

# Operation & Maintenance Manual

BULLDOZER

**D65E -12**

**D65P -12**

SERIAL NUMBERS

D65E-65001

D65P-65001

and up

**⚠ WARNING**

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who will come into contact with it.

**NOTICE**

Komatsu has Operation & Maintenance Manuals written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

**KOMATSU**

# FOREWORD

## **CALIFORNIA**

### **Proposition 65 Warning**

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

## **CALIFORNIA**

### **Proposition 65 Warning**

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

**Wash hands after handling.**

## FOREWORD

This manual provides rules and guidelines which will help you use this machine safely and effectively. The precautions in this manual must be followed at all times when performing operation and maintenance. Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. Accidents can be prevented by knowing beforehand conditions that may cause a hazard when performing operation and maintenance.



### WARNING

Before beginning operation or maintenance, operators and maintenance personnel must always observe the following points.

- Read this manual thoroughly and understand its contents fully.
- Read the safety messages and safety labels given in this manual carefully so that they should be understood fully.

Keep this manual at the storage location for the Operation and Maintenance Manual given below so that all personnel involved in working on the machine can consult it periodically.

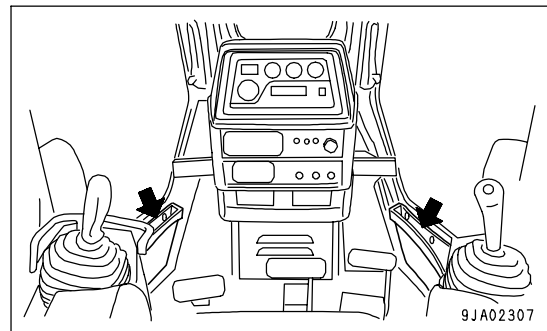
In case this manual should be lost or damaged, immediately contact Komatsu or your Komatsu distributor to obtain a new copy.

When you sell the machine, make sure that this manual should be provided to the new owner together with the machine.

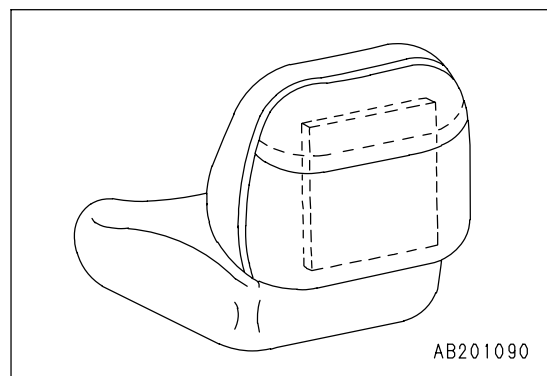
In this manual, measurements are expressed in international standard units (SI). For the reference purpose, weight units used in the past are also displayed in ( ).

Storage location for the Operation and Maintenance Manual:

If machine is equipped with a cab.  
Inside of right and left doors



If machine is not equipped with cab.  
Pocket at rear of operator's seat






## SAFETY INFORMATION

To enable you to use this machine safely, safety precautions and labels are given in this manual and affixed to the machine to give explanations of situations involving potential hazards and of the methods of avoiding such situations.


### Signal words

The following signal words are used to inform you that there is a potential hazardous situation that may lead to personal injury or damage.

In this manual and on machine labels, the following signal words are used to express the potential level of hazard.

- |  |   |
|--|---|
|  <b>DANGER</b>  | Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.  |
|  <b>WARNING</b> | Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.   |
|  <b>CAUTION</b> | Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. This word is used also to alert against unsafe practices that may cause property damage. |

### Example of safety message using signal word

|  |
|--|
|  <b>WARNING</b>   |
| <b>When standing up from the operator's seat, always place the lock lever in the LOCK position.<br/>If you accidentally touch the control levers when they are not locked, this may cause a serious injury or death.</b> |

### Other signal words

In addition to the above, the following signal words are used to indicate precautions that should be followed to protect the machine or to give information that is useful to know.

**NOTICE** This word is used for precautions that must be taken to avoid actions which could shorten the life of the machine.

**REMARKS** This word is used for information that is useful to know.

- Safety labels

Safety labels are affixed to the machine to inform the operator or maintenance worker on the spot when carrying out operation or maintenance of the machine that may involve hazard.

This machine uses "Safety labels using words" and "Safety labels using pictograms" to indicate safety procedures.

#### Example of safety label using words



Part No

#### Safety labels using pictogram

Safety pictograms use a picture to express a level of hazardous condition equivalent to the signal word. These safety pictograms use pictures in order to let the operator or maintenance worker understand the level and type of hazardous condition at all times. Safety pictograms show the type of hazardous condition at the top or left side, and the method of avoiding the hazardous condition at the bottom or right side. In addition, the type of hazardous condition is displayed inside a triangle and the method of avoiding the hazardous condition is shown inside a circle.



Part No

Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, it is your responsibility to take the necessary steps to ensure safety.

In no event should you engage in prohibited uses or actions described in this manual.

The explanations, values, and illustrations in this manual were prepared based on the latest information available at that time. Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information of your machine or for questions regarding information in this manual.

The numbers in circles in the illustrations correspond to the numbers in ( ) in the text. (For example: ① → (1))

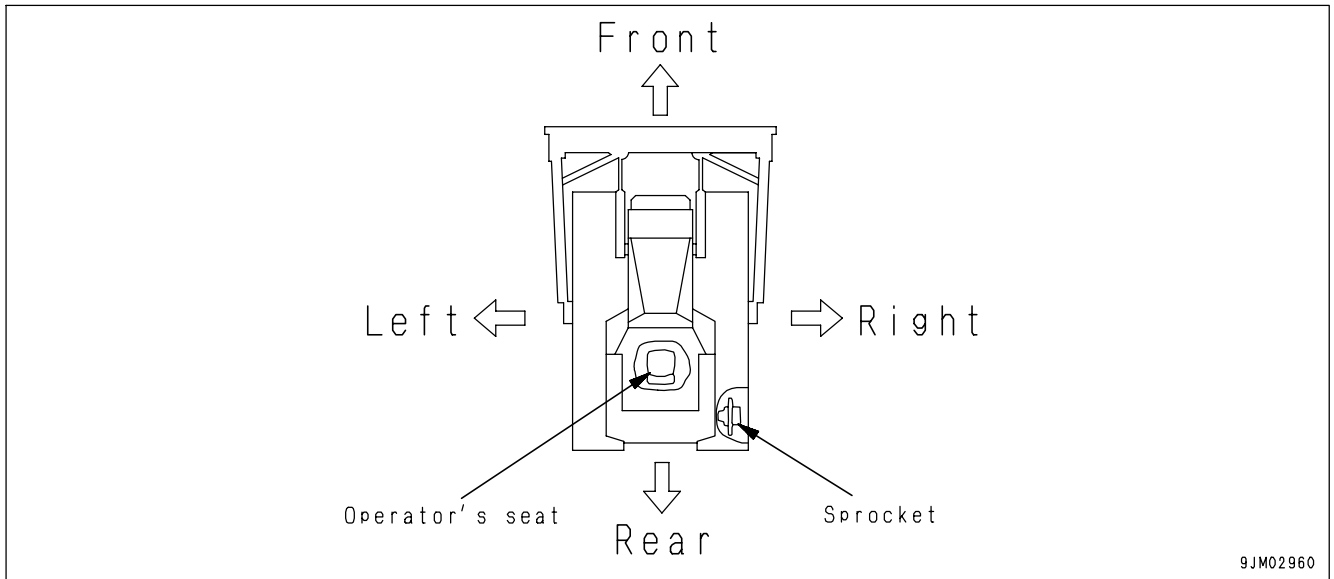
## INTRODUCTION

This Komatsu machine is designed to be used mainly for the following work:

- Dozing
- Smoothing
- Cutting into hard or frozen ground or ditching
- Felling trees, removing stumps

See the section "WORK POSSIBLE USING BULLDOZER (PAGE 3-88)" for further details.

### FRONT/REAR, LEFT/RIGHT DIRECTIONS OF MACHINE



In this manual, the terms front, rear, left, and right refer to the travel direction as seen from the operator's seat when the operator's seat is facing the front and the sprocket is at the rear of the machine.

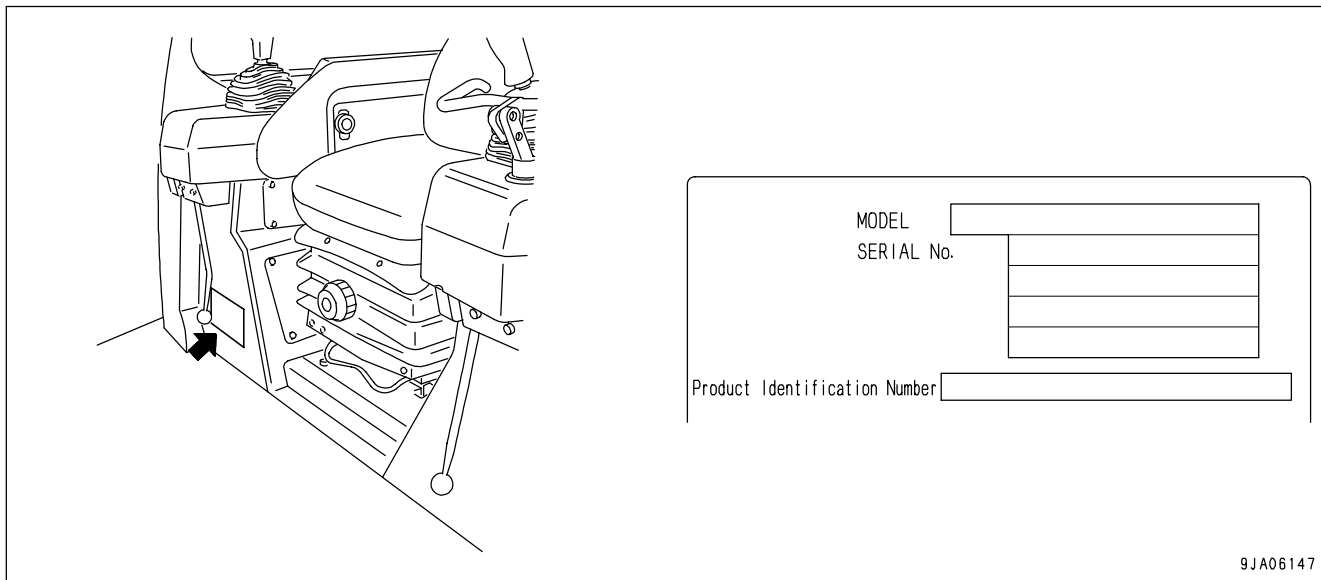
## NECESSARY INFORMATION

When requesting service or ordering replacement parts, please inform your Komatsu distributor of the following items.

