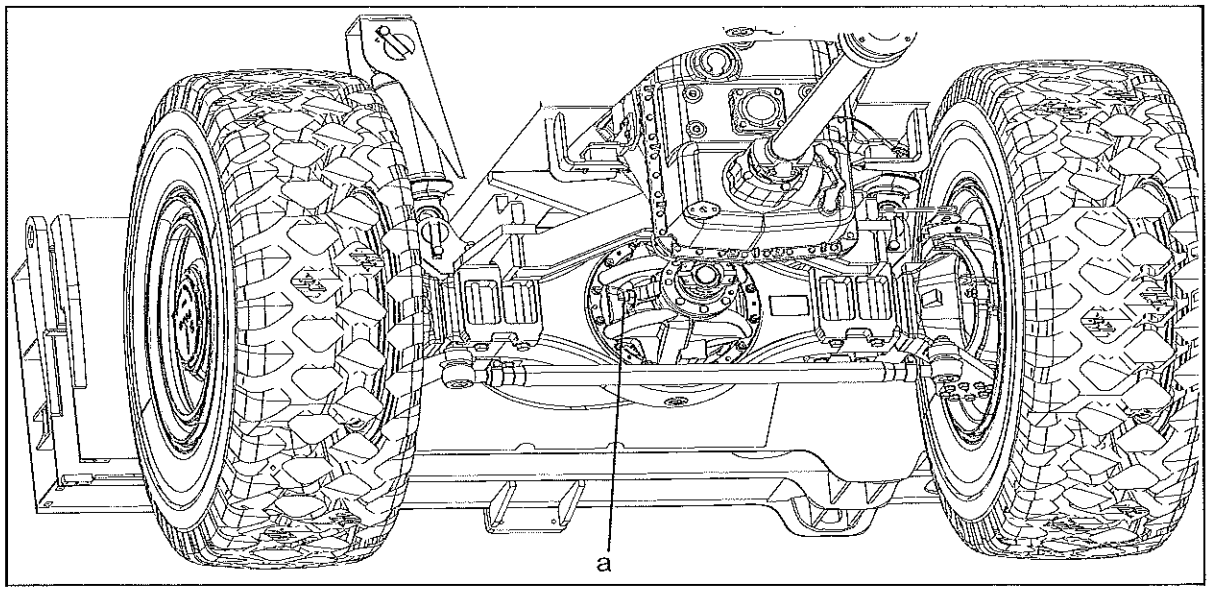


Fig 5-45 Remove the oil level plug at center drive of rear axle

a. Oil level plug

4. Check the quality of gear oil.

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc while checking.

5. Check whether the gear oil is level with the bottom of oil level hole.

- If less, refill gear oil via the oil filling inlet;
- If more, drain out gear oil via the oil level hole.

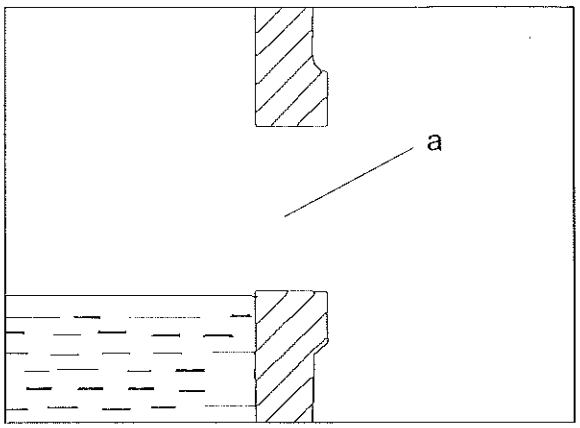


Fig 5-46 The gear oil is level with the bottom of oil level hole

a. Oil level hole

6. Replace the seal ring of plug. Clean and close opening if oil level is correct.

7. Repeat these steps above for the other axles.

NOTICE

Dispose of the contaminated gear oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

5.4.4.3 Axle Center Drive Gear Oil – Drain and Change

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

NOTICE

Dispose of the contaminated gear oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

⚠ CAUTION

• The gear oil is toxic, always keep it away from children and pets.
• The gear oil may harm physical health and environment, so it should be avoided to let gear oil into eyes or onto skin. If any gear oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with gear oil, wash the clothes immediately; If eat gear oil by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc, or in accordance with regular maintenance interval.

Choose the specified type of gear oil according to ambient temperature in different seasons.

Refer to "Lubricants and fluids"

Secure the Machine before doing this maintenance.

Refer to "Secure the machine for maintenance"

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for axles of carrier" before proceeding with these procedures.

1. Shut down the engine.
Refer to "Engine shutdown procedure" .

2. Place a gear oil collection container with appropriate size below the drain plug.

3. Remove the oil level plug.

4. Remove the drain plugs at the bottom of center drive of axles to drain the gear oil into container.

NOTE :
Do not drain any gear oil on the ground.

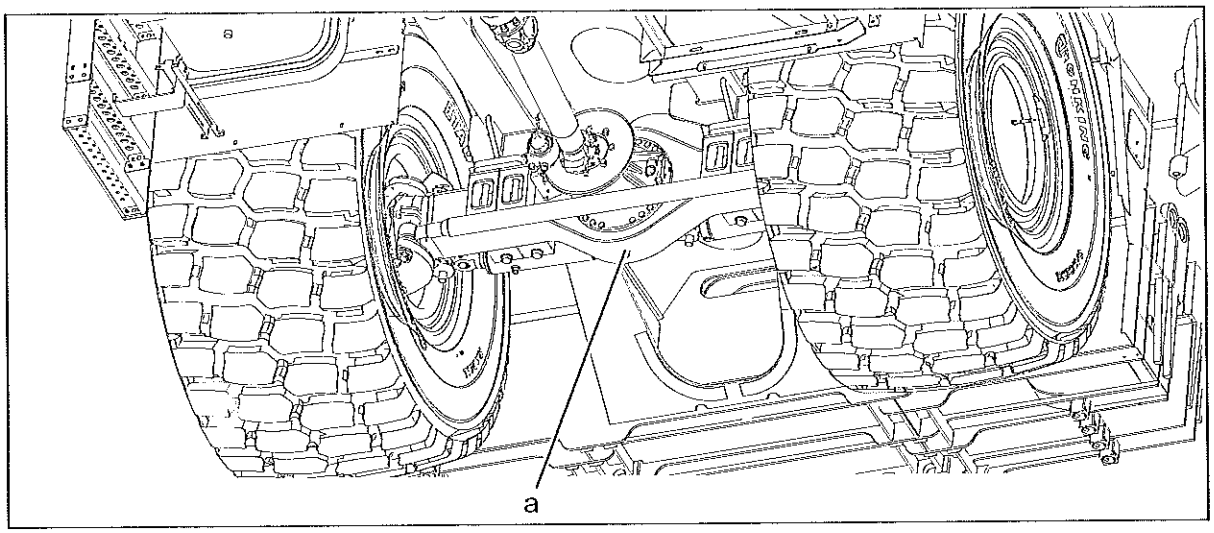


Fig 5-47 Remove the drain plugs at the bottom of center drive of front axle

a. Drain plug

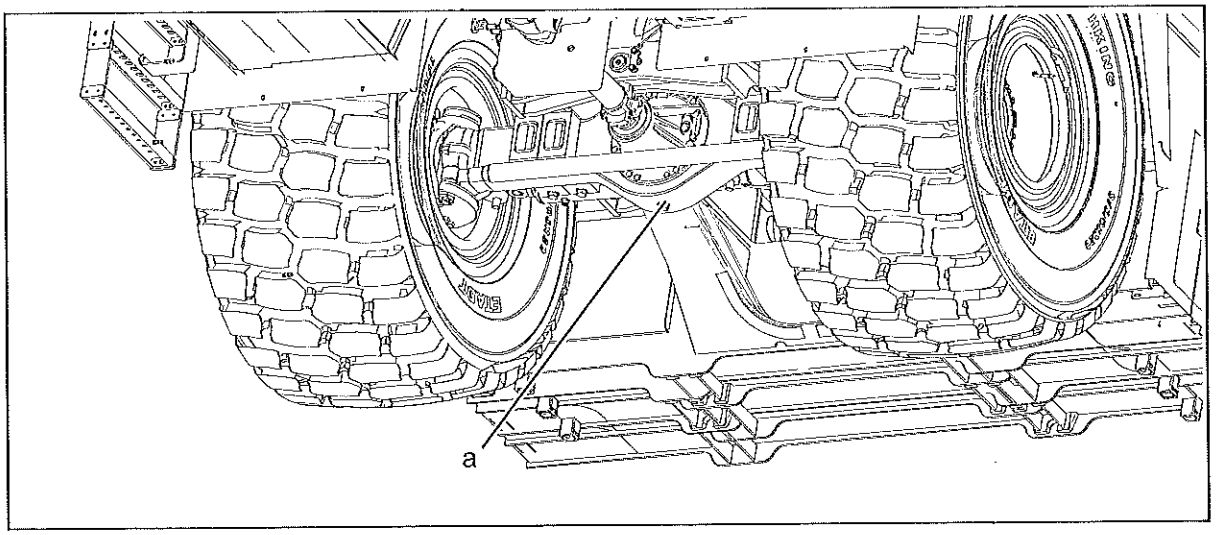


Fig 5-48 Remove the drain plug at the bottom of center drive of rear axle

a. Drain plug

5. Clean and close openings after the gear oil is completely drained. Replace a new seal on the plugs.

6. Remove the filling plug on the top of center drive of axle.

7. Fill gear oil as need via oil filling inlet by the gear oil filling nozzle or the funnel. Then secure the filling plug.

NOTE :

The gear oil is level with the bottom of oil level hole.

8. Start the engine and drive the machine to operate axles for a while.
Refer to "Engine start procedures".

9. Check the gear oil level again.

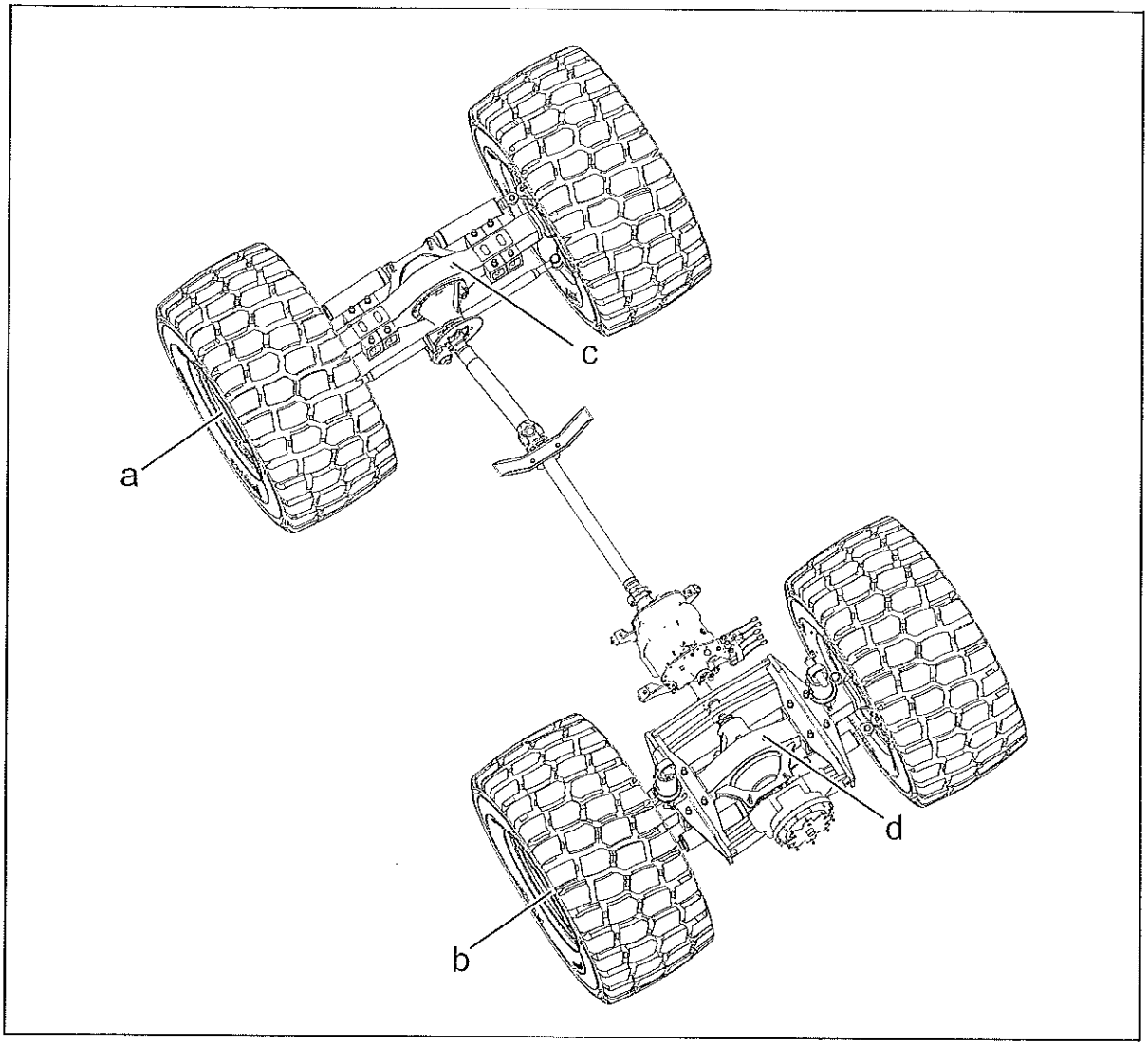


Fig 5-49 Open the filling plug and vent plug on the top of center drive of axle

a. Front axle	b. Rear axle	c. Filling plug of center drive	d. Filling plug of center drive

NOTICE

Do not overfill the gear oil. Failure to do this could result in machine damage and improper machine operation.

5.4.4.4 Check Gear Oil Level and Quality

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for axles of carrier" before proceeding with these procedures.

Park the machine on a flat ground. Then check the gear oil as following steps.

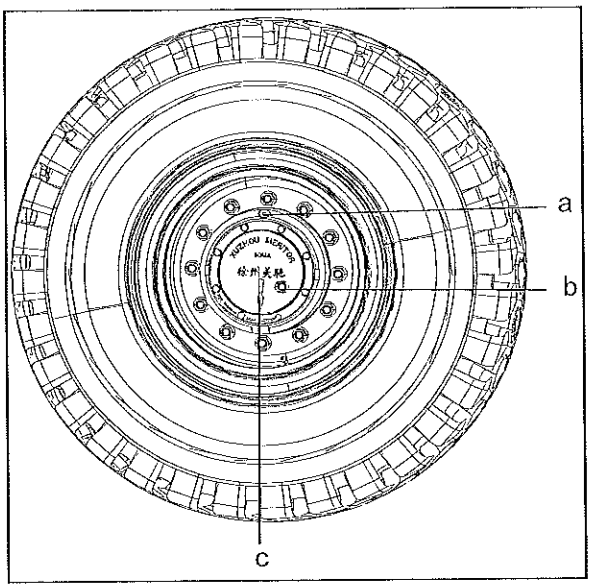


Fig 5-50 Drive the machine to rotate the wheel

a. Oil filling point & Oil drain point
b. Oil inspection point c. Indicating arrow

1. Drive the machine to rotate the wheel until the indicating arrow points vertically to the ground (6 o'clock position).
2. Place a gear oil collection container with appropriate size below the oil level inspection point.
3. Remove the oil level plug.
4. Check the quality of gear oil.

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc while checking.

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in serious injury or death.

NOTICE

Dispose of the contaminated gear oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

5. Check whether the gear oil is level with the bottom of oil level hole.

- If less, refill gear oil via the oil filling inlet;
- If more, drain out gear oil via the oil level hole.

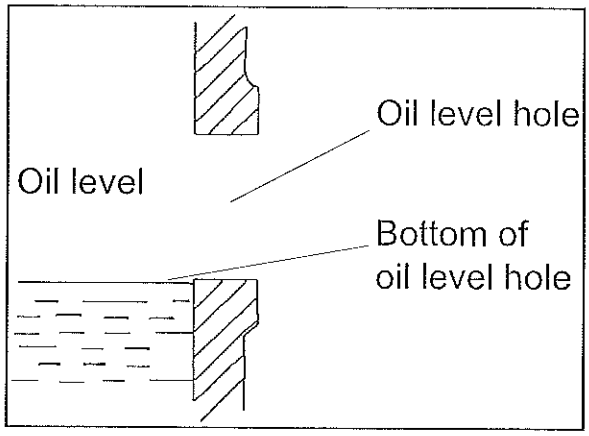


Fig 5-51 The gear oil is level with the bottom of oil level hole

6. Replace the seal ring of plug. Clean and close opening if oil level is correct.

7. Repeat these steps above for the other axles.

5.4.4.5 Drain and Change Gear Oil

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc, or in accordance with regular maintenance interval.

Choose the specified type of gear oil according to ambient temperature in different seasons.

Refer to "Lubricants and fluids".

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for axles of carrier" before proceeding with these procedures.

1. Drive the machine to rotate the wheel so that the indicating arrow is perpendicular to the ground at the top position (12 o'clock position).

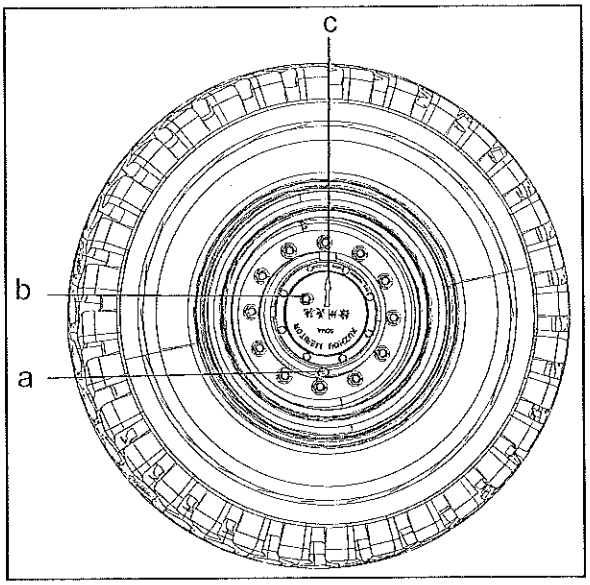


Fig 5-52 Drive the machine to rotate the wheel

a. Oil filling point & Oil drain point
b. Oil inspection pointc. Indicating arrow

2. Place a gear oil collection container with appropriate size below the drain plug.

3. Remove the drain plug to drain the gear oil into container.

NOTE :

Do not drain any gear oil on the ground.

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding.
Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

NOTICE

Dispose of the contaminated gear oil in accordance with local environmental regulations.
Failure to do so could result in damage to the environment.

⚠ CAUTION

• The gear oil is toxic, always keep it away from children and pets.
• The gear oil may harm physical health and environment, so it should be avoided to let gear oil into eyes or onto skin. If any gear oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with gear oil, wash the clothes immediately; If eat gear oil by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

4. Clean and close openings after the gear oil is completely drained. Replace a new seal on the plugs.

5. Repeat the step 1 in "Check gear oil level and quality", then fill gear oil as need via oil filling inlet by the gear oil filling nozzle or the funnel

6. Clean and close opening after filling completely. Replace a new seal on the plug.

NOTE :
The gear oil is level with the bottom of oil level hole.

7. Start the engine and drive the machine to operate axles for a while.
Refer to "Engine start procedure".

8. Check the gear oil level again.

NOTICE

Do not overfill the gear oil. Failure to do this could result in machine damage and improper machine operation.

5.4.4.6 Axles – Lubricate

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Choose the specified type of gear oil according to ambient temperature in different seasons.

Refer to "Lubricants and fluids".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for axles of carrier" before proceeding with these procedures.

1. Lubricate tie rod ends of front axle and rear axle.

a. Take the load off the axle.

b. Clean lubrication points and grease fittings.

NOTE :
Grease fittings are located above or below the steering knuckle.

c. Press grease into the grease fittings with the grease gun until grease seeps out.

Lubricate more often if environmental conditions and/or operating conditions require it.

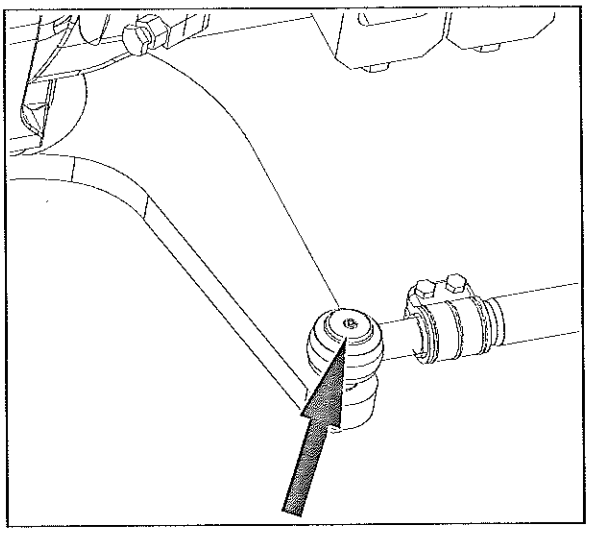


Fig 5-53 Lubricate tie rod end of axle

2. Lubricate king pins of front axle and rear axle.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into both fittings at the top and bottom of axle king pin until grease extrudes.

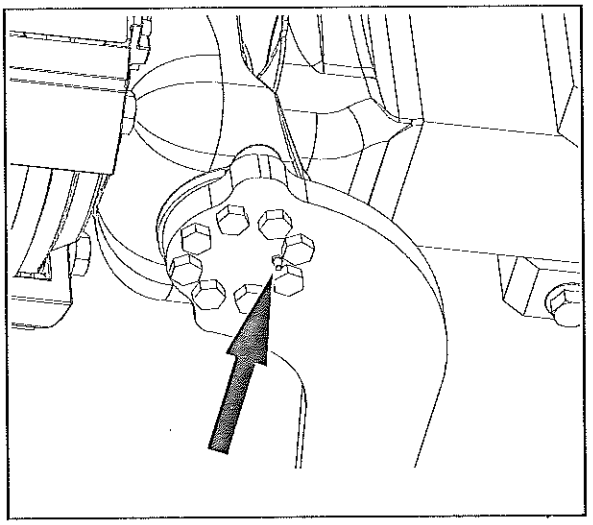


Fig 5-54 Lubricate king pin

5.4.5 Maintenance for Wheels and Tires

5.4.5.1 Check Wheels and Tires

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Maintenance interval for wheels and tires of carrier" before proceeding with these procedures.

1. Check the tightness of bolts and nuts;

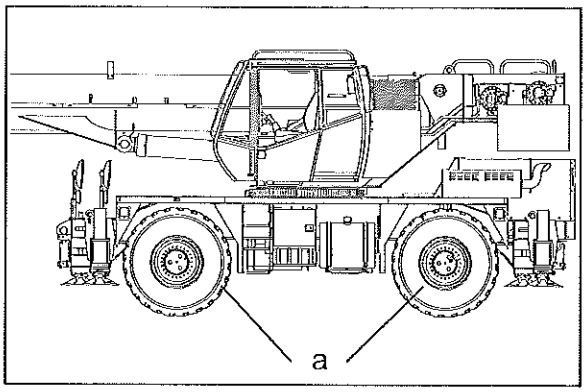


Fig 5-55 Tire

2. Check the tire pressure by air pressure gauge.

The pressure of single tire should be 9.1 bar.

The pressure of double tires should be 8.4 bar.

If insufficient, check the air leaks of tires, then recharge it;

⚠ WARNING

Have authorized personnel charge the tire. Failure to do these warnings could result in serious injury or death.

3. Check the tires for:

- Chunking
- Dents
- Areas with uneven wear.

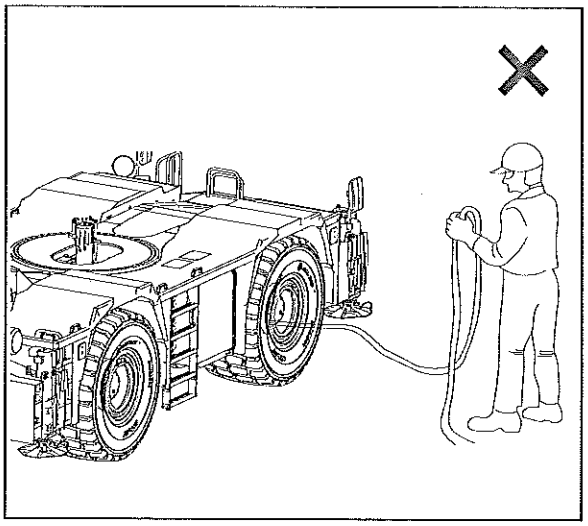


Fig 5-56 Do not stand facing the side of tire when charging

4. Check whether the tire has worn down to the wear mark.

If the tire no longer has any tread at the wear marks, then replace the tires.

NOTE :

Always replace all of the tires on the same axle if need to replace one of them.

5. Check the wheel-bearing clearance.

- Raise the crane with the outriggers. Release the parking brake.
- Push the bottom of the wheel, try to move the wheel and the bearing at the same time. If get too much clearance to play, contact with Sany dealer for repairing detail.

⚠ WARNING

Do not stand facing the side of tire when charging. Failure to do these warnings could result in serious injury or death.

5.4.6 Maintenance for Steering System

5.4.6.1 Steering Function – Check

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Maintenance interval for steering system of carrier" before proceeding with these procedures.

1. Start the engine;

Refer to "Engine start procedure" .

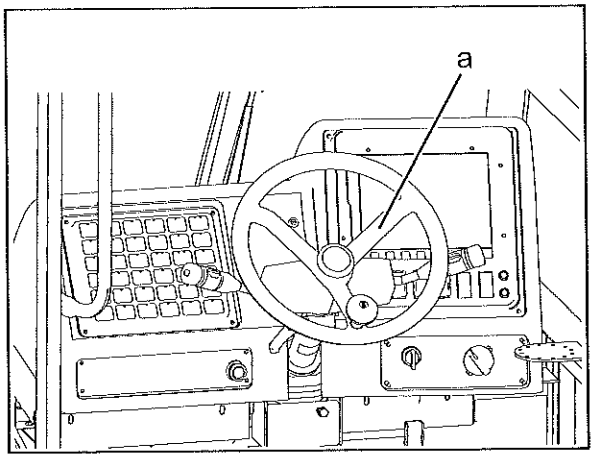


Fig 5-57 Steering wheel

a. Steering wheel

2. Check the spinning range of the steering wheel.

The spinning range of the steering wheel is 10°- 15°, which is the maximum angle of the steering wheel turning from left to right when the tires do not move.

