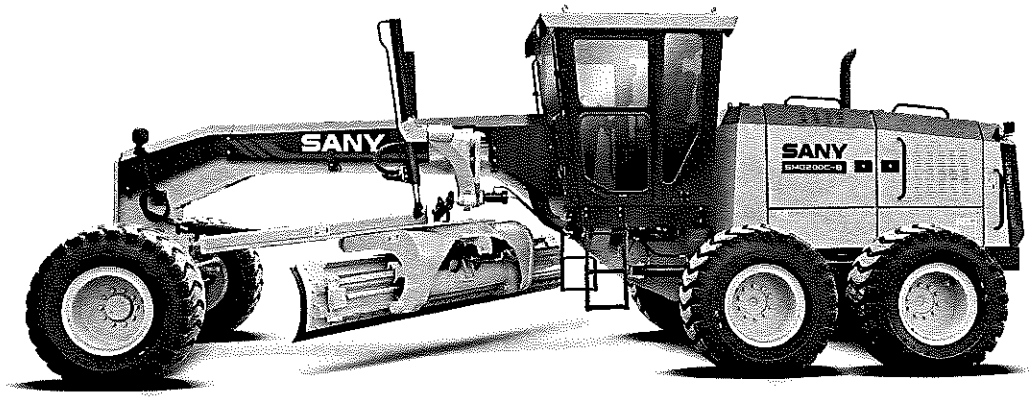
MN50

Quality Changes the World

SANY

Motor Grader

SMG200C-8



Operation and Maintenance Manual

SANY

SMG200C-8 Motor Grader

Operation and Maintenance Manual

⚠ WARNING

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

Sany Group

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DELINEATION OF RESPONSIBILITY

Specific Declaration

A grader is an enginnering vehicle with a blade used to finish soil and create a flat surface. Graders are commonly used in the construction and maintenance of gravel road and subgrade. Graders are also used to strip topsoil or greensward, produce ditches, finish side slope. Graders can mix up, backfill, bulldoze and pave materials. If equipped with a front dozer blade, it can pave, stack and backfill loose materials. If equipped with a rear scarifier, it can loose hard and dense soil. Any other use or any operation beyond the specified working range is not authorized use. Sany expressly bears no liability for any consequence due to any unauthorized use.

Information in this manual is used to guide qualified operators to operate and maintain graders correctly. Sany expressly bears no liability for any consequence due to any use not observing the information in this manual.

It is forbidden to convert the grader without authorization. Sany expressly bears no liability for any consequence. When crack or electrical malfunction on the grader occurs, please contact the supplier, and don't conduct welding or make changes without permission, or else, for any consequence due to such contravention, Sany shall not bear any liability.

Use genuine spare parts from Sany. Sany expressly bears no liability for any machine damage or accident due to the use of untested or unauthorized spare parts or tools.

Operate and maintain parts (such as engine, A/C) on the grader, and observe related regulations on Users' guide supplied from their manufacturer.

Sany expressly bears no liability for any machine failure or damage due to force majeure of natural disasters (earthquake, typhoon) and wars.

Sany cannot predict every circumstance that might involve a potential hazard in operation or maintenance. Operators and owners should highly attach importance to safety. Local specific safety rules of the countries may be stricter. If they differ from the regulations in this manual, observe the stricter one.

Duty of Sany

- Be responsible for providing qualified products and correct documents.
- Fulfill their promises on after-sales service, and document all maintenance and repair working done by after-sales service personnel.
- Train the operation and maintenance personnel based on their needs.

Duty of Owners or Other Anthorized Personnel

- Only after each person involved in the product's operation, maintenance and repair is trained and fully understands the Parts Book and Safety, Operation and Maintenance Manual, can they operate and maintain the grader.
- Ensure the operation and maintenance personnel are qualified and know their related responsibilities.
- Periodically check related personnel's safety consciousness during working.
- If any fault which will lead to unsafety occurs, stop the grader immediately.
- Sany service personnel have the right to check the grader for safety.
- Besides check items regulated by Sany, observe local laws and regulations to check the grader.
- Ensure timely maintenance and repair on the grader.
- Carefully plan the use of the grader.

Duty of All Working Personnel

- If there is any abnormal symptom which may cause abnormal working of the grader or potential hazard, report to your leader. If possible, correct fault in time.
- All personnel working around the grader must observe all warning signals and take care of their own and others' safety.
- All personnel should know their working tasks and procedures.
- Watch surrounding things like high voltage wire, unrelated personnel and poor ground for potential danger, and report to the operators and signalmen.

Duty of Managers

- Ensure the operators are trained and fully understand the Safety, Operation and Maintenance Manual supplied by Sany. Ensure they are in physical fitness and have the certification of operation. Otherwise, it is forbidden to operate the grader.
- Ensure the operators have good judgment ability, teamwork consciousness and psychological quality. Otherwise, it is forbidden to operate or repair the grader.
- Ensure the signalmen have good vision and acoustic judgment, master standard command signals. At the same time, they should have enough experience in recognizing danger factors correctly, and inform the operators of danger factors to avoid them in time.
- Ensure assistant workers can identify the model and working condition to choose a proper grader.
- Make each working person take their related responsibilities, and require them to report unsafe factors to their leader in time.

Table of Contents

SANY

Introduction

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.

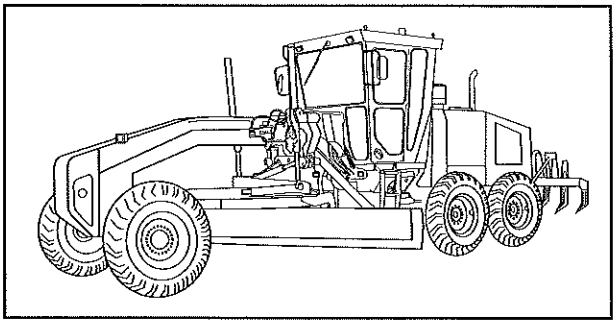

Fig.1-1

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.

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

Sany Industry Town, Economic and Technological Zone, Changsha, Hunan, China 410100

E-mail: crd@sany.com.cn

Phone: 0086 4006098318

Fax: 0086-731-84031999

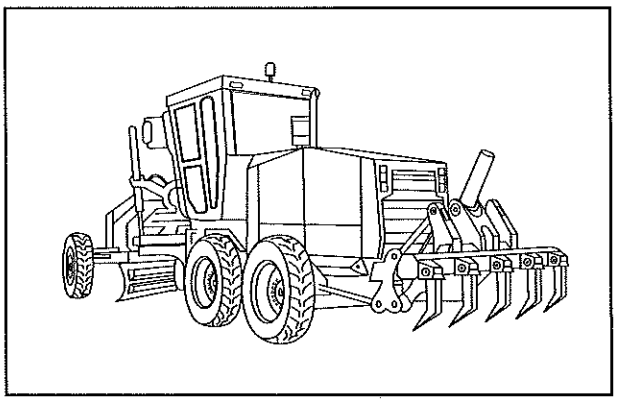

Fig.1-2

1.3 Your Documentation Package

1.3.1 Introduction

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:

1.3.2 Safety, Operation & Maintenance Manual

A copy of this Safety, Operation & Maintenance manual must always remain in the operator cab (a) at all times. See "Specific Torque Values" on page 5-7 for complete details.

A copy of this manual should be made available to maintenance personnel when maintaining the machine.

1.3.3 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.

1.4 Your Sany Machine

1.4.1 Directional Reference of the Machine

All views are from the operator's seat and facing forward as indicated by the black arrow in the image below.

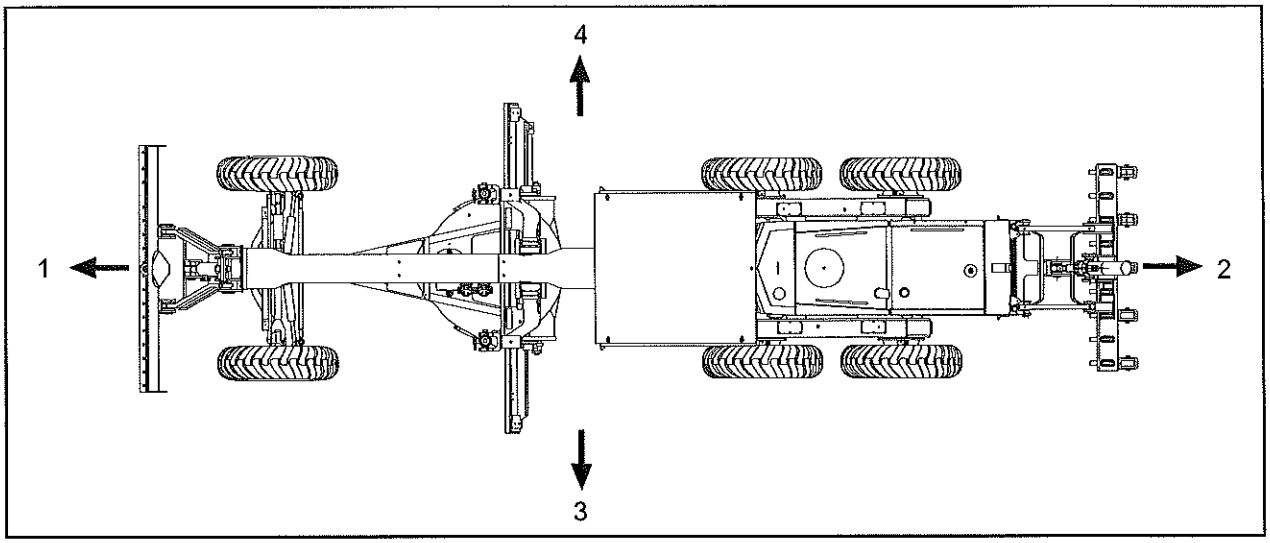

Fig.1-3

1. Front 2. Back 3. Left 4. Right

1.4.2 Serial Number Location

The data plate (a) includes information that will be needed by your Sany dealer when ordering replacement parts or providing assistance for your machine. Record this information in this manual for future use.

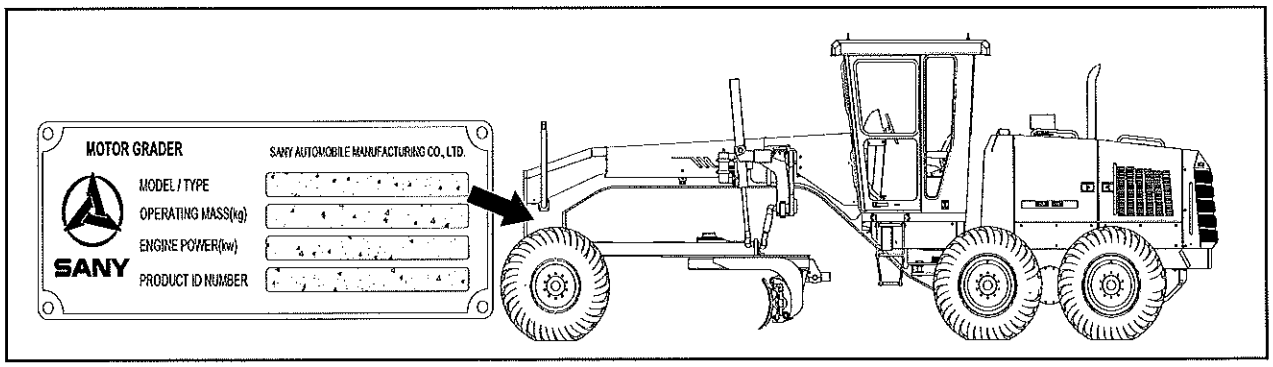

Fig.1-4

1.4.3 Record of Serial Number and Dealer Information

This location is for you to record information relating to your machine. It is required that you keep this manual with your machine at all times for reference.	
Model No.	
Machine Serial Number	
Engine Serial Number	
Transmission Serial Number	
Rear Axle Serial Number	
Right Tandem Case Serial No.	
Left Tandem Case Serial No.	
Date of Production	
Dealer Name: Address:	
Phone Numbers:	

1.4.4 Cab Interior

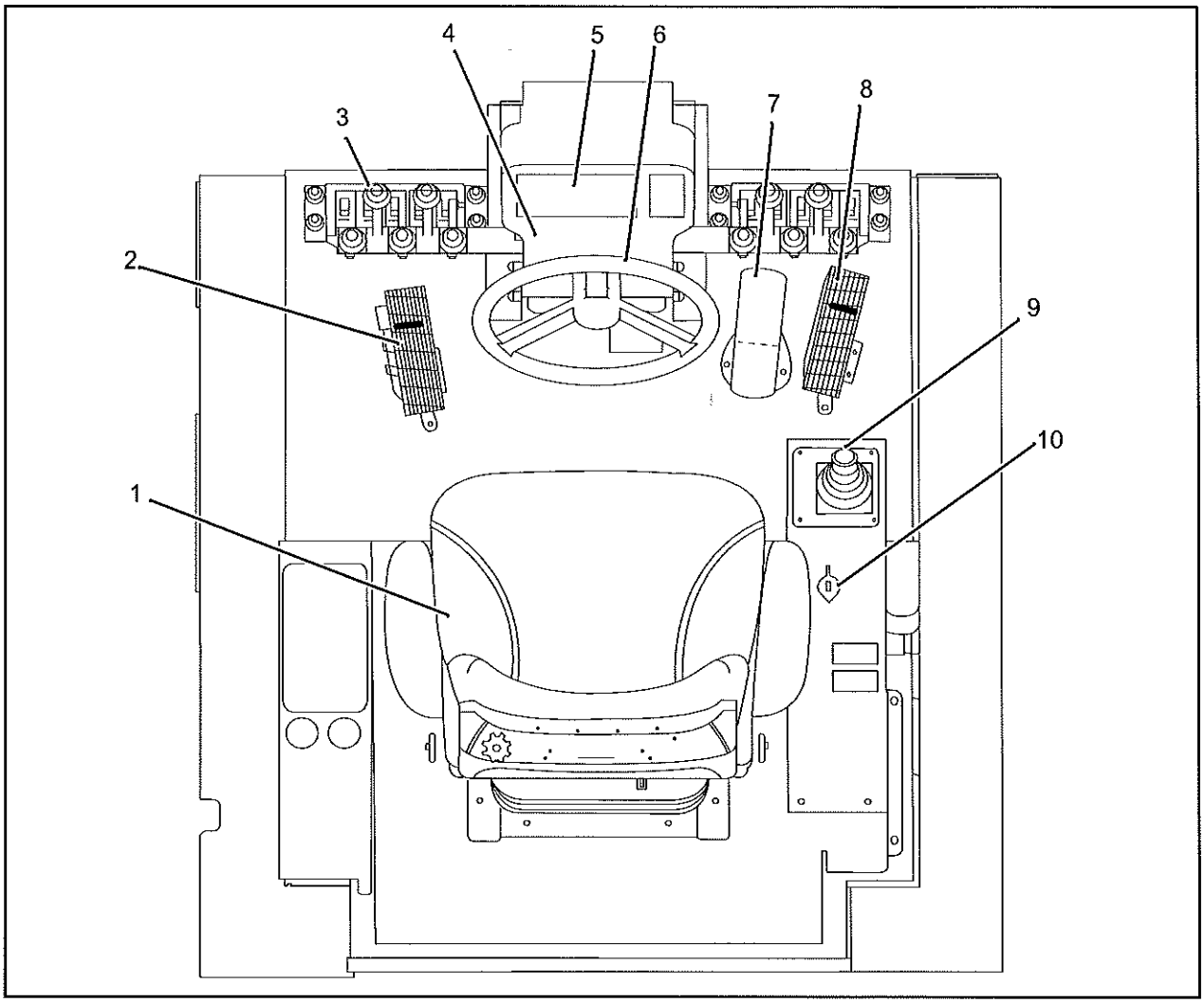

Fig.1-5

1. Seat	4. Console	7. Brake pedal	10.Key switch
2. Clutch pedal	5. Display	8. Accelerator pedal	
3. Control levers	6. Steering wheel	9. Gear selector	

1.5 Correction Request

If you find a problem with this manual, please email sanyservice@sany.com.cn with the page(s) where the problem was found and a description of the problem.

SANY

Safety

2.Safety

2.1 Safety-General

2.1.1 Introduction

This section of the manual provides detailed information on basic safety precautions and preventative measures to be followed during operation and maintenance of 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, or job site workers can result in their death or injury and costly damage to the machine and property.

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 are used to express the potential level of hazard.

Table2–1

Safety Decal	Explanation
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Table2–1 (continue)

Safety Decal	Explanation
NOTICE	Indicates a situation which can cause damage to the machine, personal property and/ or the environment, or cause the machine to operate improperly
	This symbol is used within a graphic to alert the user not to do something.

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.

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

All procedures and precautions outlined in this manual apply only to the 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.

2.1.3 Operator Safety Information

It is impossible to compile a list of safety precautions covering every situation. However, there are basic principles that must be followed when operating this machine:

- 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 dealer. Stop all work immediately if any operator aid is found to not be working properly.
- All accidentprevention guidelines, operating instructions, etc., are based on authorized use of the machine.
- Read and understand this manual and any accompanying manuals before operating this machine.
- This manual must be readily available to the operator at all times and must remain in the cab while the machine is in use.
- Ensure that all personnel in the working area around the machine are thoroughly familiar with safe operating practices as stated in this manual.

- Review the local, state, and federal regulations and standards regarding this machine and its operation. Work practice requirements may vary among government regulations, industry standards, and employer policies. A thoroughknowledge of all such relevantwork rules is required beforeoperating this machineor performing maintenance on it.
- Inspect the maintenance log before the start of each workday shift. Ensure that routine maintenance has been performed as stated in this manual. Do not operate a damaged or poorly maintained machine.
- No one besides the operator is to be anywhere on the machine while it is in operation.

2.1.4 Mount and Dismount the Machine

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

- Always be sure the machine is at a full stop before attempting to access the machine. Never jump onto or off of the machine.
- Never exit or enter the operator cab or deck by any other means than the provided grab handles (1) and steps (2).
- Always face the machine as you mount and dismount.

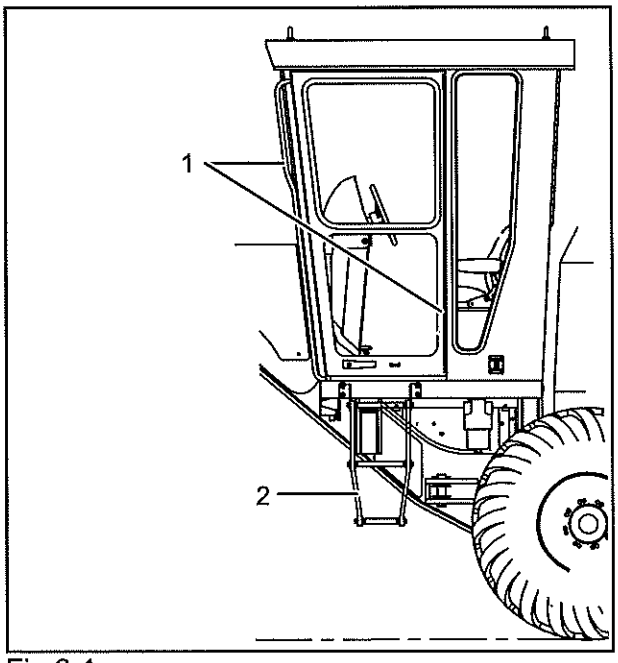

Fig.2-1

1. Grab handles 2. Steps

- Always maintain a three-point contact (both feet and one hand or one foot and both hands) with the grab handles, steps and deck to ensure proper support.
- Do not walk on the front counterweight. If you must work on the counterweight use a ladder or appropriate safety alternatives (hoist and harness.)
- Wear shoes with a slip-resistant sole material.
- Do not walk on any surface of the machine if slip- resistant material is missing or excessively worn. Do not step on surfaces of

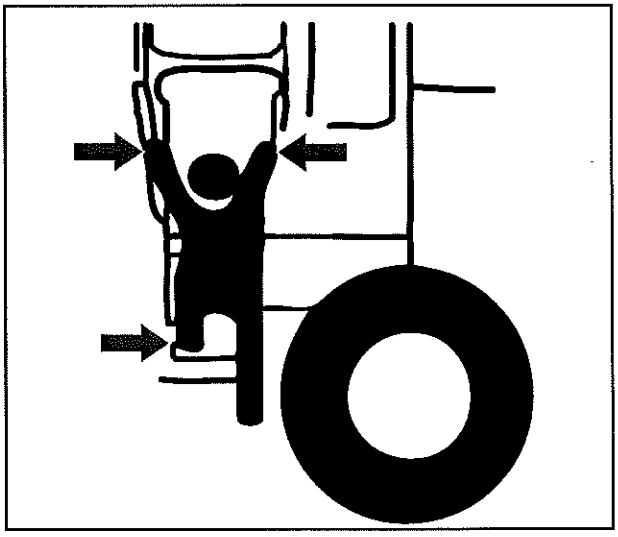

Fig.2-2

the machine that are not approved for walking and working. Keep all walking and working surfaces of the machine clean, dry and slip-resistant.

- Always keep grab handles steps and walkway areas clean and clear of mud, oil, grease or similar debris. If these areas are damaged, have them repaired or replaced immediately.

2.2 Machine Safety

2.2.1 Authorized Use of the Machine

This machine is mainly designed for the following operations:

- Clearing the foundation, fine leveling of cracked roads or hard grounds, scraping slopes, refinishing, mixture paving, collecting and compacting materials.
- Removing ice and snow.

2.2.2 Unauthorized Use of the Machine

If any procedure or action is not specified, recommended, or allowed in this manual is performed, the owner must be sure that the action can be performed safely without causing injury to the operator or others or damaging the machine.

Improper uses include, but are not limited to:

- Transporting people on the machine or in the cab.
- Using cables, chains or other items attached to the machine to transport objects.
- Pulling or pushing vehicles, trailers or containers.
- Overloading the machine beyond its maximum capacity.

2.2.3 Escape Tool

As a precaution, always keep an escape tool in the cab.

NOTE :

Inspect the escape tool periodically and replace it if it appears damaged or otherwise not able to break the cab window to allow for emergency exit.

2.2.4 Fire Safety

Fuel, oil and some coolants are flammable. Always observe the following:

- Keep open flames, airborne sparks and burning embers away from the machine.

- Shut down the engine and do not smoke when refueling or servicing the machine.
- Adding oil, fuel, or coolant should be done in a well-ventilated area.
- Clean up any spilled fluids or coolant immediately.
- Check the machine daily for excess debris buildup.

2.2.5 Electrical Fires

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

- Check the wiring on the machine for damage when doing a pre-start check. Repair or replace any damaged wiring.
- Never install aftermarket electrical equipment without approval from your Sany dealer.

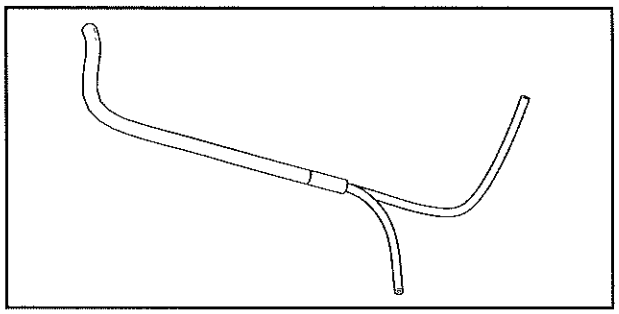

Fig.2-3

2.2.6 Fire Extinguisher

As a precaution, always keep a fire extinguisher in the cab.

Be sure the fire extinguisher is in good condition and know how to use it.

Be sure the fire extinguisher is at least a three-pound "A, B, C" fire-rated extinguisher (NFPA 10 Standard for Portable Fire Extinguishers).

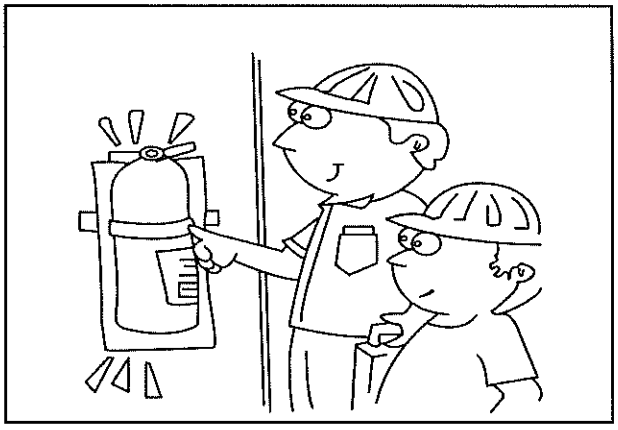

Fig.2-4

2.2.7 In Case of Fire

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

- Immediately press the emergency stop to shut down the machine. Never attempt to move or continue operating the machine.
- Exit the area immediately and remain clear of the machine until the fire department gives permission to come near the machine.

Fig.2-5

- Immediately call for help after getting clear of the machine.

When 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.

2.2.8 Crushing Hazards

Never place any body part out the windows or door during operation or travel. The movement of the work equipment or falling objects 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.

2.2.9 Unauthorized Machine Modifications

Do not perform any unauthorized machine modifications.

2.3 Job Safety

2.3.1 Introduction

It is the owner's and/or operator's responsibility to replace any safety decals if they are defaced or removed from the machine.

Never leave the machine running and unattended. Always park the machine in a safe, level area, lower any work equipment to a safe position, lock the controls to secure the machine to prevent tampering by unauthorized personnel and shut down the engine before exiting the machine even for a moment.

Before starting any work operations, travel or maintenance procedures, be sure all personnel are at a safe distance away from all points of the machine. Never allow anyone to stand near the machine while it is in operation, under maintenance or repair. Remember, the larger the machine, the more restricted the visibility will be.

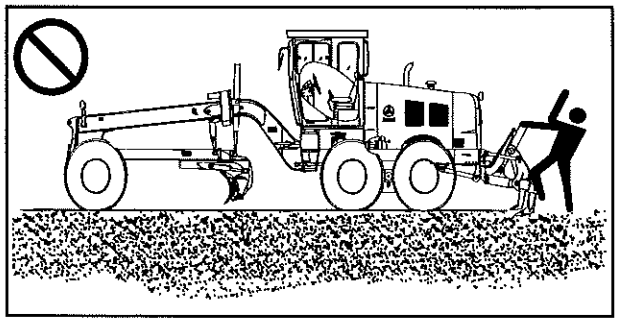

Fig.2-6

It is the responsibility of the operator's employer to conduct periodic safety training and familiarize all personnel with emergency procedures.

If pedestrians are in the area, proceed slowly and sound the horn. Pedestrians have the right of way; a loaded or smaller machine has the right-of-away over an unloaded or larger machine.

Never drive up to anyone standing in the path of travel. Always be sure all personnel are standing to the side when approached and they acknowledge the approach.

When working with another person on a job site, ensure that all personnel involved understand all industry standard hand signals that are to be used.

The operator shall respond to operating signals only from the proper signal person only, but shall obey a stop signal at any time from anybody.

The operator must always be able to see the point of work location. If this is not possible, then a signal person must be used. If visibility becomes blocked for any reason, stop operation immediately.

If the machine is equipped with operator aids, OSHA requires this equipment to be used when operating the machine.

2.3.2 Personal Protective Equipment (PPE)

Before using personal protective equipment, be sure it is in good condition and will be able to perform its task.

2.3.3 Travel and Operation Precautions

Traveling with the machine may pose some hazards. When traveling with the machine, always travel in a safe, controlled manner and remain alert at all times. Be sure the areas around the machine are clearly visible.

When traveling over rough ground, travel at low speed and steer carefully.

Whenever possible, avoid traveling over obstacles or raised areas. 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. Avoid any sharp turns or sudden stops.

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

Always check to be sure areas such as bridges or roadways will support the weight of the machine before attempting to cross.

Before traveling in public areas, always check with the relevant authorities and follow their instructions.

Always be careful when traveling in tunnels, under bridges, near utility lines or in places where weight, or clearance is a problem.

Sloped Areas

Traveling on sloped areas always poses a hazard. In order to prevent tipping, loss of control or a rollover, it is important to follow these rules:

- Always check the firmness of the surface on the slope before attempting to travel on it.
- Always travel straight up or straight down a slope.
- Never turn on a slope.

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:

- Avoid any rapid movement, acceleration or quick stopping. Always be aware of the increased stopping distance required on these surfaces.
- Avoid deep snow or frozen bodies of water.
- Keep in mind, even a slight slope may cause the machine to slip. Be extra careful when working on a sloped surface covered with snow or ice.
- When traveling or moving the machine on a snow-covered slope, slow down gently. Use the engine drag to slow the machine down.

2.3.4 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:

Table2–2 Minimum Distances Between Machine and Power Lines

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

NOTE :

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.

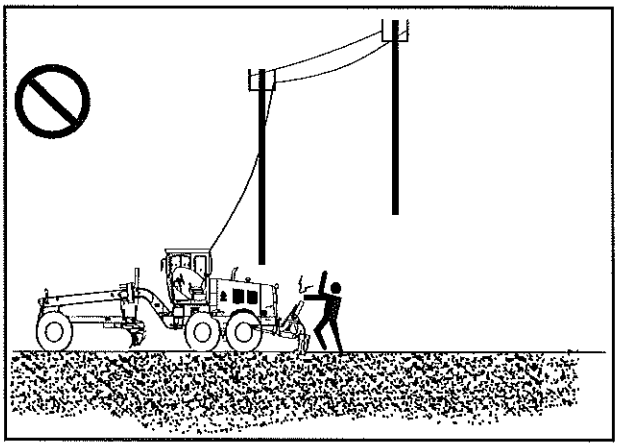

Fig.2-7

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

The jobsite supervisor 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.

It is not always necessary to physically contact a power line or power source to be 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, thereby reducing clearance.

To address these risks:

- Identify overhead power lines and mark safe routes where the machine must repeatedly travel.
- 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.
- Do not touch the machine until the signal person indicates that it is safe to do so.
- All personnel should keep away from the machine whenever it is close to power lines.
- The use of electrocution hazard devices is not a substitute for de-energizing lines, or maintaining safe clearance.
- If tag lines are used, they must be non-conductive.

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.

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 come close to the machine until the power has been turned off.
- If it is necessary to exit the machine, keep both feet and legs together, arms and hands at your side. Jump clear from the machine, maintain balance and land with both feet, legs, arms and hands still at your side. Do not touch the machine during the jump. Once on the ground continue to "bunny hop" away from the affected area as far as possible.

Following any contact with an energized electrical source, your Sany dealer must be immediately notified of the incident and consulted on necessary inspections and repairs. Should the dealer not be immediately available, contact Sany. The machine must not be returned to operation until it has been thoroughly inspected for any damage and all damaged parts are repaired or replaced as authorized by Sany or your Sany dealer.

2.3.5 Dust and Chemical Hazards

Performing operations and/or encountering hazardous materials on the job site may release substances that could pose a hazard. Exposure to hazardous chemicals or dusts poses a serious danger when they are released or mishandled. All workers involved should use approved personal protective equipment and follow all environmental safety regulations.

2.4 Maintenance Safety

2.4.1 Introduction

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 dealer.

Before carrying out any repair, read all the safety messages on the machine and associated with the specific procedure.

Wear and use the proper Personal Protective Equipment (PPE). PPE includes and is not limited to safety shoes, hard hat and goggles.

When carrying out any operation with two or more workers, always agree on the operating procedure before starting.

Always inform your fellow workers before starting any step of the operation. Before starting the work, hang lockout/tagout tags in the operator's cab.

Keep all tools in good condition, know how to use them, and use the correct one. Thoroughly checkall tools before starting any procedure.

Park the machine on a hard and level surface, and block the wheels to prevent the machine from moving before adding oil or making any repairs.

Before disconnecting or removing components of the hydraulic or coolant systems, relieve the pressure to prevent the fluids from spraying out.

The coolant and oil in the circuits may be hot after the engine is stopped, so be careful not to get scalded. Wait for the oil and coolant systems to cool before carrying out any work on them.

When checkingthe machine with the enginerunning (i.e., measuring oil pressure, revolving speed, temperature, etc.), take extreme care not to get caught in rotating parts or moving parts.

Disconnect electrical power from the machine unless needed for the procedure.

When removing hoses or lines, stop fuel or oil from spilling out. If any fuel or oil drips onto the floor, clean it up immediately.

When installing high pressure hoses, make sure they are not twisted. Damaged hoses are dangerous, so be extremely careful when installing hoses for high pressure circuits. Make sure fittings are correctly installed.

When assembling or installing parts, always tighten them to the specified torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.

2.4.2 Lockout/Tagout Procedures

Lock out/tag out the machine in accordance with local regulations.

2.4.3 Clean the Machine

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

Never pressure-wash or flood the cab.

Never use high-pressure steam cleaners to clean the machine.

Always lubricate the machine thoroughly after cleaning to force out any water or soap residue.

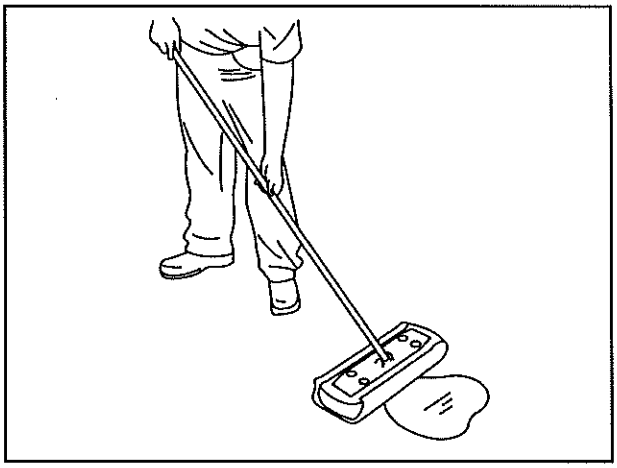

Fig.2-8

2.4.4 Fluid Systems

Add Fluids to the Machine

When fluids must be added to the machine, be aware that the fluid systems are under high pressure and hot.

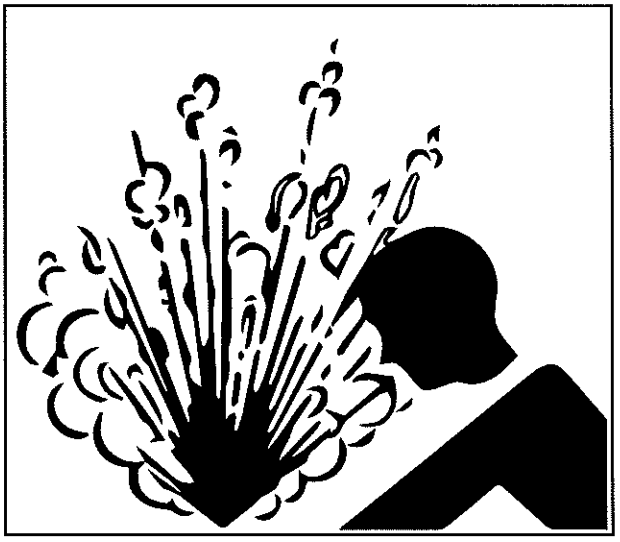

Fig.2-9

Refuel

Before adding fuel, shut down the machine before removing the fuel tank cap. Failure to do so may result in serious burns or a sudden loss of fuel.

Fuel spills pose a hazard if not cleaned up immediately.

Refuel only in a well-ventilated area. Never smoke or allow open flames nearby while refueling the machine.

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

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

Fig.2-10

High-Pressure Fluid Lines

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

Never use any body part 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.

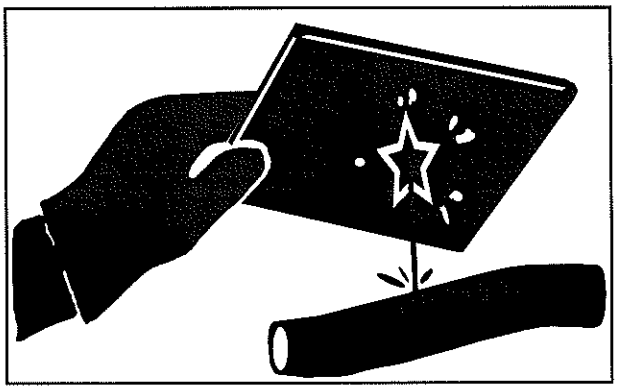

Fig.2-11

Check for cracks in the piping or hoses and for swelling in the hoses.

NOTE :
If there is any leakage from a line or hose, the surrounding area will be wet.

Replace a line or hose if a leak is found or failure occurs.

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

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 dealer.

2.4.5 Electrical System

Always clean the electrical system using only Sany-approved electrical cleaners.

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

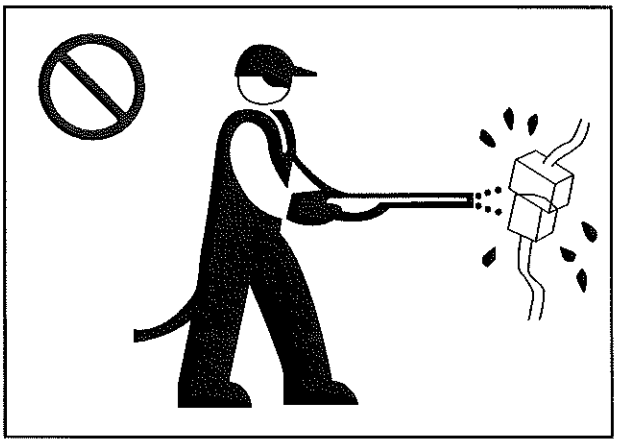

Fig.2-12

Battery Safety

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 here are some basic precautions to be aware of when working around batteries:

- Always wear personal protective equipment.

- 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.

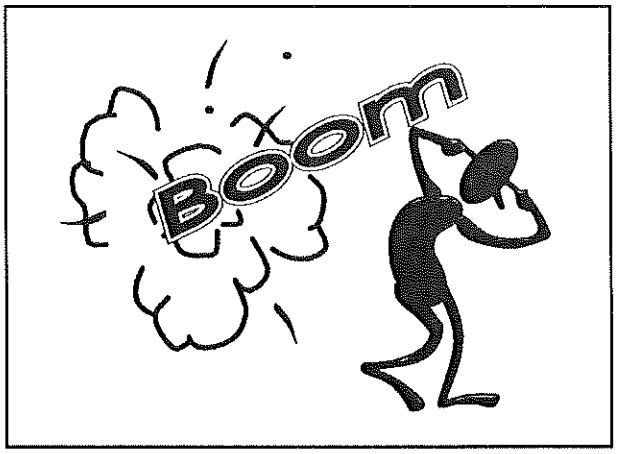

Fig.2-13

- If the battery is corroded, flush the area with a baking soda and warm water mix.
- If battery acid gets on skin or in eyes, flush the area immediately with fresh water and seek medical attention.

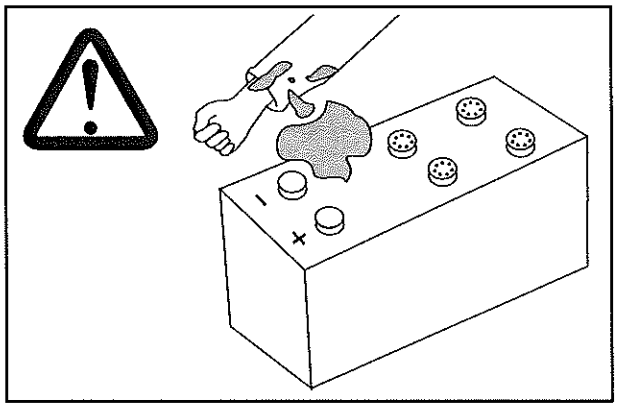

Fig.2-14

Check battery condition only with proper test equipment.

Disconnect the Battery

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

2.4.6 Environmental Precautions

Recycling used oil, coolants or filters conserves a natural resource and is good for the environment. Fluids poured onto the ground, in bodies of water, into storm drains, or tossed into trash cans (even in a sealed container) can contaminate and pollute the soil, groundwater, streams, and rivers. Recycling used fluids reduces this pollution threat.

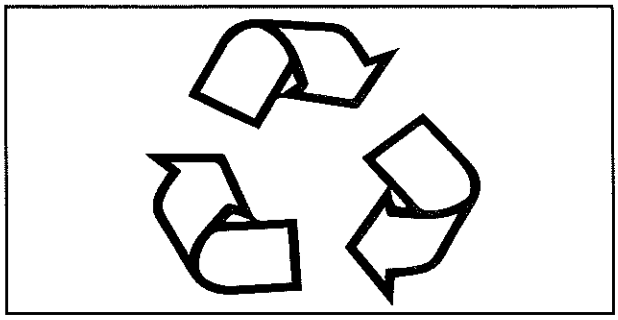

Fig.2-15

Always drain fluids from the machine into an appropriate container. Drain, crush and dispose of all filters properly.

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

2.5 Machine Decals

All safety and warning decals must be in place, undamaged, and visible. Become thoroughly familiar with the location and content of all decals on the machine. Walk around the machine and review each of them. Decals provide important instructions and warnings and must be read prior to any operational or maintenance function. Your Sany dealer can supply replacement decals if needed.

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

SANY

System Functions

3.System Functions

3.1 Main Body Components

3.1.1 Introduction

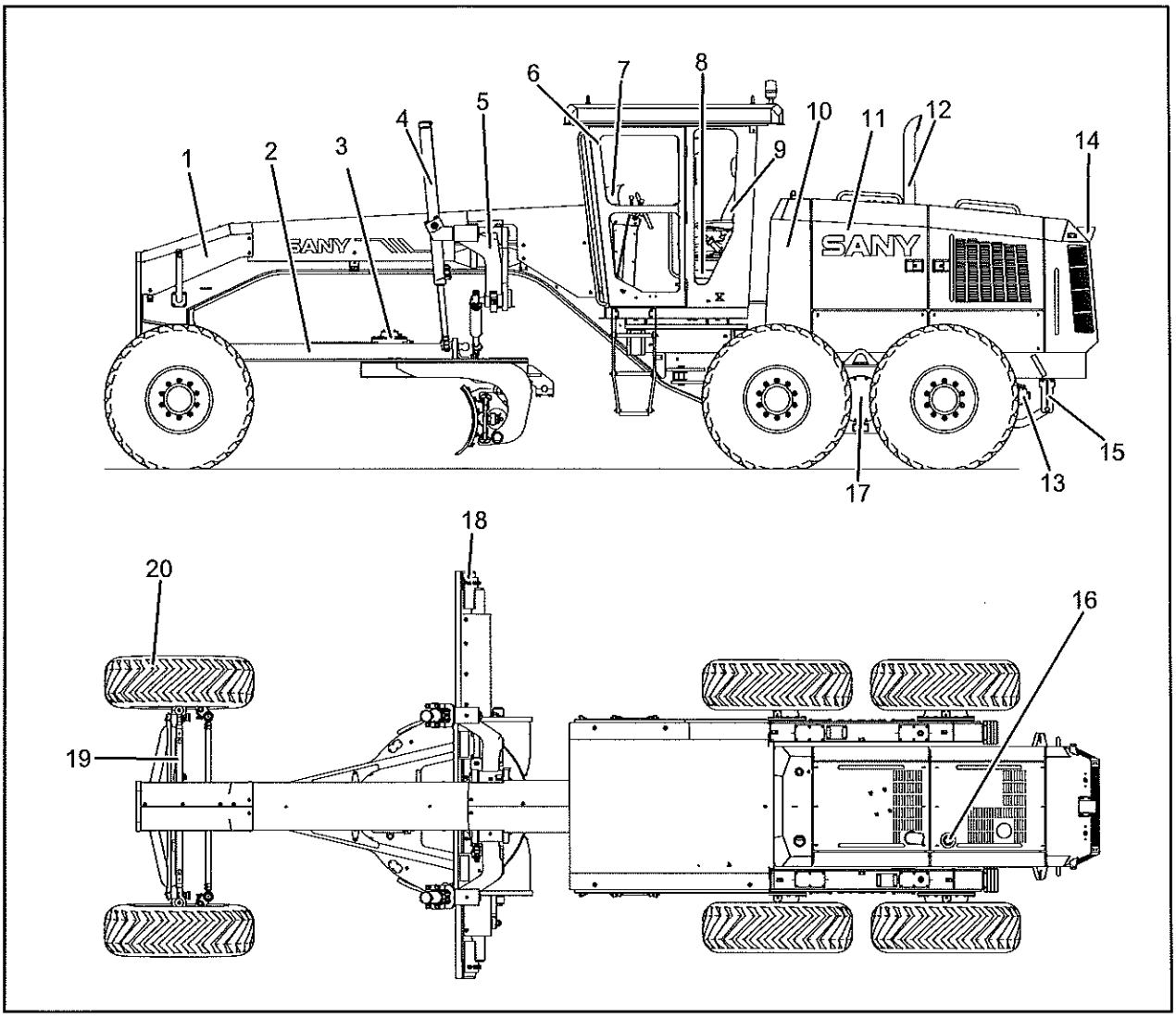

Fig.3-1

1. Frame
2. Draw bar
3. Circle drive
4. Hydraulic system
5. Swing support
6. Operator cab
7. Control console (inside cab)
8. Air conditioner/heater assembly
9. Seat
10. Fuel tank
11. Engine compartment
12. Power system
13. Transmission case
14. Electrical system
15. Rear protective cover
16. Hydraulic system
17. Tandem drive case
18. Blade
19. Front axle
20. Tire and rim

3.1.2 Frame

The frame is the main support member and is also the mounting base for all parts. The frame includes the front frame (1) and rear frame (2), connected by an upper pin (3) and a lower pin (4).

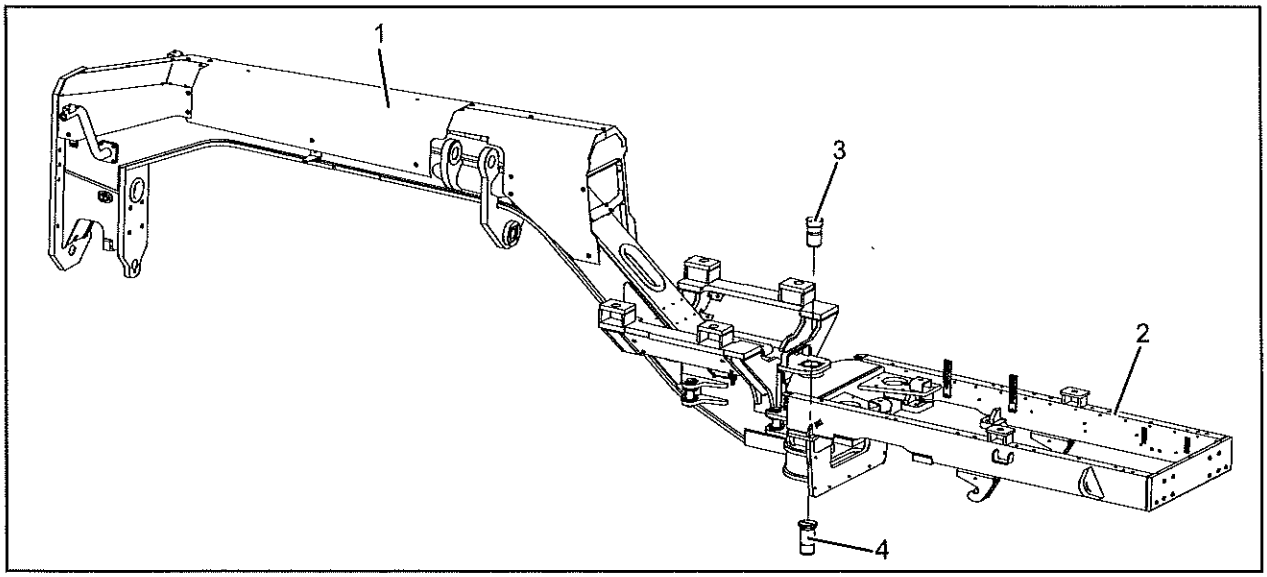

Fig.3-2

1. Front frame 2. Rear frame 3. Upper pin 4. Lower pin

3.1.3 Swing Support

This assembly is mounted onto the middle of the front frame and consists of the fork assembly (1), connection components (2), left swing arm (3), right swing arm (4), sleeve (5) and sleeve (6).

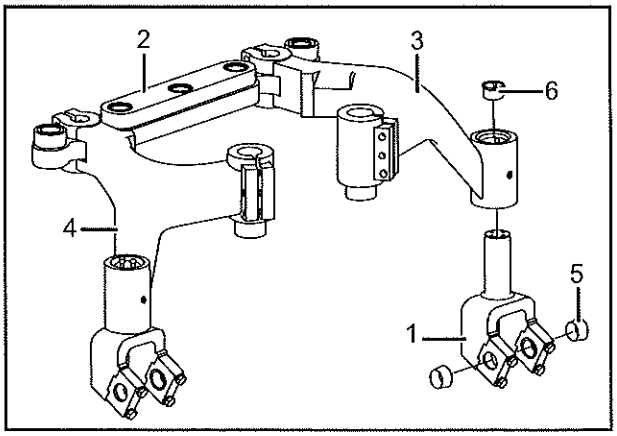

Fig.3-3

1. Fork assembly
2. Connection components
3. Left swing arm
4. Right swing arm
5. Sleeve
6. Sleeve

The main functions of the swing support are as follows:

- Support the work implement. The left lift cylinder (7), the right lift cylinder and the moldboard swing cylinder (8) are mounted to the swing support.
- Allows the moldboard to rotate a maximum of 90°.

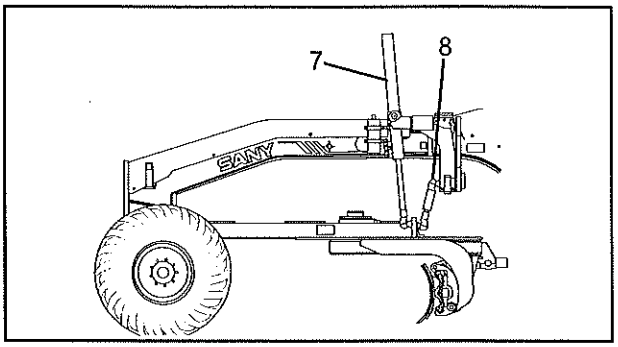

Fig.3-4

7. Left lift cylinder 8. Moldboard swing cylinder

3.1.4 Tandem Drive Case

This component is mounted to the lower portion of the rear frame. The functions of the tandem drive case are as follows:

- Reduction and torque transfer in order to drive the rear wheels (1)
- Support the rear part of the machine
- Balance the drive force
- Increase the force of the moldboard

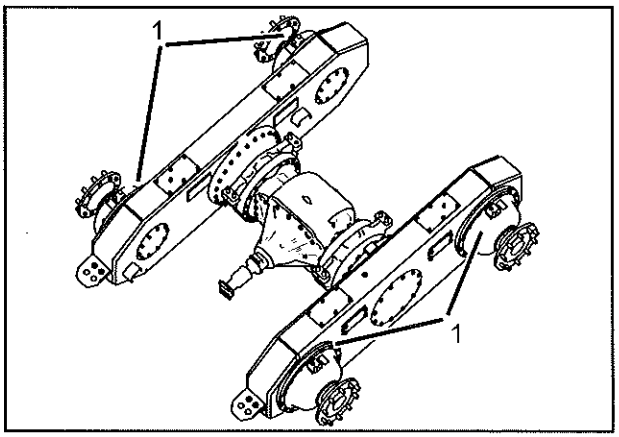

Fig.3-5

1. Rear wheels

3.1.5 Transmission Assembly

This component is mounted to the lower portion of the rear frame and includes the power shift transmission (1), transmission mounts (2) and isolators (3). The functions of the transmission are as follows:

- Transfers engine output to the tandem drive case.
- Provides a means for the operator to shift gears for power and speed adjustments.
- Transfers engine power to the two pumps to provide power to the hydraulic system.

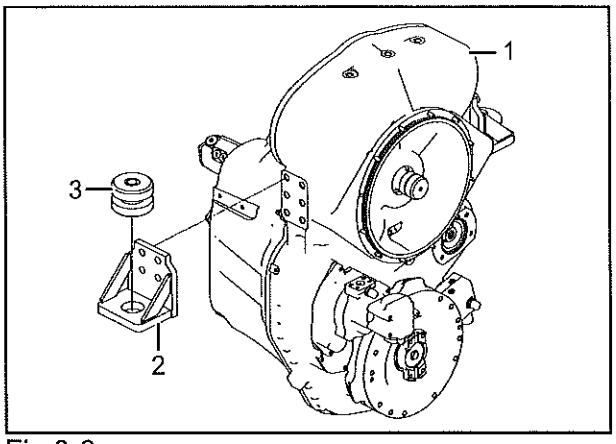

Fig.3-6

1. Power shift transmission
2. Transmission mounts
3. Isolators

3.1.6 Front Axle

The major components of this assembly are the axle frame (1), steering tie rod (2), left steering knuckle (3), right steering knuckle (6), left wheel tilt angle knuckle (5) and right wheel tilt angle knuckle (4).

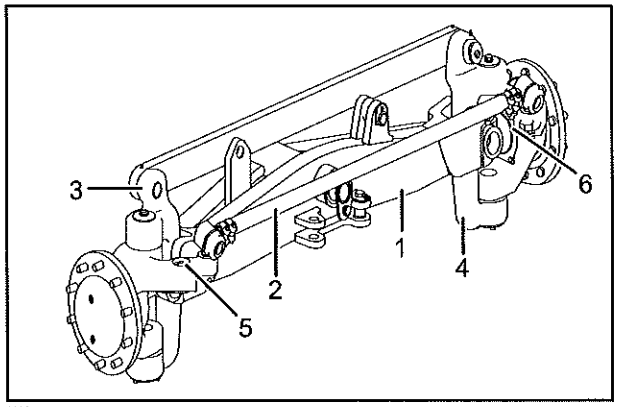

Fig.3-7

1. Axle frame
2. Steering tie rod
3. Left steering knuckle
4. Right wheel tilt angle knuckle
5. Left wheel tilt angle knuckle
6. Right steering knuckle

3.1.7 Work Implement

The work implement is a combination of draw bar (1), slew bearing (2) , circle turn (3) and blade carrier (4).

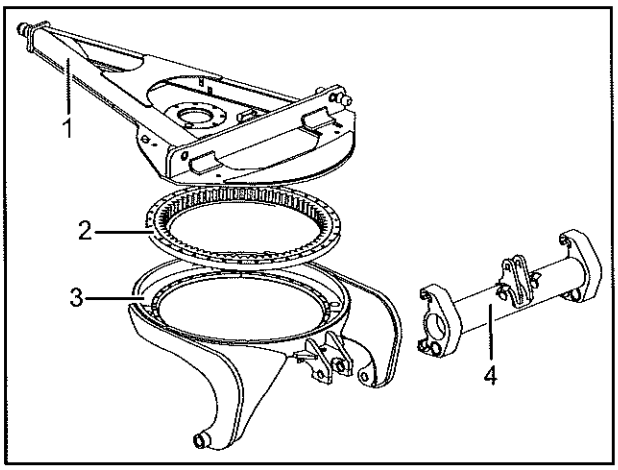

Fig.3-8

1. Draw bar
2. Slew bearing
3. Circle turn
4. Blade carrier

3.1.8 Moldboard

The moldboard is the primary work tool of this machine and is attached to and controlled by the work implement assembly.

The main components of the moldboard include the: body (1), replaceable cutting edge (2) and replaceable side- cutters (3).

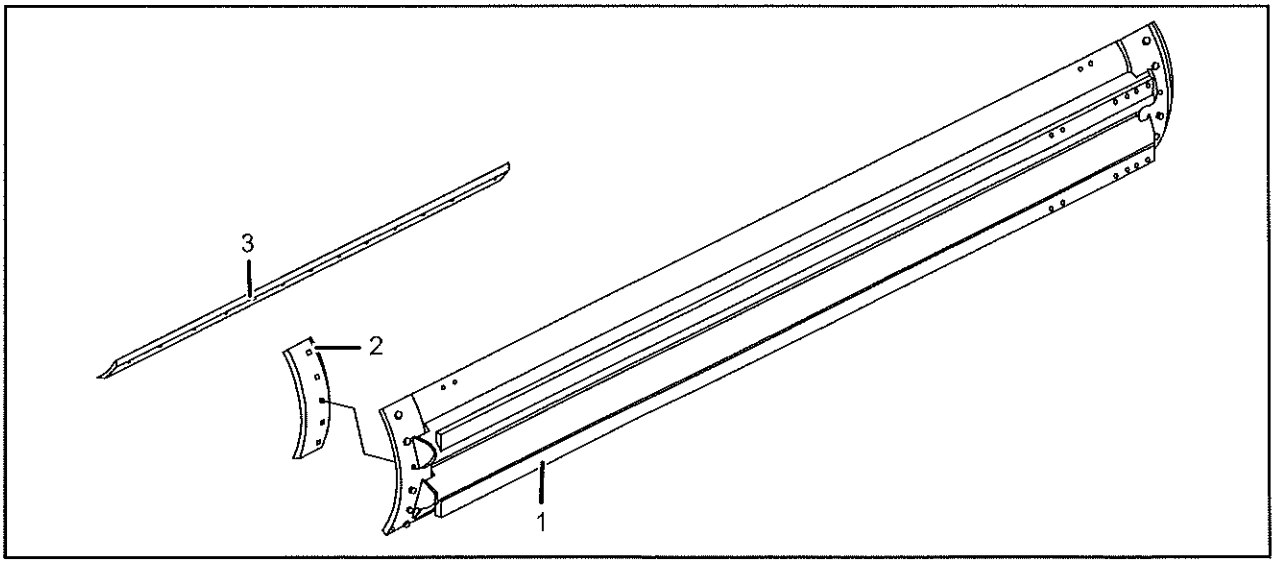

Fig.3-9

1. Body
2. Replaceable cutting edge
3. Replaceable side-cutters

3.1.9 Engine

The engine is mounted on the rear frame. Refer to your Cummins engine manual for complete details about the engine.

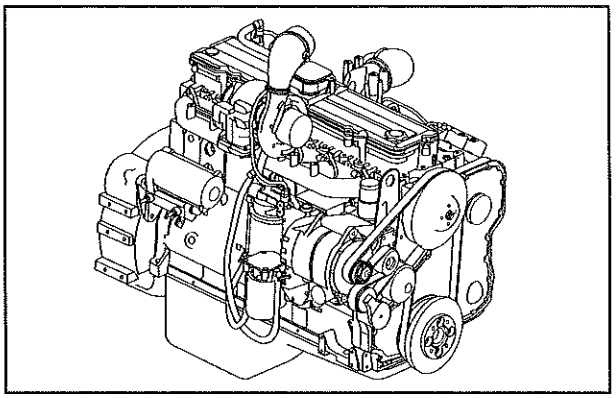

Fig.3-10

3.2 Optional Work Equipment

3.2.1 Introduction

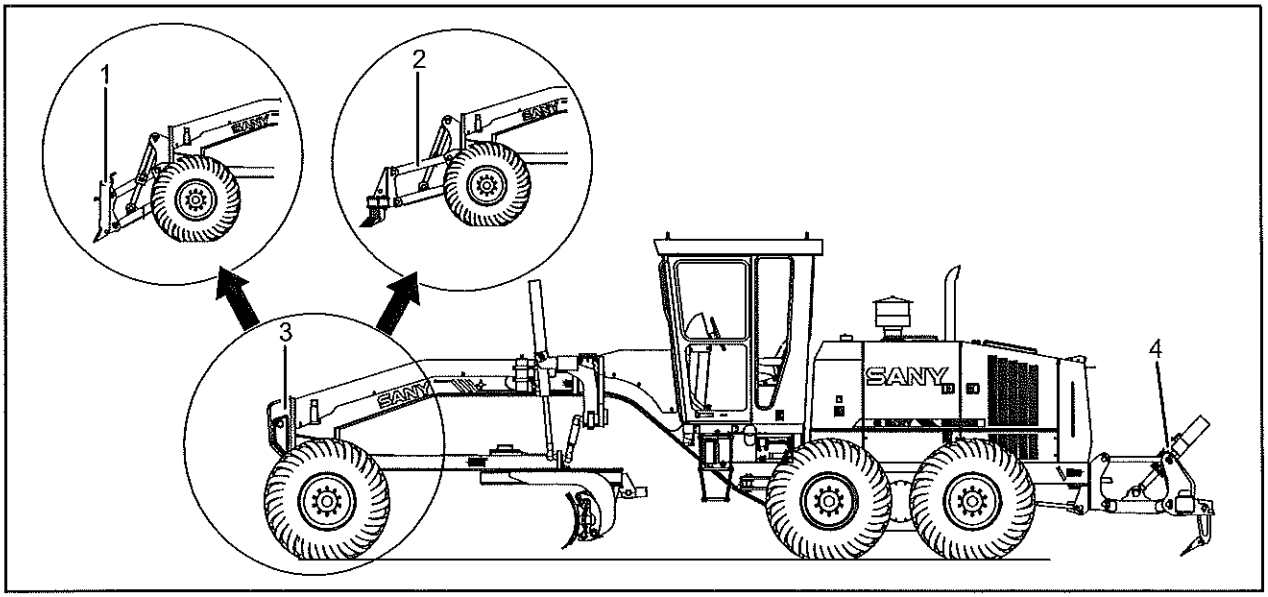

Fig.3-11

1. Front push-plate 2. Front harrow 3. Front counterweight 4. Rear scarifier

3.2.2 Front Push-Plate

This optional item is attached to the front of the machine and is mainly used to push a small quantity of material and assist the mold-board operation.

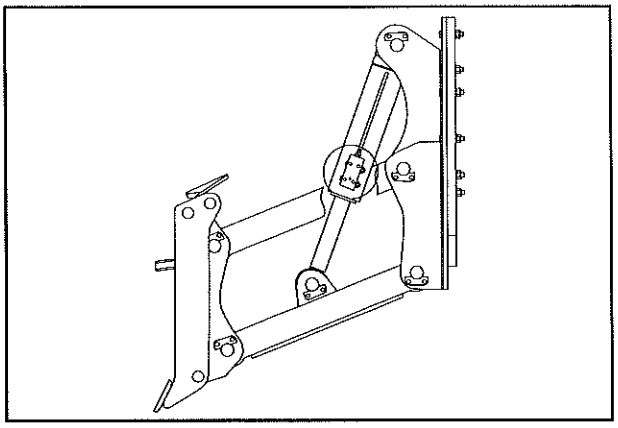

Fig.3-12

3.2.3 Front Harrow

This optional item is also attached to the front of the machine and is mainly used to break up and smooth out the surface of soil.

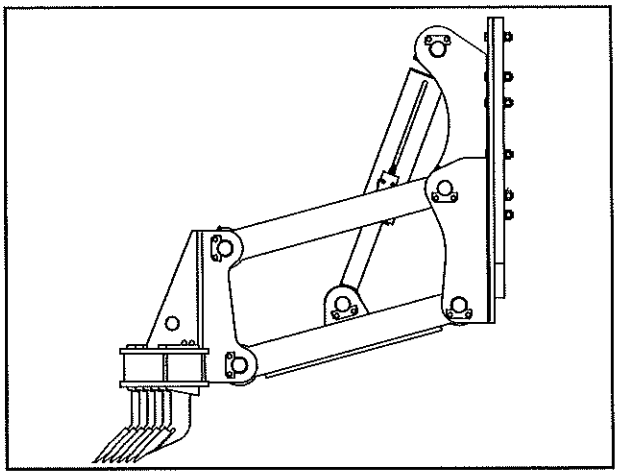

Fig.3-13

3.2.4 Front Counterweight

This item is secured with bolts to the head of the front frame. The counterweight is used for balancing the load ratio for the front axle and rear axle.

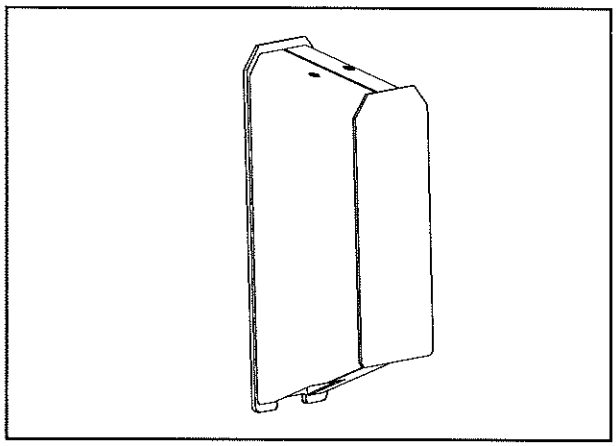

Fig.3-14

3.2.5 Rear Scarifier

This item is located at the rear of the machine and is mainly used to rip solid, heavily compacted soil.

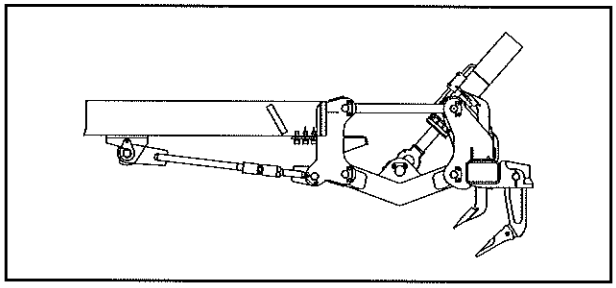

Fig.3-15

3.3 Cab Interior

3.3.1 Introduction

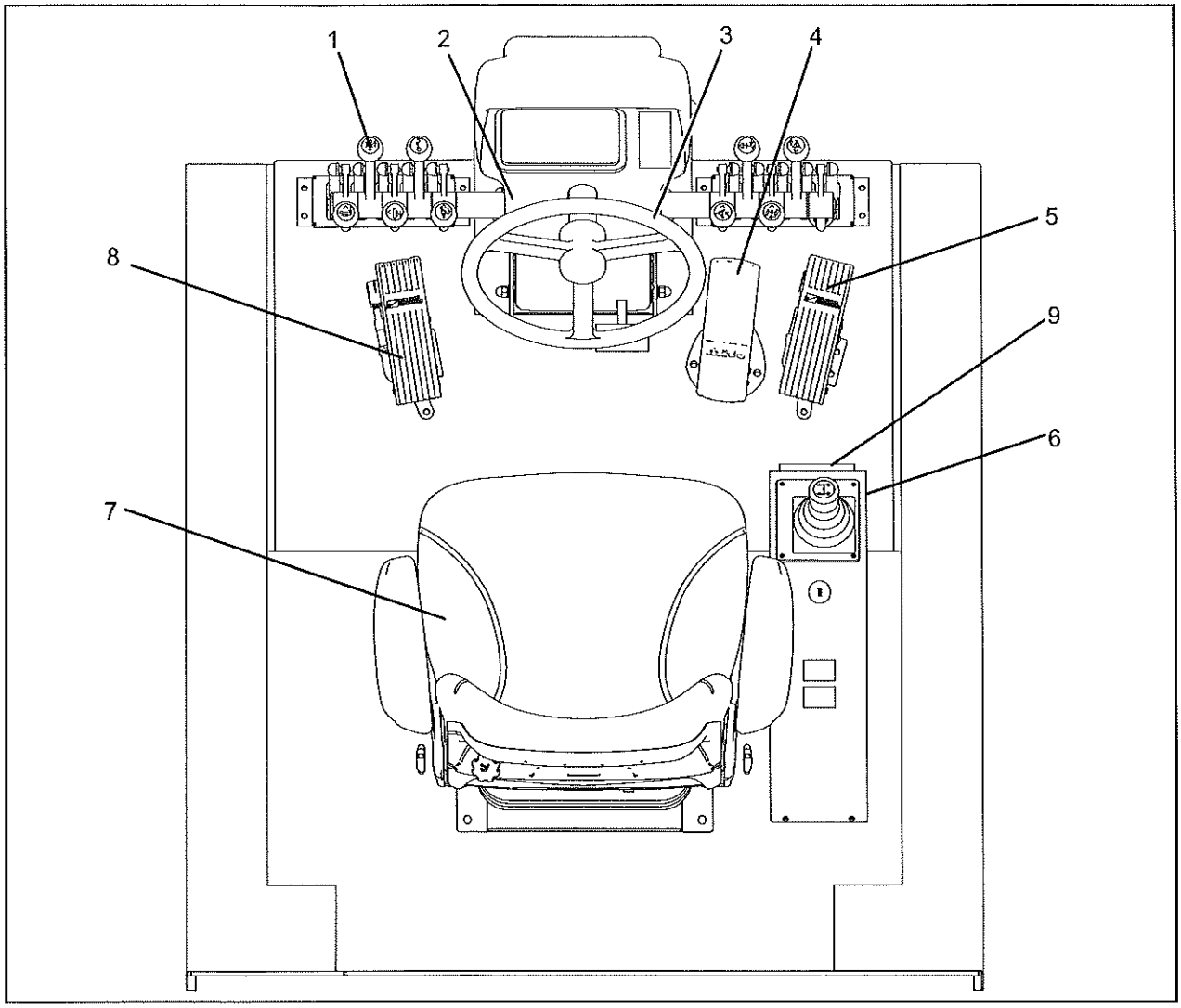

Fig.3-16

1. Control levers
2. Front control console
3. Steering wheel
4. Service brake pedal
5. Throttle pedal
6. Right control console
7. Seat
8. Inching pedal
9. Fuse box

3.3.2 Control Levers

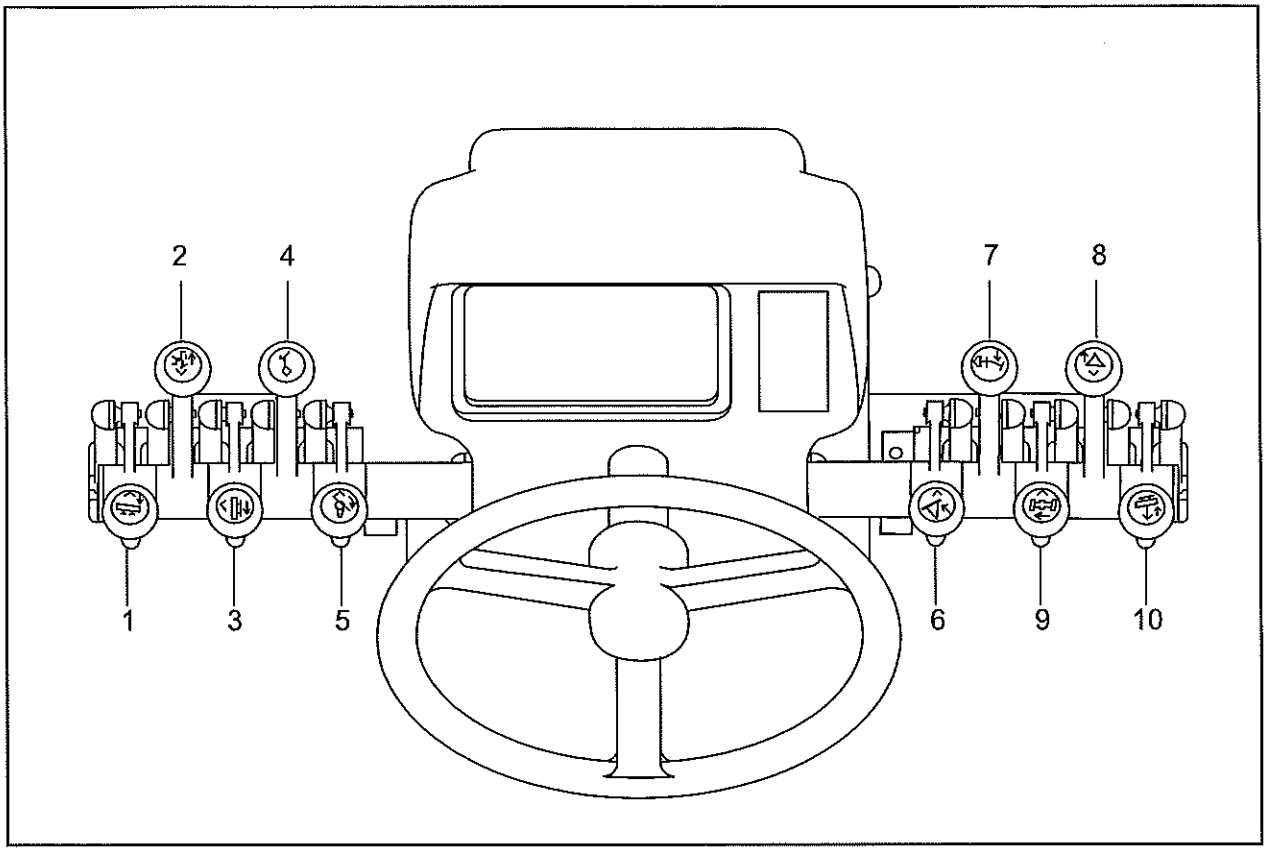

Fig.3-17

1. Left lift moldboard control lever
2. Rear scarifier control lever
3. Side shift control lever
4. Pitch control lever
5. Circle control lever
6. Drawbar center shift control lever
7. Articulation control lever
8. Front wheel lean control lever
9. Front implement (push-plate or harrow) control lever
10. Right lift control lever

Left Moldboard Lift Control Lever

Left Moldboard RAISE

Pull the lever backward to raise the left end of the moldboard.