### PRODUCT IDENTIFICATION NUMBER (PIN)/MACHINE SERIAL NO. PLATE

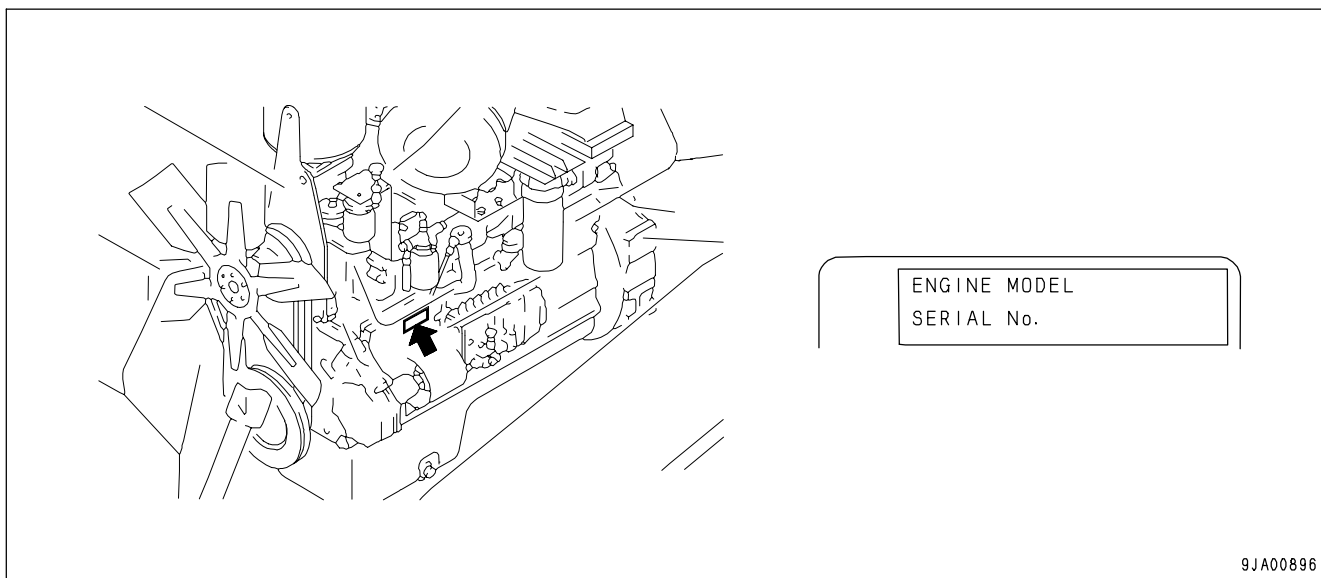
This is at the front bottom right of the operator's seat.

The design of the nameplate differs according to the territory.



### ENGINE SERIAL NO. PLATE

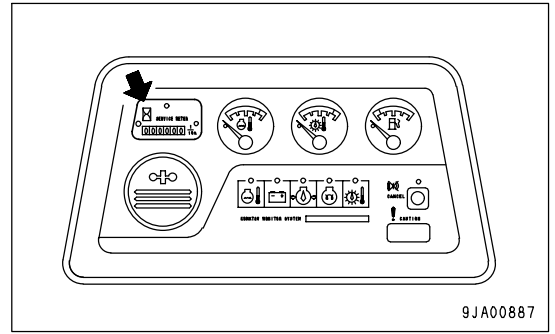
This is at the front of the side face of the engine cylinder block on the left side of the machine.



**POSITION OF SERVICE METER**

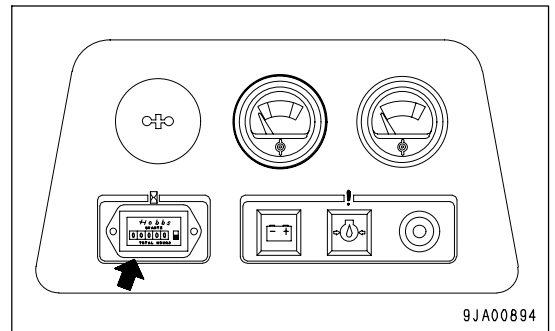
Monitor panel specification

This is at the left upper part of the monitor panel.



Gauge panel specification

The gauge is located on the left lower part of the monitor panel.



**TABLE OF ENTER SERIAL NO. AND DISTRIBUTOR**

|                                     |       |
|-------------------------------------|-------|
| Machine serial No.                  |       |
| Engine serial No.                   |       |
| Product identification number (PIN) |       |
| Distributor name                    |       |
| Address                             | ----- |
|                                     | ----- |
|                                     | ----- |
| Service Personnel                   |       |
| Phone/Fax                           | ----- |



# CONTENTS

|  |       |
|--|-------|
| FOREWORD .....   | 1- 1  |
| FOREWORD .....   | 1- 2  |
| SAFETY INFORMATION .....   | 1- 3  |
| INTRODUCTION .....   | 1- 5  |
| FRONT/REAR, LEFT/RIGHT DIRECTIONS OF MACHINE .....                 | 1- 5  |
| NECESSARY INFORMATION .....  | 1- 6  |
| PRODUCT IDENTIFICATION NUMBER (PIN)/MACHINE SERIAL NO. PLATE ..... | 1- 6  |
| ENGINE SERIAL NO. PLATE .....                                      | 1- 6  |
| POSITION OF SERVICE METER .....                                    | 1- 7  |
| TABLE OF ENTER SERIAL NO. AND DISTRIBUTOR .....                    | 1- 7  |
| SAFETY .....   | 2- 1  |
| SAFETY .....   | 2- 2  |
| SAFETY LABELS .....  | 2- 4  |
| POSITIONS OF SAFETY PICTOGRAMS .....                               | 2- 4  |
| SAFETY LABELS .....  | 2- 5  |
| GENERAL PRECAUTIONS .....  | 2- 9  |
| PRECAUTIONS FOR OPERATION .....                                    | 2- 17 |
| STARTING ENGINE .....  | 2- 17 |
| OPERATION .....  | 2- 19 |
| TRANSPORTATION .....   | 2- 22 |
| BATTERY .....  | 2- 23 |
| TOWING .....   | 2- 25 |
| PRECAUTIONS FOR MAINTENANCE .....                                  | 2- 26 |
| OPERATION .....  | 3- 1  |
| GENERAL VIEW .....   | 3- 2  |
| GENERAL VIEW OF MACHINE .....                                      | 3- 2  |
| GENERAL VIEW OF CONTROLS AND GAUGES .....                          | 3- 3  |
| EXPLANATION OF COMPONENTS .....                                    | 3- 6  |
| MONITOR PANEL .....  | 3- 6  |
| SWITCHES .....   | 3- 12 |
| LAMP .....   | 3- 18 |
| CONTROL LEVERS AND PEDALS .....                                    | 3- 19 |
| FUSE .....   | 3- 27 |
| ELECTRIC POWER TAKE-OUT ADAPTER .....                              | 3- 29 |
| DOOR - OPEN LOCK .....   | 3- 30 |
| SASH GLASS INTERMEDIATE LOCK .....                                 | 3- 30 |
| CAP, COVER WITH LOCK .....   | 3- 31 |
| HOT AND COOL BOX .....   | 3- 32 |
| DOOR POCKET .....  | 3- 32 |
| ASHTRAY .....  | 3- 33 |
| TOOL BOX .....   | 3- 33 |
| GREASE PUMP HOLDER .....   | 3- 33 |
| AIR CONDITIONER, HANDLING .....                                    | 3- 34 |
| HANDLING HEATER .....  | 3- 40 |
| OPERATION .....  | 3- 43 |
| CHECK BEFORE STARTING ENGINE, ADJUST .....                         | 3- 43 |
| STARTING ENGINE .....  | 3- 61 |
| OPERATIONS AND CHECKS AFTER STARTING ENGINE .....                  | 3- 69 |
| STOPPING ENGINE .....  | 3- 73 |

|  |       |
|--|-------|
| MACHINE OPERATION .....  | 3- 75 |
| SHIFTING GEARS .....   | 3- 79 |
| SHIFTING BETWEEN FORWARD AND REVERSE .....   | 3- 80 |
| STEERING MACHINE .....   | 3- 82 |
| PRECAUTIONS FOR OPERATION .....  | 3- 86 |
| WORK POSSIBLE USING BULLDOZER .....  | 3- 88 |
| ADJUSTING POSTURE OF WORK EQUIPMENT .....  | 3- 90 |
| PARKING MACHINE .....  | 3- 94 |
| CHECK AFTER FINISHING WORK .....   | 3- 96 |
| LOCKING .....  | 3- 97 |
| TIPS FOR LONGER UNDERCARRIAGE LIFE .....   | 3- 98 |
| TRANSPORTATION .....   | 3-101 |
| TRANSPORTATION MEANS .....   | 3-101 |
| REMOVING CAB .....   | 3-101 |
| PRECAUTIONS WHEN REMOVING WORK EQUIPMENT .....   | 3-102 |
| LOADING, UNLOADING WORK .....  | 3-103 |
| LIFTING MACHINE .....  | 3-106 |
| COLD WEATHER OPERATION .....   | 3-108 |
| PRECAUTIONS FOR LOW TEMPERATURE .....  | 3-108 |
| AFTER COMPLETION OF WORK .....   | 3-109 |
| AFTER COLD WEATHER .....   | 3-109 |
| LONG-TERM STORAGE .....  | 3-110 |
| BEFORE STORAGE .....   | 3-110 |
| DURING STORAGE .....   | 3-110 |
| AFTER STORAGE .....  | 3-110 |
| TROUBLESHOOTING .....  | 3-111 |
| AFTER RUNNING OUT OF FUEL .....  | 3-111 |
| MACHINE TOWING METHOD .....  | 3-111 |
| IF BATTERY IS DISCHARGED .....   | 3-112 |
| OTHER TROUBLE .....  | 3-116 |
| MAINTENANCE .....  | 4- 1  |
| GUIDE TO MAINTENANCE .....   | 4- 2  |
| OUTLINE OF SERVICE .....   | 4- 5  |
| HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC .....                                 | 4- 5  |
| RELATING TO ELECTRIC SYSTEM .....  | 4- 8  |
| WEAR PARTS LIST .....  | 4- 9  |
| WEAR PARTS LIST .....  | 4- 10 |
| RECOMMENDED FUEL, COOLANT, AND LUBRICANT .....   | 4- 11 |
| USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE .....                   | 4- 12 |
| RECOMMENDED BRANDS, RECOMMENDED QUALITY FOR PRODUCTS OTHER THAN<br>KOMATSU GENUINE OIL ..... | 4- 13 |
| STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS .....   | 4- 14 |
| TORQUE LIST .....  | 4- 14 |
| PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS .....  | 4- 15 |
| SAFETY CRITICAL PARTS .....  | 4- 15 |
| MAINTENANCE SCHEDULE CHART .....   | 4- 16 |
| MAINTENANCE SCHEDULE CHART .....   | 4- 16 |
| SERVICE PROCEDURE .....  | 4- 18 |
| WHEN REQUIRED .....  | 4- 18 |
| CHECK BEFORE STARTING .....  | 4- 43 |