3. Check the steering limit valve.

Turn the steering wheel left and right to the end. It means normal if hear frizzles of oil running sound.

4. Check the tightness of steering wheel;

5. Inspect all steering connection locations for looseness, damage or excessive wear.

NOTE :

If any abnormal condition is found, contact your Sany dealer for repairs.

NOTICE
Do not spin steering wheel all the way end and keep it for more than 10 seconds. Failure to do these could result in damage to the machine or cause the machine to operate improperly.

5.4.6.2 Lubricate Steering System

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Choose the specified type of grease according to ambient temperature in different seasons.

Refer to "Lubricants and fluids".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for steering system of carrier" before proceeding with these procedures.

1. Lubricate steering cylinders

Lubricate more often if environmental conditions and/or operating conditions require it.

a. Take the load off the axle.

b. Locate the steering relay cylinders.

c. Clean lubrication points and grease fittings.

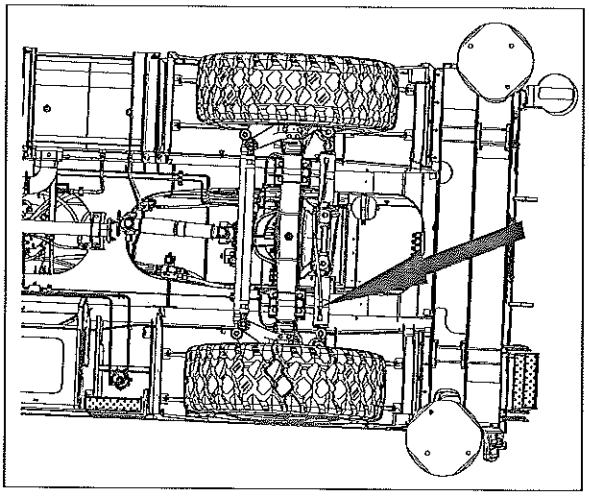


Fig 5-58 Locate the steering relay cylinders

d. Inject grease into the grease fitting with the grease gun until grease seeps out.

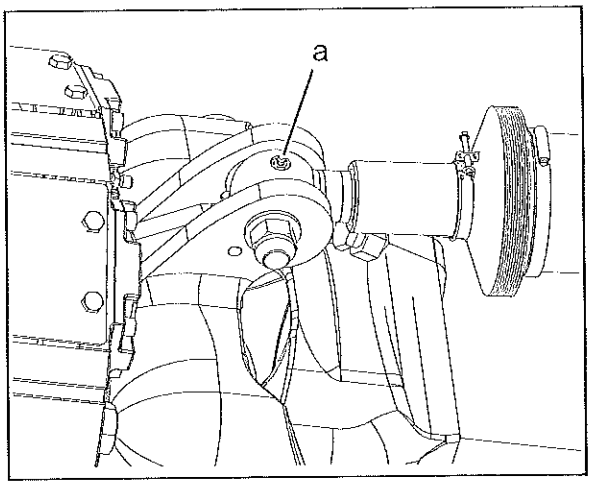


Fig 5-59 Inject grease into grease fitting

a. Grease fitting

5.4.7 Maintenance for Transmission

5.4.7.1 Check Gear Oil Level and Quality

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for transmission of carrier" before proceeding with these procedures.

Park the machine on a flat ground. Then check the transmission gear oil as following steps.

1. Start the engine. Keep the engine running at idle speed for 10 minutes.

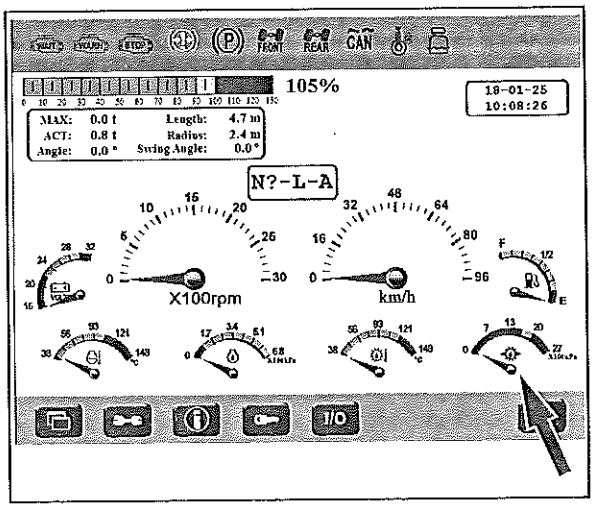


Fig 5-60 Transmission oil pressure

2. Check the transmission oil pressure on the monitor display screen.

3. Fully extend and set the outriggers to level the crane.

4. Rotate the superstructure so that the boom is over the side.

5. Place a gear oil collection container with appropriate size below the oil level plug.

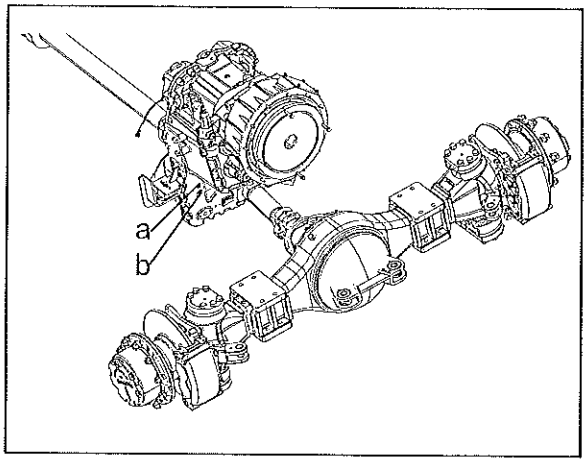


Fig 5-61 Locate the level check plug

a. Oil level plug-1
b. Oil level plug-2

6. Remove the oil level plug at the side of transmission gearbox.

7. Check the quality of gear oil.

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc while checking.

NOTICE

Dispose of the contaminated transmission gear oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

8. Check leak situation of the gear oil when plug is off:

- If not leak, then oil is less, refill gear oil via the oil filling inlet;
- If leak only from hole 1. no leak found from hole 2, then oil is in normal state;
- if leak from hole 2, then oil is more, drain out gear oil via the oil level hole.

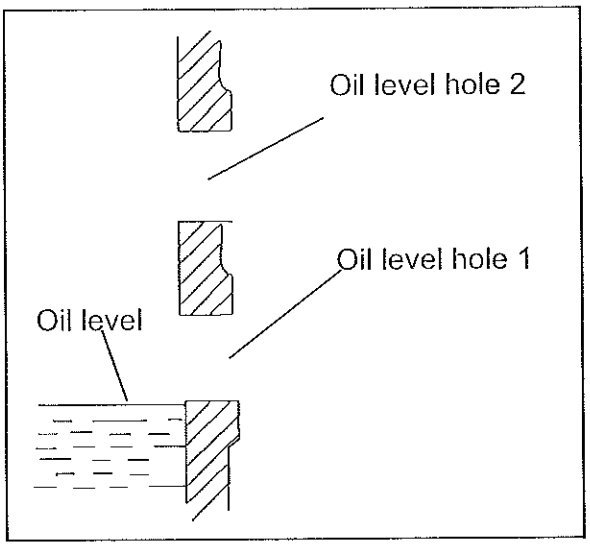


Fig 5-62 The gear oil level (less)

9. Replace the seal ring of plug. Clean and close opening if oil level is correct.

5.4.7.2 Drain and Change Gear Oil

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc, or in accordance with regular maintenance interval.

Choose the specified type of gear oil according to ambient temperature in different seasons.

Refer to "Lubricants and fluids" .

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for transmission of carrier" before proceeding with these procedures.

1. Start the engine. Keep the engine running at idle speed for 10 minutes.

2. Fully extend and set the outriggers to level the crane.

3. Rotate the superstructure so that the boom is over the side.

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

4. Shut down the engine and wait for a few minutes.

Refer to "Engine shutdown procedure".

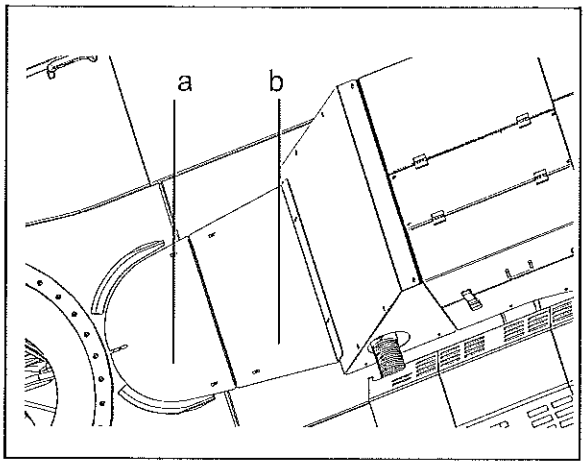


Fig 5-63 Open the transmission access covers

a. Access cover 1
b. Access cover 2

5. Open the transmission access covers on the deck.

6. Remove the oil level plug at the side of transmission gearbox.

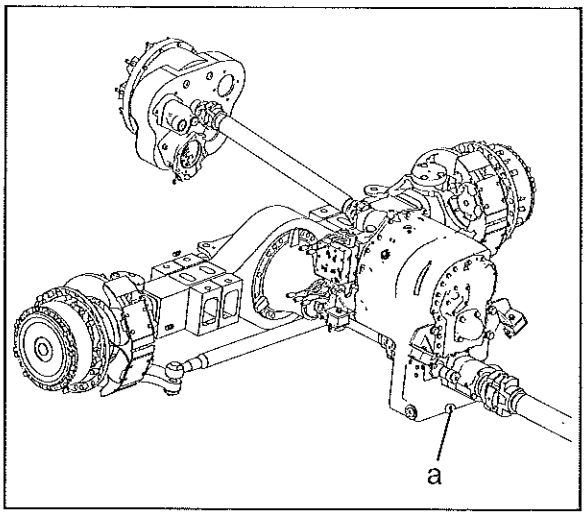


Fig 5-64

a. Drain plug

7. Place a gear oil collection container with appropriate size below the drain plug.

8. Remove the drain plug at the bottom of transmission gearbox to drain the engine oil into container.

NOTE :

Do not drain any gear oil on the ground.

9. Clean and close openings after the gear oil is completely drained. Replace a new seal on the plugs.

10. Locate the oil filling plug on the top of transmission gearbox.

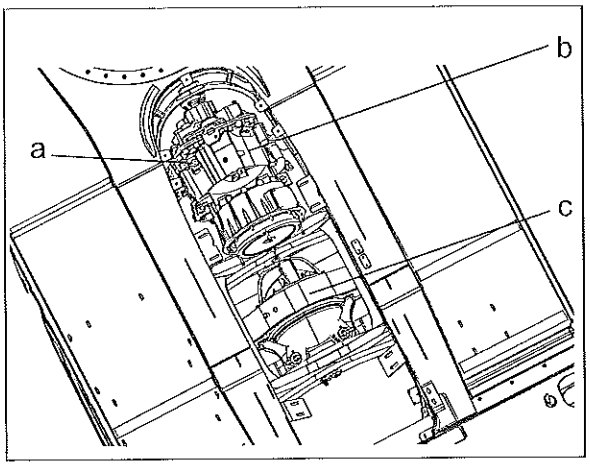


Fig 5-65 Locate the oil filling plug

a. Oil filling plug
b. Transmission gearbox
c. Rear axle

11. Remove the oil filling plug.

12. Fill gear oil as need via oil filling inlet by the gear oil filling nozzle or the funnel.

NOTE :
Add oil until the level is at the bottom of the level check hole.

NOTICE
Do not overfill the transmission gear oil. Failure to do this could result in machine damage and improper machine operation.

13. Secure the oil filling plug and oil level check plug.

14. Start the engine and drive the machine to operate transmission for a while.

Refer to "Engine start procedure".

15. Check the transmission gear oil level again.

16. Close the transmission access covers.

NOTICE

Dispose of the contaminated gear oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

⚠ CAUTION

• The gear oil is toxic, always keep it away from children and pets.
• The gear oil may harm physical health and environment, so it should be avoided to let gear oil into eyes or onto skin. If any gear oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with gear oil, wash the clothes immediately; If eat gear oil by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

5.4.7.3 Transmission Filter

Replace the transmission oil filter whenever changing the transmission oil.

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for transmission of carrier" before proceeding with these procedures.

1. Extend the outriggers and lower the jacks.

Refer to "Outrigger operation".

2. Rotate the superstructure so that the boom is over the side.

3. Open the access covers at the rear deck of the crane to expose the transmission filter.

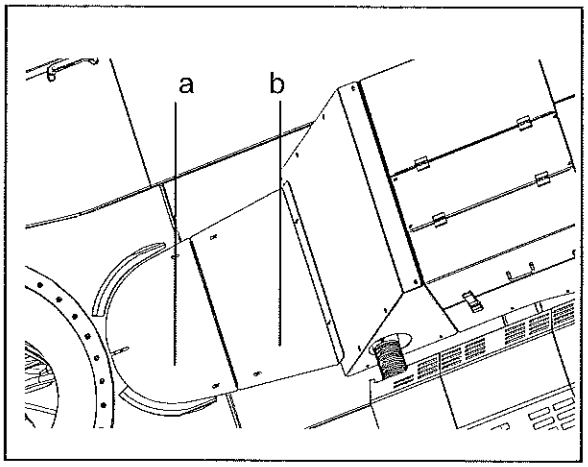


Fig 5-66 Open the access covers

a. Access cover 1
b. Access cover 2

4. Place an appropriate size container below the transmission oil filter.

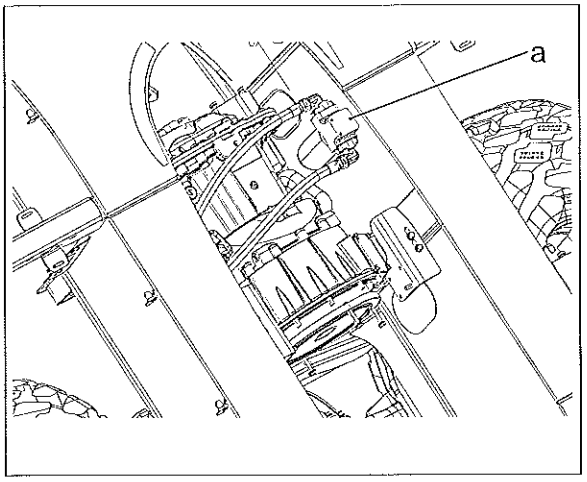


Fig 5-67 Remove used transmission oil filter

a. Transmission oil filter

5. Remove the used transmission oil filter, and dispose of filter properly.

NOTICE

Dispose of drained fluids in accordance with local environmental regulations.
Failure to do so could result in damage to the environment.

⚠ WARNING

Do not perform this task when the transmission is hot. Wait for the transmission to cool to outdoor ambient temperature before proceeding. Failure to do so could result in burns or other serious injury.
Transmission oil is toxic, keep it away from children and pets. Failure to do this will result in death or serious injury.

6. Position the new transmission oil filter upright and the plug in the center hole of the filter, fill the filter with fresh clean transmission oil through inlet holes until the filter is completely full.

NOTE :
Leave plug in place until the filter has been filled with fresh transmission oil and you are ready to install it on the filter support.

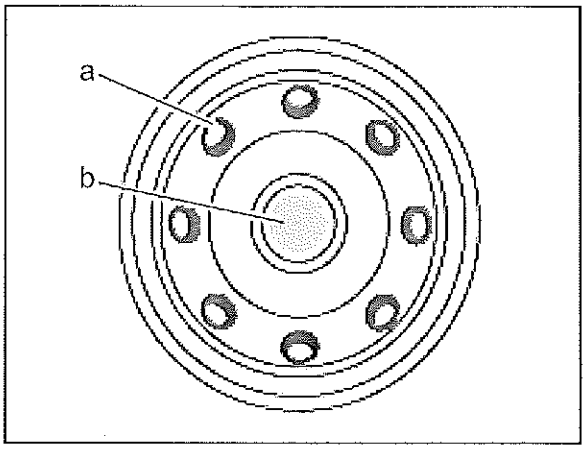


Fig 5-68 In the center of filter

a. The inlet holes
b. The plug

7. Install the new transmission oil filter onto the filter bracket.

8. Start the engine and make the crane travel at low speed for a while.

NOTE :
Do not drain any gear oil on the ground.

9. Check the system for leaks.

NOTICE

Commercially available filters may cause harm. Only use authorized filters. Failure to do this could cause damage to the machine, and could cause the machine to operate improperly.
Dispose of the used filters in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

5.4.8 Maintenance for Driveline

5.4.8.1 Drivelines – Check

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Maintenance interval for driveline of carrier" before proceeding with these procedures.

1. Check the bolts and nuts on drivelines. Clean and tighten them as the required torque.
Refer to "Tightening torques".

2. Inspect the driveline slip yoke for loose conditions, rust, damage or extensive wear.

NOTE :

If any abnormal condition is found, contact your Sany dealer for repairs.

3. Check the cardan bearings and carrier bearings on drivelines.

4. Check the cardan bearings and carrier bearings on drivelines.

NOTE :

Ensure complete dynamic balance test after disassemble & assemble the driveline or repalce any parts of driveline. Contact with Sany dealer for more details.

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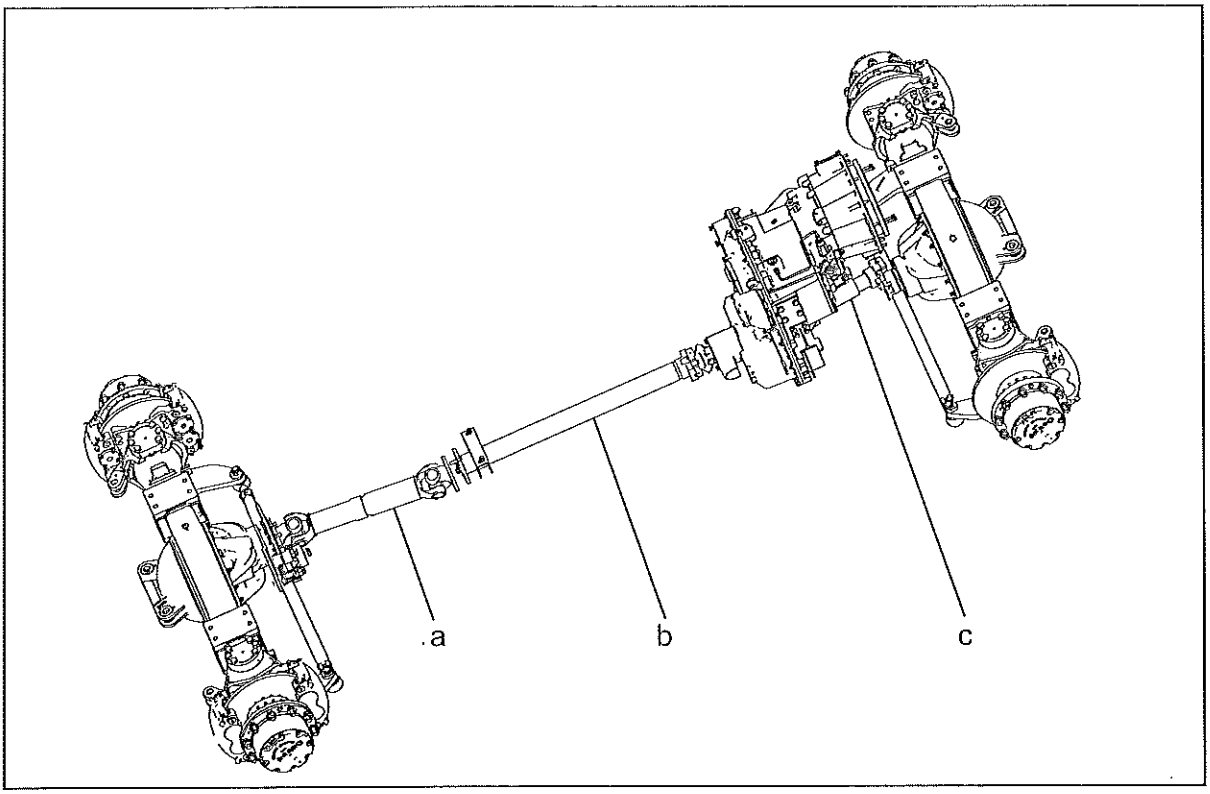

Fig 5-69 Check drivelines

a. Front driveline b. Intermediate driveline c. Rear driveline

5.4.8.2 Drivelines – Lubricate

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Choose the specified type of grease according to ambient temperature in different seasons.

Refer to "Lubricants and fluids" .

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for driveline of carrier" before proceeding with these procedures.

1. Lubricate steering pump driveline. Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes.

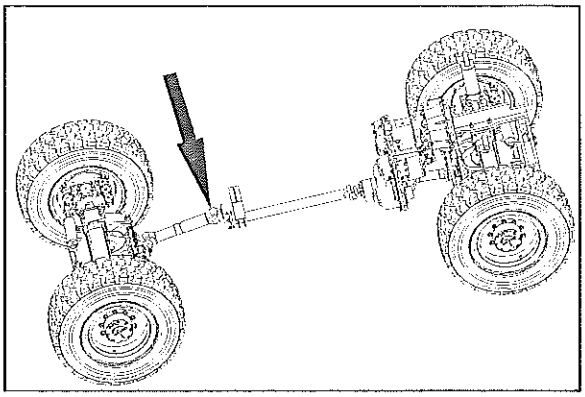

Fig 5-70 Front driveline

2. Lubricate front driveline.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes.

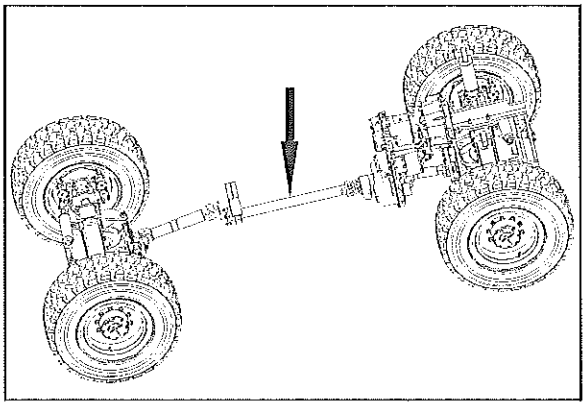

Fig 5-71 Intermediate driveline

3. Lubricate rear driveline.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes.

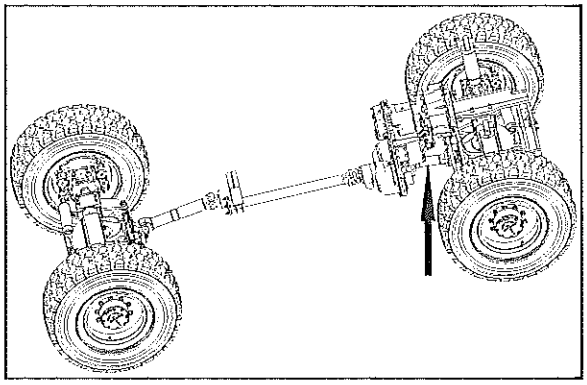

Fig 5-72 Rear driveline

5.4.9 Carrier Electrical System

5.4.9.1 Function for Electrical Components of Carrier – Check

Secure the machine before doing this maintenance.

Refer to "Secure the machine for maintenance" .

Refer to "Maintenance interval for brake system of carrier" before proceeding with these procedures.

5.4.9.2 Batteries – Check

Refer to "Environmental precautions" before proceeding with this procedure.

⚠ CAUTION

Before proceeding with any battery maintenance procedure, follow and remember these points:
Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames.
Wear personal protective equipment when working with batteries.
Work in a well-ventilated area.
If battery acid contacts your skin or your eyes, flush the area immediately with fresh water and Refer tok medical attention.
Failure to heed this caution could result in minor or moderate injury.

1. Turn the battery disconnect switch to the off position.

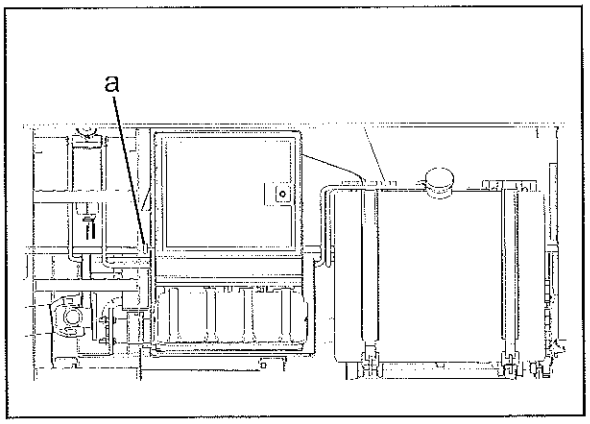

Fig 5-73

a. Battery disconnect switch

2. Remove the battery cover.

Allow several minutes for any accumulated battery gases to clear before servicing the batteries.

Refer to "Battery safety".

3. Check the top surfaces and all the battery connections for signs of corrosion or dirt build-up. Use a clean rag to wipe any dirt from the batteries.

NOTE :

If corrosion is found, flush the area with a mix of baking soda and warm water.

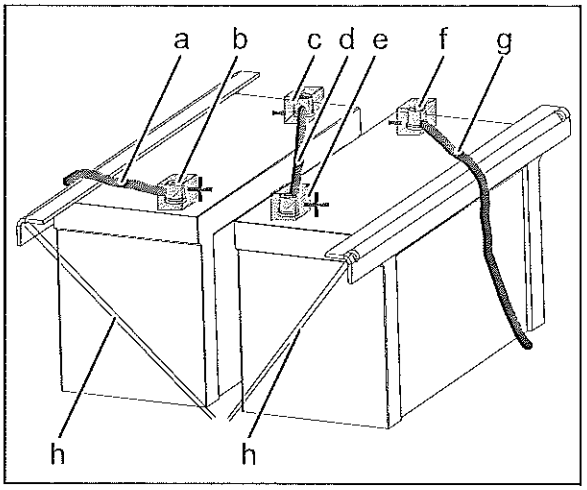

Fig 5-74 Check the top surfaces and all the battery connections

a. Positive battery cable
b. Positive terminal
c. Negative terminal
d. Transfer battery cable
e. Positive terminal
f. Negative terminal
g. Negative battery cable
h. Studs securing the batten of battery

4. Remove any trash, tools, parts or debris from the battery compartment.

5. Once the battery service procedures are complete, turn the battery disconnect switch to the on position.

⚠ DANGER

The battery acid is toxic, keep it away from children and pets. Failure to do this will result in death or serious injury.