The lever returns to the HOLD position when released.

HOLD

The lever returns to the HOLD position when released, but the moldboard will remain at the selected position.

Left Moldboard LOWER

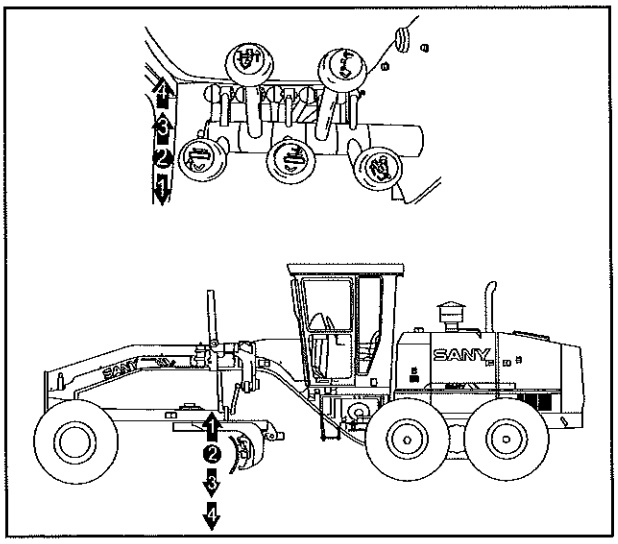

Fig.3-18

Push the lever forward to lower the left end of the moldboard.

Left Moldboard Floating

Push the lever forward to floating position, the left end of the moldboard will descend to the ground and the lever will keep in the floating position.

Rear Scarifier Control Lever

Scarifier RAISE

Pull the lever backward to raise the scarifier.

HOLD

The lever returns to the HOLD position when released, but the scarifier will remain in the selected position.

Scarifier LOWER

Push the lever forward to lower the scarifier.

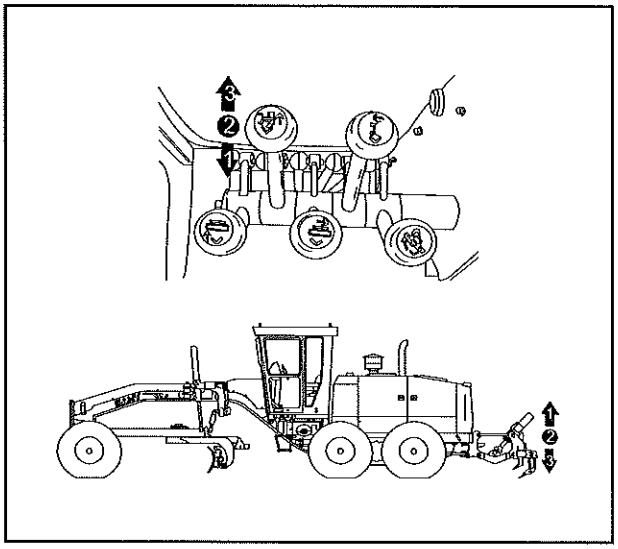

Fig.3-19

Moldboard Side-Shift Control Lever

Side-Shift RIGHT

Pull the lever backward to side shift the moldboard to the right.

HOLD

The lever returns to the HOLD position when released.

Side-Shift LEFT

Push the lever forward to side shift the moldboard to the left.

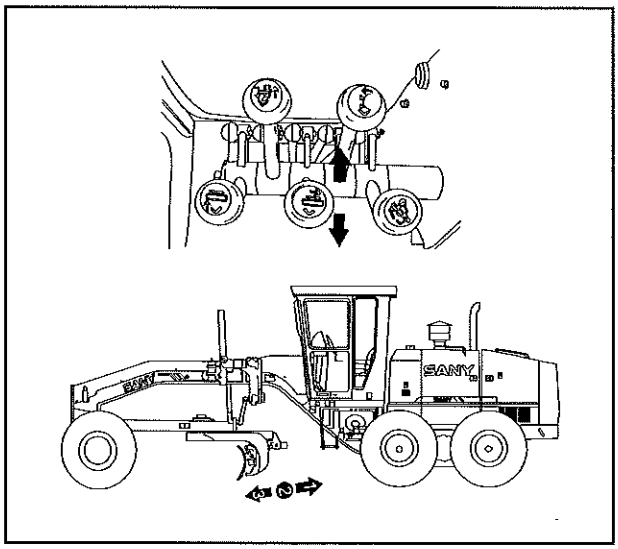

Fig.3-20

Pitch Control Lever

Pitch BACKWARD

Pull the lever backward to tilt the moldboard back.

HOLD

The lever returns to the HOLD position when released.

Pitch FORWARD

Push the lever forward to tilt the moldboard forward.

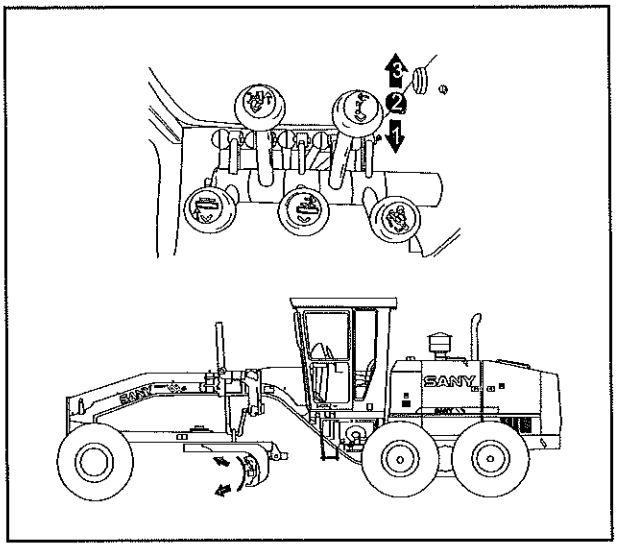

Fig.3-21

Circle Turn Control Lever

Circle Turn CLOCKWISE

Pull the lever backward to rotate the moldboard clockwise.

HOLD

The lever returns to the HOLD position when released.

Circle Turn COUNTERCLOCKWISE

Push the lever forward to rotate the moldboard counterclockwise.

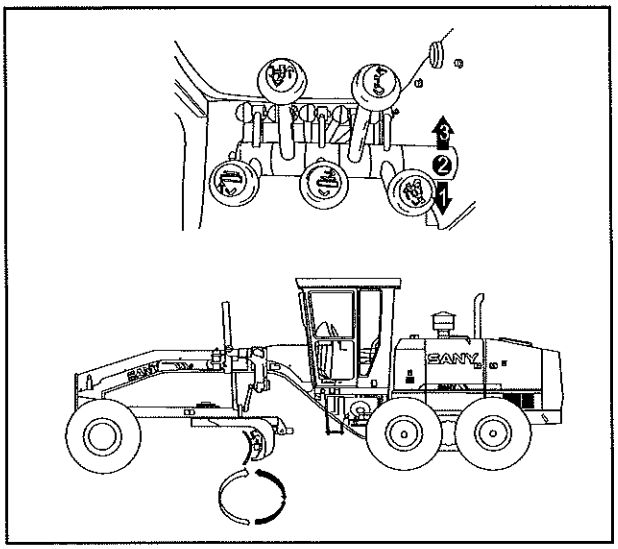

Fig.3-22

Drawbar Center Shift Control Lever

Drawbar Center Shift RIGHT

Pull the lever backward to move the drawbar to the right.

HOLD

The lever returns to the HOLD position when released, but the drawbar will remain at the selected position.

Drawbar Center Shift LEFT

Push the lever forward to move the drawbar to the left.

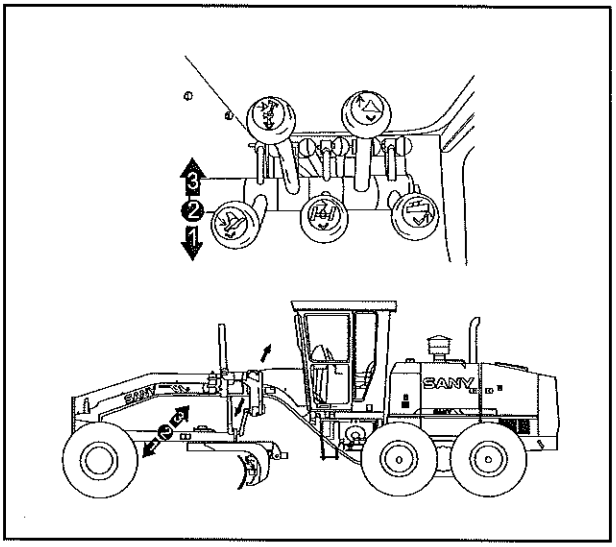

Fig.3-23

Articulation Control Lever

Articulation RIGHT

Pull the lever backward to move the rear of the machine to the right.

HOLD

The lever returns to the HOLD position when released, but the machine articulation will remain at the selected position.

Articulation LEFT

Push the lever forward to move the rear of the machine to the left.

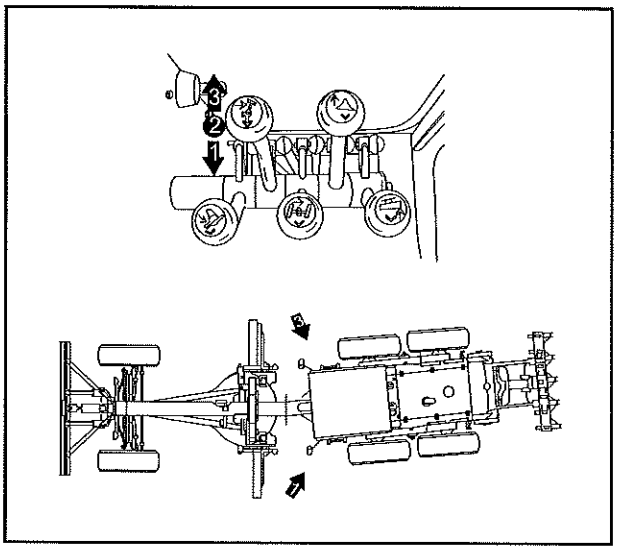

Fig.3-24

Front Implement (Push-Plate or Harrow) Control Lever

Push-Plate or Harrow RAISE

Pull the lever backward to raise the implement.

HOLD

The lever returns to the HOLD position when released, but the implement will remain at the selected position.

Push-Plate or Harrow LOWER

Push the lever forward to lower the implement.

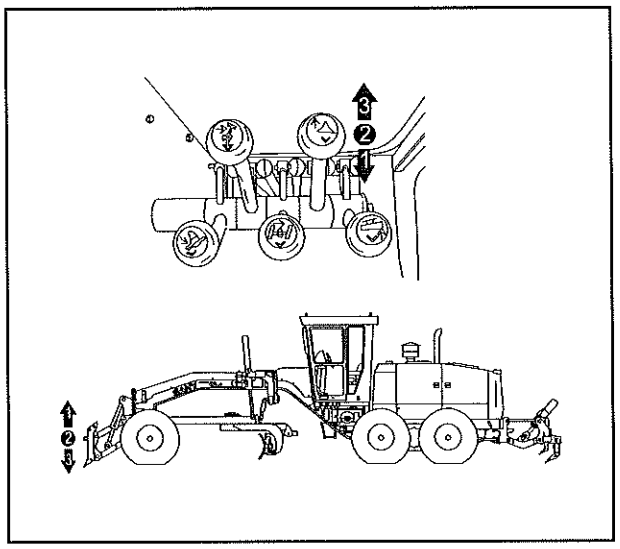

Fig.3-25

Front Wheel Lean Control Lever

Front Wheel Lean RIGH

Pull the lever backward to lean the wheels to the right.

HOLD

The lever returns to the HOLD position when released, but the wheel lean will remain at the selected position.

Front Wheel Lean LEFT

Push the lever forward to lean the wheels to the left.

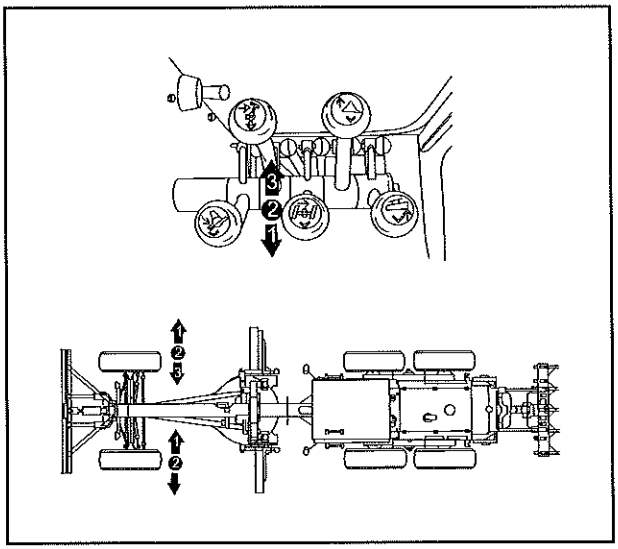

Fig.3-26

Right Moldboard Lift Control Lever

Right Moldboard RAISE

Pull the lever backward to raise the right end of the moldboard.

The lever returns to the HOLD position when released.

HOLD

The lever returns to the HOLD position when released, but the moldboard will remain at the selected position.

Right Moldboard LOWER

Push the lever forward to lower the right end of the moldboard.

Right Moldboard Floating

Push the lever forward to floating position, the right end of the moldboard will descend to the ground and the lever will keep in the floating position.

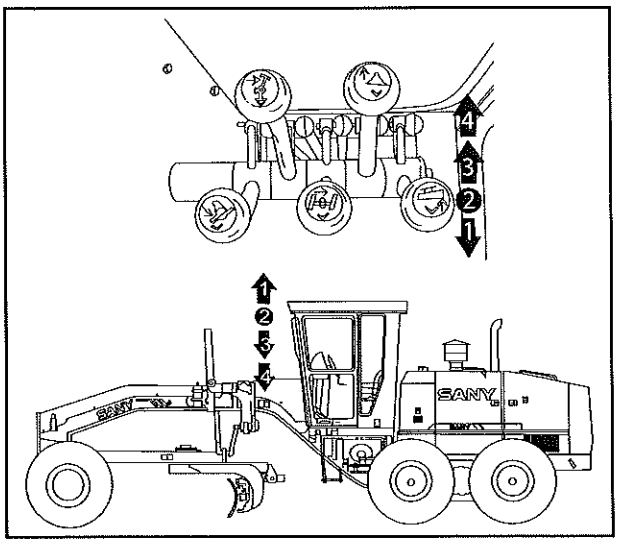

Fig.3-27

3.3.3 Front Control Console

Monitor

The monitor (1) is mounted in the front console in the operator cab and displays various machine operational parameters and the operating system menu screens.

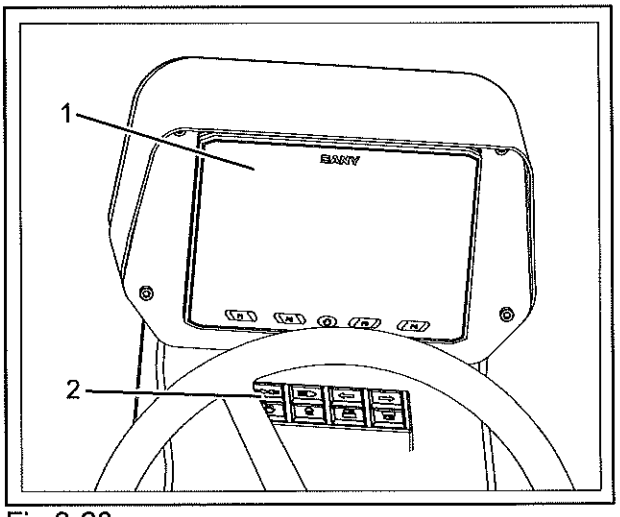

Fig.3-28

1. Monitor 2. Front switch group

Front Switch Group

The front switch group (2) is arranged below the monitor on the front console and includes the switch for the low beam headlights, high beam headlights, turn signal and driving lights.

Turn Signal Switch

The membrane switch (3) and (4) controls the front and rear turn signals.

Switch (3) controls the left turn signal. When the signal is turned off, press the switch and the indicator on the console will illuminate and the left turn signal is turned on; press it again, the indicator is out and the left turn signal is off.

Switch (4) controls the right turn signal. When the signal is turned off, press the switch and the indicator on the console will illuminate and the right turn signal is turned on; press it again, the indicator is out and the right turn signal is off.

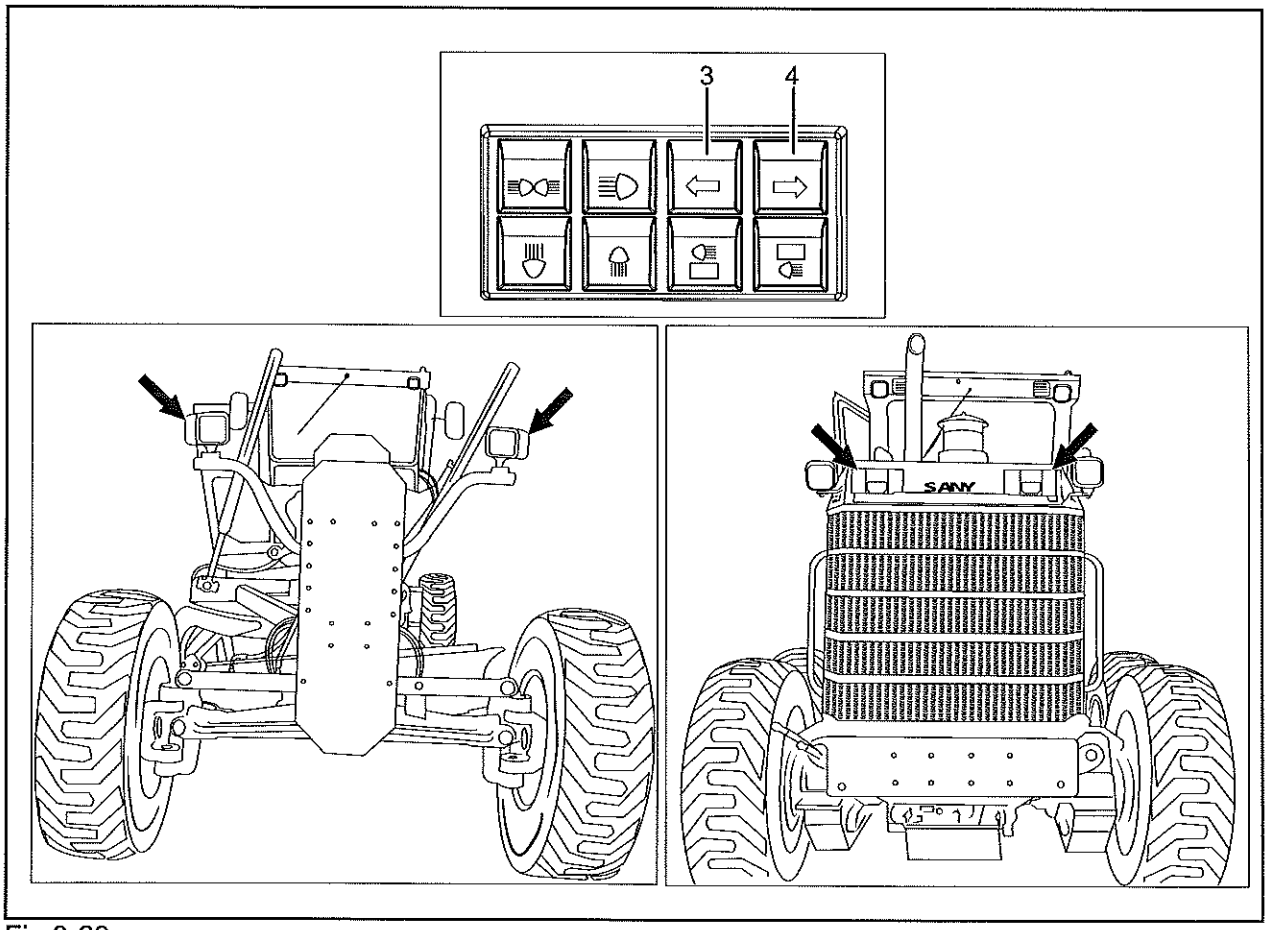

Fig.3-29

3. Left turn light switch 4. Right turn light switch

Driving lights

The low beam switch (5) and high beam switch (6) controls the front headlights and the rear taillights on the machine.

Low beam switch (5): When the headlights and taillights are turned off, press the switch, and its indicator will illuminate and the low beam lights and taillights are turned on; press it again, the indicator is out and the low beam lights and taillights are off.

High beam switch (6): When the headlights and taillights are turned off, press the switch, and its indicator will illuminate and the high beam lights and taillights are turned on; press it again, the indicator is out and the high beam lights and taillights are off.

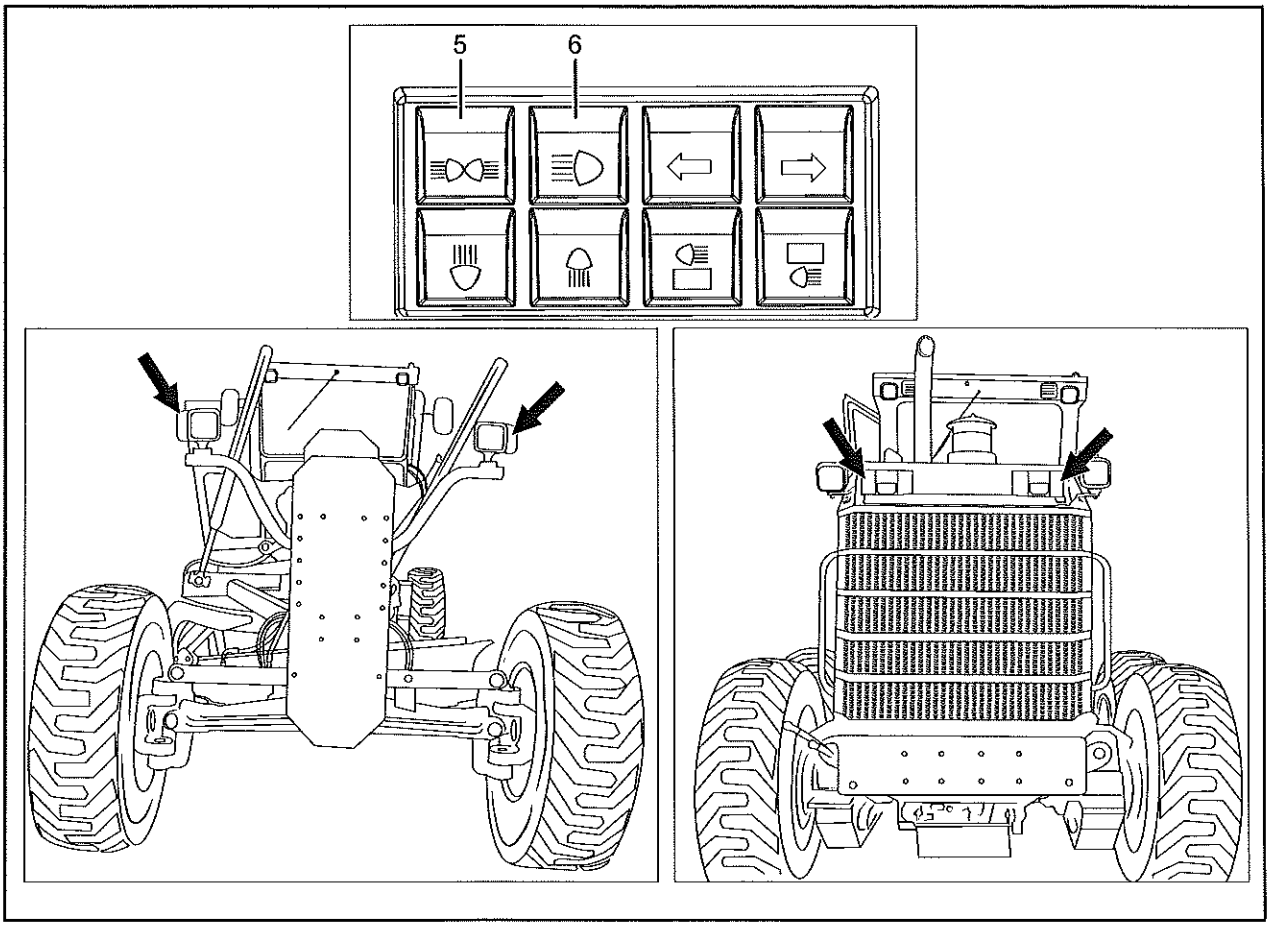

Fig.3-30

5. Low beam headlights switch
6. High beam headlights switch

Mid-frame front work lights switch

The switch is shown at (7).

Press the switch(7) once to turn the lights on and press it again to turn them off.

NOTE :
There is one light on each side of the frame.

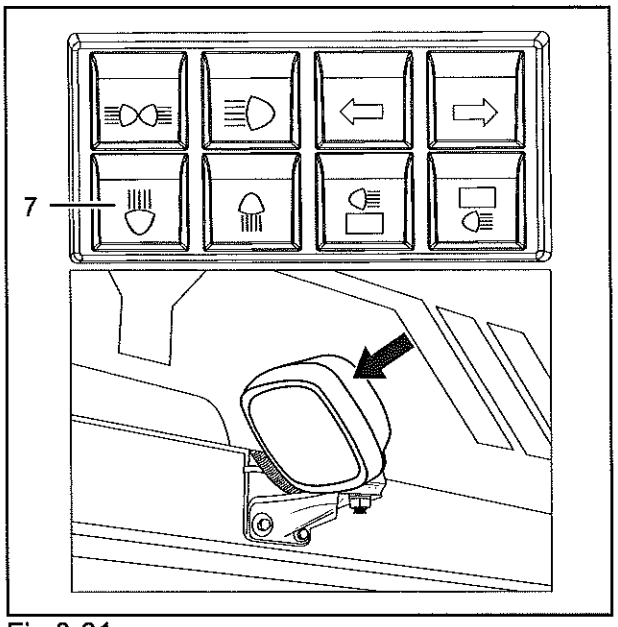

Fig.3-31

7. Mid-frame front work lights switch

Rear work lights switch

The switch is shown at (8).

Press the switch (8) once to turn the lights on and press it again to turn them off.

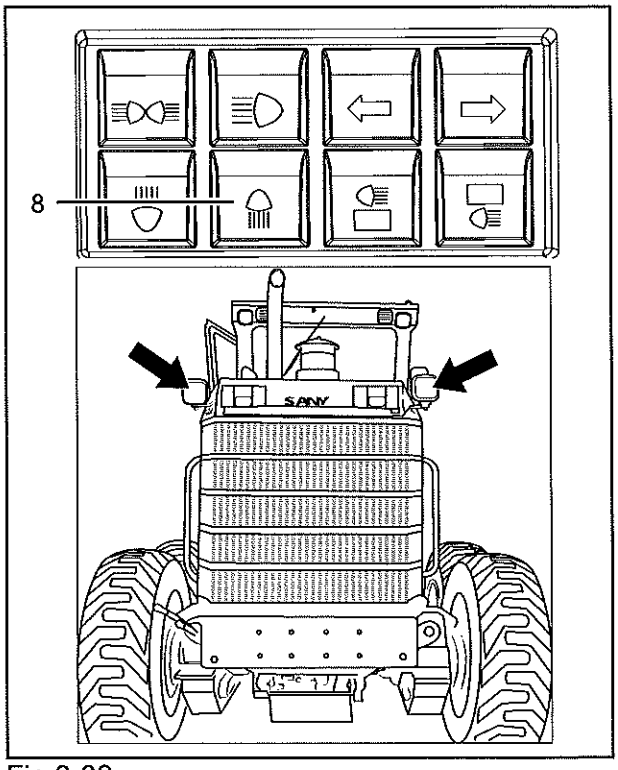

Fig.3-32

8. Rear work lights switch

Upper front cab lights switch

The switch is shown at (9).

Press the switch (9) once to turn the lights on and press it again to turn them off.

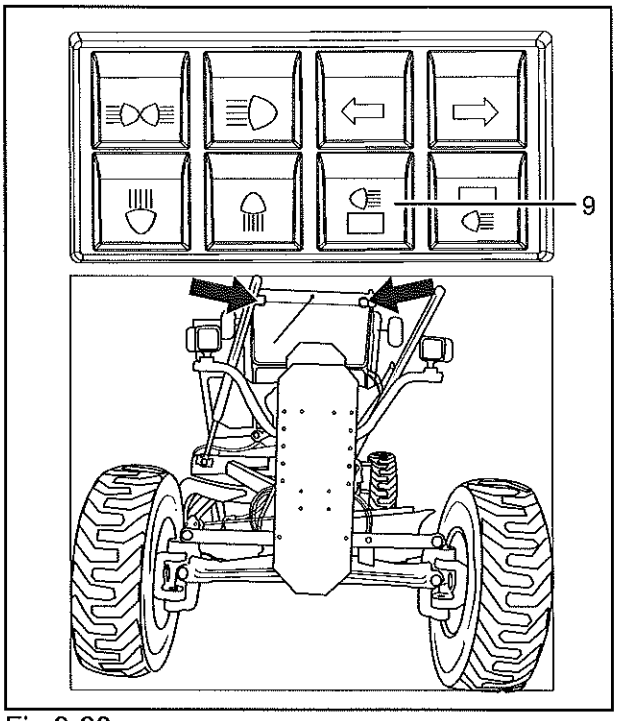

Fig.3-33

9. Upper front cab lights switch

Lower front cab work lights switch

The switch is shown at (10).

Press the switch (10) once to turn the lights on and press it again to turn them off.

NOTE :

There is one light at the bottom front corner on each side of the cab.

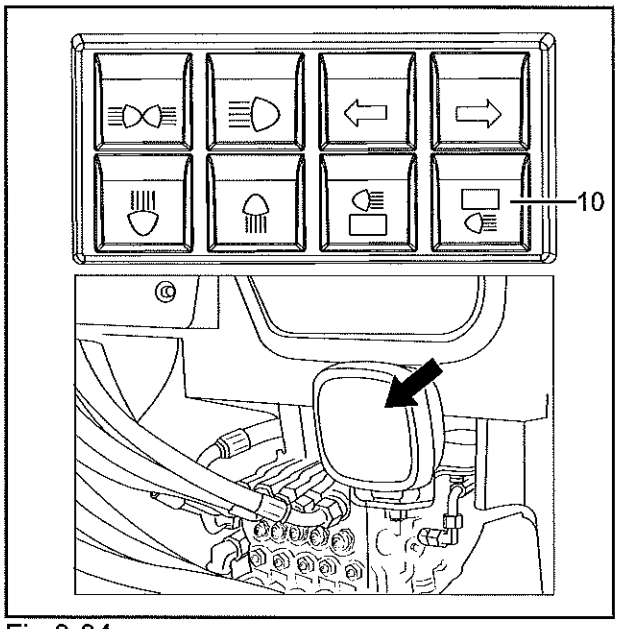

Fig.3-34

10. Lower front cab work lights switch

3.3.4 Steering Wheel

The steering wheel (1) controls the travel direction of the machine.

- Turn the steering wheel counterclockwise and the machine will turn to the left.
- Turn the steering wheel clockwise and the machine will turn to the right.

Turning the steering wheel quickly results in an immediate response by the front wheels.

The horn button (2) is located at the center of the steering wheel. Press and release the horn button to sound the horn.

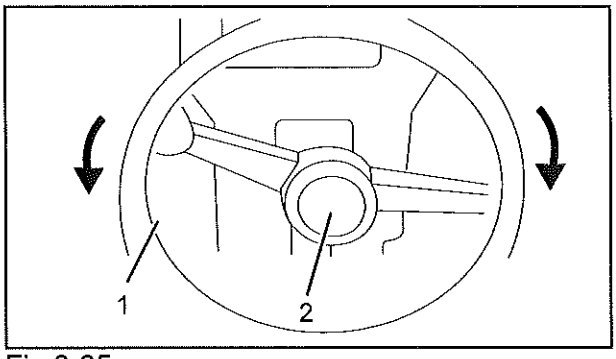

Fig.3-35

1. Steering wheel 2. Horn button

NOTE :

Observe all local traffic laws and regulations while driving this machine on public roadways.

3.3.5 Brake Pedal

The foot brake pedal is to the right of the steering wheel and is used to slow or completely stop the machine depending on the work requirements.

The brake is released when the brake pedal is released.

This machine features an emergency braking function, whereby the brake system functions even with the engine shut down.

In this case, when the operator presses the brake pedal, the accumulator provides pressurized oil to the four brakes via the brake valve and the machine slows or stops completely as-needed.

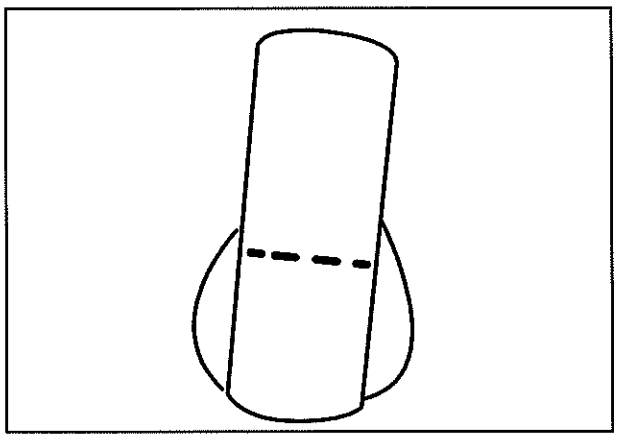

Fig.3-36

3.3.6 Throttle Pedal

The throttle pedal is to the right of the service brake pedal and is used to adjust engine speed instead of using the throttle control switches on the right control console.

Press the throttle pedal down to increase engine speed and release the throttle pedal to decrease engine speed.

NOTE :
Pressing the throttle pedal disables any input from the throttle control switches.

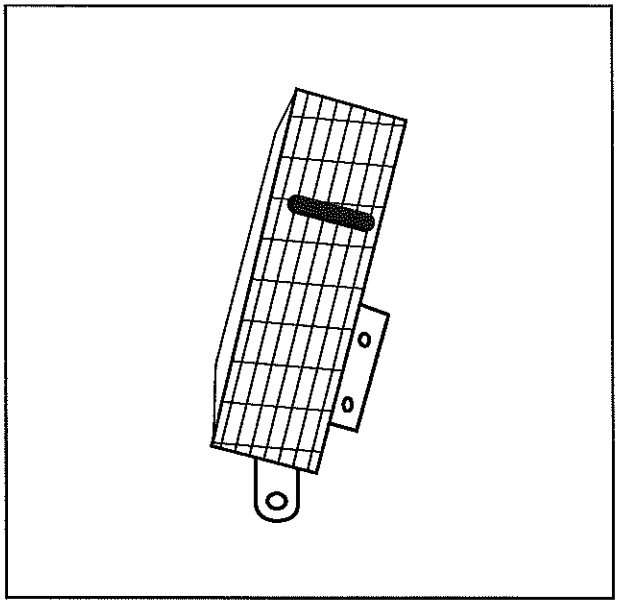

Fig.3-37

3.3.7 Right Control Console

The right control console includes the following items:

- Transmission control lever (1)
- Keyswitch (2)
- Right switch group (3)
- USB portal (4)

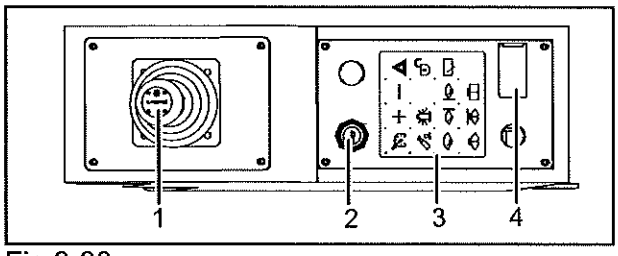

Fig.3-38

1. Transmission control lever
2. Keyswitch
3. Right switch group
4. USB port

Transmission Control Lever

The transmission control lever has four positions: neutral, forward, park and reverse.

- NEUTRAL — With transmission lever at the middle position and the engine running, the machine remains stationary, not moving in either forward or reverse direction.
- FORWARD — With the engine running and the transmission control lever at the NEUTRAL position, push the transmission control lever forward to move the machine forward. Move the lever to the right to upshift or to the left to downshift the transmission to the desired forward gear shown on the monitor. See "Initialization Screens" on page 3-43.
- PARK — The engine can be started only when the transmission control lever is at the PARK position.

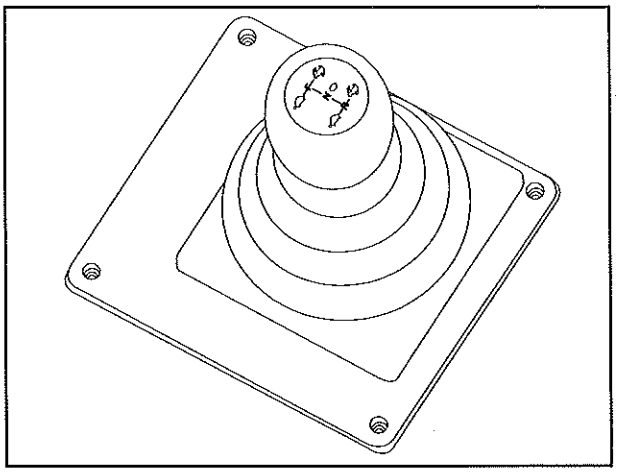

Fig.3-39

NOTE :

With the transmission control lever at the NEUTRAL position, move the lever to the right to place it in PARK; the shift lever will be locked at the PARK position. Raise the lever lock switch to unlock and shift to NEUTRAL. The transmission control lever can only be locked in the PARK position.

NOTE :

The PARK position of the transmission control lever also activates a built-in parking brake function. There is no separate control for the parking brake, only the PARK position of the transmission control lever.

- REVERSE — With the engine running and the transmission control lever at the NEUTRAL position, pull the transmission control lever backward to move the machine in reverse. Move the lever to the right to upshift or to the left to downshift the transmission

to the desired gear (as shown on the monitor. See "Initialization Screens" on page 3-43.

Changing Direction

1. Completely release the throttle pedal; the engine should be running at low idle.
2. Press the inching pedal.
3. Raise all the attachments.
4. Press the service brake pedal.
5. Set the transmission control lever to the NEUTRAL position.
6. Move the transmission control lever to select either forward or reverse machine travel.
7. Release the service brake pedal.
8. Release the inching pedal.
9. Press down on the throttle pedal until the desired speed is attained.
10. Move the transmission lever to the right to upshift one speed at a time. Increase engine speed, as required.
11. Move the transmission lever to the left to downshift one speed at time.
12. To change the machine's direction of travel, slow the machine with the service (foot) brake, then use the inching pedal to stop the machine. Use transmission control lever to select the desired travel direction. After the desired direction has been selected, release both the service (foot) brake and the inching pedal.

Keyswitch

The keyswitch is used to control the engine electrical system as well as start the engine. The keyswitch has four positions "O" (off), "I" (on), "II" (run) and "III" (start).

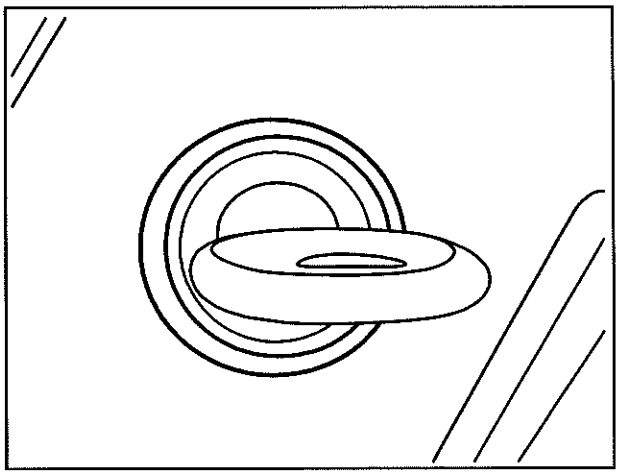

Fig.3-40

1. Turn the key to the "I" position on the keyswitch to activate the machine electrical system.

2. Turn the key to the "III" position on the keyswitch to start the engine.

The key automatically returns to the "II" position on the when the keyswitch is released after the engine is started.

NOTE :

The engine will not start unless the transmission is in the Park position.

Right Switch Group

The right switch group includes switches for hand throttle, speed control, fault alarm, beacon light, centershift cylinder lock and unlock, front window wiper, left and right window wiper, rear window wiper, front window washer, left and right window washer, rear window washer and deferential lock.

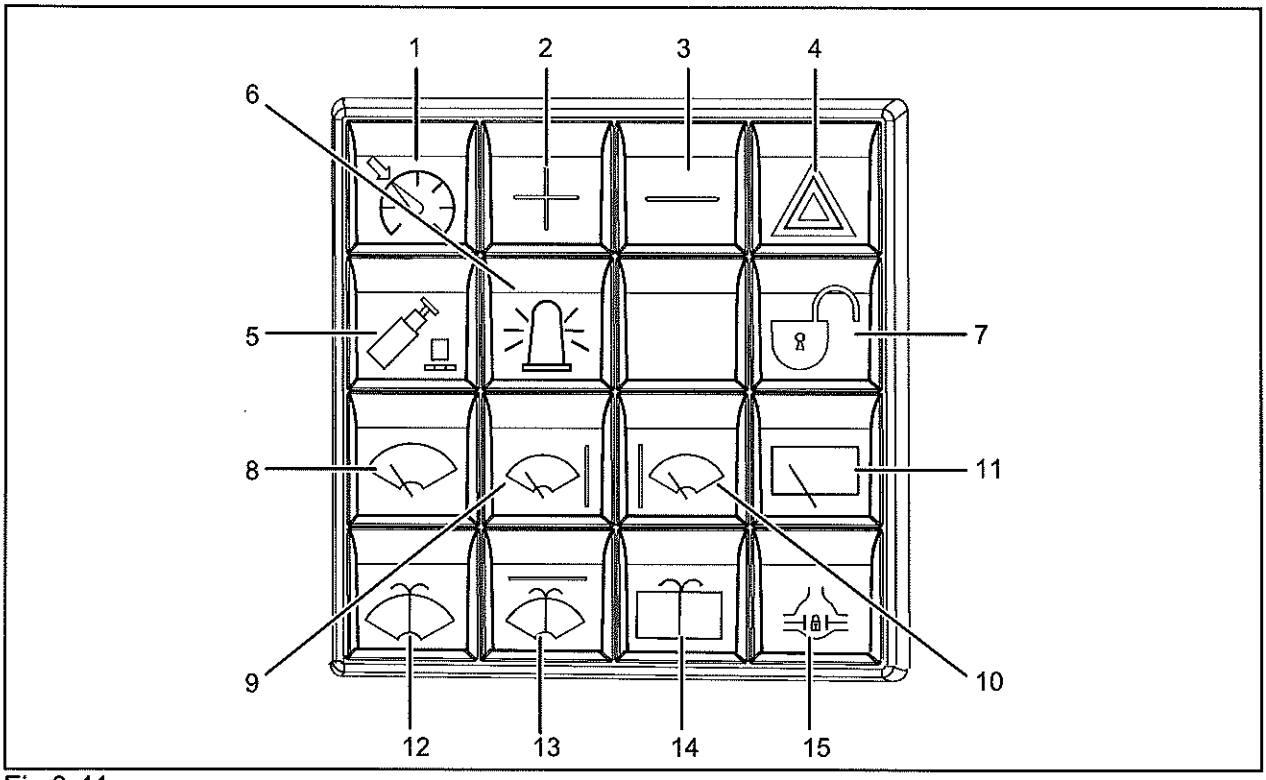

Fig.3-41

1. Hand throttle control switch
2. Speed control switch
3. Speed control switch
4. Hazard Flasher switch
5. Centershift cylinder lock/unlock switch
6. Beacon light switch
7. Centershift cylinder lock/unlock enable switch
8. Front window wiper switch
9. Left window wiper switch
10. Right window wiper switch
11. Rear window wiper switch
12. Front window washer switch
13. Left and right window washer switch
14. Rear window washer switch
15. Differential Lock Switch

Hand throttle control switches

The hand throttle control switch (1) is used to switch between the hand throttle and the throttle pedal controls.

When the hand throttle control is not on, press the switch (1) and the hand throttle control is activated. Press the switch again and the hand throttle control is cancelled.

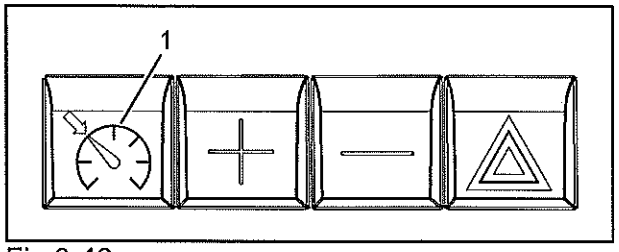

Fig.3-42

1. Hand throttle control switch

Speed control switch

These membrane switches are used to adjust engine speed in place of the throttle pedal. When the hand throttle control is on, then:

- Press the speed control switch (2) to increase the engine speed (rpm), then release the switch when the desired engine speed is reached.
- Press the speed control switch (3) to decrease the engine speed (rpm) down to the idle speed if desired, then release the switch when the desired engine speed is reached.

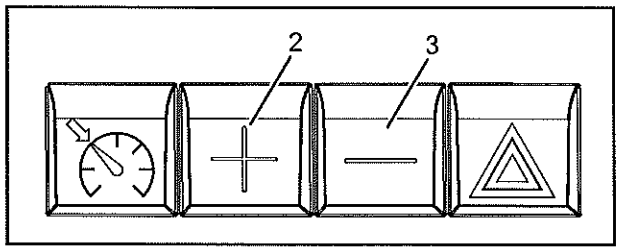

Fig.3-43

2. Speed control switch 3. Speed control switch

Hazard flasher switch

Press hazard flasher switch(4) to turn the hazard flasher on. Press it again to turn the flasher off.

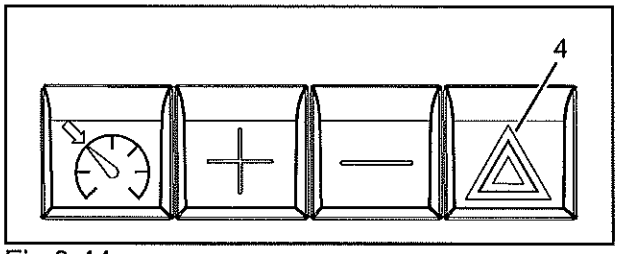

Fig.3-44

4. Hazard flasher switch

Centershift (Circle 90°) cylinder lock and unlock switch

When the centershift cylinder lock/unlock switch (5) and enable switch (7) are pressed at the same time, the indicator for the centershift cylinder lock/unlock switch (5) will illuminate and the piston rod for the cylinder will retract. When the 2 switches are pressed again at the same time, the indicator for centershift cylinder lock/unlock switch (5) will be off and the piston rod will extend.

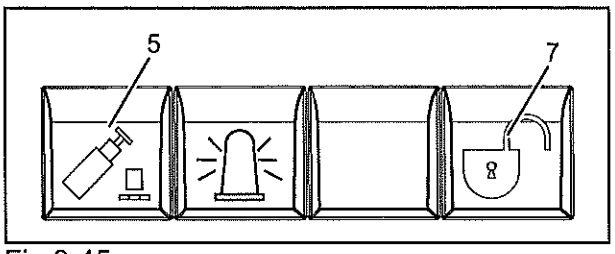

Fig.3-45

5. Centershift cylinder lock/unlock switch
7. Centershift cylinder lock/unlock enable switch

Beacon light switch

The beacon light switch (6) turns the beacon light on and off.

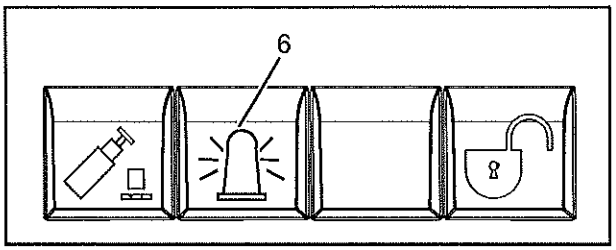

Fig.3-46

6. Beacon light switch

Front window wiper switch

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

Press the front window wiper switch (8) and the front window wiper starts working. Press it again, the wiper stops working.

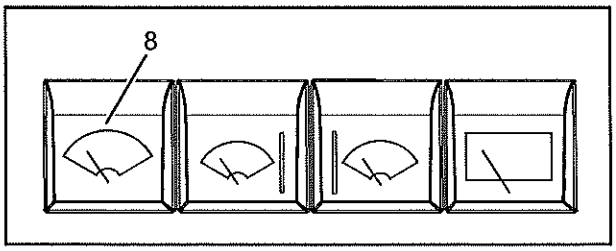

Fig.3-47

8. Front window wiper switch

Left window wiper switch

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

Press the left window wiper switch (9) and the left window wiper starts working. Press it again, the wiper stops working.

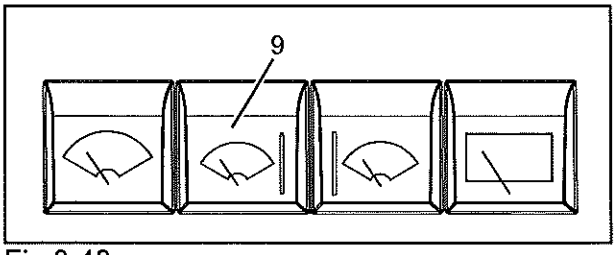

Fig.3-48

9. Left window wiper switch

Right window wiper switch

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

Press the right window wiper switch (10) and the right window wiper starts working. Press it again, the wiper stops working.

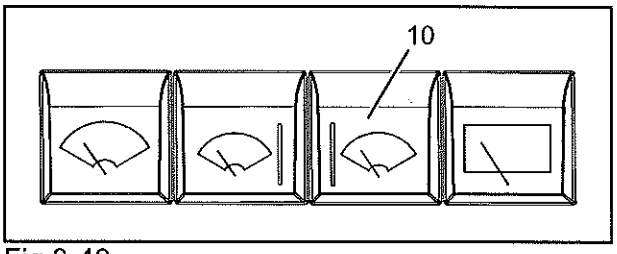

Fig.3-49

10. Right window wiper switch

Rear window wiper switch

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

Press the rear window wiper switch (11) and the rear window wiper starts working. Press it again, the wiper stops working.

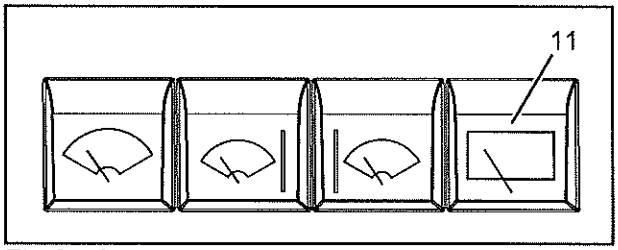

Fig.3-50

11. Rear window wiper switch

Front window washer switch

Check the water level of the washer first before operating the machine. Once the water level is less than 2/3 of the washer, you should fill it up. The washer switch is included in the right switch group.

Press the front window washer switch(12) and the front window washer switch starts working. Press it again, the washer stops working.

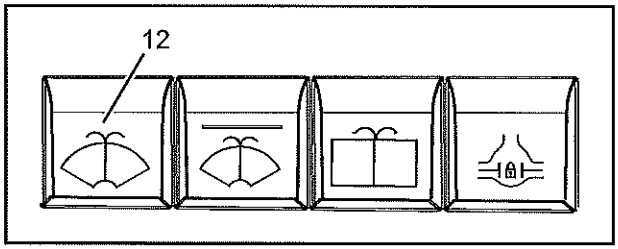

Fig.3-51

12. Front window washer switch

Left and right window washer switch

Check the water level of the washer first before operating the machine. Once the water level is less than 2/3 of the washer, you should fill it up. The washer switch is included in the right switch group.

Press the left and right window washer switch (13) and the left and right window washer switch starts working. Press it again, the washer stops working.

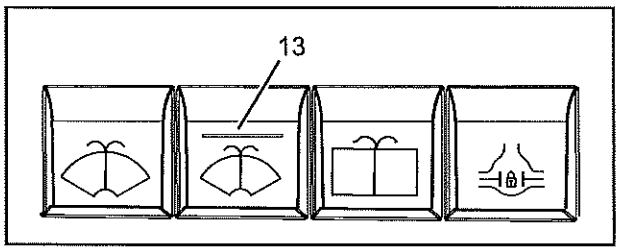

Fig.3-52

13. Left and right window washer switch

Rear window washer switch

Check the water level of the washer first before operating the machine. Once the water level is less than 2/3 of the washer, you should fill it up. The washer switch is included in the right switch group.

Press the rear window washer switch(14) and the rear window washer switch starts working. Press it again, the washer stops working.

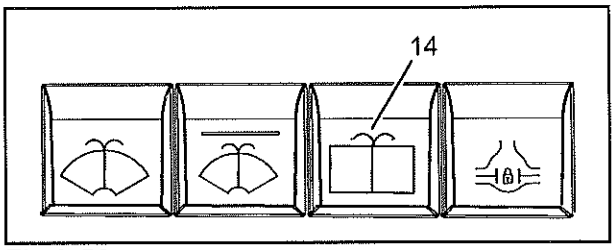

Fig.3-53

14. Rear window washer switch

Differential Lock Switch

The differential lock switch (15) is used to lock the rear axle differential for increased traction. When the differential lock is engaged an icon on the monitor will illuminate.

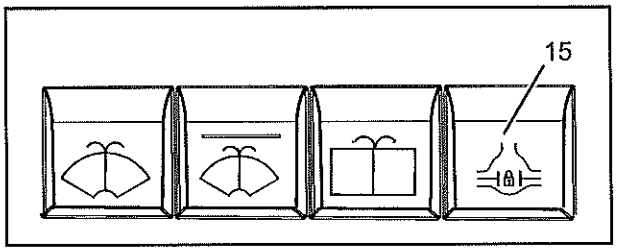

Fig.3-54

15. Differential Lock Switch

NOTICE

The differential lock should be OPEN (off) when traveling on hard surfaces. Traveling with the differential engaged (LOCKED) on hard surfaces or making sharp turns may damage the machine.

NOTE :

The differential icon will show in yellow on the monitor when LOCKED, gray when it is OPEN.

Seat

The operator seat can be adjusted as follows:

- A) Forward and backward adjustment — Pull the forward/backward lever (1) upward, slide the seat to the desired position, and release the forward/ backward lever in order to lock the seat in position.
- (B) Height adjustment — Seat height is adjusted by pulling out the lever and rotating the handle clockwise to increase, counterclockwise to decrease seat height.
- C) Backrest adjustment — Pull up on the backrest adjustment lever (2) in order to adjust the angle of the seat backrest. Adjust the seat backrest to the desired position. Release the backrest adjustment lever in order to lock the seat backrest in position.

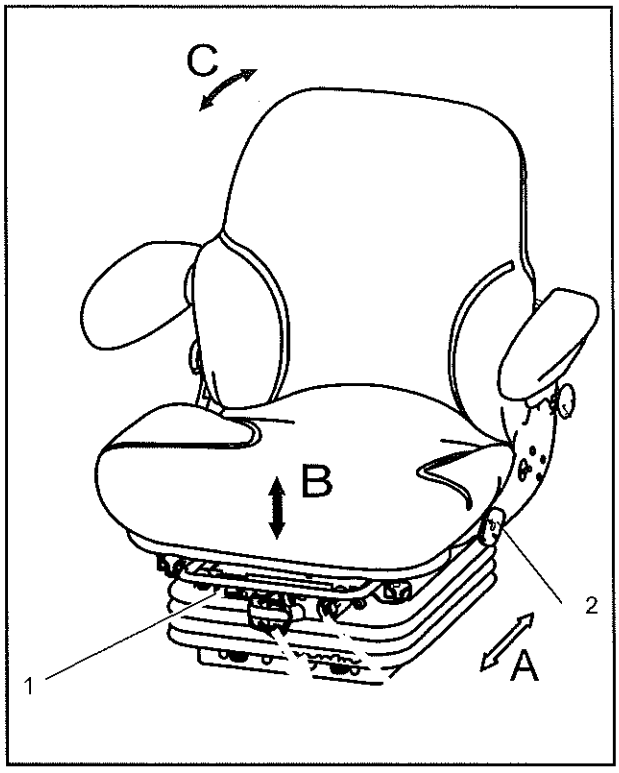

Fig.3-55

1. Forward/backward lever
2. Backrest adjustment lever

3.3.8 Inching Pedal

The inching pedal is the far-left pedal on the floor of the operator cab and is used to vary the amount of power to the rear wheels depending on the work requirements.

As the operator depresses the inching pedal, a built-in sensor causes hydraulic pressure to the direction clutches to lessen.

When the pedal is pressed completely, power to the rear wheels will be disengaged.

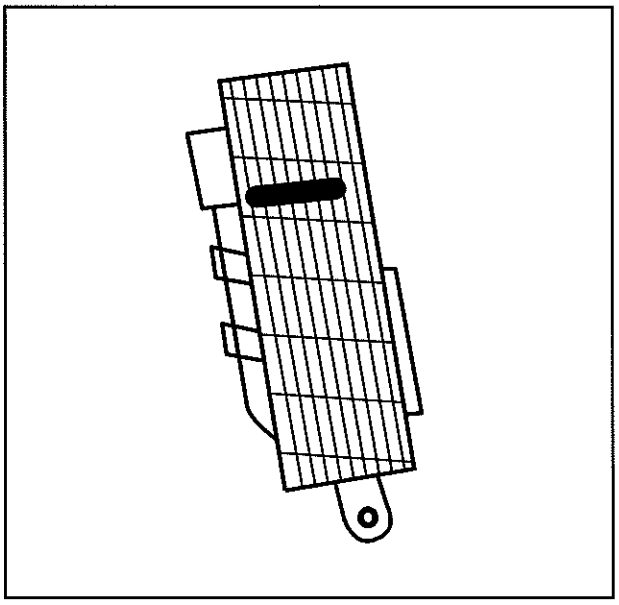

Fig.3-56

3.3.9 Fuses

The fusebox (1) is located on the front face of the right control console, below the transmission control lever inside the operator cab. Remove the clear plastic fusebox cover to access the fuses.

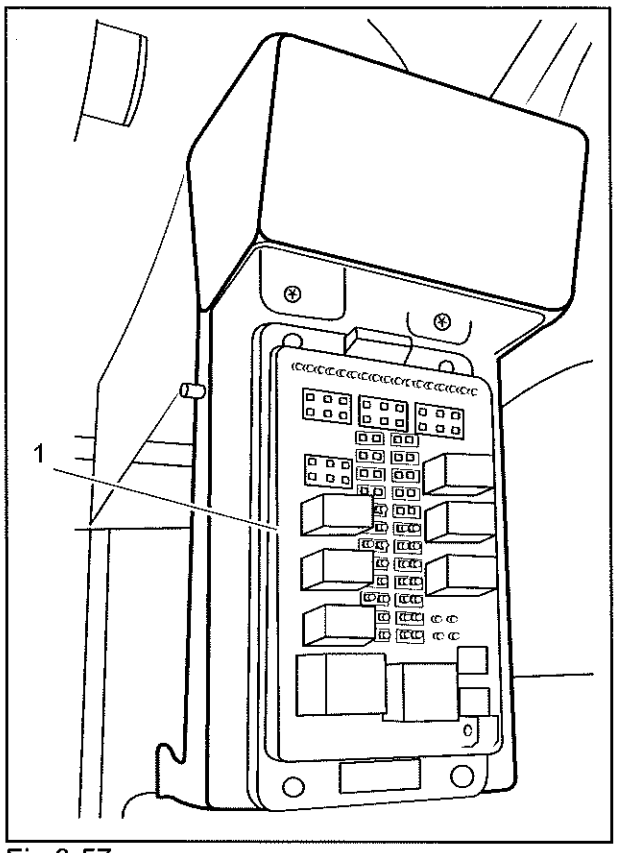

Fig.3-57

1. Fusebox

Table3–1

Fuse Locations, Circuits & Amperages		
Location	**Circuit**	**Amperage**
F0	Engine preheat	125A
F1	Ignition switch/Engine ECU	20A
F2	Starting motor	30A
F3	Start relay protective circuit	10A
F4	Backup lights and alarm	5A
F5	Sensors 24V power	5A
F6	Reversing view power	10A
F7	Reserved	NA
F8	Brake relay and lights	10A
F9	Front washer and rear washer power	10A

Table3–1 (continue)

Fuse Locations, Circuits & Amperages		
Location	**Circuit**	**Amperage**
F10	Radio/interior lights	10A
F11	Left wiper/Right wiper/Rear wiper	15A
F12	Reserved	NA
F13	AC system power	30A
F14	Reserved	NA
F15	Reserved	NA
F16	Reserved	NA
F17	Work lights on cab	15A
F18	Reserved	NA
F19	Lower front washer/Front wiper	15A

NOTICE

Before replacing a fuse, make sure that the ignition switch is in the OFF position and the batteries disconnected. A fuse should be replaced if it is corroded, produces white powder or becomes loose in the fuse panel.

Always replace a fuse with one of the same amperage. Doing otherwise can result in damage to the machine or cause the machine to operate improperly.

3.3.10 Wall-Mounted Control Panel

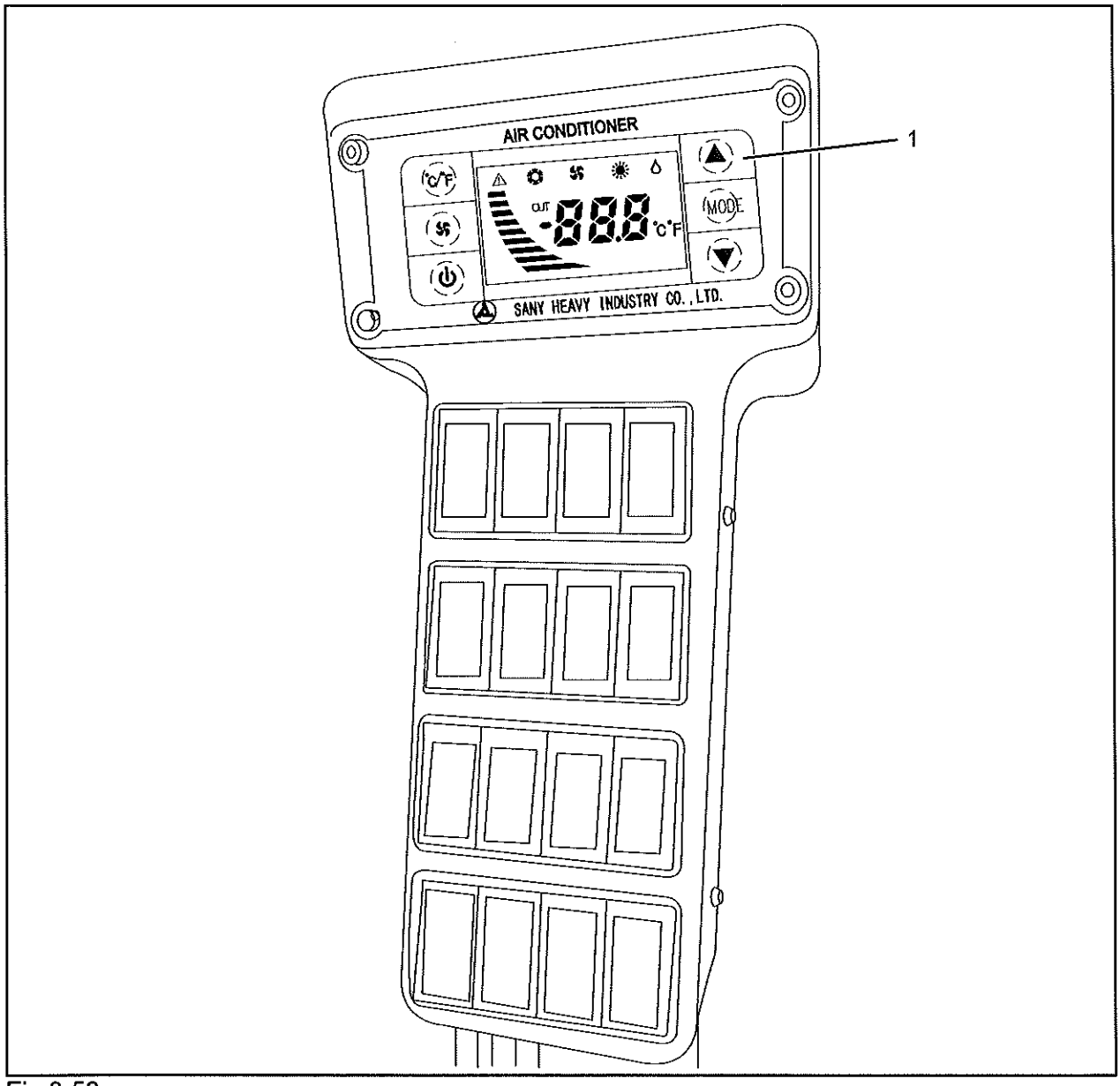

Fig.3-58

1. Climate control panel

Climate Control Panels

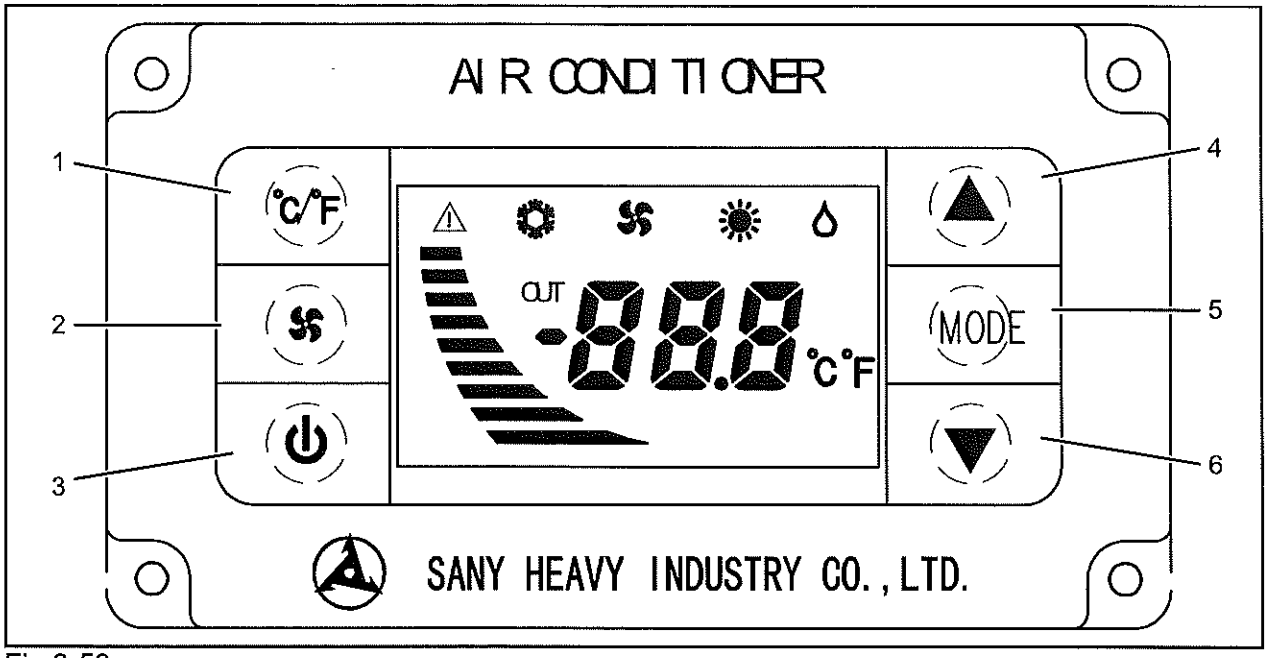

Fig.3-59

1. °C/°F switch button
2. Fan button
3. Power button
4. Up arrow button
5. MODE button
6. Down arrow button

Press the power button (3) to turn the climate control system on or off. The blue backlit button illuminates when the power is on.