|   |       |
|---|-------|
| EVERY 50 HOURS SERVICE .....  | 4- 44 |
| EVERY 250 HOURS SERVICE .....   | 4- 45 |
| EVERY 500 HOURS SERVICE .....   | 4- 57 |
| EVERY 1000 HOURS SERVICE .....  | 4- 60 |
| EVERY 2000 HOURS SERVICE .....  | 4- 67 |
| EVERY 4000 HOURS SERVICE .....  | 4- 72 |
| SPECIFICATIONS .....  | 5- 1  |
| SPECIFICATIONS .....  | 5- 2  |
| ATTACHMENTS, OPTIONS .....  | 6- 1  |
| GENERAL PRECAUTIONS .....   | 6- 2  |
| PRECAUTIONS RELATED TO SAFETY .....   | 6- 2  |
| HANDLING HYDRAULIC RIPPER .....   | 6- 3  |
| GENERAL VIEW .....  | 6- 3  |
| EXPLANATION OF COMPONENTS .....   | 6- 4  |
| OPERATION .....   | 6- 5  |
| TROUBLESHOOTING .....   | 6- 7  |
| MAINTENANCE .....   | 6- 8  |
| SPECIFICATIONS .....  | 6- 8  |
| HANDLING TOWING WINCH .....   | 6- 9  |
| EXPLANATION OF COMPONENTS .....   | 6- 9  |
| OPERATION .....   | 6- 10 |
| SERVICE PROCEDURE .....   | 6- 15 |
| SPECIFICATIONS .....  | 6- 16 |
| DELUXE SEAT .....   | 6- 17 |
| HEADREST .....  | 6- 19 |
| HANDLING ACCUMULATOR .....  | 6- 20 |
| METHOD OF RELEASING PRESSURE IN OPERATING CIRCUIT ON MACHINE EQUIPPED<br>WITH ACCUMULATOR ..... | 6- 20 |
| EQUIPPING FIRE EXTINGUISHER AND FIRST-AID KIT .....   | 6- 21 |
| INDEX .....   | 7- 1  |

# SAFETY

## **WARNING**

Please read and make sure that you fully understand the precautions described in this manual and the safety labels on the machine. When operating or servicing the machine, always follow these precautions strictly.

---

## SAFETY

|  |       |
|--|-------|
| SAFETY LABELS .....  | 2- 4  |
| POSITIONS OF SAFETY PICTOGRAMS .....                               | 2- 4  |
| SAFETY LABELS .....  | 2- 5  |
| <br>   |       |
| GENERAL PRECAUTIONS  |       |
| Safety rules .....   | 2- 9  |
| If problems are found .....  | 2- 9  |
| Clothing and personal protective items .....                       | 2- 9  |
| Fire extinguisher and first aid kit .....                          | 2- 9  |
| Safety features .....  | 2- 9  |
| Keep machine clean .....   | 2- 10 |
| Inside operator's compartment .....                                | 2- 10 |
| Always apply lock when leaving operator's seat .....               | 2- 10 |
| Handrails and steps .....  | 2- 11 |
| Mounting and dismounting .....                                     | 2- 11 |
| No people on attachments .....                                     | 2- 11 |
| Crushing or cutting prevention .....                               | 2- 11 |
| Prevention of burns .....  | 2- 12 |
| Fire prevention .....  | 2- 12 |
| Action if fire occurs .....  | 2- 13 |
| Window washer liquid .....   | 2- 13 |
| Precautions when using ROPS (Roll Over Protective Structure) ..... | 2- 13 |
| Precautions for attachments .....                                  | 2- 13 |
| Unauthorized modification .....                                    | 2- 14 |
| Safety at worksite .....   | 2- 14 |
| Working on loose ground .....                                      | 2- 14 |
| Do not go close to high-voltage cables .....                       | 2- 14 |
| Ensure good visibility .....                                       | 2- 15 |
| Ventilation for enclosed areas .....                               | 2- 15 |
| Checking signalman's signals and signs .....                       | 2- 15 |
| Emergency exit from operator's cab .....                           | 2- 15 |
| Be careful about asbestos dust .....                               | 2- 16 |

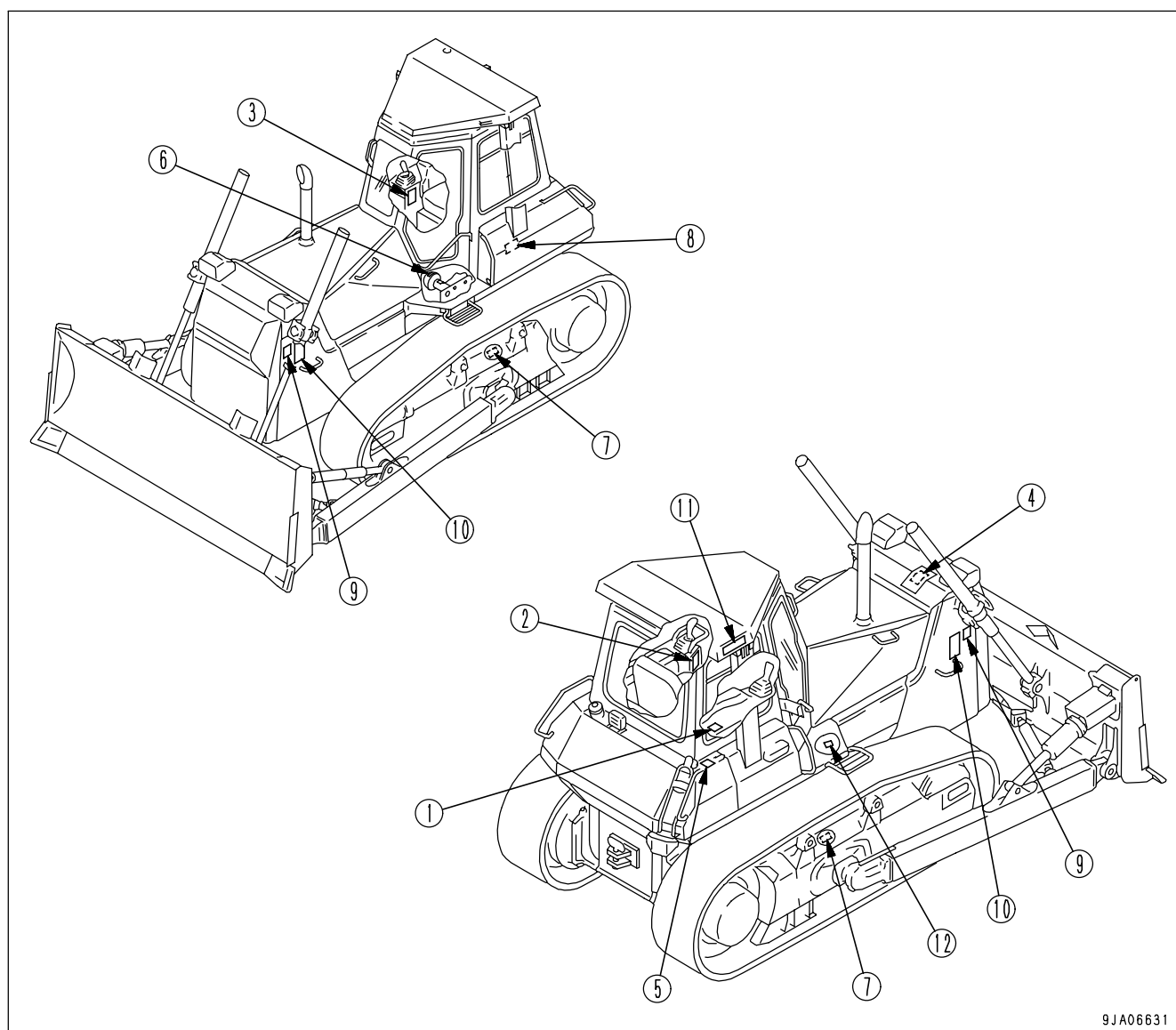
|   |       |
|---|-------|
| PRECAUTIONS FOR OPERATION .....   | 2- 17 |
| STARTING ENGINE .....   | 2- 17 |
| Checks before starting engine .....                                       | 2- 17 |
| Precautions when starting .....   | 2- 17 |
| Precautions in cold areas .....   | 2- 18 |
| OPERATION .....   | 2- 19 |
| Checks before operation .....   | 2- 19 |
| Precautions for moving machine forward or in reverse .....                | 2- 19 |
| Precautions when traveling .....  | 2- 19 |
| Traveling on slopes .....   | 2- 20 |
| Using brakes .....  | 2- 20 |
| Operate carefully on snow .....   | 2- 21 |
| Parking machine .....   | 2- 21 |
| TRANSPORTATION .....  | 2- 22 |
| Loading and unloading .....   | 2- 22 |
| Shipping .....  | 2- 22 |
| BATTERY .....   | 2- 23 |
| Battery hazard prevention .....   | 2- 23 |
| Starting with booster cable .....   | 2- 24 |
| TOWING .....  | 2- 25 |
| When towing .....   | 2- 25 |
| <br>  |       |
| PRECAUTIONS FOR MAINTENENCE .....   | 2- 26 |
| Warning tag .....   | 2- 26 |
| Keep work place clean and tidy .....                                      | 2- 26 |
| Appoint leader when working with others .....                             | 2- 26 |
| Stop engine before carrying out inspection and maintenance .....          | 2- 26 |
| Two workers for maintenance when engine is running .....                  | 2- 27 |
| Proper tools .....  | 2- 28 |
| Accumulator .....   | 2- 28 |
| No unauthorized personnel into area .....                                 | 2- 28 |
| Attachments .....   | 2- 28 |
| Work under the machine .....  | 2- 29 |
| Noise .....   | 2- 29 |
| Precautions when using hammer .....                                       | 2- 29 |
| Repair welding .....  | 2- 29 |
| Removing battery terminal .....   | 2- 29 |
| Precautions when using high-pressure grease to adjust track tension ..... | 2- 30 |
| Do not disassemble recoil spring .....                                    | 2- 30 |
| Precaution with high-pressure oil .....                                   | 2- 30 |
| Handling high-pressure hoses .....  | 2- 31 |
| Waste material .....  | 2- 31 |
| Maintenance for air conditioner .....                                     | 2- 31 |
| Compressed air .....  | 2- 31 |
| Periodic replacement of safety critical parts .....                       | 2- 31 |

## SAFETY LABELS

The following warning signs and safety labels are used on this machine.

- Be sure that you fully understand the correct position and content of labels.
- To ensure that the content of labels can be read properly, be sure that they are in the correct place and always keep them clean. When cleaning them, do not use organic solvents or gasoline. These may cause the labels to peel off.
- There are also other labels in addition to the warning signs and safety labels. Handle those labels in the same way.
- If the labels are damaged, lost, or cannot be read properly, replace them with new ones. For details of the part numbers for the labels, see this manual or the actual label, and place an order with Komatsu distributor.