⚠ WARNING

Do not remove the Lockout/Tagout tags from the machine when you connect the battery. These tags notify others that the machine is not to be used during maintenance. Failure to keep the tags in place could create a hazardous situation which, could result in death or serious injury.

5.4.10 Other Maintenance Work

5.4.10.1 Outrigger Beams – Lubricate

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Choose the specified type of grease according to ambient temperature in different seasons.

Refer to "Lubricants and fluids" .

Refer to "Environmental precautions"before proceeding with this procedure.

Refer to "Maintenance interval for other maintenance work of carrier" before proceeding with these procedure.

1. Lubricate outrigger beam.

Lubricate more often if environmental conditions and/or operating conditions require it.

a. Fully extend the outrigger beam.

b. Apply the lubricating grease with a brush or spatula to the four slide faces of beam and two wear pads on the bottom.

c. Extend and retract the outrigger beam several times in order to improve the lubrication effect.

d. Repeat these steps to lubricate the rest of outrigger beams.

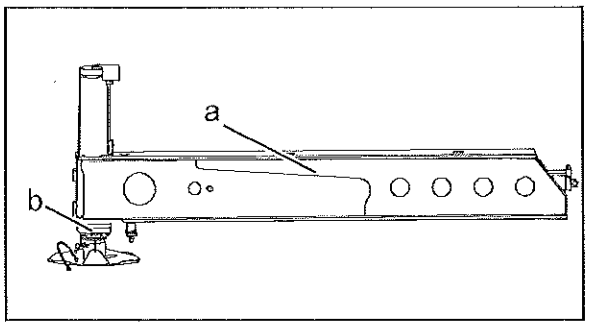

Fig 5-75 Lubricate outrigger beam

a. Slide face of outrigger beam
b. Wear pads

5.4.10.2 Suspension System – Lubricate

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Choose the specified type of grease according to ambient temperature in different seasons.

Refer to "Lubricants and fluids" .

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for other maintenance work of carrier" before proceeding with these procedures.

1. Lubricate front suspension on left / right.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into the fittings at the front side and rear side of the oscillation bar.

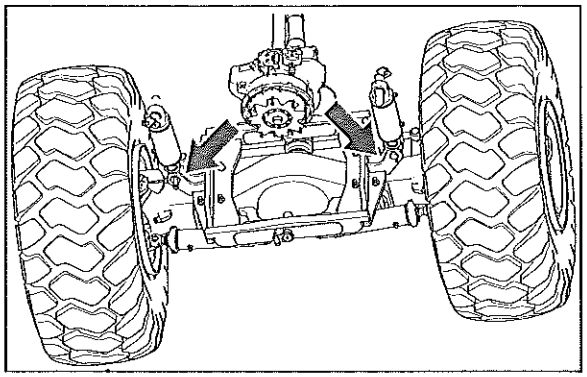

Fig 5-76 Oscillation bearing fittings

a. Oscillation bearing fittings

2. Lubricate rear suspension on left / right.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into the fittings at the top and bottom of both oscillation cylinders located above the rear axle.

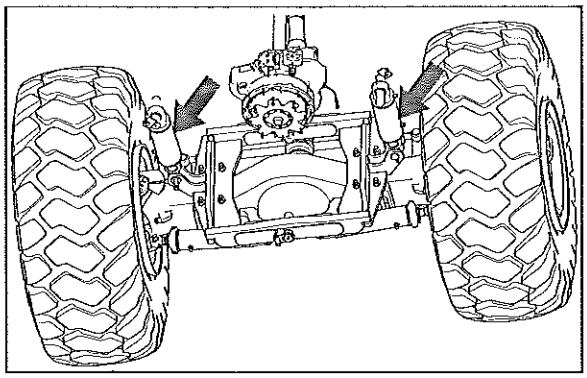

Fig 5-77 Oscillation cylinders

a. Oscillation cylinders

5.5 Description of Maintenance Work on the Superstructure

5.5.1 General

⚠ WARNING

Do not remove the Lockout/Tagout tags from the machine when you connect the battery. These tags notify others that the machine is not to be used during maintenance. Failure to keep the tags in place could create a hazardous situation which, could result in death or serious injury.

5.5.2 Wire Rope

5.5.2.1 General

The inspection interval shall be determined by a qualified person and shall be based on such factors as expected rope life as determined by experience on the particular installation or similar installations, severity of environment, percentage of capacity lifts, frequency rates of operation, and exposure to shock loads.

Periodic Inspections need not be at equal calendar intervals and should be performed at shorter time intervals as the wire rope approaches the end of its useful life. A periodic inspection shall be performed at least once a year.

The following provides inspection and maintenance procedures for wire ropes used on SANY products (for example, wire rope used as load lines [hoist wire ropes], boom extend and retract wire ropes).

5.5.2.2 Environmental Conditions

The life expectancy of wire rope may vary due to the degree of environmental hostility and other conditions to which these mechanical devices are subjected. Variation in temperature, continuous excessive moisture levels, exposure to corrosive chemicals or vapors or subjecting the wire rope to abrasive material may shorten normal wire rope life. Frequent/periodic inspections and maintenance of your wire rope is recommended for preventing premature wear and to insure long-term satisfactory performance.

5.5.2.3 Precautions and Recommendations During Inspection or Replacement

- Always lock out equipment power when removing or installing wire rope assemblies.
- Always use safety glasses for eye protection.
- Wear protective clothing, gloves, and safety shoes as appropriate.
- Use supports and clamps to prevent uncontrolled movement of wire rope, parts, and equipment.
- When replacing fixed length wire rope assemblies having permanently attached end fittings use only pre-assembled lengths of wire rope as supplied from SANY Crane Care. Do not build lengths from individual components.
- Replace an entire wire rope assembly. Do not attempt to rework damaged wire rope or wire rope ends.
- Never electroplate wire rope assemblies.
- Do not weld any wire rope assembly or component unless welding is recommended by the wire rope manufacturer. Welding spatter shall never be allowed to come in contact with the wire rope or wire rope ends. In addition, be sure that the wire rope is not an electrical path during other welding operations.
- Wire ropes are manufactured from special steels. If heating a wire rope assembly is absolutely necessary for removal, the entire wire rope assembly shall be discarded.

- On systems equipped with two or more wire rope assemblies operating as a matched set, they shall be replaced as an entire set.
- Do not paint or coat wire ropes with any substance except approved lubricants.

⚠ CAUTION
Always wear leather gloves when handling wire rope. Failure to do so could result in minor or moderate injury.

5.5.2.4 Wire Rope (Hoist Wire Ropes) – Inspect

Wire rope should be inspected frequently/daily and periodically/yearly in accordance with the following information excerpted from a National Consensus Standard as referenced by Federal Government Agencies. Recommended inspection intervals may vary from crane to crane and may vary based on environmental conditions, frequency of lifts, and exposure to shock loads. The inspection time intervals may also be predetermined by state and local regulatory agencies.

Any deterioration observed in the wire rope should be noted in the equipment inspection log and an assessment concerning wire rope replacement should be made by a qualified person.

Secure the machine before doing this maintenance.

Refer to "Secure Machine for Maintenance"..

Refer to "Maintenance interval for hoist wire ropes of superstructure" before proceeding with these procedures.

NOTE :

Any suspected changes in the condition of the wire rope must be reported.

NOTE :

Always use left-lay wire rope.

NOTE :

The highest working temperature of wire rope shall not exceed 180° F (82° C).

Frequent Inspection

A frequent daily visual inspection is recommended for all hoist wire ropes in service. This inspection should be made on all wire rope which can be expected to be in use during the day's operation. This inspection should be used to monitor progressive degradation and to discover severe damages necessitating wire rope replacement such as:

- Distortion, Kinking, Crushing, Un-stranding, Bird caging, Reduction of diameter, etc.
- General corrosion.

- Broken or cut strands.
- Number, distribution and type of broken wires.
- Evidence of core failure.
- End fitting wear/abrasion.

Periodic Inspection

Wire rope should be inspected periodically/annually or at a shorter time interval if necessitated by environmental or other adverse conditions, and shall cover the entire length of the wire rope. Only the outer surface of the wire rope need be inspected, and no attempt should be made to open the rope. Periodic inspection should include all items listed under frequent inspection plus the following:

1. Inspect for reduction of rope diameter below nominal diameter.

2. Inspect for severely corroded or broken wires at end connections.

3. Inspect for severely corroded, cracked, bent, worn, or improperly applied end connections.

4. Inspect wire rope in areas subjected to rapid deterioration such as:
- Sections in contact with saddles, equalizer sheaves, or other sheaves where wire rope travel is limited.
- Sections of wire rope at or near terminal ends where corroded or broken wires may protrude.

5. Inspect boom nose sheaves, hook block sheaves, swingaway boom extension and its sheaves, auxiliary boom nose sheaves, and hoist drums for wear. Damaged sheaves or hoist drums can accelerate wear and cause rapid deterioration of the wire rope.

5.5.2.5 Wire Rope (Boom Extend and Retract Wire Ropes) – Inspect

It is recommended that a periodic inspection of all boom extend and retract wire ropes be performed using the following guidelines. This inspection shall cover the entire length of the extend and retract wire ropes. This inspection should be used to monitor progressive degradation and to discover severe damages necessitating wire rope replacement or equipment repair.

Secure the machine before doing this maintenance.

Refer to “Secure Machine for Maintenance”.

Refer to “Maintenance interval for hoist wire ropes of superstructure” before proceeding with these procedures.

NOTE :

Any suspected changes in the condition of the wire rope must be reported.

NOTE :

Always use left-lay wire rope.

NOTE :

The highest working temperature of wire rope shall not exceed 180° F (82° C).
Inspection criteria are as follows:

1. Inspect for reduction of rope diameter below nominal diameter.

2. Inspect for severely corroded or broken wires at end connections.

3. Inspect for severely corroded, cracked, bent, worn, or improperly applied end connections.

4. Inspect wire rope in areas subjected to rapid deterioration such as:

- Sections in contact with saddles, equalizer sheaves, or other sheaves where wire rope travel is limited.
- Sections of wire rope at or near terminal ends where corroded or broken wires may protrude.
- Sections of wire rope in contact with stationary surfaces where abrasion or chafing may take place as a result of equipment vibration.

5. Inspect for damaged or wobbly boom and retract sheaves that may cause rapid deterioration of the wire rope.

6. Inspect for unusual cable sag/stretch and be sure cables used in sets all have an equal tension applied. Repeated need for adjustment of an individual cable is evidence of cable stretch and indicates the need for additional and more thorough inspection in order to determine and correct the cause.

5.5.2.6 Wire Rope (All Wire Ropes) – Replace

No precise rules can be given for determination of the exact time for replacement of wire rope since many variable factors are involved. Determination regarding continued use or replacement of wire rope depends largely upon the good judgement of an appointed and qualified person who evaluates the remaining strength in a used rope after allowance for any deterioration disclosed by inspection.

Wire rope replacement should be determined by the following information excerpted from a National Consensus Standard as referenced by local government agencies and as recommended by SANY Crane Group. All wire rope will eventually deteriorate to a point where it is no longer usable.

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

Wire rope should be replaced immediately under the following conditions:

- One broken strand
- Wire breaks within a limited range
- The number of broken wire reaches a specified quantity
- Corkscrew deformation reaches 1/3 of rope diameter (figure 1)
- Vault (figure 2)
- Hair-shaped wire and wire strand protruding from rope (figure 3)
- Diameter reduced by 15% or 10% of nominal
- Corrosion and / or wear appears (figure 4)
- Rope appears loose (figure 4)
- Retraction occurs (figure 5)
- Reeling and Compression occurs (figure 6 + 8)
- Deformation occurs (figure 7)

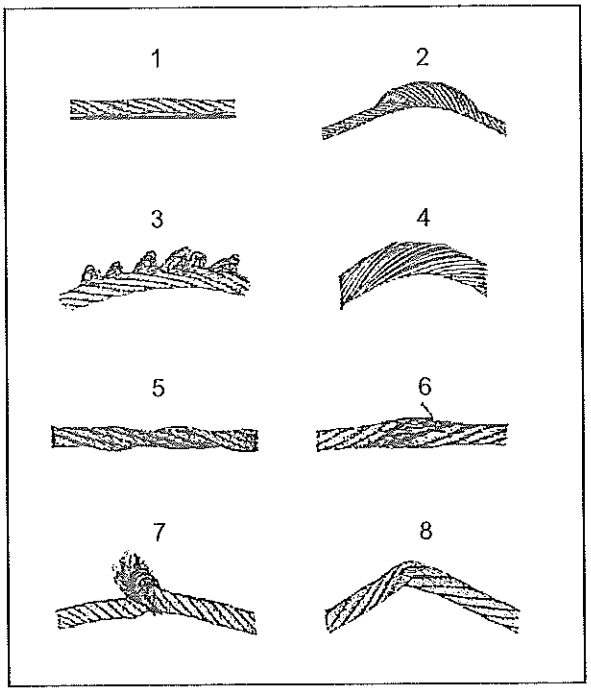

Fig 5-78

1. Corkscrew deformation reaches 1/3 of rope diameter
2. Vault
3. Hair-shaped wire and wire strand protruding from rope
4. Corrosion and / or wear appears
5. Retraction occurs
6. Reeling occurs
7. Deformation occurs
8. Compression occurs

5.5.2.7 Wire Ropes – Lubricate

Secure the machine before doing this maintenance.

Refer to "Secure Machine for Maintenance".

Choose the specified type of grease according to ambient temperature in different seasons. .

Refer to "Lubricants and fluids"

Refer to "Maintenance interval for hoist wire ropes of superstructure" before proceeding with this procedure.

A wire rope cannot be lubricated sufficiently during manufacture to last its entire life. Therefore, new lubricant must be added throughout the life of a rope to replace factory lubricant which is used or lost. It is important that lubricant applied as part of a maintenance program shall be compatible with the original lubricant, and to this end, the rope manufacturer should be consulted. Lubricant applied shall be of the type which does not hinder visual inspection. Those sections of rope which are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope. The object of rope lubrication is to reduce internal friction and to prevent corrosion.

During fabrication, ropes receive lubrication; the kind and amount depends on the rope's size, type, and anticipated use. This in-process treatment will provide the finished rope with ample protection for a reasonable time if it is stored under proper conditions. But, when the rope is put into service, the initial lubrication may be less than needed for the full useful life of the rope. Because of this possibility, periodic applications of a suitable rope lubricant are necessary.

The following are important characteristics of a good wire rope lubricant:

- It should be free from acids and alkalis.
- It should have sufficient adhesive strength to remain on the ropes.
- It should be of a viscosity capable of penetrating the interstices between wires and strands.
- It should not be soluble in the medium surrounding it under the actual operating conditions (that is, water).
- It should have a high film strength.
- It should resist oxidation.

Before applying lubrication, accumulations of dirt or other abrasive material should be removed from the rope. Cleaning can be accomplished by using a stiff wire brush and solvent, compressed air, or live steam. Immediately after the wire rope is cleaned, it should be lubricated. Many techniques may be used; these include bath, dripping, pouring, swabbing, painting or pressure spray methods. Whenever possible, the lubricant should be applied at the top of a bend in the rope, because at that point the strands are spread by bending and are more easily penetrated. There should be no load on the rope while it is being lubricated. It should be noted, the service life of wire rope will be directly proportional to the effectiveness of the method used and amount of lubricant reaching the working parts of the rope.

5.5.3 Hook Blocks

5.5.3.1 General

Sany recommends that all hooks be removed and checked before operating. Contact with Sany dealer if any hook failure occurs. The owner or operator should take the responsibility for the result of not checking the hooks regularly.

Refer to "Operation of hoist" .

The hook shall be replaced if any single problem occurs as below (defects of the hook cannot be repaired by welding).

- Cracks and crevasse exist on the surface of the hook.
- The opening degree of the hook exceeds 10% of the original size.
- The wear of the dangerous section reaches 10% of the original size.
- The wear of the roping section is up to 10% of the original height.
- The twisted deformation of the hook exceeds 10°.
- There is deformation on the dangerous section as the hook end, the screw thread and the rope stop bars.

NOTE :

The hooks must be replaced annually. (If the hooks are frequently used at overload, replace them every three months.) Inspection can detect failure in time to prevent accidents. The failures and replacements must be recorded.

5.5.3.2 Main Hook Block – Check

Secure the machine before doing this maintenance.

Refer to "Secure Machine for Maintenance".

Refer to "Maintenance interval for hook blocks of superstructure" before proceeding with these procedures.

⚠ WARNING

Never use a faulty main hook block. Failure to observe and follow this warning could result in death or serious injury.

- Check the lifting lug for deformation or cracks.
- Check the sheaves and bearings for completeness, fit, smooth rotation or lack of lubrication.
- Check the lock plates and mounting bolts for fit and locked.
- Check the tie bars and securing bolts for loose, missing or damaged.
- Check the hook beam and swivel bearing for aging.
- Check the latch for completeness and fit.
- Check the hook and side plates for cracks or deformation.

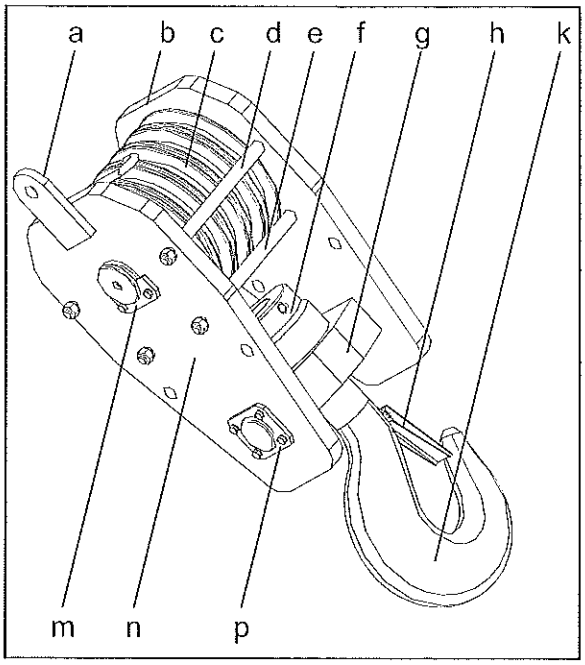

Fig 5-79

a. Lifting lug
b. Side plates

c. Sheaves

d. Tie bars

e. Tie bars

f. Swivel bearing

g. Hook beam

h. Latch

k. Hook

m. Lock plates and mounting bolts

n. Side plates

p. Lock plates and mounting bolts

5.5.3.3 Headache Ball – Check

Secure the machine before doing this maintenance.

Refer to "Secure Machine for Maintenance" on page 5-24.

Refer to "Maintenance interval for hook blocks of superstructure" before proceeding with these procedures.

⚠ WARNING

Never use a faulty headache ball. Failure to observe and follow this warning could result in death or serious injury.

- Check the lifting lug for deformation or cracks.
- Check the bolts for loose, missing or damaged.
- Check the hook nut and swivel bearing for aging.
- Check the latch for completeness and fit.
- Check the hook and ball for cracks or deformation.

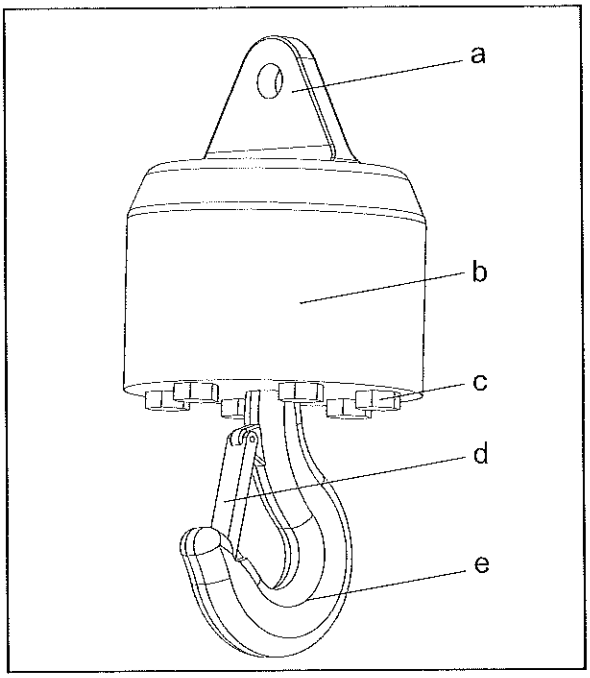

Fig 5-80

a. Lifting lug
b. Ball
c. Bolts
d. Latch
e. Hook

5.5.3.4 Hook Block – Lubricate

Secure the machine before doing this maintenance.

Refer to "Secure Machine for Maintenance".

Refer to "Lubricants and fluids"

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for hook blocks of superstructure" before proceeding with these procedures.

1. Lubricate hook block trunnion.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes.

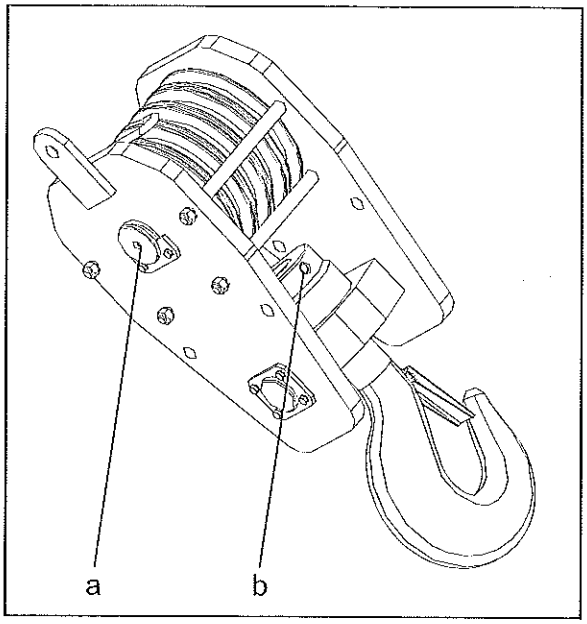

Fig 5-81

a. Grease fitting for hook block trunnion
b. Grease fitting for hook block swivel bearing

2. Lubricate hook block swivel bearing.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes.

5.5.4 Main Boom and Boom Extension

5.5.4.1 Boom and Boom Extension – Check

Secure the machine before doing this maintenance.

Refer to "Secure Machine for Maintenance".

Refer to "Maintenance interval for main boom and boom extension of superstructure" before proceeding with these procedures.

⚠ CAUTION
Do not insert fingers into holes in the boom. This could result in minor or moderate injury.

1. Start the engine. Then extend the outriggers and support the crane properly.

Refer to "Engine Start Procedure".

2. Activate the hydraulic system and check for proper operation and any leaks.
- Check the boom extend and retract properly.
- Check the lift cylinder will not allow the boom to drift down until the operator lowers it.

3. Check all electrical cables and components are operating properly.

4. Check all visible parts of the entire boom and boom extension with following criteria:

- Crack, bend or damage;
- Bolts get loose;
- Scratch on the wear surface;
- Deformation or crack on the boom section;
- Bad lubricating condition;
- Damage, dents, crack or deformation on the sheave.

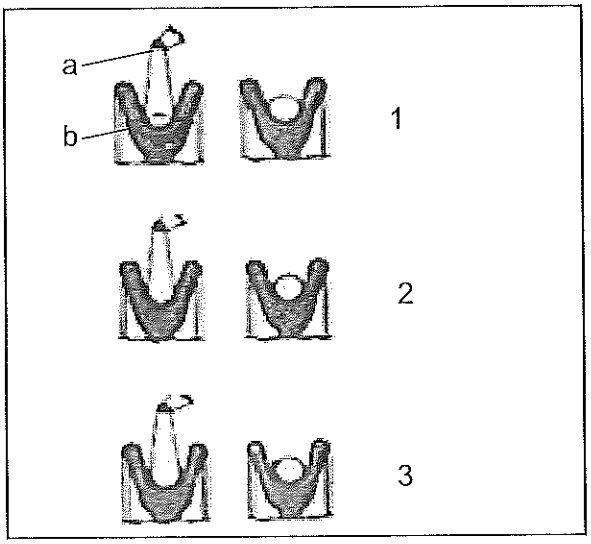

Fig 5-82

a. Channel gauge
b. Sheave channel1. Correct2. Too tight3. Too loose

5. Check all of sheaves for security and freedom of movement.
Then check the channel radius of sheave with gauge.
The channel radius for roller and sheave should be 0.595×rope rated diameter. Due attention should be paid on any change in rope condition.

5.5.4.2 Boom Sections – Align

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance" .

Refer to "Maintenance interval for main boom and boom extension of superstructure" before proceeding with these procedures.

1. Start the engine. Then extend the outriggers and support the crane properly.

Refer to "Engine start procedure" .

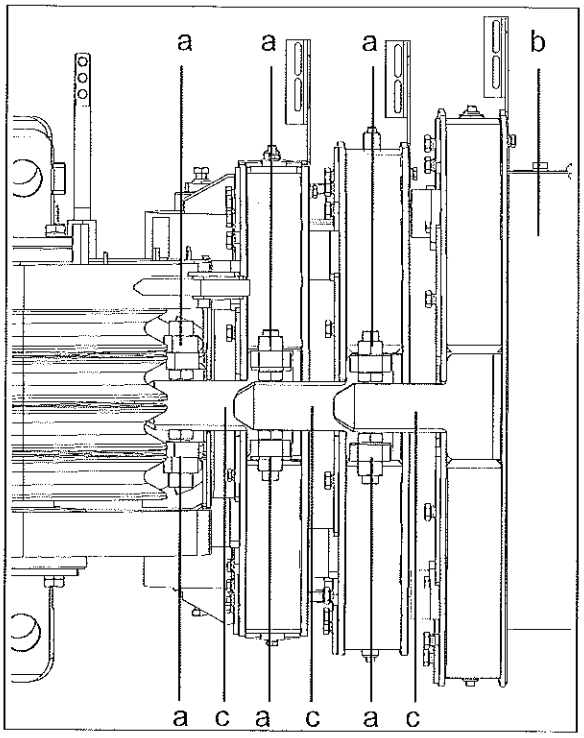

Fig 5-83 Adjust the align devices at the bottom of boom tele sections

a. Align devices
b. Boom sections

c. Align plates

2. Attach a weight and extend the boom full length. Check for side deflection.

Example: If the boom deflects to the left, the top left wear pad would have shims added and the top right wear pad would have shims removed.