Press the MODE button (5) to choose the following four modes:

Green LED indicates cool mode.

Green LED indicates ventilation mode.

Red LED indicates warm mode.

Green LED indicates dehumidification mode.

Press the °C/°F switch button (1) to choose the unit of the temperature display.

Press the fan button (2) to change the fan speed.

Fan speed display:

Fan at low speed.

Fan at medium speed.

Fan at high speed.

Press the up arrow button (4) to increase temperature or page up.

Press the down arrow button (6) to reduce temperature or page down.

A red LED indicates a fault alarm.

-88.℃ A red LED indicates cab temperature, defrosting temperature, and fault code display.

3.4 Other Operator Controls and Switches

3.4.1 Door Release Lever

Pull door release lever (1) to unlock and release the operator cab door. There is one lever at each of the two doors.

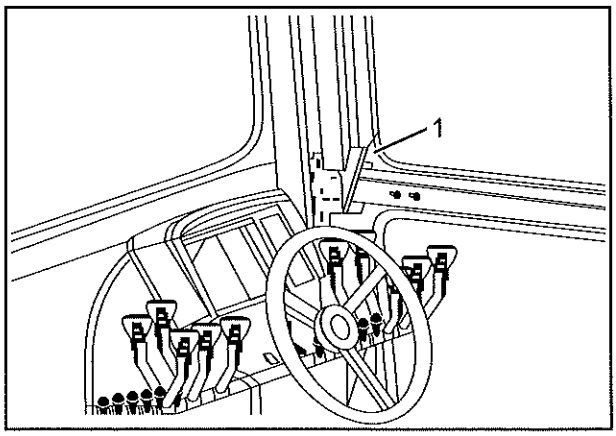

Fig.3-60

1. Door release ever

3.4.2 Battery Disconnect Switch

This two-position rotary switch is located inside the engine compartment, mounted to a bracket diagonally down from the batteries.

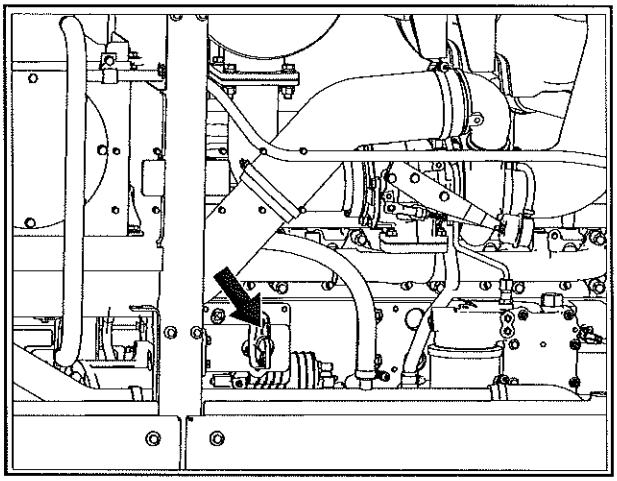

Fig.3-61

The battery disconnect switch has two positions:

ON

The electrical system is activated and the engine can be started only with the battery disconnect switch turned clockwise to the ON position.

OFF

The electrical system is deactivated with the battery disconnect switch turned counterclockwise to this position. The engine cannot be started with the battery disconnect switch set to the OFF position.

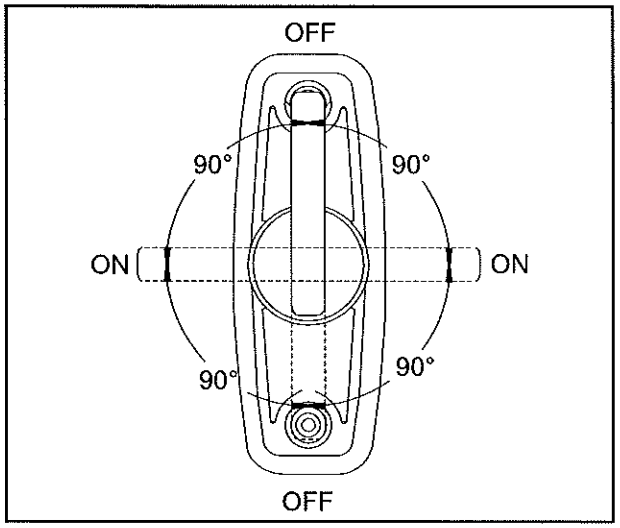

Fig.3-62

The battery disconnect switch operates differently than the engine key switch. The battery disconnect switch must be at the OFF position to disable the electrical system.

Even though the engine will be off with the engine key switch set to the OFF position, the machine electrical system remains active with the battery disconnect switch turned to the ON position.

Turn the battery disconnect switch to the OFF position after you shut down the engine to

prevent the battery from being discharged and when servicing the electrical system or other components on the machine.

The following problems can cause battery discharge:

- Short circuits
- Current draw via electrical components
- Vandalism

NOTICE

Never move the battery disconnect switch to the OFF position while the engine is running. Serious damage to the electrical system could result.

3.4.3 Back-up Alarm

This item is located on the right rear of the machine.

The alarm sounds when the transmission control lever is at the REVERSE position. The alarm alerts the people behind the machine that the machine is traveling in reverse.

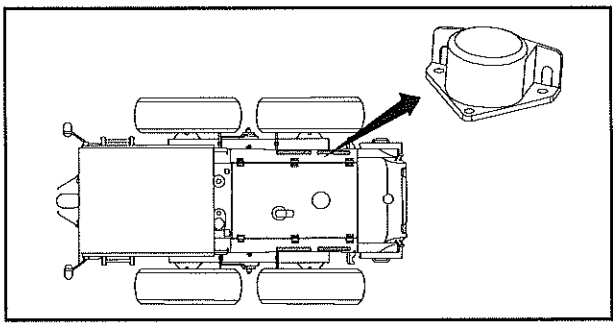

Fig.3-63

3.4.4 Cab Interior Lights

There are two cab interior lights, each mounted vertically as shown here, one on the left side pillar and one on the right side pillar.

A switch (1) on each of the lights turns that light on and off.

NOTE :

The interior lights will not work if the keyswitch is at the "O" position.

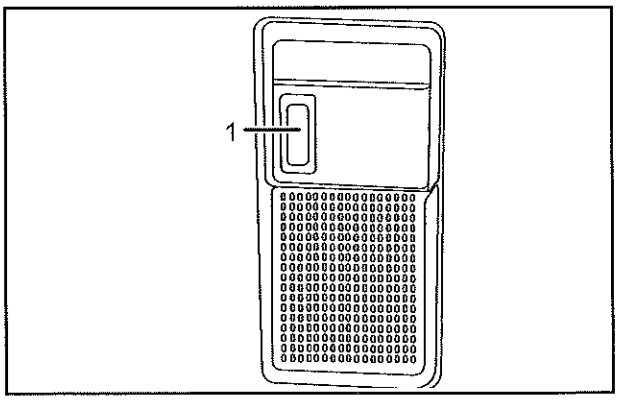

Fig.3-64

1. Switch

3.4.5 Radio/MP3 Player

Radio Operation

NOTE :

There is no provision for AM radio operation.

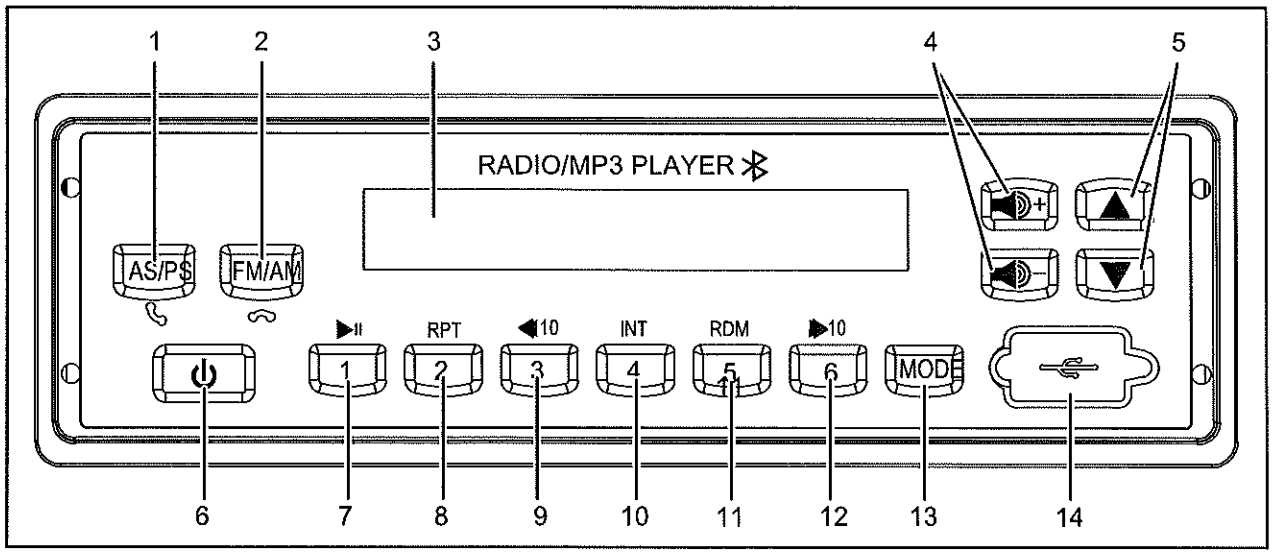

Fig.3-65

1. AS/PS button	5. Tuning buttons	9. Preset station buttons 3	13. Mode button
2. FM/AM button	6. ON/MUTE/OFF button	10. Preset station buttons 4	14. USB input
3. LCD display	7. Preset station buttons 1	11. Preset station buttons 5	
4. Volume control buttons (+/-)	8. Preset station buttons 2	12. Preset station buttons 6	

AS/PS Button (1)

Press and hold the AS/PS button for 2 seconds to activate the auto programming feature. In auto programming, the six radio stations with the strongest signals are stored in the six preset buttons (1-6).

FM/AM selector Button(2)

Press this key to choose either FM1/FM2/FM3/AM1/AM2 radio stations.

LCD Display (3)

With the radio / sound system on, various settings will be displayed, depending on which function was selected.

Volume control buttons (+/-) (4)

Press VOL (+) to increase the volume. Press VOL (—) to decrease the volume.

Tuning buttons (5)

Press this button to move either back to the previous radio frequency or forward to the next radio frequency, whether or not a radio station is located at that frequency.

Press this button for 2 seconds to begin automatic search for frequency forward or backward.

NOTE :
When the signal is weak, manual search may stops at noise frequency since it is more sensitive.

Preset station buttons (1,2,3,4,5,6)

Press and hold any of the six PRESET STATION buttons to assign the current radio station to that button. Afterwards, press and release any of the buttons to select its preselected station.

Mode button (13)

Use the MODE button (13) to toggle between FM operation and AUX (MP3) operation.

NOTE :
There is no provision for AM radio stations on this device.

AUX (MP3) Player Operation

NOTE :
Use this mode to access audio stored on USB devices such as a smart phone or an SD chip.

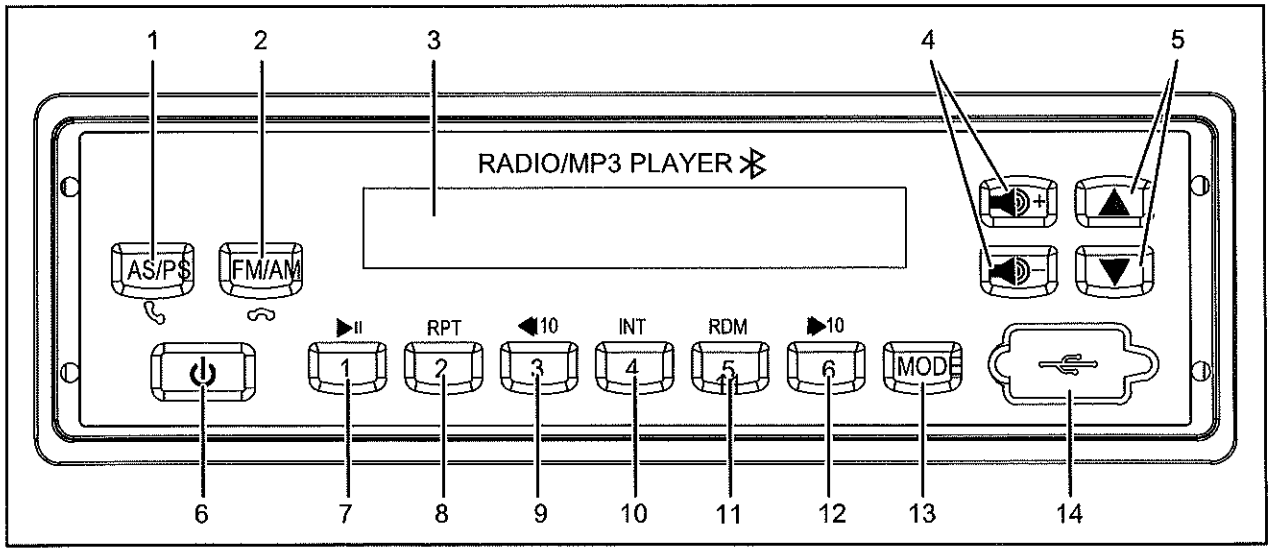

Fig.3-66

1. AS/PS button	5. Music search buttons	9. Return to 10th track back button	13. Mode button
2. FM/AM button	6. ON/MUTE/OFF button	10. Search for 10 seconds button	14. USB input
3. LCD display	7. Stop/Start button	11. Random track order button	
4. Volume control buttons (+/-)	8. Repeat current track button	12. Advance to 10th track forward button	

LCD display (3)

With the radio / sound system on, various settings will be displayed, depending on which function was selected.

Volume control buttons (+/-) (4)

Press VOL (+) to increase the volume. Press VOL (—) to decrease the volume.

Music search buttons (5)

Press the left ◄ or right ► tuning buttons (5) to move either back to the previous track or forward to the next track.

ON/OFF button (6)

Press this button to activate the sound system. Press it again to mute the speakers. Finally, press and hold this button for several seconds to switch off the sound system.

Stop/Start button (7)

Press this button to stop and start the current track as desired.

Repeat current track button (8)

Press this button until 'RPT' shows on the display to repeat the current track.

Return to 10th track back button (9)

Press this button to return to the 10th previous track (or first one if there are less than 10 tracks).

Scan for 5 seconds button (10)

In USB mode, press this button until 'INT' shows on the display to scan each track for 5 seconds. Press this button once more to cancel the scanning function.

Random track order (11)

Press this key to randomly play the various tracks. Press this key again to cancel random play operation.

Advance to 10th track forward button (12)

Press this key to advance to the 10th track (or last one if there are less than 10 tracks) after the current one.

Mode button (13)

Use the MODE button (14) to toggle between USB operation and REDIO operation.

USB input (14)

Use this feature to access MP3 files stored on a smart phone or similar device.

NOTE :
There is no provision for AM radio stations on this device.

Bluetooth Player Operation

NOTE :
Use this mode to activate bluetooth player. The bluetooth name is CAR KIT and the initial password is 0000.

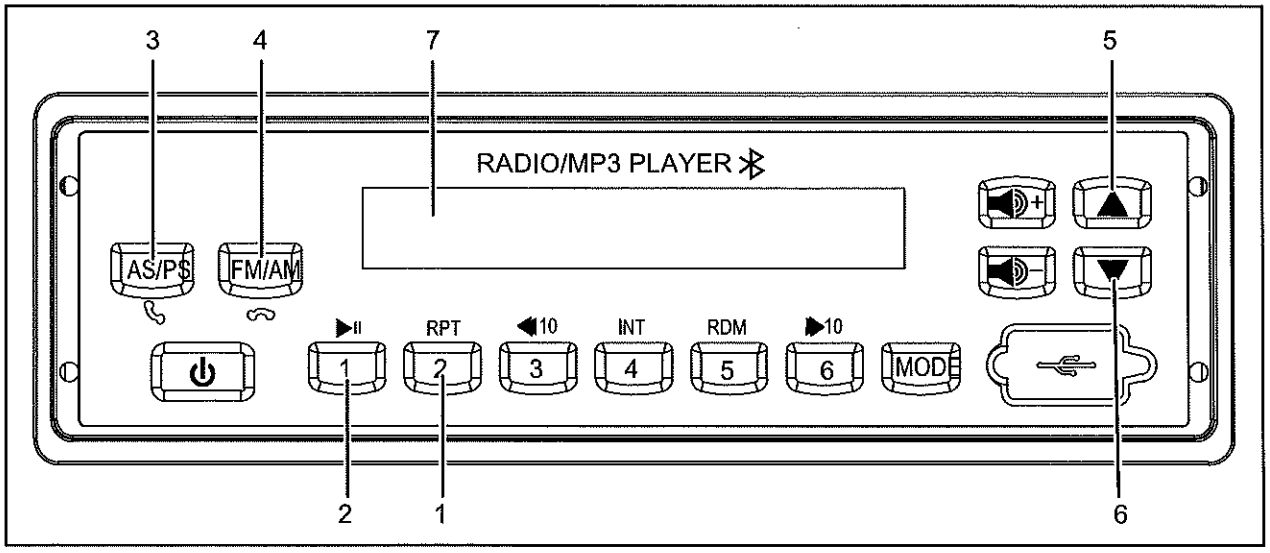

Fig.3-67

1. Disconnect button	2. Audio switch button/ Start-stop button	3. Phone answering button	4. Hang up button
5. Last track button	6. Next track button	7. LCD display	

Disconnect button (1)

Press the button to disconnect bluetooth.

Audio switch button/ start-stop button(2)

Press this button to switch between bluetooth and mobile phone when answering the phone call.

Press this button to stop or start the track while playing music.

Phone answering button (3)

Press this button to answer the phone.

Hang up button (4)

Press this button to hang up the phone.

Last track button (5)

Press this button to return to the last track.

Next track button (6)

Press this button to advance to the next track.

3.5 Monitor

3.5.1 Initialization Screens

A welcome screen displays when the monitor is first powered-up.

The Main Menu screen then appears after a few seconds.

3.5.2 Main Menu Screen

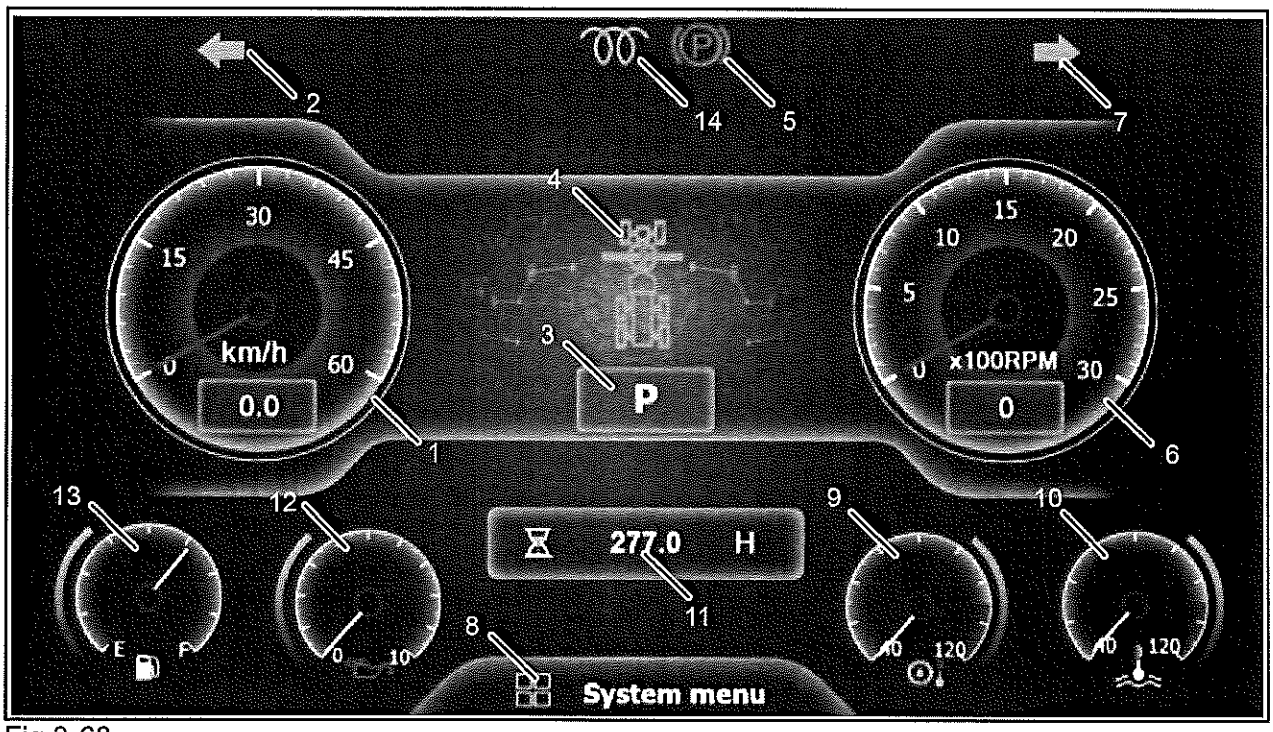

Fig.3-68

1. Speedometer 2. Left turn indicator

3. Transmission gear indicator and gear selection for drive
4. Articulation indicator
5. Parking brake indicator
6. Engine tachometer
7. Right turn indicator
8. Function keys and icons
9. Transmission oil temperature gauge
10. Engine coolant temperature gauge
11. Hour meter
12. Engine oil pressure gauge
13. Fuel gauge
14. Preheating indicator

Engine Tachometer

Unit of measure is revolutions per minute (rpm).

- White section (0 to 2,500 rpm) = engine speed normal
- Red section (over 2,500 rpm) = rated engine speed exceeded.

NOTICE

Failure to immediately shut down the engine if the rpm reaches the red area (over 2,500 rpm) could result in engine damage.

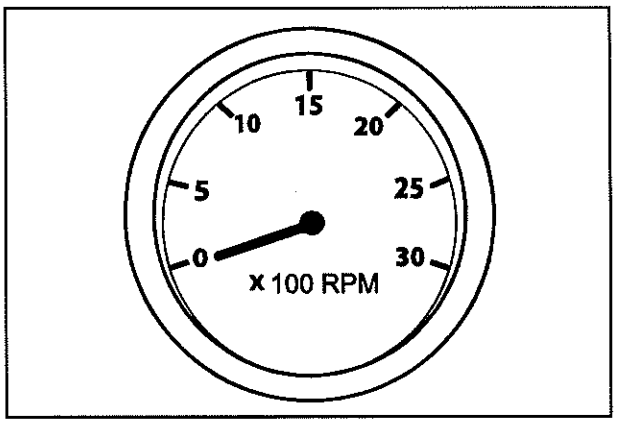

Fig.3-69

Left Turn Indicator

- Flashing green = signal is operating
- Grey = signal is off

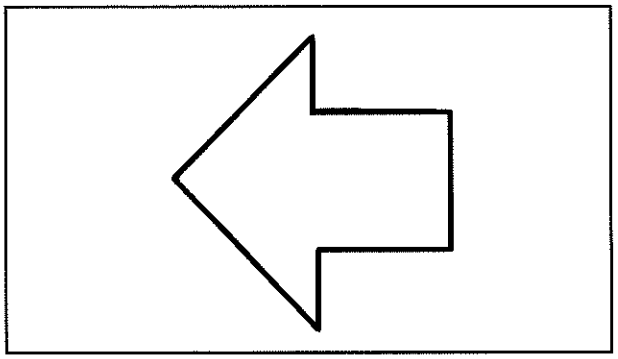

Fig.3-70

Transmission Gear Indicator

- P = Park, brake applied
- F = Forward, 1-8 available
- R = Reverse, 1-6 available

NOTE :

All selections are illuminated in green.

- Grey = indicator is off

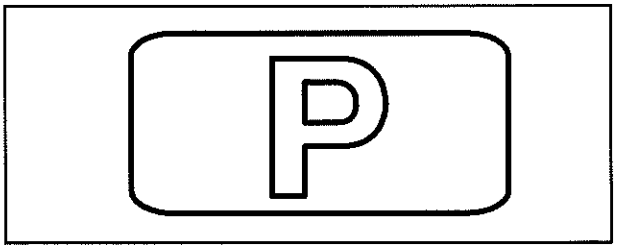

Fig.3-71

NOTE :

While "P" for parking gear is displayed here, a number for the current gear also appears when the transmission is set for either forward or reverse direction.

Articulation Indicator

NOTE :

The articulation indicator shows green when the rear frame is aligned with the front of the machine, yellow if articulated.

- Yellow = articulated
- Grey = off

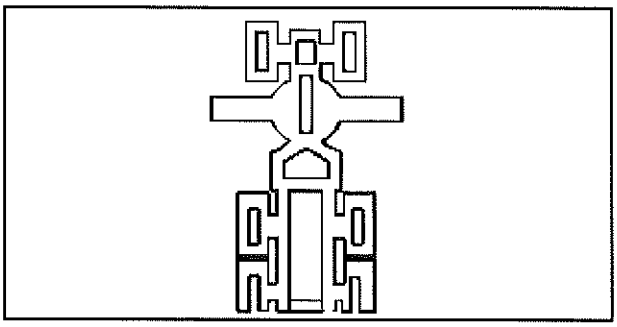

Fig.3-72

Parking Brake Indicator

- Red = parking brake is engaged
- The light does not illuminate when the Parking brake is released.

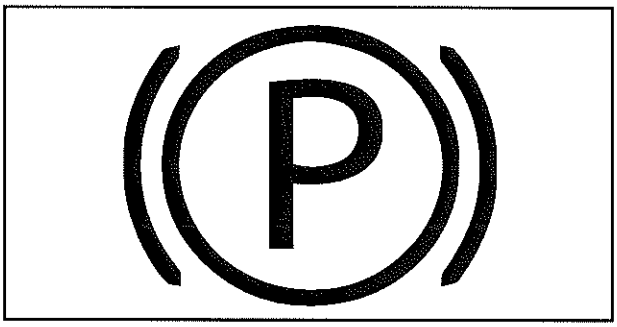

Fig.3-73

Speedometer

Unit of measure is kilometers per hour.

- White section = normal
- Red = Machine rated travel speed exceeded

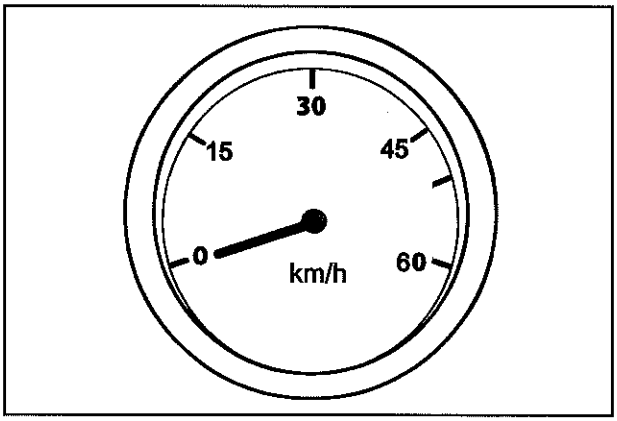

Fig.3-74

Right Turn Indicator

- Flashing green = signal is operating
- Grey = signal is off

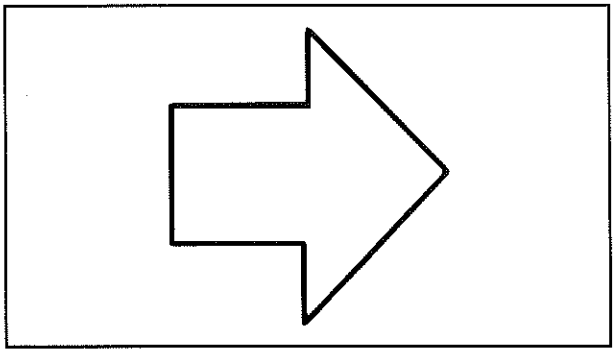

Fig.3-75

System Menu Key

- Shortcut keys for accessing the "System Menu" page.

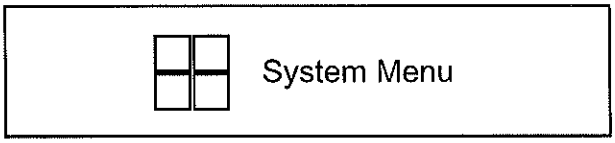

Fig.3-76

Transmission Fault Indicator

- Flashing = fault

NOTICE

If the fault light starts to flash, stop the machine and contact your Sany dealer for repairing.

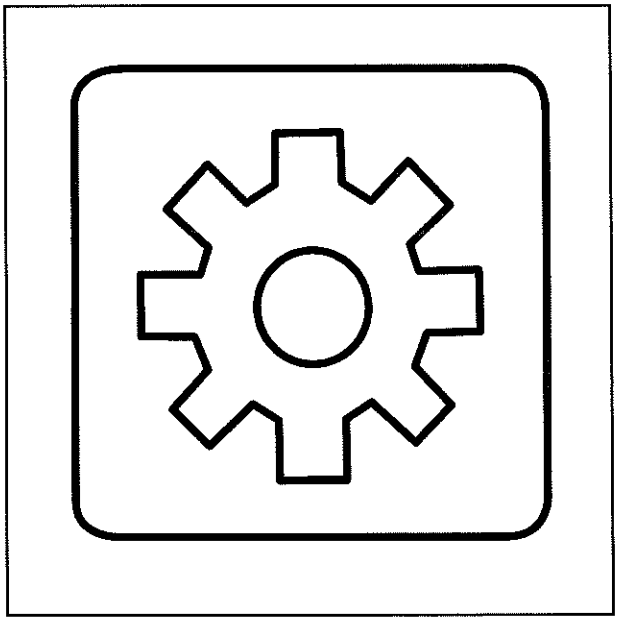

Fig.3-77

Transmission Oil Temperature

Unit of measure is degrees Celsius.

- Needle in white area = normal transmission oil temperature range.
- Needle in yellow area = transmission oil temperature is 100°C - 105°C.
- Needle in red area = transmission oil temperature is 106° C- 120° C; icon displays in red and flashes off and on.

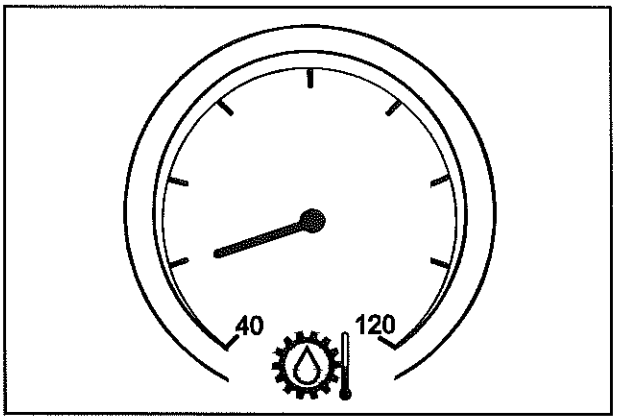

Fig.3-78

NOTE :

The icon flashes when the transmission oil temperature is less than 20° C or above 100° C.

NOTICE

Stop the machine and shut down the engine if the transmission oil temperature is outside the normal operating temperature range. Failure to do so may result in equipment damage.

Engine Coolant Temperature

Unit of measure is degrees Celsius.

- Needle in white area = normal coolant temperature range.
- Needle in yellow area = coolant temperature is 100°C - 105°C.
- Needle in red area = coolant temperature is 106° C - 120° C; icon displays in red and flashes off and on

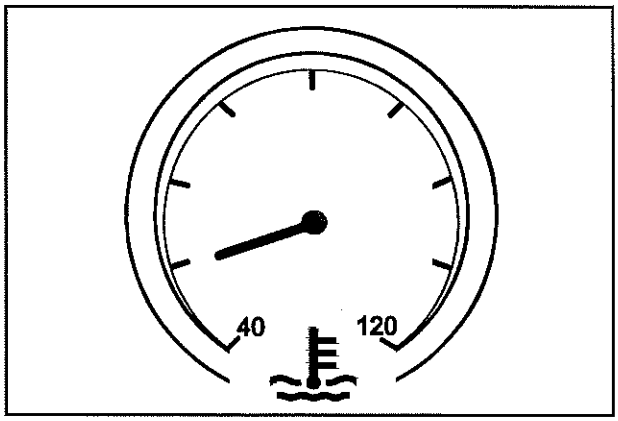

Fig.3-79

NOTICE

Shut down the engine immediately if the needle enters the red area of the gauge. Inspect the machine and repair the problem before operating the machine. Failure to observe this notice may result in unexpected and sudden shutdown of the machine engine and engine damage.

Hour Meter

Displays the total number of service hours the machine has accumulated down to a tenths of an hour.

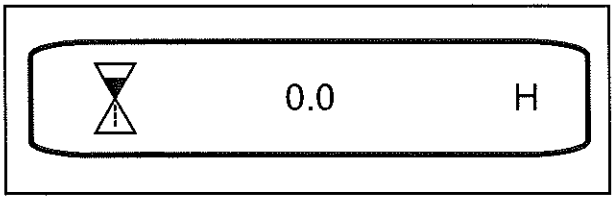

Fig.3-80

Engine Oil Pressure Gauge

Unit of measure is in bar.

- Needle in white area = normal engine oil pressure range.
- Needle in red area = engine oil pressure is 1 bar or less; icon flashes off and on.

NOTICE

Shut down the engine immediately if the needle enters the red area of the gauge. Inspect the machine and repair the problem before operating the machine. Failure to observe this notice may result in unexpected and sudden shutdown of the machine engine and engine damage.

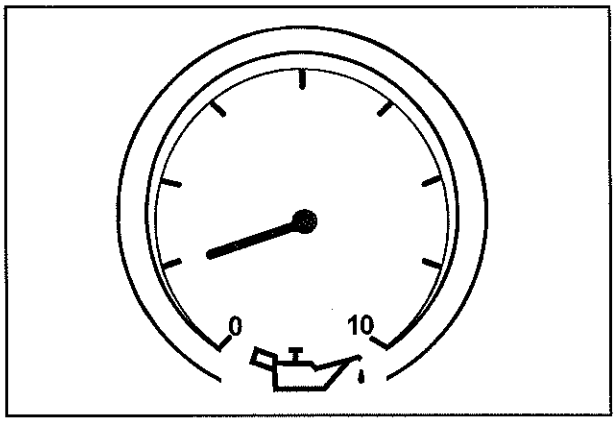

Fig.3-81

Fuel Level Gauge

Unit of measure is the percent of a full fuel tank.

- Needle in white area = sufficient fuel to run the machine
- Needle in yellow area = Icon flashes, fuel level is 10 percent of full tank or less.

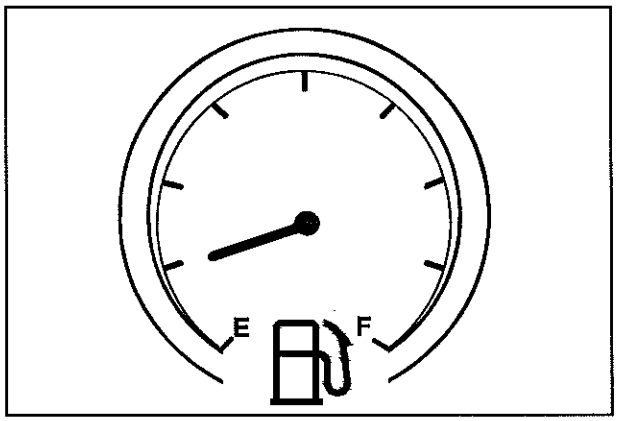

Fig.3-82

Preheating Indicator

If the engine is not able to start due to low ambient temperature, preheat it first and then start it.

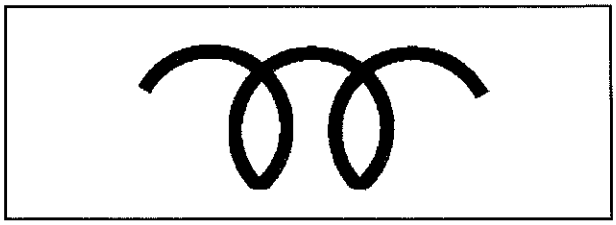

Fig.3-83

3.5.3 Operating System Screens

System Version Screens

1. At the "Main menu" screen, click "System menu".

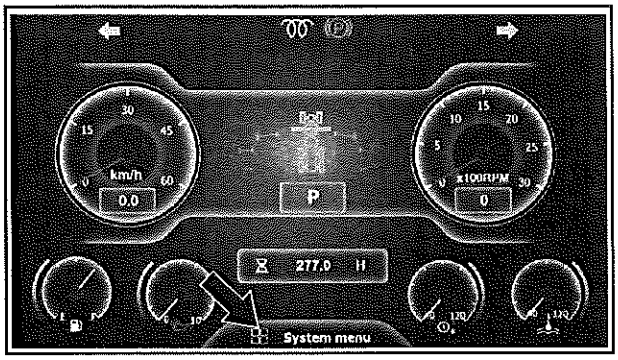

Fig.3-84

2. Click "System version" to view detailed data.

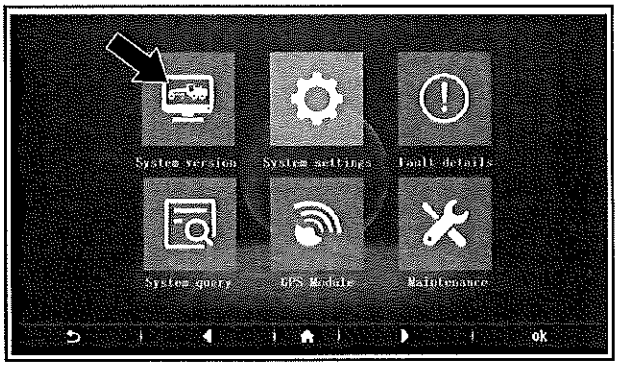

Fig.3-85

3. The "System version" screens appears with data about the following items:

- SYMC Module
- SYDC Module
- SYMT Module

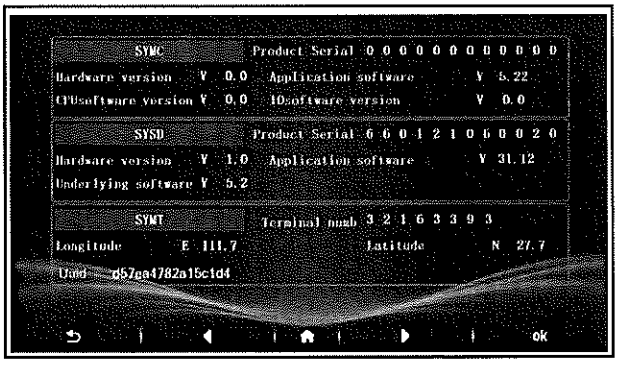

Fig.3-86

4. Press the first icon below to return to the last screen.

5. Press the third icon to return to the Main Menu screen.

System Setting Screens

1. At the “System menu” screen, click “System settings”.

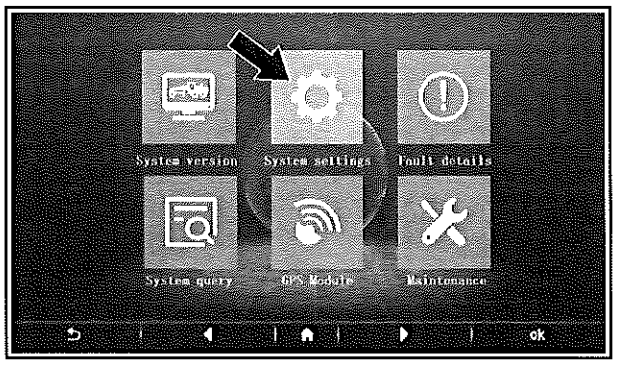

Fig.3-87

2. The password prompt screen is used by authorized Sany technicians.

NOTE :

The password is known to service engineer only. Please contact Sany service person if any changes in system settings are needed.

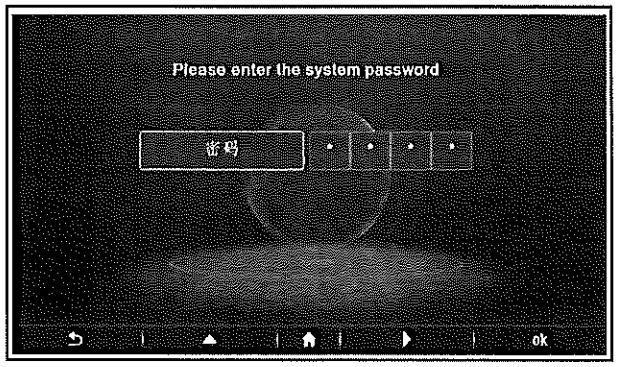

Fig.3-88

3. After entering the password, the “System Setting” screen appears with a list of the following options:

- Model configuration
- Time setting
- Language selection
- Construction data settings
- Brightness setting
- Articulation settings
- Fan settings

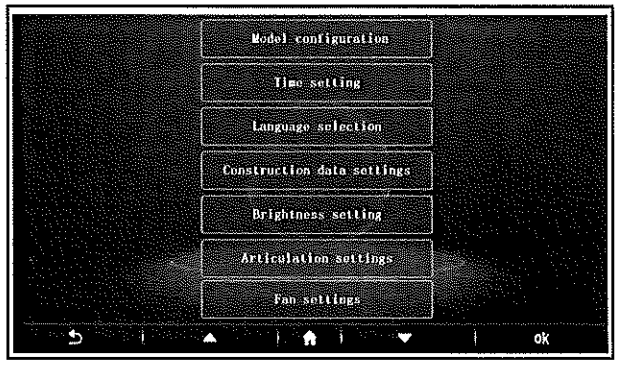

Fig.3-89

4. Click model configuration and the screen appears with a list of the following information:

- Motor grader S/N
- Motor grader model
- Engine model

Click "Confirm" to confirm the choice and "Restore" for information change.

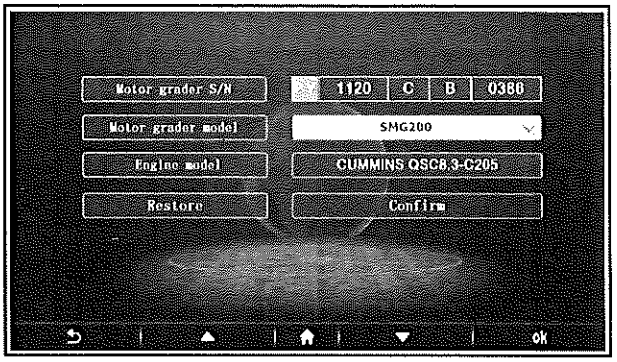

Fig.3-90

5. Click "Time setting" for access to the screen that allows you to perform manual or automatic setting of time.

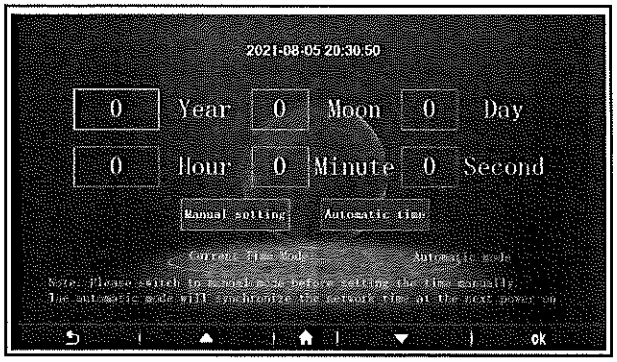

Fig.3-91

6. Click "Language selection" for access to the screen that allows you to select the desired on-screen language.

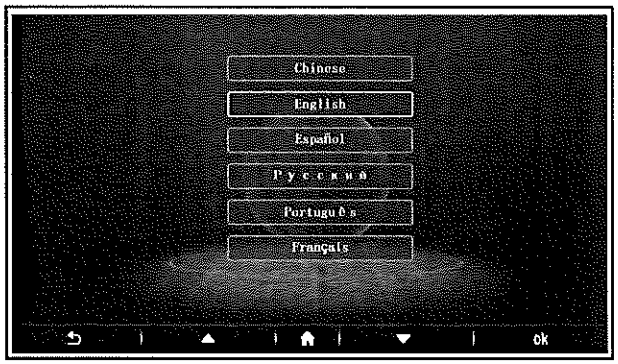

Fig.3-92

7. Click "Construction data settings" for access to the screen that allows you to change the working data.

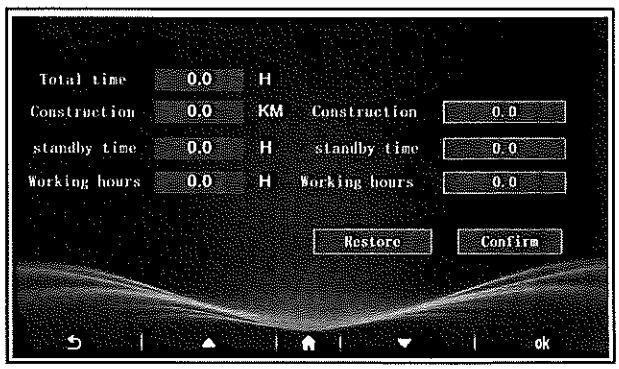

Fig.3-93

8. Click "Brightness settings" for access to the screen that allows you to adjust the brightness on the screen.

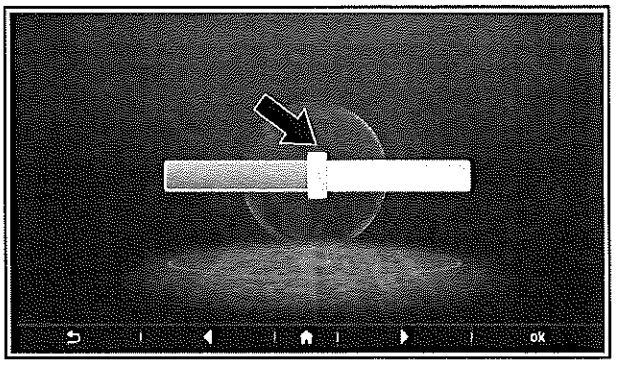

Fig.3-94

9. Click "Articulation settings" for access to the screen that allows you to perform the left and right articulation settings.

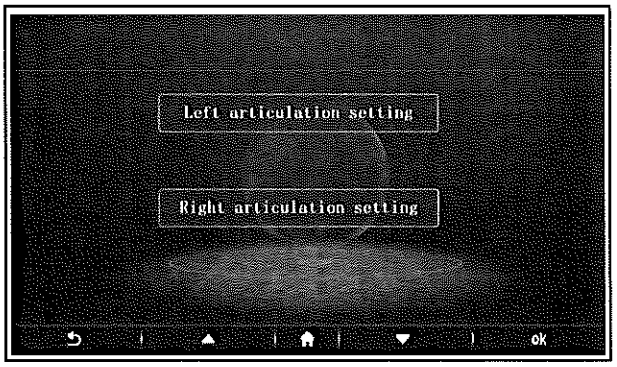

Fig.3-95

10. Click "Fan settings" for access to the screen that allows you to perform the manual or automatic fan settings.

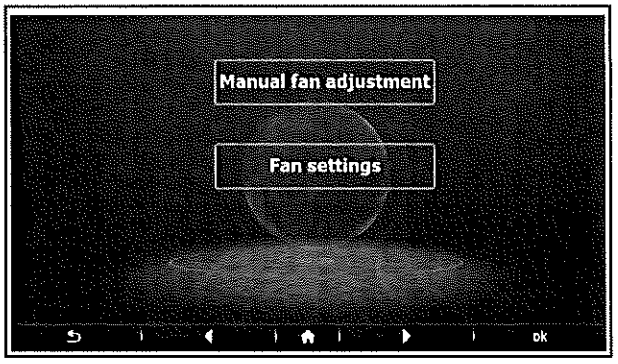

Fig.3-96

Fault Details Screens

1. At the "Main menu" screen, click "Fault details".

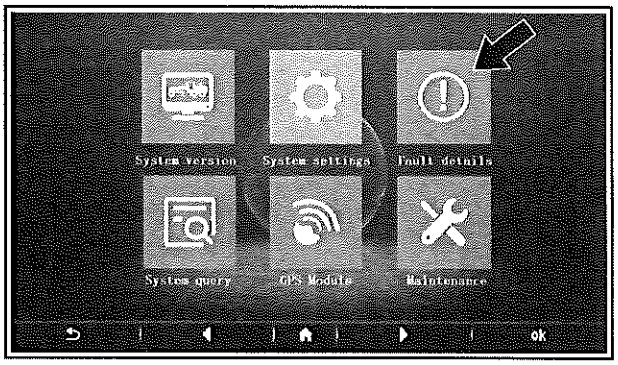

Fig.3-97

2. The Fault List screen appears with a list of all current faults, if any.

3. Click "Current fault" and the screen appears with a list of all current faults, if any.

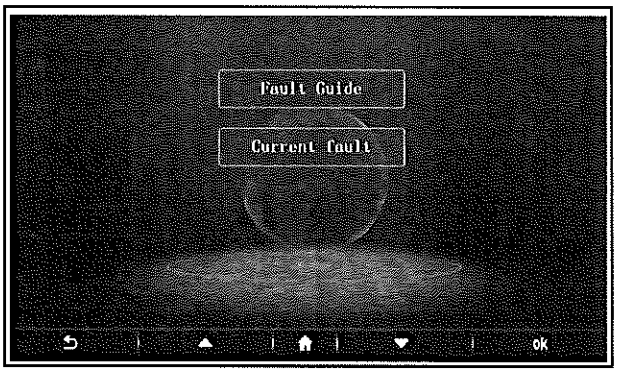

Fig.3-98

4. Click "Fault guide" and the screen appears the possible reasons for the faults.

5. The "Fault guide" screen appears with the fault name and the possible reason for the faults..

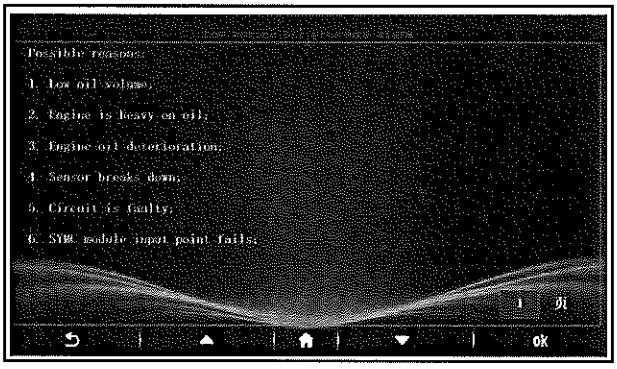

Fig.3-99

System query screen

1. At the "Main menu" screen, click "System query".

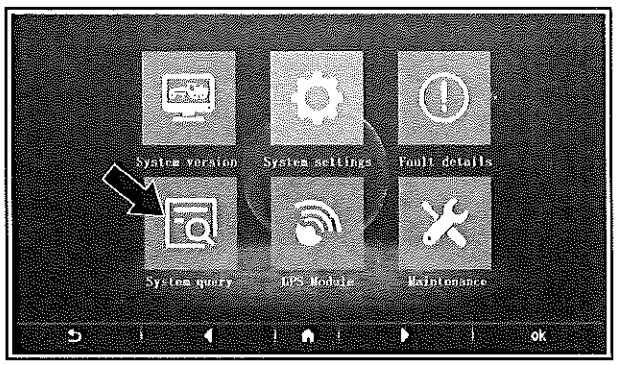

Fig.3-100

2. The "System query" screen appears with a list of categories:

- Analog query
- Switch valve query
- Construction data query
- Engine fault code query
- Status query

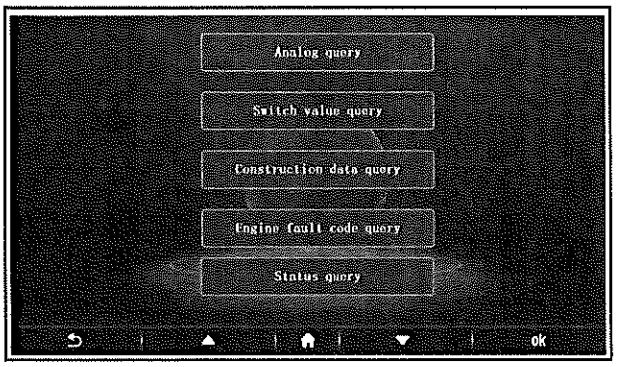

Fig.3-101

3. Click "Analog query" at the "System query" and the screen appears with a list of the following information:

- Fuel level
- Oil pressure
- Water temperature
- Transmission temperature
- Total fuel consumption
- Construction
- Working time
- Standby time
- Total time

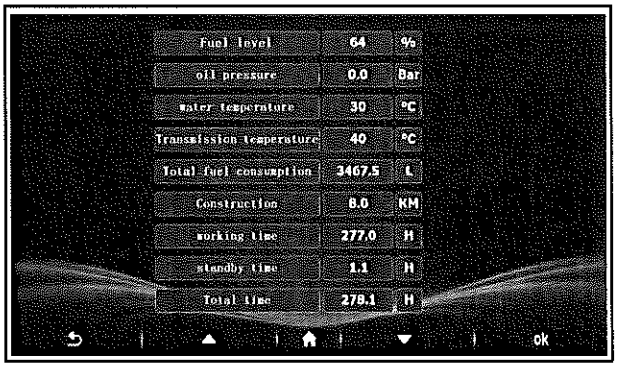

Fig.3-102

4. Click the forth icon below to the next screen for "shift number of time".

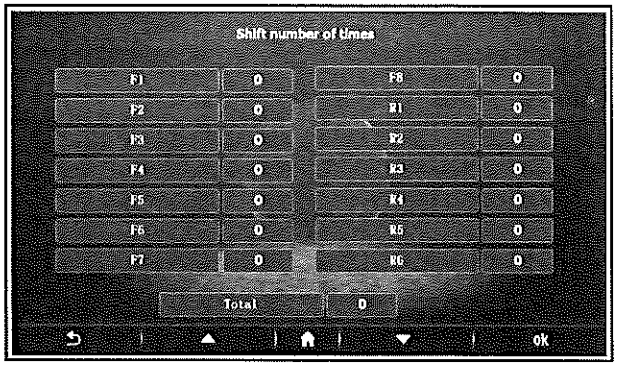

Fig.3-103

5. Click "Analog query" at the "Switch valve query" and the screen appears with the status of the machine. The green circle means the machine is under current status.

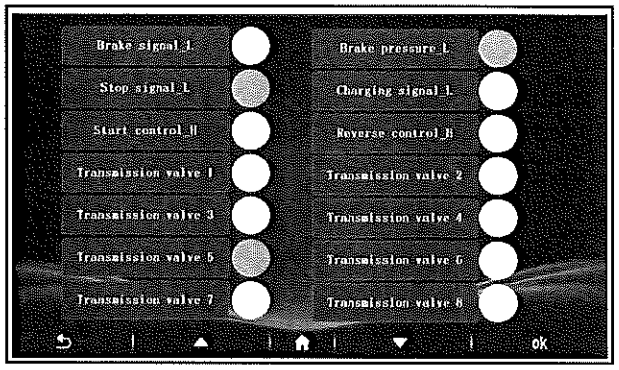

Fig.3-104

6. Click "Construction data query" at the "Switch valve query" and the screen appears with a list of the following information:

- Total time
- Construction
- Standby time
- Standby time
- Working hours

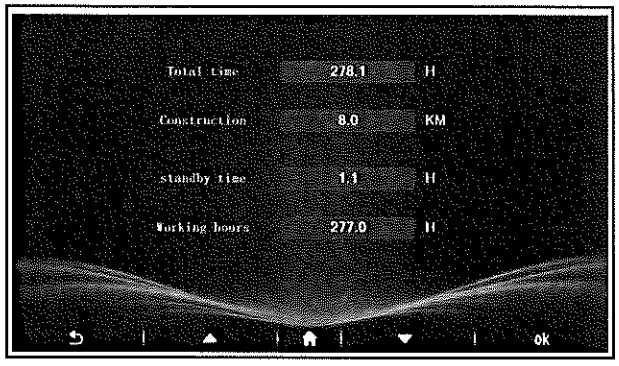

Fig.3-105

7. Click the first icon to return to the "System query" screen.

8. Click "Engine fault code query" at the "System query" and the screen appears with a list of fault code.

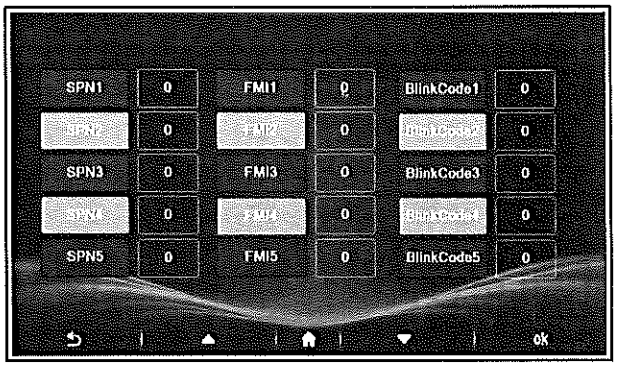

Fig.3-106

9. Click the first icon to return to the "System query" screen.

10. Click "Status query" at the "System query" and the screen appears with a list of current data of the machine.

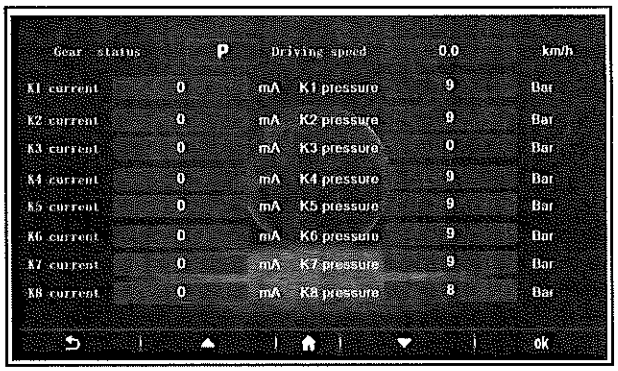

Fig.3-107

11. Click the first icon below at the "Status query" and the screen appears with more information of the machine.

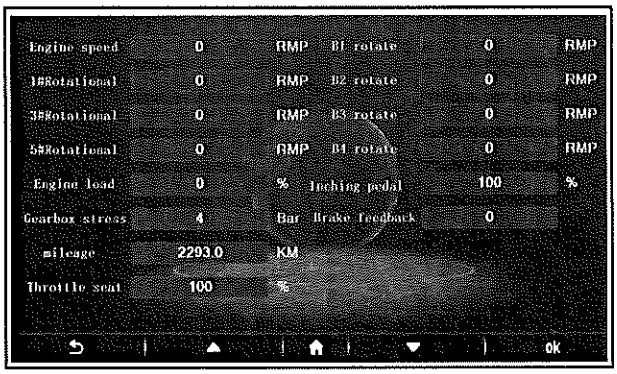

Fig.3-108

12. Press the third icon to return to the System Check screen.

Maintenance Instructions Screens

NOTICE

The Maintenance Instructions series of screens are for use only by authorized Sany technicians.

1. At the "System Check" screen, click "Maintenance".

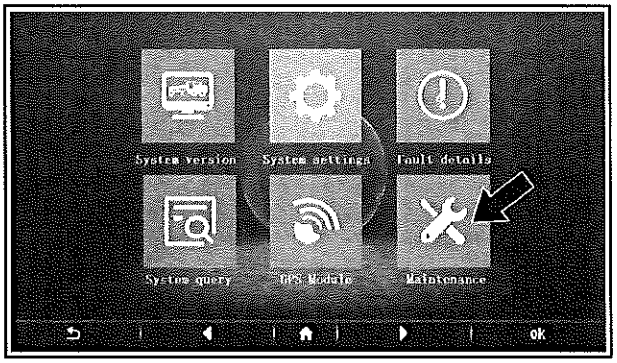

Fig.3-109

2. The "Maintenance" screen appears with a list of the following information:

- Check the maintenance content
- Check maintenance history
- Customer maintenance confirmation
- Modify maintenance password

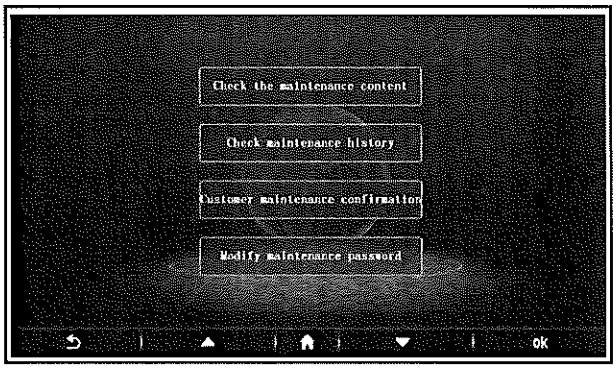

Fig.3-110

3. Click "Check the maintenance content" at the "Maintenance" screen.

4. At "Check the maintenance content" screen, maintenance items for different working hours could be checked.

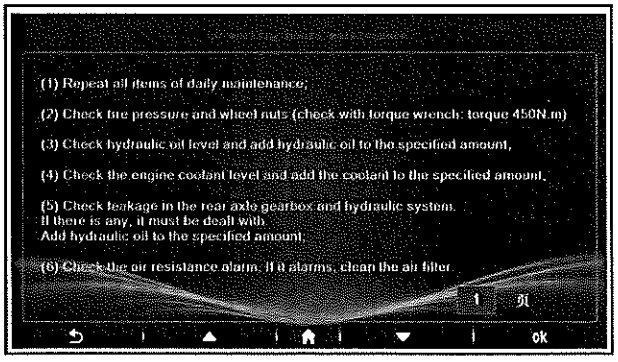

Fig.3-111

5. Click the first icon below to return to the "Maintenance" screen and click "Check maintenance history".

6. At "Check the maintenance history" screen, progress for maintenance items different working hours can be checked.

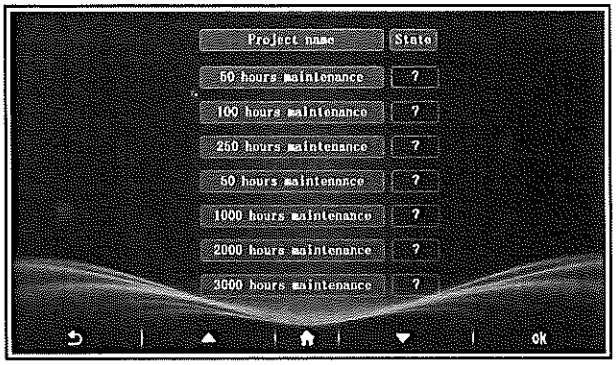

Fig.3-112

7. Click the first icon below to return to the "Maintenance" screen and click "Customer maintenance confirmation".

8. At "Customer maintenance confirmation" screen, maintenance access code should be entered first and click "OK" for the next screen.

NOTE :

The initial access code is 8318. Please modify the code for safety concerns after it has been used.

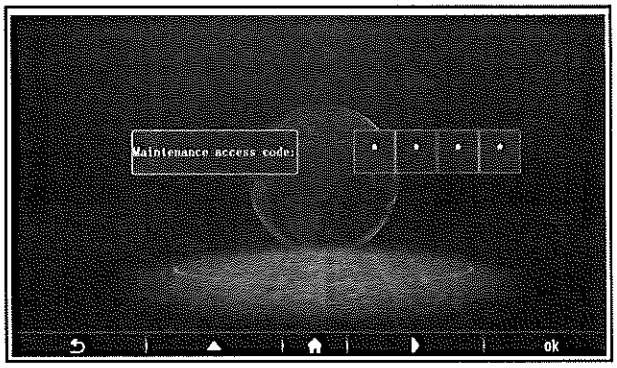

Fig.3-113

9. After the access code is entered, maintenance information could be checked and maintenance status could be confirmed.

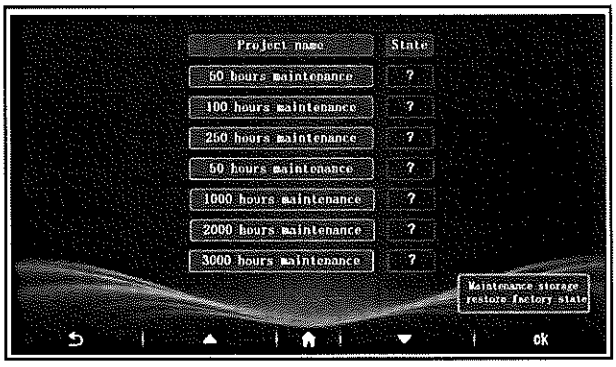

Fig.3-114

10. Click "OK" to confirm the state and click the first icon to return to the "Maintenance" screen.

11. At the "Maintenance" screen, click "Modify maintenance password". The password modification screen appeared with the following items:

- Old password
- New password
- New password confirmation

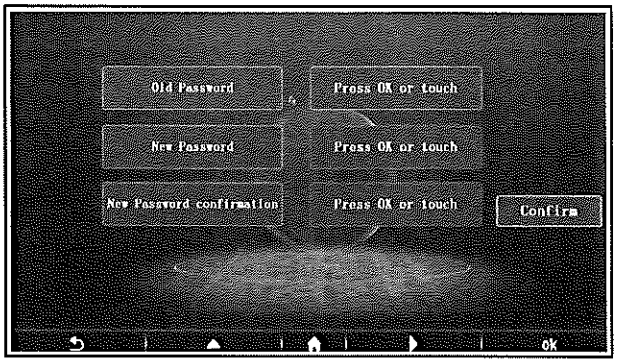

Fig.3-115

12. Click "OK" or click the three items to enter the password. Click "Confirm" to finish the setting and click the first icon below to return to the "Maintenance" screen.

GPS Module

1. At the "Maintenance" screen, click "GPS Module"

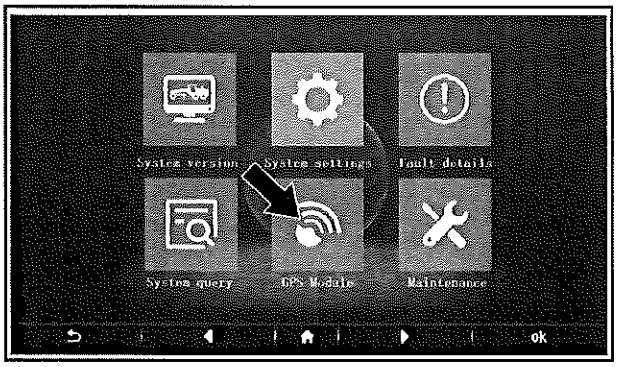

Fig.3-116

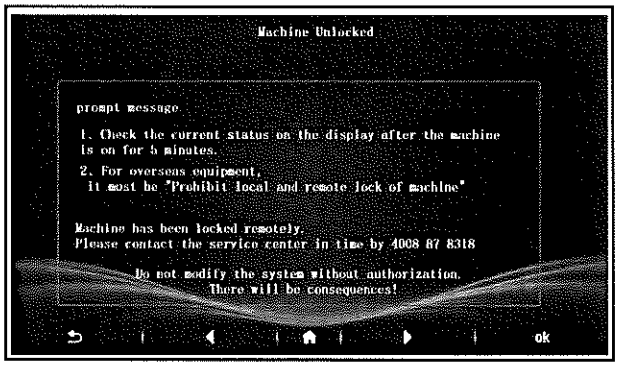

Fig.3-117

2. At the "GPS Module" screen", solutions are provided in case the machine is locked.

SANY

Operation

4.Operation

4.1 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 service hours for a new machine.

NOTE :
The total number of service hours (down to the tenths of an hour) since the machine was put into service can be found in the middle of the Main Menu screen on the monitor after the engine has been started and the welcome screen has cleared.

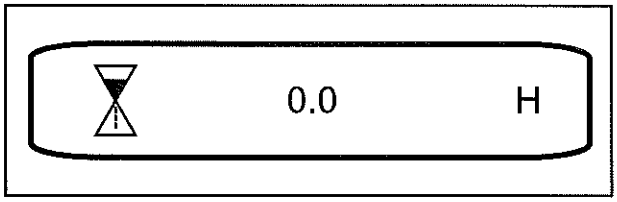

Fig.4-1

Proper run-in of a new machine is crucial for guaranteeing a long service life of the machine. Ensure that the machine is in a normal working condition before proceeding with the running-in.

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

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

- The machine travel speed should not exceed 70% of the maximum travel speed.
- Ensure proper engine warm up per the engine manual.
- Avoid long periods of operation with the engine at idle or continuous maximum horsepower levels.
- Avoid sudden starts, movements or stops. Also never operate this machine with a full load during the run- in period.
- Manage engine power to allow acceleration to governed speed when conditions require more power. Do not over-rev the engine.
- Monitor the instruments frequently — especially the engine oil pressure and coolant

temperature. Shut down the machine at the first indication of an abnormal reading.

- Check all components frequently for proper operation, unusual noises, and excessive heating.
- Always let the engine cool down before shutting off the engine.
- Frequently check the fasteners for tightness. Also check the various fluid levels and add fluidsor lubricants as required.

4.2 Pre-Start Checks

4.2.1 Introduction

⚠ CAUTION

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

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.

4.2.2 Operation & Maintenance Manual

Ensure that this Operation and Maintenance manual remains in the cab.

4.2.3 Daily Maintenance Record

Check the Maintenance Log 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.

NOTE :
See "Directional Reference of the Machine" on page 1-4.

NOTE :
See "Secure the Machine for Maintenance" on page 5-17.