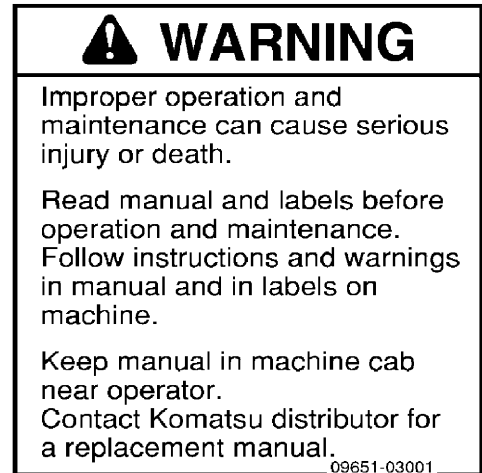
## POSITIONS OF SAFETY PICTOGRAMS



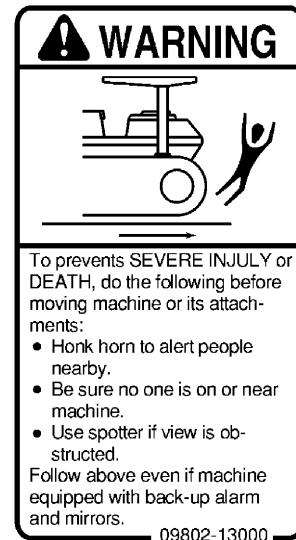
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**SAFETY LABELS**

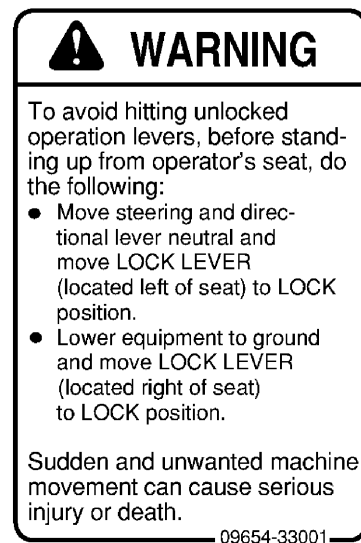
- (1) Caution before operating or maintaining machine  
(09651-03001)



- (2) Caution before moving in reverse (09802-13000)

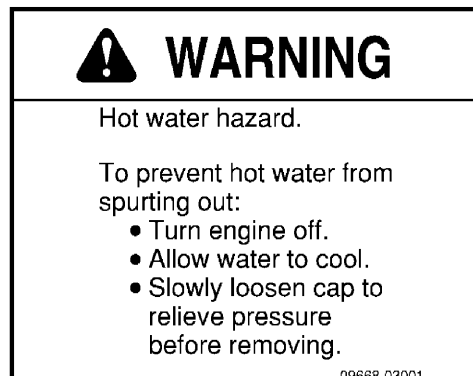


- (3) Caution for leaving operator's seat (09654-33001)





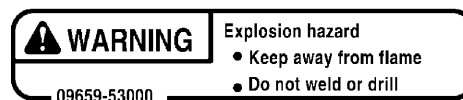
(4) Caution for high-temperature coolant (09668-03001)



(5) Caution for high-temperature oil (09653-03001)



(6) Caution for accumulator (09659-53000)

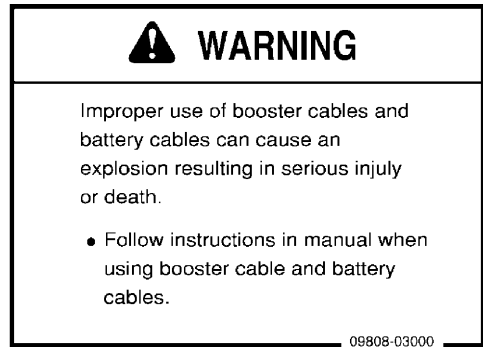


(7) Caution for adjusting track tension (09657-03003)

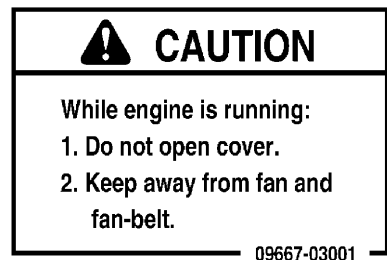
The safety label is attached to the back side of the cover of the track adjustment window.



(8) Caution for battery cable (09808-03000)



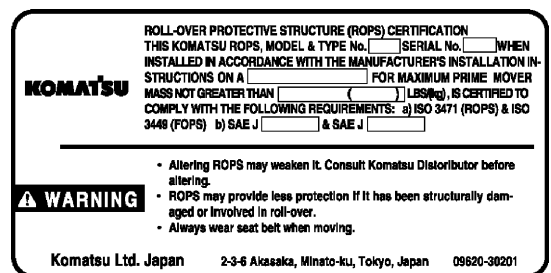
(9) Caution for engine running (09667-03001)



(10) Caution for approach when machine moving (09812-13000)



(11) Precautions when handling ROPS (09620-30201)



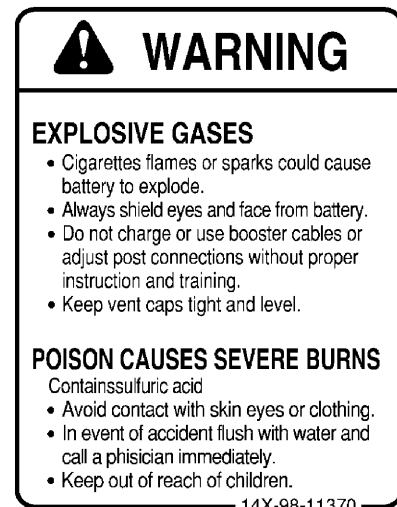
(12) Prohibition of jump start (09842-A0481)



Start the engine only after sitting down in the operator's seat.

Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.

(13) Precaution when handling battery (14X-98-11370)



## GENERAL PRECAUTIONS

### SAFETY RULES

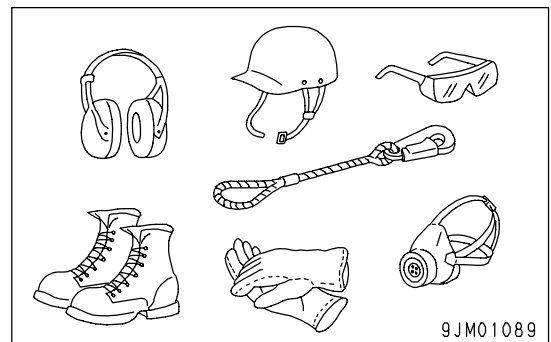
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions in this manual when operating or performing maintenance on the machine.
- If you are not feeling well, or if you are under the influence of alcohol or medication, your ability to safely operate or repair your machine may be severely impaired, putting yourself and everyone else on your job site in danger.
- When working with another operator or with the person on the worksite traffic duty, discuss the content of the operation beforehand and use the determined signals when carrying out the operation.

### IF PROBLEMS ARE FOUND

If you find any problems in the machine during operation or maintenance (noise, vibration, smell, incorrect gauges, smoke, oil leakage, etc., or any abnormal display on the warning devices or monitor), report to the person in charge and have the necessary action taken. Do not operate the machine until the problem has been corrected.

### CLOTHING AND PERSONAL PROTECTIVE ITEMS

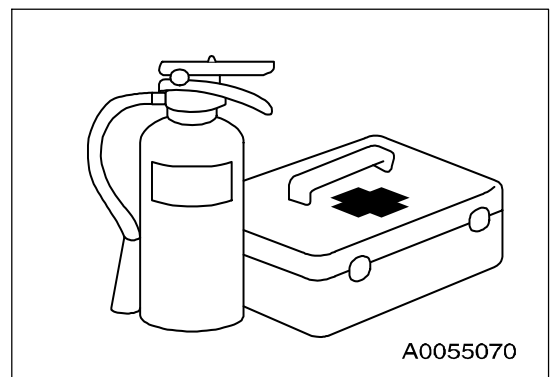
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get caught.
- Always wear a hard hat and safety shoes. If the nature of the work requires it, wear safety glasses, mask, gloves, ear plugs, and safety belt when operating or maintaining the machine.
- Check that all protective equipment functions properly before using it.



### FIRE EXTINGUISHER AND FIRST AID KIT

Always follow the precautions below to prepare for action if any injury or fire should occur.

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them in emergencies.
- Carry out periodic inspection and maintenance to ensure that the fire extinguisher can always be used.
- Provide a first aid kit in the storage point. Carry out periodic checks and add to the contents if necessary.

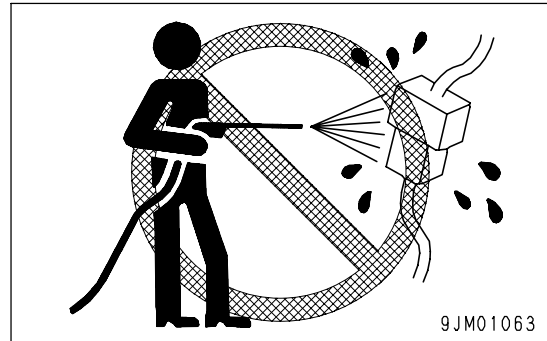


### SAFETY FEATURES

- Be sure that all guards, covers and mirrors are in their proper position. Have guards and covers repaired immediately if they are damaged.
- Understand the method of use of safety features and use them properly.
- Never remove any safety features. Always keep them in good operating condition.

**KEEP MACHINE CLEAN**

- If water gets into the electrical system, there is a hazard that it will cause malfunctions or misoperation. Do not use water or steam to wash the electrical system (sensors, connectors).
- If inspection and maintenance is carried out when the machine is still dirty with mud or oil, there is a hazard that you will slip and fall, or that dirt or mud will get into your eyes. Always keep the machine clean.

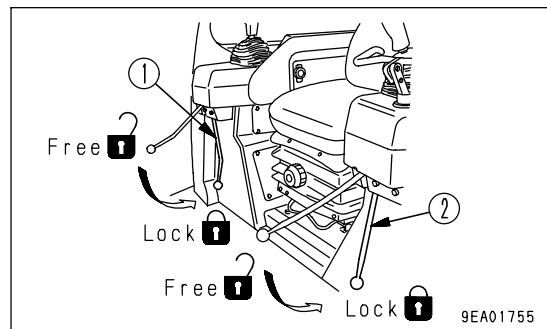
**INSIDE OPERATOR'S COMPARTMENT**

- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do not stick suction pads to the window glass. Suction pads act as a lens and may cause fire.
- Do not use cellular telephones inside the operator's compartment when driving or operating the machine.
- Never bring any dangerous objects such as flammable or explosive items into the operator's compartment.

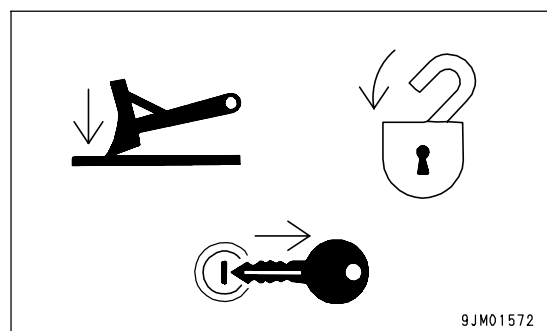
**ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT**

- Before standing up from the operator's seat (such as when adjusting the operator's seat), lower the work equipment completely to the ground, set work equipment lock lever (1) and parking brake lever (2) securely to the LOCK position, then stop the engine.

If you accidentally touch the levers when they are not locked, there is a hazard that the machine may suddenly move and cause serious injury or property damage.