3. Retract all of the boom tele sections.

NOTE :
When extending and retracting the boom during alignment, movement should be stopped if a restriction is encountered.

4. Adjust the align devices at the bottom of boom tele sections, so that each align plate go through the align devices with 1 - 2 mm from the wear pad surfaces of both align devices.

5.5.4.3 Extend Wire Ropes – Adjust

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Refer to "Maintenance interval for main boom and boom extension of superstructure" before proceeding with these procedures.

NOTE :

Do not twist the wire rope. Failure to do this will result in damage or failure of wire rope.

NOTE :

The extend wire ropes must be adjusted properly before the retract wire ropes can be adjusted.

1. Start the engine. Then extend the outriggers and support the crane properly.

Refer to "Engine start procedure".

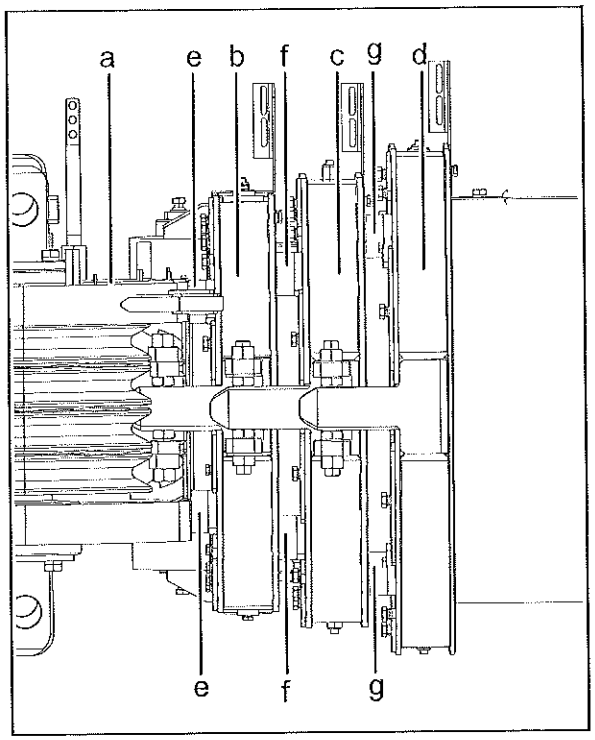

Fig 5-84 Wire ropes adjustment

a. Boom tele 3 section
b. Boom tele 2 section

c. Boom tele 1 section

d. Boom base section

e. Stop blocks 3

f. Stop blocks 2

g. Stop blocks 1

2. Extend boom tele 3 and tele 4 sections about several centimeters.

3. Retract the boom tele cylinder 1 to the original position. Measure the clearance between the heads of boom base and tele 1 sections = Δ1. Thus, the thickness of stop blocks 1 = Δ1 + (1~2 mm).

Install the stop blocks 1 with proper thickness between the heads of boom base and tele 1 sections.

4. Retract the boom tele cylinder 2 to the original position. Measure the clearance between the heads of boom tele 1 and tele 2 sections = Δ2. Thus, the thickness of stop blocks 2 = Δ2 + (1~2 mm).

Install the stop blocks 2 with proper thickness between the heads of boom tele 1 and tele 2 sections.

5. Retract the boom tele cylinder 2 again, making the clearance between the stop blocks at the heads of boom tele1 and tele 2 sections = 0.

6. Adjust the tele 3 retract wire ropes.

Refer to "Adjust retract wire ropes".

⚠ CAUTION

Overtightening the retract wire rope will damage the wire rope. Be careful when fully retracting the boom for wire rope adjustment to avoid damage.

7. Measure the clearance between the heads of boom tele 2 and tele 3 sections = Δ3. Thus, the thickness of stop blocks 3 = Δ3 ± 1 mm.

8. Install the stop blocks 3 with proper thickness between the heads of boom tele 2 and tele 3 sections.

9. Retract the boom tele cylinder 2 again, making the clearance between the stop blocks at the heads of boom tele 2 and tele 3 sections = 0.

10. Adjust the tele 4 retract wire ropes.

Refer to "Adjust retract wire ropes".

⚠ CAUTION

Overtightening the retract wire rope will damage the wire rope. Be careful when fully retracting the boom for wire rope adjustment to avoid damage.

11. Measure the clearance between the heads of boom tele 3 and tele 4 sections = Δ4. Thus, the thickness of stop blocks 4 = Δ4 ± 1 mm.

12. Install the stop blocks 4 with proper thickness between the heads of boom tele 3 and tele 4 sections.

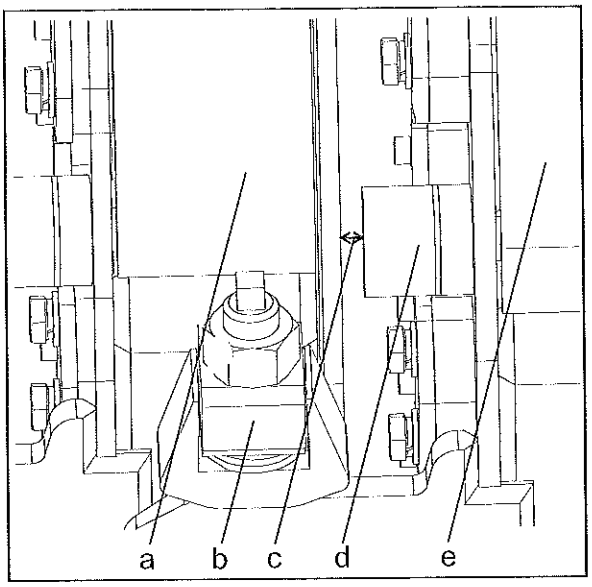

Fig 5-85 Recheck the clearance

a. Boom tele section head
b. Align device
c. The clearance
d. Stop block
e. Next boom tele section head

13. Retract the boom tele cylinder 2 again, making the clearance between the stop blocks at the heads of all boom sections = 0.

14. Extend and retract all boom sections for 3 time.

Then recheck the clearance between boom tele section head and stop block of next section head. If the clearance is less than 2 mm, the adjustment is successful.

15. If the adjustment is failed, remove all the tension in the retract and extend wire ropes and repeat all of the steps above.

5.5.4.4 Retract Wire Ropes – Adjust

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance" .

Refer to "Maintenance interval for main boom and boom extension of superstructure" before proceeding with these procedures.

1. Start the engine. Then extend the outriggers and support the crane properly.

Refer to "Engine start procedure".

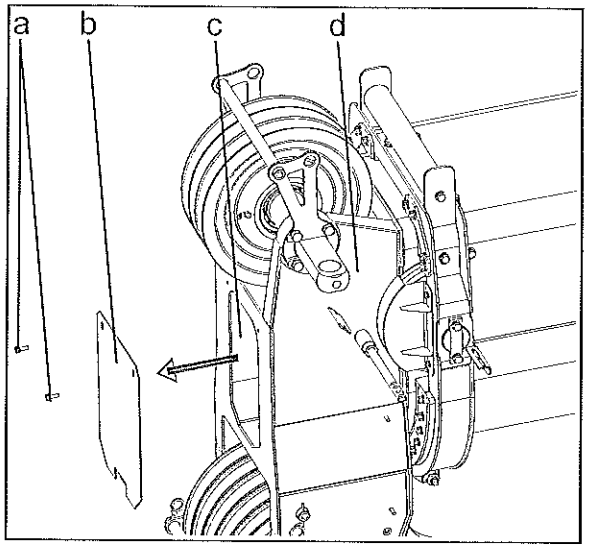

Fig 5-86

a. Capscrews and washers
b. Cover plate

c. Access to tele 4 retract wire rope anchors

d. Boom tele 4 section

2. Rotate the superstructure so the main boom is positioned directly over the front of the machine.

3. Lower the boom at horizontal position (boom angle elevation 0 degrees or lower).

4. Extend the boom approximately 200 mm to relieve tension in the boom retract wire ropes.

5. Remove the capscrews and washers securing cover plate at the head of boom tele 4 section.

6. Check the slack of tele 4 retract wire ropes.

Use the adjustment nuts on retract wire rope anchors to remove slack evenly as needed.

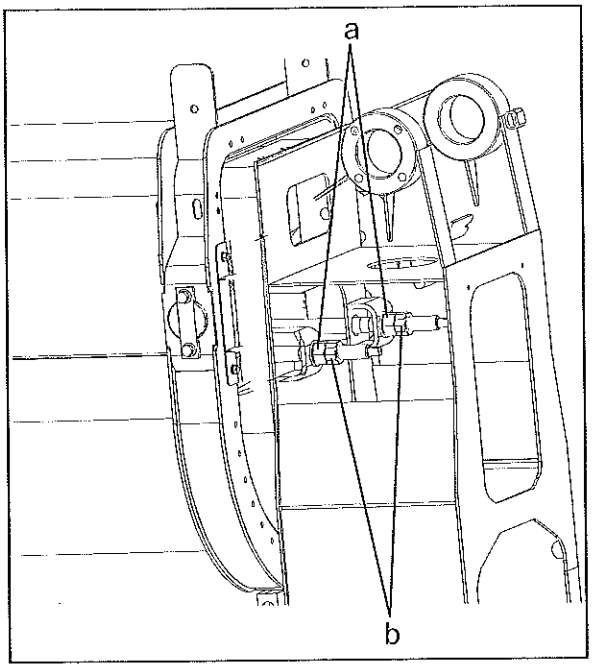

Fig 5-87

a. Adjustment nuts
b. Locknuts

7. Secure the adjustment nuts with the locknuts.

8. Extend the boom tele 3 section part way till can reach the window of tele 3 retract wire rope anchor.

⚠ CAUTION

Hold the wire rope stationary and turn the nuts during the adjustment process. Turning wire rope while adjusting will result in damage to or failure of wire rope.

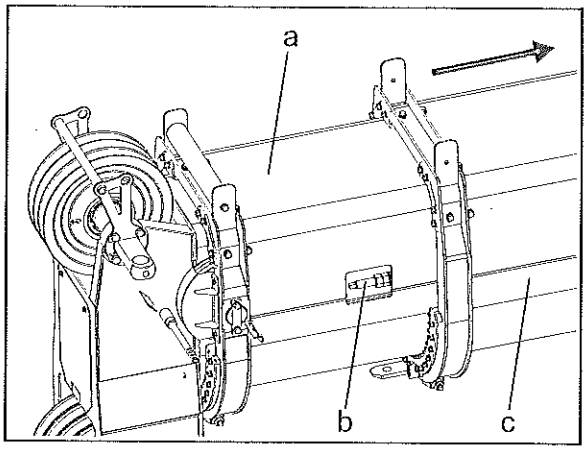

Fig 5-88

a. Boom tele 3 section
b. Tele 3 retract wire rope anchor
c. Boom tele 2 section

9. Check the slack of tele 3 retract wire ropes.

Use the adjustment nuts on retract wire rope anchors to remove slack evenly as needed at both side of boom tele 3 section.

10. Secure the adjustment nuts with the locknuts.

⚠ CAUTION

Hold the wire rope stationary and turn the nuts during the adjustment process. Turning wire rope while adjusting will result in damage to or failure of wire rope.

5.5.4.5 Main Boom and Boom Extension – Lubricate

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Choose the specified type of grease according to ambient temperature in different seasons.

Refer to "Lubricants and fluids".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for main boom and boom extension of superstructure" before proceeding with these procedures.

Refer to "Maintenance interval for main boom and boom extension of superstructure" before proceeding with these procedures.

1. Start the engine. Then extend the outriggers and support the crane properly.

Refer to "Engine start procedure".

2. Rotate the superstructure so the main boom is positioned directly over the front of the machine.

3. Lower the boom at horizontal position (boom angle elevation 0 degrees or lower).

⚠ CAUTION

Do not insert fingers into holes in the boom. This could result in minor or moderate injury.

4. Lubricate boom sections

Lubricate more often if environmental conditions and/or operating conditions require it. Grease for each one boom section include top wear pads, bottom wear pads, telescopic slide faces and grease fitting of telescope lock pin.

a. Remove the hook block or headache ball.

b. Wind all the hoist wire ropes onto the hoist drum.

c. Extend the boom tele 1 section to line up the hole on the base section and get access to the grease fitting of telescope lock pin.

d. Lubricate the telescope lock pin.

Inject grease into fitting through access hole until grease extrudes.

e. Apply the lubricating grease with a brush or spatula to the top and bottom wear pads of boom tele 1 section.

f. Thoroughly spread grease on telescopic slide faces of boom tele 1 section.

g. Raise boom to 70° and retract boom tele 1 section.

h. Repeat these steps above to lubricate each boom tele sections.

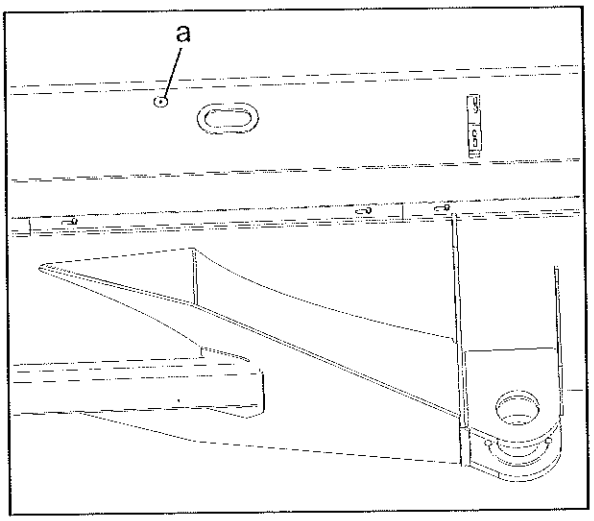

Fig 5-89 Extend the boom tele 1 section to line up the hole on the base section

a. Access hole

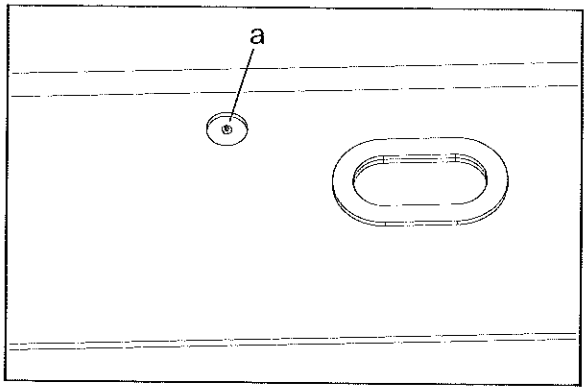

Fig 5-90 Lubricate the telescope lock pin

a. Grease fitting

⚠ WARNING

Always wear personal protective equipment, including a hard hat, eye protection, gloves and work shoes as required. Failure to observe and follow these warnings could result in death or serious injury or equipment damage.

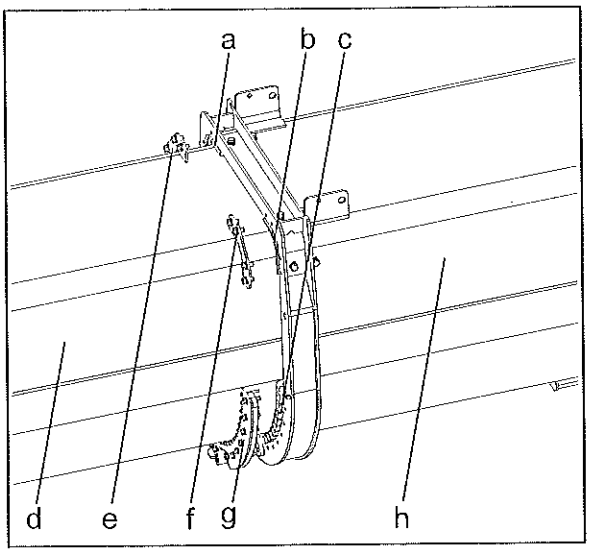

Fig 5-91 Apply the lubricating grease

a. Top wear pads
b. Top wear pads

c. Bottom wear pads

d. Telescopic slide face of boom tele 1 section

e. Keeper plates

f. Keeper plates

g. Keeper plates

h. Boom base section

5. Lubricate upper lift cylinder pivot pin.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes

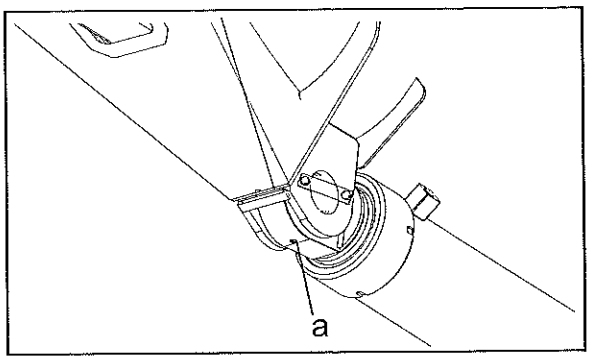

Fig 5-92 Lubricate upper lift cylinder pivot pin

a. Grease fitting

6. Lubricate lower lift cylinder pivot pin.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes

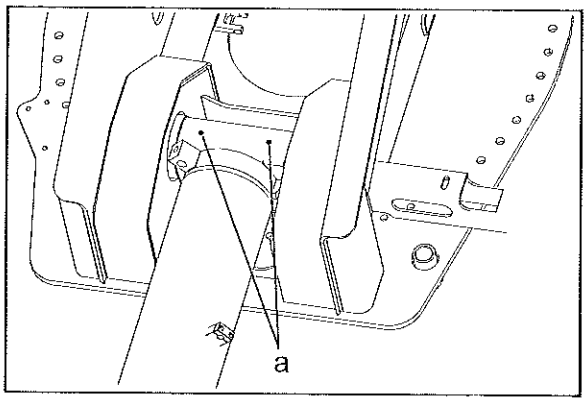

Fig 5-93 Lubricate lower lift cylinder pivot pin

a. Grease fitting

7. Lubricate boom pivot pin.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes

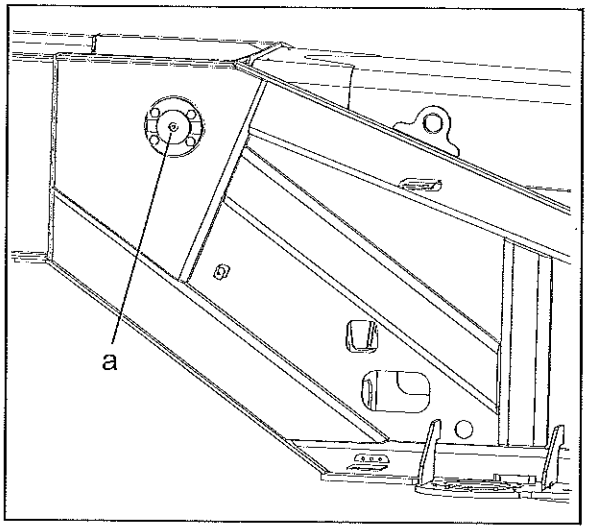

Fig 5-94 Lubricate boom pivot shaft

a. Grease fitting

8. Lubricate upper boom nose sheaves.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes

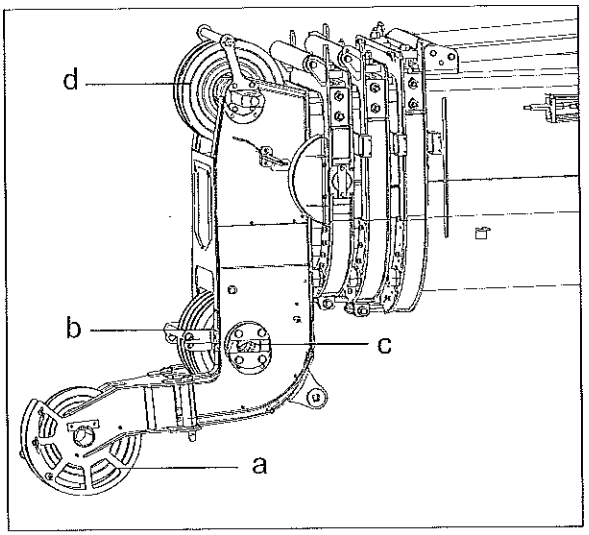

Fig 5-95 Lubricate the boom head

a. Auxiliary boom nose sheave
b. Lower boom head sheaves

c. Grease fitting

d. Upper boom head sheaves

9. Lubricate lower boom nose sheaves.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes

10. Lubricate auxiliary boom nose sheaves.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes

11. Lubricate swingaway boom extension ramp.

Lubricate more often if environmental conditions and/or operating conditions require it.

Thoroughly spread grease on swingaway boom extension ramp with brush.

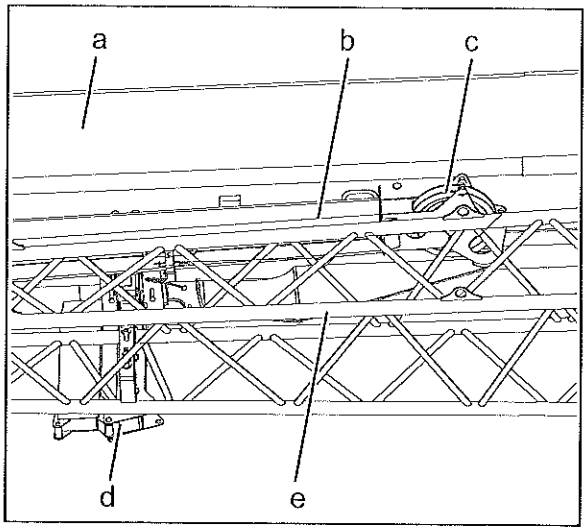

Fig 5-96 Lubricate swingaway boom extension ramp

a. Main boom
b. Swingaway boom extension-fly section
c. Swingaway boom extension sheave 1
d. Swingaway boom extension ramp
e. Swingaway boom extension-lattice section

12. Lubricate swingaway boom extension sheave 1 and 2.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes

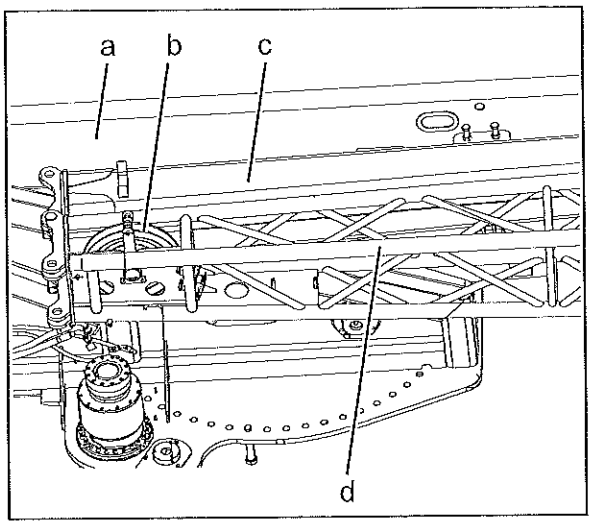

Fig 5-97 Lubricate swingaway boom extension sheave 2

a. Main boom
b. Swingaway boom extension sheave 2
c. Swingaway boom extension-fly section
d. Swingaway boom extension-lattice section

5.5.5 Swing Mechanism

5.5.5.1 Check the Gear Oil Level and Quality

Secure the machine before doing any lubrication maintenances.

Refer to "Secure Machine for Maintenance" on page 5-24.

Refer to "Environmental Precautions" on page 2-35.

Refer to "Maintenance interval for swing mechanism of superstructure" before proceeding with these procedures.

1. Shut down the engine.

Refer to "Engine shutdown procedure".

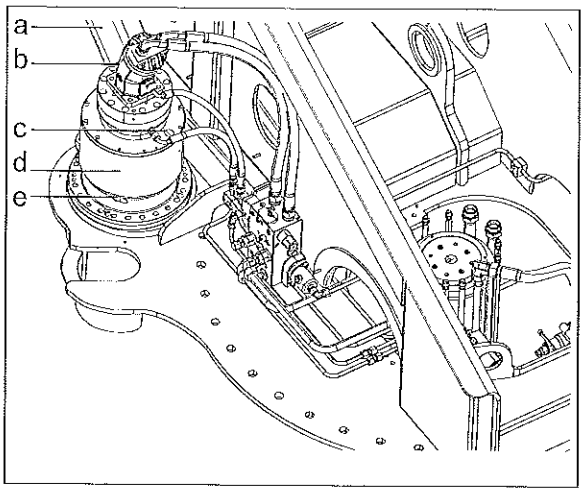

Fig 5-98 Remove the oil filling plug

a. Turntable
b. Swing motor

c. Oil filling plug

d. Swing drive

e. Drain plug

2. Remove the oil filling plug.

3. Check the quality of gear oil.

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc while checking.

4. Check the oil level through the filling inlet. The gear oil must be visible in the oil filling inlet.

- If less, refill gear oil via the oil filling inlet;
- If more, drain out gear oil via the oil drain hole.

5. Replace the seal ring of plug. Clean and close opening if oil level is correct.

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

5.5.5.2 Drain and Change the Gear Oil

Choose the specified type of gear oil according to ambient temperature in different seasons.

Refer to "Lubricants and fluids" .

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for swing mechanism of superstructure" before proceeding with these procedures.

1. Shut down the engine.

Refer to "Engine shutdown procedure".

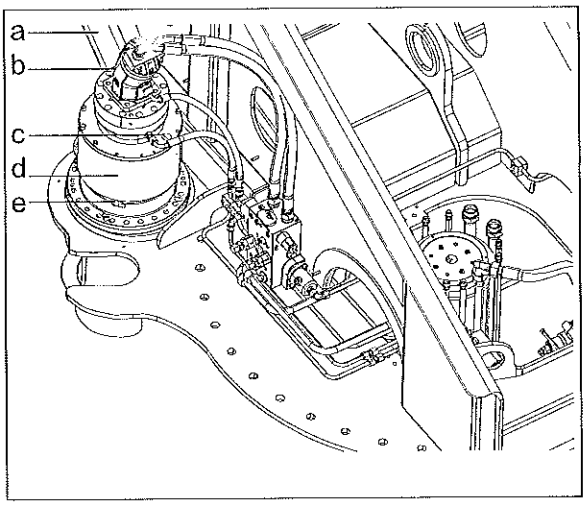

Fig 5-99 Remove the drain plug

a. Turntable
b. Swing motor

c. Oil filling plug

d. Swing drive

e. Drain plug

2. Place a gear oil collection container with appropriate size below the drain plug

3. Remove the oil level plug.

4. Remove the drain plugs at the bottom of center drive of axles to drain the gear oil into container.

NOTE :
Do not drain any gear oil on the ground.