4.2.4 Exterior

Make sure these items are cleaned:

- Windows (1)
- Mirrors (2)
- Grab handles(3)

NOTE :

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

- Steps (4)

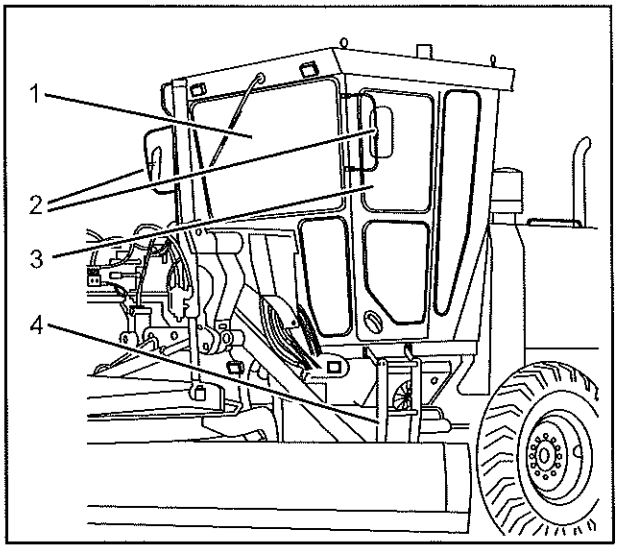

Fig.4-2

1. Windows
2. Mirrors
3. Grab handles
4. Steps

4.2.5 Interior

Operator Cab

⚠ CAUTION

Never allow other personnel to ride with you inside the operator cab. Never bring objects into the operator cab that could restrict your movement or vision in any manner. Failure to observe and follow this caution could result in minor or moderate injury.

Remove all trash from inside the cab to avoid interference with operation of the machine.

Seat Belt

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

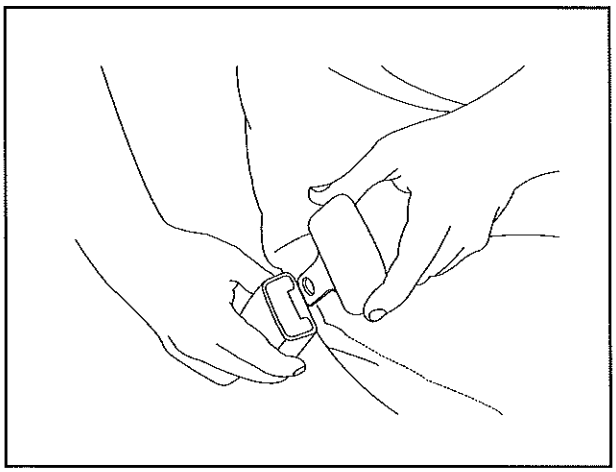

Fig.4-3

2. Ensure that the latch plate (1) and the buckle (2) connect together and click.

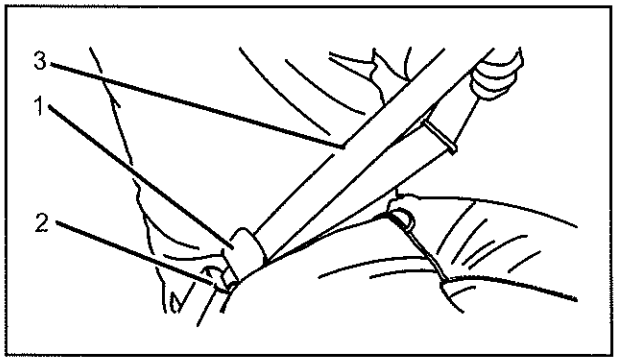

Fig.4-4

1. Latch plate
2. Buckle
3. Belt

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

⚠ 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 observe and follow this warning could result in death or serious injury.

4. Ensure that the belt releases when the red button (4) is pressed at the end of the buckle (2).

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.

⚠ WARNING

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

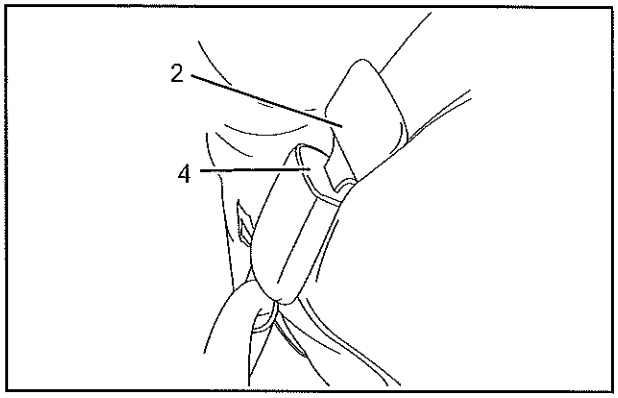

Fig.4-5

2. Buckle 4. Red button

Mirrors

Adjust both the right outside rear view mirror (1) and left outside rear view mirror (2) for clear vision and safe driving.

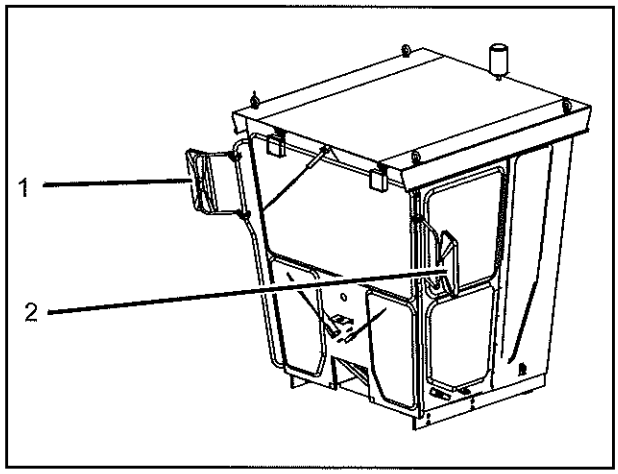

Fig.4-6

1. Right outside rear view mirror 2. Left outside rear view mirror

Operator Controls

Check all operator control lever movements for smooth operation with the ignition key-switch at the "O" position. The control levers should return to neutral freely and there should not be any excessive play in the control levers.

NOTE :
See "Control Levers" on page 3-12 for controls information.

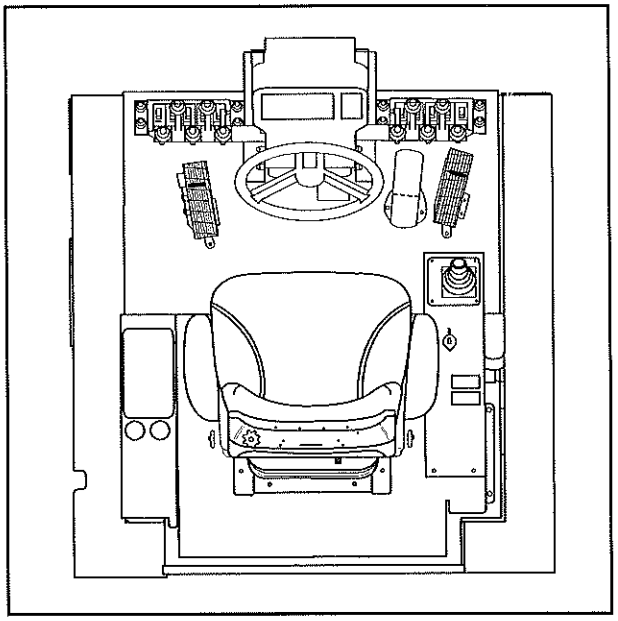

Fig.4-7

Lights and Warning Devices

Check the horn and various lights for proper operation with the keyswitch set to the "I" position:

Fire Extinguisher

Check that the fire extinguisher is properly mounted in the cab and is in good condition.

NOTE :
Be sure the fire extinguisher meets all local requirements and is NFPA 10 Standard for Portable Fire Extinguishers.

Escape Tool

Check that the escape tool is properly mounted the cab.

4.3 Monitor/First-Time Setup

Access the Main Menu

Turn the ignition key to the "I" position to view the welcome screen and then the Main Menu screen.

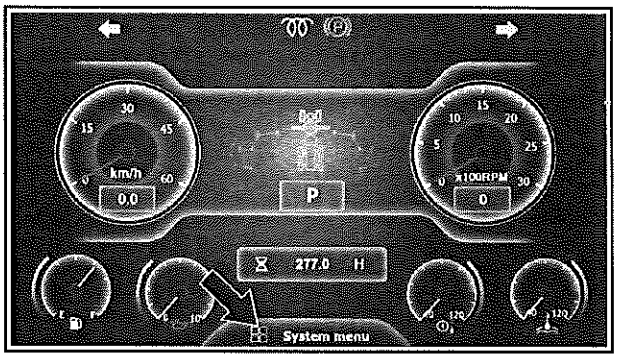

Fig.4-8

Set the Date and Time

1. Click "System menu" at the "Main menu" screen and click "System settings" .

NOTE :
The Maintenance Instructions screens are for use only by authorized Sany technicians.

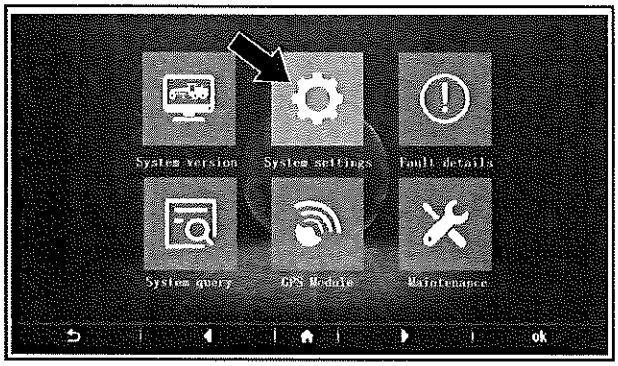

Fig.4-9

2. Password should be entered before you have the access to the next screen.

NOTE :
The password can only be used by authorized Sany technicians.

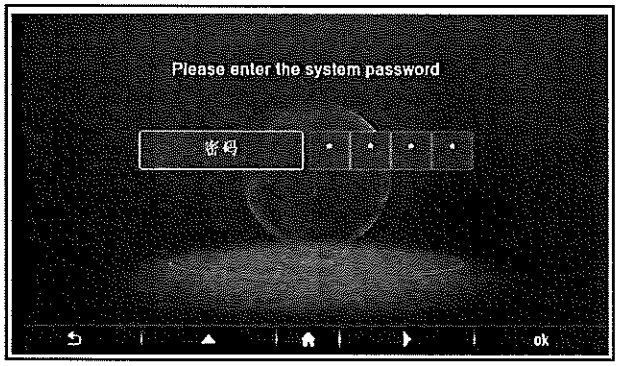

Fig.4-10

3. At the "System settings" screen, click the second or forth icon to select "Time setting" item and click "OK" to confirm your choice.

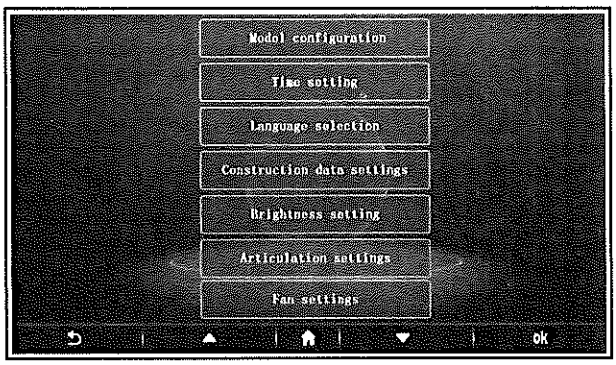

Fig.4-11

4. Click the forth icon to select "Manual setting" and press OK.

NOTE :

Please switch to manual mode before setting the time manually. Otherwise, automatic mode will synchronize the network time at the next power-on.

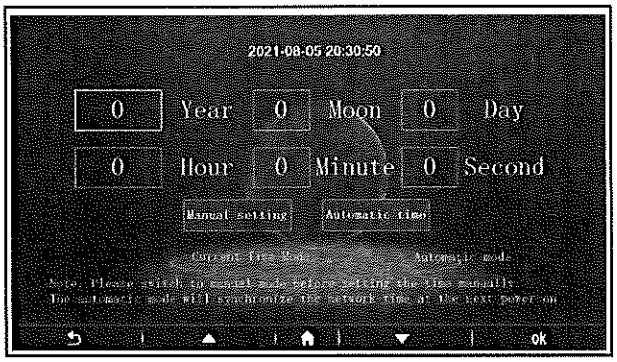

Fig.4-12

5. Click "0" to input the right number for the time setting.

6. When the right number is entered, press "OK" to confirm the time.

Select the Language

NOTE :

Perform this procedure if the desired language has not already been set for the machine.

1. At the "System settings" screen, click the second or forth icon below to select "Language selection" item and click "OK" to confirm your choice..

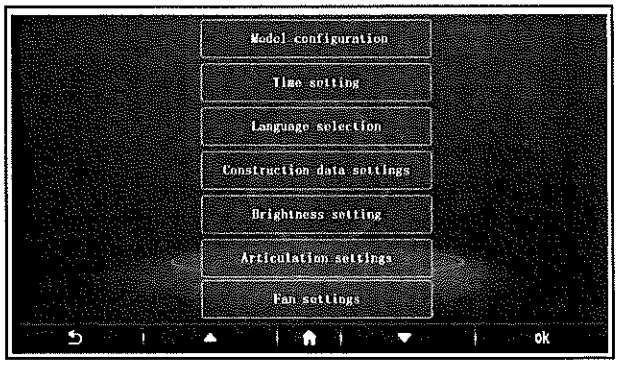

Fig.4-13

2. The "Language selection" screen appears with a list of different language choice.

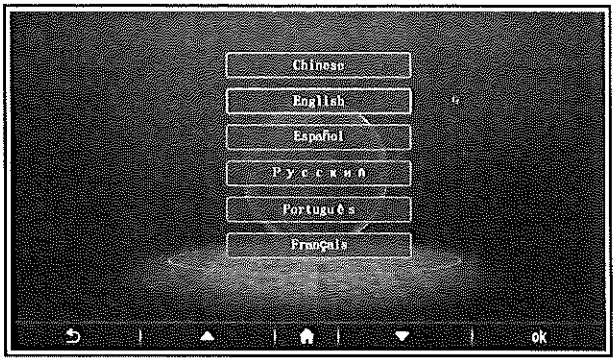

Fig.4-14

3. Click the second or forth icon below to choose the desired on-screen language.

4. Click "OK" to confirm your choice.

5. Click the first icon below return to the "System Setting" screen.

6. Click the first icon below again to return to the "Main Menu" screen.

4.4 Engine Procedures

4.4.1 Introduction

⚠ CAUTION

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

NOTE :

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

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 OEM engine manual for detailed procedures.)

⚠ WARNING

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

4.4.2 Engine Start-Up Procedures

Normal

⚠ WARNING

Do not spray starting fluid into the air inlet. The spray could explode. Failure to observe and follow this caution could result in death or serious injury.

Perform the following steps to start the engine:

NOTE :

The 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 OEM engine manual for detailed procedures).

1. The transmission control lever (1) must be in the PARK position.

NOTE :

The engine can be started only when the transmission control lever is at the PARK position.

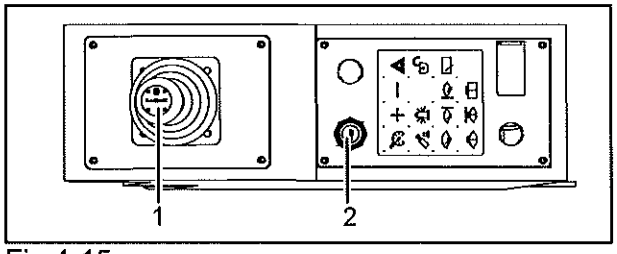

Fig.4-15

1. Control lever 2. Keyswitch

NOTE :

See "Right Control Console" on page 3-23.

2. Turn the keyswitch (2) to the "I" position and the welcome screen will display on the monitor.

3. The Main Menu screen then appears after a few seconds.

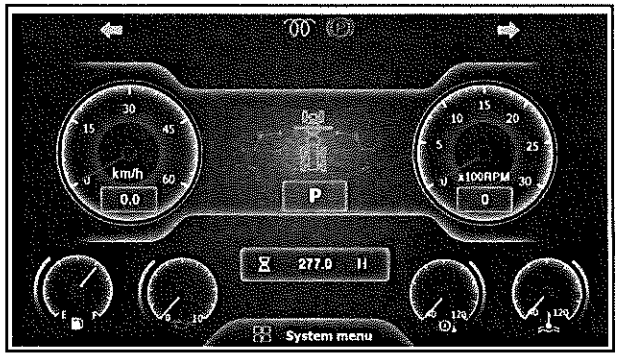

Fig.4-16

4. Turn the keyswitch (2) to "III" to start the engine and release the key when the engine has started.

NOTE :

The keyswitch automatically returns to the "I" position after the engine has started

NOTICE

Never crank the engine for more than 15 seconds. If the engine fails to start after 15 seconds, stop and allow the starter motor to cool for at least 10 seconds before attempting another start. If the engine does not start after five (5) attempts, contact your Sany dealer. Failure to observe and follow this notice can cause damage to the machine or improper operation.

5. Immediately check the gauges and Main Menu screen for any fault alarms after starting.

NOTE :

Shut down the engine if a fault alarm occurs, then complete any required repairs.

NOTE :

See "Initialization Screens" on page 3-43.

Cold Weather

NOTE :

Detailed cold-weather starting and operating procedures are covered in the OEM engine manual. See "Inspection and Maintenance in Adverse Environments" on page 5-5 and "Hydraulic Oil Viscosity/Temperature Data" on page 5-13.

4.4.3 Idle the Engine

Idling the engine for unnecessarily 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.

4.4.4 Engine Warm-Up

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

1. Start the engine.

NOTE :

See "Engine Start-Up Procedures" on page 4-12.

NOTICE

Do not begin machine operation immediately after starting the engine. Perform the following warm-up procedures to prepare the system for operations. Failure to do so can cause damage to the machine, personal property and/or the environment, or cause the machine to operate improperly.

2. Run the engine at idle speed (1,500 rpm) for approximately about five minutes.

3. Operate all control lever sin sequence so that hydraulic oil flows into each hydraulic cylinder and hydraulic oil pipeline.

4. Check for black exhaust smoke, very loud noise, or excessive vibration.

NOTE :
If found, notify your Sany dealer immediately for assistance.

5. If the hydraulic system responds slowly, continue to run the engine at idle speed for a longer warm-up time.

6. With the machine running, observe the various gauges and display meters frequently. Continue with engine warm-up if the coolant temperature and hydraulic oil temperature fail to reach normal values (50°C~70°C).

4.4.5 Cold-Weather Operation

The following recommendations are for operation in very low ambient temperatures (32° F / 0°C).

NOTE :
See "Right Control Console" on page 3-23 for details on using the 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 10° F (6°C) less than the lowest expected temperature.

NOTE :
See "Engine Oil Viscosity/Temperature Data" on page 5-11 and "Fuel" on page 5-11

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

NOTE :
"Location, Capacity and Type" on page 5-10.

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

Cold weather operation requires additional cautions:

- Do not touch metal surfaces that could cause you to be frozen to them.
- Allow sufficient time for the hydraulic oil to warm up.
- Park the machine in an area where it cannot freeze to the ground.

4.5 Travel Operations

4.5.1 Introduction

⚠ WARNING

Never allow any personnel to be within 26 ft. (8 m) of the machine.
Never allow any personnel to be around the machine while it is moving.
Be aware of all crush points on the machine and ensure that all personnel keep clear of these areas.
Failure to observe and follow these warnings could result in death or serious injury.

NOTE :

See "Crushing Hazards" on page 2-8.

NOTICE

Avoid suddenlever release when traveling at top speeds to stop the machine.Failure to follow this notice can cause damage to the machine, personal property or cause the machine to operate improperly.

NOTE :

See "Travel and Operation Precautions" on page 2-9.

4.5.2 Before Travel

NOTE :

See "Engine Start-Up Procedures" on page 4-12.

- Always keep the machine under control to avoid injury.
- Fasten the seat belt properly.
- Lift all work equipment (moldboard, front push-plate, front harrow, rear scarifier) to pass over ground obstacles.

4.5.3 Steering

1. Use the turn signal switch (3) or (4) on the front console to activate either the left or right turn signals as required.

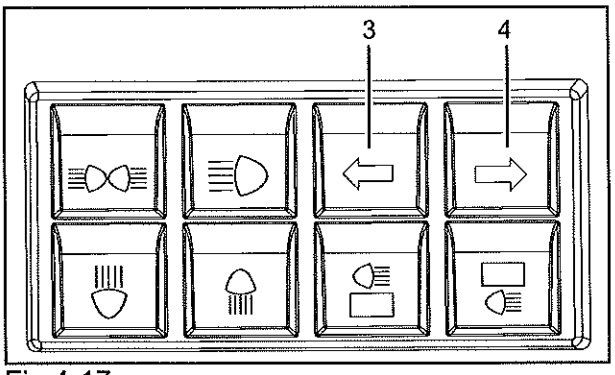

Fig.4-17

3. Left turning light 4. Right turning light

2. Push the transmission control lever forward from the neutral position, then turn the steering wheel clockwise (to turn right) or counterclockwise (to turn left) as required.

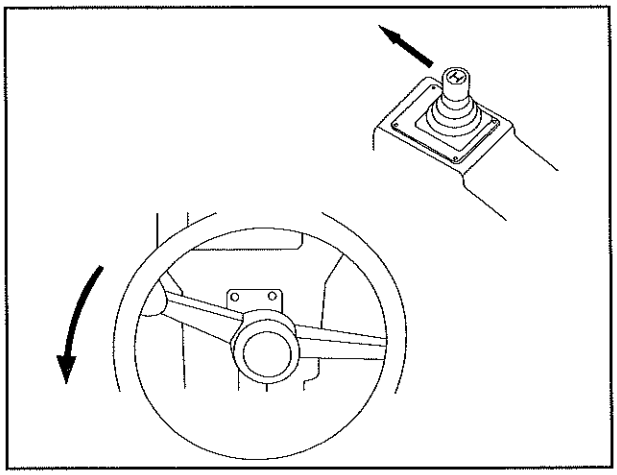

Fig.4-18

4.5.4 Travel Forward

⚠ WARNING

Do not travel at high speeds when driving the machine on slopes or on roads in poor condition.
Select the proper gear before driving the machine downhill. Never shift gears while traveling downhill.
Failure to observe this warning could result in loss of control, equipment damage, death or serious injury.

1. Sound the horn, then push the transmission control lever forward.

NOTE :
This action releases the built-in parking brake function.

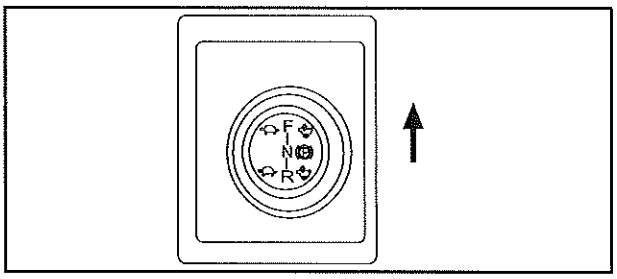

Fig.4-19

2. Lean the lever to the right to upshift the transmission to any of forward gears 1 ~ 3.

NOTE :
Lean the lever to the left to downshift to a lower gear.

3. Depress the foot throttlepedal and the motor graderwill move forward.

NOTE :
If a faster speed is required, lean the lever to the right to upshift the transmission to a higher gear (4 through 8) and depress the throttle pedal as needed.

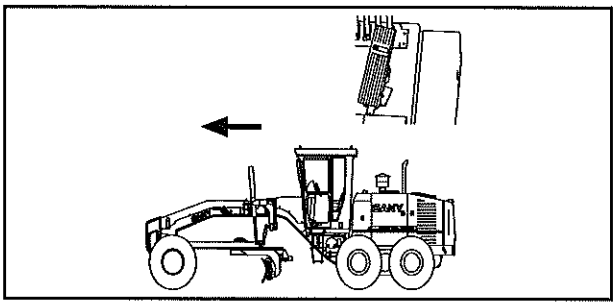

Fig.4-20

4.5.5 Travel in Reverse

⚠ WARNING

Do not travel at high speeds when driving the machine on the slope or on roads in poor condition.
Select proper gear before driving the machine downhill. Never shift gears while moving the machine downhill.
Failure to observe this warning could result in loss of control, equipment damage, death or serious injury.

1. Sound the horn, then pull the transmission control lever on the right control console back.

NOTE :
This action releases the built-in parking brake function.

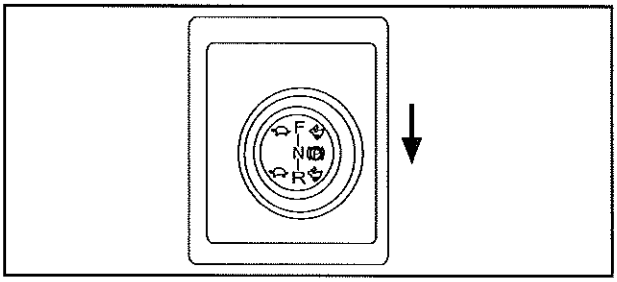

Fig.4-21

2. Lean the lever to the right to upshift the transmission to any of reverse gears 1 ~ 3.

NOTE :
Lean the lever to the left to downshift to a lower gear.

3. Depress the throttle pedal and the motor grader will move in reverse.

NOTE :
If a faster speed is required, lean the lever to the right to upshift the transmission to a higher gear (4 through 6) and depress the throttle pedal as needed.

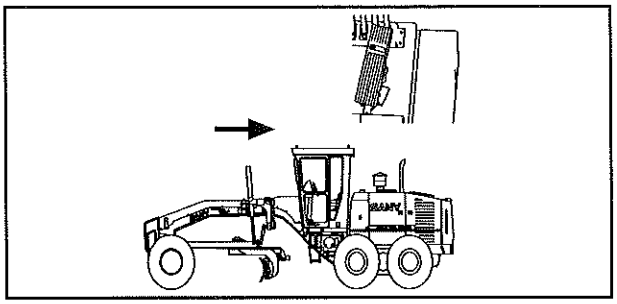

Fig.4-22

4.5.6 Reverse from a Steep Slope or Ditch

1. Stop machine forward travel and lift the moldboard.

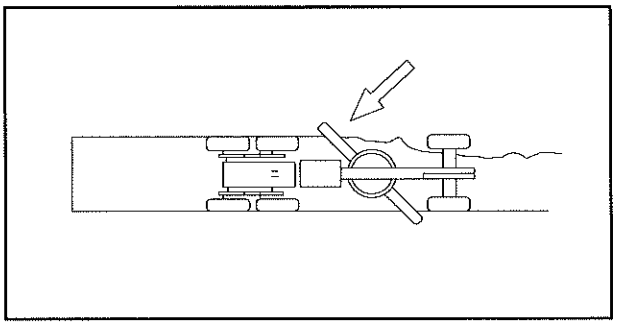

Fig.4-23

2. Place the transmission in reverse and slowly back away while carefully twisting the rear frame to the road center.

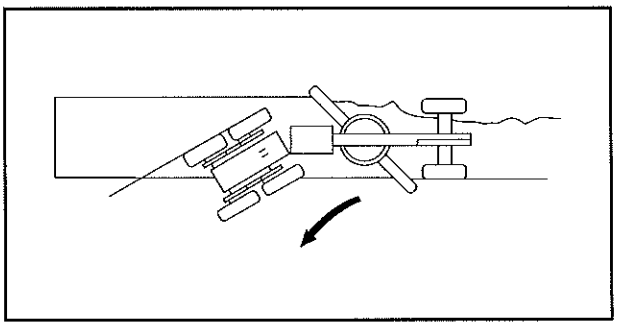

Fig.4-24

3. Continue slow reverse travel with the front wheels set towards the travel direction.

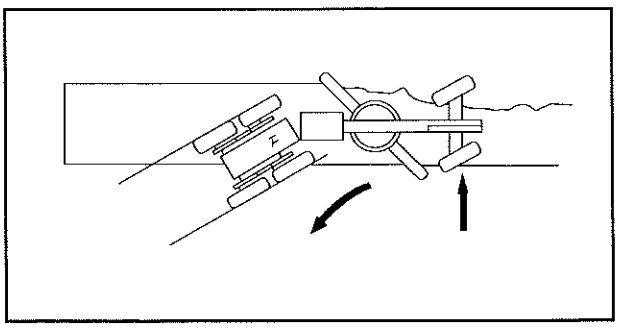

Fig.4-25

4. Continue reverse travel until the machine is free from the deep slope or ditch.

4.6 Control the Work Equipment

4.6.1 Introduction

⚠ WARNING

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

4.6.2 Grade on the Left

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :
If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

1. Release the swing support centershift cylinder.

2. Use the swing cylinder control lever and lift cylinder control lever to rotate the swing support to the right by 1 or 2 holes, then lock the swing support.

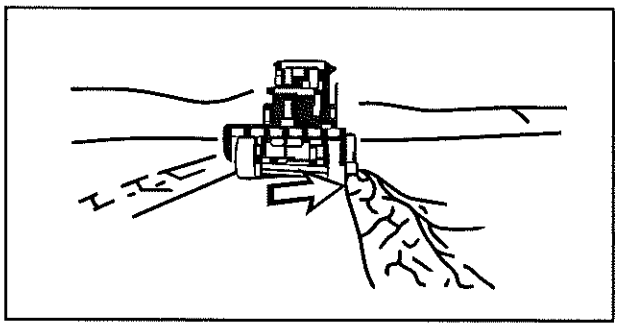

Fig.4-26

3. Set the moldboard properly so that scraped earth is pushed outside the right rear wheels.

4. Lower the moldboard to the target cutting depth.

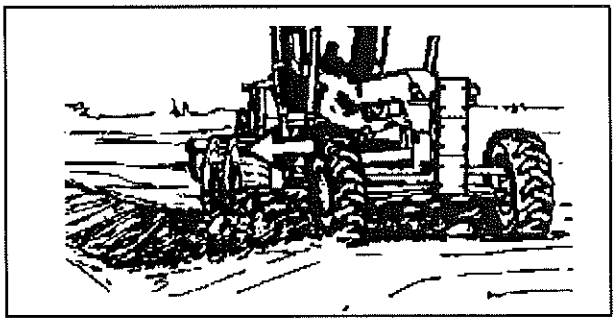

Fig.4-27

5. Set the front wheels to lean slightly to the left to offset any side drifting.

6. Adjust the moldboard pitch angle according to the earth being scraped. Tilt the top of the moldboard so it is 4 in. (100 mm) ahead of the cutting edge.

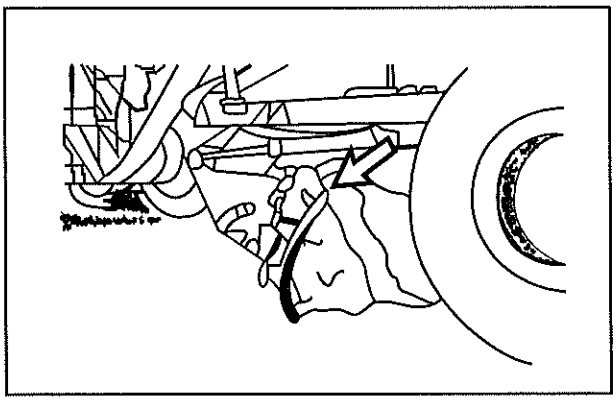

Fig.4-28

7. Under good conditions, ground grading can be performed from one side to the other side.

8. Grade the earth until the road surface is flat.

Normally, straighten the machine body to grade the ground horizontally. Twisting the machine body is mainly to offset side drifting caused by the load when cutting deeply. Turn the tandem driven front wheels to the rear end bit.

In case of wheel slippage, turn the front wheels away from the rear end bit. This can reduce the scraping width and the machine load.

In normal grading operations, the scraped earth is pushed outside the rear wheels to make the ground under the rear wheels flat.

4.6.3 Grade on the Right

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

1. Release the swing support centershift cylinder.

2. Use the swing cylinder control lever and lift cylinder control lever to rotate the swing supportto the left by 1 or 2 holes, then lock the swing support.

3. Set the moldboard properly so that scraped earth is pushed outside the left rear wheels.

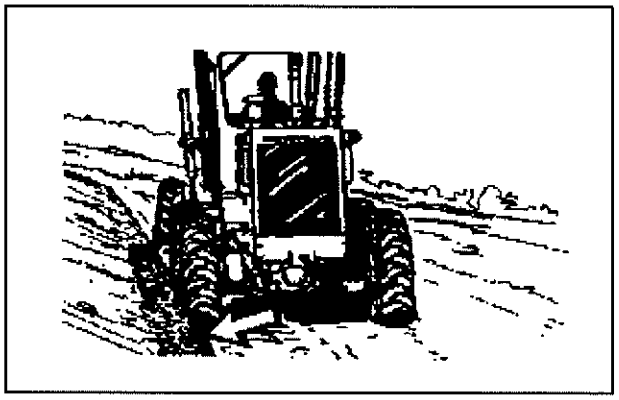

Fig.4-29

4. Lower the moldboard to the target cutting depth.

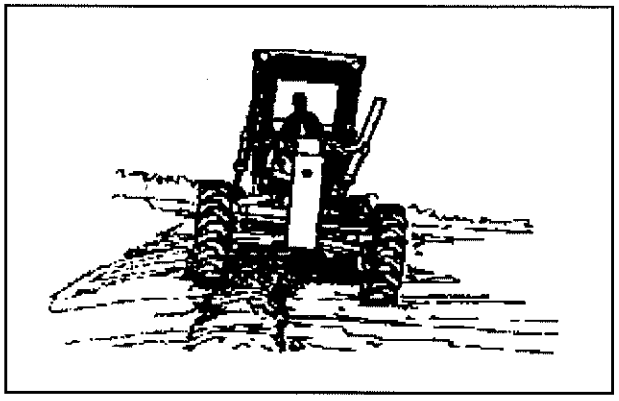

Fig.4-30

5. Set the front wheels to lean slightly to the right to offset any side drifting.

6. Adjust the moldboard pitch angle according to the earth being scraped.

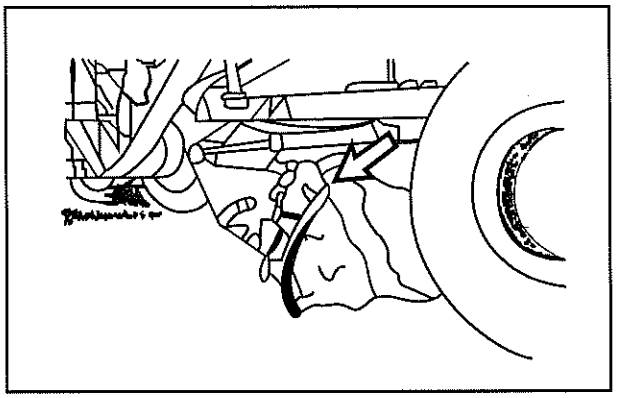

Fig.4-31

7. Tilt the top of the moldboard so it is 4 in. (100 mm) ahead of the cutting edge.

8. Under good conditions, ground grading can be performed from one side to the other side.

9. Grade the earth until the road surface is flat.

Normally, straighten the machine body to grade the ground horizontally. Twisting the machine body is mainly to offset side drifting caused by the load when cutting deeply. Turn the tandem driven front wheels to the rear end bit.

In case of wheel slippage, turn the front wheels away from the rear end bit. This can reduce the scraping width and the machine load.

In normal grading operations, the scraped earth is pushed outside the rear wheels to make the ground under the rear wheels flat.

4.6.4 Grade Around an Obstacle

1. Grade the ground near the obstacle.

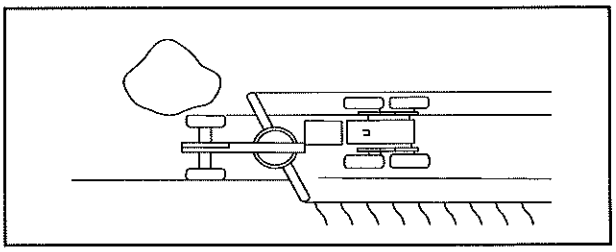

Fig.4-32

2. Move the moldboard along the profile of the obstacle.

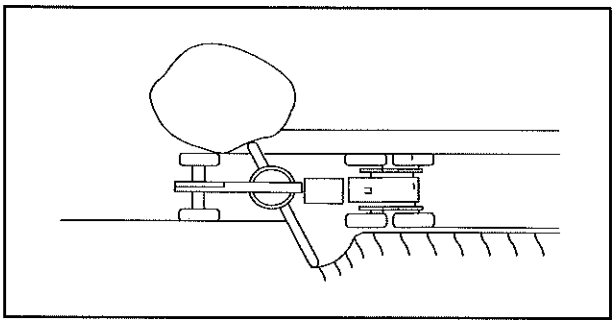

Fig.4-33

3. After the machine passes the obstacle, return the moldboard to its original position.

NOTE :

For ground grading, move the moldboard as close as possible to the obstacle to reduce manual clearing work.

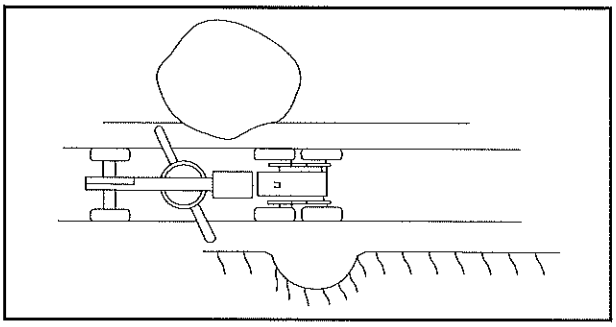

Fig.4-34

4.6.5 Grade on S-Shape Curves

NOTICE

Prevent any of the moldboard cutting edges from contacting the tires. If the machine twists, a tire sidewall may contact the backslope and be damaged or destroyed.

1. Twist the machine leftwards. Shift the moldboard to right side.

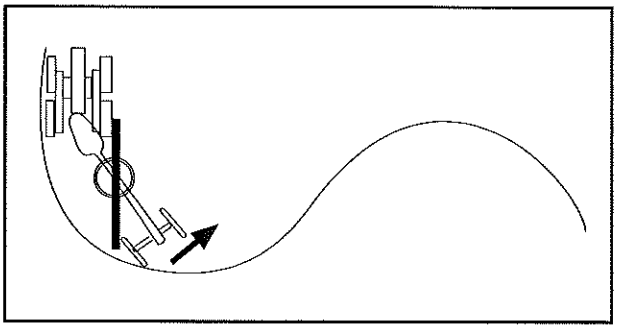

Fig.4-35

2. Straighten the wheels. Shift the moldboard laterally as required.

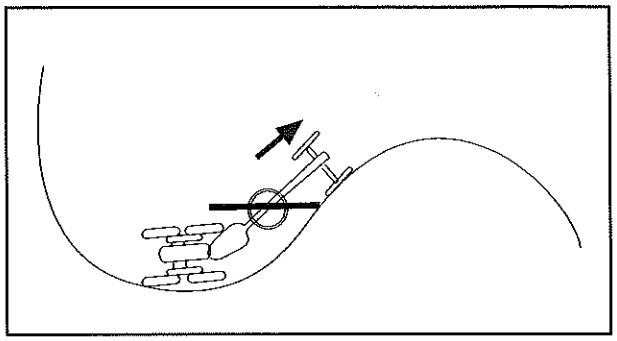

Fig.4-36

3. Twist the machine rightward. Shift the moldboard to left side

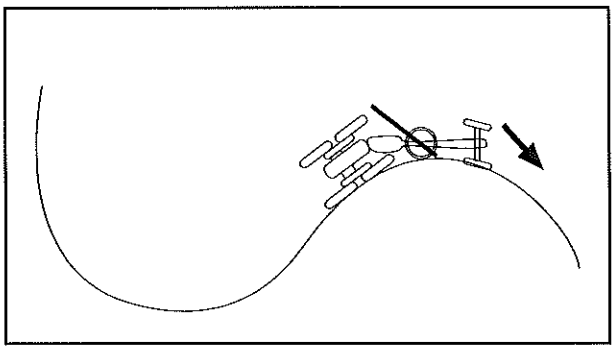

Fig.4-37

4.6.6 Cut a Left Side V-Ditch

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

1. Adjust the position of the swing support properly to align the centershift cylinder piston rod with the hole on the swing support. Use the switch to lock the swing support.

2. Set the moldboard so its left end swings to a position level with the outer edge of the left front wheel. Tilt the moldboard forward so the upper part of the moldboard is slightly ahead of the cutting edge.

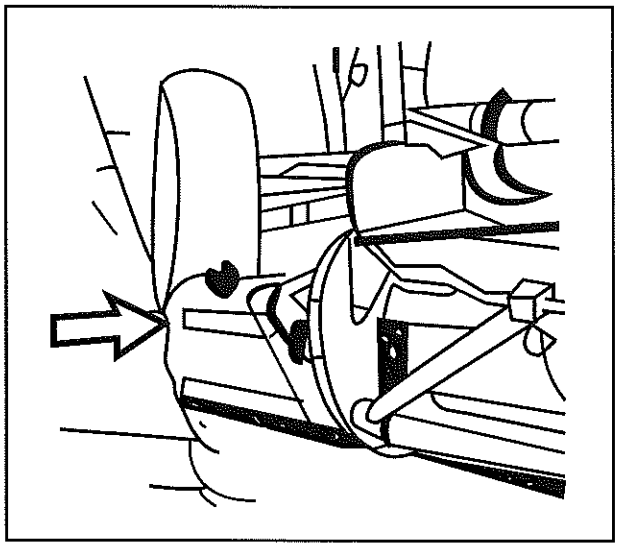

Fig.4-38

3. Lift the right moldboard to its highest position. Adjust the moldboard angle so the scraped earth will be stacked inside the right rearwheels.

4. Lower the left end of the moldboard to set the cutting depth.

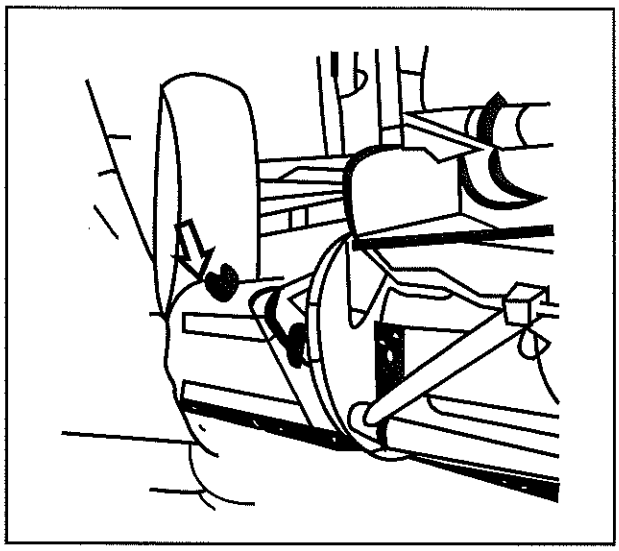

Fig.4-39

5. Set the front wheels to lean slightly to the right, then scrape a thin layer of earth with a thickness of 2 - 4 in. (50 - 100 mm).

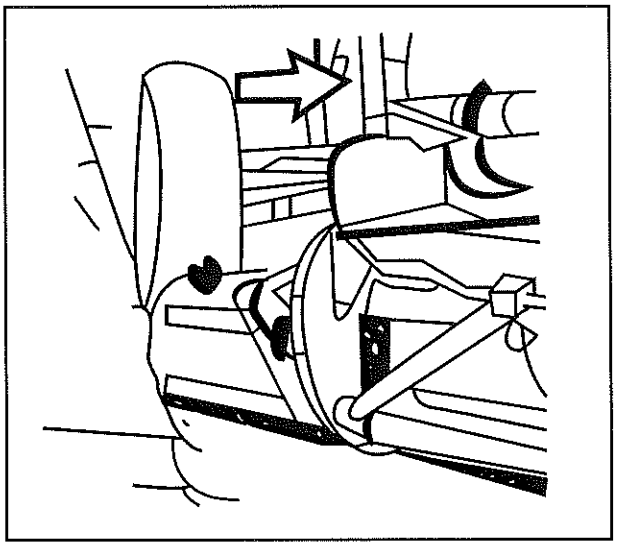

Fig.4-40

6. Keep the left front wheel at the bottom of the ditch and continue to cut the ditch to the desired depth.

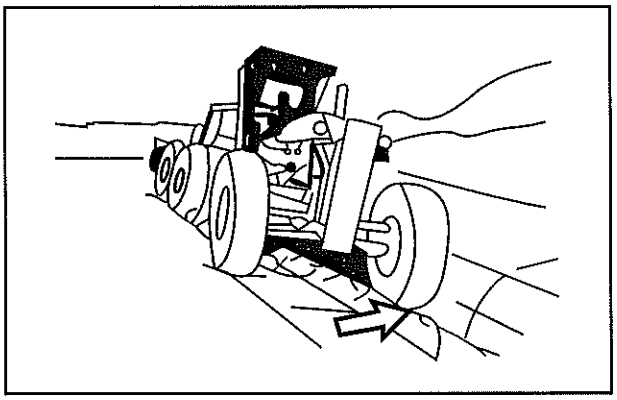

Fig.4-41

4.6.7 Cut a Right Side V-Ditch

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

1. Adjust the position of the swing support properly to align the centershift cylinder piston rod with the hole on the swing support. Use the switch to lock the swing support.

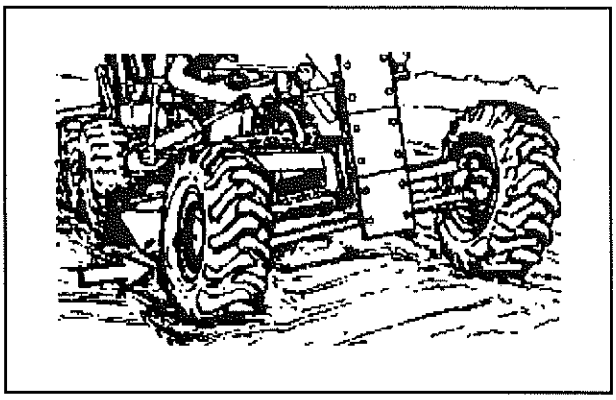

Fig.4-42

2. Set the moldboard so its right end swings to a position level with the outer edge of the right front wheel. Tilt the moldboard forward so the upper part of the moldboard is slightly ahead of the cutting edge.

3. Lift the right moldboard to its highest position. Adjust the moldboard angle so the scraped earth will be stacked inside the left rear wheels.

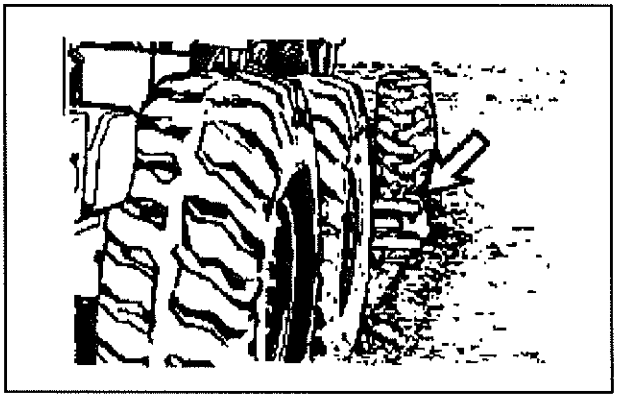

Fig.4-43

4. Lower the left end of the moldboard to set the cutting depth.

5. Set the front wheels to lean slightly to the left, then scrape a thin layer of earth with a thickness of 2 - 4 in. (50 - 100 mm).

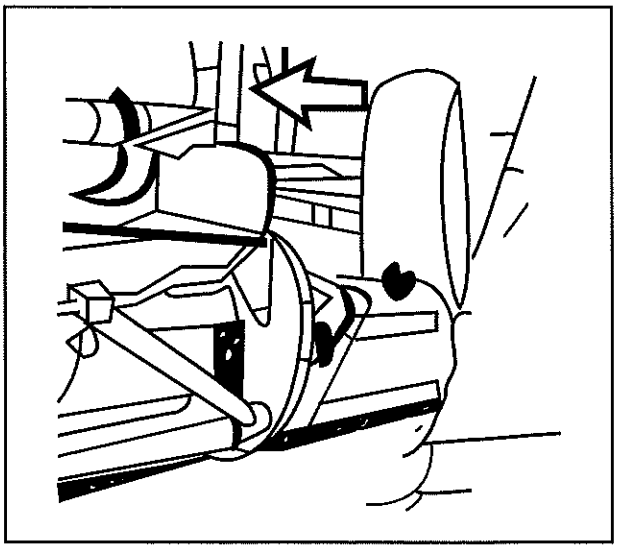

Fig.4-44

6. Keep the right front wheel at the bottomof the ditch and continue to cut the ditch to the desired depth.

4.6.8 Cut a Flat-Bottom Ditch

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

If there is no V-ditch, cut one whose depth is that of the required flat-bottom ditch.

The slope of the road shoulder should be flatter than that of general road shoulder. The shoulder slope should be continuous to the end of the road shoulder.

1. Tip the moldboard forwards.

2. Adjust the position of the swing support properly to align the centershift cylinder piston rod with the hole on the swing support.

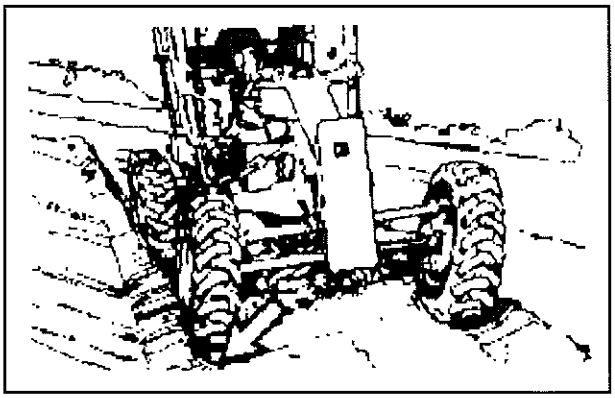

Fig.4-45

3. Use the switch to lock the swing support.

4. Position the right front wheel on the bottom of the V- ditch.

5. Place the left front end bit of the moldboard at the track of right front wheel and allow the required flat-bottom ditch width to be obtained in one step.

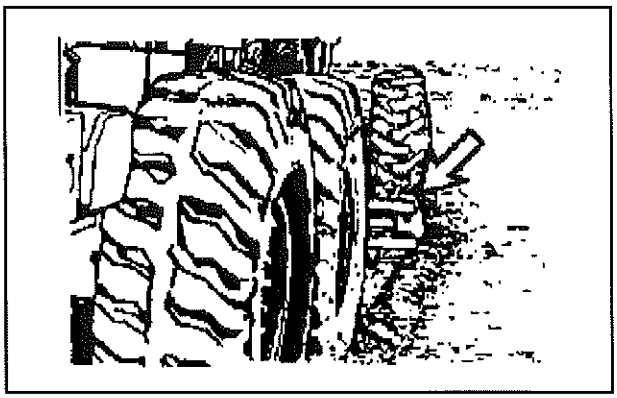

Fig.4-46

6. Lower the right end bit to the target depth.
7. Lift the left end bit and swing it to the desired slope gradient of the road shoulder.
8. Lean the front wheels to the left side.
9. When cutting another V-ditch, make it slightly deeper than or as deep as the first one.
10. Remove the earth to the road center.
11. Lower the right end bit to the target depth.

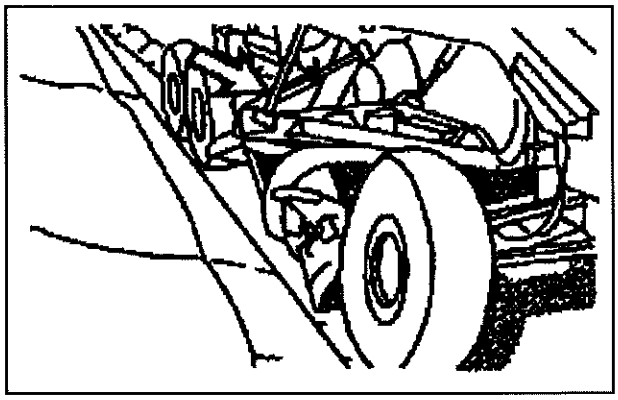

Fig.4-47

12. Lower the left end bit to the target depth.
13. Adjust the position of swing support properly to align the centershift cylinder piston rod with the hole on the swing support.
14. Use the switch to lock the swing support.

15. At the beginning, position the right front wheel on the bottom of the first V-ditch.

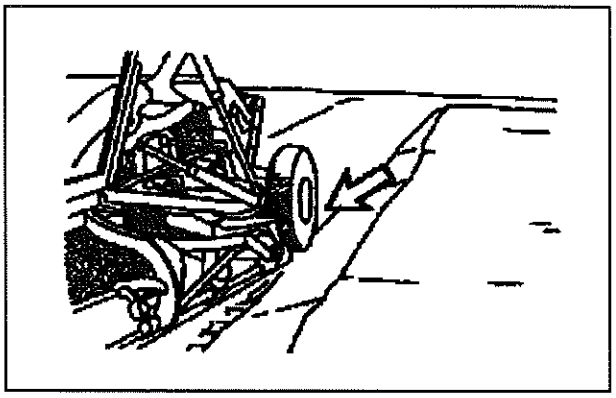

Fig.4-48

16. Swing the right end bit to the bottom of the backslope.

17. Lower the right end bit and straighten the cutting edge on the cutslope.

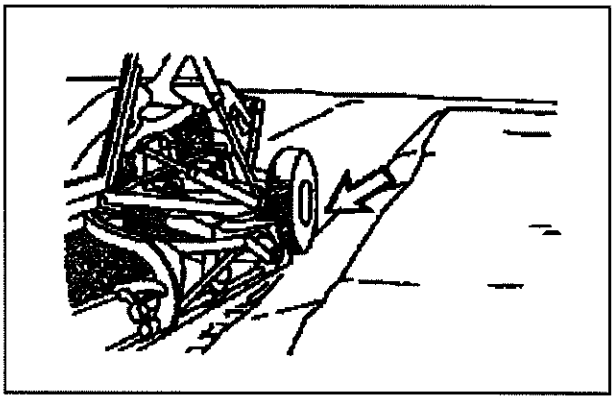

Fig.4-49

18. Lower the left end bit to the target depth and lean the front wheels to the left side.

19. Set the moldboard at a very small angle and remove the earth to the ditch backslope.

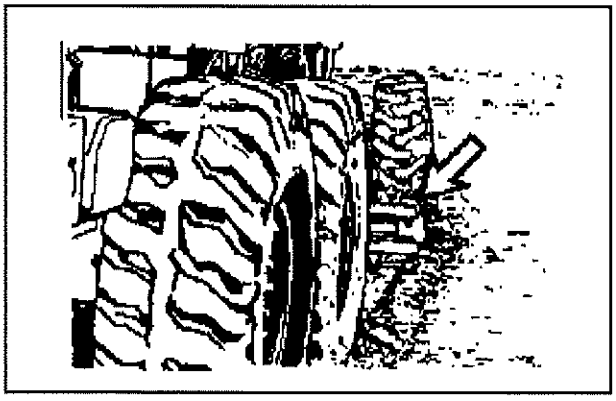

Fig.4-50

20. Level the mounds of earth to finish grading.

4.6.9 Clean a Left Ditch

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

1. Adjust the position of the swing support properly to align the centershift cylinder piston rod with the hole on the swing support. Use the switch to lock the swing support.

2. Swing the left end of the moldboard so it is directly behind the left front wheel.

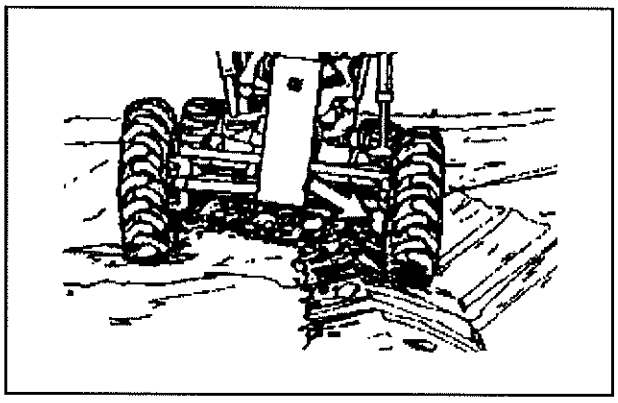

Fig.4-51

3. Lower the left end of the moldboard to set the cutting depth.

4. Set the position of the right side of the moldboard to stack the scraped earth on the slope between the tandem wheels at both sides.

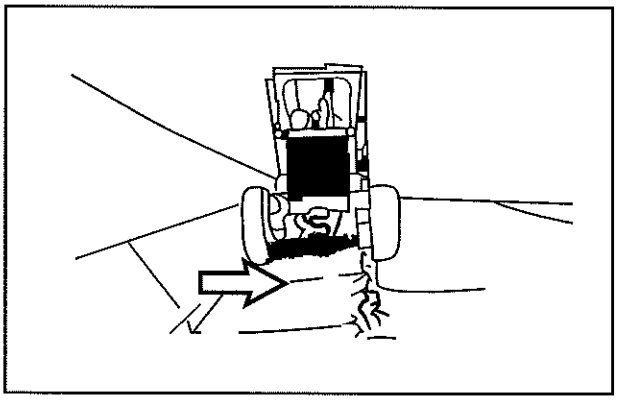

Fig.4-52

5. Set the front wheels to lean slightly to the right.

6. Perform another scraping operation so that the scraped earth is paved on the slope and road shoulder. Level the mounds of earth for final grading.

4.6.10 Clean a Right Ditch

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

1. Adjust the position of the swing support properly to align the centershift cylinder piston rod with the hole on the swing support. Use the switch to lock the swing support.

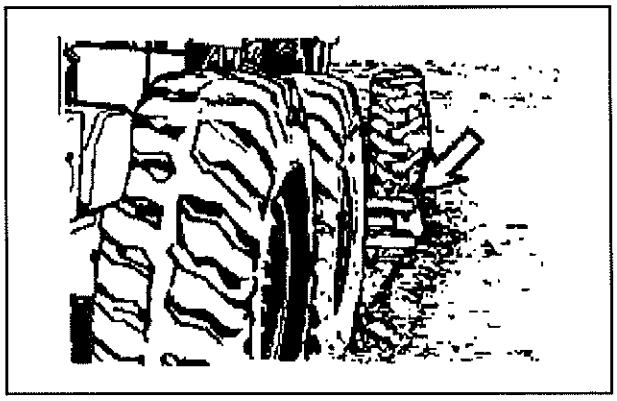

Fig.4-53

2. Swing the right end of the moldboard so it is directly behind the right front wheel.

3. Lower the right end of the moldboard to set the cutting depth.

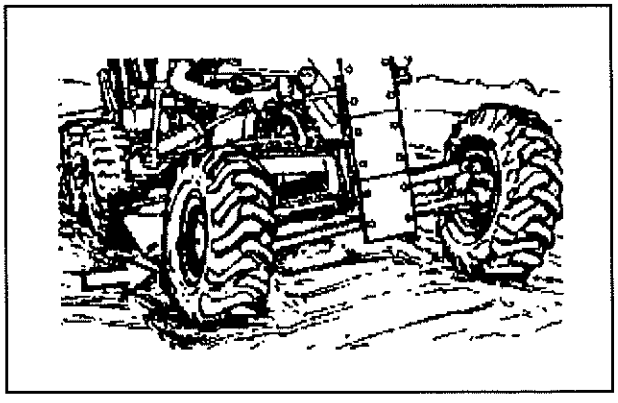

Fig.4-54

4. Set the position of the right side of the moldboard to stack the scraped earth on the slope between the tandem wheels at both sides.

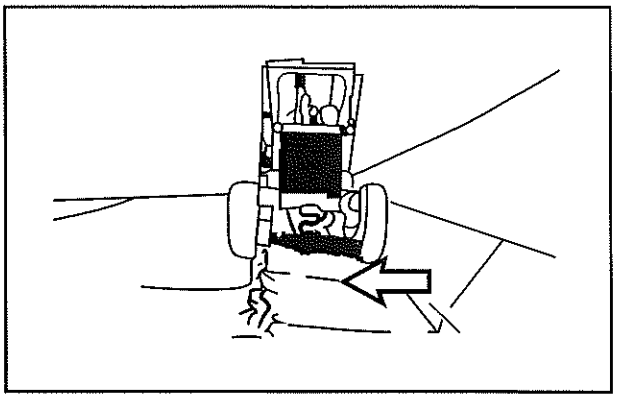

Fig.4-55

5. Set the front wheels to lean slightly to the right.

6. Perform another scraping operation so that the scraped earth is paved on the slope and road shoulder. Level the mounds of earth for final grading.

4.6.11 Clean a Left Road Shoulder

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

1. Adjust the position of the swing support to properly align the centershift cylinder rod with the hole on the swing support. Use the centershift cylinder switch to lock the swing support.

2. Swing the left end bit to the position level with the outer edge of the left wheels. The earth must be removed from the space between the two wheels.

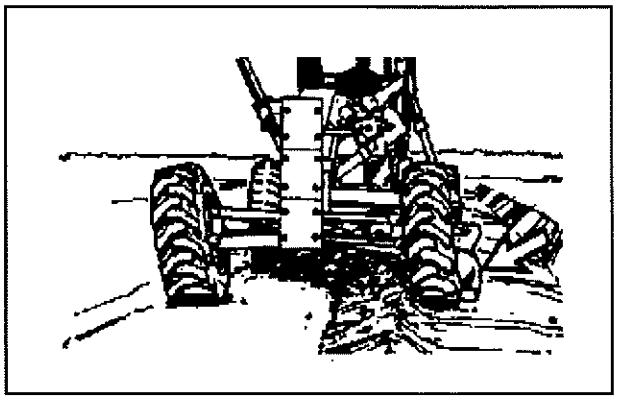

Fig.4-56

3. Lower the moldboard horizontally to the target cutting depth.

4. Set the front wheels to lean slightly to the right side.

4.6.12 Clean a Right Road Shoulder

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

1. Adjust the position of the swing support to properly align the centershift cylinder rod with the hole on the swing support. Use the centershift cylinder switch to lock the swing support.

2. Swing the right end bit to the position level with the outer edge of the right wheels. The earth must be removed from the space between the two wheels.

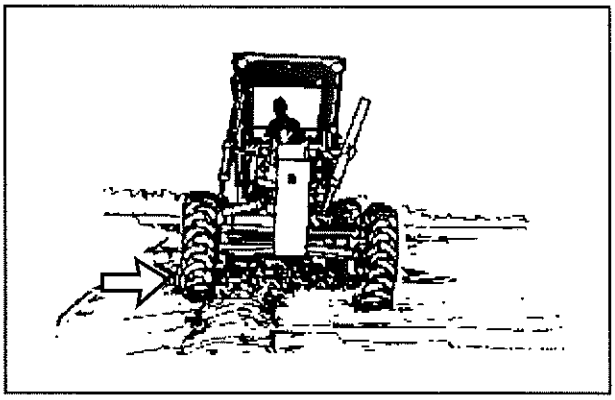

Fig.4-57

3. Lower the moldboard horizontally to the target cutting depth.

4. Set the front wheels to lean slightly to the left side.

4.6.13 Scrape a Wet Ditch

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

Twist the machine to make its front wheels and moldboard in the ditch. Turn with the front wheels.

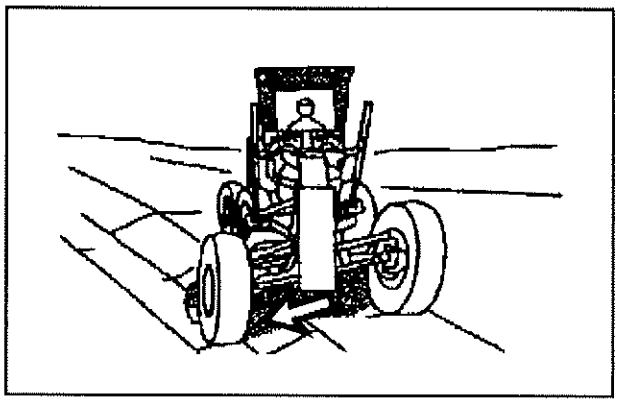

Fig.4-58

The wet mud and loose earth will make the wheels slip. Hold the rear wheels on the road shoulder to avoid slip.

NOTICE

There may be obstacles such as branches and stones in old ditches. Use the machinecontrols to bypass these obstacles.

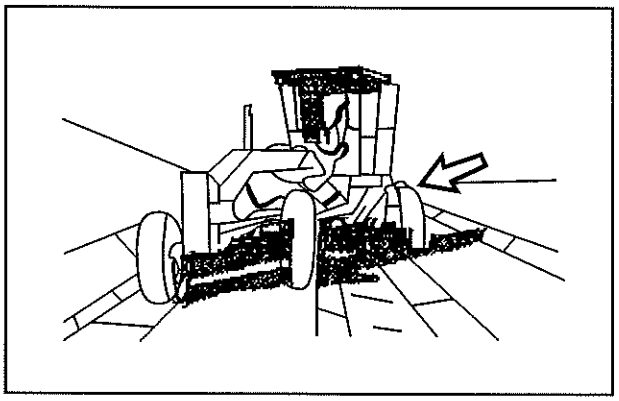

Fig.4-59

4.6.14 Grade On a Slope

⚠ WARNING

Be very familiar with operation and performance of this machinebefore working on steep side slopes. Do not twist the machine body excessively when traveling uphill or on a very steep slope. Travel slowly on steep slopes. There is the possibility of a machine tip-over when working on a very steep slope. Failure to observe and follow these warnings may result in death or personal injury.

1. On a very steep slope, turn by twisting the machine. This method can make the rear of the machine hold at the bottom of the cutting surface. To obtain maximum stability, twist the machine body for balance compensation.

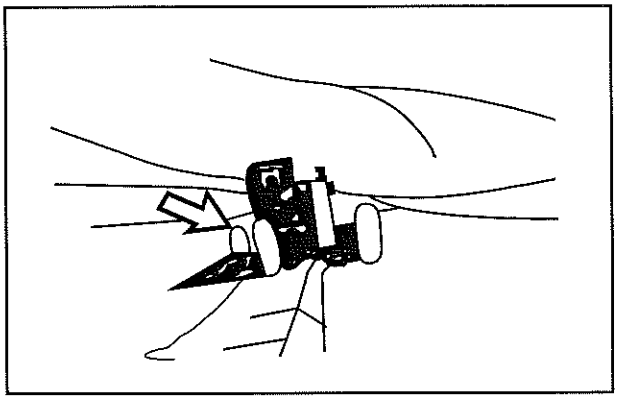

Fig.4-60

2. If the machine head deflects as the moldboard is subject to heavy load, twist the machine to complete a turn.

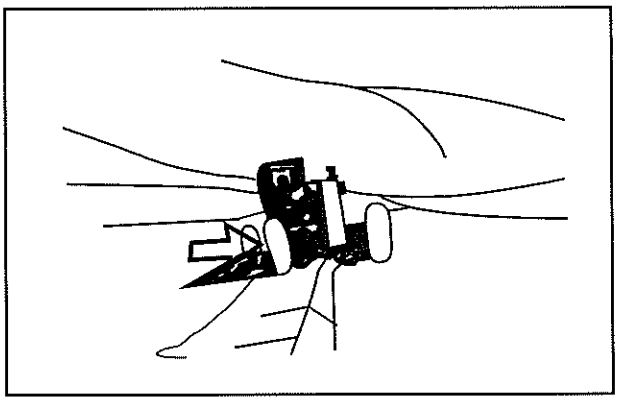

Fig.4-61

4.6.15 Scrape a Right-Side Slope

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in personal death or injury.

NOTE :

If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

The following procedures are for right-side mounds of earth. Swing the moldboard to the other side for treating left-side mounds of earth.

1. As subgrade, the cut roadbed surface should be uniform.

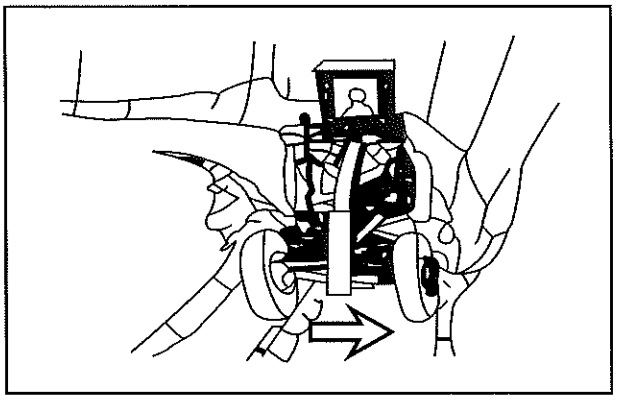

Fig.4-62

2. In case of hard (compacted) earth, provide the subgrade with a slope towards the mound of earth to prevent the machine from sliding away from the mound of earth during working.

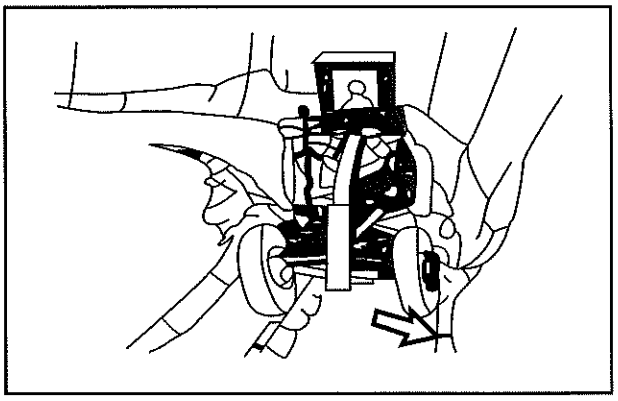

Fig.4-63

3. Tip the moldboard forward to 3/4 of the full range or fully tip it forwards.

4. Adjust the rear frame to a proper position and lock it.

5. Shift the moldboard to the right side.

6. Rotate the circle clockwise and whole lowering the left end of the moldboard.

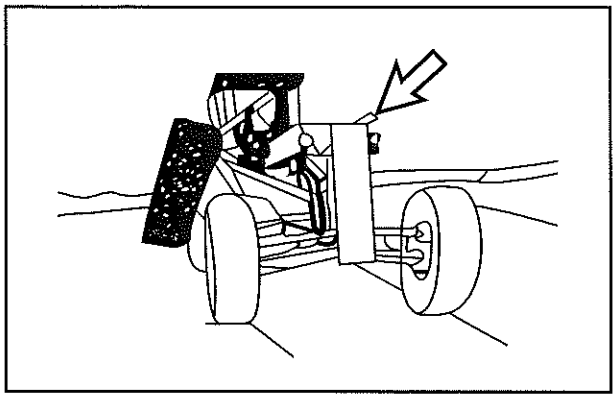

Fig.4-64

7. Place the rear end of the moldboard at the bottom of the slope. Swing it to the place level with the outer side of the rear wheels.