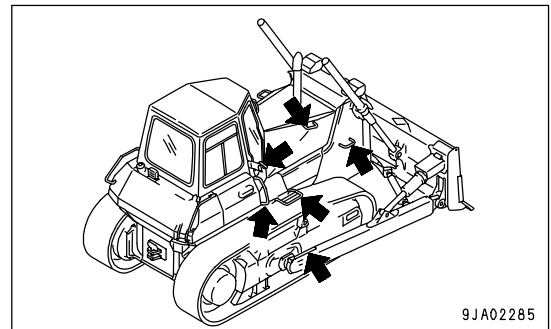
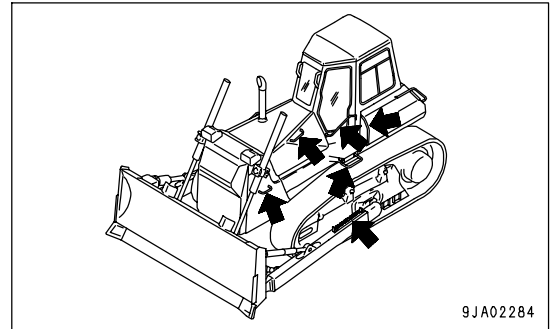
- When leaving the machine, always lower the work equipment completely to the ground, set work equipment lock lever (1) and parking brake lever (2) securely to the LOCK position, then stop the engine. Use the key to lock all the equipment. Always remove the key, take it with you, and keep it in the specified place.



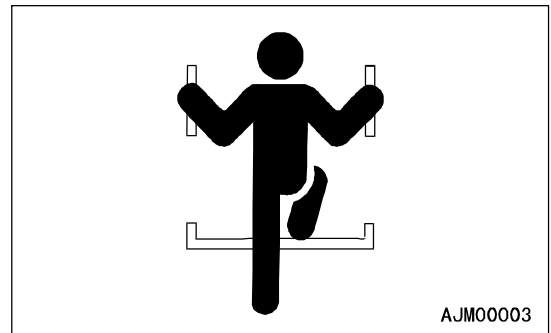
### HANDRAILS AND STEPS

To prevent personal injury caused by slipping or falling off the machine, always do as follows.

- Use the handrails and steps marked by arrows in the diagram on the right when getting on or off the machine.



- To ensure safety, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps (including the track shoe) to ensure that you support yourself.
- Do not grip the control levers, or work equipment lock lever when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Before getting on or off the machine, check the handrails and steps (including the track shoe). If there is any oil, grease, or mud on the handrails or steps (including the track shoe), wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Do not get on or off the machine while holding tools in your hand.



### MOUNTING AND DISMOUNTING

- Never jump on or off the machine. Never get on or off a moving machine.
- If the machine starts to move when there is no operator on the machine, do not jump on to the machine and try to stop it.

### NO PEOPLE ON ATTACHMENTS

Never let anyone ride on the work equipment, or other attachments. There is a hazard of falling and suffering serious injury.

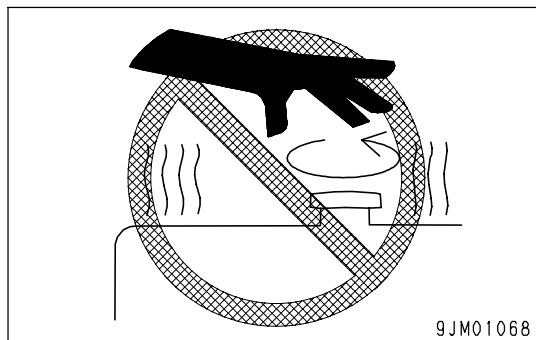
### CRUSHING OR CUTTING PREVENTION

The clearance around the work equipment will change according to the movement of the link. If you get caught, this may lead to serious personal injury. Do not allow anyone to approach any rotating or telescoping part.

**PREVENTION OF BURNS**

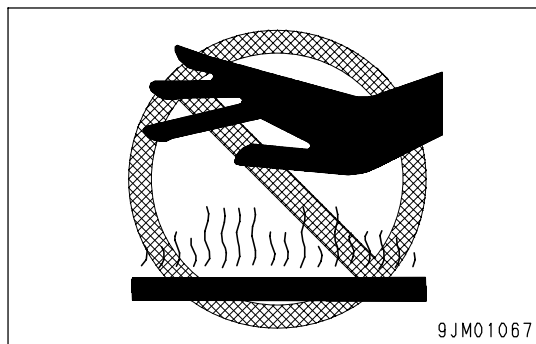
**Hot coolant**

- To prevent burns from hot water or steam spurting out when checking or draining the coolant, wait for the water to cool to a temperature where it is possible to touch the radiator cap by hand before starting the operation. Even when the coolant has cooled down, loosen the cap slowly to relieve the pressure inside the radiator before removing the cap.



**Hot oil**

- To prevent burns from hot oil spurting out when checking or draining the oil, wait for the oil to cool to a temperature where it is possible to touch the cap or plug by hand before starting the operation. Even when the oil has cooled down, loosen the cap or plug slowly to relieve the internal pressure before removing the cap or plug.

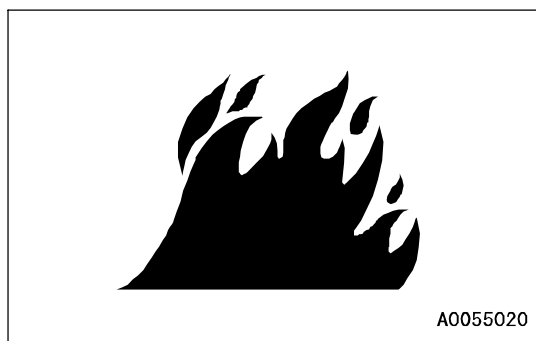


**FIRE PREVENTION**

**• Fire caused by fuel or oil**

Fuel, oil, antifreeze, and window washer liquid are particularly flammable and can be hazardous. To prevent fire, always observe the following:

- Do not smoke or use any flame near fuel or oil.
- Stop the engine before refueling.
- Do not leave the machine while adding fuel or oil.
- Tighten all fuel and oil caps securely.
- Do not spill fuel on overheated surfaces or on parts of the electrical system.
- Use well-ventilated areas for adding or storing oil and fuel.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- When carrying out grinding or welding work on the chassis, move any flammable materials to a safe place before starting.
- When washing parts with oil, use a non-flammable oil. Diesel oil and gasoline may catch fire, so do not use them.
- Put greasy rags and other flammable materials into a safe container to maintain safety at the work place.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.



**• Fire caused by accumulation of flammable material.**

Remove any dry leaves, chips, pieces of paper, dust, or any other flammable materials accumulated or affixed around the engine, exhaust manifold, muffler, or battery, or inside the undercovers.

- **Fire coming from electric wiring**

Short circuits in the electrical system can cause fire.

- Always keep electric wiring connections clean and securely tightened.
- Check the wiring every day for looseness or damage. Tighten any loose connectors or wiring clamps. Repair or replace any damaged wiring.

- **Fire coming from hydraulic line**

Check that all the hose and tube clamps, guards, and cushions are securely fixed in position.

If they are loose, they may vibrate during operation and rub against other parts. This may lead to damage to the hoses, and cause high-pressure oil to spurt out, leading to fire damage or serious injury.

- **Explosion caused by lighting equipment**

- When checking fuel, oil, battery electrolyte, window washer fluid, or coolant, always use lighting with anti-explosion specifications. If such lighting equipment is not used, there is danger of explosion that may cause serious injury.
- When taking the electrical power for the lighting from the machine itself, follow the instructions in this manual.

### **ACTION IF FIRE OCCURS**

If a fire occurs, escape from the machine as follows.

- Turn the start switch OFF to stop the engine.
- Use the handrails and steps to get off the machine.

### **WINDOW WASHER LIQUID**

Use an ethyl alcohol base washer liquid.

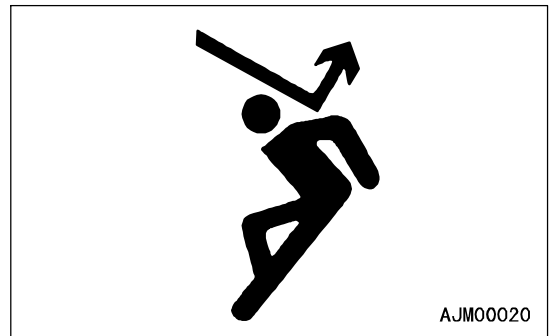
Methyl alcohol base washer liquid may irritate your eyes, so do not use it.

### **PRECAUTIONS WHEN USING ROPS**

Install ROPS when working in places where there is danger of falling rocks, such as in mines and quarries, or in places where there is danger of rolling over.

- If ROPS is installed, do not remove it when operating the machine.
- ROPS is installed to protect the operator when machine rolls over. When machine rolls over, ROPS supports its weight and absorbs its impact energy.
- If ROPS is modified, its strength may be reduced. When modifying, consult your Komatsu distributor.
- If ROPS is damaged or deformed by falling objects or by rolling over, its strength will be reduced and it will not be able to fulfill its function properly. In such cases, always Komatsu contact your distributor for advice of the method of repair.

Even if ROPS is installed, always fasten your seat belt properly when operating the machine. If you do not use your fasten your seat belt properly, it cannot display its effect.



### **PRECAUTIONS FOR ATTACHMENTS**

- When installing optional parts or attachments, there may be problems with safety or legal restrictions. Therefore contact your Komatsu distributor for advice.
- Any injuries, accidents, product failures or other property damages resulting from the use of unauthorized attachments or parts will not be the responsibility of Komatsu.
- When installing and using optional attachments, read the instruction manual for the attachment, and the general information related to attachments in this manual.



**UNAUTHORIZED MODIFICATION**

Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

- Komatsu will not be responsible for any injuries, accidents, product failures or other property damages resulting from modifications made without authorization from Komatsu.

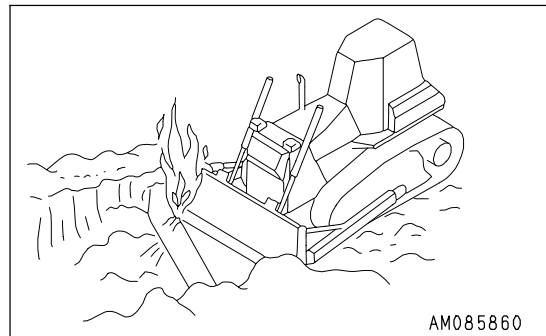
**SAFETY AT WORKSITE**

Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.

- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not operate where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Take action to prevent unauthorized people from approaching the jobsite.

When working on public roads, position flagmen and erect barriers to ensure the safety of passing traffic and pedestrians.

- When traveling or operating in shallow water or on soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting operations.

**WORKING ON LOOSE GROUND**

- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil after heavy rain or blasting or after earthquakes is weak in these areas.
- When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the machine will cause the soil to collapse. Before starting operations, take steps to ensure that the ground is safe and to prevent the machine from rolling over or falling.

**DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES**

Do not travel or operate the machine near electric cables. There is a hazard of electric shock, which may cause serious personal injury or death. On jobsites where the machine may go close to electric cables, always do as follows.