5. Clean and close openings after the gear oil is completely drained. Replace a new seal on the plugs.

6. Fill gear oil as need via oil filling inlet by the gear oil filling nozzle or the funnel.

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

NOTICE

Dispose of the contaminated gear oil in accordance with local environmental regulations. Failure to d so could result in damage to the environment.

⚠ CAUTION

The gear oil is toxic, always keep it away from children and pets.
The gear oil may harm physical health and environment, so it should be avoided to let gear oil into eyes or onto skin. If any gear oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with gear oil, wash the clothes immediately; If eat gear oil by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

7. Clean and close opening after filling completely. Replace a new seal on the plug.

NOTE :
The gear oil must be visible in the oil filling inlet.

8. Start the engine and drive the machine to operate axles for a while.

Refer to "Engine start procedure".

9. Check the gear oil level again.

NOTICE

Do not overfill the gear oil. Failure to do this could result in machine damage and improper machine operation.

5.5.5.3 Check Swing System Mounting Bolts

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Refer to "Maintenance interval for swing mechanism of superstructure" before proceeding with these procedures.

1. Extend the outriggers and lower the outrigger jacks.

Refer to "Set up outrigger".

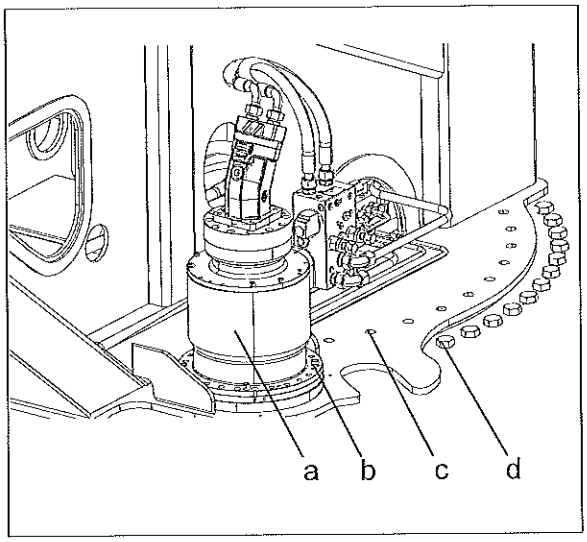

Fig 5-100 Check swing system mounting bolts

a. Swing drive
b. Swing drive mounting bolts
c. Turntable bolts
d. Swing gear mounting bolts

2. Rotate the superstructure so there is plenty of room to work on the swing drive.

Refer to "Swing the boom".

3. Check the swing system mounting bolts torque, tighten the bolts if needed.

Refer to "Torque values".

4. Check for damage, loose or missing bolts. Look for signs of cracking.

5. Start the engine and rotate the superstructure to align the opening with each of the rotating bearing bolts and check the torque of each bolt.

5.5.5.4 Swing Gear and Drive Pinion – Check

1. Check the swing gear and pinion for loosing or missing bolts, cracks or any abnormal condition

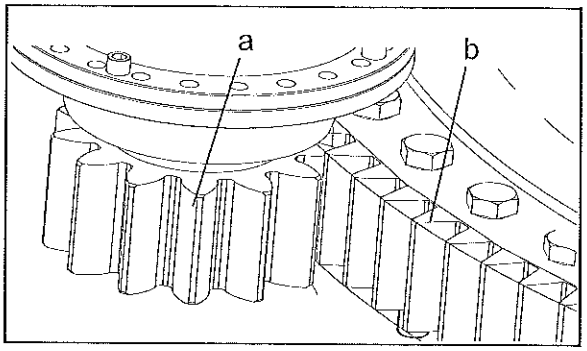

Fig 5-101

a. Swing drive pinion
b. Swing gear

2. Check the gear clearance between swing gear and drive pinion.

NOTE :

If any abnormal condition is found, contact with your Sany dealer for repairs.

5.5.5.5 Swing Drive Braking – Check

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for swing mechanism of superstructure" before proceeding with these procedures.

1. Set up the machine in a clear area for normal operations.
Refer to "Outrigger operation".

2. Extend the boom.
Refer to "Boom operation".

3. Carefully swing the boom in both directions while monitoring the brake function stopping distance.

- If the stopping distance is unusually long or slow to stop, the swing drive 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.
Refer to "Boom operation".

5. Remove the drain plug from the swing drive and capture a sample of the fluid and refill as necessary.

- 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 dealer if issues are found.

5.5.5.6 Swing Mechanism – Lubricate

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance"

Choose the specified type of grease according to ambient temperature in different seasons. Refer to "Lubricants and fluids".

Refer to "Lubricants and fluids".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for swing mechanism of superstructure" before proceeding with this procedure.

1. Lubricate swing gear and drive pinion.

Lubricate more often if environmental conditions and/or operating conditions require it.

Apply the lubricating grease with a brush or spatula to all teeth of gear and pinion.

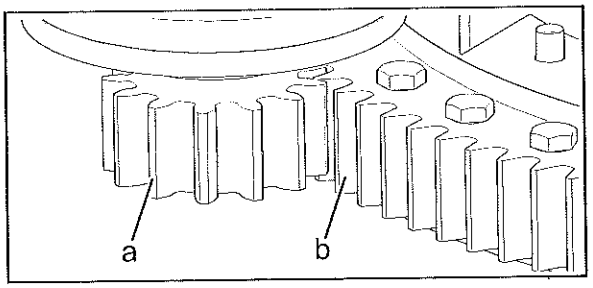

Fig 5-102

a. Swing drive pinion
b. Swing gear

2. Lubricate swing bearing.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into each fittings around the edge of the swing bearing, Until grease extrudes the whole circumference of the bearing, To reach the grease fittings shown in photos, the access cover must be removed.

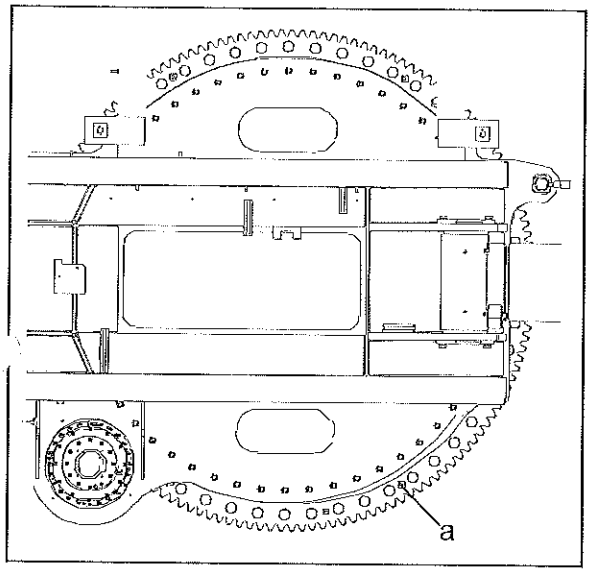

Fig 5-103

a. Grease fittings

5.5.6 Hoist

5.5.6.1 Hoist Mounting Bolts – Check

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance" .

Refer to "Maintenance interval for hoist of superstructure" before proceeding with this procedure.

1. Pin railings in the up position.

2. Check the main and auxiliary hoist mountings for loosing or missing bolts, cracks or any abnormal condition.

NOTE :

If any abnormality is found, contact your Sany dealer for repairs.

3. Check the hoist mounting bolt torque, tighten the bolts if need.
Refer to "Tightening torques".

5.5.6.2 Gear oil level and quality – Check

Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for hoist of superstructure" before proceeding with these procedures.

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding.
Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

NOTICE

Dispose of the contaminated gear oil in accordance with local environmental regulations.
Failure to do so could result in damage to the environment.

Park the machine on a flat ground. Then check the gear oil as following steps.

1. Shut down the engine.

Refer to "Engine shutdown procedure".

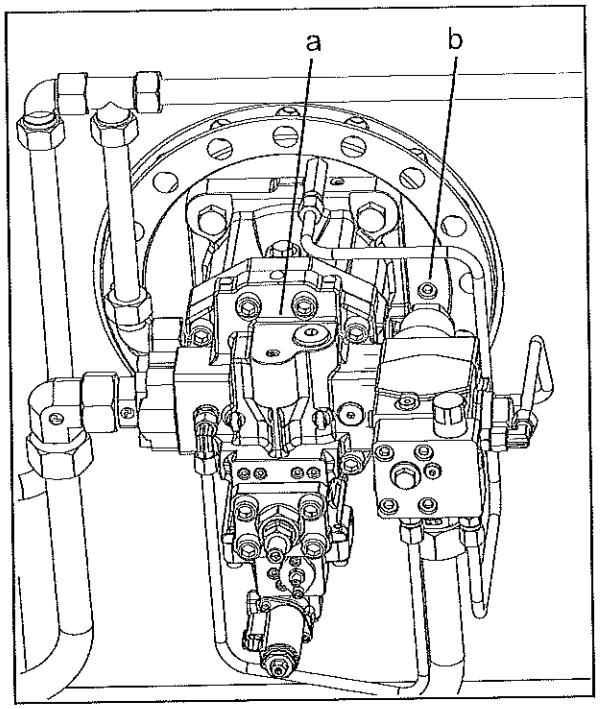

Fig 5-104 Remove the oil level plug

a. Hoist motor
b. Oil level plug / Oil filling inlet

2. lace a gear oil collection container with appropriate size below the oil level plug.

3. Remove the oil level plug.

4. Check the quality of gear oil.

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc while checking.

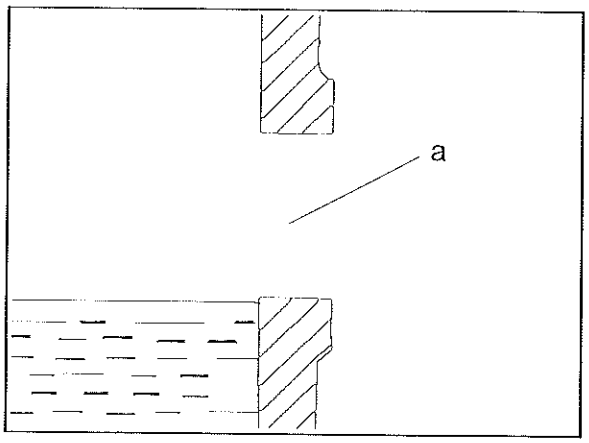

Fig 5-105 The gear oil is level with the bottom of oil level hole

a. Oil level hole

5. Check whether the gear oil is level with the bottom of oil level hole.
   - If less, refill gear oil via the oil filling inlet;
   - If more, drain out gear oil via the oil level hole.

6. Replace the seal ring of plug. Clean and close opening if oil level is correct.

7. Repeat these steps above for other hoist drive.

5.5.6.3 Gear Oil – Drain and Change

Drain and change the gear oil if finding badly black color or serious deterioration, dilution, etc, or in accordance with regular maintenance interval.

Choose the specified type of gear oil according to ambient temperature in different seasons.

Refer to "Lubricants and fluids" .

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for swing mechanism of superstructure" before proceeding with these procedures.

1. Shut down the engine.

Refer to "Engine shutdown procedure".

2. Place a gear oil collection container with appropriate size below the drain plug.

3. Remove the oil level plug.

4. Remove the drain plugs at the bottom of center drive of axles to drain the gear oil into container.

NOTE :
Do not drain any gear oil on the ground.

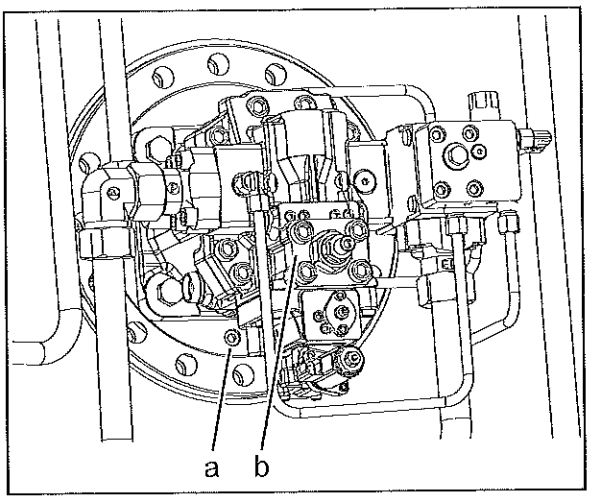

Fig 5-106 Remove the drain plug

a. Drain plug
b. Hoist motor

5. Clean and close openings after the gear oil is completely drained. Replace a new seal on the plugs.

6. Fill gear oil as need via oil filling inlet by the gear oil filling nozzle or the funnel.

NOTICE

Do not overfill the gear oil. Failure to do this could result in machine damage and improper machine operation.

⚠ WARNING

Always wait for the gear oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

NOTICE

Dispose of the contaminated gear oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

⚠ CAUTION

- The gear oil is toxic, always keep it away from children and pets.
- The gear oil may harm physical health and environment, so it should be avoided to let gear oil into eyes or onto skin. If any gear oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with gear oil, wash the clothes immediately; If eat gear oil by mistake, get medical help immediately.

Failure to do this could result in minor or moderate injury.

7. Clean and close opening after filling completely. Replace a new seal on the plug.

NOTE :

The gear oil is level with the bottom of oil level hole.

8. Start the engine and drive the machine to operate axles for a while.

Refer to "Engine start procedure".

9. Check the gear oil level again.

5.5.6.4 Hoist – Lubricate

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance" .

Choose the specified type of grease according to ambient temperature in different seasons.

Refer to "Lubricants and Fluids".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for hoist of superstructure" before proceeding with this procedure.

1. Lubricate hoist drum bearing.

Lubricate more often if environmental conditions and/or operating conditions require it.

Inject grease into fitting until grease extrudes.

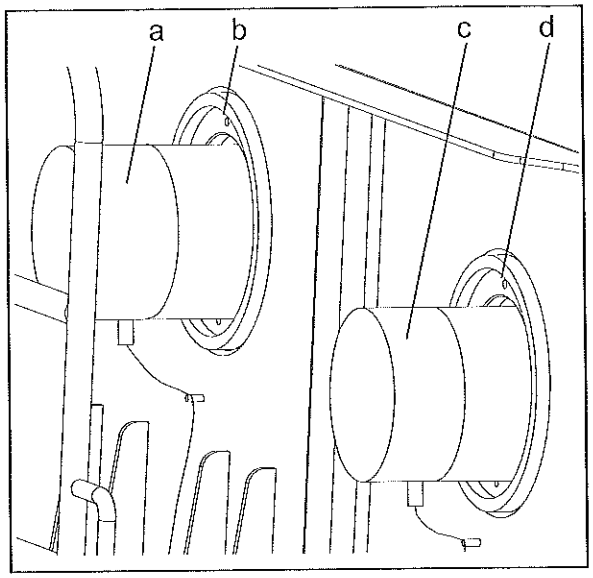

Fig 5-107

a. Third wrap protector of main hoist
b. Grease fitting

c. Third wrap protector of aux hoist

d. Grease fitting

5.5.7 Hydraulic System

5.5.7.1 Hydraulic Oil Level and Quality – Check

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Refer to "Maintenance interval for hydraulic system of superstructure" before proceeding with these procedures.

NOTE :

The maximum operating temperature of hydraulic oil is 80°C.

1. Park the machine on a flat ground

2. Return the crane to its stowed position, lower the boom all the way down and turn the front wheels to the extreme left.

3. Shut down the engine and wait for the hydraulic system to cool down sufficiently.
Refer to "Engine shutdown procedure".

4. Locate the hydraulic reservoir at the left side of carrier.

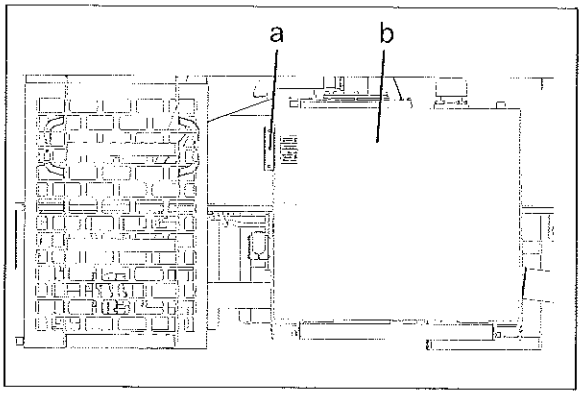

Fig 5-108 Check the hydraulic oil through the level sight glass

a. Hydraulic oil level sight glass
b. Hydraulic reservoir

5. Check the hydraulic oil level and quality through the level sight glass on hydraulic reservoir.

The hydraulic oil level must be between the Min. and Max. marks at level sight glass on hydraulic reservoir.

- If less, refill hydraulic oil via the hydraulic oil filling inlet;
- If more, drain out hydraulic oil.

Drain and change the hydraulic oil if finding serious deterioration, dilution, etc while checking.

5.5.7.2 Hydraulic Oil – Drain and Change

Drain and change the hydraulic oil if finding serious deterioration, dilution, etc, or in accordance with regular maintenance interval.

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.
Choose the specified type of hydraulic oil according to ambient temperature in different seasons.

Refer to "Lubricants and fluids".

Secure the machine before doing this maintenances.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for hydraulic system of superstructure" before proceeding with these procedures.

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. Return the crane to its stowed position, lower the boom all the way down and turn the front and rear wheels to the extreme left.

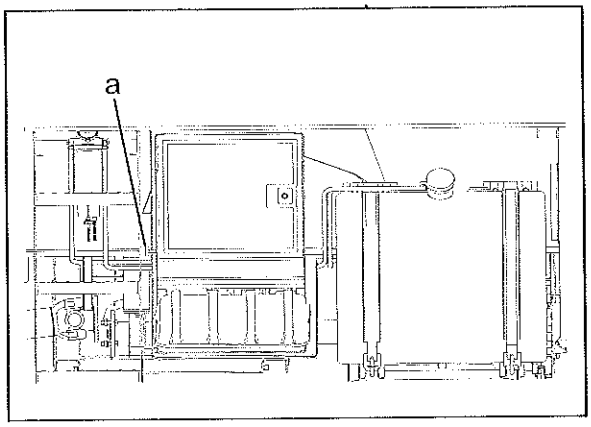

Fig 5-109

a. Battery disconnect switch

2. Shut down the engine. Turn the ignition switch off two minutes before proceeding to the next step.

3. Set the battery disconnect switch to the OFF position.

⚠ CAUTION

When hydraulic oils are changed or added, ensure that hydraulic oils of different manufacturers are of the same specifications, however, discoloration (milkiness) may occur.

4. Place a suitable container under the drain plug at the bottom of reservoir.

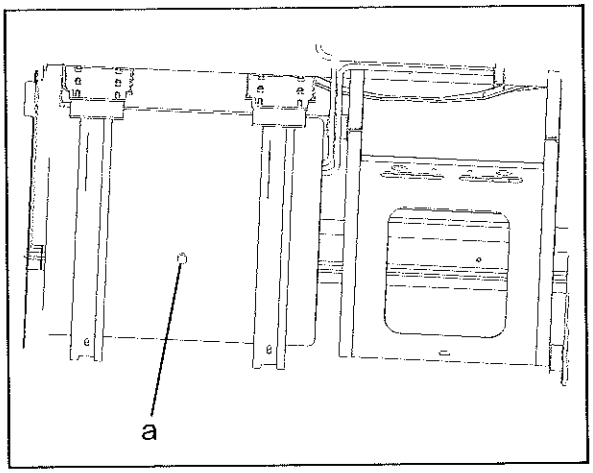

Fig 5-110 Remove the reservoir drain plug

a. Drain plugs

5. Remove the reservoir drain plug. Allow about three minutes after hydraulic oil stops flowing from the drain port for the side walls to drain.

6. Clean and install the reservoir drain plug.

⚠ WARNING

Always wait for the hydraulic oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

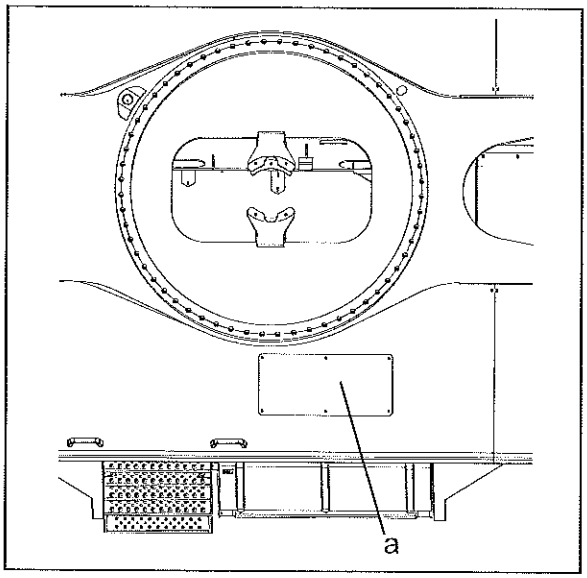

Fig 5-111 Remove the hydraulic reservoir filler cap access cover

a. Access cover

NOTICE

Dispose of the contaminated hydraulic oil in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

7. Remove the hydraulic reservoir filler cap access cover.

8. Remove two mounting covers on the top of the reservoir.

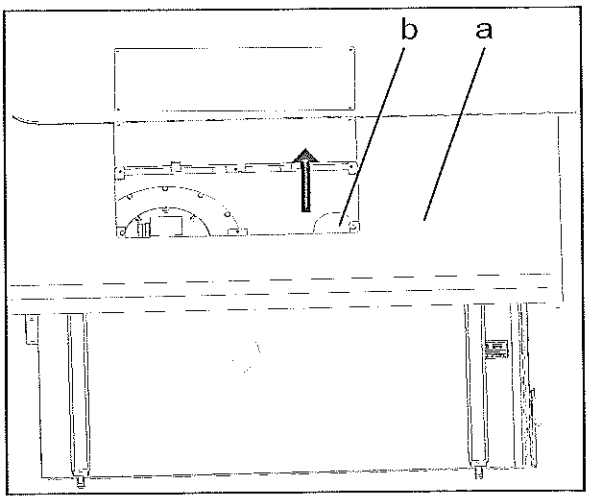

Fig 5-112 Remove two mounting covers on the top of the reservoir

a. Hydraulic reservoir
b. Filter mounting cover

NOTICE

Prevent water and foreign material entering hydraulic reservoir during draining or filling. Failure to do this could result in hydraulic oil failure or cause the machine operate improperly.

9. Remove the hydraulic filter.

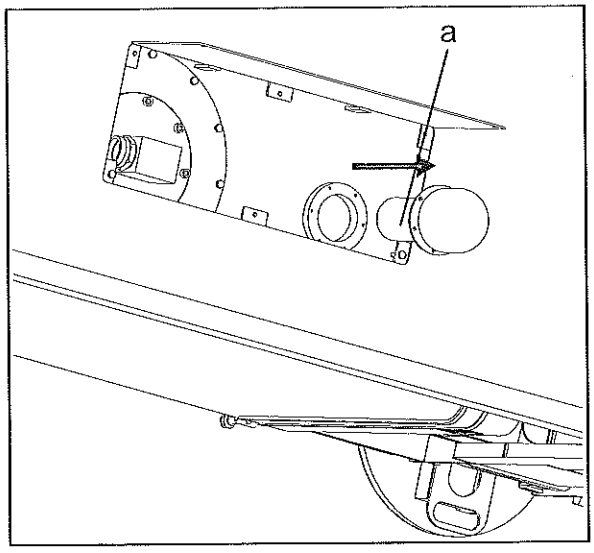

Fig 5-113 Remove the hydraulic filter

a. Hydraulic filter

10. Fill the reservoir with a mineral spirits, to clean and flush the hydraulic reservoir.

Choose the mineral spirits refer to "Lubricants and fluids".

11. Agitate the fluid inside the tank to loosen and remove any remaining residue.

12. Remove the reservoir drain plug, to drain the mineral spirits into a suitable container.

13. Clean and install the drain plug and fill the reservoir to the level as necessary with clean hydraulic oil.

14. Install the new hydraulic filter.

15. Install the mounting cover on the top of filter.

NOTICE

Do not operate the machine with mineral spirits in the reservoir. This could damage the machine or cause it to operate improperly.

16. Disconnect the return line from the boom lift cylinder to drain the oil into a suitable container. Then reconnect it and raise the boom to maximum elevation.

⚠ CAUTION

Hydraulic oil supply lines must be connected to the cylinders when flushing the system.

NOTICE

Draining the various components will be aided by connecting a drain line in place of the disconnected return line.

17. Lower the boom to its stowed position. Replenish the reservoir hydraulic oil level as required.

18. Disconnect the return line from an outrigger beam cylinder to drain the oil into a suitable container. Then reconnect it and fully extend the outrigger beam.

19. Retract the outrigger beam. Replenish the reservoir hydraulic oil level as necessary.

20. Repeat Steps 18 and 19 for the remaining outriggers.

⚠ CAUTION

When draining the outrigger cylinders, always operate either both front or both rear cylinders together to prevent twisting the crane.

21. Disconnect the return lines from a pair of outrigger stabilizer cylinders to drain the oil into a suitable container. Then reconnect them and activate the cylinders to their maximum down positions.

22. Raise the outrigger stabilizer cylinders to the stowed position. Replenish the reservoir hydraulic oil level as necessary.

23. Repeat Steps 21 and 22 for the remaining two outrigger stabilizer cylinders.

24. Disconnect the return line from the boom tele cylinder to drain the oil into a suitable container. Then reconnect it and fully extend the boom.

25. Retract the boom to the stowed position. Replenish the reservoir hydraulic oil level as necessary.

26. Disconnect the return lines from both front steering cylinders to drain the oil into a suitable container. Then reconnect them and turn the front wheels to the extreme right.

27. Turn the front wheels to the extreme left and then back to center. Replenish the reservoir hydraulic oil level as necessary.

28. Repeat Steps 26 and 27 for the both rear steering cylinders.

29. Disconnect the return line from the main hoist motor to drain the oil into a suitable container. Then reconnect it and fully hoist up the hoist.

30. Fully hoist down the hoist, then hoist up again. Replenish the reservoir hydraulic oil level as necessary.

31. Repeat Steps 29 and 30 for the auxiliary hoist as necessary.

32. Disconnect one of the lines from the swing motor to drain the oil into a suitable container. Then reconnect it and drive the motor in the direction it will go.