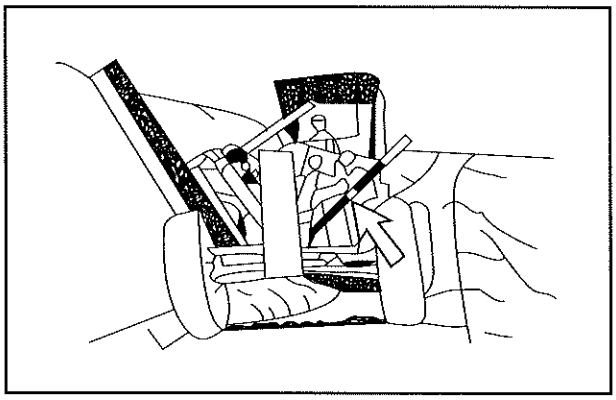

Fig.4-65

8. Set the right rear wheels to the base of the slope formed by the V-ditch.

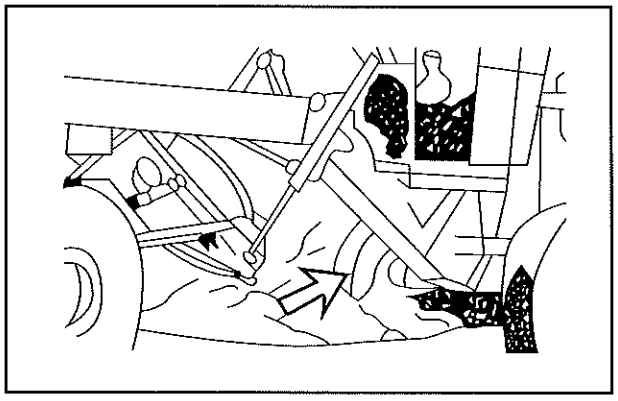

Fig.4-66

9. Lower the right moldboard to enable it to cut the target slope.

10. Gradually move to the cutting surface.

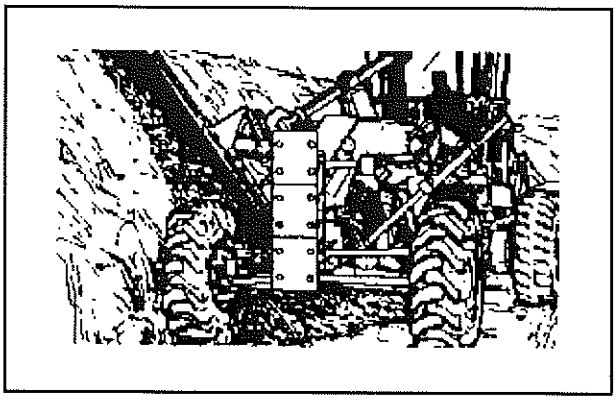

Fig.4-67

11. For normal cutting, position the wheels nearly vertical to the ground.

NOTE :

In case of deep cutting, lean the front wheels towards the slope.

NOTE :

For shallow cutting, lean the front wheels away from the slope. The earth is removed from the slope to the outside of the rear wheels.

4.6.16 Left-Side Vertical Operation.

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

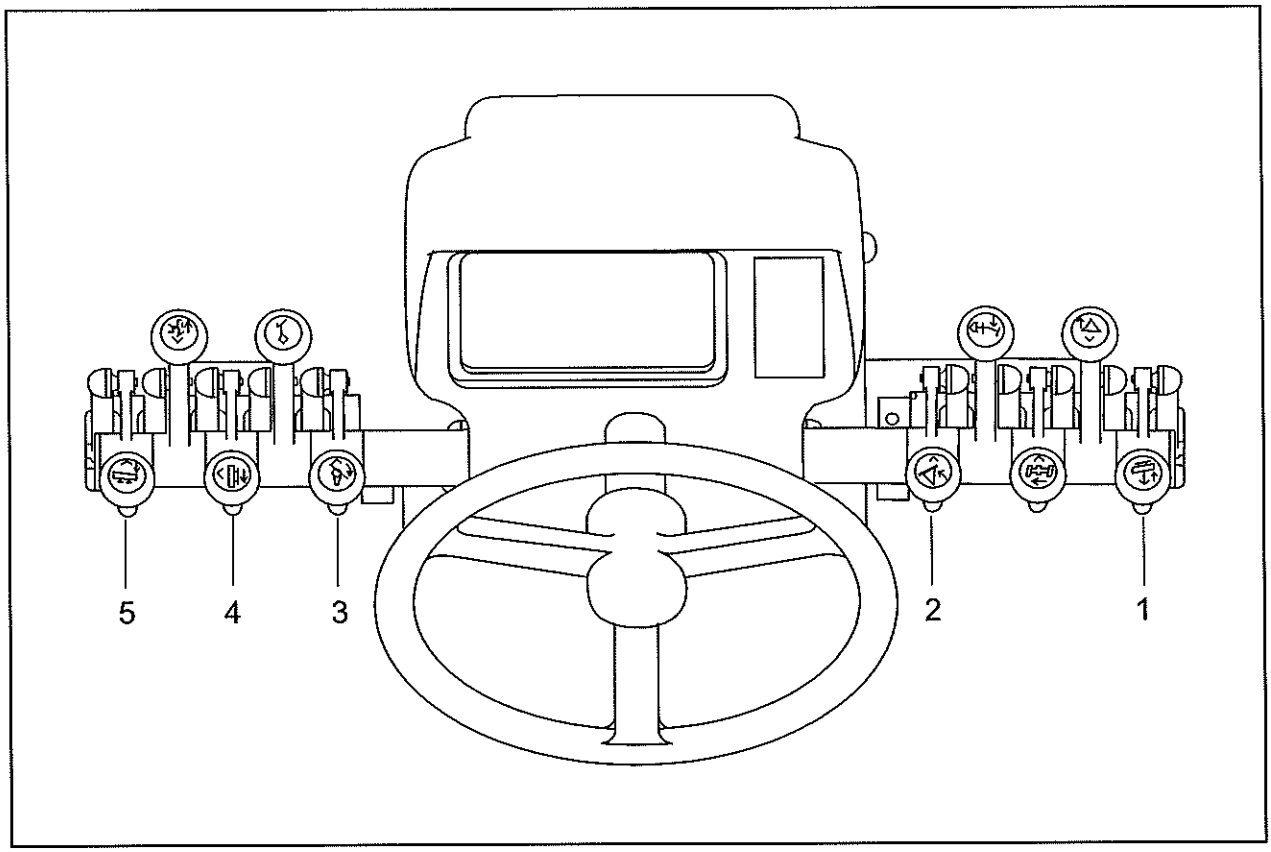

Fig.4-68

1. Right moldboard lift control lever
2. Draw bar center shift control lever
3. Circle turn control lever
4. Side shift control lever
5. Left moldboard lift control lever

1. Use the right moldboard lift control lever (1) to fully retract the piston rod (6).

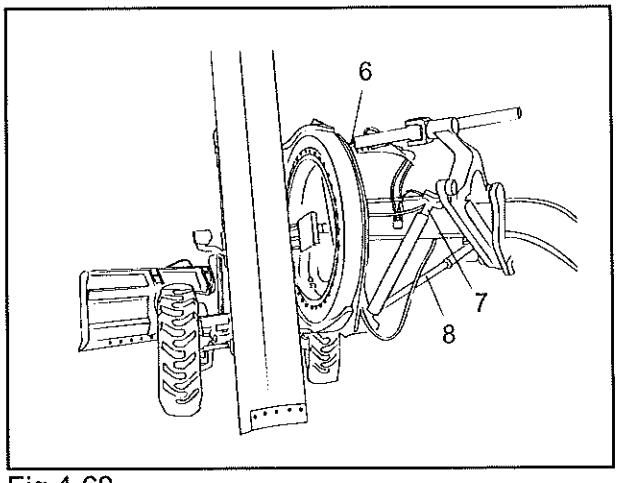

Fig.4-69

6. Retract the piston rod
7. Extend the piston rod
8. Cylinder piston

2. Use the drawbar center shift control lever (2) to extend the piston rod (7) fully.

3. Use the circle turn control lever (3) to form an angle of 55° ~ 60° between the moldboard and the front beam.

4. Use the moldboard side shift control lever (4) to shift the moldboard to the left end.

5. Use the left moldboard lift control lever (5) to slowly extend the left lift cylinder piston (8) to make the outermost side of the moldboard contact the ground slightly.

6. Use the centershift cylinder lock/unlock switch (9) and enable switch (10) on the control box at the right side of the driver's seat to make the centershift cylinder piston rod recede from the hole on the swing support.

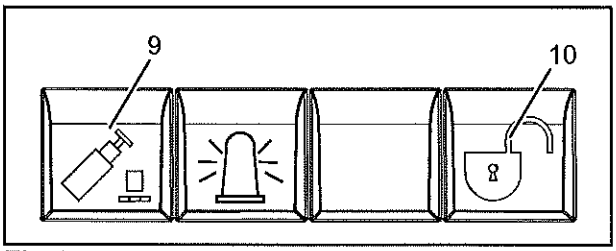

Fig.4-70

9. Centershift cylinder lock/unlock switch
10. Centershift cylinder lock/unlock enable switch

7. Slowly extend the left lift cylinder piston (8) and rotate the swing support to align the centershift cylinder piston with the proper hole on the swing support.

8. Use the centershift cylinder lock/unlock switch (9) and enable switch (10) to insert the d centershift cylinder piston into the corresponding hole on the swing support.

9. Shift the drawbar laterally to the position where the ground is to be graded. Use the moldboard lift cylinder to determine the slope angle for grading.

4.6.17 Right-Side Vertical Operation

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death personal injury.

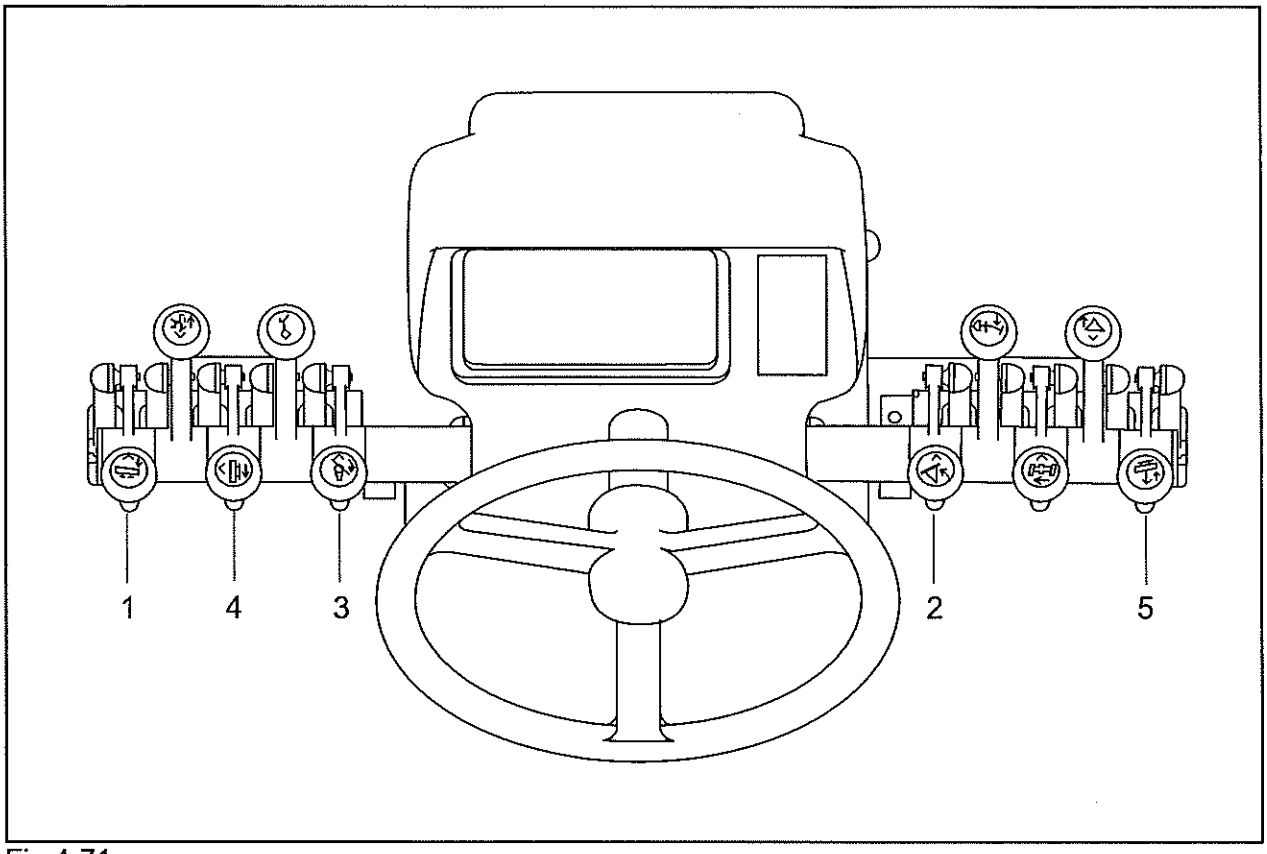

Fig.4-71

1. Moldboard lift control lever
2. Draw bar center shift control lever
3. Circle turn control lever
4. Moldboard sideshift control lever
5. Right moldboard lift control lever

1. Use left moldboard lift control lever (1) to fully retract the piston rod (C).

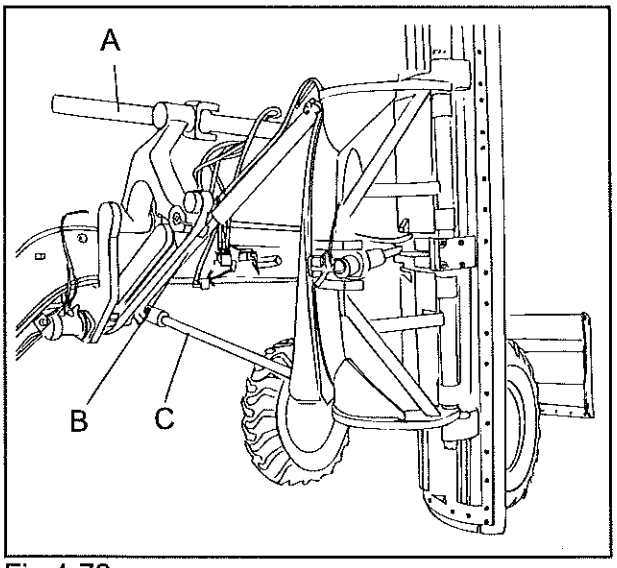

Fig.4-72

A. Right lift cylinder piston
B. Piston rod
C. Right lift cylinder piston

2. Use the drawbar center shift control lever (2) to extend the piston rod (B) fully.

3. Use the circle turn control lever (3) to form an angle of 55 ~ 60 degrees between the moldboard and the front beam.

4. Use the moldboard sideshift control lever (4) to shift the moldboard to the right end.

5. Use the right moldboard lift control lever (5) to slowly extend the right lift cylinder piston (C) to make the outermost side of the moldboard contact the ground slightly.

6. Use the centershift cylinder lock/unlock switch (9) and enable switch (10) on the right wall-mounted switch box to make the centershift cylinder piston rod recede from the hole on the swing support.

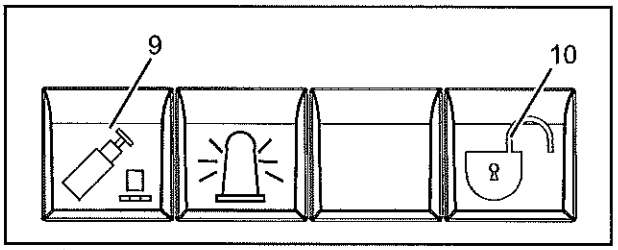

Fig.4-73

9. Centershift cylinder lock/unlock switch 10. Centershift cylinder lock/unlock enable switch

7. Slowly extend the right lift cylinder piston (A) and rotate the swing support to align the centershift cylinder piston with the proper hole on the swing support.

8. Use the centershift cylinder lock/unlock switch (9) and enable switch (10) to insert the centershift cylinder piston into the corresponding hole on the swing support.

9. Shift the drawbar laterally to the position where the ground is to be graded. Use the moldboard lift cylinder to determine the slope angle for grading.

4.6.18 Operate the Scarifier

NOTICE

Position the machine in-line (straight) and not an angle when using the scarifier. Raise the scarifier when turning to avoid damage to the scarifier tips. Position the scarifier at its highest position. Failure to follow this notice can result in improper performance or equipment.

1. The large scarifier teeth (1) are used with rigid soil, while the small teeth (2) are used with soft soil.

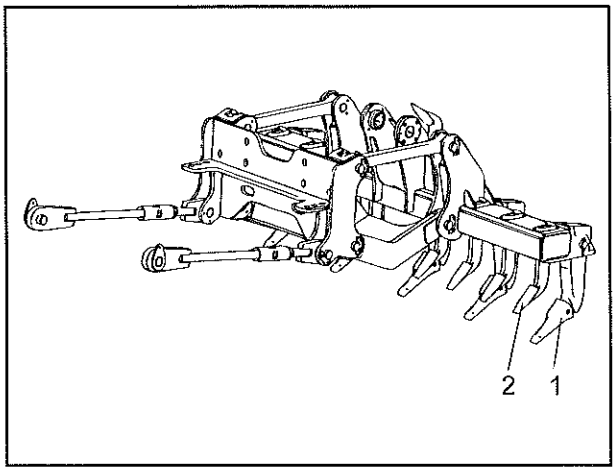

Fig.4-74

1. Large scarifier teeth 2. Small teeth

2. With the machine traveling forward in a straight line, push the scarifier control lever (1) forward to operate the scarifier.

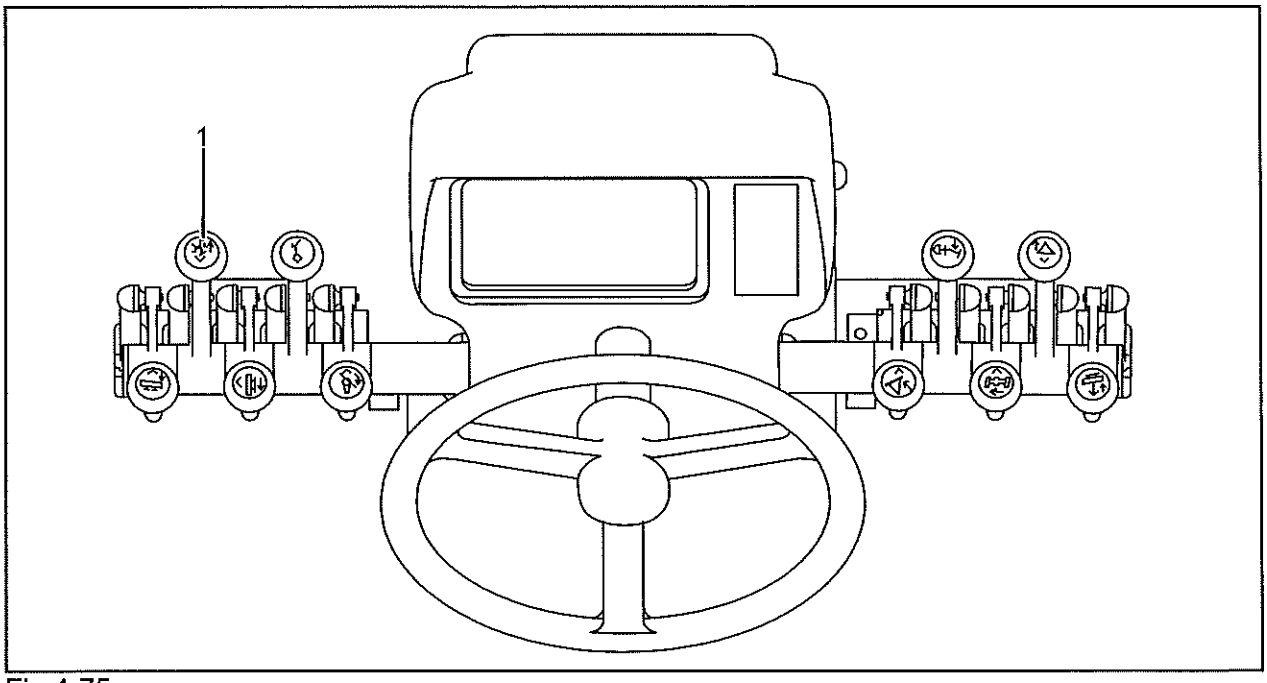

Fig.4-75

1. Scarifier control lever

3. Dig the teeth of the scarifier into the soil

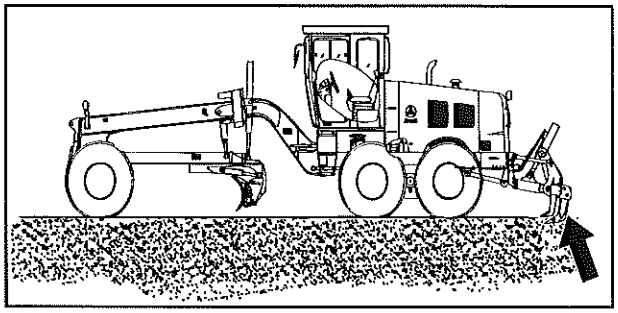

Fig.4-76

4. Dig the teeth into the soil deeper at a speed matching with the work load.

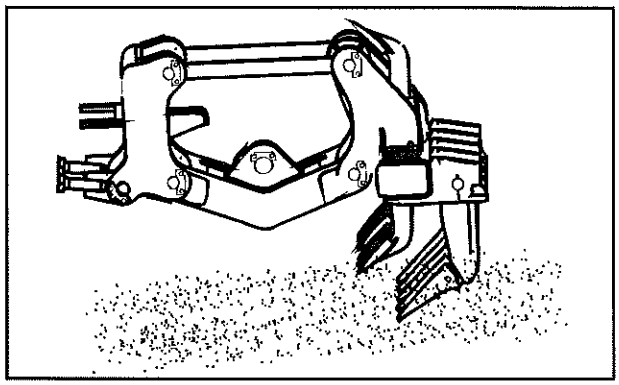

Fig.4-77

5. Afterwards, pull the scarifier control lever backward to raise the scarifier to the highest position.

6. Clean the soil from the scarifier teeth after completing work operation.

4.6.19 Operate the Push-Plate

Use the push plate control lever (1) to raise or lower the push-plate.

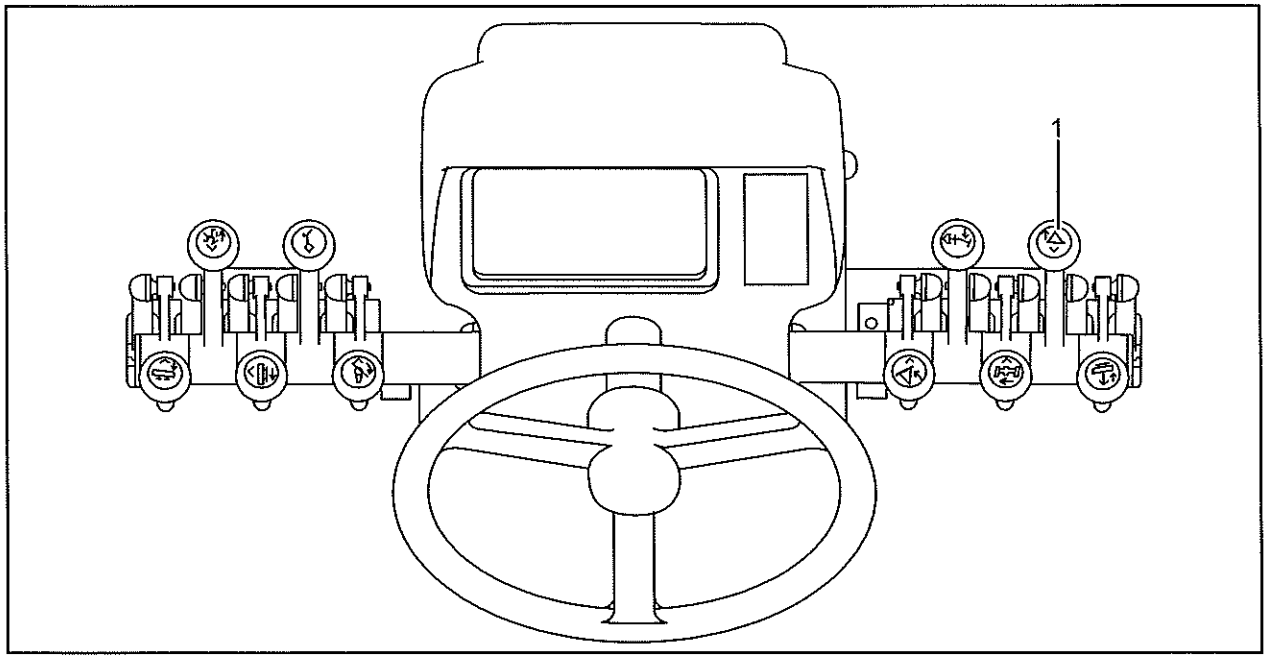

Fig.4-78

1. Push plate control lever

The push-plate lift height and cutting depth depend on the stroke of the operating cylinder. Operate the push-plate with full load.

- Never overload the machine.
- Avoid excessive tires lip page.

NOTE :

It is easier to control the push-plate with full load than without full load.

4.6.20 Operate the Centershift Cylinder

⚠ WARNING

When removing the lock pin of swing support, the moldboard may move suddenly. Therefore, ensure that no personnel are near the moldboard before removing the lock pin. Also, set the circle and the moldboard properly to be at the center under the machine. Straighten the frame and lower the moldboard to the ground. Failure to observe and follow this warning may result in death or personal injury.

There are five holes on the front frame for the centershift cylinder.

There are five holes on the front frame for the centershift cylinder.

When the working state of the swing support is as shown here, insert the centershift cylinder lock pin into the third hole on the left.

When turning over the moldboard to the left or the right, lock the swing support at position 5 (leftward) or position 1 (rightward) respectively.

If necessary, adjust the position of the swing support. Operate the centershift cylinder by performing the following procedures:

1. Press the centershift cylinder switch on the control panel to withdraw the lock pin from the center hole of the swing support.

2. Operate the left and right lift cylinder control levers to lower the left part of the moldboard to the ground. Operate the left lift cylinder control lever to extend the left lift cylinder, and the swing support rotates clockwise until the lock pin of the centershift cylinder aligns with the center hole of the swing support.

3. Press the centershift cylinderswitch on the control panel to insert the lock pin into the centerhole of the swing support.

4. Repeat step 2 and 3 to lower the right side of the moldboard to the ground. Operate the right lift cylinder to rotate the swing support counterclockwise.

NOTE :
If the locking pin cylinder is hard to be pulled out , please place the blade against the ground, push the lever for the lifting cylinder and swing cylinder back and forth intensively to shake the machine.

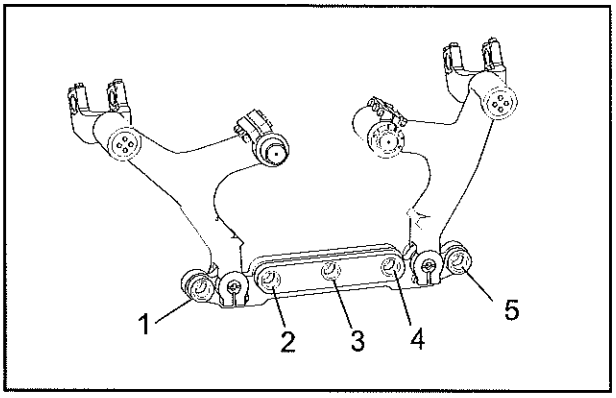

Fig.4-79

1. Hole
2. Hole
3. Hole
4. Hole
5. Hole
6. Hole

4.7 Park the Machine

4.7.1 Stop the Machine

1. Park on a level ground. If it is necessary to park on a slope, chock the wheels securely.
2. Release the throttle pedal to decrease the engine speed.
3. Apply the service brakes in order to slow the machine.
4. Apply the transmission control lever to stop the machine, then place the transmission control lever in the P position.
5. Lower the work equipment to the ground. Apply a slight downward pressure.

4.7.2 Engine Shutdown (Normal)

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

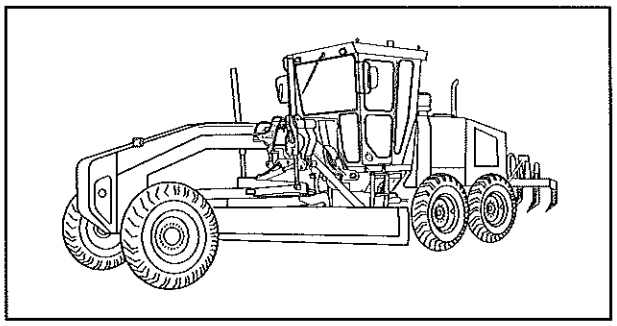

Fig.4-80

2. Lower the moldboard and other work equipment to rest on the ground.

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.

3. Run the engine at idle speed for about 5 minutes.
4. Turn the key in the keyswitch to the "O" position.

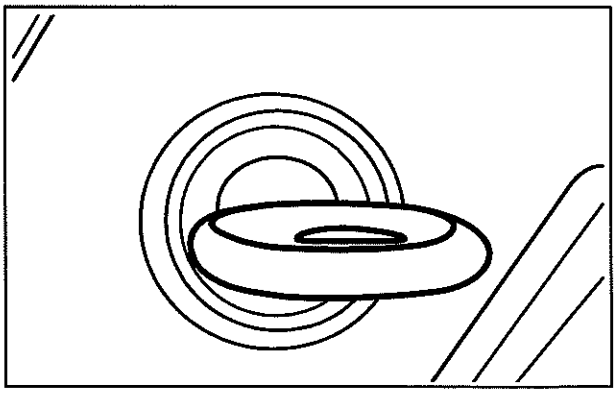

Fig.4-81

5. Move all the control levers forward and backward to relieve pressure in the hydraulic system. Reset the hydraulic levers to their fixed positions.

6. Remove the key from the keyswitch.

NOTE :

For short-term parking and if the machine is at an unsafe place, leave the key in the keyswitch, turn it to the "I" position and use the hazard flasher switch on the front console to activate the hazard flasher lamps. This can help prevent accidents.

4.7.3 Engine Shutdown (Electrical Malfunction)

Follow this procedure if the engine does not stop when the keyswitch is already set to the "0" position:

1. Remove the key.

2. Open the right front access panel of the engine compartment and locate the battery disconnect switch.

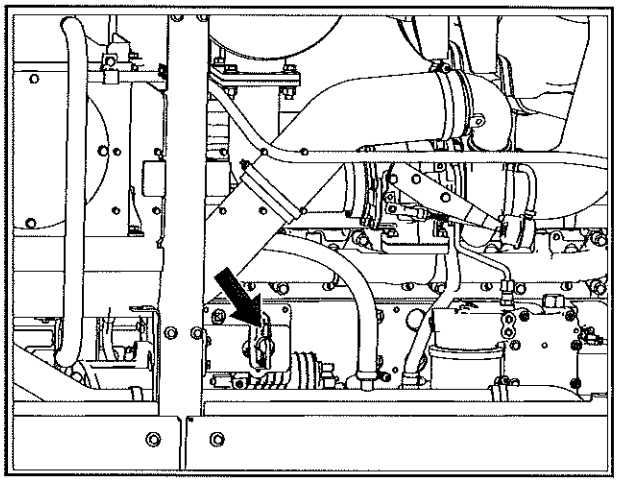

Fig.4-82

3. Rotate the battery disconnect switch counterclockwise to the OFF position.

4. Close the access panel.

4.7.4 Leave the Machine

- Use the steps and the hand-holds when you dismount being sure to face the machine and use both hands.
- Inspect the engine compartment for debris. Clean out any debris in order to avoid a fire hazard.
- Remove all flammable debris from the front bottom guard through the access doors in order to reduce a fire hazard. Discard the debris properly.
- Turn the battery disconnect switch counterclockwise to the OFF position.
- Lock all access panels and compartments.

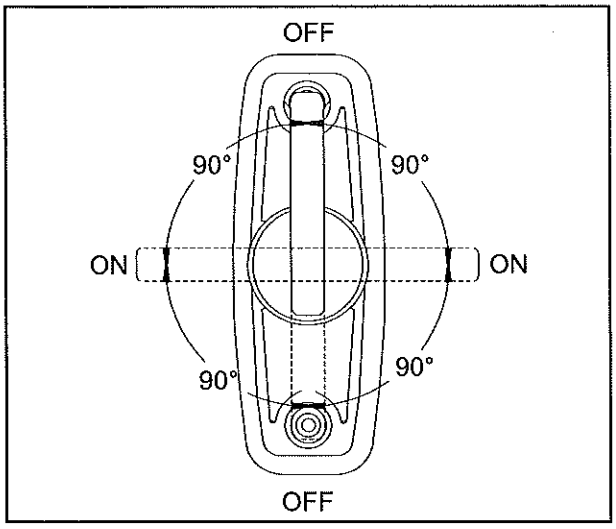

Fig.4-83

4.8 Tow the Machine

⚠ WARNING

Make sure that the wire ropes used for towing the machine are rated for the task.
Do not use wire ropes with broken strands, reduced diameter or knots.
Always wear protective gloves when handling wire ropes.
Never tow the machine on a slope.
Never stand between the towing machine and the disabled machine when performing towing operations.
Move the machine slowly and avoid imposing sudden load on the wire ropes.
Failure to observe and follow this warning could result in equipment damage, serious injury or death.

NOTICE

Towing a disabled machine may cause transmission damage. Therefore, never tow a disabled machine more than 100 yd (90 m) if at all possible. Always use a flat-bed trailer to haul the machine if long-distance moving is required. Move at a maximum speed of 1.2 mph (2 kph) when towing the machine. Failure to observe this notice may result in equipment damage.

In case of an engine malfunction, the motor gradercan be towed to a nearby maintenance location. Always haul the machine if long-distance moving is required.

This machine is equipped with parking brakes that are applied by springs and are released by hydraulic pressure. The parking brake must be disengaged before towing the machine because it cannot be moved if the parking brake is engaged.

These towing instructions are for moving a disabled machine for a short distance at low speed. Move the machine at a speed of about 1 mph or less to a nearby location for repair. These instructions are only for emergencies.

Take the following steps before towing the machine:

- Chock tires at their front or rear while connecting it to the towing vehicle.
- Remove the drive shaft connecting the transmission and the rearaxle.
- Connect wire ropes and hooks from the rescue machine to solid locations on the disabled machine; also, place wood blocks or other protective materials between where the wire ropes contact the disabled machine to prevent damage to the wire rope or the machine.
- Remove the chocks from the wheels of the disabled machine when ready to begin towing.

Tow the disabled machine carefully and slowly to the nearest repair facility with the wire ropes parallel to the ground and aligned with the machine frame.

4.9 Transport the Machine

4.9.1 Preparation Before Loading

- Perform warm-up machine operation before loading/unloading the machine in cold weather.
- Take care to prevent damage by sea water, salt mist and corrosion. For example, applying wax on paint; applying anti-rust oil on machined surfaces and cylinder piston rods and then wrapping them in oiled paper.

4.9.2 Check Before Loading

- Verify the length, width, height and weight of the trailer is suitable for loading the machine.
- Verify that the groundis solid and flat. Check whether there is sufficient distance between the machine and the road edge.
- Verify that wheel chocks have been set under the trailer wheels.
- Verify that the access ramp to the trailer is wide and strong enough to support the machine and that the gradient of the access ramp is less than 15°.

4.9.3 Load

- Raise the moldboard and all other installed work equipment to their highest positions. Position them to the traveling position.
- Align the center line of the machine with that of the trailer.
- Slowly and carefully drive the machine onto the ramp and trailer.
- After the machine is on the trailer, correctthe machine position, straighten the articulation frame, adjust the front wheels to be vertical, lower the work equipment to the required position for traveling, and pad them with rubber or soft wood.
- Shut down the engine and remove the key from the keyswitch.

- Lock the cab window and close the engine compartment (if it had been opened).

4.9.4 Transportation

- Secure the four machine corners and work implements to the trailer with chains or cables. Connect the chains or cables to the motor grader frame, being careful not to have them cross or press on hydraulic pipelines or hoses.
- Secure the articulation steering with the pull rod. Place wheel chocks at the wheels, then take other measures to secure the motor grader firmly in place.
- Set the battery disconnect switch to the OFF position.

4.9.5 Unload

1. Disconnect all chains and cables that secure the machine to the trailer.
2. Start the engine and let it warm up as detailed earlier this manual.
3. Lift the work equipment to their highest positions.
4. Remove the chock and the machine wheels.
5. Move the machine slowly towards the end of the trailer.

NOTE :
The junction of the end of the trailer and its ramp may be steep. Be extra careful when passing over it.

NOTE :
When the machine moves onto the ramp and down to the ground, drive the machine carefully until it is completely free of the ramp to prevent possible hydraulic cylinder damage and hard contact between the moldboard and ground.

SANY

Maintenance

5.Maintenance

5.1 General Maintenance Information

5.1.1 Introduction

Do not perform any maintenance and/or repairs not authorized in this Operation & Maintenance manual. Always observe and follow all safety precautions.

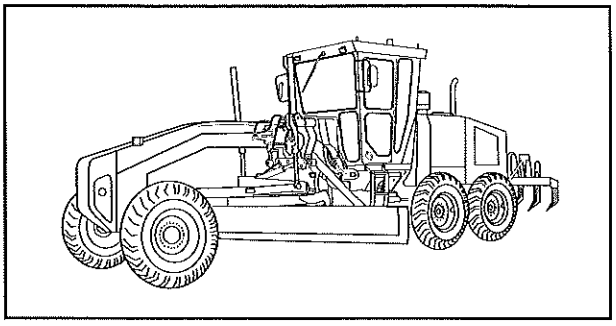

Fig.5-1

5.1.2 Checks Before Maintenance

Read and understand the Safety section of this manual before proceeding with any inspection or maintenance procedures.

Review the Maintenance Log and follow these points to ensure your safety:

- Do not perform any maintenance not authorized in this manual's Maintenance section for this machine. If maintenance is required that is not listed within this manual, contact your Sany dealer before proceeding.
- Avoid working on the machine while the engine is runningunless required to do so in the procedure. If the engine must remain running duringa 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.

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.

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.

After performing maintenance or repairs to the machine, always take time to inventory your tools, parts used and nuts and bolts to be sure none of these items were left on or inside the machine.

5.1.4 Hour Meter Reading

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

NOTE :
See "Initialization Screens" on page 3-43,

5.1.5 Genuine Sany Replacement Parts

Use genuineSany replacement partswhen 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 coolants. Never mix different lubricant brands or viscosities. The use of unapproved lubricants and coolants or mixing different lubricant brands or viscosities may result in shortened service life or system failure of the machine.

5.1.7 Weld, Drill, Cut or Grind on the Machine

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

⚠ CAUTION

Disconnect the battery prior to welding. Failure to disconnect the battery could result in damage to the machine and personal property or cause the machine to operate improperly. Failure to disconnect the battery could also result minor or moderate injury.

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.

5.1.8 Clean Parts or the Machine

Never clean the machine with caustic chemicals or steam cleaners. Instead, use mild soaps and a pressure washer to clean the machine. Always protect electrical parts when cleaning the machine. Never flood or pressure-wash the inside of the operator's cab. Use only nonflammable cleaning solvents. Never use flammable liquids to clean parts or systems.

NOTICE

Failure to protect the electrical system when cleaning the machine may damage the machine or cause it to operate improperly.

5.1.9 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.

5.1.10 Hydraulic Oil Inspection

Inspect hydraulic oil 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 oil for contamination may damage the hydraulic system or cause the machine to operate improperly.

5.1.11 Inspection and Maintenance in Adverse Environments

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.

For heavy-load operation and deep excavation, add grease to the pins of the work equipment prior to each operation. Cycle the operation of all working parts several times before refilling with additional grease.

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 bolt sand nuts. Add oil and lubricating grease as needed.

NOTE :
See "Travel and Operation Precautions" on page 2-9.

Near Ocean (Salt Air) Environments

Before operating the machine, inspect each plug and pin for looseness. Apply grease where rust is found, especially at connecting 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.

Dusty Environments

Clean the following components:

- Engine air filter: Clean the dust evacuator frequently.

NOTE :
See "Secure the Machine for Maintenance" on page 5-48.

- Radiator: Clean the radiator core frequently to prevent blockage.

NOTE :
See "Secure the Machine for Maintenance" on page 5-80.

- Fuel equipment: Drain sediment frequently.

NOTE :
See "Maintenance Log" on page 5-47.

- Fresh-air and recirculation filters: Check/replace filters frequently.

Cold Environments

In extremely cold environments (32° F (0°C)), lubricate only with the oils shown in"Engine Oil Viscosity/Temperature Data" on page 5-11 Sany recommends the use of fuels identified in"Location, Capacity and Type" on page 5-10 for extremely cold environments. Prior to starting the engine, ensure that the battery is fully charged and that the battery case and the cables have not cracked.

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, long-time duty cycle, etc., lubricating intervals should be shortened. Always

follow the schedule described in this manual until enough experience is obtained to establish a new schedule.

5.2 Torque Values

5.2.1 Introduction

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.

5.2.2 Specific Torque Values

Table5–1

Bolts	Tightening Torque	
	(ft•lb)	(N•m)
Wheel lug nut	332	450
Draw-bar ball and socket bolts	400-418	540-565
Battery pole clamp bolts	7.2	9.8
Hydraulic tank drain plug	43.4 - 57.9	58.8 - 78.5

5.2.3 General Torque Values

Always refer to the chart on this page if the tightening torque value cannot be found anywhere in this section of the manual.

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. When replacing bolts or nuts, use genuine Sany parts of equivalent size.

Hardware

Table5–2

Bolt Size	Tightening Torque		Bolt Size	Tightening Torque	
	ft•lb	N•m		ft•lb	N•m
M6	7 - 9	10 - 12	M16	158 - 189	214 - 256
M8	18 - 22	25 - 30	M18	218 - 260	295 - 353
M10	36 - 44	49 - 59	M20	308 - 39	417 - 500

Table5–2 (continue)

Bolt Size	Tightening Torque		Bolt Size	Tightening Torque	
	ft•lb	N•m		ft•lb	N•m
M12	63 - 76	86 - 103	M22	419 - 502	568 - 680
M14	101 - 121	137 - 164	M24	53 - 637	722 - 864

NOTE :

The torques shown in the chart above are for Grade 10.9 bolts.

NOTE :

All specifications shown are for "dry", not "wet" torque values.

Hoses

Hydraulic hoses are tightened according to the torque values shown below:

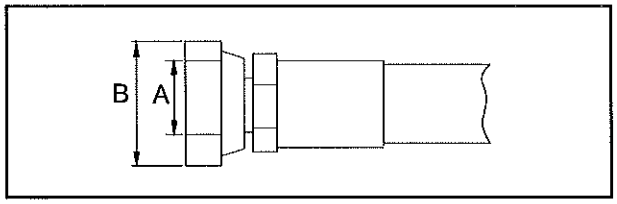

Fig.5-2

A. Nominal thread B. Hex size number

Table5–3

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.

Fittings

Table5–4

Port Fitting	Tightening Torque		Tube Fitting	Tightening Torque	
	N•m	ft•lb or (in•lb)		N•m	ft•lb or (in•lb)
M14	34.3 ± 5	25 ± 4	G1/8	16.7 ± 2	(148 ± 18)
M16	54 ± 5	40 ± 4	G1/4	36.7 ± 2.5	27.1 ± 2
M18	70 ± 10	52 ± 7	G3/8	73.5 ± 5	54 ± 4
M20	93 ± 10	69 ± 7	G1/2	107.8 ± 7.8	80 ± 6
M22	125 ± 10	92 ± 7	G3/4	161.7 ± 14	119 ± 10
M24	142 ± 20	105 ± 15	G1	220 ± 25	162 ± 18
M24	68.6 ± 10	51 ± 7			
M26	180 ± 20	133 ± 15			
M20	49 ± 5	36 ± 4			
G3/8	68.6 ± 20	51 ± 15			
G3/4 (A)	1,661.7 ± 14	1,226 ± 10			

5.3 Fluids & Lubricants

5.3.1 Introduction

Always use Sany-approved lubricants, coolants and filters. Sany is not responsible for damage caused by using unauthorized lubricants and coolants.

NOTICE

Never mix fluids of different brands or viscosities (weights) and never overfill the system you are servicing. Failure to follow these standards can cause damage to the machine or cause the machine to operate improperly.

5.3.2 Location, Capacity and Type

Table5–5

Location	Approx. Capacity*	Lubricant/Coolant
Engine	4.8 gal. (18 L)	See "Engine Oil Viscosity/Temperature Data" on page 5-11. Oils of this type include Valvoline Premium Blue or Valvoline Premium Blue Extra.
Fuel tank	145.0 gal. (380 L)	See "Fuel" on page 5-11. Use #2 Diesel Fuel or mixture of #2 Diesel and #1 Diesel Fuels in cold weather conditions.
Engine cooling system	13.0 gal. (49.2 L)	See "Engine Coolant" on page 5-15. Sany recommends brands that include ES Compleat, Fleetcool EX, and ES Optimax.
Differential	11.6 gal. (44 L)	See "Differential and Circle Drive Oil" on page 5-13. Recommended brands are made by Mobil, Chevron and Shell.
Circle drive	1.7 gal (6.5 L)	
Transmission	14.5 gal (55 L)	See "Transmission and Tandem Drive Case Oil Viscosity/Temperature Data" on page 5-14. Recommended brands are produced by Conoco, Mobil, Shell, Chevron, Exxon and Texaco.
Hydraulic system (including tank)	29.1 gal. (110 L)	See "Hydraulic Oil Viscosity/Temperature Data" on page 5-13. Recommended brands are produced by Conoco, Mobil, Shell, Chevron, Exxon and Texaco.
Tandem drive case	19.0 gal (72 L)	See "Transmission and Tandem Drive Case Oil Viscosity/Temperature Data" on page 5-14. Oils of this type include Valvoline Premium Blue or Valvoline Premium Blue Extra.
Anaerobic sealant	NA	Any anaerobic sealant having properties similar to LOCTITE 243 (Blue).
Spray lubricant	NA	Any lithium grease based spray lubricant.
Mineral spirit	NA	Type II odorless and/or Class 1 (high flash point.)

NOTE :
The capacities in the above table are approximations. For exact capacities, use the inspection points, inspection plugs, dipsticks, and sight glasses.

5.3.3 Fuel

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

NOTE :
See "Fire Safety" on page 2-6 and "Location, Capacity and Type" on page 5-10.

Cummins® recommends the use of No. 2 ultra-low sulfur diesel (ULSD) fuel for all normal operations. Use of No. 1 diesel fuel in a blend with No. 2 diesel fuel is permitted in cold weather environments (below 32° F (0° C)).

NOTE :
Cummins® 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.

NOTE :
If fuel waxing or bacteria should occur in the fuel system, contact your Sany dealer.

Be sure that there is no water or any foreign material in the fuel.

Take appropriate precautions to prevent fuel contamination during refueling.

NOTICE

Never dilute fuels. Damage to the injection system can result which causes the machine to operate improperly.

NOTE :
B20 Biodiesel blend with ULSD is approved by Cummins® for Tier 4 engines. See your Cummins® Engine Owners Manual for details.

5.3.4 Engine Oil Viscosity/Temperature Data

Any engine oil meeting API category ck-4 or CES 20081 is acceptable. Due to its comparatively better lubricating characteristics (including improved oil consumption, engine operation in frigid climates, and continued lubrication in high temperatures), SAE 15W-40 is recommended for most 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. Contact a SANY dealer for additional information.

Component or System	Type and Specification	Viscosity	Ambient Temperature °F (°C)	
			Minimum	Maximum
Engine	Diesel Engine Oil API-CI-4/API-CH-4 CES 20081	SAE 0W-20	-40 (-40)	50 (10)
		SAE 0W-30	-40 (-40)	86 (30)
		SAE 0W-40	-40 (-40)	104 (40)
		SAE 5W-30	-22 (-30)	86 (30)
		SAE 5W-40	-22 (-30)	104 (40)
		SAE 10W-30	-4 (-20)	104 (40)
		SAE 10W-40	-4 (-20)	122 (50)
		SAE 15W-40	5 (-15)	122 (50)

5.3.5 Lubricating Grease/Temperature Data

Table5–6

Temperature ° F (° C) Grease Type	Summer	Winter
NGLI #2 molybdenum disulfide lithium-based grease		
NGLI #1 molybdenum disulfide lithium-based grease		

NOTE :
Always use clean EP (extreme pressure) grease when greasing the machine. Avoid using low viscosity greases. Sany recommends Chevron Starplex® Grease EP 2 or equivalent. See "Grease" on page 5-16.

5.3.6 Differential and Circle Drive Oil

Component or System	Type and Specification	Viscosity	Ambient Temperature °F (°C)	
			Minimum	Maximum
Differential and Circle Drive	Heavy-Duty Gear Oil: API GL-5 AGMA Standard 9005-D94 ISO 3448 Grade 220	SAE 75W-90	-40 (-40)	50 (10)
		SAE 80W-90	-4 (-20)	86 (30)
		SAE 85W-90	5 (-15)	104 (40)
		SAE 85W-140	14 (-10)	86 (30)
		SAE 90	32 (0)	104 (40)

5.3.7 Hydraulic Oil Viscosity/Temperature Data

Hydraulic oil is an important part of the hydraulic system: It lubricates hydraulic system components, carries heat away from components, and contains anti-corrosion additives and detergents.

Hydraulic system malfunctions are often caused by poor machine maintenance practices. Following these guidelines will result in proper hydraulic system maintenance:

- Do not add use additives in the hydraulic oil.
- Replace hydraulic oil that has been subjected to overheating or damaged components.
- Change the hydraulic oil filters as recommended.
- Keep the hydraulic oil tank filled to the full level.
- Keep the hydraulic oil cooler free of dust and debris.
- Cap and plug all openings after removing components for service or repair.

Component or System	Type and Specification	Viscosity	Ambient Temperature °F (°C)	
			Minimum	Maximum
Hydraulics	Normal Temperature Hydraulic Oil HM / L-HM Anti-Wear Hydraulic Oil: AFNOR NF E 48-603 HM ISO 11158 L-HM P68, P69, P70 M-2950 S, I-286S HF-0, HF-1, HF-2 Q/SH303 0550	ISO 32	-4 (-20)	41 (5)
		ISO 46	-4 (-20)	50 (10)
		ISO 68	5 (-15)	122 (50)
	Wide-Temperature Hydraulic Oil	ISO 32	-22 (-30)	50 (10)
		ISO 46	-22 (-30)	59 (15)

Component or System	Type and Specification	Viscosity	Ambient Temperature °F (°C)	
			Minimum	Maximum
	HV / L-HV Low-Temperature Hydraulic Oil: AFNOR NF E-48-603 HV ISO 67434/4 HV DIN 51524 P3 HVLP P68, P69, P70 M-2950 S, I-286S Q/SH303 0661	ISO 68	-13 (-25)	122 (50)

NOTE :

Selection of the proper hydraulic oil is based on local operating climate and conditions:

- Use ISO VG 46 antiwear hydraulic oil in generally temperate climates.
- Use ISO VG 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.

See the NOTICE (below) for additional information.

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 1,000 - 1,200 rpm and perform only no-load traveling for at least 30 minutes or until the hydraulic oil temperature is at least 68° F (20°C).
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.

5.3.8 Transmission and Tandem Drive Case Oil Viscosity/Temperature Data

Component or System	Type and Specification	Viscosity	Ambient Temperature °F (°C)	
			Minimum	Maximum
Power Shift Transmission	Transmission Oil: TO-4	SAE 0W-20	-40 (-40)	50 (10)
		SAE 0W-30	-40 (-40)	68 (20)
		SAE 5W-30	-22 (-30)	68 (20)
		SAE 10	-4 (-20)	50 (10)

Component or System	Type and Specification	Viscosity	Ambient Temperature °F (°C)	
			Minimum	Maximum
		SAE 20	5 (-15)	68 (20)
		SAE 30	32 (0)	95 (35)
		SAE 40	41 (5)	113 (45)
		SAE 50	50 (10)	122 (50)
Tandem Drive Cases	Transmission Oil: TO-4 API GL-4	SAE 0W-30	-40 (-40)	68 (20)
		SAE 5W-30	-22 (-30)	68 (20)
		SAE 20W-30	5 (-15)	104 (40)
		SAE 50	50 (10)	122 (50)

5.3.9 Engine Coolant

Engine coolants used can be any brand meeting the Cummins® Engine Standard Classification (CES) 14603. Brands meeting these requirements include ES Compleat, Fleetcool EX, and ES Optimax.

Supplemental Coolant Additive (SCA)

Cummins® recommends using the following Fleetguard® products for coolant additive and glycol level testing: 3- Way™ Heavy-Duty Coolant Test Kits part number CC2602B and for contamination/replacement limits, part number CC2607B. Perform the tests in accordance with the instructions included with the test kits.

If the SCA concentration level is between 1.2 and 5.0 units/gal. (0.3 and 1.3 units/L), either install a chemical filter containing the appropriate amount of SCA or add the equivalent amount of liquid SCA and install a chemical-free filter.

If the SCA concentration level is less than 1.2 units/gal. (0.3 units/L), add 5 oz. (0.15 L) of Fleetguard® DCA4 or Fleetcool liquid per 1 gal. (3.8 L) of cooling system capacity and install a chemical-free filter.

If the SCA concentration level is greater than 5.0 units/gal. (1.3 units/L), installa chemical-free filter. Do not install a chemical coolant filter or add liquid Extender/SCA.

Test the SCA level at each oil change. When SCA units drop below 5.0 units/gal. (1.3 units/L), resume installing chemical filters or using the equivalent liquid SCA dosage and installing chemical-free filters.

Consult your Sany dealer or Cummins® Filtration Customer Assistance for detailed Fleetguard® product information and assistance at 800-223-4583 or http://www.cumminsfiltration.com.

Cummins® recommends using (Restore or Restore Plus) by Fleetguard® for cleaning and flushing the cooling system. Follow the instructions on the flushing solution label.

5.3.10 Lubricants

Sany recommends using only those lubricants listed in "Location, Capacity and Type" on page 5-10.

NOTICE

Some commercially available lubricants and additives may cause harm. Use only those lubricants recommended in this manual. Using other lubricants can cause damage to the machine and could cause the machine to operate improperly.

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.

5.3.11 Grease

Always use clean EP (extreme pressure) grease when greasing the machine. Avoid using low-viscosity greases. Sany recommends Chevron Starplex® Grease EP 2 or equivalent designed for:

- Heavy-duty bearings and general industrial lubrication.
- Heavy-duty plain and rolling element bearings operating under severe conditions, including shock loading in wet environments.

5.3.12 Windshield Washer Fluid

Use only automotive windshield washer fluid.

⚠ CAUTION

Never use flammable liquids that could ignite or explode. If not avoided, this could result in minor or moderate injury.

NOTICE

Never use tap water, dirty water or fluids that could freeze, clog or damage the system. Using these fluids could result in damage to the machine and improper machine operation.

5.4 Daily Maintenance

5.4.1 Introduction

NOTICE

Failure to perform the following procedures when and how directed can cause damage to the machine and cause the machine to operate improperly.

5.4.2 Secure the Machine for Maintenance

1. Obtain the Maintenance Log for this machine and complete it at the close of all maintenance procedures.

2. Read and understand all of the tasks listed in this section.

3. Follow the Lockout/Tagout procedure in the Safety section of this manual.

NOTE :
See "Lockout/Tagout Procedures" on page 2-15

NOTE :
Allow the systems time to cool down before proceeding with any maintenance.

4. With the machine secured, proceed with the following:

- Exterior Cleaning
- Tires
- Oil Leaks
- Sheet Metal
- Decals
- Circle Drive Pinion Teeth
- Moldboard Cutting Edges and End Bits
- Front Scarifier Tips & Rear Ripper Tips
- Axle and Moldboard Bolts
- Tandem Drive Breathers
- Articulation Bearings
- Axle Oscillation Bearing
- Engine Coolant level
- Radiator Fins
- Engine Serpentine Belt
- Hydraulic Line Connections
- Hydraulic Oil Tank
- Transmission Oil Level
- Air Conditioner
- Engine Oil Level
- Air Conditioner Compressor Belt
- Air Filter
- Primary Fuel Filter
- Operating Functions
- Fuel Level
- Seat Belt

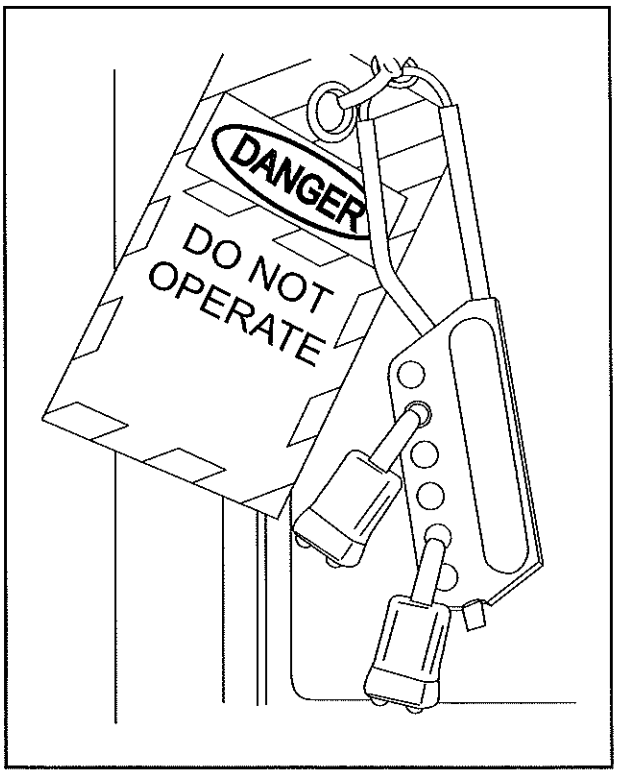

Fig.5-3

- Electrical System

Exterior Cleaning

1. Clean the motor grader.

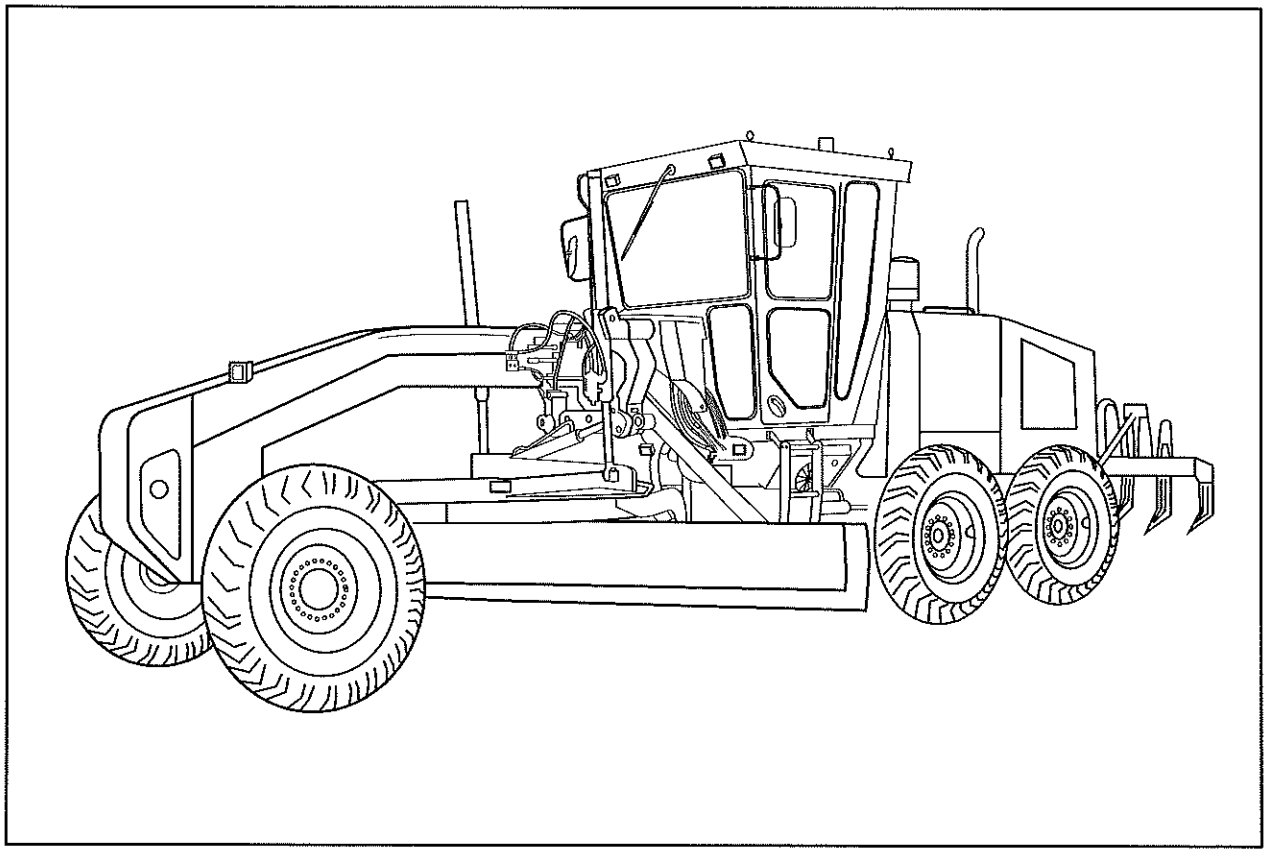

Fig.5-4

2. Ensure that all mud, dirt, sand and gravel has been removed from the:
   - Moldboard, guide bar and cutting edge.
   - Circle
   - Tires
   - Front axle, tilting joint, steering knuckle
   - Tandem drive case
   - Rear axles

Tires

Check tire pressure (1) and torque on all tire lug nuts (2).

NOTE :
Front tire pressure is 34.4 psi (2.37 bar), rear tire pressure is 39.9 psi (2.75 bar).

NOTE :
The wheel lug nuts should be torqued to 332 ft•lb (450 N•m).

Visually check the tires and wheel rims for damage and excessive wear.

NOTE :
Contact your Sany dealer for any of your tire needs.

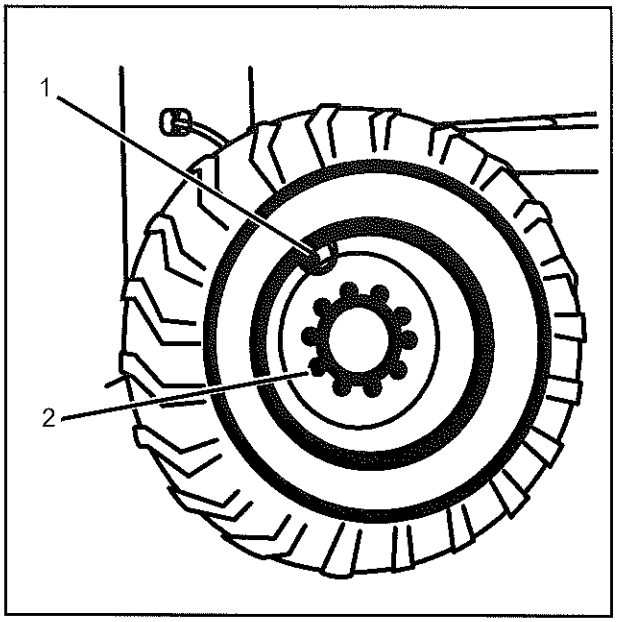

Fig.5-5

1. pressure 2. Lug nuts

Oil Leaks

Check for leaks in the following areas:

- Pump
- Drive motor
- Control valves
- Hoses and flanges
- Engine
- Tandem drive case
- Transmission case

Repair all leaks as necessary.

Sheet Metal

Check the sheet metal panels and covers for loss, damage, loose connections or missing bolts.

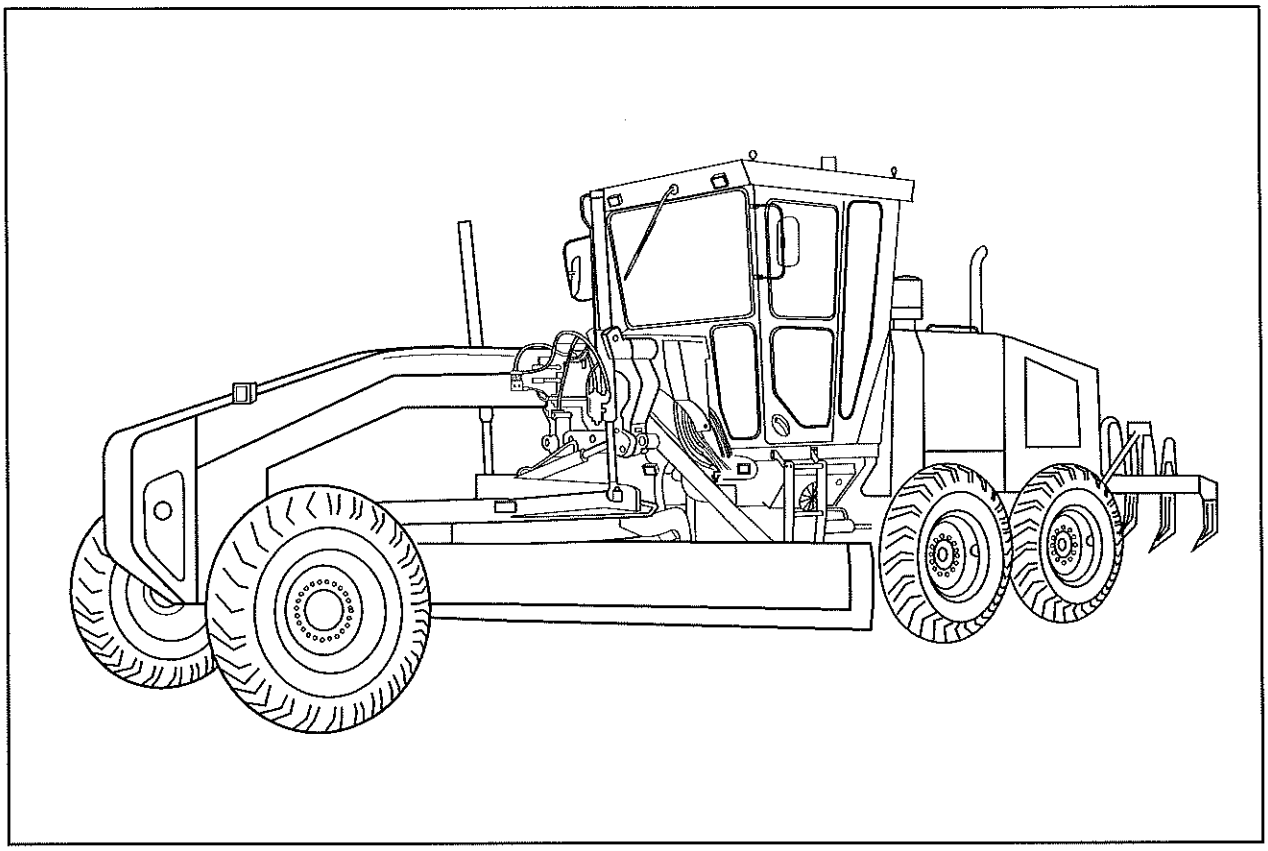

Fig.5-6

NOTE :

Repair or replace sheet metal parts as needed using Sany-approved parts.

Decals

All safety decals should be visible and complete.

Circle Drive Pinion Teeth

⚠ CAUTION

Be sure the engine is shut down and that the moldboard and attachments are lowered to the ground. Failure to observe and follow this caution could result in sudden movement by the moldboard or work attachment, causing minor or moderate injury.

1. Locate then clean the grease fitting.
2. Apply appropriate grease to the circle drive pinion teeth.
3. Start the machine, then activate the circle drive in order to swing the circle for lubricating the engaged teeth.

Moldboard Cutting Edges and End Bits

⚠ CAUTION

Place blocks under the moldboard to properly support it before replacing moldboard components. Failure to observe and follow this caution could result in death or serious injury.

1. Raise the moldboard with the engine running.

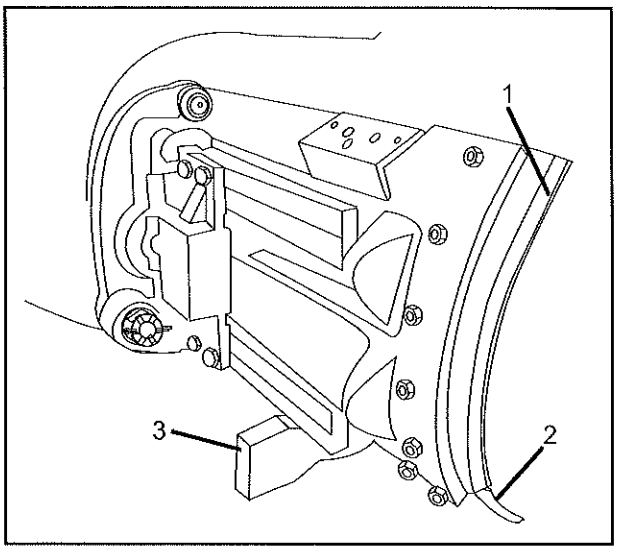

Fig.5-7

1. End bits
2. Cutting edges
3. Supporting blocks

2. Place only enough supporting blocks under the moldboard so the end bits (1) and cutting edges (2) can be inspected and replaced if necessary, then lower the moldboard onto the supporting blocks (3).

3. Shut down the engine and inspect the end bits (1) and cutting edges (2) for damage or excessive wear.

4. Contact your Sany dealer if replacement is required.

Front Scarifier Tips & Rear Ripper Tips

1. With the engine running, raise the front scarifier and rear ripper to a convenient working height.

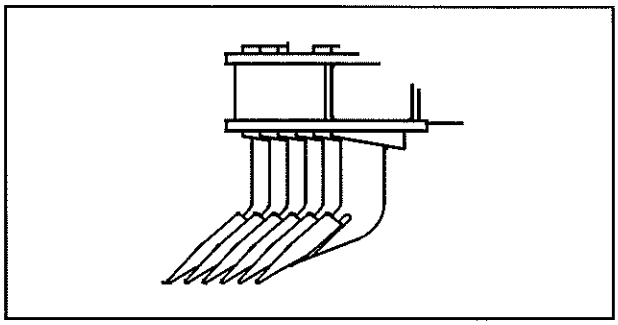

Fig.5-8

2. Place supporting blocks under the scarifier and ripper to ensure they remain securely at this position, then shut down the engine.