- Before starting work near electric cables, inform the local power company of the work to be performed, and ask them to take the necessary action.

- Even going close to high-voltage cables can cause electric shock, which may cause serious burns or even death. Always maintain a safe distance (see the table on the right) between the machine and the electric cable. Check with the local power company about safe operating procedure before starting operations.
- To prepare for any possible emergencies, wear rubber shoes and gloves. Lay a rubber sheet on top of the seat, and be careful not to touch the chassis with any exposed part of your body.
- Use a signalman to give warning if the machine approaches too close to the electric cables.
- When carrying out operations near high voltage cables, do not let anyone near the machine.
- If the machine should come too close or touch the electric cable, to prevent electric shock, the operator should not leave the operator's compartment until it has been confirmed that the electricity has been shut off.  
Also, do not let anyone near the machine.

| Voltage of Cables | Safety Distance   |
|-------------------|-------------------|
| 100 V - 200 V     | Over 2 m (7 ft)   |
| 6,600 V           | Over 2 m (7 ft)   |
| 22,000 V          | Over 3 m (10 ft)  |
| 66,000 V          | Over 4 m (14 ft)  |
| 154,000 V         | Over 5 m (17 ft)  |
| 187,000 V         | Over 6 m (20 ft)  |
| 275,000 V         | Over 7 m (23 ft)  |
| 500,000 V         | Over 11 m (36 ft) |

### ENSURE GOOD VISIBILITY

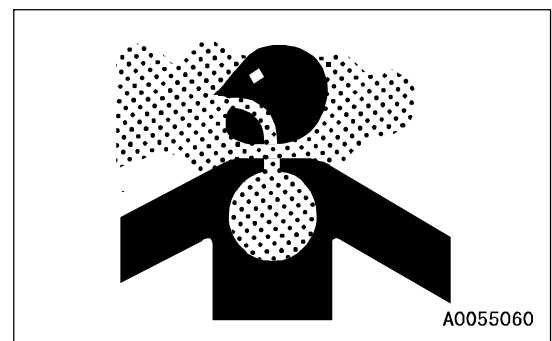
Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.

- Position a signalman if there are areas at the rear of the machine where the visibility is not good.
- When working in dark places, turn on the working lamp and front lamps installed to the machine, and set up additional lighting in the work area if necessary.
- Stop operations if the visibility is poor, such as in mist, snow, rain, or dust.

### VENTILATION FOR ENCLOSED AREAS

Exhaust fumes from the engine can kill.

- If it is necessary to start the engine within an enclosed area, or when handling fuel, flushing oil, or paint, open the doors and windows to ensure that adequate ventilation is provided to prevent gas poisoning.



### CHECKING SIGNALMAN'S SIGNALS AND SIGNS

- Set up signs to inform of road shoulders and soft ground. If the visibility is not good, position a signalman if necessary. Operators should pay careful attention to the signs and follow the instructions from the signalman.
- Only one signalman should give signals.
- Make sure that all workers understand the meaning of all signals and signs before starting work.

### EMERGENCY EXIT FROM OPERATOR'S CAB

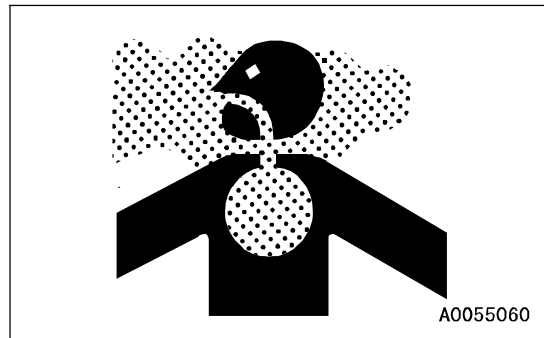
Machines equipped with a cab have doors on the left and right sides. If the door on the one side does not open, escape from the door on the other side.

**BE CAREFUL ABOUT ASBESTOS DUST**

Asbestos dust in the air can cause lung cancer if it is inhaled. There is danger of inhaling asbestos when working on jobsites handling demolition work or work handling industrial waste. Always observe the following.

- Spray water to keep down the dust when cleaning. Do not use compressed air for cleaning.
- If there is danger that there may be asbestos dust in the air, always operate the machine from an upwind position. All workers should use an approved respirator.
- Do not allow other persons to approach during the operation.
- Always observe the rules and regulations for the work site and environmental standards.

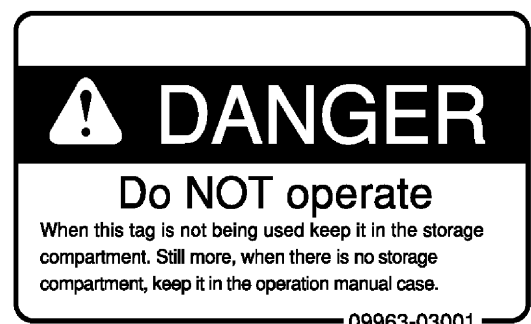
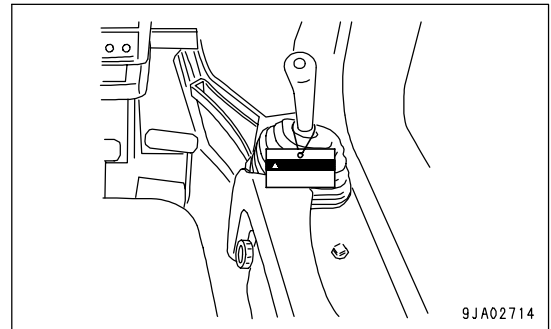
This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.



## PRECAUTIONS FOR OPERATION

### STARTING ENGINE

If there is a warning tag hanging from the work equipment control lever, do not start the engine or touch the levers.



### CHECKS BEFORE STARTING ENGINE

Carry out the following checks before starting the engine at the beginning of the day's work.

- Remove all dirt from the surface of the window glass to ensure a good view.
- Remove all dirt from the surface of the lens of the front lamps and working lamps, and check that they light up correctly.
- Check the coolant level, fuel level, and oil level in engine oil pan, check for clogging of the air cleaner, and check for damage to the electric wiring.
- Adjust the operator's seat to a position where it is easy to carry out operations, and check that there is no damage or wear to the seat belt or mounting clamps.
- Check that the gauges work properly, check the angle of the lights and working lamps, and check that the control levers are all at the neutral position.
- Adjust the mirror to a position which gives a good view to the rear from the operator's seat.
- Check that there are no persons or obstacles above, below, or in the area around the machine.

### PRECAUTIONS WHEN STARTING

- Start and operate the machine only while seated.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- When starting the engine, sound the horn as a warning.
- Do not allow anyone apart from the operator to ride on the machine.

**PRECAUTIONS IN COLD AREAS**

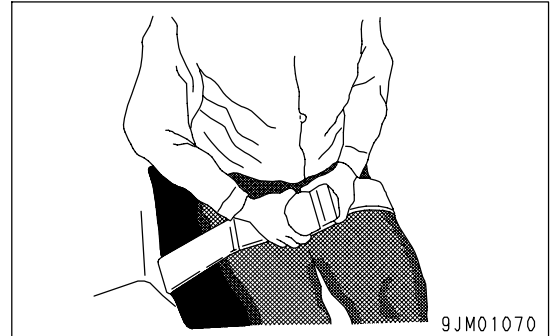
- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery and cause the battery to explode. Before charging or starting the engine with a different power source, melt the battery electrolyte and check that there is no leakage of electrolyte before starting.

## OPERATION

### CHECKS BEFORE OPERATION

When carrying out the checks, move the machine to a wide area where there are no obstructions, and operate slowly. Do not allow anyone near the machine.

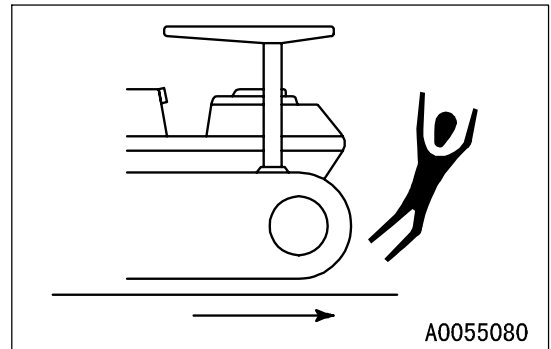
- Always fasten your seat belt.
- Check the operation of travel, steering and brake systems, and work equipment control system.
- Check for any problem in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of oil or fuel.
- If any problem is found, carry out repairs immediately.



### PRECAUTIONS FOR MOVING MACHINE FORWARD OR IN REVERSE

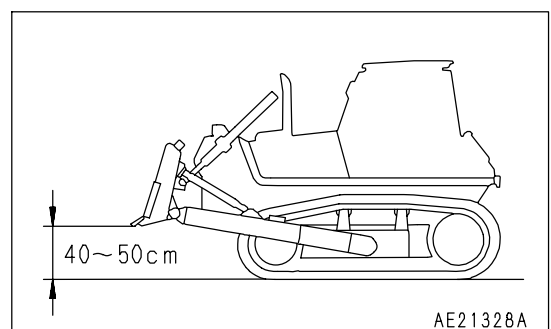
- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- Always operate the machine only when seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Check that the backup alarm (alarm buzzer when machine travels in reverse) works properly.
- Fix the operator's compartment doors and windows in the closed position securely.
- If there is an area to the rear of the machine which cannot be seen, position a signal person. Take special care not to hit other machines or people when turning or swinging the machine.

Always be sure to carry out the above precautions even when the machine is equipped with mirrors.

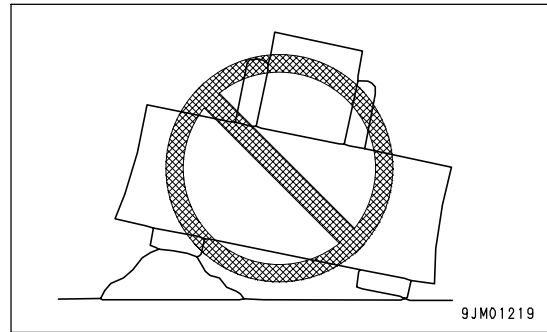


### PRECAUTIONS WHEN TRAVELING

- When traveling on level ground, keep the work equipment at a height of 40 to 50 cm (16 to 20 in) from the ground.
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is danger that the machine may turn over. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.



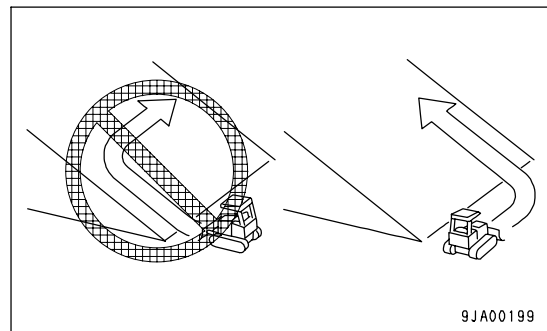
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.
- When traveling or carrying out operations, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the machine body or work equipment hit anything.
- Do not approach the edge of a cliff carelessly. When dropping soil over a cliff for banking or reclamation, leave soil of one scoop at the edge of the cliff and push it with the next scoop.
- When the machine passes over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, and there is danger that the travel speed rises suddenly. To prevent this, lower the travel speed.
- If the machine moves with only either side of the blade loaded, its tail may swing. Take care.