33. Drive the swing motor in the opposite direction until the boom is centered and forward. Replenish the reservoir hydraulic oil level as necessary.

34. Operate all circuits and recheck the reservoir sight gauge. Add hydraulic oil as required.

NOTE :

Ensure the crane is level when the hydraulic system is being filled. The system must be filled with all cylinders retracted. Fill the reservoir to the full mark on the reservoir sight gauge.

NOTICE

Do not overfill the hydraulic reservoir. This could result in machine damage and improper machine operation.

35. Install the hydraulic reservoir filler cap and its mounting cover.

36. Install the access cover.

37. Remove air from the hydraulic system.

Refer to "Removing air from the hydraulic system" on next section.

⚠ CAUTION

When hydraulic oils are changed or added, ensure that hydraulic oils of different manufacturers are of the same specifications, however, discoloration (milkiness) may occur.

⚠ CAUTION

• The hydraulic oil is toxic, always keep it away from children and pets.
• The hydraulic oil may harm physical health and environment, so it should be avoided to let hydraulic oil into eyes or onto skin. If any hydraulic oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with hydraulic oil, wash the clothes immediately; If eat hydraulic oil by mistake, get medical help immediately.
Failure to do this could result in minor or moderate injury.

5.5.7.3 Air in Hydraulic System – Remove

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for hydraulic system of superstructure" before proceeding with these procedures.

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.

Small leaks may be hard to locate. If a leak is not readily detectable, use the following way to check for it:

1. 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 0.14 to 0.28 bar and inspect all connectors and fittings for evidence of leaks. A soap solution applied to the fittings and connectors 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.

2. This action should return any entrapped air to the reservoir where it can be removed from the hydraulic oil by the baffles.

3. To remove entrapped air from boom tele cylinder, lower the boom to below horizontal and fully telescope the boom in and out several times.

4. If the air is not readily removed, lower the boom to below horizontal, extend the boom tele cylinder 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.

⚠ WARNING

Locate the machine on a firm supporting surface and position the boom over the front on outriggers when extending the boom at low angles.

5. 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.

⚠ WARNING

Extreme care must be used when removing any plugs or restrictions from a hydraulic system suspected to have entrapped air that may be pressurized.

⚠ WARNING

Do not attempt to loosen fittings in pressurized lines or while the hydraulic pumps are in operation.

6. In the event that air entrapment should persist, bleeding of air by loosening various clamp and screw type fittings may become necessary.

7. If the above procedures fail to eliminate air entrapment, contact your authorized SANY Distributor.

5.5.7.4 Reservoir Breather – Replace

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for hydraulic system of superstructure" before proceeding with these procedures.

⚠ WARNING

Always allow the oil ample time to cool down to ambient temperature before troubleshooting. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

1. Shut down the engine and wait for the hydraulic system to cool down sufficiently.

Refer to "Engine shutdown procedure" .

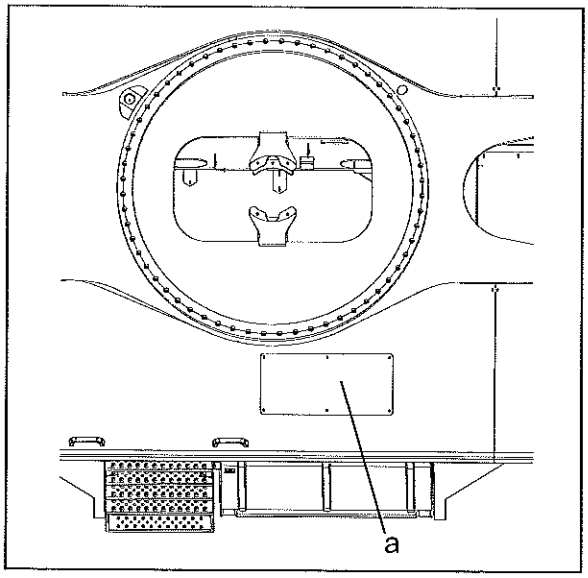

Fig 5-114 Remove the hydraulic reservoir breather access cover

a. Hydraulic reservoir breather access cover

2. Remove the hydraulic reservoir breather access cover.

⚠ WARNING

Always wait for the hydraulic oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury

3. Wipe any dirt from the reservoir breather.

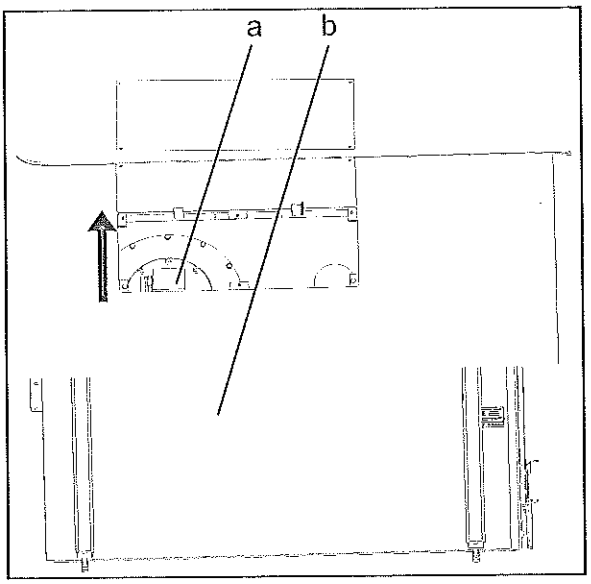

Fig 5-115 Remove the reservoir breather

a. Reservoir breather
b. Hydraulic reservoir

4. Remove the reservoir breather from the top of hydraulic reservoir.

5. Screw the replacement reservoir breather on the top of hydraulic reservoir.

6. Reinstall the hydraulic reservoir breather access cover.

5.5.7.5 Hydraulic Filter – Replace

Replace the hydraulic filter whenever changing the hydraulic oil, or in accordance with regular maintenance interval.

Secure the machine before doing any lubrication maintenances.

Refer to "Secure machine for maintenance".

Refer to "Environmental precautions" before proceeding with this procedure.

Refer to "Maintenance interval for hydraulic system of superstructure" before proceeding with these procedures.

1. Shut down the engine and wait for the hydraulic system to cool down sufficiently.

Refer to "Engine shutdown procedure" .

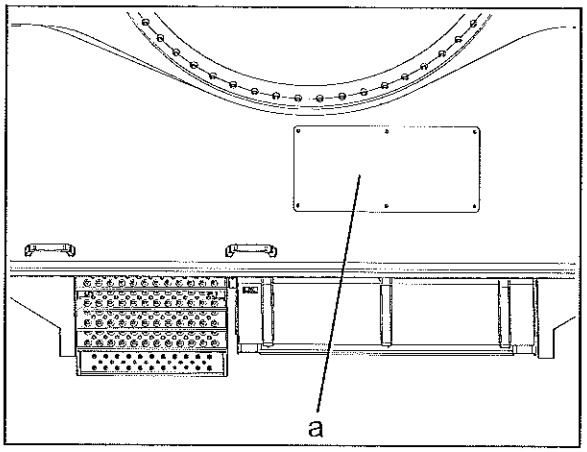

Fig 5-116 Remove the access cover

a. Hydraulic reservoir breather access cover

2. Remove the access covers on the deck.

⚠ WARNING

Always wait for the hydraulic oil cool down to ambient outdoor temperature before proceeding. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

⚠ CAUTION

• The hydraulic oil is toxic, always keep it away from children and pets.

• The hydraulic oil may harm physical health and environment, so it should be avoided to let hydraulic oil into eyes or onto skin. If any hydraulic oil comes into eyes, do flush them with clean water immediately for at least 15 mins and then get medical help; If your clothes are stained with hydraulic oil, wash the clothes immediately; If eat hydraulic oil by mistake, get medical help immediately.

Failure to do this could result in minor or moderate injury.

3. Remove the filter mounting cover on the top of reservoir.

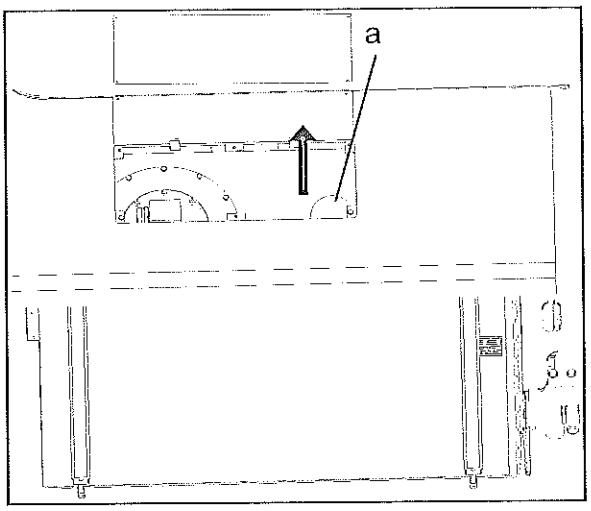

Fig 5-117 Remove the filter mounting cover on the top of reservoir

a. Filter mounting cover

NOTICE

Prevent water and foreign material from entering hydraulic reservoir while replacing the filter. Failure to do this could result in hydraulic oil failure or cause the machine operate improperly.

4. Pull out and discard the used hydraulic filter

NOTE :

Do not drain hydraulic oil on the ground or dispose of used filters improperly

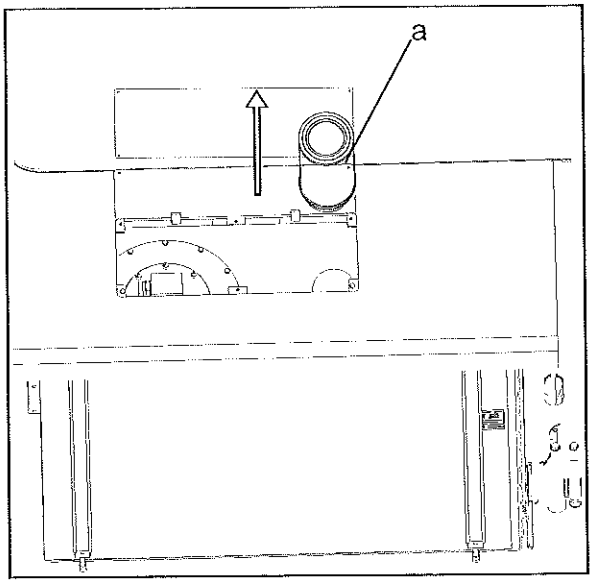

Fig 5-118 Pull out and discard the used hydraulic filter

a. Hydraulic filter

5. Install a new hydraulic filter after filling the filter with fresh clean hydraulic oil.

6. Install the filter mounting cover.

7. Install the access covers on the deck.

5.5.7.6 Main Valve Body – Check

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 dealer for repairs.

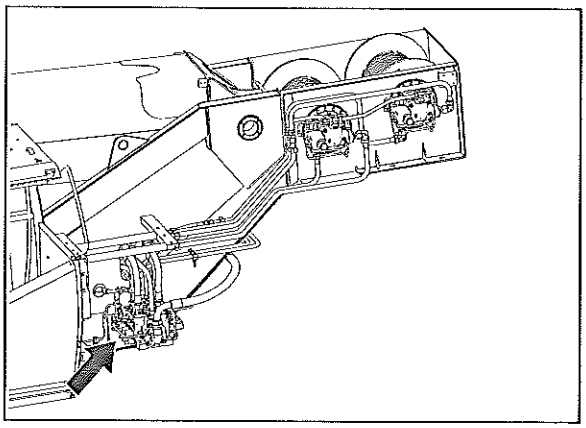

Fig 5-119

a. Main valve body

5.5.7.7 Check Hydraulic Hoses

Refer to "High-pressure fluid lines".

1. Check all hoses regularly for possible leakage and replace damaged or leaking hoses immediately, even slight damage.

NOTE :
Any hydraulic pump lines and connectors connected to the engine chamber must be replaced if they are damaged due to mechanical /thermal or other effects.

2. Ensure that there is a sufficient distance from all lines and hoses to the high temperature engine components (e.g., the exhaust system) and that there is no friction between them.

NOTE :
Possible hose defects are as follows:

- The couplings slip in the hose
- Damage, cuts or abrasions in the external rubber layer
- Hardening, chapping or burning of hose
- Any cracks, damage or serious corrosion on the couplings
- Any leakage at the hose couplings
- Any twisted, broken, flat or distorted hose
- Blisters or softness in the external hose layer

3. Look for these signs of problems when doing the visual inspection:

- Oil leakage at the oil orifice of the engine block.

- Clogging by debris

NOTE :

Possible hose defects are as follows:

4. Check hoses under and around all sides of the crane.

5. Check hoses under the boom end and at the right side of the boom support.

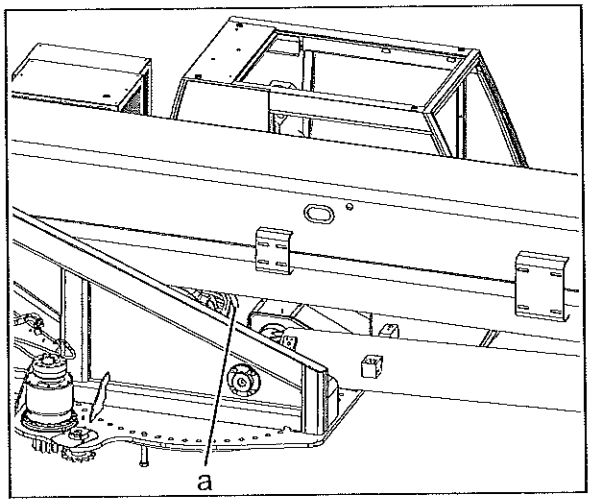

Fig 5-120

a. Hoses under the boom end

6. Check hoses at the left side behind the operator's cab and boom support.

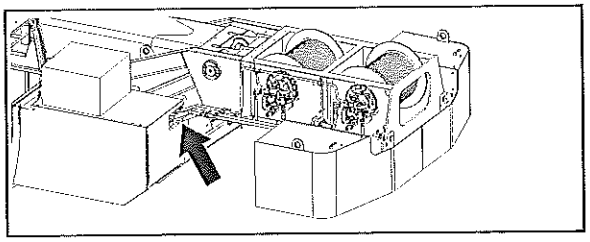

Fig 5-121 Check hoses at the left side behind the operator's cab and boom support

7. Remove access covers to expose the engine and transmission area and check all hoses in the area.

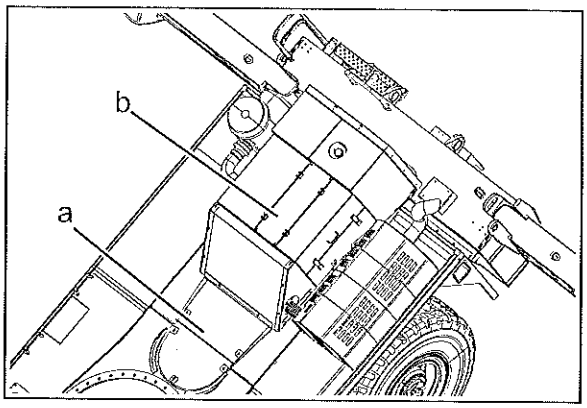

Fig 5-122

a. Transmission access covers
b. Engine access covers

5.5.8 Superstructure Electrical System

5.5.8.1 Electrical Components of Superstructure – Check

Secure the machine before doing this maintenance.

Refer to "Secure Machine for Maintenance".

Refer to "Maintenance interval for electrical system of superstructure" before proceeding with these procedures.

1. Check the function of warning and indicator lamps, They should illuminate or flash properly;

2. Check the function of the horn, It should make sound properly;

3. Check all lamps, They should have no damages, no discoloration,. no dust and no water inside.
- If dust, clean it in time;
- If water inside, disconnect the wire connector first, then drain water, and fix the water leaking.

4. Check the function of Anti-Two-Block switch.
Raise the hook block and overhaul ball slowly to hit with ATB weight. It should shut down the function immediately.
Refer to "Operation of hoist".

5. Check all the LMI functions in operator's cab. Every screens should work properly.
The reading deviation of boom angle, length and load should not exceed ±5% of actual value.
Refer to "Load moment indicator (LMI) system".

6. Contact with your Sany dealer if any electrical components lose function.

⚠ WARNING

Do not remove the Lockout/Tagout tags from the machine when you connect the battery. These tags notify others that the machine is not to be used during maintenance. Failure to keep the tags in place could create a hazardous situation which, could result in death or serious injury.

5.5.9 Torque Values

5.5.9.1 Torque Values

NOTICE

Nuts, bolts or other parts not tightened to specific torque values may lead to loose or damaged parts. This situation can cause damage to the machine, personal property, or cause the machine to operate improperly.

5.5.9.2 Specific Torque Values

NOTE :

Tightening torque is the maximum permissible screw preload.

Bolts	Torque (ft•lb)	Torque (N•m)
Swing drive fill and drain plugs	50	68
Wheel lugs	380 - 400	515 - 542
Swing drive mounting bolts	57	77.5
Turntable bolts	810 to 1,080	1,098 to 1,464

5.5.9.3 General Torque Values

Always refer to the chart on this page if the tightening torque value is not listed in the table of specific torque values.

Unless specified otherwise, the nuts and bolts shall be tightened to the values given in the following table. The tightening torque is determined by the width of the screw cap or nut. In replacement of the bolts or nuts, use genuine Sany parts of equivalent size.

5.5.9.4 Hardware

NOTE :

Tightening torque is the maximum permissible screw preload.

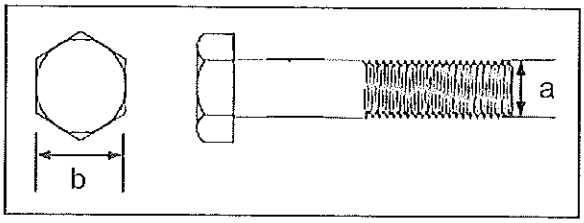

Fig 5-123

a. Thread diameter size
b. Hexagon cap size

Thread Size "a" (mm)	Hex Size "b" (mm)	Tightening Torques			
		Target Value		Acceptable Range	
		ft•lb	N•m	ft•lb	N•m
M6	10	9.8	13.2	8.7 - 10.8	11.8 - 14.7
M8	13	23.1	31	20.3 - 25.3	27 - 34
M10	17	48.5	66	43.4 - 54.2	59 - 74
M12	19	83.2	113	72.3 - 90.4	98 - 123
M14	22	130.2	117	115.7 - 144.7	157 - 196
M16	24	206.1	279	180.8 - 227.8	245 - 309
M18	27	282.1	382	253.2 - 314.6	343 - 425
M20	30	405	549	361.7 - 448.4	490 - 608
M22	32	549.7	745	488.2 - 611.2	662 - 829
M24	36	683.5	927	607.6 - 759.5	824 - 1030
M27	41	976.5	1320	868.0 - 1085.0	1180 - 1470
M30	46	1265.8	1720	1121.1 - 1410.4	1520 - 1910
M33	50	1627.4	2210	1446.6 - 1808.3	1960 - 2450
M36	55	2025.2	2750	1808.3 - 2242.2	2450 - 3040
M39	60	2423.1	3280	2133.7 - 2676.2	2890 - 3630

NOTE :

The torques shown in the chart above are for Grade 10.9 bolts.

5.5.9.5 Hoses

Hydraulic hoses are tightened according to the torque values shown below:

NOTE :

Tightening torque is the maximum permissible screw preload.

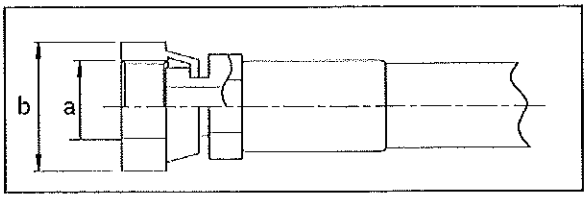

Fig 5-124

a. Nominal thread size
b. Hexagon size

Nominal Thread Number (a)	Hex Size (b) (mm)	Tightening Torque			
		Target Value		Acceptable Range	
		ft•lb	N•m	ft•lb	N•m
9/16-18UNF	19	32.5	44	25.3 - 47	35 - 63
11/16-16UN	22	54.2	74	39.8 - 68.7	54 - 93
13/16-16UN	27	75.9	103	61.5 - 97.6	84 - 132
1-14UNS	32	115.7	157	94 - 137.4	128 - 186
13/16-12UN	36	159.1	216	130.2 - 180.8	177 - 245
*1-7/16-12UN- 2B	41	159.1	215	130.2 - 180.8	176 - 234

NOTE :

The item marked with * is used for tightening the hose on top of the swivel joint.

5.5.9.6 Fittings

NOTE :

Tightening torque is the maximum permissible screw preload.

Port Fitting	Tightening Torque Value	
	N•m	ft•lb or (in•lb)
M14	34.3 ± 5	25 ± 4
M16	54 ± 5	40 ± 4
M18	70 ± 10	52 ± 7
M20	93 ± 10	69 ± 7
M22	125 ± 10	92 ± 7
M24	142 ± 20	105 ± 15
M24	68.6 ± 10	51 ± 7

Port Fitting	Tightening Torque Value	
	N•m	ft•lb or (in•lb)
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

Tube Fitting	Tightening Torque Value	
	N•m	ft•lb or (in•lb)
G1/8	16.7 ± 2	148 ± 18)
G1/4	36.7 ± 2.5	27.1 ± 2
G3/8	73.5 ± 5	54 ± 4
G1/2	107.8 ± 7.8	80 ± 6
G3/4	161.7 ± 14	119 ± 10
G1	220 ± 25	162 ± 18

SANY

Troubleshooting

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6.Troubleshooting

6.1 Emergency Operation

6.1.1 Emergency Troubleshooting During Crane Operation

If an issue occurs:

1. Keep calm.

2. If possible put down the load immediately. You may override the LMI (Load Moment Indicator) to set down the load if the LMI issue occur. Observe the warning and safety information in the section LMI overriding when doing so.

3. Retract the main boom completely and set it down on the boom support. Refer to "Operation of boom".

4. Secure the danger zone using cordons and assigned personnel if the load cannot be lower.

5. Lockout/Tagout in the operator's cab to prevent unauthorized use of the crane. Remove the ignition key. Refer to "Lockout/Tagout procedures".

6. Inform your supervisor.

7. Try to repair the issue. Notify your local Sany service if you cannot repair the problem yourself.

⚠ WARNING

Failure to do these warnings could result in death or serious injury.
- Do not carry out the repair work when the load is suspended.
- Do not perform any crane movements that may increase the size of the load moment when a load is on the hook block and the LMI is overriden.
- Only trained, qualified personnel may carry out an inappropriate emergency operation.

6.1.2 Jump-start the Engine

1. Ensure that the ignition switches of both machines are in the OFF position.

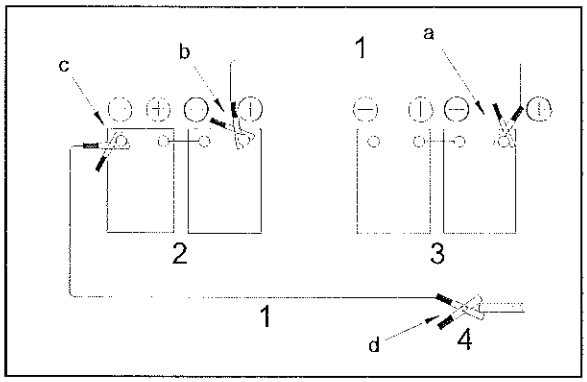

Fig 6-1

a. b. c. d are the order of the procedures.
1. Booster cable

2. Service vehicle battery

3. Disabled vehicle battery

4. Frame

2. Clamp one end of a jumper cable to the positive red terminal (+) of the drained battery.

3. Clamp the other end of the same jumper cable to the positive red terminal (+) of the charged battery.

4. Clamp one end of a second jumper cable to the ground black terminal (-) of the charged battery.

5. Clamp the other end of the second jumper cable to the ground black terminal (-) of the drained battery.

6. Start the engine of the machine with the charged battery and run it at a medium engine speed. Refer to "Engine start procedure".

7. Attempt to start the engine of the machine with the drained battery. Retry after 3 minutes if the engine will not start.

8. Disconnect the jumper cables from the machine that had the drained battery in reverse order as shown above.

9. Then disconnect the cables from the machine with the charged battery in the same way. The disconnection order is from c to b to a.

⚠ WARNING

When working with any open electrical power circuit, ensure that your hands are free of any metal objects (rings, watches, jewelry, etc.) that could come in contact with electrical power points. Failure to observe and follow this warning could result in death or serious injury

⚠ CAUTION

Failure to observe and follow this caution could result in minor or moderate injury.

• Before proceeding with any battery maintenance procedure, remember and follow these points:

• Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames.

• Wear personal protective equipment when working with batteries. Work in a well-ventilated area. If battery acid contacts your skin or your eyes, flush the area immediately with fresh water and seek medical attention.

NOTICE

Failure to observe and follow this notice can result in damage to the machine or cause the machine to operate improperly.

• The starting system voltage and the battery voltage in the boosting machine should be no more than 24 VDC. Never use a welder or equipment with a higher voltage system to jump-start the machine. Using a higher voltage to jump-start the engine may damage the electrical system or cause an unexpected explosion or fire. Always jump-start the engine with equal voltages.

• 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.

• Set all controls to their neutral positions.

• Never allow the jumper cable clamps to touch each other.

• Ensure that all jumper cables are clamped to their connections securely.

6.2 Wheel Change

6.2.1 General

The following tire size is available for the axles:

- Front / Rear axle; size 29.5R25

NOTE :

Tire diameter, width, and weight may vary slightly depending upon the manufacturer.

⚠ CAUTION

Do not mix tires or rims from different manufacturers.

Tires are designed to operate with a certain sidewall deflection or bulge. Correct air pressures ensures proper deflection which, in turn ensures proper traction, flotation, support of load and prevents excessive flexing of the tire. Overinflation increases rim stresses which results in lower rim life.

Inflate tires to the pressure specified on the tire inflation decal on the crane.

⚠ CAUTION

Do not install the largest tires on one driving axle and the smallest on the other driving axle. This will cause axle "fight" and high lubricant temperatures resulting in premature lubricant breakdown and costly axle service.

In addition to matching individual tire rolling radii and circumference, match the total tire circumference of one driving axle should match the other driving axle.The result will be satisfactory axle lubricant temperatures.