3. Inspect the tips of both devices for damage or excessive wear.

4. Contact your Sany dealer if replacement is required.

Axle and Moldboard Bolts

Tighten or replace any loose or broken bolts on the axles, and moldboard assembly.

NOTE :

See "General Torque Values" on page 5-7 for further torque information.

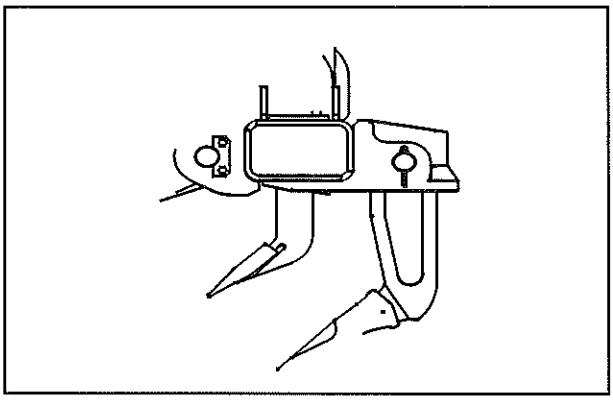

Fig.5-9

Tandem Drive Breathers

1. There are two breather valves (1) between the rear tires on either side of the machine.

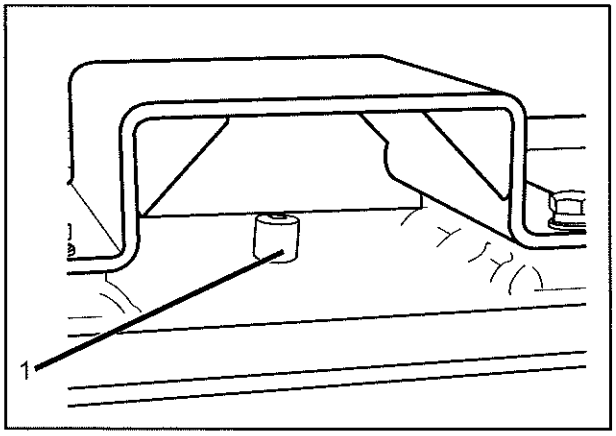

Fig.5-10

1. Breather valves

2. Remove any dirt or debris from the area around the breathers.

Articulation Bearings

NOTE :

Sany recommends the use of either NGLI #1 (winter) or #2 (summer) molybdenum disulfide lithium- based grease for lubricating this component.

1. Locate then clean the articulation grease fittings which are located on the right side of the front frame.

NOTE :

There is an upper grease fitting (1) for the upper articulation bearing and a lower grease fitting (2) for the lower articulation bearing

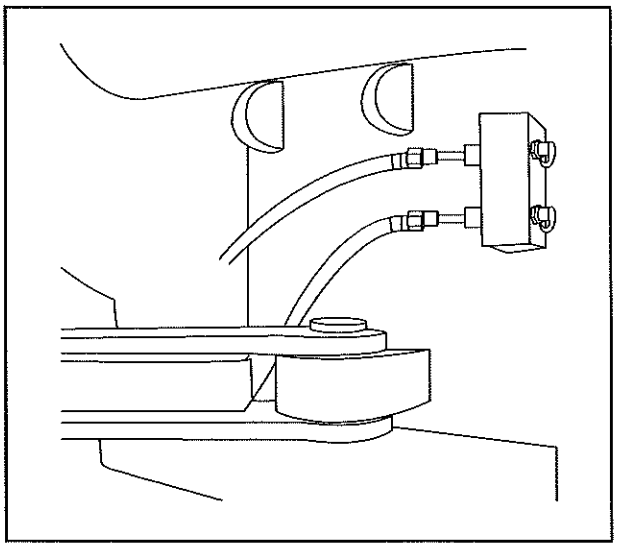

Fig.5-11

2. Inject grease through each fitting.

Axle Oscillation Bearing

1. Locate then clean the axle oscillation grease fitting which is located on the front frame as shown.

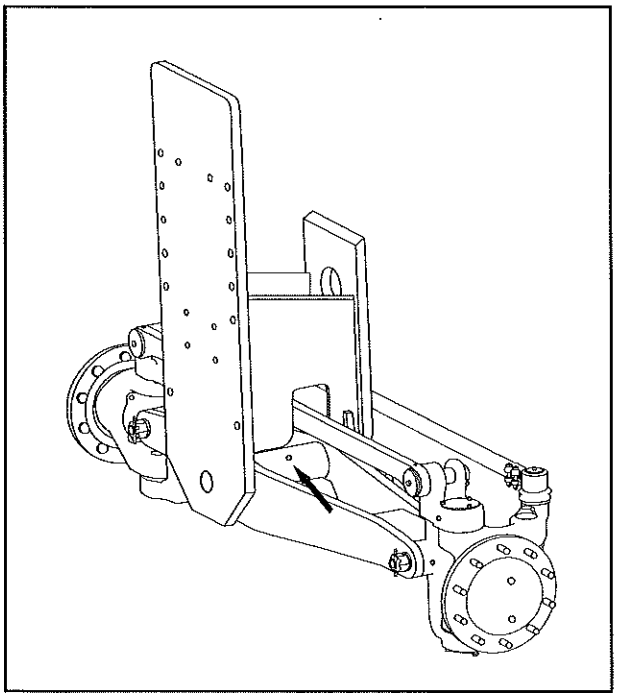

Fig.5-12

2. Inject grease through the fitting.

Engine Coolant Level

⚠ CAUTION

Do not remove the filler cap while the engine is hot. Engine coolant is under pressure when hot and will spurt out. Always wait for the engine to cool to outdoor ambient temperatures before removing the filler cap. Failure to follow this warning could result in minor or major injuries.

NOTE :

See "Engine Coolant" on page 5-15.

1. Shut down the engine and allow the machine to cool to ambient temperature.

2. Locate the coolant recovery tank cap (a) accessible from the top rear of the machine.

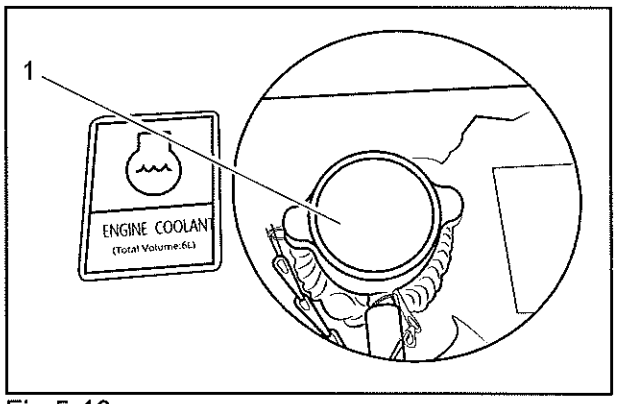

Fig.5-13

1. Coolant recovery tank cap

3. Slowly loosen the cap to relieve any remaining pressure inside the recovery tank, then slowly remove the cap.

4. Open the left front engine compartment panel and locate the recovery tank (2).

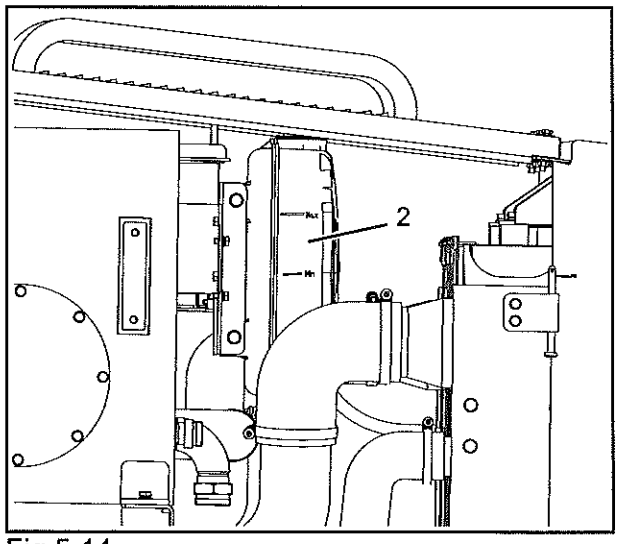

Fig.5-14

2. Recovery tank

5. Check that the coolant level is between the top and bottom scale lines.

6. If not, slowly add coolant to the recovery tank until the level reaches the lower sight glass.

NOTE :

The coolant system capacity is 13 gal. (49.2 L).

7. Reinstall the cap onto the coolant recovery tank, start the engine and run it at low idle speed until the coolant temperature gauge on the monitor shows 60°C - 83°C.

8. Recheck the sight glass. If necessary, slowly remove the filler cap and repeat steps 6, 7 and 8 as required.

9. Close the engine compartment panel.

Radiator Fins

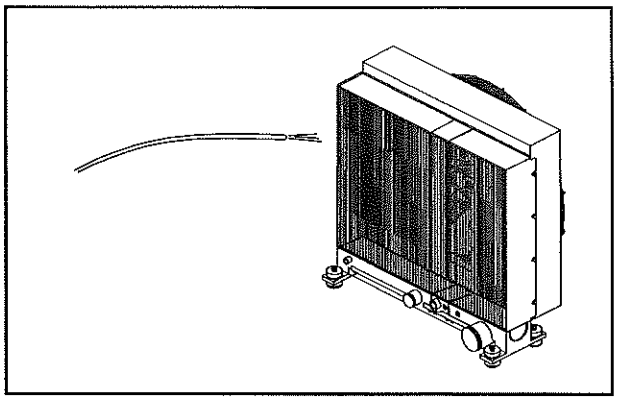

Fig.5-15

1. Check and clean any debris from between the radiator core and radiator fins with compressed air.

NOTICE

To avoid damage to the radiator fins, the compressed air pressure should not exceed 29 psi (0.2 MPa) and the distance between the end of the compressed air hose nozzle and the radiator fins should be not less than 2 in. (50 mm).

NOTICE

When cleaning the radiator core with compressed air, be careful not to deform or otherwise damage the radiator fins. Damaged radiator fins may require repair or even replacement of the entire radiator.

2. Start the engine and carefully check the air flow with your hand on the air outlet of the radiator and the engine running at idle speed.

⚠ CAUTION

Be very careful to keep your hands and any loose clothing away from moving engine parts when performing this step. Failure to observe and follow this caution could result in serious injury.

Engine Serpentine Belt

1. Open the right front engine compartment access panel (1).

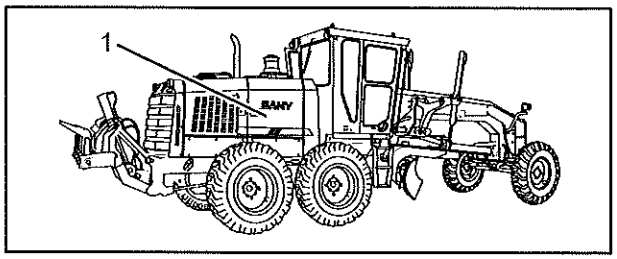

Fig.5-16

1. Panel

2. Locate the engine serpentine belt (2) and visually inspect it for the following:

- **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 the primary contributors.
- **Pulling**: Belt material is sheared off from the ribs. Lack of tension, misalignment, worn pulleys 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.

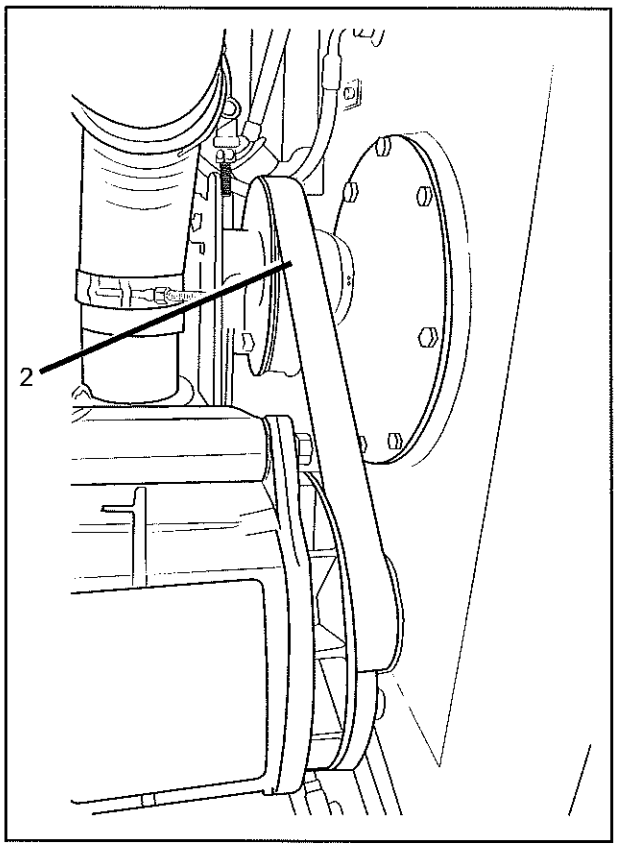

Fig.5-17

2. Engine serpentine belt

- **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 can be frayed, indicating damage from foreign objects such as dirt, gravel or similar debris.

3. Contact your Sany dealer to replace a damaged serpentine belt.

Hydraulic Line Connections

1. Open the left rear engine access panel (1).

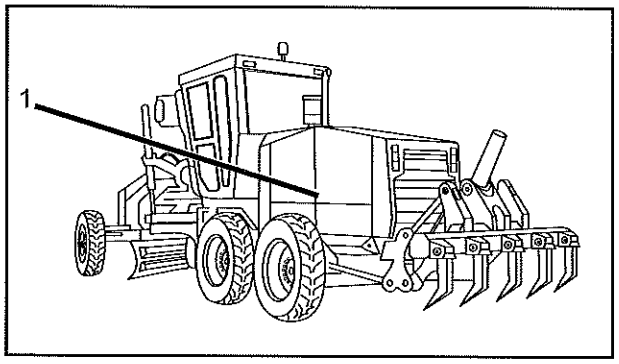

Fig.5-18

1. Panel

2. Locate the hydraulic tank and examine all attached hoses for cracks, damage or abnormal wear.

NOTE :
Replace any hose if it is cracked, damaged or worn.

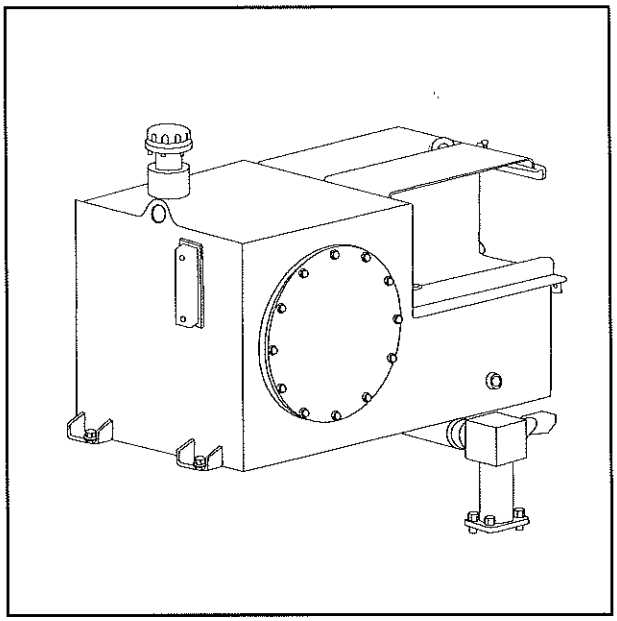

Fig.5-19

3. Check fittings at both ends of all flexible hoses.

NOTE :
See "General Torque Values" on page 5-7 for further information.

NOTE :
Do not use thread sealant when reinstalling loose bolts and installing new bolts.

Hydraulic Oil Tank

⚠ CAUTION

Hydraulic oil may be hot and under pressure. Always wait for the machine to cool down to below 160° F (71°C) before attempting to open the hydraulic oil system. Failure to follow this process could result in minor or moderate injury.

NOTE :
See "Fluid Systems" on page 2-15.

1. Position the machine work equipment as shown with the machine articulated parts straight the front and rear frames locked in place with the pin of the frame articulation steering tierod.

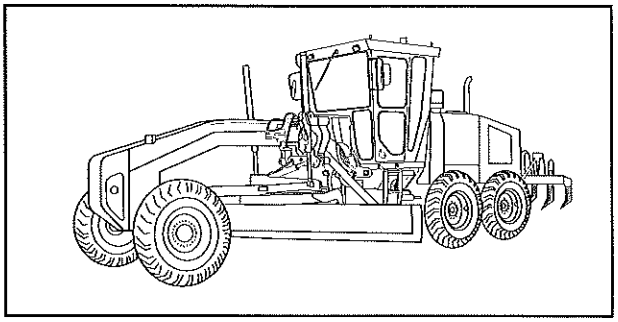

Fig.5-20

2. Lower all moldboards and attachments to the ground.

3. Apply the parking brake and shut down the engine.

4. Within 15 seconds after stopping the engine, operate the cab control levers in all directions in order to release internal pressure.

5. Open the left rear engine access panel to access the hydraulic tank sight gauge (1).

NOTE :
The hydraulic oil level should be maintained between the middle and upper mark "H".

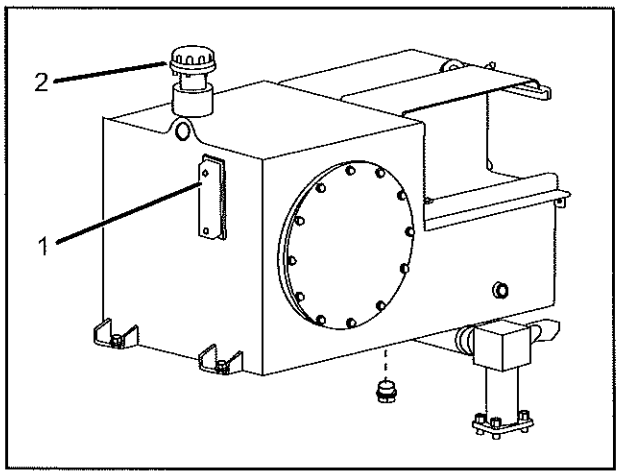

Fig.5-21

1. Hydraulic tank sight gauge
2. Hydraulic tank filler cap

6. Add hydraulic oil as described below if required. Otherwise clean and reinstall the filler cap.

Adding Hydraulic Oil

1) With the hydraulic tank filler cap (2) already removed, add hydraulic oil until the oil level in sight gauge (1) is between the middle and upper mark "H".

NOTE :
See "Hydraulic Oil Viscosity/Temperature Data" on page 5-13 for the correct type of hydraulic oil.

2) Clean and reinstall the filler cap.

NOTICE

Do not overfill the hydraulic tank. This could result in machine damage and improper machine operation.

Transmission Oil Level

1. Park the machine on level ground, set the transmission control lever to neutral, then run the engine at idle speed

2. Note when the transmission oil temperature reaches 50°C on the monitor.

3. Open the left front access panel and locate the transmission oil dipstick (1).

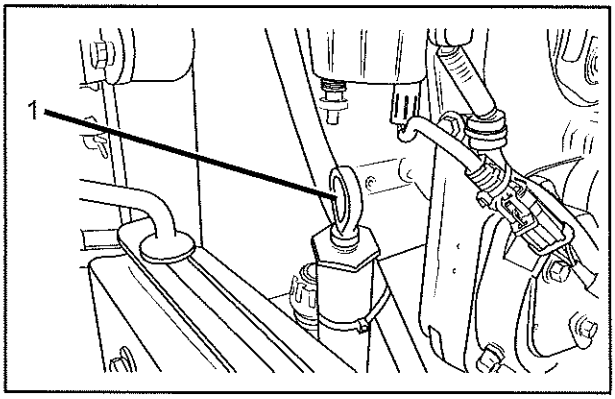

Fig.5-22

1. Transmission oil dipstick

4. Remove the transmission oil dipstick with the engine still running.

5. Wipe the dipstick with a clean cloth, then reinsert it into the tube.

6. Remove the dipstick once more and note if the oil level is between the L and H marks on the dipstick.

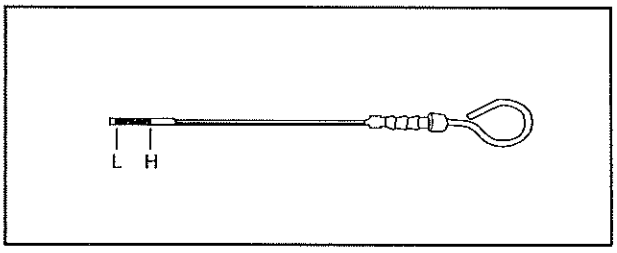

Fig.5-23

7. If the level is low, remove the transmission filler cap and add only enough transmission oil to bring the level up to between the MAX and MIN marks on the dipstick after checking it again.

NOTE :

See "Location, Capacity and Type" on page 5-10.

NOTICE

Do not overfill the transmission. This could result in machine damage and improper machine operation. Contact your Sany dealer if the fluid level is above the MAX mark on the dipstick.

8. Reinstall the transmission filler cap and reinsert the dipstick when the oil level is correct.

9. Close the left front access panel.

Air Conditioner

1. With the engine running, turn the air conditioning system on to check startup, air flow and fan speed control.

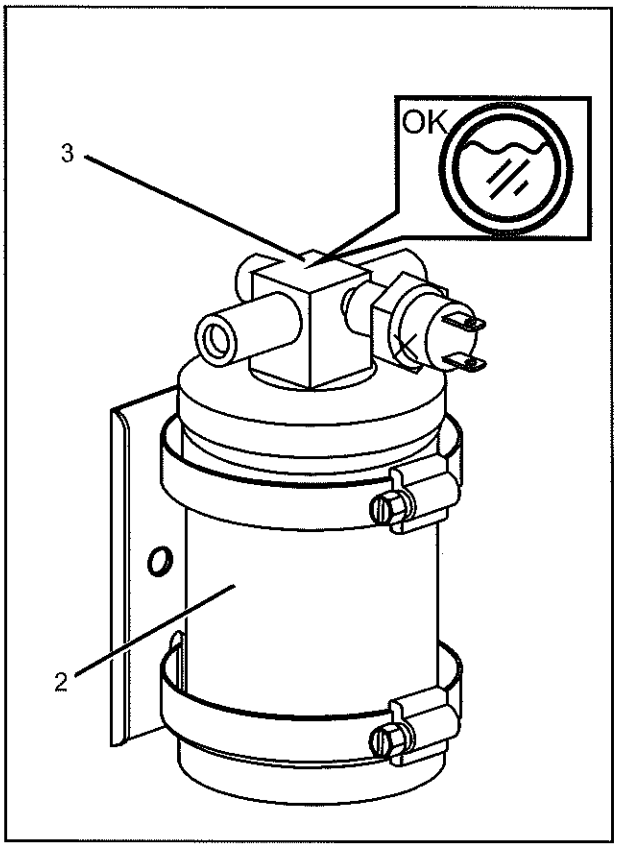

Fig.5-24

2. Receiver dryer 3. Sight glass

2. Locate the receiver dryer (2) inside the engine compartment.

3. Check the sight glass (3) on top of the receiver dryer for refrigerant quantity.

NOTICE

The engine must be running to get a correct reading on the sight glass. Failure to run the engine when inspecting the sight glass could result in machine damage and improper machine operation.

NOTE :

The quantity of refrigerant is low if the flow of the refrigerant contains bubbles.

NOTE :

Contact your Sany dealer if bubbles or oil are found in the dryer.

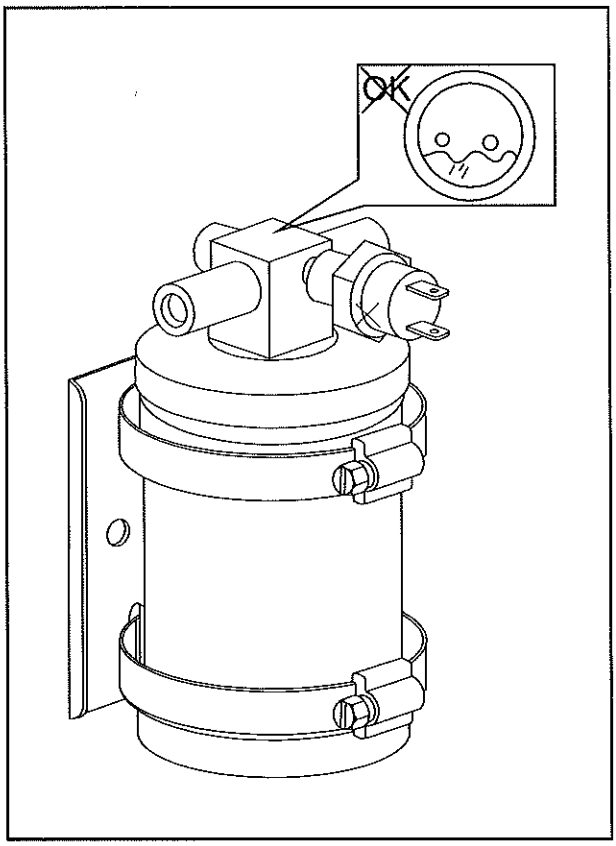

Fig.5-25

4. Shut down the engine.

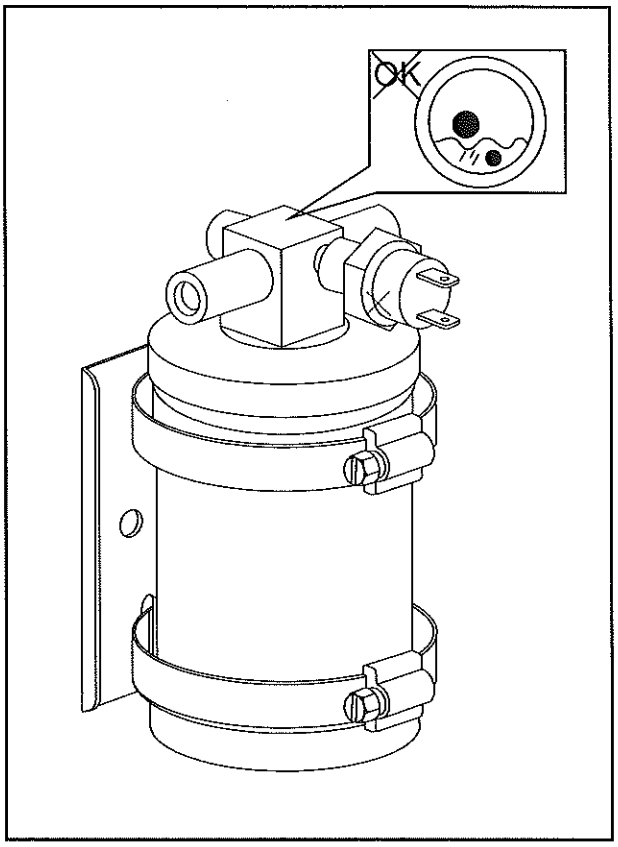

Fig.5-26

Engine Oil Level

1. Open the left rear engine access panel (1).

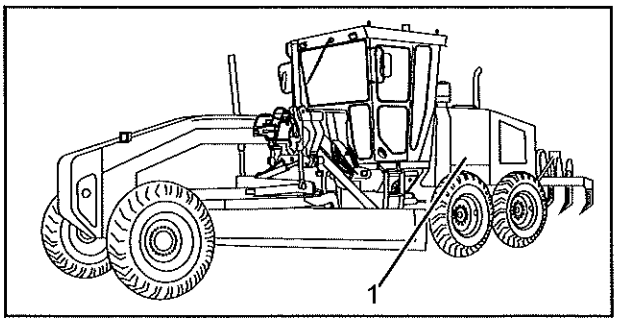

Fig.5-27

1. Left rear engine access panel

2. Locate the engine oil dipstick (2) in the engine compartment.

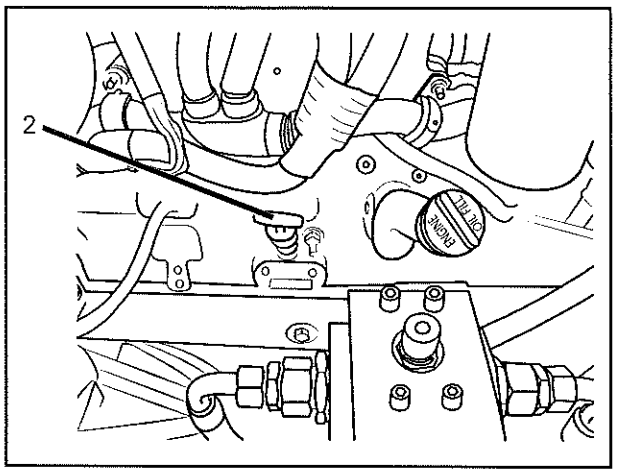

Fig.5-28

2. Engine oil dipstick

3. Wipe the dipstick with a clean rag, then reinsert the dipstick into its tube.

4. Remove the dipstick once more and note the oil level.

NOTE :

The oil level should be is within the etched area (3) on the dipstick.

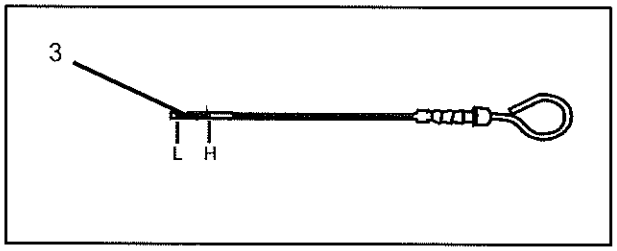

Fig.5-29

3. Etched area

5. If the oil is not within the etched area, remove the oil filler cap (4), add oil as needed, then reinstall the cap.

NOTE :

See "Engine Oil Viscosity/Temperature Data" on page 5-11 for details on engine oil types.

NOTICE

Do not overfill the engine with oil. This could result in engine damage.

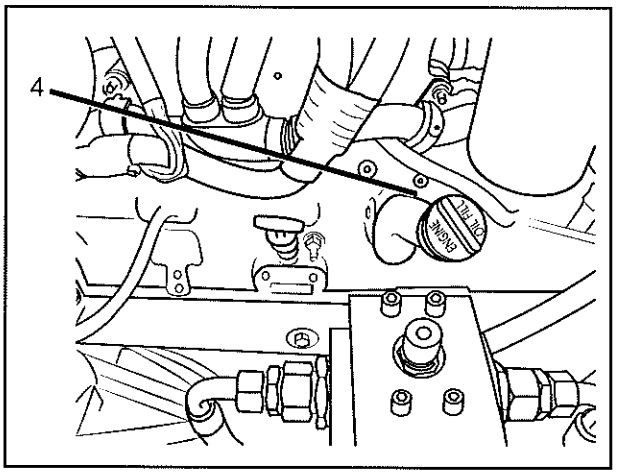

Fig.5-30

4. Oil filler cap

6. Close the engine access panel.

Air Conditioner Compressor Belt

Inspection

1. Locate the air conditioner compressor (1) directly beneath the alternator.

⚠ CAUTION

Ensure that the engine is off and that all rotating parts inside the engine compartment have stopped moving. Failure to do so could result in minor or moderate injury.

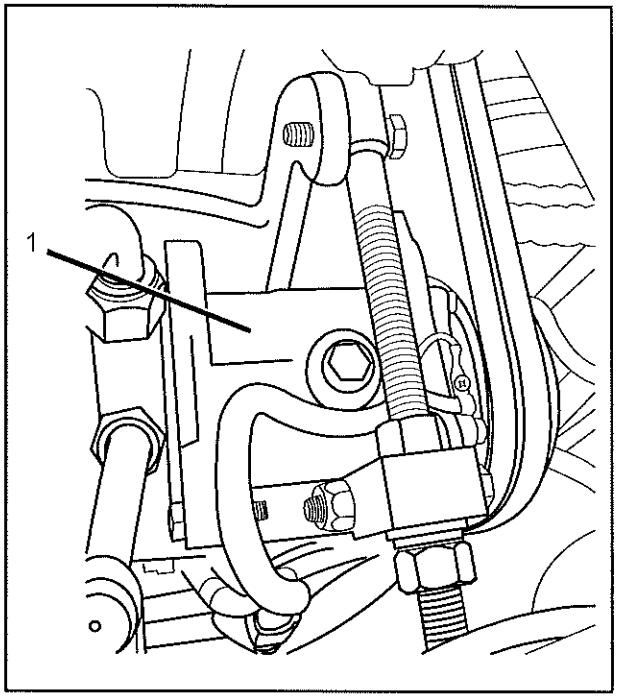

Fig.5-31

1. Air conditioner compressor

2. Examine both belts for cracks and other signs of damage.

3. Press down on each belt halfway between the compressor pulley and the drive pulley and measure the belt deflection.

NOTE :

The belt should deflect 0.40 - 0.60 in. (10 - 15 mm) when pressed with a force of 43 ft•lb (19.5 N•m).

NOTE :

If using a tension meter to check the belt tension of the compressor, the tension should measure 470 ft•lb (637 N•m).

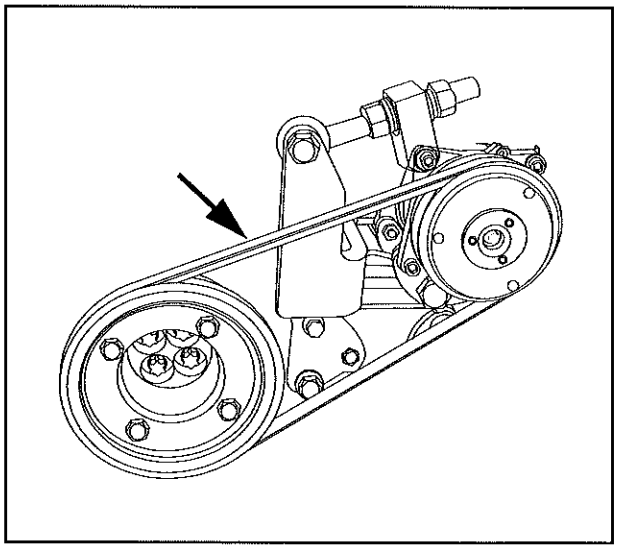

Fig.5-32

4. Contact your Sany dealer to replace both belts if either one appears damaged or tests out of specification.

Air Filter

1. Open the left rear access panel (1) to locate the air filter housing.

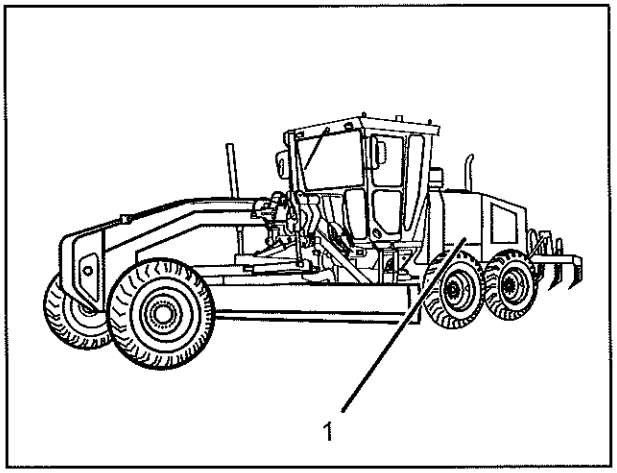

Fig.5-33

1. Left rear access panel

2. Remove the air filter housing end cover (2.)

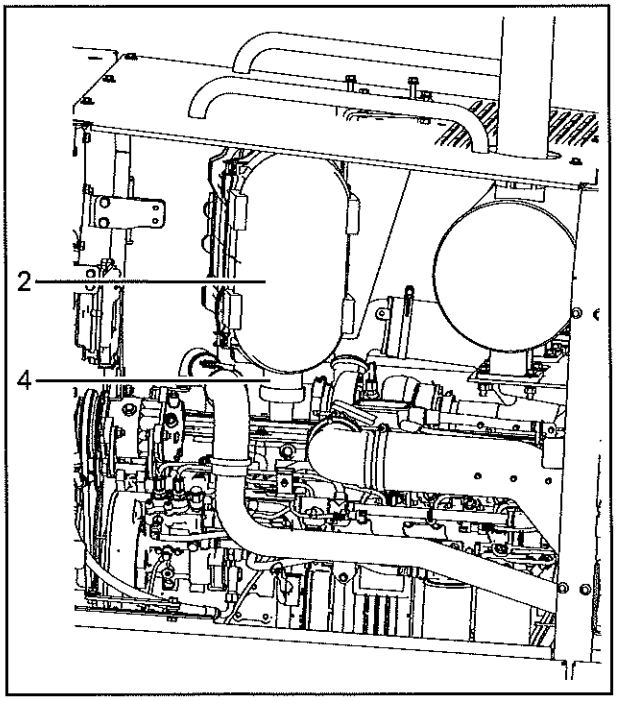

Fig.5-34

2. Air filter housing end 4. Dust ejection valve cover

3. Pull the air filter element (3) out from the housing and inspect it.

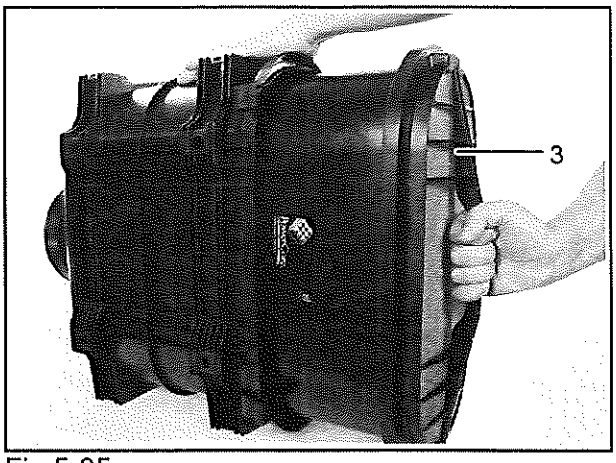

Fig.5-35

3. Air filter element

4. Replace it with a new one if it shows signs of damage, extreme wear or blockages. Otherwise, reinstall the old filter.

5. Reattach the air filter housing end cover.

Dust Ejection Valve

Check and squeeze the dust ejection valve (4) for cracks, deformation and looseness. Replace/repair if any damage is found

Primary Fuel Filter

NOTE :

See "Environmental Precautions" on page 2-18 before performing this procedure.

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

Fuel Filter Drain

1. Locate the primary fuel filter (1) inside the engine compartment.

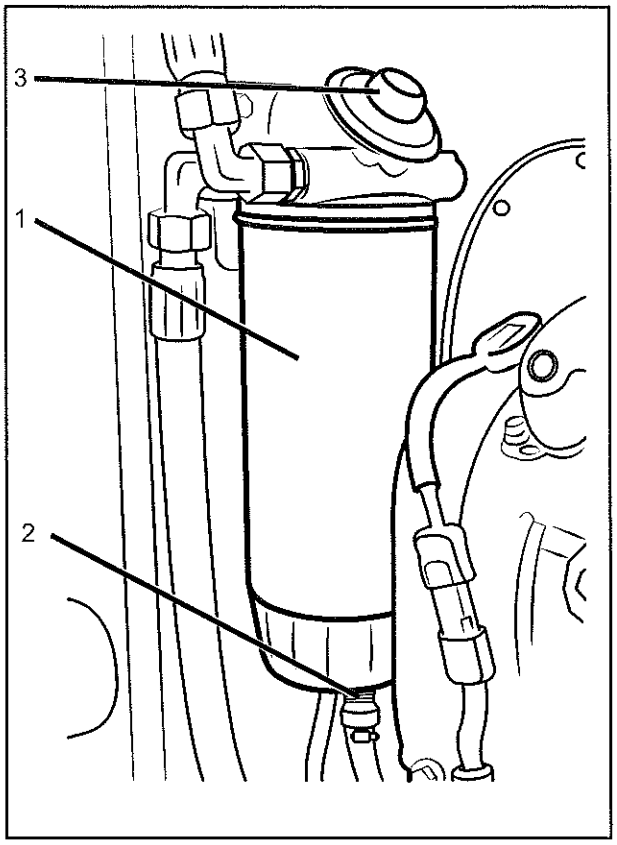

Fig.5-36

1. Primary fuel filter 3. Priming bulb
2. Drain valve

2. Place an appropriately sized container beneath the drain valve (2) at the bottom of the primary fuel filter.

3. Open the drain valve (3) to allow all water and/or contaminated fuel to drain from the filter.

NOTICE

Dispose of the contaminated fuel properly. Failure to do so could result in damage to the environment.

NOTE :

Avoid draining the fuel filter completely. Air could enter the fuel system.

4. Close the drain valve (2) when the flow into the catch container is free of water and contamination.

5. Press the priming bulb (3) at the top of the primary fuel filter approximately 10 times or until the bulb becomes noticeably harder to press.

NOTE :

This action pulls fuel from the intake line into the primary fuel filter to replace the contaminated liquid that was drained.

NOTE :

If an excessive amount of water or contaminant was found, Sany recommends draining the fuel tank.

Fuel Tank Drain

1. Locate the fuel filler(1) behind the cab (accessible from the top rear of the machine).

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

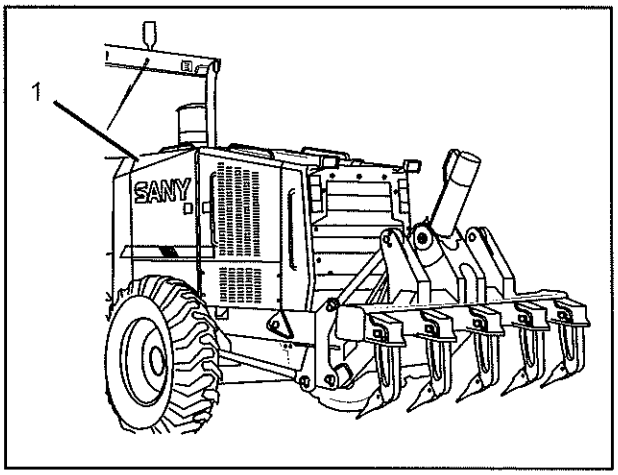

Fig.5-37

1. Fuel filler

2. Use compressed air to blow away any dirt and other debris from around the lockable fuel filler cap (2), then b remove the cap.

NOTICE

Contaminants in the fuel system can eventually clog the fuel-water separator and could even cause fuel starvation to the engine and reduced performance and operation.

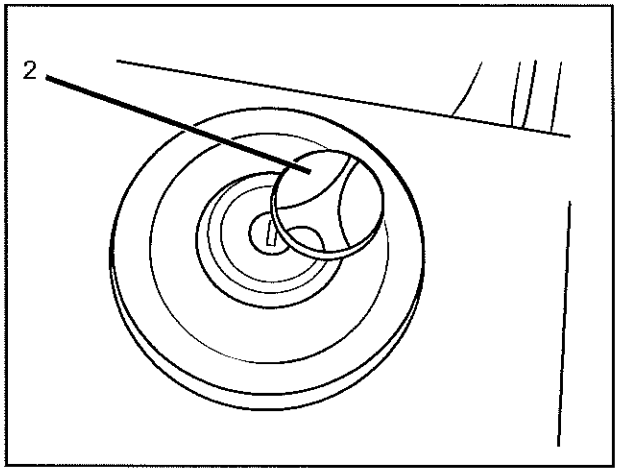

Fig.5-38

2. Lockable fuel filler cap

3. Place an appropriately sized container (3) under the fuel tank drain plug (5), then remove the drain plug and allow the fuel tank to completely empty.

NOTE :

he fuel tank capacity is 145 gal. (380 L).

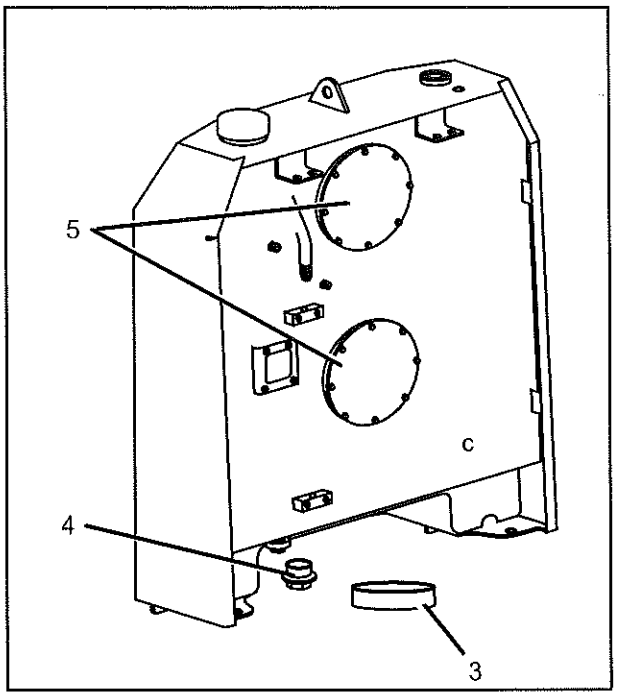

Fig.5-39

3. Container
4. Fuel tank drain plug
5. Access plates

4. Remove the access plates (5) from the front of the fuel e tank.

5. Rinse the access plates and tank interior with clean fuel to remove residual dirt and other debris, then reattach the access plates.

NOTICE

Dispose of the drained fuel properly. Failure to do so could result in damage to the d environment.

6. Refill the tank with clean fuel, then reinstall the fuel filler cap.

7. Press the priming bulb (3) at the top of the primary fuel filter approximately 10 times or until the bulb becomes noticeably harder to press.

NOTE :

This action pulls fuel from the intake line into the primary fuel filter/water separator to replace the contaminated liquid that was drained.

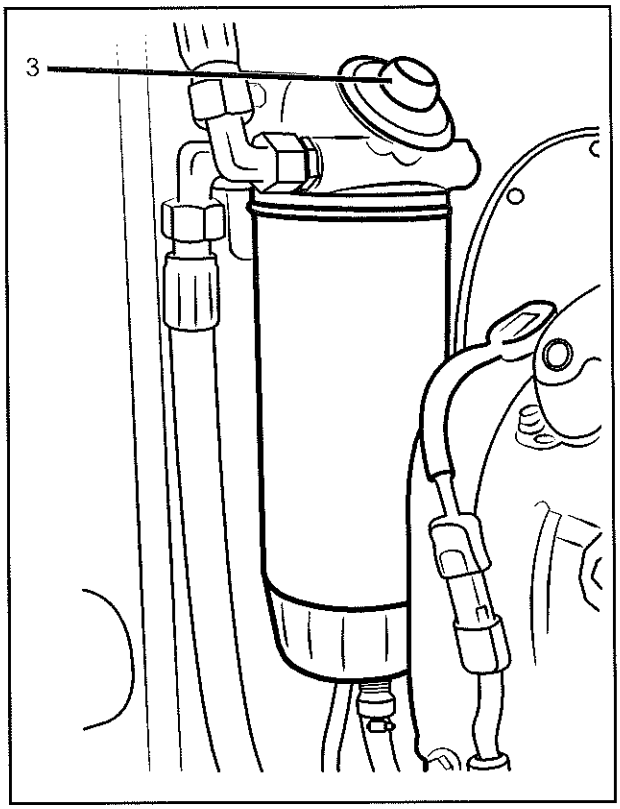

Fig.5-40

3. Priming bulb

8. Turn the keyswitch to the ON position to operate the fuel delivery pump for 30 seconds, then turn the keyswitch to the OFF position.

NOTE :

Do not start the engine.

9. Repeat step 8 approximately 3 or 4 more times.

10. Start the engine and allow it to run at idle speed.

11. Check for leaks in the fuel system.

12. Check the fuel level display (4) on the system monitor.

NOTE :
If the level is low, shut down the engine and proceed to step 13.

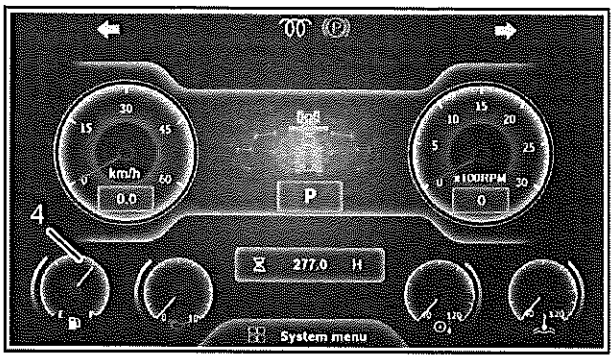

Fig.5-41

4. Fuel level display

13. Remove the fuel filler cap and add fuel as needed until the tank is full, then reinstall the fuel filler cap.

14. Repair any leaks found in the system.

Operating Functions

1. Turn the keyswitch (1) to position "I" to provide power to the machine, then check that all functions in the operator cab work correctly.

NOTE :
Do not start the engine.

NOTE :
Contact your Sany dealer if any component is damaged or inoperable.

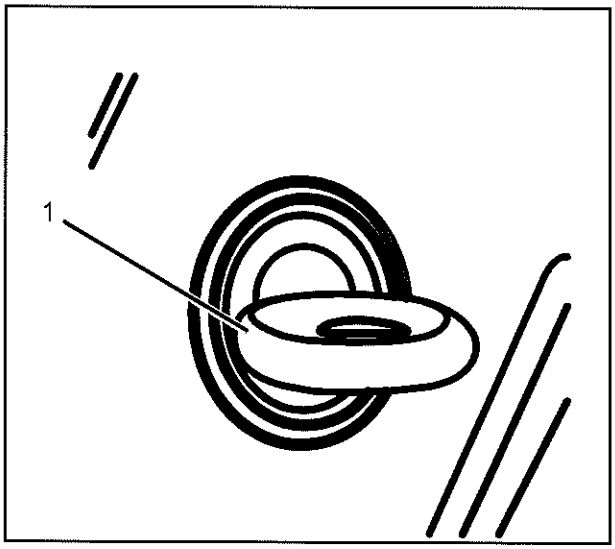

Fig.5-42

1. Keyswitch

2. Ensure that the following devices work properly:

- Horn button (2)
- Chassis work lamps (3).

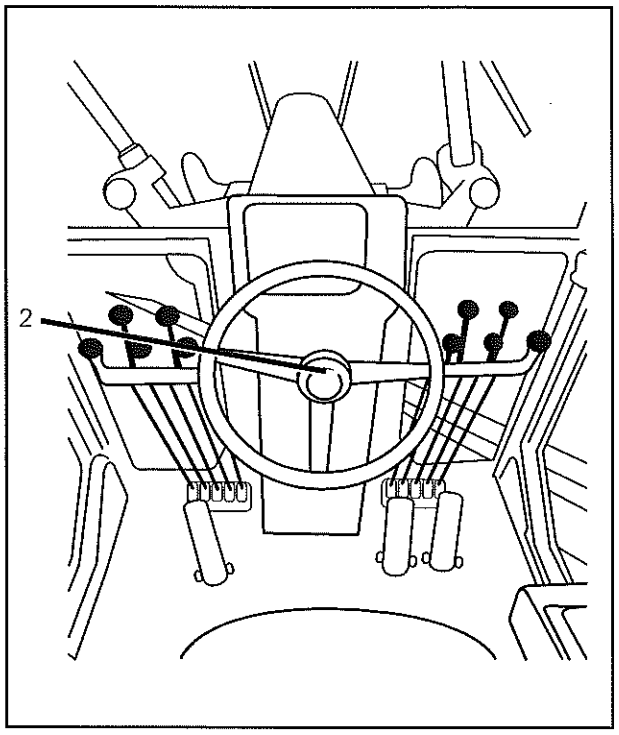

Fig.5-43

2. Horn button

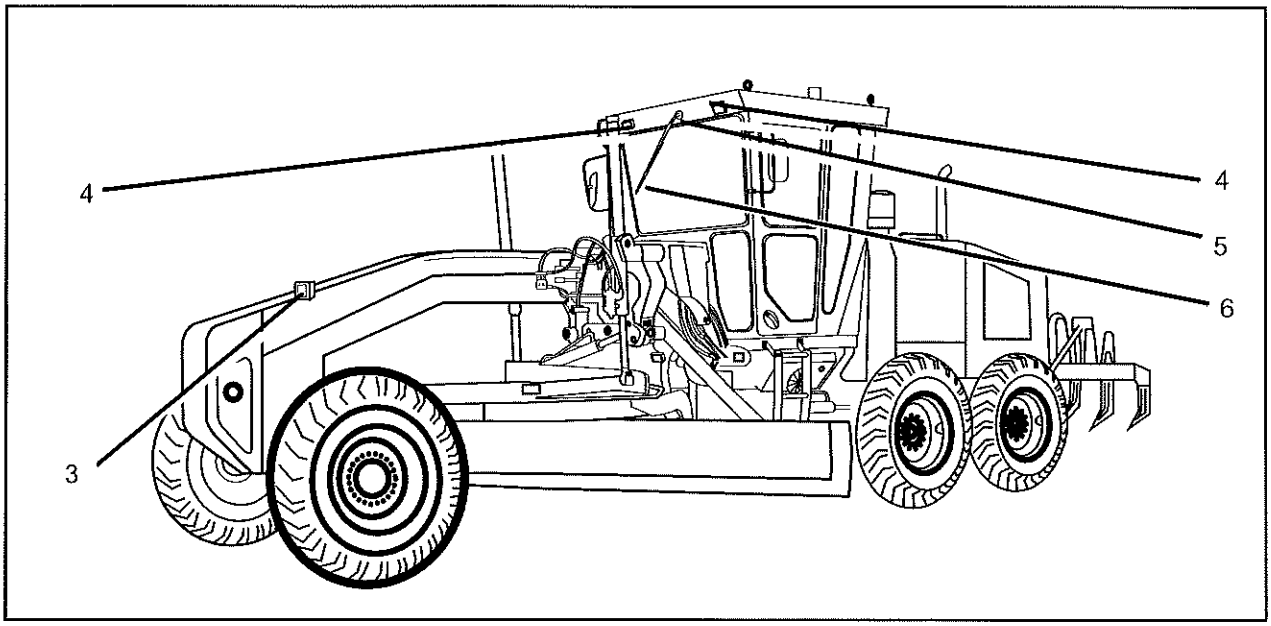

Fig.5-44

3. Chassis work lamps
4. Head lamps
5. Windshield washer
6. Wiper

- Head lamps (4)
- Windshield washer (5) and wiper (6)

Fuel Level

1. With the keyswitch still at the "I" position, check the fuel level display (1) on the system monitor.

NOTE :
If the level is low, turn the keyswitch to the "O" position, then proceed to step 2.

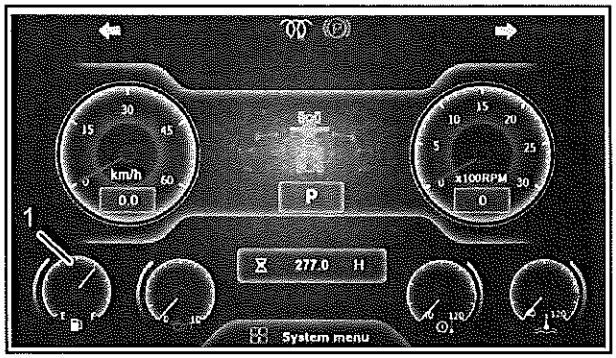

Fig.5-45

1. Fuel level display

2. Locate the fuel filler (2) behind the cab.

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

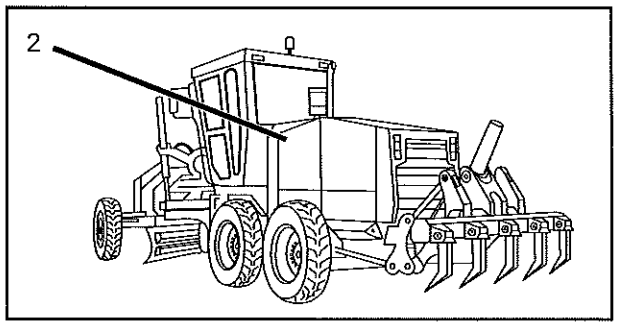

Fig.5-46

2. Fuel filler

3. Use compressed air to blow away any dirt and other debris from around the fuel filler cap (2), then remove the cap.

NOTE :
Contaminants in the fuel system can eventually clog the primary fuel filter and could even cause fuel starvation to the engine and reduced performance and operation.

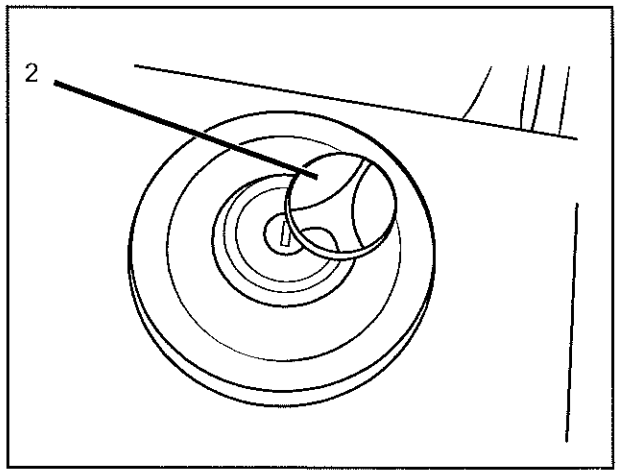

Fig.5-47

2. Fuel filler cap

4. Add fuel as needed until the tank is full.

5. Reinstall the fuel cap.

Seat Belt

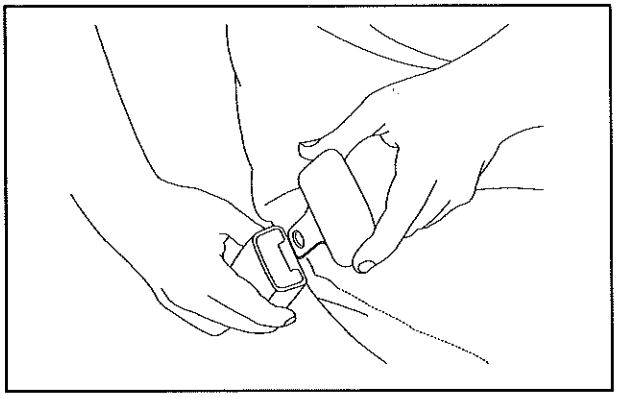

Fig.5-48

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

2. Ensure that the latch plate (1) and the buckle (2) connect together and click.

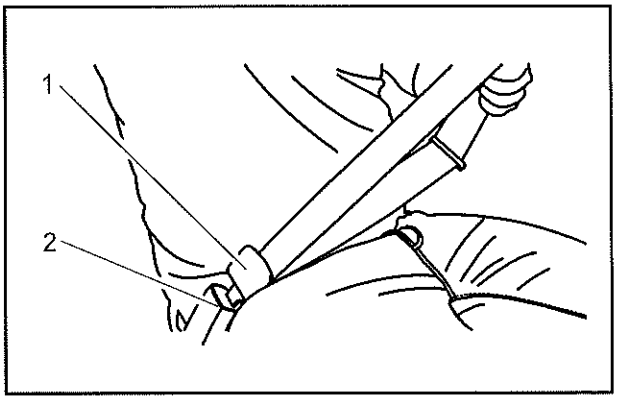

Fig.5-49

1. Latch plate 2. Buckle

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

⚠ 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 observe and follow this warning could result in death or serious injury.

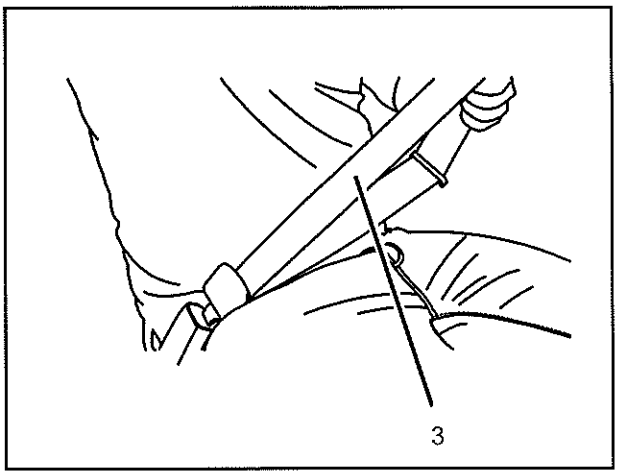

Fig.5-50

3. Belt

4. Ensure that the belt releases when the red button (4) is pressed at the end of the buckle (2).

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.

⚠ WARNING

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

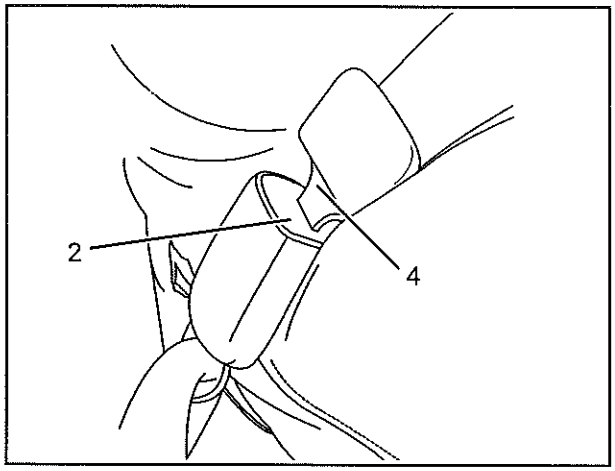

Fig.5-51

2. Red button 4. Buckle

Electrical System

The electrical system should be inspected starting with the fuse box. The fuse box (1) is located on the front face of the right control console.

NOTE :

If a fuse is corroded or if a white powder can be seen on it, contact your Sany dealer for repair information regarding the electrical circuit in question.

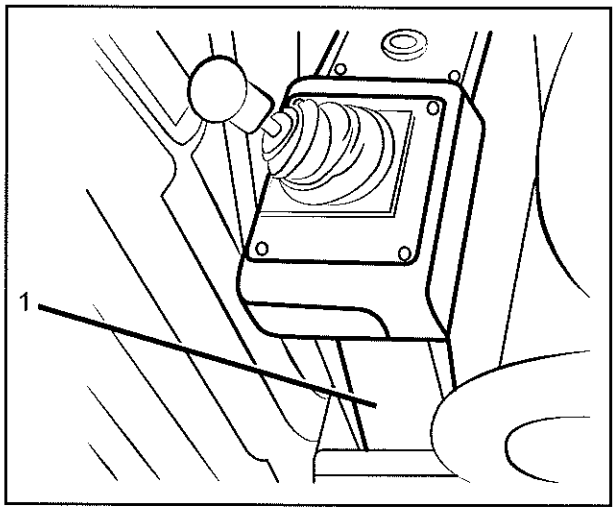

Fig.5-52

1. Fuse box.

Electrical Power Disconnect Process

NOTE :

See "Battery Disconnect Switch" on page 3-37.

1. Open the right rear engine access panel to locate the power disconnect switch, which is mounted to a bracket diagonally down from the batteries.

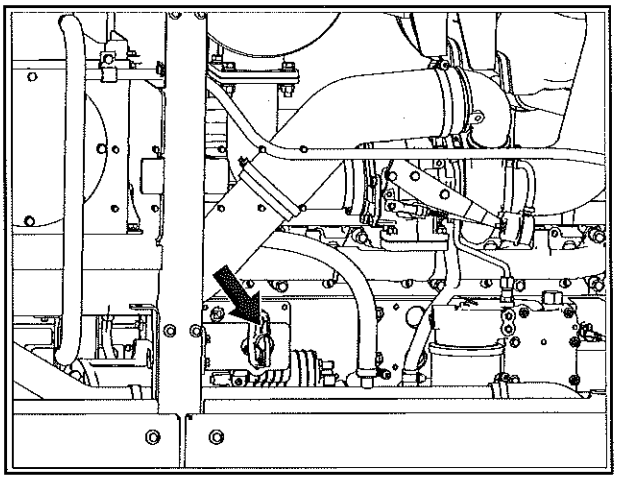

Fig.5-53

2. Turn the power disconnect switch counter-clockwise to OFF.

⚠ WARNING

When working with any open electrical power source, 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 avoid this hazardous situation could result in death or serious injury.

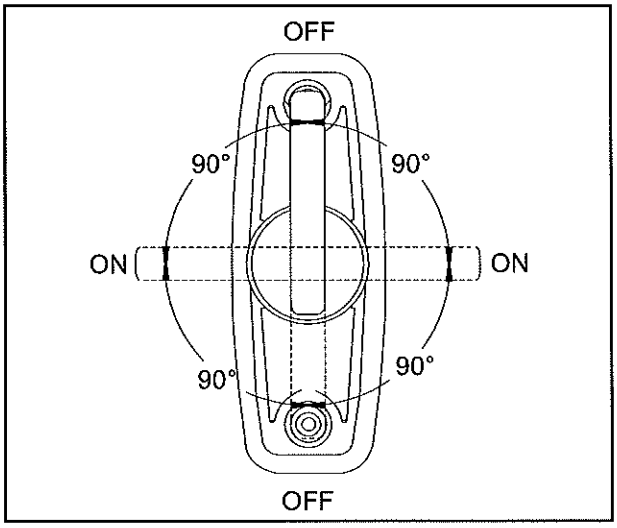

Fig.5-54

3. To reconnect power, reverse the process shown in step 2, and turn the power disconnect switch clockwise to ON.

Other Electrical Inspection Points

- Inspect all electrical equipment. If necessary, remove and replace all faulty items, including loose connectors, worn or degraded wiring, cables, etc.
- Locate and remove the cause of any electrical faults.
- Use only genuine Sany parts.
- Shut down the engine immediately if a fault occurs with the power supply.
- Do not modify the electrical system without prior authorization from Sany.

5.4.3 Maintenance Log

Record the completion of all of the maintenance tasks from this section.

5.5 50-Hour Maintenance

5.5.1 Introduction

NOTICE

Failure to perform the following procedures when and how directed can cause damage to the machine and cause the machine to operate improperly.

5.5.2 Secure the Machine for Maintenance

1. Obtain the Maintenance Log for this machine and complete it at the close of all maintenance procedures.

2. Read and understand all of the tasks listed in this section.

3. Follow the Lockout/Tagout procedure in the Safety section of this manual.

NOTE :
See "Lockout/Tagout Procedures" on page 2-15 for details.

NOTE :
Allow the systems time to cool down before proceeding with any maintenance.

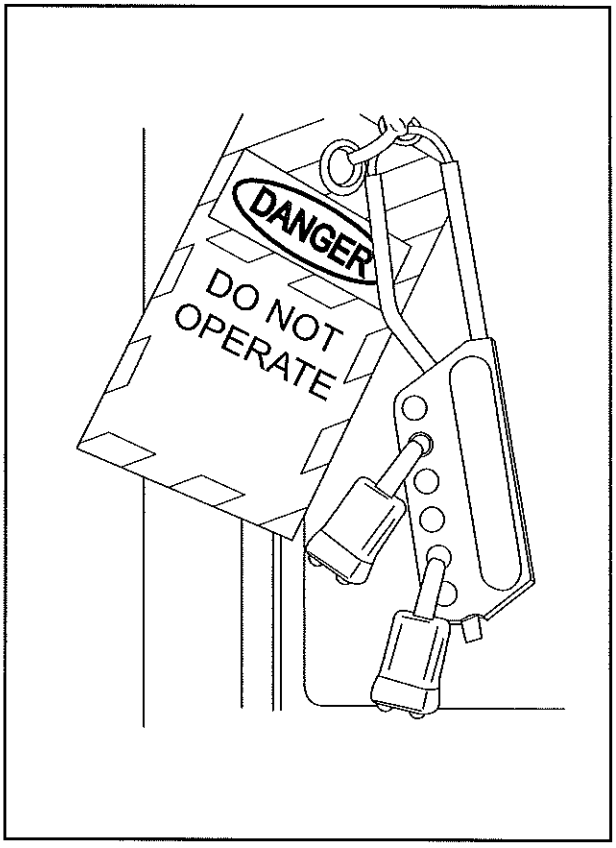

Fig.5-55

4. With the machine secured, check the following:
   - Engine Oil and Filter
   - Drive Shaft
   - Centershift Lock Bar
   - Steering Cylinder Ends and Tie Rods
   - Wheel Bearings
   - Wheel Lean Bar Bearings

- Wheel Lean Joint Bearings
- Wheel Lean Cylinder Bearings
- Tandem Drive Cases and Differential Oil Levels
- Moldboard Lift Cylinder Socket - Check/Lubricate
- Centershift Cylinder Sockets - Check/Lubricate
- Circle Drive Oil Level
- Drawbar Ball and Socket - Check/Lubricate
- Moldboard Angle Cylinder
- Moldboard Sideshift Cylinder
- Swing Support
- Circle Bearing Teeth
- Air Filter System
- Hydraulic Hoses
- Batteries

Engine Oil and Filter (Initial)

NOTE :

Replace the engine oil after the initial 50 hours of service, then every 250 hours.

NOTE :

Inspect the drained oils and filter for signs of metal particles and foreign material. Contact your Sany dealer for an oil analysis if any abnormality is found.

NOTE :

See "Fluid Systems" on page 2-15.

⚠ WARNING

Do not perform this task when the engine is hot. Wait for the engine to cool to outdoor ambient temperature before proceeding. Failure to do so could result in burns or other serious injury.

1. Start and run the engine at idle speed for approximately about five minutes, then shut down the engine.

2. Locate the oil drain hose (1) attached to the lower rear frame.

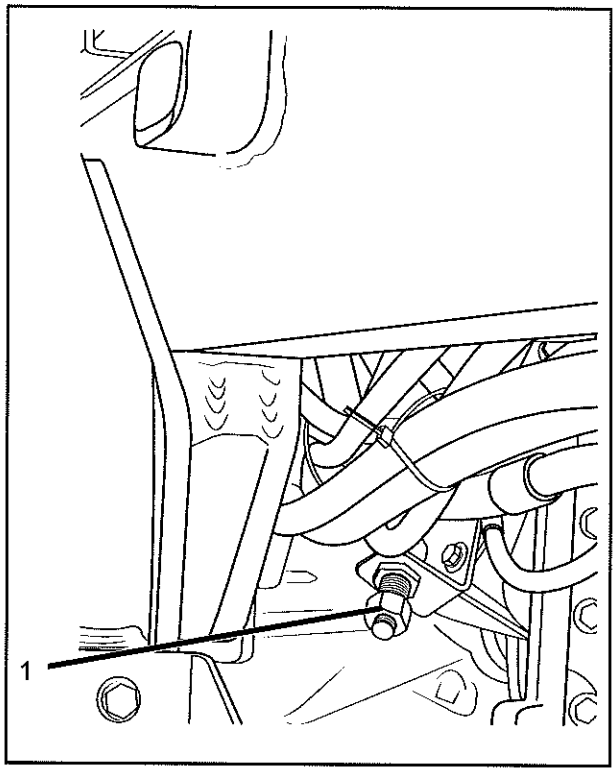

Fig.5-56

1. Oil drain hose

3. Place an appropriately sized container under the drain hose end cap then remove the end cap and allow the engine oil to drain.