**TRAVELING ON SLOPES**

To prevent the machine from tipping over or slipping to the side, always do as follows.

- Keep the work equipment approx. 20 to 30 cm (8 to 12 in) above the ground. In case of emergency, lower the work equipment to the ground immediately to help stop the machine.
- When traveling down a slope, always place the transmission in low speed and travel down the slope slowly.
- Always travel straight up or down a slope. Traveling at an angle or across the slope is extremely dangerous.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine, then travel on to the slope again.
- Travel on grass, fallen leaves, or wet steel plates with low speed. Even with slight slopes there is a hazard that the machine may slip.



**USING BRAKES**

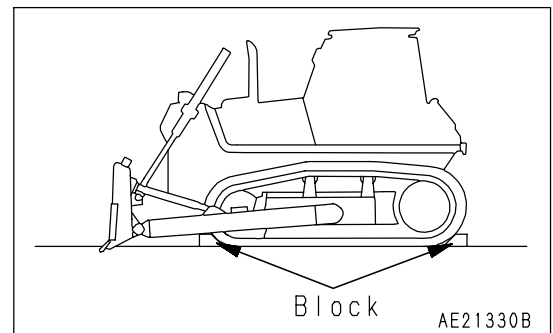
- When the machine is traveling, do not rest your foot on the brake pedal. If you travel with your foot resting on the pedal, the brake will always be applied, and this will cause the brakes to overheat and fail.
- Do not depress the brake pedal repeatedly if not necessary. If this is neglected, the brake will be overheated and will not work when required.
- When traveling downhill, use the braking force of the engine. If necessary, use the brake pedal at the same time.

**OPERATE CAREFULLY ON SNOW**

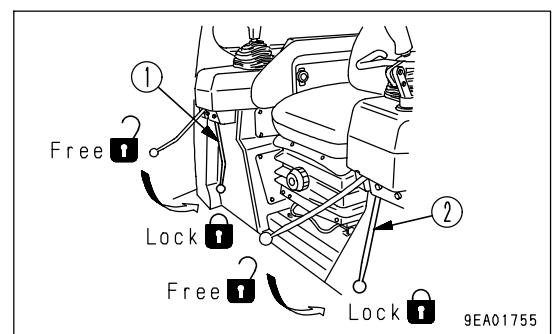
- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over or make it impossible for the machine to escape.
- If the machine enters deep snow, there is a hazard that it may tip over or become buried in the snow. Be careful not to leave the road shoulder or to get trapped in a snow drift.
- When clearing snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen. There is a hazard of the machine tipping over or hitting covered objects, so always carry out operations carefully.
- When traveling on snow-covered slopes, never apply the brakes suddenly. Reduce the speed and use the engine as a brake while applying the foot brake intermittently (depress the brake intermittently several times). If necessary, lower the blade to the ground to stop the machine.

**PARKING MACHINE**

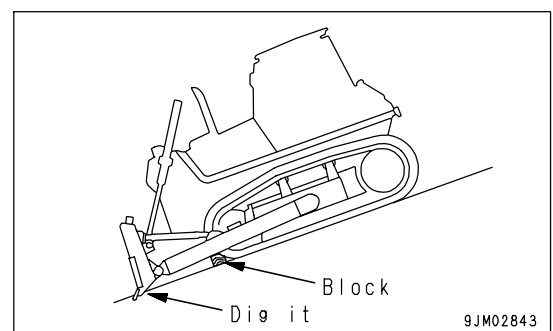
- Park the machine on firm, level ground.
- Select a place where there is no hazard of landslides, falling rocks, or flooding.
- Lower the work equipment completely to the ground.



- When leaving the machine, set the steering, forward-reverse, gear shift lever in the N (Neutral) position and set the blade lever in the HOLD position, then apply work equipment lock lever (1) and parking brake lever (2) and stop the engine.
- Always close the operator's cab door, and use the key to lock all the equipment in order to prevent any unauthorized person from moving the machine. Always remove the key, take it with you, and leave it in the specified place.



- If it is necessary to park the machine on a slope, always do as follows.
  - Set the blade on the downhill side, then dig it into the ground.
  - Put blocks under the tracks to prevent the machine from moving.





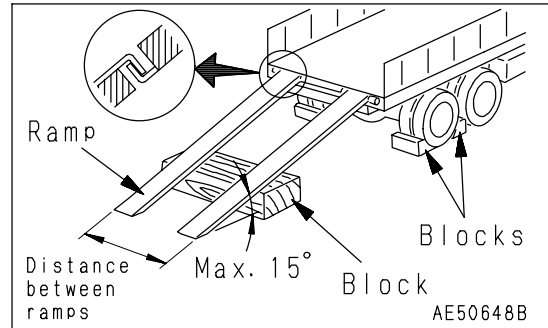
## TRANSPORTATION

The machine can be divided into parts for transportation, so when transporting the machine, please contact your Komatsu distributor to have the work carried out.

### LOADING AND UNLOADING

When loading or unloading the machine, mistaken operation may bring the hazard of the machine tipping over or falling, so particular care is necessary. Always do as follows.

- Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of the road or cliff.
  - Always use ramps of adequate strength. Be sure that the ramps are wide, long, and thick enough to provide a safe loading slope. Take suitable steps to prevent the ramps from moving out of position or coming off.
  - Be sure the ramp surface is clean and free of grease, oil, ice and loose materials. Remove dirt from machine-tracks. On a rainy day, in particular, be extremely careful since the ramp surface is slippery.
  - Run the engine at low speed and travel slowly.
  - When on the ramps, do not operate any lever except for the travel lever.
  - Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
  - The center of gravity of the machine will change suddenly at the joint between the ramps and the track or trailer, and there is danger of the machine losing its balance. Travel slowly over this point.
  - When loading or unloading to an embankment or platform, make sure that it has suitable width, strength, and grade.
  - For machines equipped with a cab, always lock the door after boarding the machine. If this is not done, the door may suddenly open during transportation.
- Refer to "TRANSPORTATION (PAGE 3-101)".



### SHIPPING

When shipping the machine on a trailer, do as follows.

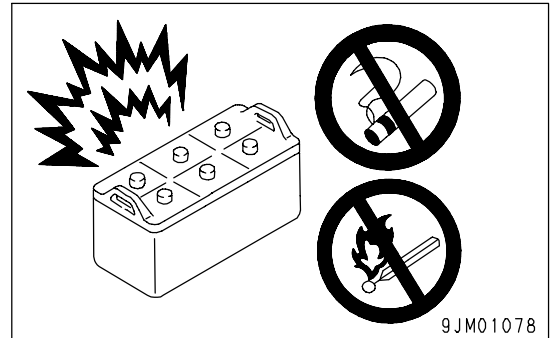
- The weight, transportation height, and overall length of the machine differ according to the work equipment, so be sure to confirm the dimensions.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the shipping procedure, see "TRANSPORTATION (PAGE 3-101)" in the OPERATION section.

## BATTERY

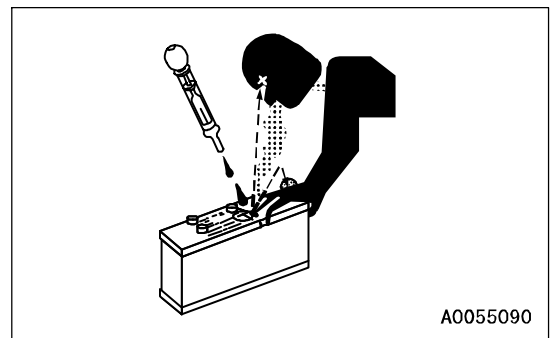
### BATTERY HAZARD PREVENTION

Battery electrolyte contains sulphuric acid, and batteries generate flammable hydrogen gas, which may explode. Mistaken handling can lead to serious injury or fire. For this reason, always observe the following precautions.

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- When working with batteries, always wear safety glasses and rubber gloves.
- Never smoke or use any flame near the battery.



- If you spill acid on your clothes or skin, immediately flush the area with large amount of water.
- If acid gets into your eyes, flush them immediately with large amount of water and seek medical attention.



- Before working with batteries, turn the starting switch to the OFF position.

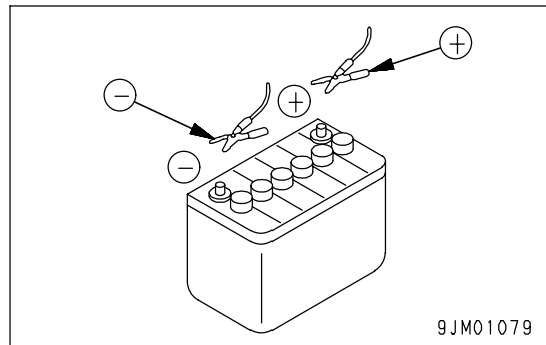
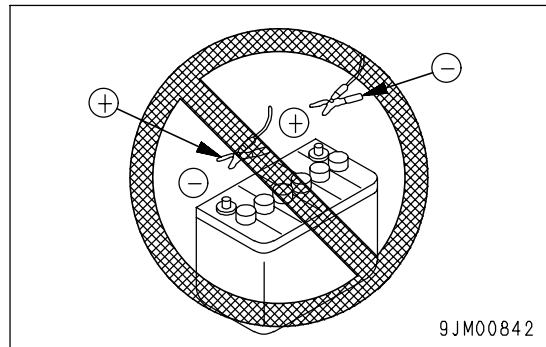
As there is a hazard that sparks will be generated, always do as follows.

- Do not let tools or other metal objects make any contact between the battery terminals. Do not leave tools or other metal objects lying around near the battery.
- Always disconnect the negative (-) terminal (ground side) first when removing the battery; when installing the battery, connect the positive (+) terminal first, and connect the ground last. Tighten the battery terminals securely.
- Flammable hydrogen gas is generated when the battery is charged, so remove the battery from the chassis, take it to a well-ventilated place, and remove the battery caps before charging it.
- Tighten the battery caps securely.
- Install the battery securely to the determined place.

**STARTING WITH BOOSTER CABLE**

If any mistake is made in the method of connecting the booster cables, it may cause the battery to explode, so always do as follows.

- When starting with a booster cable, carry out the starting operation with two workers (one worker sitting in the operator’s seat and the other working with the battery).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF position for both the normal machine and problem machine. There is a hazard that the machine will move when the power is connected.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the negative (-) cable (ground side) first when removing them.
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.
- Always wear safety glasses and rubber gloves when starting the engine with booster cables.
- When connecting a normal machine to a problem machine with booster cables, always use a normal machine with the same battery voltage as the problem machine.
- For details of the starting procedure when using booster cables, see "STARTING ENGINE WITH BOOSTER CABLE (PAGE 3-114)" in the OPERATION section.