Tire failure condition as below

1. If the tire's cord can be seen from the rubber, please repair or scrap it.
2. If the tire's tread or sidewall was cut deeply to the cord, please repair or scrap it.
3. If the tire has depression, bumps or avulsion, please repair or scrap it.
4. Please stop using the tire when the pattern goes down to the tread wear mark.

6.2.2 Dismount the Wheel from Axle

⚠ DANGER

Do not dismount or mount tires on rims without proper training. High pressures can cause tire and rim parts to fly apart with explosive force and cause injury or death.

⚠ CAUTION

Secure the wheel against falling or tipping over when replacing it. Be careful the wheel can slip off the hub and tip in your direction when unscrewing the last wheel nuts. Failure to observe and follow this caution could result in serious injury.

NOTE :

Do not lubricate the wheel studs or lug nuts or the wheel face or the hub. On aluminum wheels, lubricate the wheel pilot or hub pads only with an antiseize compound or synthetic lubricant with teflon. Do not lubricate wheel or axle faces.

1. Secure the machine before doing this maintenance.

Refer to "Secure machine for maintenance".

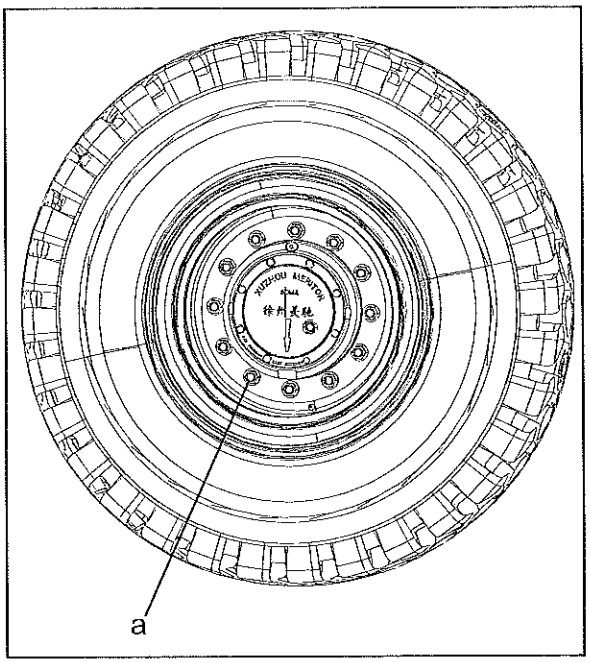

Fig 6-2 Remove the lug nuts

a. Lug nuts

2. Raise the crane on outriggers so the wheels are off the ground.

3. Remove the lug nuts.

4. Use a adequate lifting device to remove the wheel assembly from the mounting studs. Take care not to damage the studs.

5. Set the wheel on blocking properly that will not allow it to tilt or roll.

6.2.3 Mount the Wheel on Axle

NOTE :

Do not lubricate the wheel studs or lug nuts or the wheel face or the hub. On aluminum wheels, lubricate the wheel pilot or hub pads only with an antiseize compound or synthetic lubricant with teflon. Do not lubricate wheel or axle faces.

1. Raise the crane on outriggers so the wheels will be off the ground while mounting.

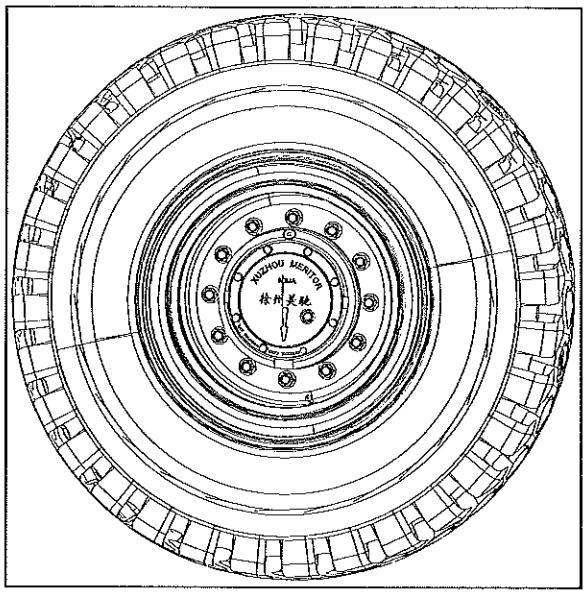

Fig 6-3 Tighten the lug nuts in proper sequence

2. Generously coat the wheel pilot with antiseize compound. Do not apply antiseize compound to the face of the wheel or the hub.

3. Use a adequate lifting device to place the wheel assembly on the mounting studs. Take care not to damage the studs.

4. Install the lug nuts and tighten them until they are just snug. Do not lubricate the nuts or studs.

5. Tighten and torque the lug nuts in proper sequence to the target value.

Refer to "Torque values"

6. Lower the crane onto its tires. Retract and stow the outrigger assemblies and the floats.

7. Travelling test the tire, then retorque the lug nuts in proper sequence to the target value.

Refer to "Torque values"
Maintain proper torque on wheel lugs and check for proper wheel mounting. Check and retorque the wheel lugs as specified after the first 50 km of travel when the wheels are removed and reinstalled. This will reseat the lug nuts.

6.3 Oil and Fluid

6.3.1 Hydraulic Noise

If hear noise during steering or crane hydraulic operation:

1. Fix hydraulic oil lines if find anything cracked.

2. Fill hydraulic oil if find hydraulic oil level is too low. Refer to "Hydraulic oil".

3. Check hydraulic oil suction lines whether there's air leakage, because the air may enter into hydraulic pumps. Refer to "Oil and fluid leaks".

1) Fix the oil leaks.

2) Drain all of air from the hydraulic lines.

- Loosen the screws or plugs or caps or fittings in this hydraulic oil suction lines.
- Start the engine.
- Keep the machine running till all of air go out from those loosened parts in the lines.
- Tighten loosened screws or plugs or caps or fittings.

4. Check hydraulic filters and lines whether they are blocked. Replace the filters or clean the hydraulic lines if yes. Refer to "Hydraulic filter".

5. Check the hydraulic pump pressures. Replace it if find anything wrong.

NOTICE

Failure to do so could result in damage to the environment.
Dispose of the drained oil in accordance with local environmental regulations.

6.3.2 Oil and Fluid Leaks

Refer to "High-pressure fluid lines".

1. Have an oil collection container ready. Always use oil containers to collect leaking oil. Wipe up and clean the leaked oil;

2. Inspect the leaking location and find out the issues;

3. If find anything cracked:

- If the crack is small, then clean the surface and use seal glue to fix it;.
- If the crack is impossible to be fixed, then replace it with a new one.

4. If find any screws/plugs/caps/fittings loosened;

- Take off the screws/plugs/caps/fittings loosened;
- Clean them;
- Replace the O-rings or seals with new one;
- Screw back the screws/plugs/caps/fittings and tighten them.

⚠ DANGER

Oil is toxic, keep it away from children and pets. If not avoided, this will result in death or serious injury.

5. If find any O-rings or seals damaged; Replace the O-rings or seals damaged. Refer to step No.4.

⚠ WARNING

Always allow the oil ample time to cool down to ambient temperature before troubleshooting. Failure to do so could result in unexpected spurting of hot oil which could result in death or serious injury.

6. If find any leaking from contact surface.

- Take apart the contact surface;
- Clean each parts of them;
- Replace the O-rings or seals with new one;
- Smear contact surface with seal glue;
- Install every parts back and tighten them regularly.

7. Wipe up and clean the oil and check it again while machine running.

8. Repeat the procedure above till no oil leaking anymore.

NOTICE

Failure to do so could result in damage to the environment.
Dispose of the drained oil in accordance with local environmental regulations.

6.4 Motors Repair

6.4.1 Hoist Motor

6.4.1.1 General

The hoist motor is a bent axis, bidirectional, variable displacement heavy-duty motor. The motor is bolted to the hoist and is geared directly to the hoist planetary. The motor control valve is bolted to the motor.

6.4.1.2 Removal

⚠ WARNING

Failure to do so can result in serious injury or death
Read and understand all safety precautions and instructions in the Safety section of this manual before continuing.

1. Thoroughly clean the external surfaces of the drum and motor with steam or clean solvent and blow dry.

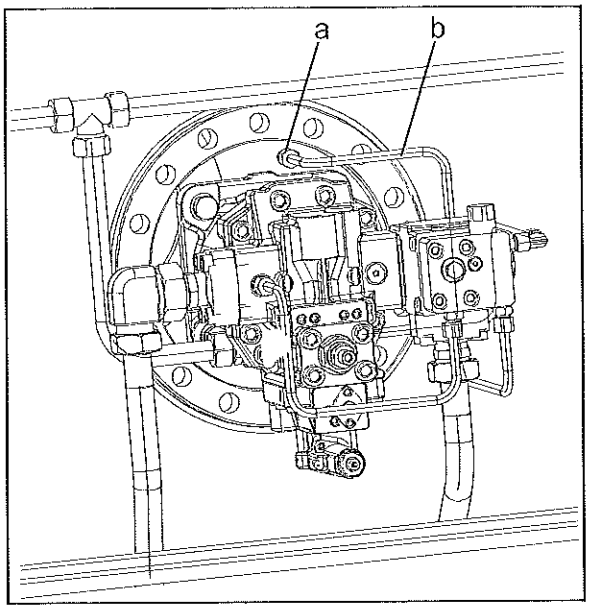

Fig 6-4 Tag and disconnect the hydraulic line of hoist brake

a. Hydraulic fitting of hoist brake
b. Hydraulic line of hoist brake

2. Place a suitable container under the motor.

3. Unscrew the nut that secures hydraulic line and fitting of hoist brake.

4. Tag and disconnect the hydraulic line of hoist brake.

5. Plug the openings to prevent oil leak.

6. Unscrew the nut that secures the hydraulic line and fitting of oil drain.

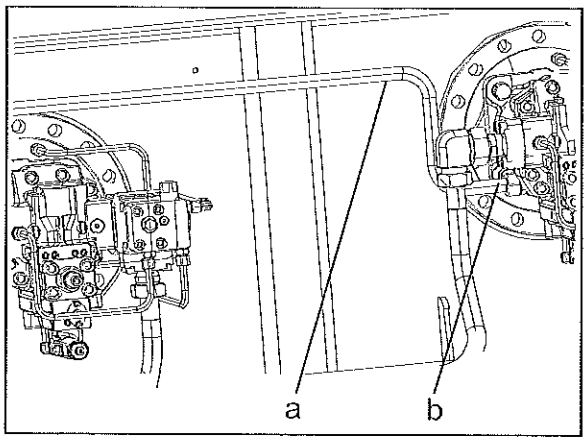

Fig 6-5 Tag and disconnect the hydraulic line of oil drain

a. Hydraulic line of oil drain
b. Hydraulic fitting of oil drain

7. Tag and disconnect the hydraulic line of oil drain.

8. Plug the openings to prevent oil leak.

9. Unscrew the nut that secures the hydraulic line and fitting of oil drain.

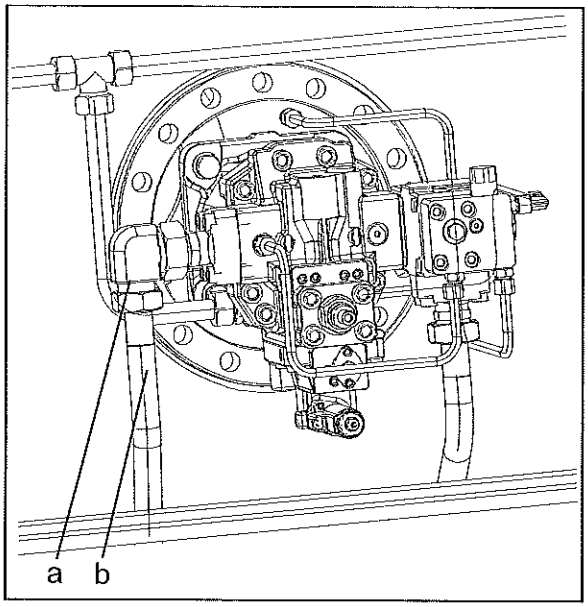

Fig 6-6 Tag and disconnect the hydraulic line of manifold block

a. Hydraulic fitting of manifold block
b. Hydraulic line of manifold block

10. Tag and disconnect the hydraulic line of hoist brake.

11. Plug the openings to prevent oil leak.

12. Unscrew the nut that secures the hydraulic line and fitting of counterbalance valve.

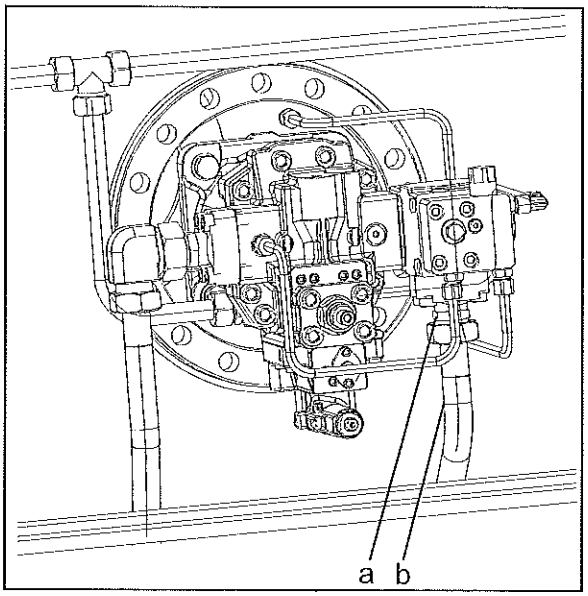

Fig 6-7 Tag and disconnect the hydraulic line of counterbalance valve

a. Hydraulic fitting of counterbalance valve
b. Hydraulic line of counterbalance valve

13. Tag and disconnect the hydraulic line of counterbalance valve.

14. 14. Plug the openings to prevent oil leak.

15. Remove the bolts securing counterbalance valve.

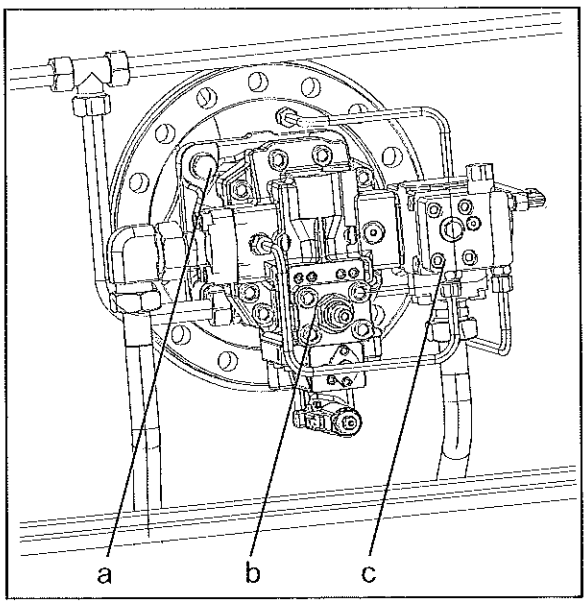

Fig 6-8 Remove the counterbalance valve and hoist motor

a. Mounting bolts of hoist motor
b. Hoist motor
c. Counterbalance valve

16. Remove the counterbalance valve from hoist motor.
17. Plug the openings to prevent oil leak.
18. Remove the mounting bolts and washers securing the hoist motor.
19. Remove the hoist motor using adequate lifting device.
20. Place the hoist motor, counterbalance valve, hydraulic lines and other accessories in a clean, dry suitable work area.

6.4.1.3 Installation

⚠ WARNING

Read and understand all safety precautions and instructions in the Safety section of this manual before continuing. Failure to do so can result in serious injury or death.

NOTE :

Read and understand all safety precautions and instructions in the Safety section of this manual before continuing. Failure to do so can result in serious injury or death.

1. Clean the motor shaft (the part that needed installed inside).

2. Install a new O-ring on the motor pilot then lubricate with gear oil. Install the hoist motor into place.

3. Apply Loctite® No. 243 to the mounting bolts, and install the bolts and washers securing hoist motor. Tighten and torque the mounting bolts.

4. Install the counterbalance valve onto hoist motor and secure it with bolts.

5. Connect the hydraulic line of counterbalance valve. Tighten and mark it.

6. Connect the hydraulic line of manifold block. Tighten and mark it.

7. Connect the hydraulic line of oil drain. Tighten and mark it.

8. Attach the hydraulic line with the brake fitting. Tighten and mark it.

9. Fill the hoist drum with gear oil.

6.4.1.4 Test

1. Test the hoist function in each direction. Stop and start hoist several times.

2. Inspect for hydraulic leaks and repair as necessary.

6.4.1.5 Check Hoist Motor Internal Leak

⚠ WARNING

Read and understand all safety precautions and instructions in the Safety section of this manual before continuing. Failure to do so can result in serious injury or death.

⚠ WARNING

Ensure that both the ignition key switch and the battery disconnect switch are set to the off position before continuing with this procedure. Working on a system with input power still active could result in serious injury or death.

NOTICE

Do not drain fluids 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.

1. Shut down the engine

2. Set the battery disconnect switch to the OFF position.

3. Locate the affected hydraulic motor on the main hoist or auxiliary hoist

4. Disconnect the hydraulic line from the drain port of the faulty hydraulic motor and block it to prevent drainage.

NOTE :

Do not disconnect the drain line from the other hydraulic motor.

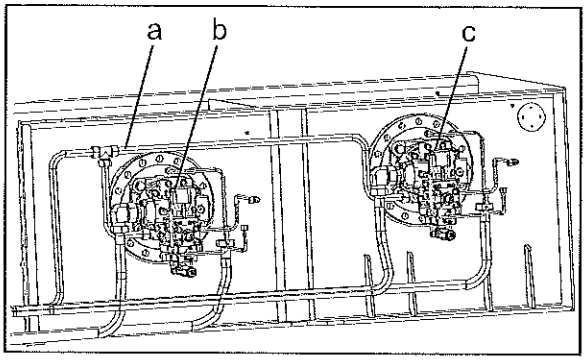

Fig 6-9 Disconnect the hydraulic line from the drain port

a. Hydraulic line of oil drain
b. Aux hoist motorc. Main hoist motor

5. Connect a new hose to the motor drain port.

6. Direct the open end of the new hose into an empty container to catch the hydraulic oil.

7. Set the battery disconnect switch to ON.

8. Start the engine.

9. Lower the hook while checking the flow from the new drain hose.

10.Replace the motor if the flow of draining hydraulic oil exceeds 9.5 L per minute.

6.4.2 Swing Motor

6.4.2.1 Swing Motor

The swing motor is mounted on the swing brake housing and drives the swing gearbox through the brake assembly. The swing motor is a hydraulic piston type. The motor has two ports for connection to the hydraulic system.

6.4.2.2 Removal

⚠ CAUTION
Pull straight up on the motor assembly to avoid damaging the splined shaft.

⚠ CAUTION

Lock pin must be engaged or superstructure free swing will occur when brake or gearbox is removed.

1. Ensure the swing brake and swing lock are engaged.

2. Clean the port area around the motor. Tag and disconnect the hydraulic hoses from the motor assembly. Cap or plug all openings.

NOTE :

Hydraulic oil can be hot and cause burns.

3. Remove mounting 4 capscrews and washers between swing motor and swing gearbox assembly.

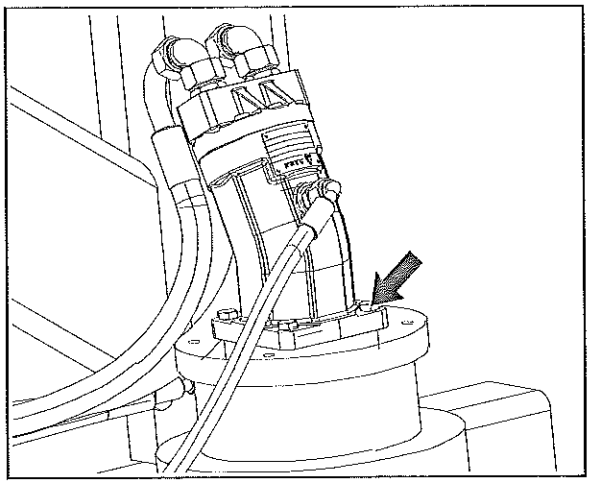

Fig 6-10 Capscrew and washer

4. Lift the swing motor free of the motor support plate.

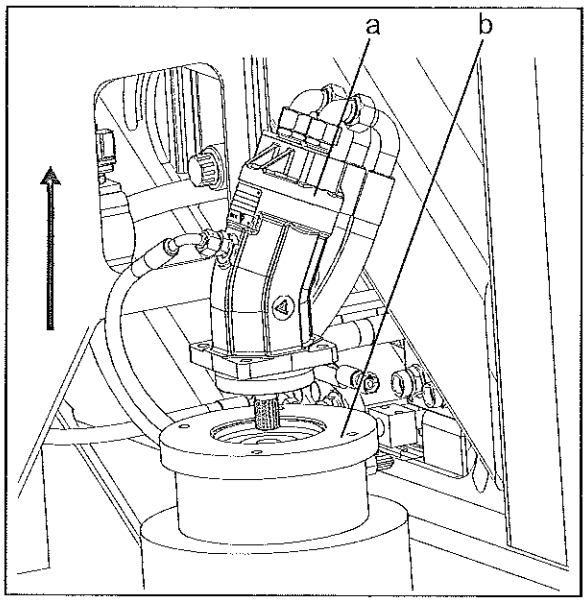

Fig 6-11

a. Swing motor
b. Swing motor support plate

6.4.2.3 Installation

⚠ CAUTION

Use care when engaging the swing motor drive gear, do not force the shaft to engage.

1. Clean the splined shaft of motor and fitting bore on the input shaft of swing brake assembly and ensure no dirt, dust, etc., gets into the fitting bore before mounting.

2. Position the swing motor on the swing brake assembly, engaging the shaft with the brake input shaft.

3. Apply Loctite® 243 to the capscrew threads. Install the capscrews and secure the motor to the brake housing. Tighten the capscrews.

4. Connect the hydraulic lines to the swing motor as tagged during removal.

6.4.2.4 Test

1. Test swing of superstructure in each direction. Stop and start swing several times.

2. Inspect for hydraulic leaks and repair as necessary

6.5 Wiper and Washer Repair

6.5.1 Windshield Wiper

6.5.1.1 General

⚠ WARNING

Read and understand all safety precautions and instructions in the Safety section of this manual before continuing. Failure to do so can result in serious injury or death.

6.5.1.2 Removal

⚠ CAUTION

To prevent possible engine fault codes and undesirable operation, in order: Ensure keyswitch has been off 2 minutes, Battery disconnect is in the off position.

1. Ensure that the key switch has been off for 2 minutes.

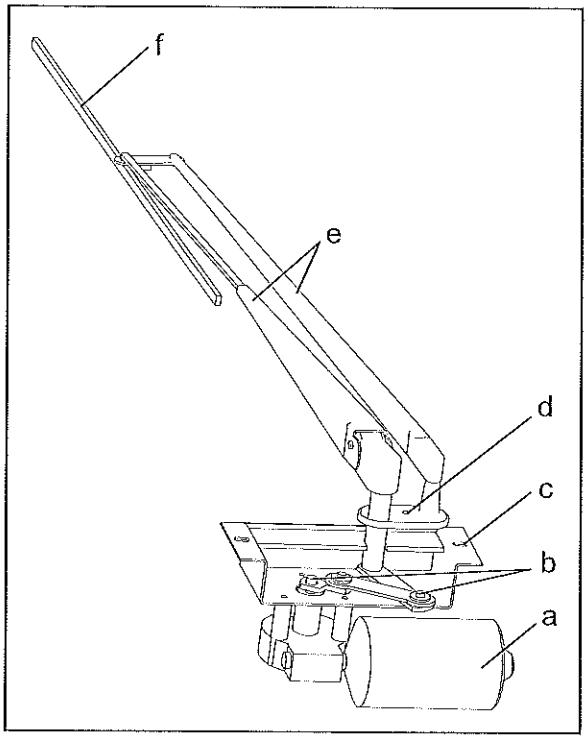

Fig 6-12

a. Motor
b. Capscrews
c. Capscrews
d. Screw
e. Wiper arm
f. Wiper blade

2. Turn the battery disconnect switch to the OFF position.
3. Open the cover of motor under the dashboard.
4. Tag and disconnect the electrical leads from the motor.
5. Remove the capscrews scuring the motor braket.
6. Remove the capscrews securing the spacer
7. Remove the motor from the operator's cab interior.
8. Remove the screw securing the wiper arm.
9. Remove the wiper arm from the operator's cab exterior.

10. Remove the wiper blade from the wiper arm.

6.5.1.3 Inspection

1. Visually check the motor housing for evidence of cracks or other damage. Check for excessive shaft end play indicating worn or damaged bearings. Replace motor if damaged.

2. Inspect the wiper blade for serviceability. Replace wiper blade when worn.

3. Inspect the wiper arm and parts of the linking component kits (pantograph adapter kit, pivot shaft kit, wiper motor kit link and crank, wiper motor bracket) for damage. Replace as needed.

6.5.1.4 Installation

1. Put the motor bracket in place and secure it with the attaching capscrews.

2. Put the motor and spacer in place and secure them with the attaching capscrews.

3. Connect the electrical leads to the motor as tagged during removal.

4. Install the wiper blade on the wiper arm.

5. Install the wiper arm from the operator's cab exterior and secure it with attaching screw.

6. Turn the battery disconnect switch to the ON position.

6.5.1.5 Check

1. Squirt some cleaning fluid onto the windshield with the windshield washer.

2. Operate the windshield wiper. Verify it works. (Replace wiper blade as needed if it streaks or otherwise wipes poorly.

6.5.2 Windshield Washer

6.5.2.1 Removal

⚠ CAUTION

To prevent possible engine fault codes and undesirable operation, in order: Ensure keyswitch has been off 2 minutes, Battery disconnect is in the off position.

1. Turn the battery disconnect switch to the off position.

2. Locate the windshield washer container and pump.

3. Tag and disconnect the pump's electrical lead and ground wire.

4. Disconnect the hose from the windshield washer pump. Point it so it won't spill cleaning fluid. Catch cleaning fluid from the windshield washer container with a suitable container.

5. Remove attaching hardware securing the windshield washer container. Remove the windshield washer container.

6. Remove pump and pump seal.

6.5.2.2 Inspection

1. Visually check the pump for evidence of cracks, leaks, or other damage. Replace pump if damaged.

2. Inspect the container for leaking. Replace pump seal if it is leaking. Replace container if it is damaged and leaking.