4. Reinstall the oil drain hose end cap when all of the oil has drained.

NOTICE

Properly dispose of the drained oil. Failure to do so could result in damage to the environment.

5. Place a catch container under the engine oil filter (2), then unscrew the filter from its mount (3).

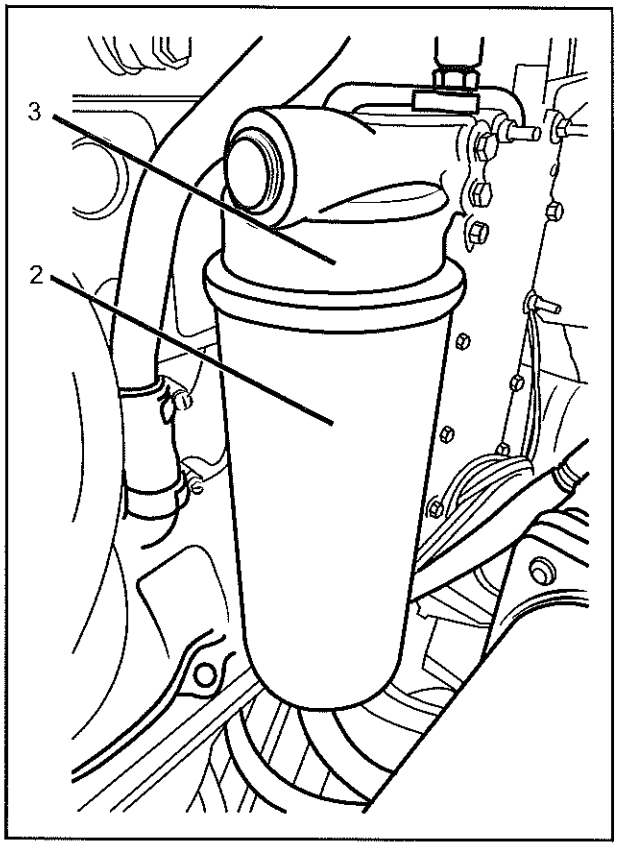

Fig.5-57

2. Engine oil filter 3. Mount bracket

6. Clean the underside of the oil filter mount of any debris or residue.

7. Coat the rubber gasket at the top of the new filter with a thin layer of engine oil, then thread the new filter in place on the filter mount until it is tight. Do not overtighten.

8. Remove the engine oil filler cap (4) and add oil as needed through the oil filler.

NOTE :

See "Location, Capacity and Type" on page 5-10 for additional information on engine oil capacity and type.

NOTICE

Do not overfill the engine with oil. This could result in engine damage.

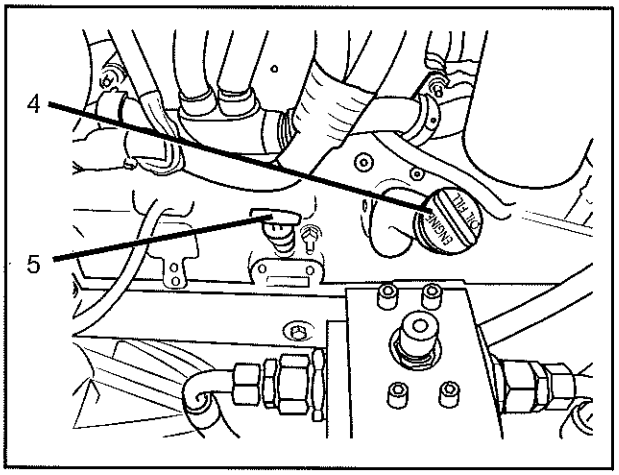

Fig.5-58

4. Engine oil filler cap 5. Engine oil dipstick

9. Locate and remove the engine oil dipstick (5) from the engine.

10. Wipe the dipstick with a clean rag, then reinsert the dipstick into its tube.

11. Remove the dipstick once more and note the oil level.

NOTE :
The oil level should be is within the etched area (6) on the dipstick.

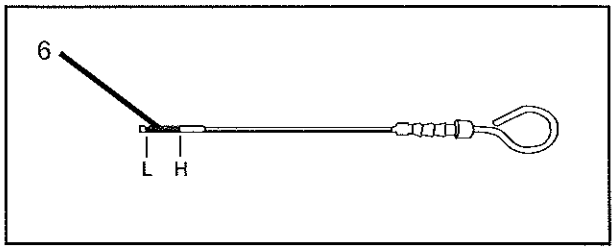

Fig.5-59

6. Etched area

12. If the oil is not within the etched area, add engine oil and continue to check the level on the dipstick until the oil level is within the etched area then reinstall the filler cap (4).

NOTICE

Do not overfill the engine with oil. This could result in engine damage.

NOTE :
See "Location, Capacity and Type" on page 5-10 for details on engine oil types.

NOTICE

Do not overfill the engine with oil. This could result in engine damage.

13. Start and run the engine at idle speed for approximately about five minutes,then shut down the engineand wait for several minutes.

14. Check the oil level once more and add oil as needed, then reinstall the cap and close the engine compartment access panel.

Drive Shaft

NOTE :
The drive shaft is located between the transmission output and rear axle input and has three fittings on it.

1. Clean any dirt and other debris from around the grease fittings.

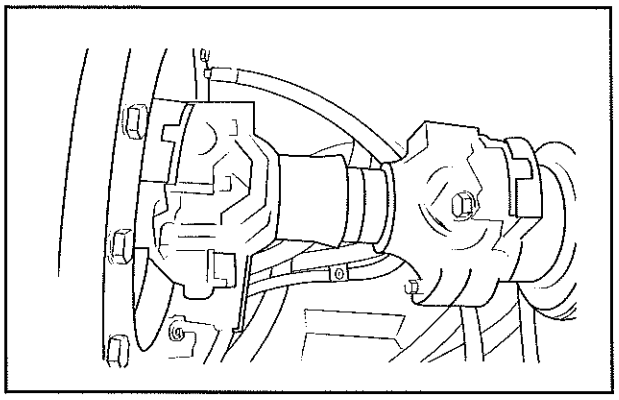

Fig.5-60

2. Inject grease into grease fittings.

NOTE :

Sany recommends the use of either NGLI #1 (winter) or #2 (summer) molybdenum disulfide lithium-based grease for lubricating this component.

Centershift Lock Bar

NOTE :

The centershift lock bar is located under the front frame and above the circle.

NOTE :

The centershift lock bar is located under the front frame and above the circle.

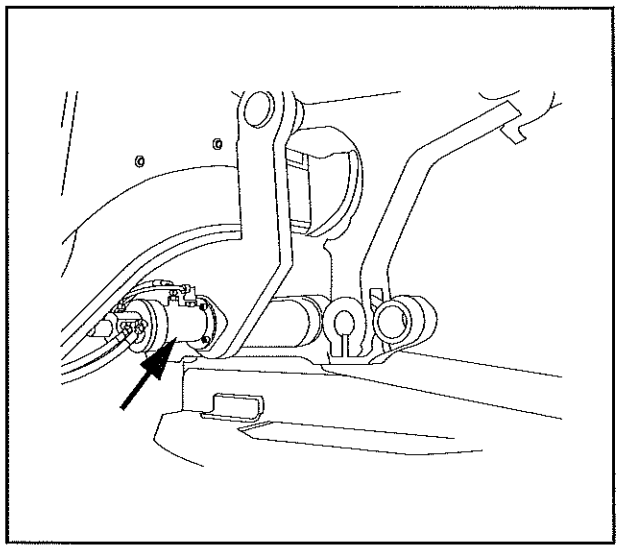

Fig.5-61

1. Clean any dirt, rust and other debris from the holes in the centershift lock bar.

2. Inject grease into the holes in the centershift lock bar.

Steering Cylinder Ends and Tie Rods

NOTE :

Both steering cylinders have two grease fittings. Both tie rods have only one grease fitting each.

Clean the fittings, then inject grease into them.

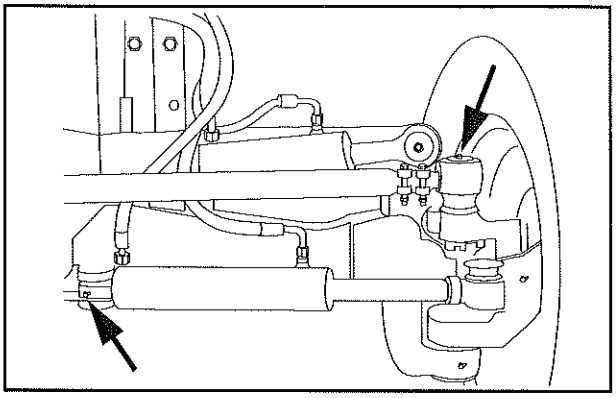

Fig.5-62

Wheel Bearings

NOTE :

The front wheel bearings are located on the inner side of each front wheel.

NOTE :

The grease fitting is located on the housings of each front wheel bearing.

Clean the fittings, then inject grease into them.

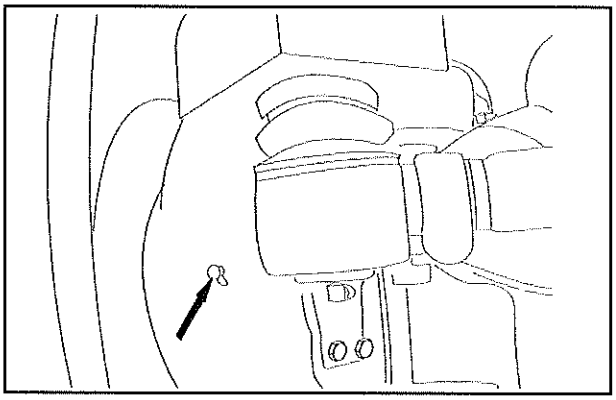

Fig.5-63

Wheel Lean Bar Bearings

NOTE :

Each end of the wheel lean bar has a grease fitting (1).

Clean the fittings, then inject grease into them.

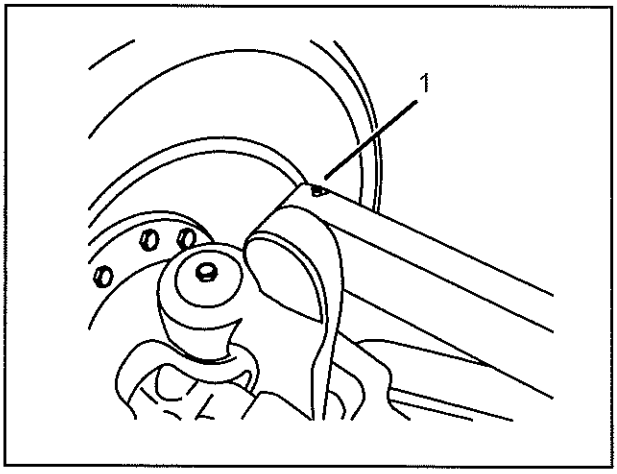

Fig.5-64

1. Grease fittings

Wheel Lean Joint Bearings

NOTE :

Each joint has two grease fittings (1) and (2).

Clean the fittings, then inject grease into them.

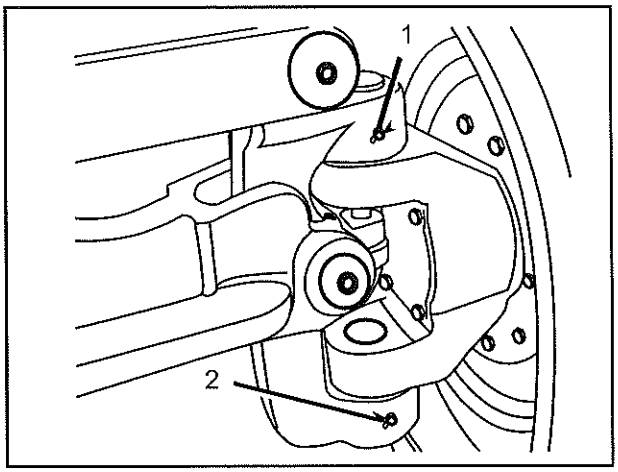

Fig.5-65

1. Grease fittings 2. Grease fittings

Wheel Lean Cylinder Bearings

NOTE :

The right front wheel has two grease fittings (1 and 2) on the wheel lean cylinder.

Clean the fittings, then inject grease into them.

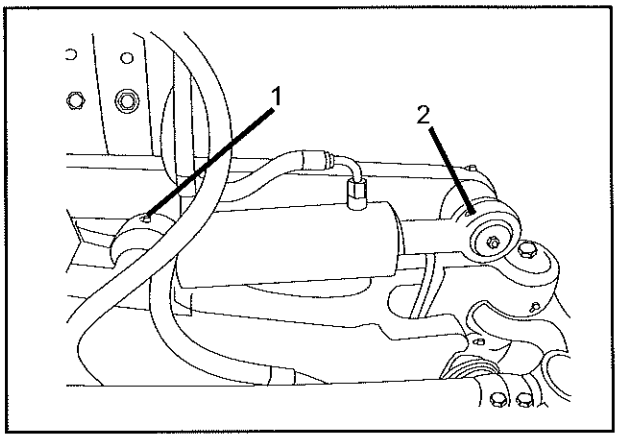

Fig.5-66

1. Grease fittings 2. Grease fittings

Tandem Drive Cases and Differential Oil Levels

1. Park the machine on firm, level ground, then shut down the engine.

2. Locate the sight glass (1) on the side of each of the tandem drive cases.

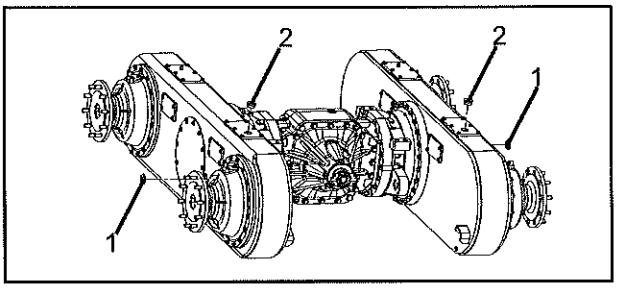

Fig.5-67

1. Sight glass 2. Oil filler plug

3. Check that the oil level is at the mid-point on the sight glass.

4. If not, remove the oil filler plug (2) from the top of the case and add oil until the oil level is correct, then reinstall the oil filler plug in the top of its case.

5. Repeat steps 2, 3 and 4 for the other tandem drive case.

6. Remove the oil filler pipe adapter (3) from the rear axle housing.

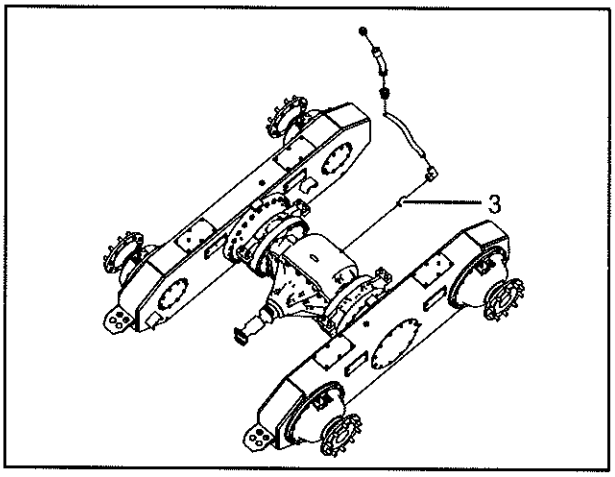

Fig.5-68

3. Oil filler pipe adapter

7. Check that the oil level is no more than 0.4 in. (1 cm) below the adapter hole in the rear axle housing, then reinstall the adapter and oil filler pipe.

8. If the oil level is too low, add oil through the adapter hole until the oil level is correct, then reinstall the adapter and oil filler pipe.

Moldboard Lift Cylinder Socket - Check/Lubricate

NOTE :

There are two moldboard lift cylinders. Each lift cylinder socket has its own grease fitting.

1. With the engine running, rotate the moldboard and position it at an angle of 90 degrees to the frame, then lower the moldboard to the ground.

2. Operate the moldboard lift cylinders while observing the sockets. Adjustment is necessary if a socket moves without moldboard movement.

3. Contact your Sany dealer if adjustment is required. Otherwise, proceed to step 4.

4. Wipe any debris from the two moldboard grease fittings (1), then apply grease at the two fittings.

NOTE :
Sany recommends the use of either NGLI #1 (winter) or #2 (summer) molybdenum disulfide lithium-based grease for lubricating this component.

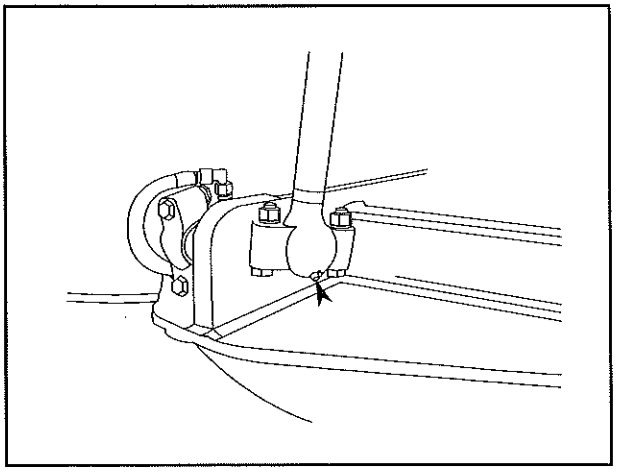

Fig.5-69

Centershift Cylinder Sockets - Check/Lubricate

NOTE :
There are two centershift cylinder sockets, each with its own grease fitting.

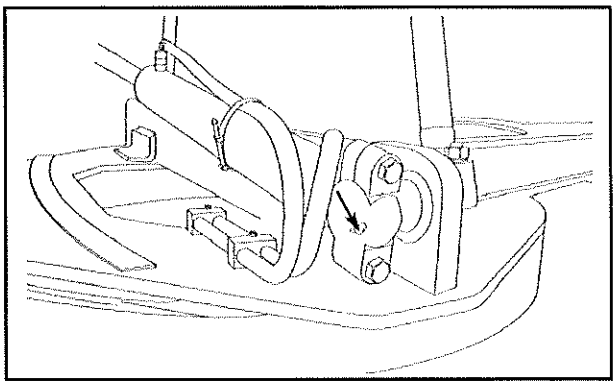

Fig.5-70

1. With the engine running, rotate the moldboard and position it at an angle of 90 degrees to the frame, then lower the moldboard to theground.
2. Operate the moldboard lift cylinders while observing the sockets. Adjustment is necessary if a socket moves without moldboard movement.
3. Contact your Sany dealer if adjustment is required. Otherwise, proceed to step 4.
4. Wipe any debris from the two moldboard grease fittings (1), then apply grease at the two fittings.

NOTE :
Sany recommends the use of either NGLI #1 (winter) or #2 (summer) molybdenum disulfide lithium- based grease for lubricating this component.

Circle Drive Oil Level

1. With the engine running, position the circle drive so it is horizontal, then shut down the engine.

2. Wipe any debris from the sight glass (1).

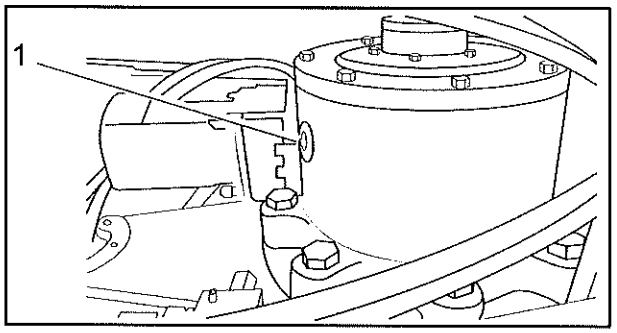

Fig.5-71

1. Sight glass

3. Observe the oil level through the sight glass. The oil level should be above the middle position.

4. If the oil level is low, remove the filler plug (2) from the top of the circle drive housing.

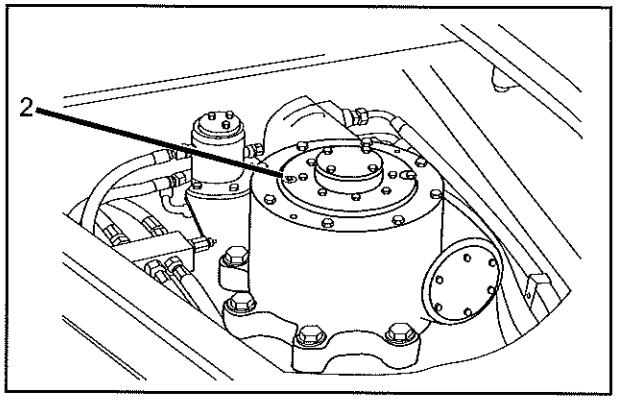

Fig.5-72

2. Filler plug

5. Add oil through the filler hole until the oil level is at the mid-point of the sight glass, then reinstall the filler plug.

Drawbar Ball and Socket - Check/Lubricate

Check

1. With the engine running, rotate the moldboard and position it at an angle of 90 degrees to the frame, then lower the moldboard to the ground.

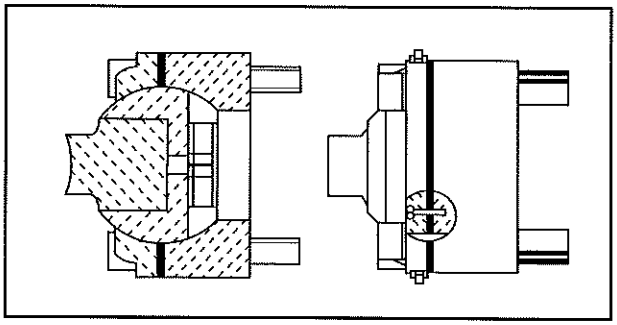

Fig.5-73

2. While maintaining a light load between the ball and the socket, inch the machine slowly to the rear, then stop the machine and shut down the engine.

3. On the drawbar ball and socket, measure the end play between the ball (1) and cap (2). The cap fastens the drawbar ball and socket to the adapter.

NOTE :
The end play should be +0.02/-0.01 in. (+0.6 /-0.2 mm).

4. Contact your Sany dealer if adjustment is required. Otherwise, proceed to Lubrication.

Lubricate

Wipe any debris from the grease fitting, then inject grease through the fitting.

NOTE :
Sany recommends the use of either NGLI #1 (winter) or #2 (summer) molybdenum disulfide lithium-based grease for lubricating this component.

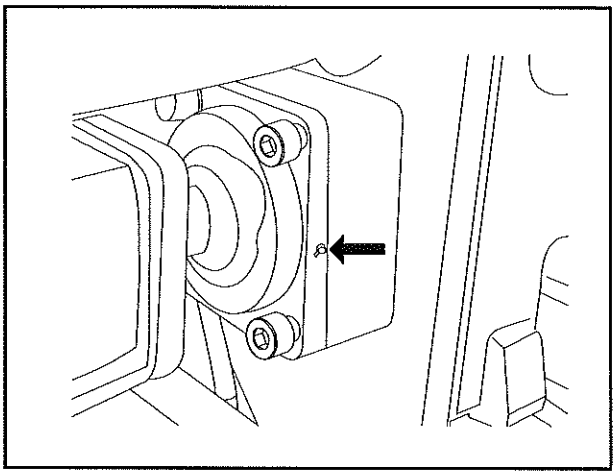

Fig.5-74

Moldboard Sideshift Cylinder

1. Park the machine on a level surface, engage the parking brake, lower the moldboard and attachments to the ground, then shut down the engine.

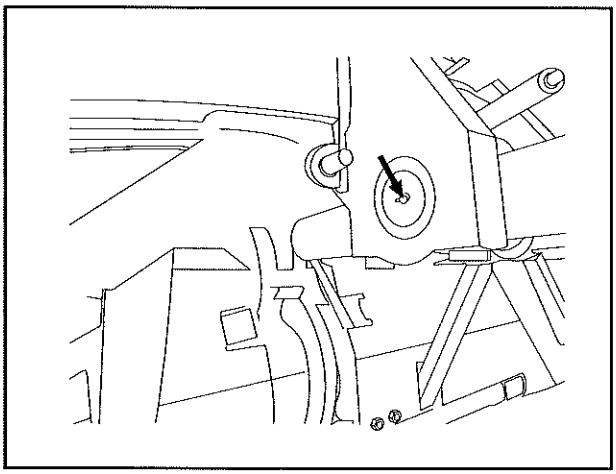

Fig.5-75

2. Locate then clean all grease fittings.

3. Remove the dust covers and inject grease into the fittings.

Moldboard Sideshift Cylinder

1. Park the machine on a level surface, engage the parking brake.

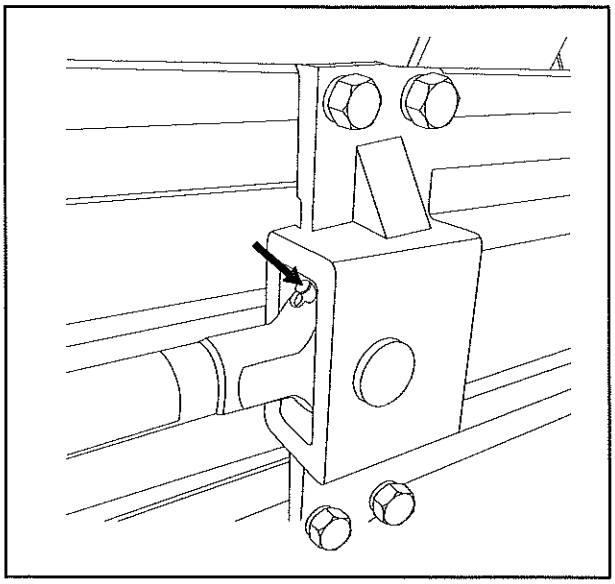

Fig.5-76

2. Slide the moldboard to the right approximately 20 in. (500 mm), lower the moldboard and attachments to the ground, then shut down the engine.

3. Locate the grease fitting.

4. Remove the dust cover from grease fitting, clean any debris from the fitting, then inject grease into the fitting.

NOTE :

There are 12 swing support grease fittings, including those on the opposite sides from items (1), (3), (5), (7).

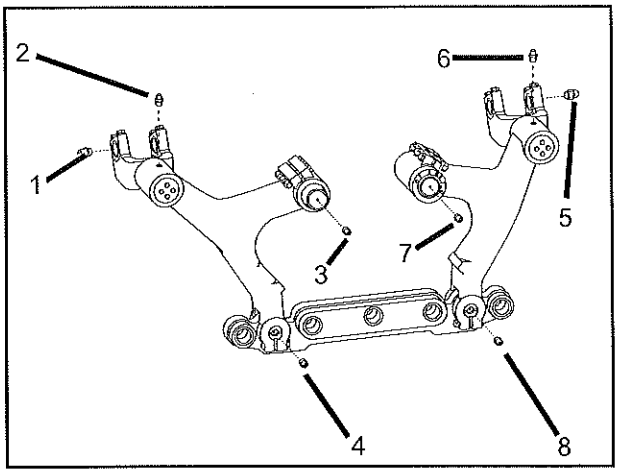

Fig.5-77

1. Swing support grease fitting	5. Swing support grease fitting
2. Swing support grease fitting	6. Swing support grease fitting
3. Swing support grease fitting	7. Swing support grease fitting
4. Swing support grease fitting	8. Swing support grease fitting

1. Park the machine on a level surface, engage the parking brake, lower the moldboard and attachments to the ground, then shut down the engine.
2. Locate then clean all grease fittings.
3. Remove the dust covers and inject grease into the fittings.

Circle Bearing Teeth

NOTE :

There are two circle bearing grease fittings.

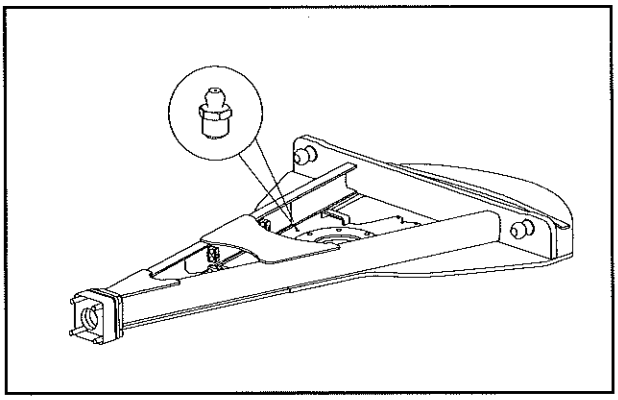

Fig.5-78

1. Park the machine on a level surface, engage the parking brake, then shut down the engine.

2. Locate then clean both grease fittings.

3. Remove the dust cover and inject grease through the fittings.

Air Filter System

1. The air intake system is located inside the engine compartment.

2. Ensure that the pipeline (1) is secure and is not leaking. Replace it if it is leaking.

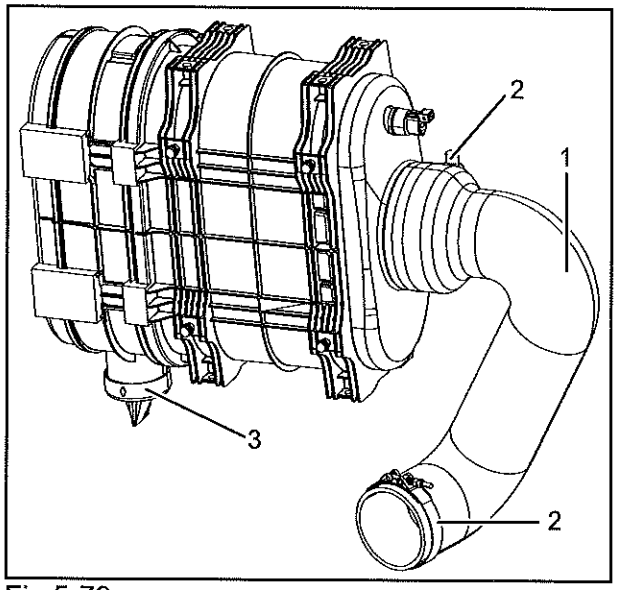

Fig.5-79

1. Pipeline
2. Clamps
3. Dust evacuator

3. Ensure that the clamps (2) at both ends of the pipeline are tight. Tighten any loose clamps.

4. Squeeze the dust evacuator (3) mounted on the end cap of the air filter system to release any dust or debris.

5. Check the condition of the dust evacuator (3) 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 filter service life.

Hydraulic Hoses

Check all hoses for leaks and replace damaged or leaking hoses immediately. Damaged or otherwise faulty hydraulic lines and fittings must be replaced.

Ensure that there is sufficient distance between all lines and hoses and any nearby high-temperature engine components (for example, the exhaust system).

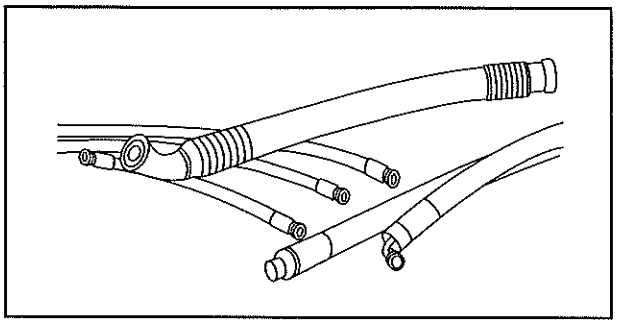

Fig.5-80

NOTE :

See "Fluid Systems" on page 2-15.

Examine hoses for the following:

- Hose fittings that are cracked or become loose.
- Damage, cuts or abrasions in the external rubber layer.
- Hardening, chapping or burning of hose.
- Cracks, damage or serious corrosion on the couplings.
- Leaks at the hose fittings.
- Twisted, broken, flat or distorted hoses.
- Blisters or softness in the external hose layer.

NOTE :

If any damage is found, contact your Sany dealer.

Batteries

⚠ CAUTION

Before proceeding with any battery maintenance procedure, follow and remember these points:

- **Battery gases are explosive. Never smoke around batteries or expose them to sparks or open flames.**
- **Wear personal protective equipment when working with batteries.**
- **Work in a well-ventilated area.**
- **If battery acid contacts your skin or your eyes, flush the area immediately with fresh water and seek medical attention.**

Failure to observe and follow this caution could result in minor or moderate injury.

1. Locate the batteries (1) at the right rear of the engine compartment.

NOTE :

Allow several minutes for any accumulated a battery gases to clear before servicing the batteries. See "Electrical System" on page 2-17

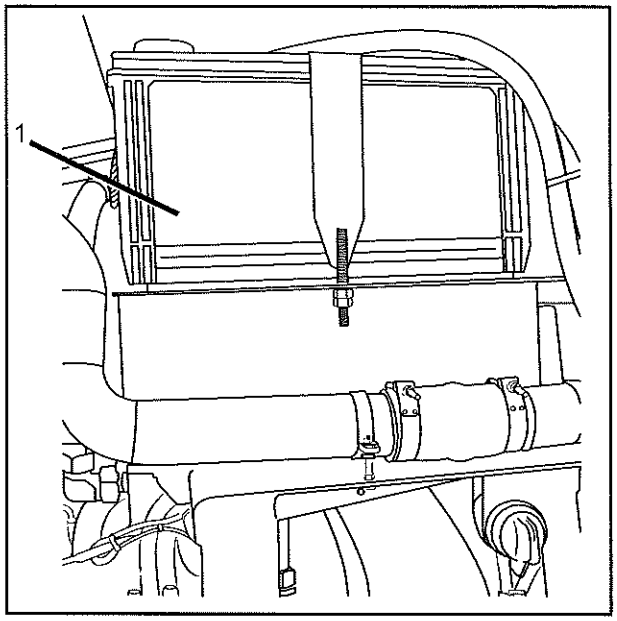

Fig.5-81

1. Batteries

2. Check the top surfaces and all the battery connections (2) for signs of corrosion or dirt build-up. Use a clean rag to wipe any debris from the batteries.

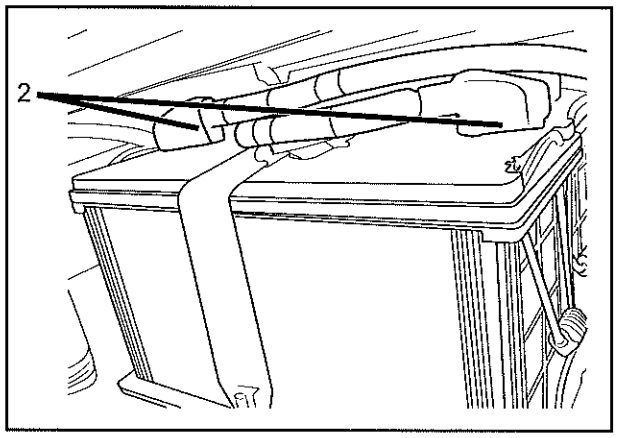

Fig.5-82

2. Battery connections

NOTE :

If corrosion is found (and with the battery disconnect switch set to OFF), disconnect the black ground (-) battery cables first, then disconnect the red positive (+) cables afterwards. Flush the area with a mix of baking soda and warm water, dry it completely, then reattach the battery cables.

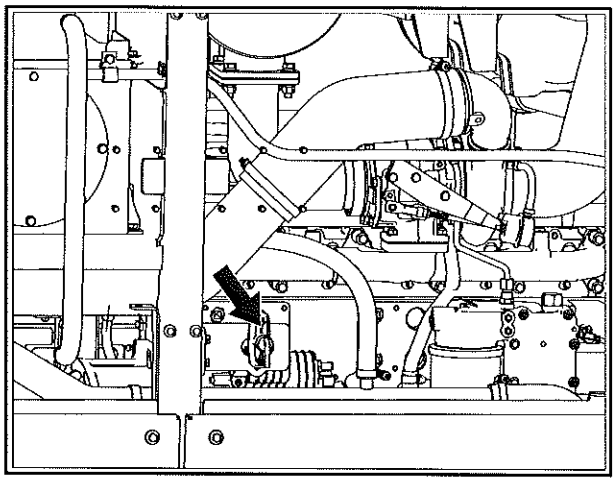

Fig.5-83

3. Remove any trash, tools, parts or debris from the battery compartment.

Replacement (If Required)

1. Remove the nuts from the retaining bolts and lift the battery hold-down bracket (3) off of the batteries.

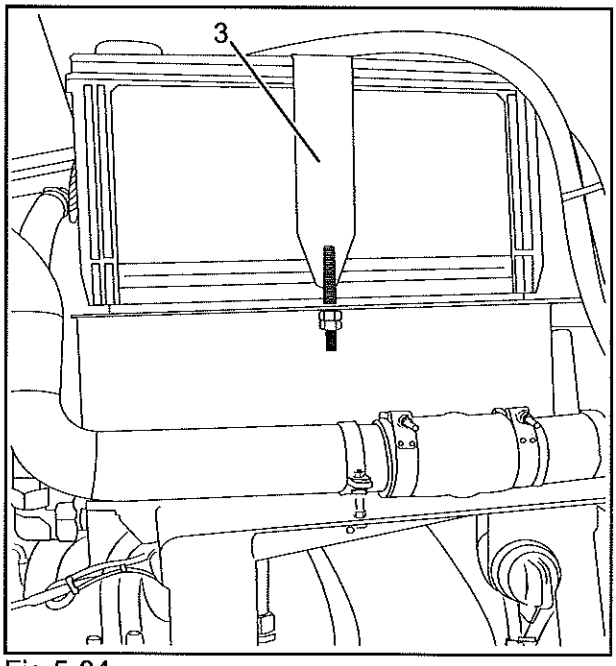

Fig.5-84

3. Battery hold-down bracket

2. Disconnect the black ground(-) battery cablesfirst, then disconnect the red positive (+) cables afterwards.

3. Remove the failed battery (or batteries).

4. Install the new battery (or batteries).

5. Connect the red positive (+) cables first. Connect the black ground (-) cables last.

NOTE :

The two 12-volt batteries are attached in series. Be sure they are installed in the same manner.

NOTE :

See "Specific Torque Values" on page 5-7.

6. Reinstall the battery hold-down bracket (1) over the batteries and secure it in place with the nuts removed in step 1.

Grease for Slewing Bearing of Work Implement-Refill

1. Park the machine on flat ground and switch the gear to P.

2. Refill grease to 4 nozzles (1) on the draw bar. Apply the grease while spinning the circle drive until the grease is overflowed from the nozzles.

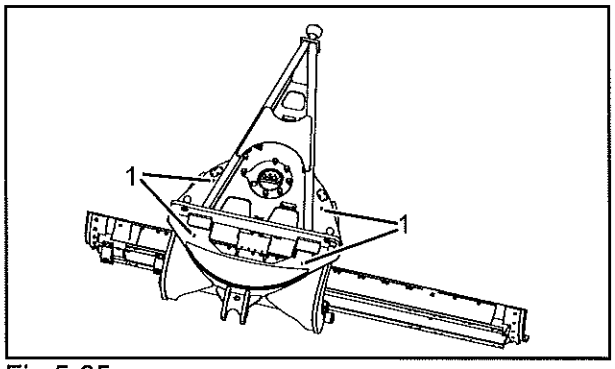

Fig.5-85

1. nozzles

Transmission Oil Level-Check and Refill

1. Pour the correct amount of new, clean transmission oil into the transmission auxiliary tank filler tube.

2. Start and run the machine at low idle speed. Check the transmission case and transmission auxiliary tank drain plugs for leaks.

3. Use the inching pedal and slowly operate machine in all gears to circulate the transmission oil.

4. With the engine running at low idle, the transmission set to neutral and the transmission oil temperature at 50°C, remove the transmission oil dipstick and wipe it clean with a clean cloth, then fully reinsert it into its tube.

5. Remove the dipstick (6) once more and note if the level is between the MIN and MAX marks on the dipstick.

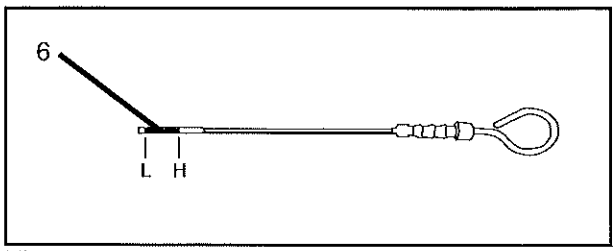

Fig.5-86

6. Dipstick

6. If necessary, add the appropriate amount of transmission oil through the transmission tank filler tube until the transmission oil level is between the L and H marks on the dipstick.

5.5.3 Maintenance Log

Record the completion of all of the maintenance tasks from this section.

5.6 250-Hour Maintenance

5.6.1 Introduction

NOTICE

Failure to perform the following procedures when and how directed can cause damage to the machine and cause the machine to operate improperly.

5.6.2 Secure the Machine for Maintenance

1. Obtain the Maintenance Log for this machine and complete it at the close of all maintenance procedures.

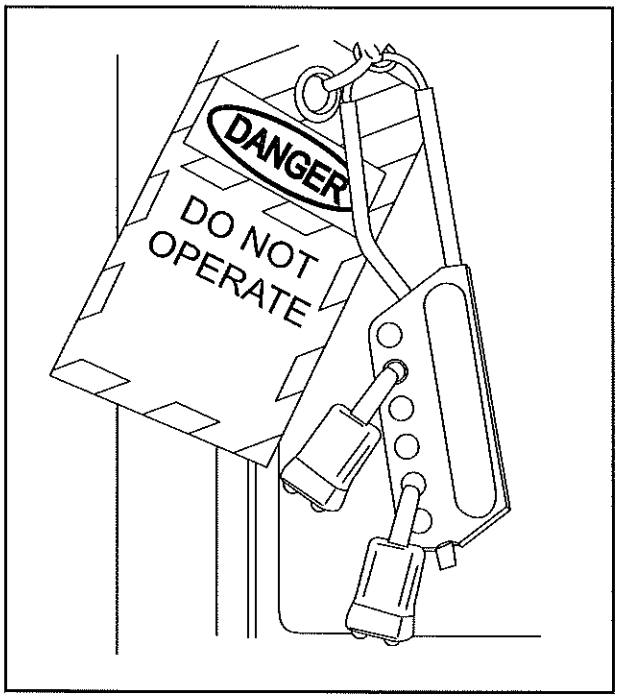

Fig.5-87

2. Read and understand all of the tasks listed in this section

3. Follow the Lockout/Tagout procedure in the Safety section of this manual.

NOTE :

See "Lockout/Tagout Procedures" on page 2-15 for details.

NOTE :
Allow the systems time to cool down before proceeding with any maintenance.

4. With the machine secured, check the following:
   - Air Conditioner Compressor Belt
   - Supplemental Coolant Additive (SCA) Levels (if used)
   - Grab Handles and Steps
   - Radiator Fins
   - Transmission Oil and Transmission Filter Screens (Initial)
   - Tandem Drive Cases and Differential Case Oils (Initial)
   - Cab Door, Access Panels and Locks
   - Windshield Washer and Windshield Wiper
   - Engine Oil and Filter
   - Circle Drive Oil

Air Conditioner Compressor Belt

Inspection

1. Locate the air conditioner compressor belt (1) directly behind the radiator.

⚠ CAUTION

Ensure that the engine is off and that all rotating a parts inside the engine compartment have stopped moving. Failure to do so could result in minor or moderate injury.

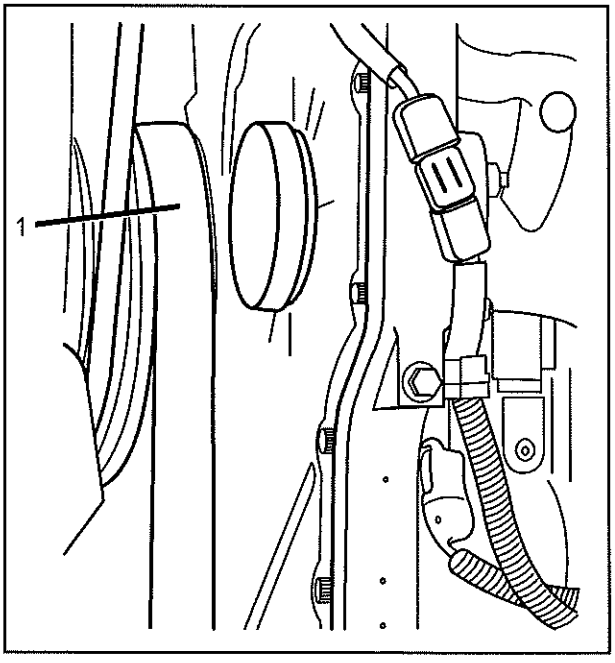

Fig.5-88

1. Air conditioner compressor belt

2. Examine the belt for cracks and other signs of damage.

3. Press down on the belt halfway between the compressor pulley and the drive pulley and measure the belt deflection.

NOTE :
The belt should deflect 0.40 - 0.60 in. (10 - 15 mm) when pressed with a force of 11.2 lb (50N).

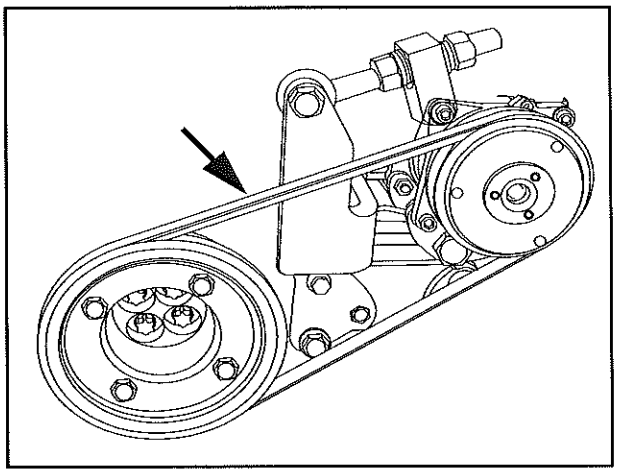

Fig.5-89

4. Contact your Sany dealer if adjustment is required.

Supplemental Coolant Additive (SCA) Levels (if used)

Check the SCA fluid.

NOTE :
See "Engine Coolant" on page 5-15 for additional information.

Grab Handles and Steps

1. Check the mounting bolts on the grab handles.
2. Replace any missing or damaged mounting bolts and tighten any loose bolts.
3. Remove any tools, greases or debris from the steps. Never allow loose items to remain on the machine.

Radiator Fins

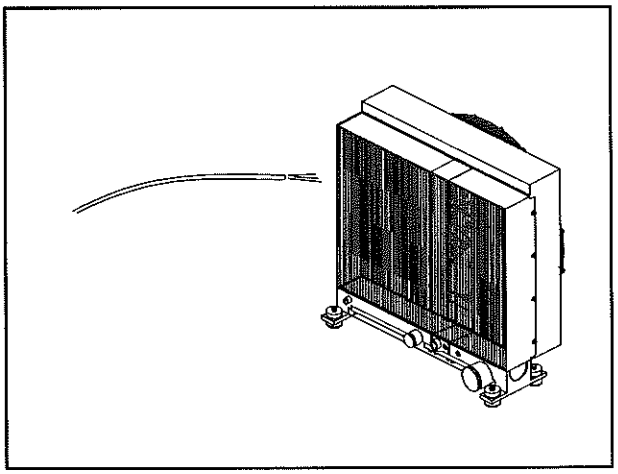

Fig.5-90

1. Use high-pressure water to clean foreign substances from between the radiator core and radiator fins that could not be removed easily during the daily inspection with compressed air.

NOTE :

During the cleaning process, do not spray water directly onto the alternator, cables and other electrical components. After cleaning, start the engine after the moisture is evaporated.

NOTICE

To avoid damage to the radiator fins, the water pressure should not exceed 39 psi (0.27 MPa) and the distance between the end of the water hose nozzle and the radiator fins should be not less than 4 in. (100 mm).

NOTICE

When cleaning the radiator core with high-pressure water, be careful not to deform or otherwise damage the radiator fins. Damaged radiator fins may require repair or even replacement of the entire radiator.

2. Afterwards, start the engine, run it at idle speed and carefully check the air flow with your hand on the air outlet of the radiator. Contact your Sany dealer if no air flow can be felt.

⚠ CAUTION

Be very careful to keep your hands and any loose clothing away from moving engine parts when performing this step. Failure to observe and follow this caution could result in serious injury.

Transmission Oil and Transmission Filter Screens (Initial)

Drain

NOTE :

Perform this procedure every 1,000 service hours after this first-time transmission fluid change or at least once each year, whichever occurs first.

1. Park the machine on a solid, level surface, then engage the parking brake and lower all moldboards and attachments to the ground.

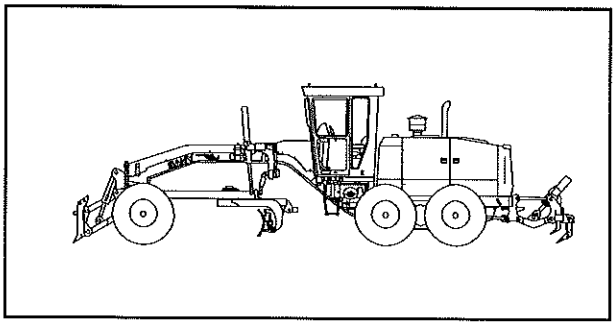

Fig.5-91

2. Apply slight downward pressure to the moldboard, then shut down the engine.

3. Clean the area around the transmission case oil filler hole and the drain plug.

4. Place an appropriately sized container under the transmission drain plug (1).

NOTE :
See "Location, Capacity and Type" on page 5-10 for capacity.

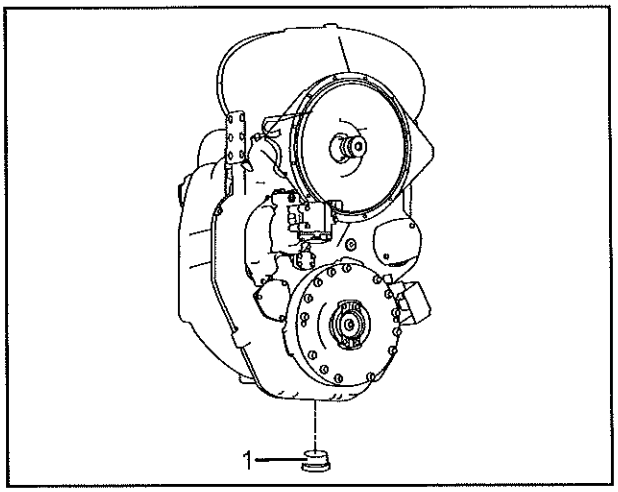

Fig.5-92

1. Transmission drain plug

5. Remove the transmission drain plug and allow the oil to empty into the catch container.

6. Clean the drain plug, install a new sealing washer on the drain plug, then install the plug back into the bottom of the transmission case.

7. Place an appropriately sized container under the transmission auxiliary tank drain plug (2).

NOTE :
See "Location, Capacity and Type" on page 5-10 for capacity.

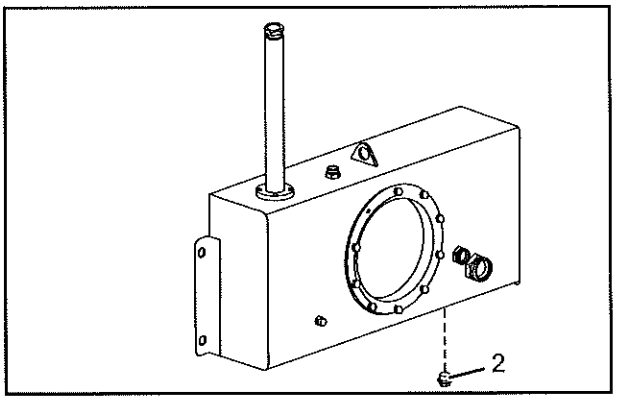

Fig.5-93

2. Transmission auxiliary tank drain plug

8. Remove the transmission auxiliary tank drain plug and allow the oil to empty into the catch container.

9. Clean the drain plug ,install a new sealing washer on the drain plug, then install the plug back into the bottom of the transmission auxiliary tank.

Transmission Filter Screens

1) Place an appropriately sized container under the upper transmission case filter housing.

2) Remove the three bolts (1), then the cover (2), O-ring (3) and magnetic screen filter (4) from the upper filter housing. Allow any residual transmission fluid to drain into the catch container.

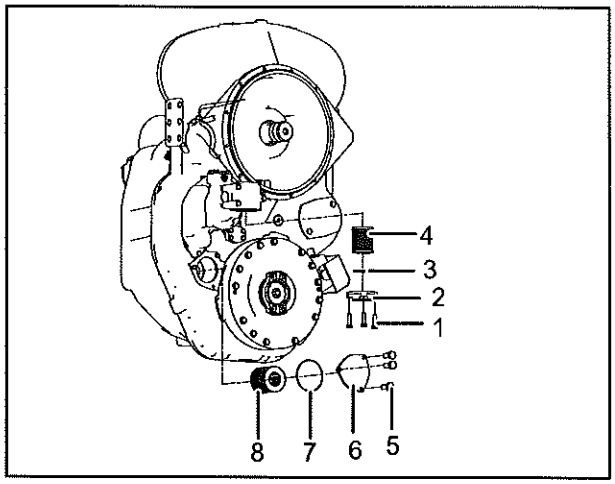

Fig.5-94

1. Bolt	5. Bolt
2. Cover	6. Cover
3. O-ring	7. O-ring
4. Magnetic screen filter	8. Magnetic screen filter

3) Thoroughly clean the screen filter, magnet and cover with mineral spirits, then dry them using compressed air.

4) Install the magnetic screen filter (4) back into its housing.

5) Install a new O-ring(3) in the cover (2), then secure it in place with the bolts (1) removed in step 4.

6) Place an appropriately sized container under the lower transmission case filter housing.

7) Remove the three bolts(5), then the cover (6), O-ring (7) and magnetic screen filter (8) from the lower filter housing. Allow any residual transmission fluid to drain into the catch container.

8) Thoroughly clean the screen filter, magnet and cover with solvent, then dry them using compressed air.

9) Install the magnetic screen filter (8) back into its housing.

10) Install a new O-ring (7) in the cover (6), then secure it in place with the bolts (5) removed in step 9.

Hydraulic filter-Lubricate

1. Locate the hydraulic filters (3)

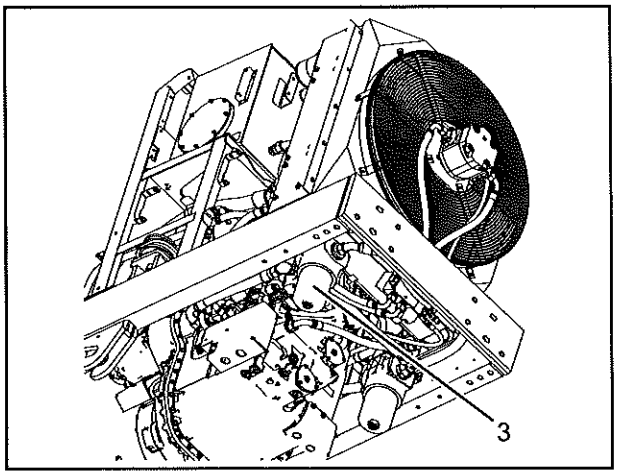

Fig.5-95

3. Hydraulic filters

2. Unscrew the filter housing (1) from the first hydraulic filter assembly, then remove the filter element from the filter housing.

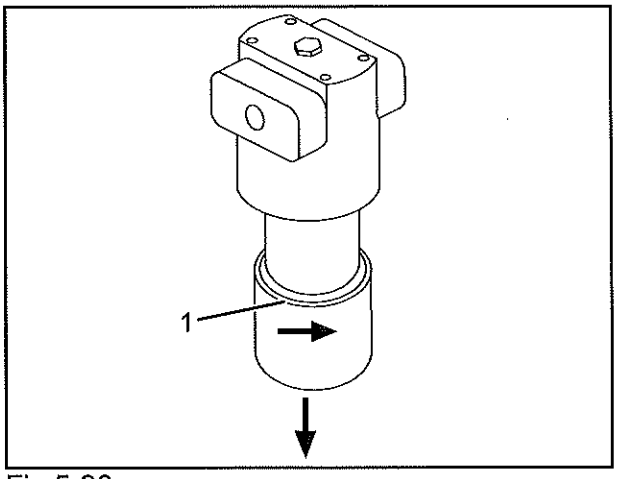

Fig.5-96

1. Filter housing

3. Inspect the filter element surface for visible debris or damage.

4. Clean the filter housing and its threads.

5. Install a new filter element (2) and new seal rings, then install the filter housing.

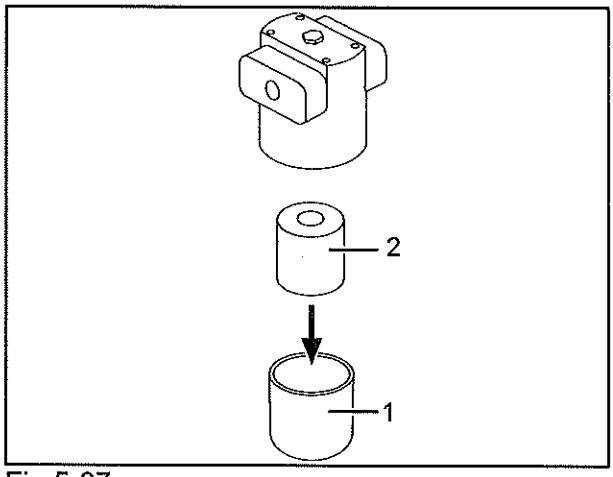

Fig.5-97

1. Filter housing 2. Filter element

Refill

1) Pour the correct amount of new, clean transmission oil into the transmission auxiliary tank filler tube.

NOTE :

See "Location, Capacity and Type" on page 5-10 for capacity and "Transmission and Tandem Drive Case Oil Viscosity/Temperature Data" on page 5-14 for type.

NOTICE

Do not overfill. Failure to observe and follow this could result in machine damage or improper machine operation.

2) Start and run the machine at low idle. Check the transmission case and transmission auxiliary tank drain plugs for leaks.

3) Use the inching pedal and slowly operate machine in all gears to circulate the transmission oil.

4) With the engine running at low idle, the transmission set to neutral and the transmission oil temperature at 50° C, remove the transmission oil dipstick and wipe it clean with a clean cloth, then fully reinsert it into it its tube.

5) Remove the dipstick once more and note if the level is between the MIN and MAX marks on the dipstick.

6) If necessary, add the appropriate amount of transmission oil through the transmission tank filler tube until the transmission oil level is between the L and H marks on the dipstick.

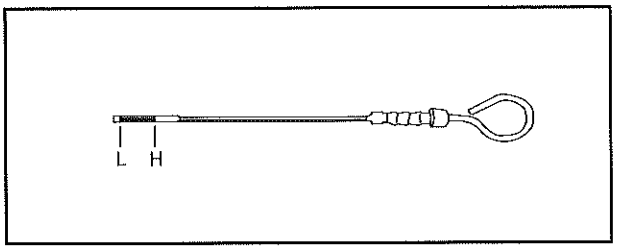

Fig.5-98

7) Shut down the engine.

Tandem Drive Cases and Differential Case Oils (Initial)

⚠ CAUTION

These components will be hot while performing this procedure. Wear protective clothing and use extreme caution when performing this procedure. Failure to do so could result in minor or moderate injury.

NOTE :

See "Fluid Systems" on page 2-15.

NOTE :

Perform this procedure every 2,000 service hours after this fluid change or at least once each year, whichever occurs first.

Tandem Drive Cases

1) Park the machine on firm, level ground, then shut down the engine.

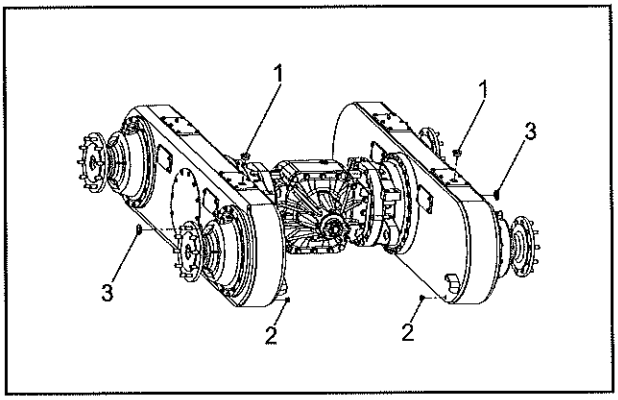

Fig.5-99

1. Plug from the oil filler
2. Drain plug
3. Sight glass

2) Clean then remove the plug from the oil filler (1) at the top of either tandem drive case

3) Place an appropriately sized container under the drain plug (2).

NOTE :

See "Location, Capacity and Type" on page 5-10 for capacity and "Hydraulic Oil Viscosity/ Temperature Data" on page 5-13for type.

4) Clean then remove the drain plug (2) and allow the tandem drive case to completely drain of all oil.

NOTICE

Dispose of drained oil properly. Failure to do so could result in damage to the environment.

5) Reinstall the drain plug (2).

6) Add clean fresh oil through the filler (1) at the top of the tandem drive case until the oil level is at the mid-point on the sight glass (3) on the side of the drive case.

NOTE :

he quantity is approximately 19 gal. (72 L).

7) Reinstall the oil filler plug in the top of its case.

8) Repeat steps 2 through 7 for the other tandem drive case.

Differential Case

1) Ensure that the machine still parked on firm, level ground and the engine is off.

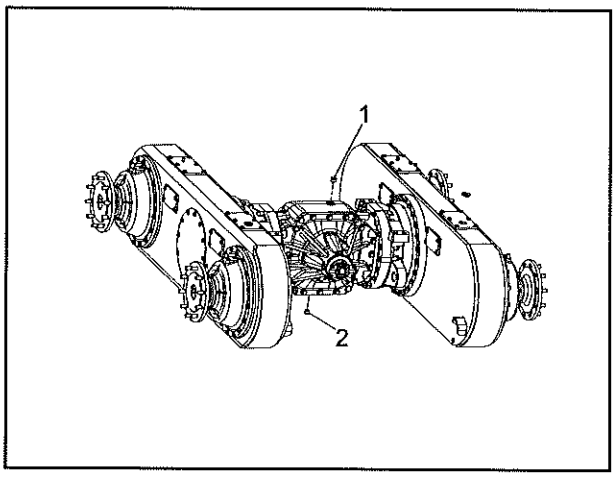

Fig.5-100

1. Plug 2. Drain plug

2) Clean then remove the plug (1) from the top of the differential case.

3) Place an appropriately sized container under the drain plug (2).

NOTE :

See "Location, Capacity and Type" on page 5-10 for capacity and "Transmission and Tandem Drive Case Oil Viscosity/Temperature Data" on page 5-14 for type.

4) Clean then remove the drain plug (2) and allow the differential case to completely drain of all oil.

NOTICE

Dispose of drained oil properly. Failure to do so could result in damage to the environment.

5) Reinstall the drain plug (2), then reinstall the plug (1) to its hole at the top of the differential case.

6) Remove the plug (3) from the filler hole at the rear of the differential case.

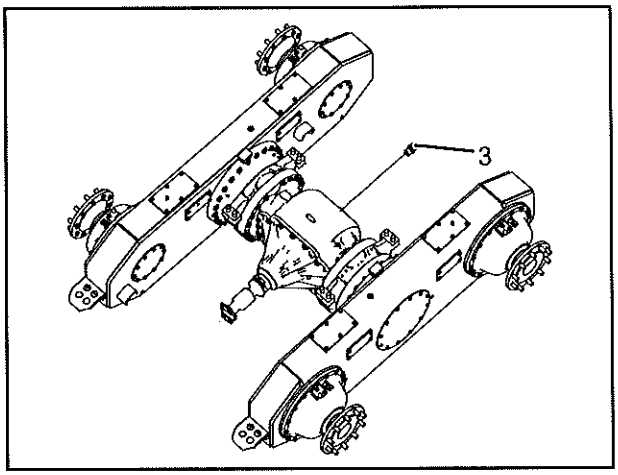

Fig.5-101

3. Plug

7) Add clean fresh oil through the oil filler hole at the rear of the differential case, then reinstall the plug (3).

NOTE :

The quantity is approximately 11.6 gal. (44 L).

Cab Door, Access Panels and Locks

1. Inspect the cab door access panels and locks to be sure they close and lock properly.

2. Repair or replace any damaged doors, access panels or locks immediately.

Windshield Washer and Windshield Wiper

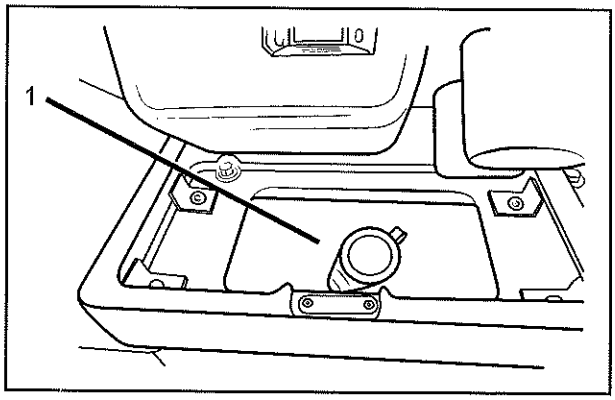

Fig.5-102

1. Reservoir

1. Visually check the washer fluid level inside the reservoir (1) located beneath the storage tray to the left of the operator's seat.

2. If the fluid level is low, remove the cap and add windshield washer fluid.

3. Check the operation of the windshield washer nozzle (2) and front and rear wipers (3) to ensure there is no smearing across the windshield during operation. Replace the wiper blade with a new one if smearing does occur.

NOTE :
The front windshield wiper is shown here.

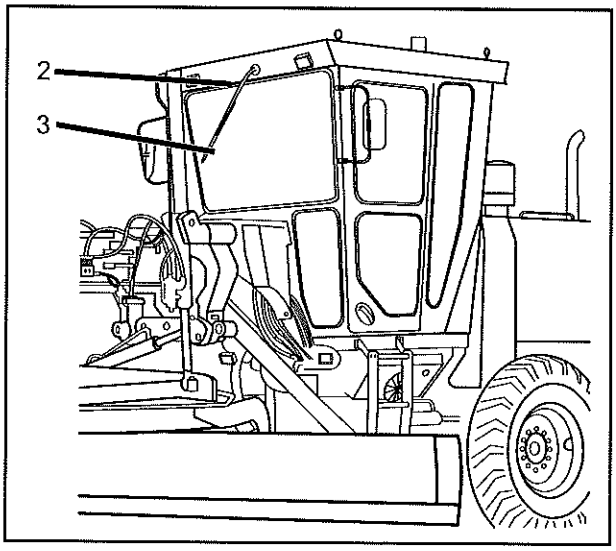

Fig.5-103

2. Spray nozzle 3. Rear wipers

4. If necessary, adjust the spray nozzle (2) to ensure that the fluid spray is properly directed.

Circle Drive Oil

1. Park the machine on firm, level ground, then shut down the engine.

2. Place an appropriately sized container under the circle drive drain plug (1).

NOTE :

See "Location, Capacity and Type" on page 5-10 for capacity and "Differential and Circle Drive Oil" on page 5-13 for type.

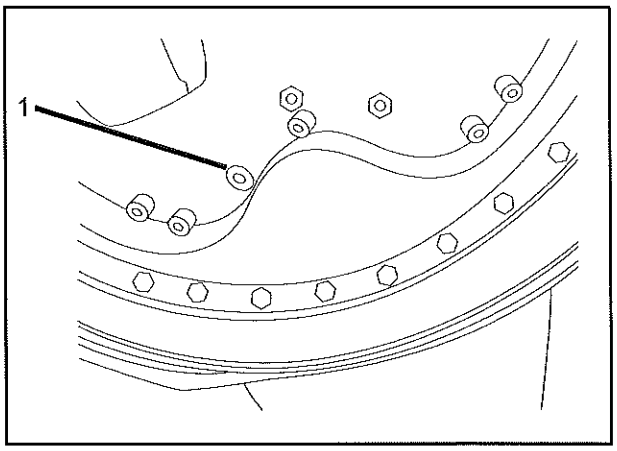

Fig.5-104

1. Circle drive drain plug

3. Remove the filler plug (2) from the top of the circle drive case.

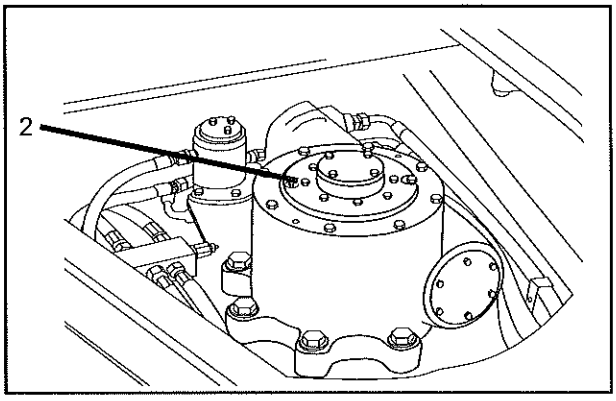

Fig.5-105

2. Filler plug

4. Remove the circle drive drain plug (1) and allow the circle drive case to completely drain of all fluid.

NOTICE

Dispose of drained oil properly. Failure to do could result in damage to the environment.

5. Clean the drain plug (1), install a new sealing ring on the plug, then reinstall it back in the circle drive case.

6. Add clean fresh oil through the filler (2) at the top of the circle drive case until the oil level is above the mid- point on the sight glass (3) on the side of the drive case.

NOTE :
The quantity is approximately 1.7 gal. (6.5 L).

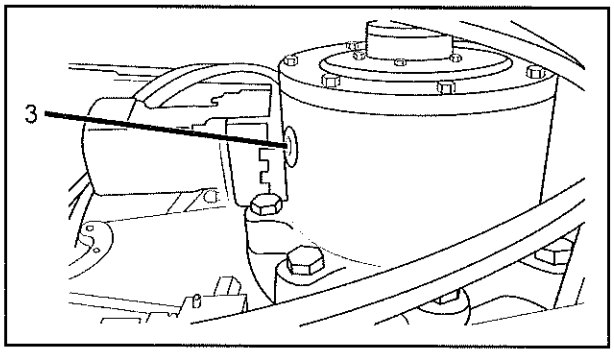

Fig.5-106

3. Sight glass

7. Clean the oil filler plug (2), install a new sealing ring on the plug, then reinstall it back in the top of the circle drive case.

5.6.3 Maintenance Log

Record the completion of all of the maintenance tasks from this section.

5.7 500-Hour Maintenance

5.7.1 Introduction

NOTICE

Failure to perform the following procedures when and how directed can cause damage to the machine and cause the machine to operate improperly.

5.7.2 Secure the Machine for Maintenance

1. Obtain the Maintenance Log for this machine and complete it at the close of all maintenance procedures.

2. Read and understand all of the tasks listed in this section.

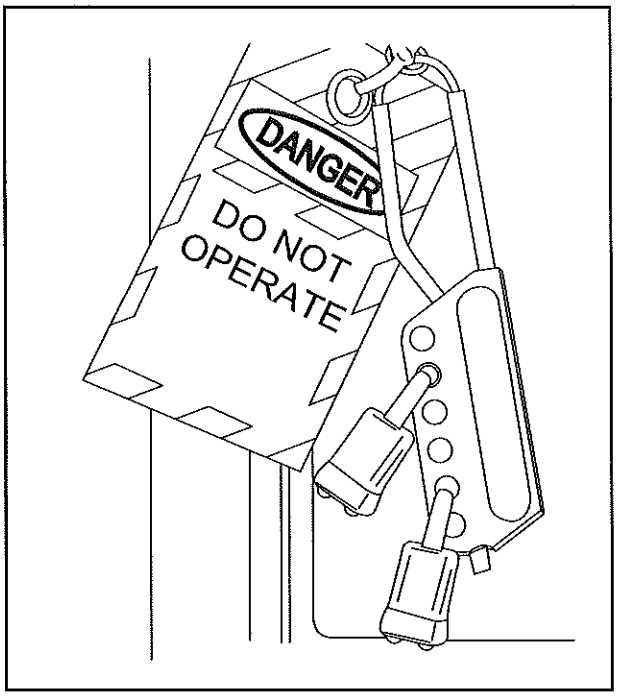

Fig.5-107

3. Follow the Lockout/Tagout procedure in the Safety section of this manual

NOTE :

See "Lockout/Tagout Procedures" on page 2-15 for details.

NOTE :

Allow the systems time to cool down before proceeding with any maintenance.

4. With the machine secured, check the following:

- Air Filters
- Primary Fuel Filter
- Dual Fuel Filter Assembly
- Fuel Tank Strainer
- Radiator, Oil Cooler, and A/C Condenser Fins
- Hydraulic Pumps
- Seat Belt

Engine Oil and Filter

NOTE :

See "Secure the Machine for Maintenance" on page 5-48 for instructions on performing this procedure.

Air Filters

NOTICE

Maintenance work can be done only after the engine is shut down. Never start the engine after the air filter is removed. Otherwise dust will be drawn into the engine. And this will badly shorten the service life of the engine.

When the engine is in operation, if the air filter warning lamp on the dashboard flashes, you should maintain the air filter . Take the following steps to maintain the air filter.

1. Unlock the right engine hood door and open it.

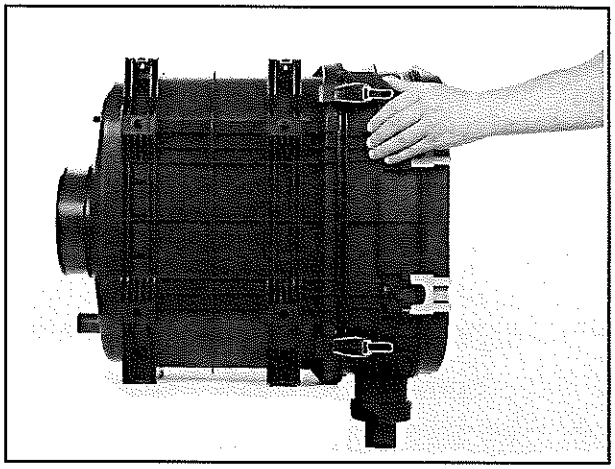

Fig.5-108

2. Release the two claps at the left side. And remove the end cover of the air filter.

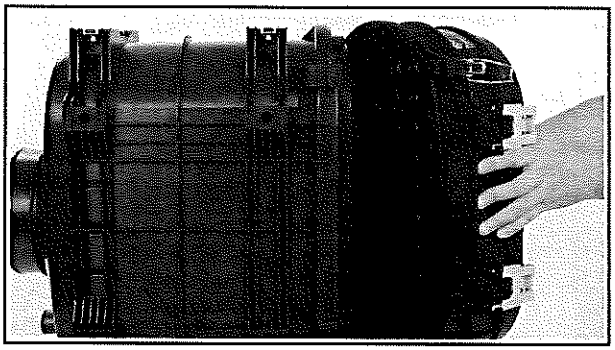

Fig.5-109

3. Remove the pre-filter, pull the four yellow claps and remove the yellow claps.

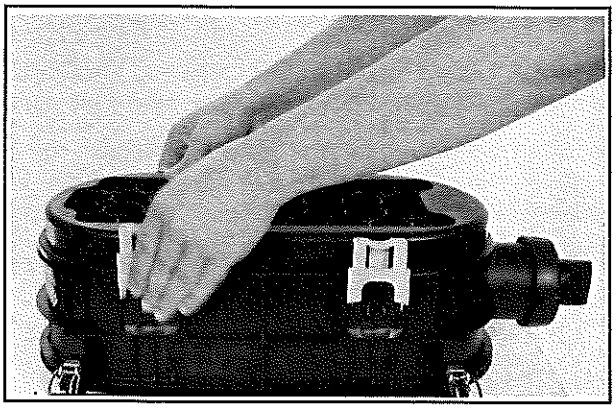

Fig.5-110

4. Clean the end cover and the dust valve.

5. Recover the pre-filter.

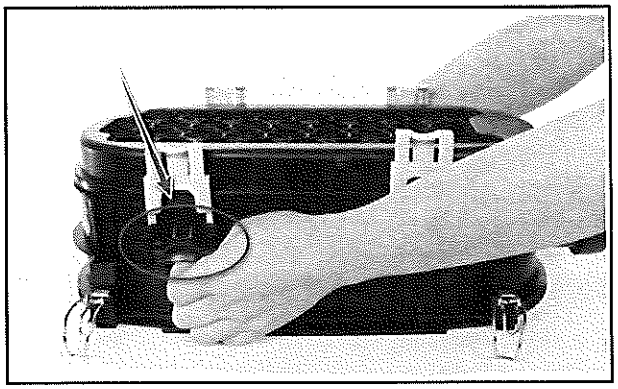

Fig.5-111

6. Loosen the main filter element carefully. Check the used main filter element.

It's advised to change the main filter element if it has been cleaned for three times. Meanwhile the safety filter element should be changed as well. If the main filter element is damaged, the main filter element and safety element must be replaced regardless the cleaning times is three or not.

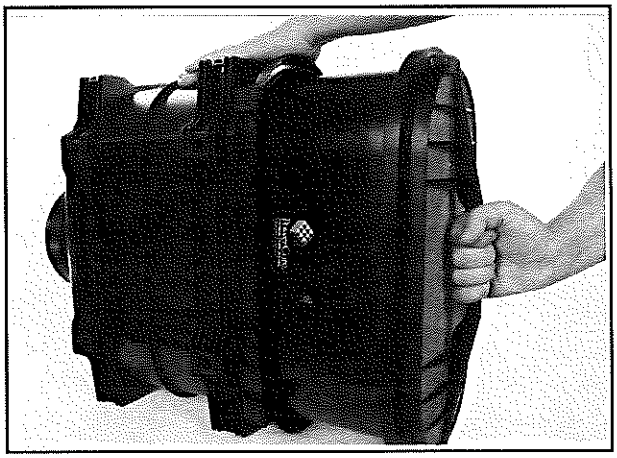

Fig.5-112

NOTICE

It's forbidden to clean the main filter element by knocking, otherwise the main filter element could be damaged.

7. Clean the interior surface and outlet pipe with clean wet cloth.

8. Reinstall the end cover. Make sure that the claps are firmly installed.

It's advised to send for the SANY service to maintain the air filter. Any damage to the engine due to customer's improper maintenance to the air cleaner will assume by the customer.

Primary Fuel Filter

NOTE :

See "Electrical System" on page 2-17 before performing this procedure.

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

1. Shut down the engine and set the battery disconnect switch inside the left engine compartment to the OFF position.

2. Locate the primary fuel filter (1) inside the engine compartment.

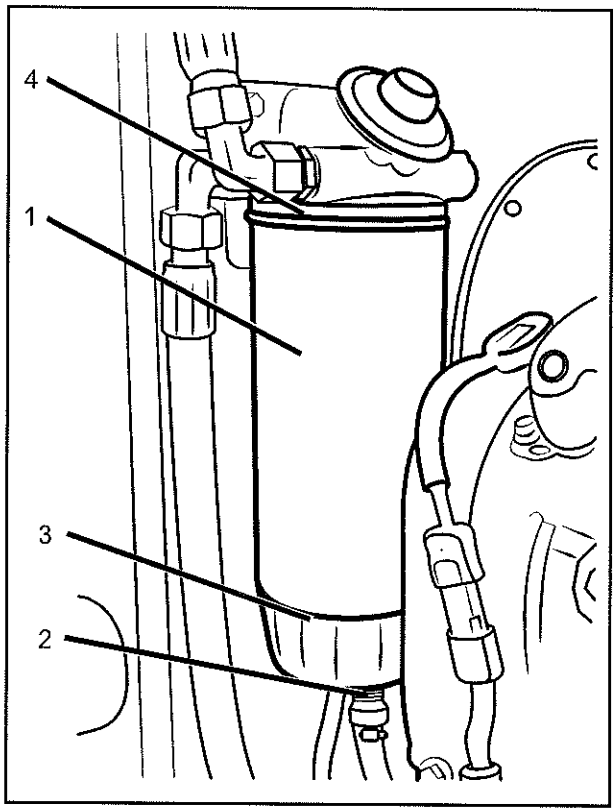

Fig.5-113

1. Primary fuel filter/ Water separator	3. Water separator bowl
2. Drain valve	4. From its mounting plate

3. Place an appropriately sized container beneath the drain valve (2) at the bottom of the primary fuel filter.

NOTE :

If a hose is connected to the drain valve, place the catch container beneath the end of the hose.

4. Open the drain valve (4) to allow all water and/or contaminated fuel to drain.

NOTICE

Dispose of the contaminated fuel properly. Failure to do so could result in damage to the environment.

5. Close the drain valve (2) when the flow into the catch container is free of water and contamination.
6. Disconnect the water-in-fuel sensor harness.
7. Remove the bowl (3) from the bottom of the primary fuel filter.
8. Unscrew and remove the primary fuel filter/water separator (1) from its mounting plate (4).
9. Clean the bottom of the filter mounting plate (4).
10. Lubricate the water separator bowl (3) and clean the O-ring groove with clean diesel fuel.
11. Place a new O-ring in the groove on the water separator bowl (3), then install the bowl onto a new filter by hand.
12. Apply clean diesel fuel to the seal at the top of the new filter(1).
13. Thread the new filter onto its mounting plate (4) until the seal of the filter contacts the filter mounting base.

NOTE :

Note the position of the index marks on the filter (1) in relation to a fixed point on the filter mounting plate (4).

14. Tighten the filter according to the instructions printed on the filter.

15. Reconnect the water-in-fuel sensor harness.

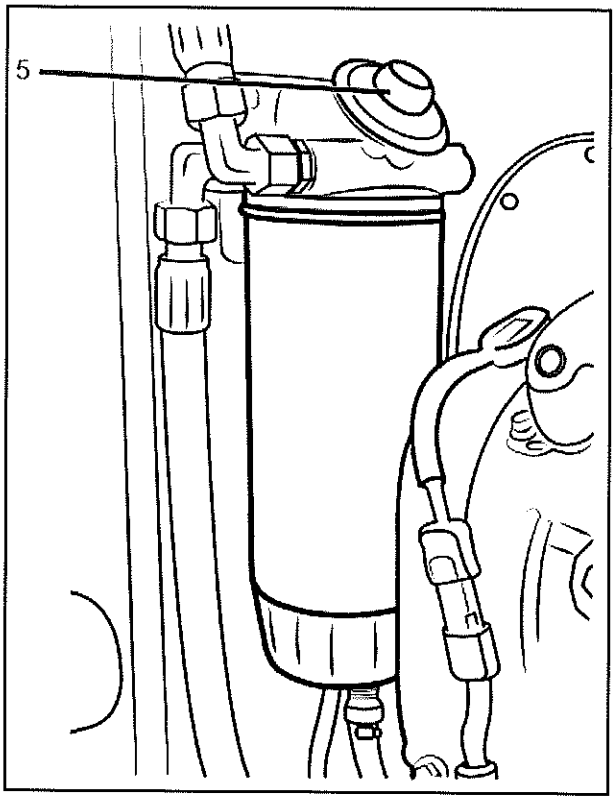

Fig.5-114

5. Priming bulb

16. Press the priming bulb (5) at the top of the fuel filter assembly about 10 times or until the bulb becomes noticeably harder to press.

NOTE :

This action pulls fuel from the fuel tank.

17. Set the battery disconnect switch inside the left engine compartment to the ON position

18. Turn on the ignition key switch inside the operator cab to the ON position to operate the fuel delivery pump for 30 seconds,then turn the ignition key switch to the OFF position.

NOTE :

Do not start the engine.

19. Repeat step 18 approximately 3 or 4 more times.

Dual Fuel Filter Assembly

NOTE :

See "Electrical System" on page 2-17 before performing this procedure.

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

1. Shut down the engine and set the battery disconnect switch inside the left engine compartment to the OFF position.

2. Locate the dual fuel filter assembly (1) inside the engine compartment.

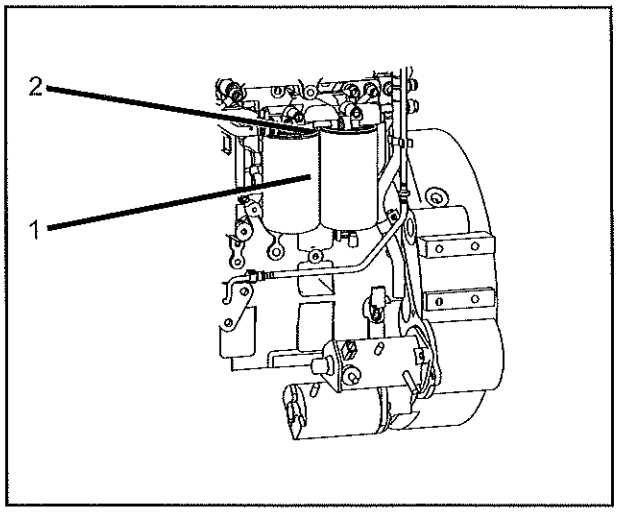

Fig.5-115

1. Dual fuel filter assembly 2. Mounting plate

3. Disconnect the water-in-fuel sensor harness.

4. Place an appropriately sized container beneath the filter assembly.

5. Unscrew and remove each of the two fuel filters from their mounting plate (2).

NOTICE

Dispose of the contaminated fuel filters properly. Failure to do so could result in damage to the environment.

6. Clean the bottom of the filter mounting plate (2).

7. Apply clean diesel fuel to the seal at the top of the new filters.

8. Thread the new filters onto their mounting plate (2) until the seal of the filter contacts the filter mounting base.

9. Tighten the new filters by one-haft turn until the seal of the filter contacts the base properly.

10. Reconnect the water-in-fuel sensor harness.

11. Press the priming bulb (3) at the top of the primary fuel filter about 10 times or until the bulb becomes noticeably harder to press.

NOTE :
This action pulls fuel from the fuel tank.

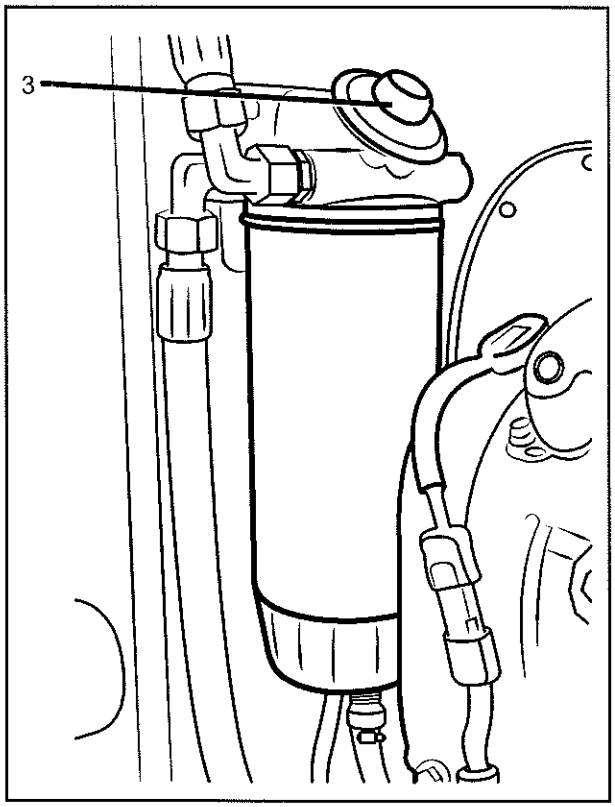

Fig.5-116

3. Priming bulb

12. Turn on the ignition key switch inside the operator cab to the ON position to operate the fuel delivery pump for 30 seconds, then turn the ignition key switch to the OFF position.

NOTE :
Do not start the engine.

13. Repeat step 11 approximately 3 or 4 more times.

14. Start the engine and allow it to run at idle speed.

15. Check for leaks in the fuel system.

16. Shut down the engine.

Fuel Tank Strainer

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

1. Use compressed air to blow away any dirt and other debris from around the fuel cap at the top rear of the machine, then remove the lockable cap (1).

NOTICE

Contaminants in the fuel system can eventually clog the fuel-water separator and could even cause fuel starvation to the engine and reduced performance and operation.

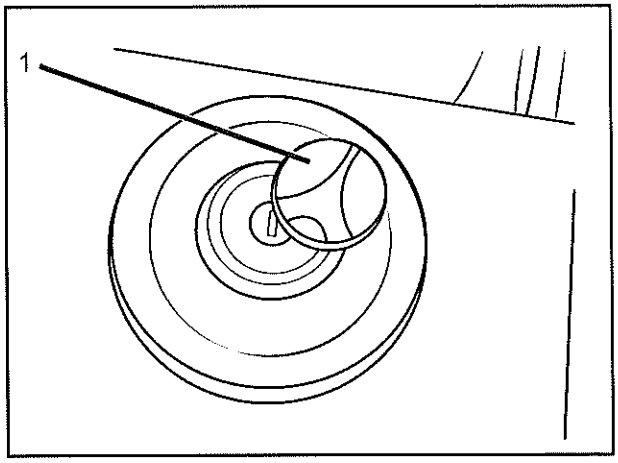

Fig.5-117

1. Lockable cap

2. Lift the fuel tank strainer element (2) out from the fuel filler neck.

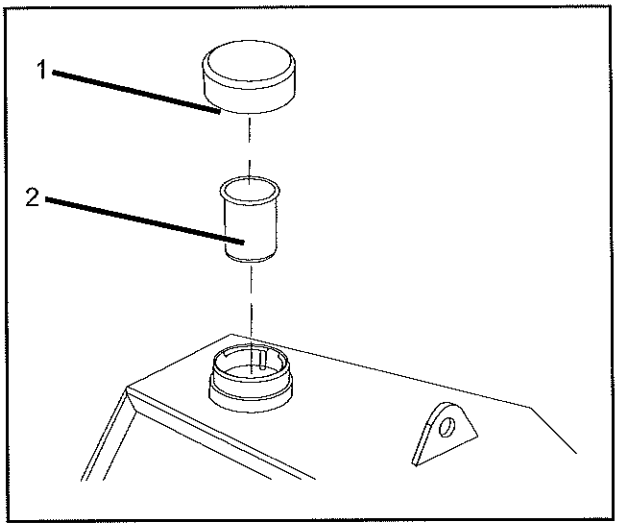

Fig.5-118

1. Lockable cap 2. Fuel tank strainer

3. Clean and inspect the fuel tank strainer.

NOTE :

Replace a damaged or missing fuel strainer with a new one.

4. Install the new (or cleaned) fuel tank strainer (2).

5. Reinstall and lock the fuel tank cap.

Radiator, Oil Cooler, and A/C Condenser Fins

1. Open the left rear access panel.

2. Open the engine cover.

3. Remove the wing nuts securing the protection screen mounted in front of the engine coolant radiator.

4. Pull the protection screen away from the coolers.

5. Clean the protection screen using compressed air.

6. Clean the radiator, hydraulic oil cooler and A/C condenser fins using compressed air.

NOTICE

Use low pressure compressed air and point the nozzle away from the radiator fins to avoid damaging the fins or causing other engine damage.

7. Remove the covers below the coolers.

8. Clean out any debris that has accumulated during operations and cleaning.

9. Reinstall the covers.

10. Reinstall the protection screen.

11. Close the engine cover.

Hydraulic Pumps

⚠ CAUTION

Hydraulic oil is hot and under high pressure. Always wait for the machine to cool down to below 160° F (71°C) before attempting to open the hydraulic oil system. Failure to do so could result in minor or moderate injury.

NOTE :

See "Fluid Systems" on page 2-15.

1. Locate the hydraulic pump behind the right rear access panel.

2. Locate the brake and steering pump on the left side.

3. Start the engine

4. Check for leaks, function and noise.

5. Shut down the engine.

NOTE :

Contact your Sany dealer if any abnormality is found.

6. Close the access panel.

Seat Belt

Ensure that the seat belt is not damaged (cut, frayed, etc.) and is in proper working condition, especially if it has been subjected to severe stress.

NOTE :
Contact your Sany dealer for replacement if needed.

5.7.3 Maintenance Log

Record the completion of all of the maintenance tasks from this section.

5.8 1,000-Hour Maintenance

5.8.1 Introduction

NOTICE

Failure to perform the following procedures when and how directed can cause damage to the machine and cause the machine to operate improperly.

5.8.2 Secure the Machine for Maintenance

1. Obtain the Maintenance Log for this machine and complete it at the close of all maintenance procedures.

2. Read and understand all of the tasks listed in this section.

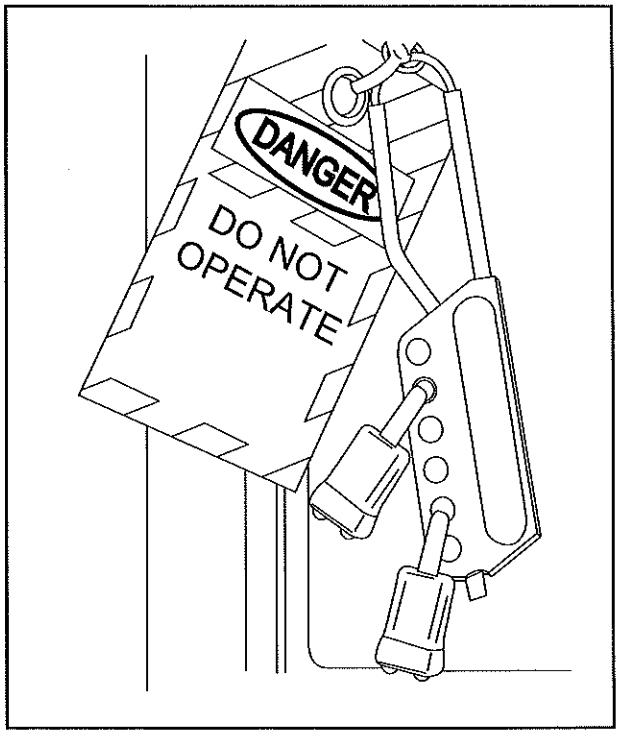

Fig.5-119

3. Follow the Lockout/Tagout procedure in the Safety section of this manual.

NOTE :

See "Lockout/Tagout Procedures" on page 2-15 for details.

NOTE :

Allow the systems time to cool down before proceeding with any maintenance.

4. With the machine secured, check the following:

- Hydraulic Filter
- Muffler and Exhaust System.
- Fuel Lines
- Accumulator
- Transmission Oil and Transmission Filter Screens

Hydraulic Filter

⚠ CAUTION

Hydraulic oil is hot and under pressure. Always wait for the machine to cool down to below 160° F (71°C) before attempting to open the hydraulic oil system. Failure to do so could result in minor or moderate injury.

NOTE :

See "Fluid Systems" on page 2-15.

NOTE :

Perform this procedure every 1,000 service hours after this first-time replacement or at least once each year, whichever occurs first.

1. Lower the moldboard and all attachments to the ground.

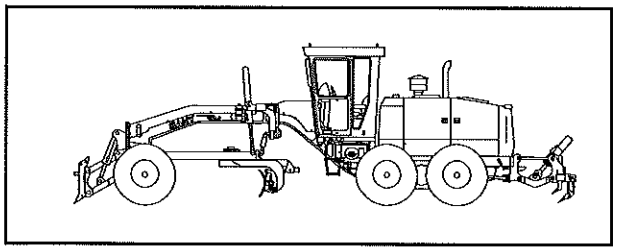

Fig.5-120

2. Shut down the engine.

3. Locate the hydraulic filters.

NOTE :

The hydraulic oil filters are at the bottom of the cab and the right side of the rear frame.

4. Unscrew the filter housing (1) from the first hydraulic filter assembly, then remove the filter element from the filter housing.

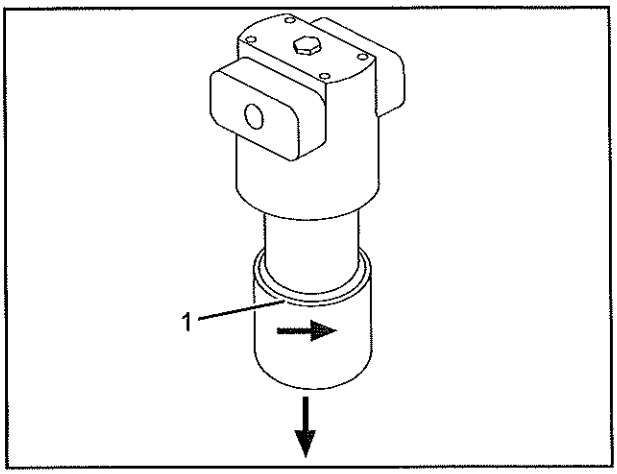

Fig.5-121

1. Filter housing

5. Inspect the filter element surface for visible debris or damage.

NOTICE

Debris or damage to the filter indicates potential faults with hydraulic system components. Repair the faults and repair or replace defective components. Failure to do so may result in faulty operation or equipment damage.

6. Clean the filter housing and its threads.

7. Install a new filter element (2) and new seal rings, then install the filter housing.

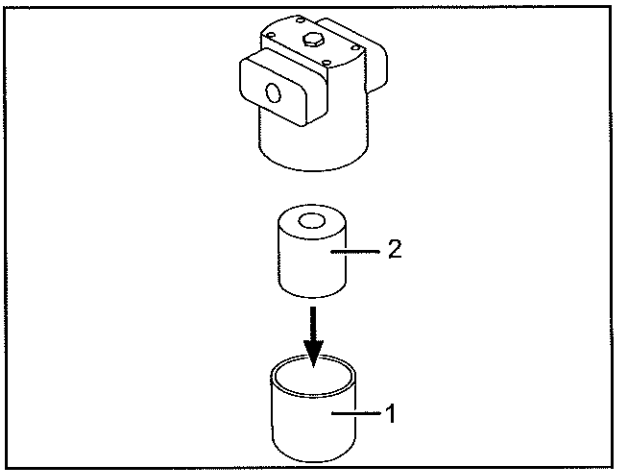

Fig.5-122

1. Filter housing 2. Filter element

Muffler and Exhaust System.

⚠ CAUTION

Ensure that the engine is off and that the exhaust components have cooled down to a point where they can be touched without burning. Failure to avoid this could result in minor or moderate injury.

1. Open the engine compartment to gain access to the muffler and its connections.

2. Check the muffler (1), exhaust pipe (2) and expansion pipe (3) for leaks and other signs of damage.

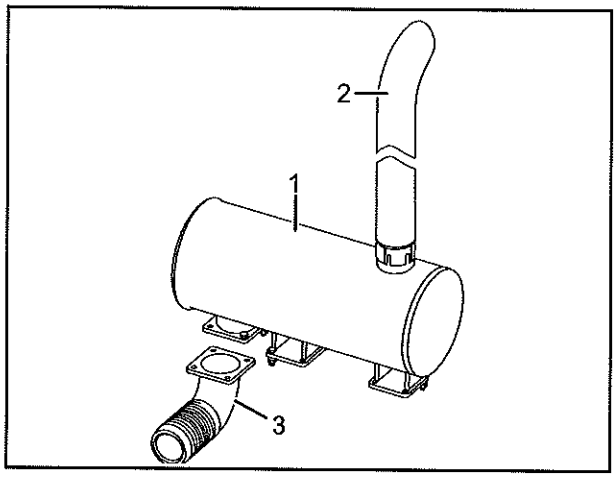

Fig.5-123

1. Muffler
2. Exhaust pipe
3. Exhaust pipe

3. Be sure the exhaust pipe (2) is clear and is not restricted.

4. Check the connection to the expansion pipe (3) for leaks or signs of damage.

NOTE :

If any abnormality is found, contact your Sany dealer for repairs.

⚠ WARNING

Never operate a machine with a defective exhaust system. Exhaust leaks or a restricted or damaged exhaust system could result in death or serious injury.

5. Check the four bolts (4) and nuts that secure the intake pipe to the muffler and the clamp (5) that secures the pipe to the turbocharger for tightness.

NOTE :
Tighten as required. Replace damaged or missing bolts or clamps.

NOTE :
See "General Torque Values" on page 5-7.

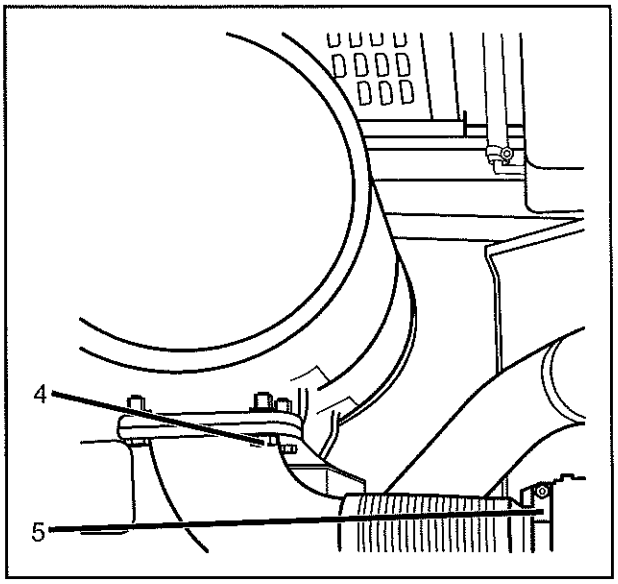

Fig.5-124

4. Four bolts 5. Clamp

Fuel Lines

Inspect all steel, plastic and rubber fuel lines including those on the engine.

⚠ CAUTION

Failure to perform this procedure as directed could result in a fire during operation which could result in minor or moderate injury.

NOTE :
See "Fluid Systems" on page 2-15.

NOTE :
Replace any fuel lines which show signs of deterioration, wear, damage or leaks. Contact your Sany dealer for repairs on the fuel system.

Accumulator

⚠ WARNING

Cold ambient temperatures could result in the loss of secondary braking function due to an inadequate hydraulic accumulator nitrogen pre-charge. The loss of the secondary braking system as well as the main hydraulic pressure will result in little or no braking function and a potential for death or injury.

⚠ CAUTION

Hydraulic oil is hot and under high pressure. Always wait for the machine to cool down to below 160° F (71° C) before proceeding. Failure to do so could result in minor or moderate injury.

NOTICE

Sany recommends that th accumulators (1) be checked anytime the machine has been idle for longer than two hours with the ambient temperature at -13° F (-25° C) or lower.

NOTE :

See "Fluid Systems" on page 2-15.

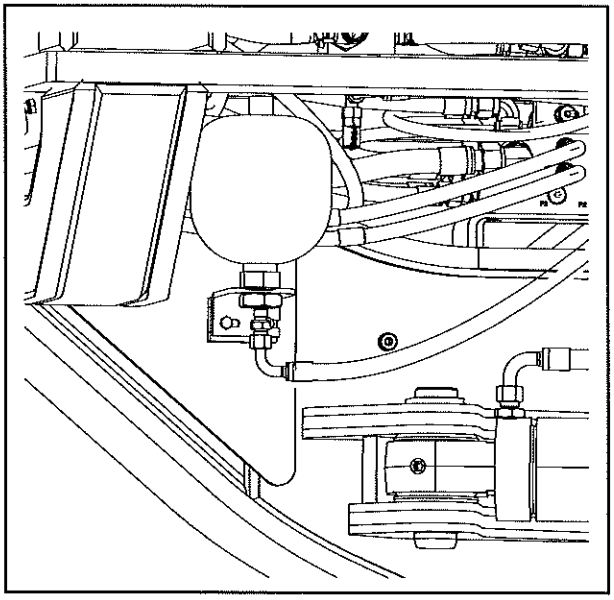

Fig.5-125

1. Lower the moldboard and all attachments to the ground.

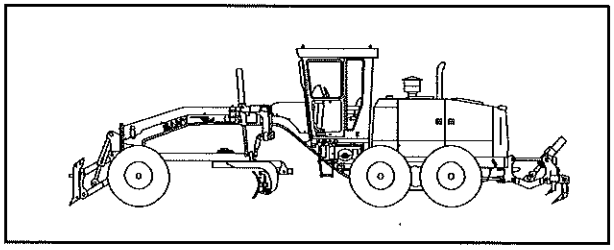

Fig.5-126

2. Continue to run the engine for one minute more to increase the brake accumulator pressure. The alert indicator (2) on the monitor should turn off. Shut down the engine.

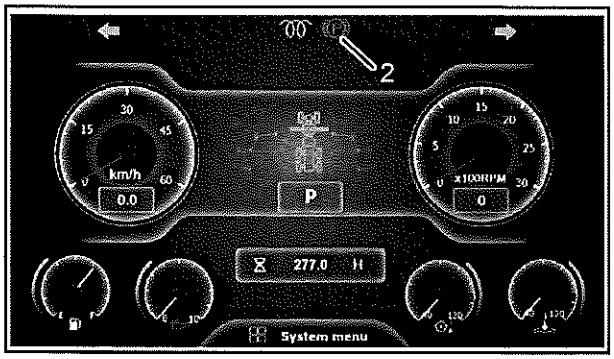

Fig.5-127

2. Alert indicator

3. Press and release the service brake pedal (3) at least five times or until the alert indicator on the Combined Instruments Display flickers on and off.

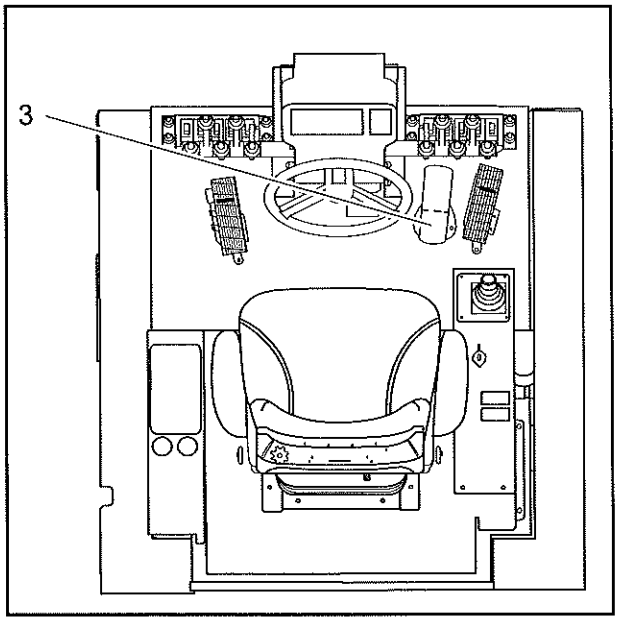

Fig.5-128

3. Service brake pedal

4. Contact Sany if the alert indicator begins flickering on and off before the service brake pedal has been pressed and released less than five times.

Transmission Oil and Transmission Filter Screens

NOTE :

See "Secure the Machine for Maintenance" on page 5-48.

5.8.3 Maintenance Log

Record the completion of all of the maintenance tasks from this section.

5.9 2,000-Hour Maintenance

5.9.1 Introduction

NOTICE

Failure to perform the following procedures when and how directed can cause damage to the machine and cause the machine to operate improperly.

5.9.2 Secure the Machine for Maintenance

1. Obtain the Maintenance Log for this machine and complete it at the close of all maintenance procedures.

2. Read and understand all of the tasks listed in this section.

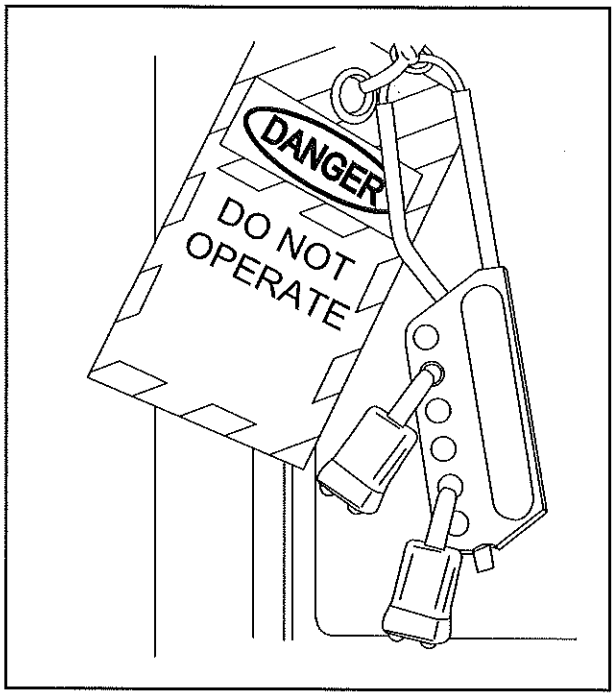

Fig.5-129

3. Follow the Lockout/Tagout procedure in the Safety section of this manual.

NOTE :

See "Lockout/Tagout Procedures" on page 2-15.

NOTE :

Allow the systems time to cool down before proceeding with any maintenance.

4. With the machine secured, check the following:

- Engine Coolant
- Tandem Drive Cases and Differential Case Oils
- Circle Drive Oil
- Hydraulic Oil
- Fuel Tank

Engine Coolant

⚠ DANGER

Inhaling or ingesting coolant is toxic. If not avoided, this will result in death or serious injury.

⚠ CAUTION

Do not remove the filler cap while the engine is hot. Engine coolant is under pressure when hot and will spurt out. Always wait for the engine to cool to outdoor ambient temperature before removing the filler cap. Failure to follow this warning will result in creating a hazardous situation which could result in minor or moderate injury.

NOTE :

See "Engine Coolant" on page 5-15.

1. Shut down the engine, then locate the coolant recovery tank cap (1) which is accessible from the top rear of the machine.

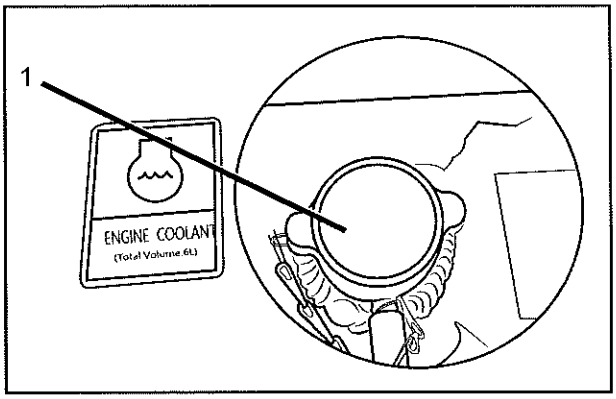

Fig.5-130

1. Coolant recovery tank cap

2. Slowly remove the cap from the recovery tank.

3. Place an appropriately sized container under the radiator drain.

NOTE :

See "Location, Capacity and Type" on page 5-10 for capacity and "Engine Coolant" on page 5-15 for type.

4. Disconnect the hose (2) at and allow the coolant to completely drain into a catch container, then reconnect the hose.

NOTICE

Dispose of the drained coolant in accordance with local environmental regulations. Failure to do so could result in damage to the environment.

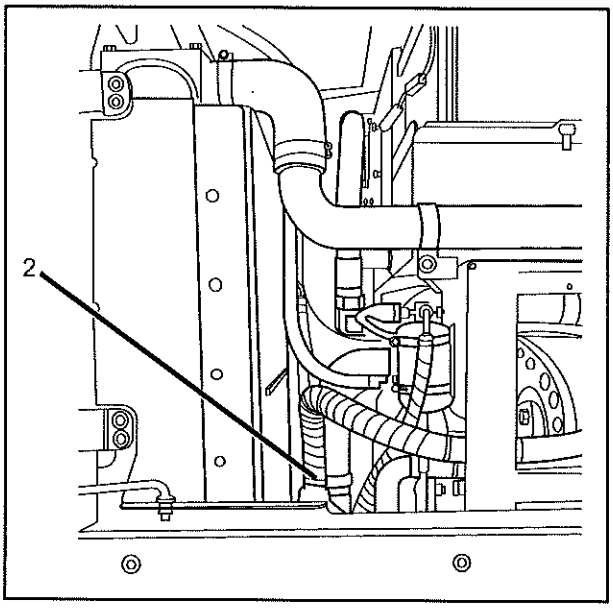

Fig.5-131

2. Hose

5. Add new coolant to the middle between the maximum and minimum value mark.

NOTE :

See "Location, Capacity and Type" on page 5-10 for coolant capacity.

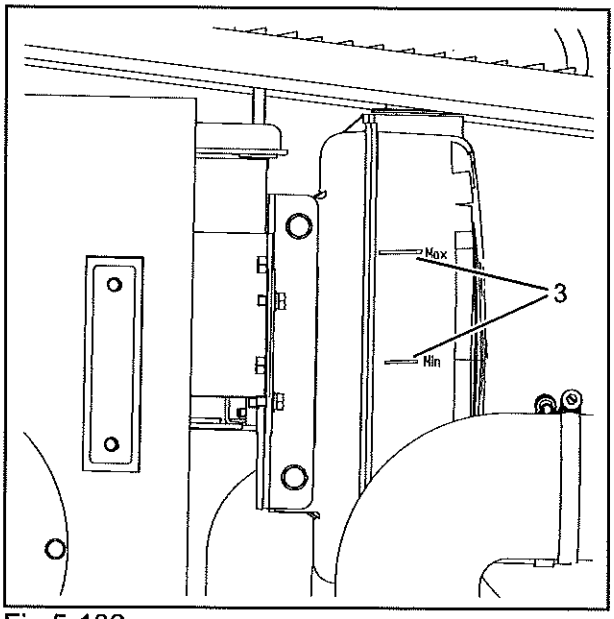

Fig.5-132

3. Recovery tank sight glass

6. Reinstall the cap on the coolant recovery tank, start the engine and run it at low idle speed until the coolant temperature gauge on the monitor shows 60° - 83° C.

7. Check the coolant level. If the coolant level is below the minimum value mark, remove the coolant recovery tank cap and add coolant as-needed.

Tandem Drive Cases and Differential Case Oils

NOTE :

See "Maintenance Log" on page 5-47 for these procedures.

Circle Drive Oil

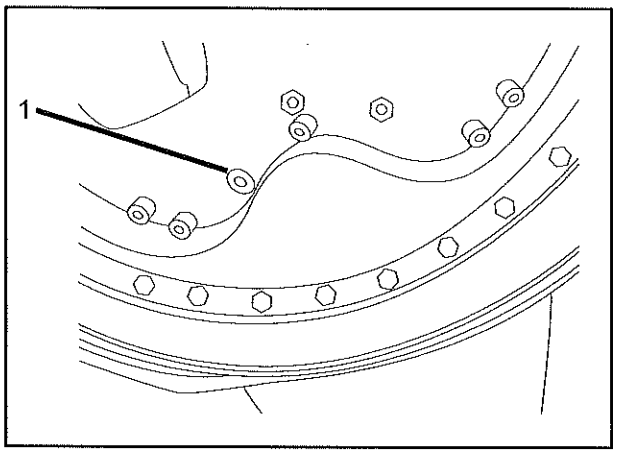

Fig.5-133

1. Circle drive drain plug

1. Park the machine on firm, level ground, then shut down the engine.

2. Place an appropriately sized container under the circle drive drain plug (1).

NOTE :

See "Location, Capacity and Type" on page 5-10 for capacity and "Differential and Circle Drive Oil" on page 5-13 for type.

3. Remove the filler plug (2) from the top of the circle drive case.

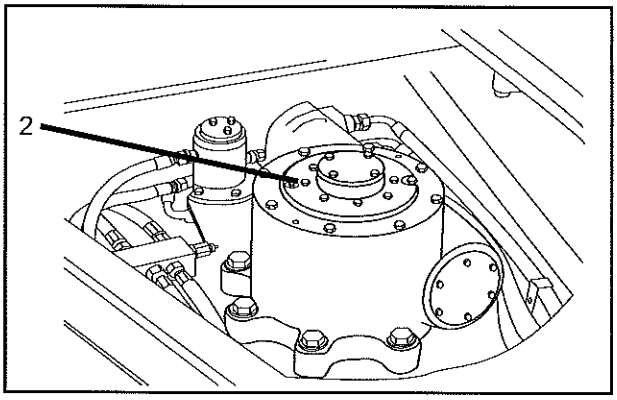

Fig.5-134

2. Filler plug

4. Remove the circle drive drain plug (1) and allow the circle drive case to completely drain of all fluid.

NOTICE

Dispose of drained oil properly. Failure to do could result in damage to the environment.

5. Clean the drain plug (1), install a new sealing ring on the plug, then reinstall it back in the circle drive case.

6. Add clean fresh oil through the filler (2) at the top of the circle drive case until the oil level is above the mid- point on the sight glass (3) on the side of the drive case.

NOTE :

The quantity is approximately 1.7 gal. (6.5 L).

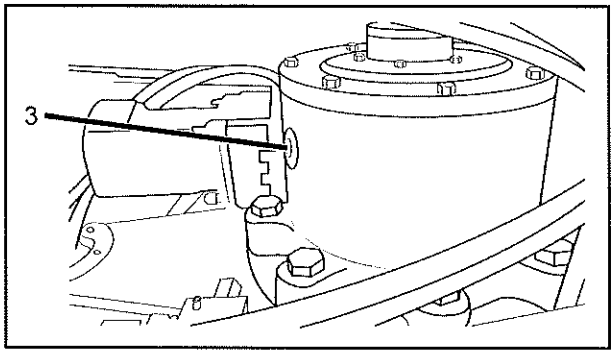

Fig.5-135

3. Sight glass

7. Clean the oil filler plug (2), install a new sealing ring on the plug, then reinstall it back in the top of the circle drive case.

Adjusting the Over-load Protection Circle Drive Torque

In order to prevent the grader from being damaged against hard objects, the overload protection of the circle drive has been set before delivery. If the turning torque of the blade exceeds the set value, the grader will automatically slip for protection.

Normally, after 1000 working hours, adjust the circle drive torque. However, if the grader slips frequently influencing its working efficiency , it is necessary to adjust the torque of the circle drive.

Special tools: 13# spanner, torque spanner and 18# socket spanner.

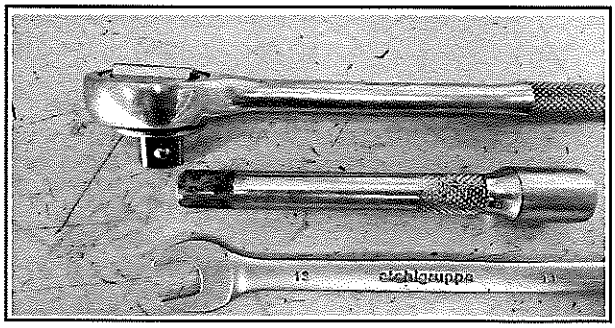

Fig.5-136

Take the following procedures to adjust the torque of the circle drive.

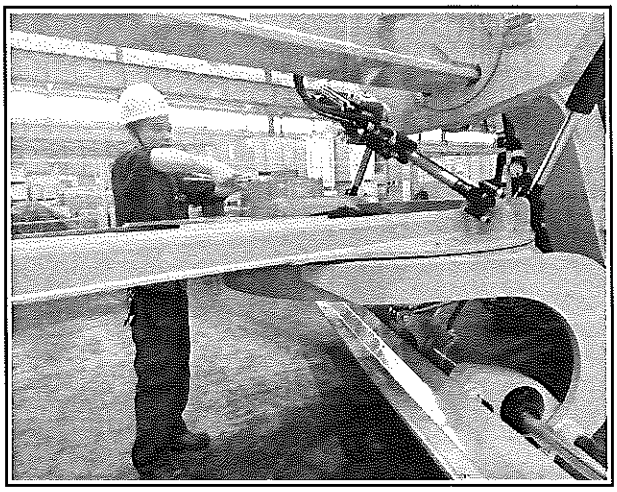

Fig.5-137

1. Ensure the safety of the personnel during ensuing debugging after the blade is placed on the ground. Level the drawbar for easy operation.

2. Stop the grader to clean debris. At the same time, ensure dust does not enter the circle drive when the cover of the circle drive is opened.

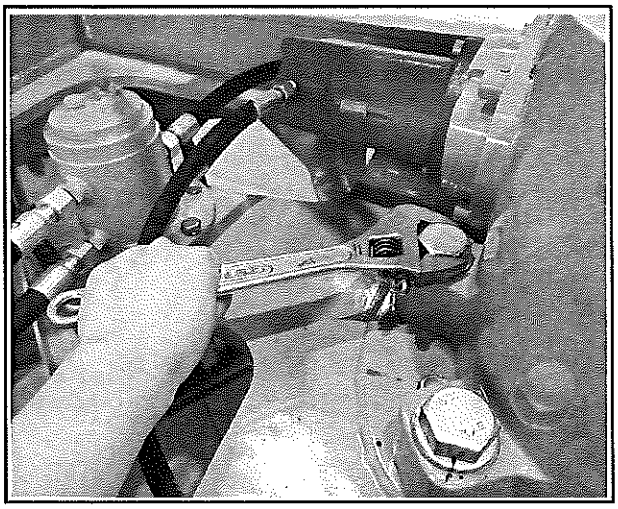

Fig.5-138

3. Loosen M8 bolt and remove the upper cover of the circle drive.

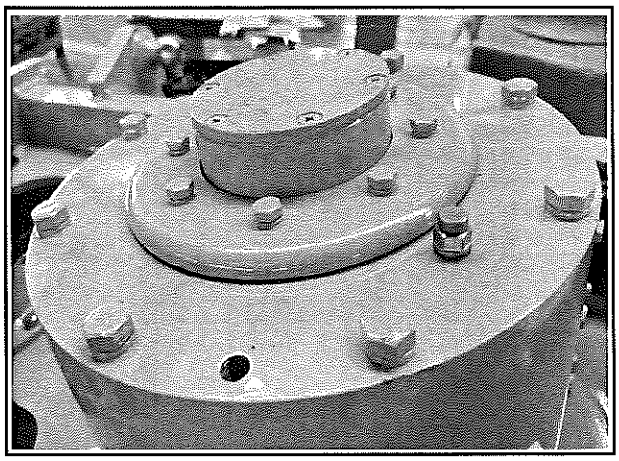

Fig.5-139

4. Align each ratchet in the adjustment holes of the circle drive with the holes for easy placement of the socket spanner.

5. The ratchets of the circle drive can rotate clockwise but can not rotate anticlockwise.

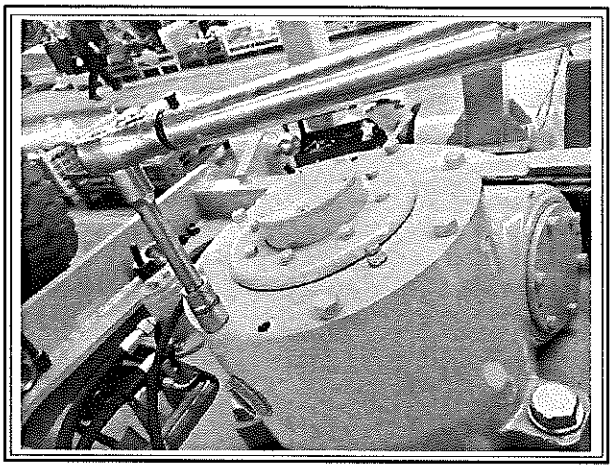

Fig.5-140

6. The torque value depends on the actual working conditions on jobsite. The range of the torque is 35 N.m - 45 N.m.

7. Adjust the ratchets evenly.

8. Ensure the sealing performance of the seal plate during the assembly of the circle drive cover. If any damage, replace a new gasket.

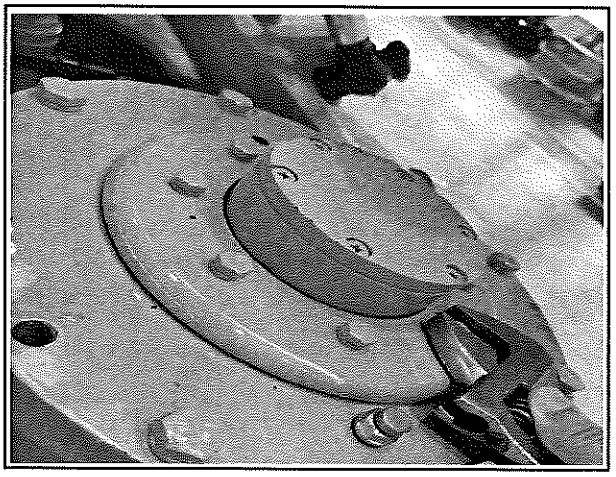

Fig.5-141

Hydraulic Oil

NOTE :

See "Electrical System" on page 2-17 before performing this procedure.

⚠ CAUTION

Wait at least 24 hours after the machine has stopped for the hydraulic system to cool down sufficiently to allow it to drain. Failure to follow this step could result in minor or moderate injury.

NOTE :

See "Fluid Systems" on page 2-15.

1. Position the machine work equipment as shown.

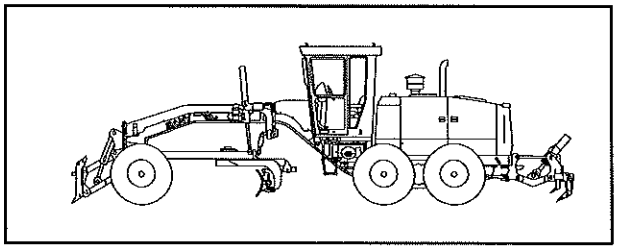

Fig.5-142

2. Lower the moldboards and all attachments to the ground.

3. Set the machine articulated parts straight and lock the front and rear frames with the lock pin of frame articulation steering tie rod.

4. Apply the parking brake, then shut down the engine.

5. Within 15 seconds after stopping the engine, operate the cab control levers in all directions in order to release internal pressure.

6. Locate and remove the hydraulic tank cap from the top of the hydraulic tank.

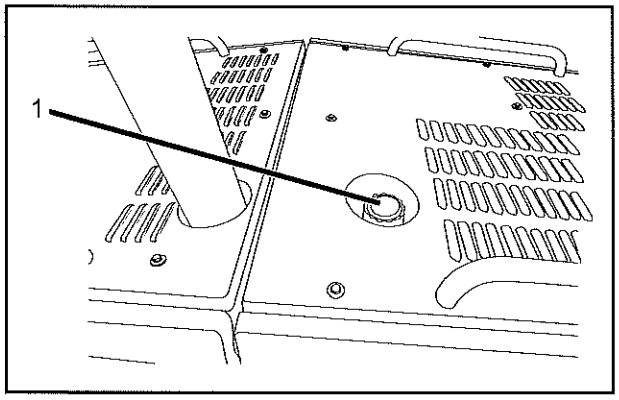

Fig.5-143

1. Hydraulic tank cap from

7. Remove the screws that secure the filter screen (2) in place in the hydraulic tank filler tube.

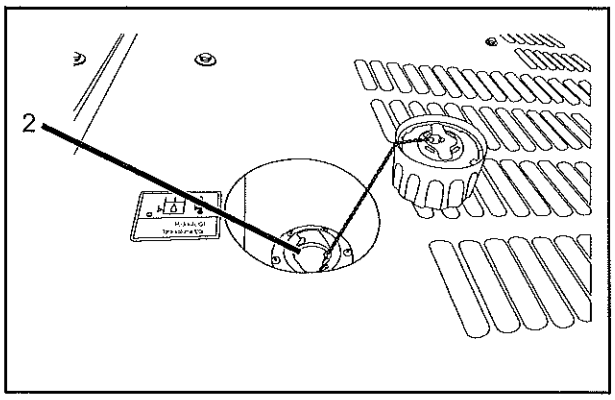

Fig.5-144

2. Filter screen

8. Wash the filter screen in mineral spirits, let it air dry then reinstall the filter screen in the hydraulic filler tube and secure it in place with the screws removed in step 7.

NOTE :

Replace the filter if damaged.

9. Place an appropriately sized container (3) under the drain plug.

NOTE :

See "Location, Capacity and Type" on page 5-10 for capacity and "Hydraulic Oil Viscosity/ Temperature Data" on page 5-13 for type.

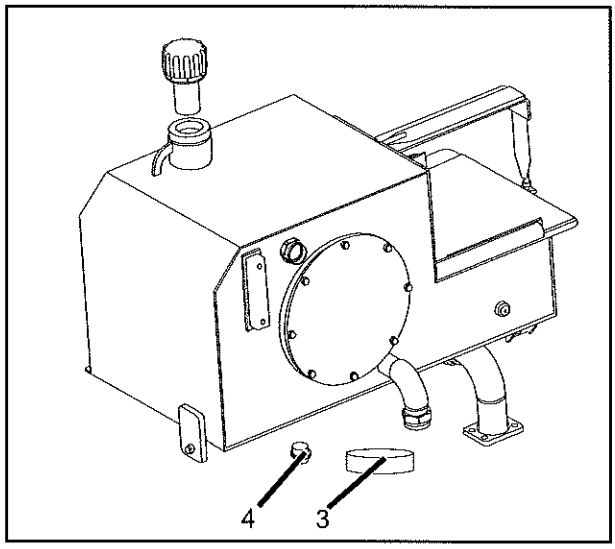

Fig.5-145

3. Container 4. Drain plug

10. Remove the drain plug (4), then allow the tank to completely drain of all hydraulic oil.

NOTE :

If the drained oil contains sediment or other debris, it may be necessary to remove the access plate (5) from the front of the tank and clean the tank interior. Contact your Sany dealer before proceeding.

11. Remove the O-ring from the drain plug, then wash the plug in mineral spirits, air dry it and install a new O-ring.

12. Reinstall and tighten the plug after the hydraulic tank has completely drained.

NOTE :

See "Specific Torque Values" on page 5-7.

13. Add hydraulic oil to the system through the filler tube and screen until the hydraulic oil level is at the mid-point on the sight gauge (5) on the side of the tank.

NOTE :

See "Location, Capacity and Type" on page 5-10 for the correct type of hydraulic oil.

NOTICE

Do not overfill the hydraulic tank. This could result in machine damage and improper machine operation.

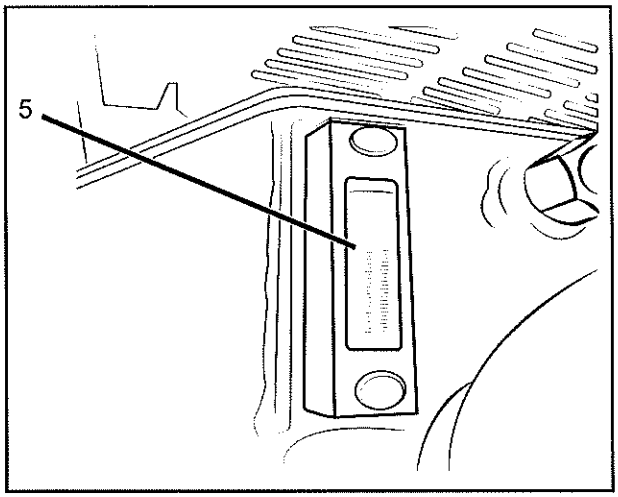

Fig.5-146

5. Sight gauge

14. Clean and reinstall the hydraulic oil filler cap.

15. Start the engine.

16. Run the engine for 10 minutes to purge the air from the hydraulicsystem.

17. Shut down the engine.

18. Check for leaks and recheck the hydraulic oil level once more. Add hydraulic oil if necessary.

NOTE :

Tighten connections if leaks are found.

Fuel Tank

NOTE :

See "Electrical System" on page 2-17 before performing this procedure.

⚠ DANGER

Never maintain the fuel system near an open flame or while smoking. Failure to follow this rule will result in death or serious injury.

1. Use compressed air to blow away any dirt and other debris from around the fuel cap, accessible from the to prear of the machine, then remove the lockable cap (1).

NOTICE

Contaminants in the fuel system can eventually clog the fuel-water separator and could even cause fuel starvation to the engine and reduced performance and operation.

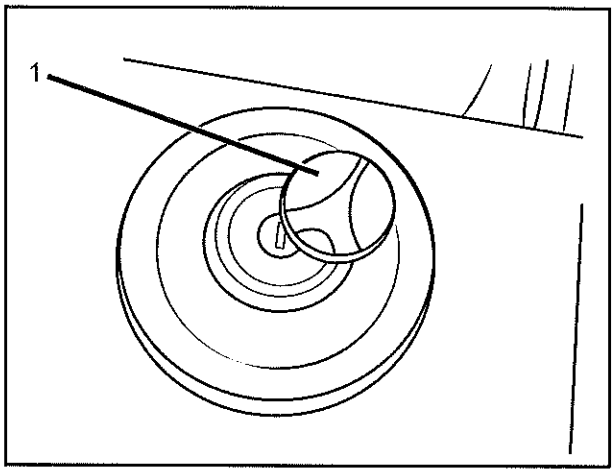

Fig.5-147

1. Lockable cap

2. Place an appropriately sized container (2) under the fuel tank drain plug (3), then remove the drain plug and allow the fuel tank to completely drained.

NOTE :

See "Location, Capacity and Type" on page 5-10. for capacity size.

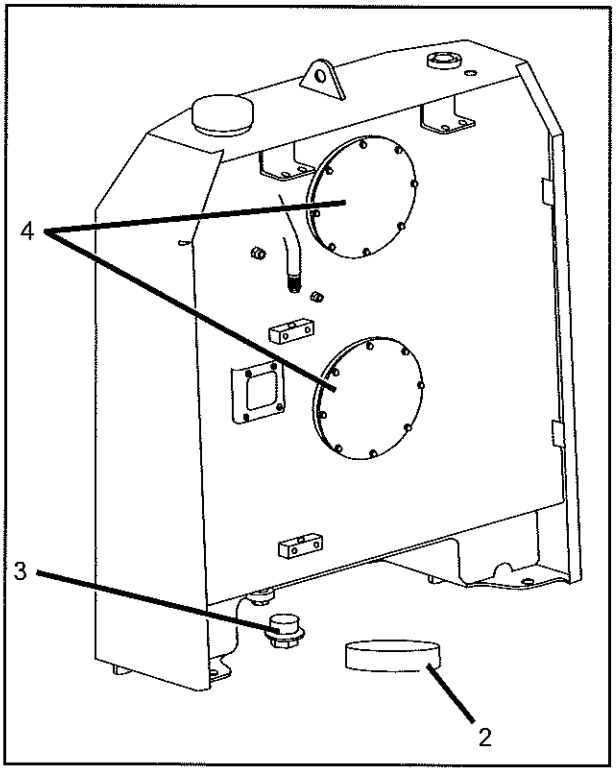

Fig.5-148

2. Container
3. Fuel tank drain plug
4. Access plates

3. Remove the access plates (4) from the front of the fuel tank.

4. Use clean diesel fuel to flush out residual dirt and other debrisfrom inside the tank, then reinstall the drain plug.

NOTICE

Dispose of the drained fuel properly. Failure to do so could result in damage to the c environment.

5. Add a small amount of clean diesel fuel into the fuel tank.

6. Use a new brush to clean the tank interior. When the diesel fuel becomes dirty, remove the drain plug to allow the dirty fuel to empty into the catch container, then reinstall the drain plug.

7. Repeat steps 5 and 6 until all dirt and sediment are removed from the tank interior.

8. With the drain plug installed and tightened correctly, reattach both access plates.

9. Refill the tank with the correct amount of clean, fresh diesel fuel.

NOTE :

See "Location, Capacity and Type" on page 5-10 for the type and quantity.

10. Press the priming bulb (5) at the top of the primary fuel filter/water separator approximately 10 times or until the bulb becomes noticeably harder to press.

NOTE :

This action pulls fuel from the intake line into the primary fuel filter/water separator.

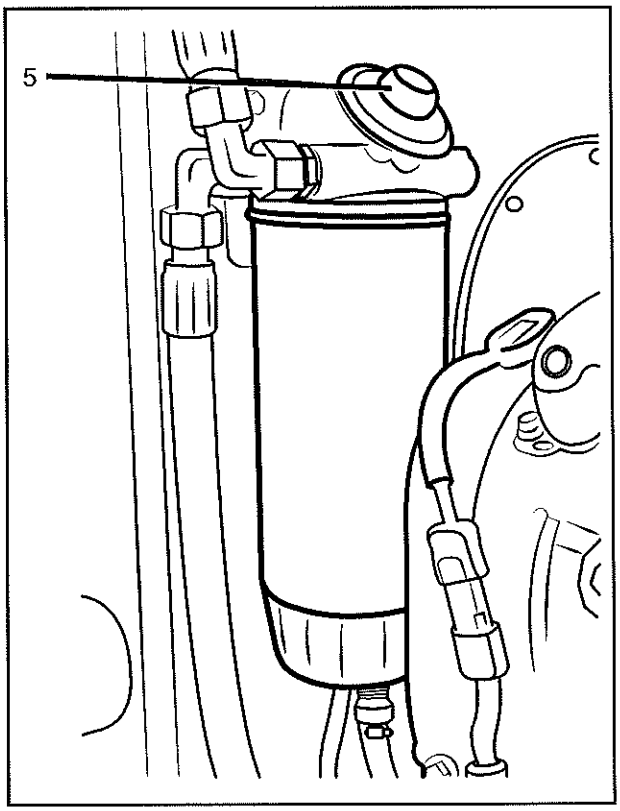

Fig.5-149

5. Priming bulb

11. Turn on the keyswitch to run the fuel delivery pump for 30 seconds, then turn off the keyswitch. Repeat this steps 3 or 4 times to cycle the fuel pump.

12. Check for leaks in the fuel system and repair them.

5.9.3 Maintenance Log

Record the completion of all of the maintenance tasks from this section.

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Specifications

6.Specifications

6.1 Machine Dimensions

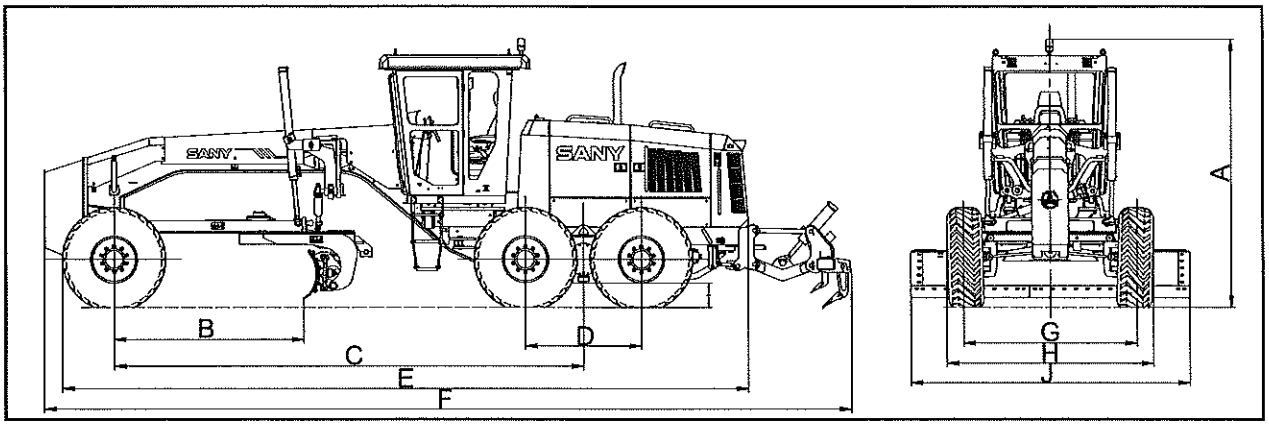

Fig.6-1

Table6–1

	Item	Unit	Value
A	Height to top of cab (high cab)	mm	3485
B	Length (front axle to moldboard)	mm	2500
C	Wheel base (between front and rear axle)	mm	6175
D	Wheel base (between middle and rear wheels)	mm	1524
E	Length (front tire to rear of machine)	mm	9005
F	Overall length (counterweight to ripper)	mm	10700
G	Width (tire center lines)	mm	2270
H	Width (outside front tires)	mm	2720
I	Ground clearance at rear axle	mm	370
J	Moldboard length (standard machine)	mm	3660

NOTE :

The above data are specifications of standard machine, so specific data of actual machine may be different.

6.2 Technical Specifications

Category	Item	Value
Performance specifications	Front wheel steering angle	±50°
	Front wheel tilt angle	±17°
	Frame articulation steering angle	±20°
	Front axle oscillation angle	±16°
	Minimum turning radius (m)	7.5
Blade	Blade tilt angle	±90°
	Blade revolving angle	±360°
	Maximum lift above ground (mm)	460
	Maximum cutting depth (mm)	715
	Blade angle range	Reverse 2° / Forward 43°
	Blade height (mm)	610
Travel Speed	Forward (km/h)	4/5.5/8/11/17.2/23.4/32.3/46.8
	Reverse (km/h)	3.2/6/8.7/13.6/25.4/37
Tyre	Model	17.5-25
Engine	Manufacturer	Dongfeng Cummins
	Model	QSC8.3
	Rated power (kW)	160

NOTE :

The above data are specifications of standard machine, so specific data of actual machine may be different.

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