3. Inspect spray nozzle on the wiper arm. As needed, clean the nozzle with a fine piece of wire and compressed air.

6.5.2.3 Installation

⚠ CAUTION

To prevent possible engine fault codes and undesirable operation, in order: Ensure key switch has been off 2 minutes, Battery disconnect is in the off position.

1. Install pump and pump seal.

2. Install windshield washer container. Secure the container with attaching hardware.

3. Attach the hose to the windshield washer pump.

4. Connect the pump's electrical lead and ground wire as tagged during removal.

5. Turn the battery disconnect switch to the on position.

6. Fill the container with cleaning fluid.

6.5.2.4 Check

1. Squirt some cleaning fluid onto the windshield with the windshield washer.

2. Make repairs if windshield washer doesn't work.

6.5.3 Skylight Wiper

6.5.3.1 General

⚠ WARNING

Read and understand all safety precautions and instructions in the Safety section of this manual before continuing. Failure to do so can result in serious injury or death.

6.5.3.2 Removal

1. Ensure that the key switch has been off for 2 minutes.

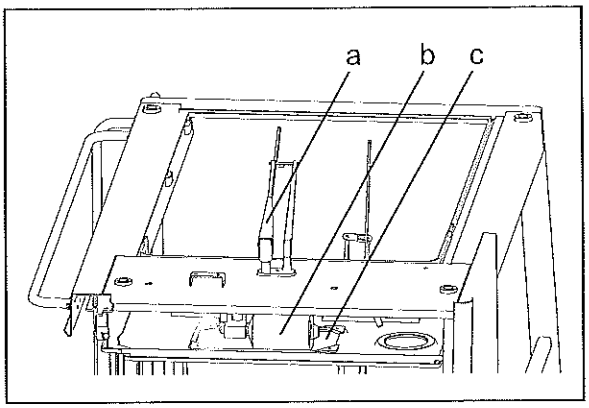

Fig 6-13

a. Skylight wiper
b. Wiper motor
c. Cover

2. Turn the battery disconnect switch to the OFF position.

3. Open the cover of wiper motor on the roof of operator's cab.

4. Tag and disconnect the electrical leads from the wiper motor.

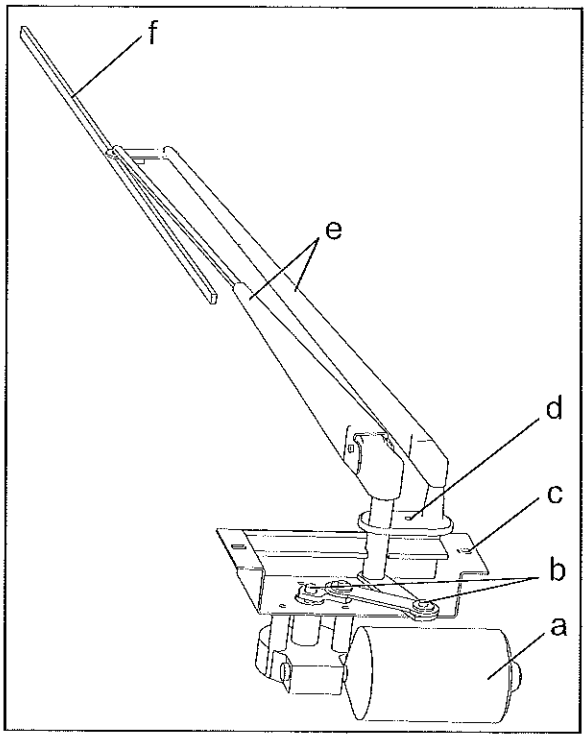

Fig 6-14 Skylight wiper

a. Motor
b. Capscrews

c. Capscrews

d. Capscrews

e. Wiper arm

f. Wiper blade

5. Remove the capscrews scuring the motor braket.

6. Remove the capscrews securing the spacer

7. Remove the motor from the operator's cab interior.

8. Remove the screw securing the wiper arm.

9. Remove the wiper arm from the operator's cab exterior.

10. Remove the wiper blade from the wiper arm.

6.5.3.3 Inspection

1. Visually check the motor housing for evidence of cracks or other damage. Check for excessive shaft end play indicating worn or damaged bearings. Replace motor if damaged.

2. Inspect the wiper blade for serviceability. Replace wiper blade when worn.

3. Inspect the wiper arm and parts of the linking component kits (pantograph adapter kit, pivot shaft kit, wiper motor kit link and crank, wiper motor bracket) for damage. Replace as needed.

6.5.3.4 Installation

1. Put the motor braket in place and secure it with the attaching capscrews.

2. Put the motor and spacer in place and secure them with the attaching capscrews.

3. Connect the electrical leads to the motor as tagged during removal.

4. Install the wiper blade on the wiper arm.

5. Install the wiper arm from the operator's cab exterior and secure it with attaching screw.

6. Turn the battery disconnect switch to the ON position.

6.5.3.5 Check

1. Squirt some cleaning fluid onto the windshield with the windshield washer.

2. Operate the windshield wiper. Verify it works. (Replace wiper blade as needed if it streaks or otherwise wipes poorly.)

6.6 Electrical Components

6.6.1 Third Wrap Protector

6.6.1.1 Check

1. Start the engine and verify if its function works.

2. As needed, troubleshoot further any system or circuit malfunction not corrected by repair or replacement of the switch or associated wiring.

6.6.1.2 Removal

1. Shut down the engine. Turn the ignition switch off two minutes before proceeding to the next step.

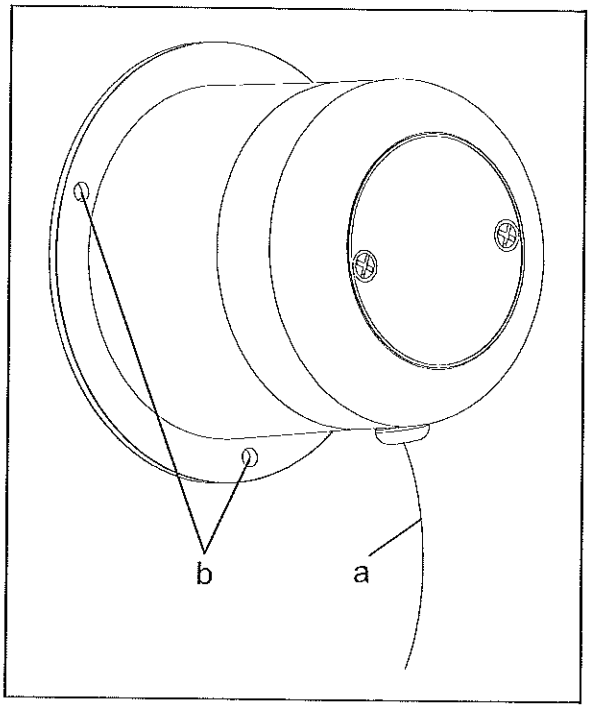

Fig 6-15

a. Electrical leads
b. Screws

2. Turn the battery disconnect switch to OFF.
3. Tag and disconnect the electrical leads from the third wrap protector.
4. Remove the screws securing third wrap protector.
5. Remove the third wrap protector.

6.6.1.3 Installation

1. Put the third wrap protector in place and secure it with the attaching screws.
2. Connect the electrical leads to the third wrap protector as tagged during removal.
3. Turn the battery disconnect switch to ON.
4. Start the engine and verify that if the third wrap protector works.

6.6.1.4 Adjustment

1. Start the engine.

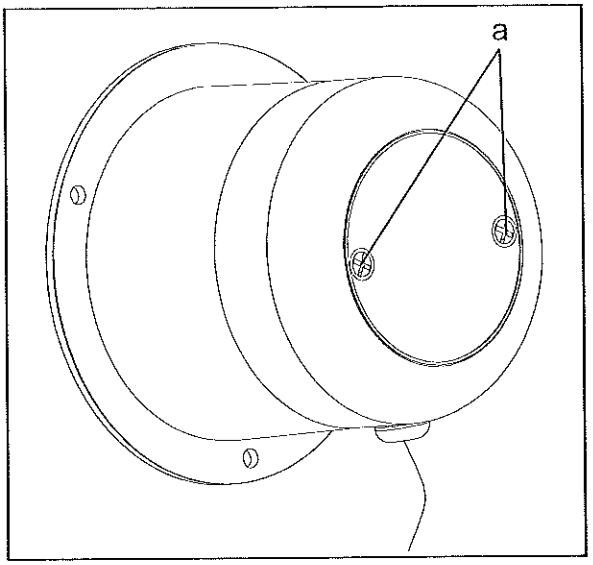

Fig 6-16

a. Screws

2. Extend and set the outriggers.
3. Operate the crane to pull the wire ropes out of hoist drum, and leave 3 loops of rope on the hoist drum.
4. Remove the screws securing the shield cover of the third wrap protector.
5. Remove the shield cover.

6. Rotate the cam clockwise to press the switch slightly until the switch is turned on momently. Then tighten the cam to hold this position.

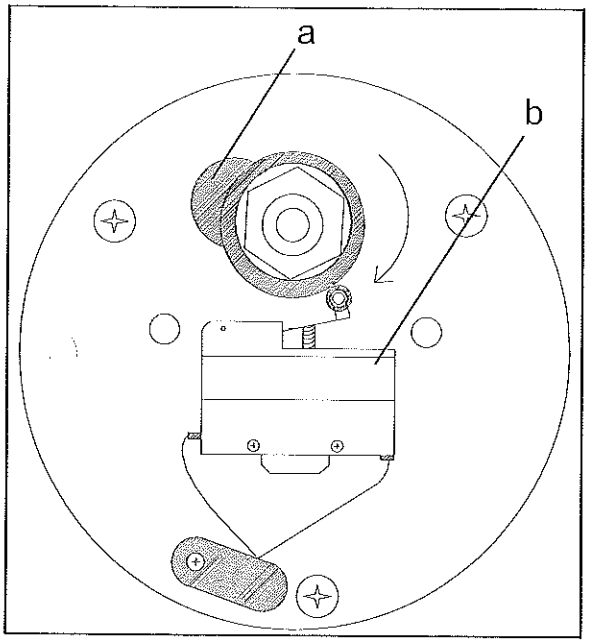

Fig 6-17 Third wrap protector

a. Cam
b. Switch

7. Attach the shield cover to the top of third wrap protector.

6.6.2 Anti-two Block Switch Replacement

6.6.2.1 General

⚠ WARNING

Read and understand all safety precautions and instructions in the Safety section of this manual before continuing. Failure to do so can result in serious injury or death.

6.6.2.2 Removal

1. Shut down the engine. Turn the ignition switch off two minutes before proceeding to the next step.

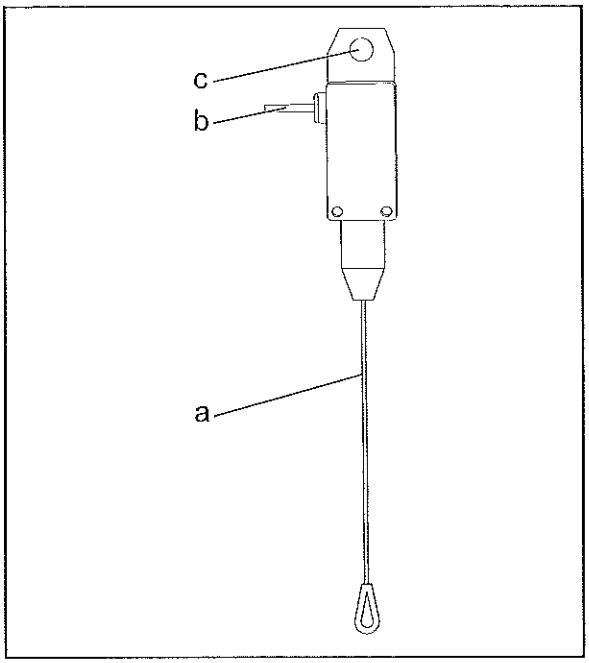

Fig 6-18 Anti-two block switch

a. Steel wire
b. Electrical wire

c. Capscrew and washer securing the anti-two block switch

2. Turn the battery disconnect switch to OFF.

3. Disconnect the steel wire from the switch to the weight on the wire rope.

4. Remove the capscrew and washer securing the anti-two block switch.

5. Tag and disconnect the electrical leads from the anti-two block switch to the boom tip.

6. Remove the anti-two block switch.

6.6.2.3 Installation

1. Connect the electrical leads to the anti-two block switch as tagged during removal.

2. Put the anti-two block switch in place and secure it with the attaching capscrew.

3. Connect the steel wire from the switch to the weight on the hook block wire rope.

4. Turn the battery disconnect switch to ON.

5. Start the engine and verify that if the anti-two block switch works.

6.6.3 Battery Replacement

6.6.3.1 General

⚠ CAUTION

To avoid possible engine fault codes and undesirable operation, ensure the keyswitch has been off 2 minutes before disconnecting batteries. Disconnect batteries, if machine will be inactive for over 24 hours.

⚠ CAUTION

To prevent damage to electronics, in order: Ensure keyswitch has been off 2 minutes, Battery disconnect is in the off position, Remove ECU power fuse, Remove negative cables, Remove positive cables

6.6.3.2 Removal

1. Turn the battery disconnect switch to the OFF position.

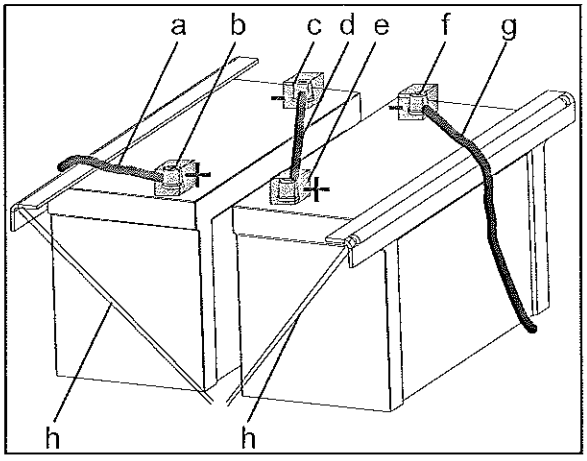

Fig 6-19 Battery connections

a. Positive battery cable
b. Positive terminal
c. Negative terminal
d. Transfer battery cable
e. Positive terminal
f. Negative terminal
g. Negative battery cable
h. Studs securing the batten of battery

2. Locate the battery box.

Refer to "Battery"

3. Remove the capscrews securing the cover of battery box.

4. Remove the battery cables.

Remove negative battery cables first.

Remove positive battery cables next.

Tag and disconnect leads from the battery terminals starting with the positive terminals.

5. Release the nut and washer securing the batten of battery.

6. Remove the screw and washer securing the battery box.

7. Remove and place the battery at a proper location.

6.6.3.3 Installation

1. Position the battery on mounting bracket.

2. Install the screw and washer securing the battery box.

3. Install the screws securing the batten of battery.

4. Install the battery cables.
- Connect leads from the battery terminals starting with the positive terminals.
- Install positive battery cables first.
- Install negative battery cables next.

5. Install the capscrew securing the cover of battery box.

6. Turn the battery disconnect switch to ON.

7. Verify replacement batteries work by starting crane's engine and operating various crane components.

6.6.4 Outrigger Length Sensor Replacement

6.6.4.1 General

⚠ WARNING

Read and understand all safety precautions and instructions in the Safety section of this manual before continuing. Failure to do so can result in serious injury or death.

6.6.4.2 Removal

1. Fully retract the outrigger beams if they are extended.

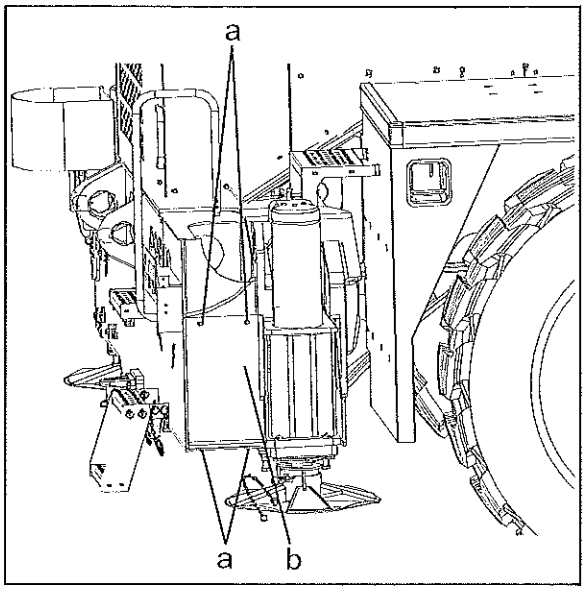

Fig 6-20 Remove the beam cover plate

a. Hex head bolts
b. Beam cover plate

2. Remove the hex head bolts.

3. Remove the beam cover plate to access the outrigger beam cylinder mounting pin and outrigger length sensor.

The cover plate is on the opposite side of the crane from the stabilizer cylinder to be removed.

4. Unplug the outrigger length sensor.

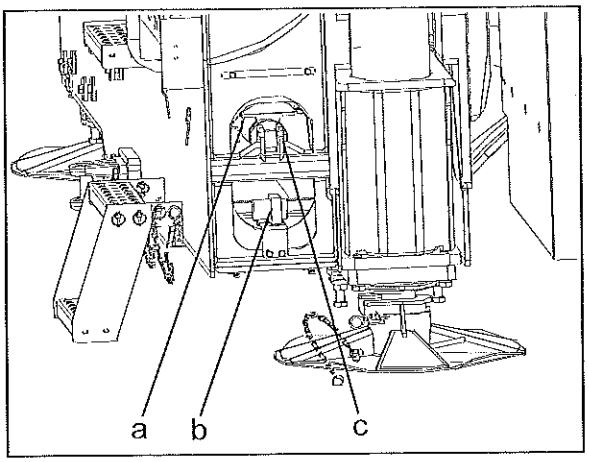

Fig 6-21 Unplug the outrigger length sensor

a. Outrigger beam cylinder
b. Outrigger length sensor
c. Outrigger beam cylinder mounting pin

5. Cut the stay-tie securing the outrigger length sensor harness.

6. Remove the setscrews from the bottom of outrigger length sensor.

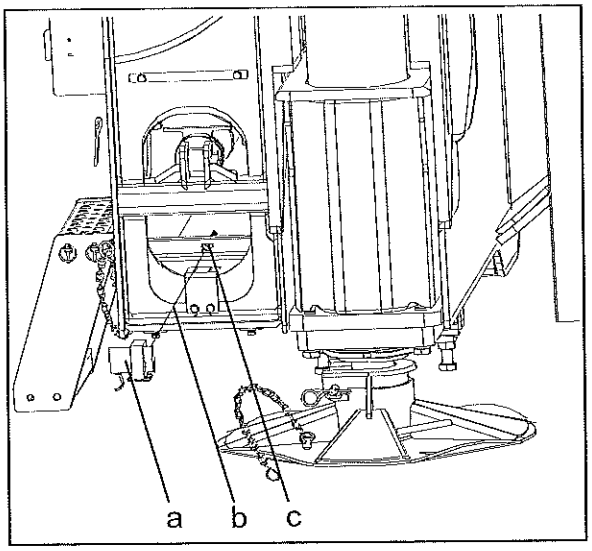

Fig 6-22 Remove the outrigger length sensor

a. Outrigger length sensor
b. Outrigger length sensor cable
c. Outrigger length sensor cable anchor

7. Remove the outrigger length sensor.

8. Remove the outrigger length sensor cable anchor and disconnect the sensor cable from the outrigger beam.

Avoid free-release of cable to prevent from damage to outrigger length sensor caused by overrange of cable.

The outrigger length sensor may be easily removed to avoid damage during outrigger beam cylinder removal.

6.6.4.3 Installation

1. Install the outrigger length sensor and secure it with setscrews.

2. Attach the outrigger length sensor cable anchor on the outrigger beams.
Avoid free-release of cable to prevent from damage to the outrigger length sensor caused by overrange of cable.

3. Plug the outrigger length sensor and attach the stay-tie securing the outrigger length sensor harness.

4. Install the beam cover plate and secure it in place with four hex head bolts.

5. Start the engine and test the operation of the outrigger beam and stabilizer cylinders.

SANY

Specifications

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7.1 General Machine Dimensions 7-3
7.2 Main Technical Parameters 7-4

7.Specifications

7.1 General Machine Dimensions

The data presented here are the dimensions and weights necessary for general operating procedures with only the standard boom and work equipment.

The data are not for shipping purposes.

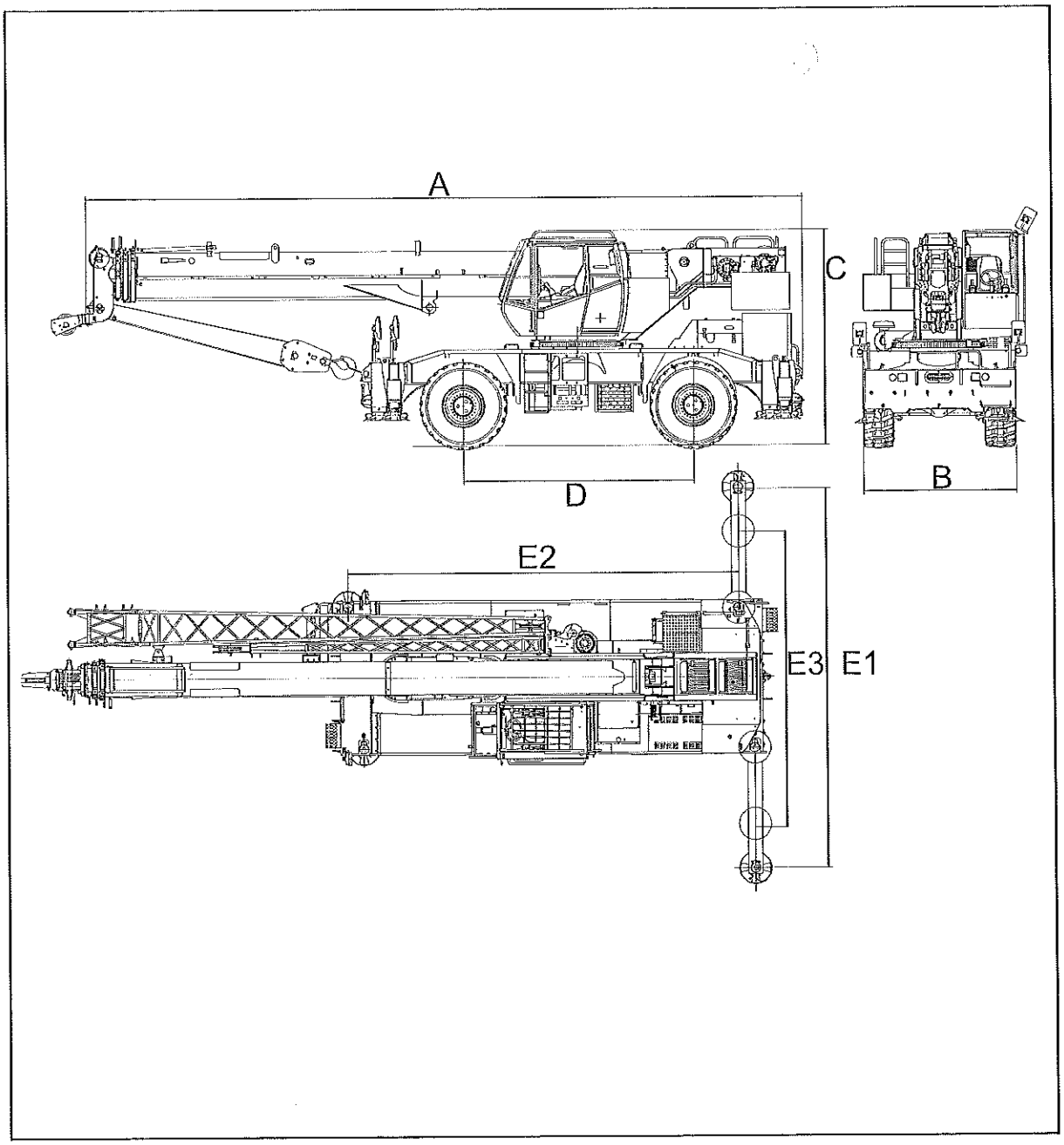

Fig 7-1 Outline of machine

7.2 Main Technical Parameters

Location	Item	Unit	Parameter
A	Overall length of vehicle	mm	12340
B	Overall width of vehicle	mm	2625
C	Overall height of vehicle	mm	3650
D	Wheel bases	mm	3940
E	Outrigger span(center to center, outrigger 100% extended, E1×E2)	m	6.5×6.7
E	Outrigger span(center to center, outrigger 50% extended, E3)	m	5
	Engine model	\	QSB6.7 C260 31
	Rated power of engine	kw/rpm	194/2400
	Rated torque of engine	N·m/rpm	990/1500
	Emission standard	\	Euro III A
	Max. traveling speed	km/h	40
	Overall mass	kg	30700
	Front shaft load	kg	15100
	Rear shaft load	kg	15600
	Min. turning radius(2 wheels/4 wheels)	m	12.2/6.2
	Min. ground clearance	mm	348
	Max. gradeability	%	92
	Approach angle	°	21.9/14.1
	Departure angle	°	20.2/13.1
	Max. lifting speed of single rope of main hoist (no-load)	m/min	150
	Max. lifting speed of single rope of auxiliary hoist (load)	m/min	150
	Full extension/retraction time of boom	s	36/43
	Luffing time of boom(up/down)	s	34/52
	Max. swing speed	r/min	2.7
	Full extension/retraction time of outrigger beam	s	25/25
	Full extension/retraction time of outrigger jack	s	25/25
	Max. rated lifting capacity	t	40

Location	Item		Unit	Parameter
	Min. working radius		m	2.5
	Max. lifting torque	Base boom	kN.m	1175
		Fully extended boom	kN.m	755
		Fully extended boom+ swingaway boom extension	kN.m	457
	Lifting height (Max tip height)	Base boom	m	12.9
		Fully extended boom	m	33.9
		Fully extended boom+ swingaway boom extension	m	47.4
	Boom length	Base boom	m	10
		Fully extended boom	m	31.5
		Fully extended boom+ swingaway boom extension	m	45.2
	Fitting angle of swingaway boom extension		°	0,15,30

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