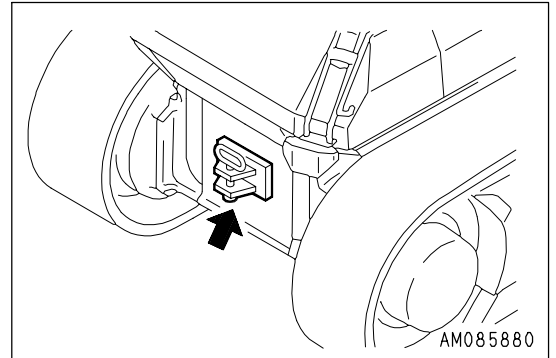
## TOWING

### WHEN TOWING

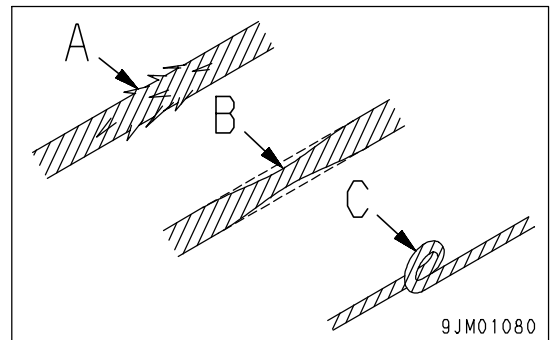
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

For towing method, see "MACHINE TOWING METHOD (PAGE 3-111)".

- Always wear leather gloves when handling wire rope.
- Connect a wire rope to the part indicated with the arrow in the diagram at right.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Never tow a machine on a slope.



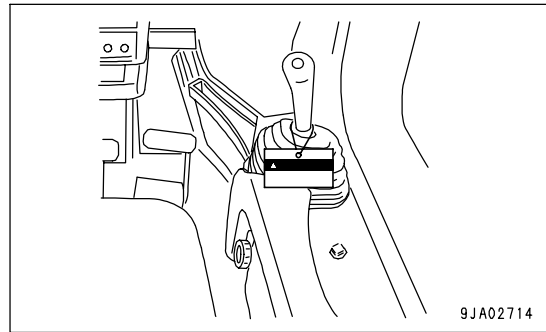
- Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). There is danger that the rope may break during the towing operation.



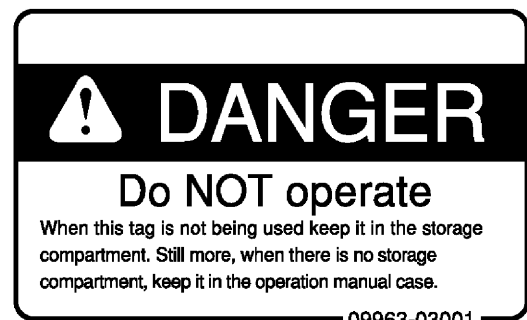
# PRECAUTIONS FOR MAINTENANCE

## WARNING TAG

- Always attach the "DO NOT OPERATE" warning tag to the work equipment control lever in the operator's cab to alert others that you are performing service or maintenance on the machine. Attach additional warning tags around the machine if necessary. Warning tag Part No. 09963-03001  
Keep this warning tag in the tool box while it is not used. If there is no toolbox, keep the tag in the operation manual pocket.
- If others start the engine, or touch or operate the work equipment control lever while you are performing service or maintenance, you could suffer serious injury or property damage.



9JA02714



## KEEP WORK PLACE CLEAN AND TIDY

Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean and tidy to enable you to carry out operations safely. If the work place is not kept clean and tidy, there is the danger that you will trip, slip, or fall over and injure yourself.

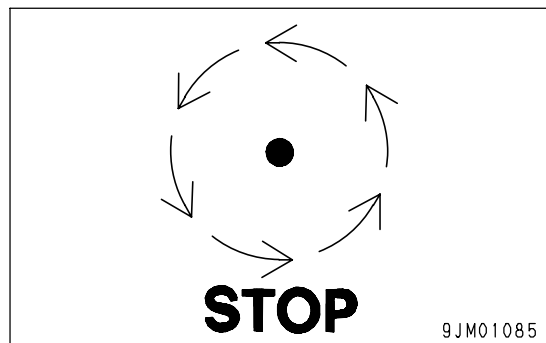
## APPOINT LEADER WHEN WORKING WITH OTHERS

When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.

When working with others, misunderstandings between workers can lead to serious accidents.

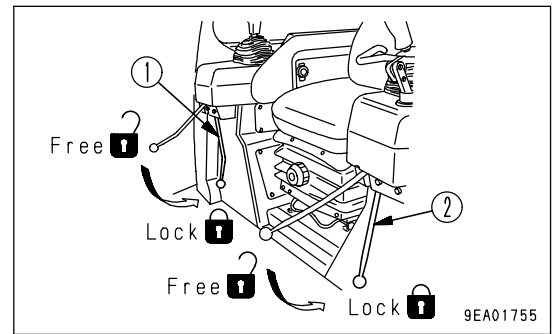
## STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

- Stop the machine on firm, level ground.
- Select a place where there is no hazard of landslides, falling rocks, or flooding.
- Lower the work equipment completely to the ground and stop the engine.

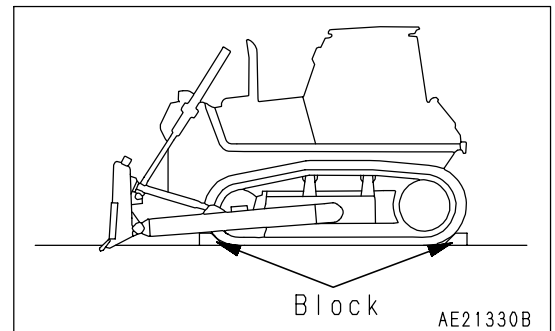


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- Set work equipment lock lever (1) and parking brake lever (2) to the LOCK position.



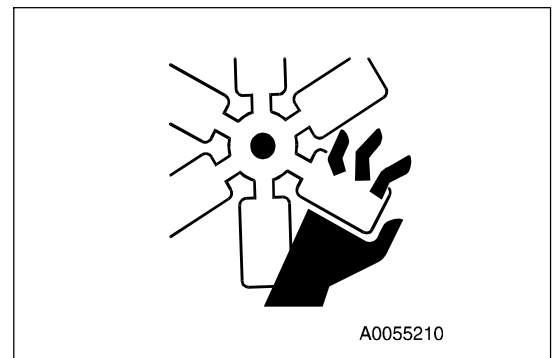
- Put blocks under the track to prevent the machine from moving.



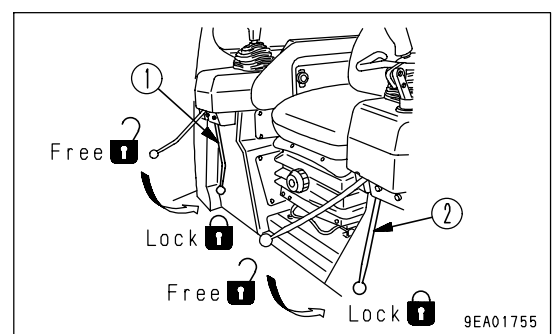
### TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

To prevent personal injury, do not carry out maintenance with the engine running. If maintenance must be carried out with the engine running, carry out the operation with at least two workers and do as follows.

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.

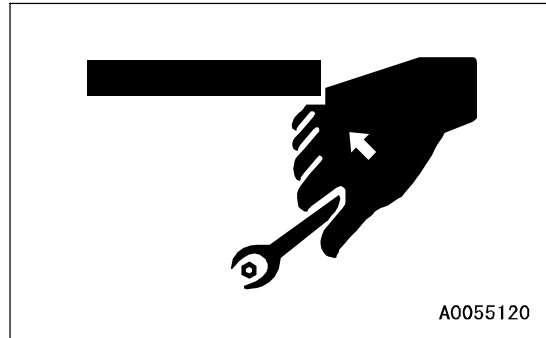


- Set work equipment lock lever (1) and parking brake lever (2) to the LOCK position.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be careful not to come close.
- Do not touch any control levers. If any control lever must be operated, give a signal to the other workers to warn them to move to a safe place.
- Never drop or insert tools or other objects into the fan or fan belt. Parts may break or be sent flying.



**PROPER TOOLS**

Use only tools suited to the task and be sure to use the tools correctly. Using damaged, low quality, faulty, makeshift tools or improper use of the tools could cause serious personal injury.



**ACCUMULATOR**

The accumulator is charged with high-pressure nitrogen gas. When handling the accumulator, careless procedure may cause an explosion which could lead to serious injury or property damage. For this reason, always observe the following precautions.

- Do not disassemble the accumulator.
- Do not bring it near flame or dispose of it in fire.
- Do not make holes in it, weld it, or use a cutting torch.
- Do not hit or roll the accumulator, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work performed.



**NO UNAUTHORIZED PERSONNEL INTO AREA**

Do not allow any unauthorized personnel into the area when servicing the machine. If necessary, employ a guard.

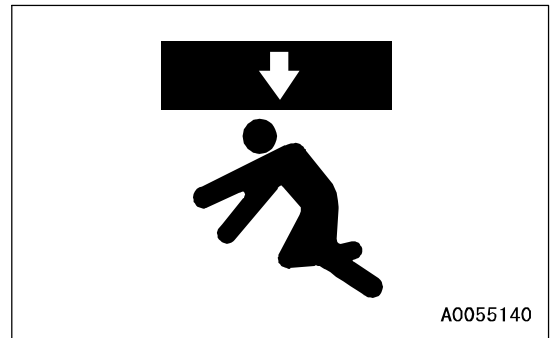
**ATTACHMENTS**

- Appoint a leader before starting removal or installation operations for attachments.
- Place attachments that have been removed from the machine in a stable condition so that they do not fall. And take steps to prevent unauthorized persons from entering the storage area.



**WORK UNDER THE MACHINE**

- If it is necessary to go under the work equipment or the machine to carry out service and maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
- It is extremely dangerous to work under the machine if the track shoes are lifted off the ground and the machine is supported only with the work equipment. If any of the control levers is touched by accident, or there is damage occurring to the hydraulic piping, the work equipment or the machine will suddenly drop. This is extremely dangerous. Never work under the work equipment or the machine.

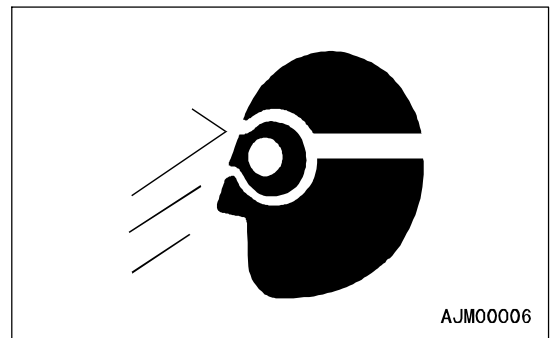
**NOISE**

If the noise from the machine is too loud, it may cause temporary or permanent hearing problems. When carrying out maintenance of the engine and you are exposed to noise for long periods of time, wear ear covers or ear plugs while working.

**PRECAUTIONS WHEN USING HAMMER**

When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious injury. Always do as follows.

- If hard metal parts such as pins, bucket teeth, cutting edges, or bearings are hit with a hammer, there is a hazard that pieces might be scattered and cause serious personal injury or death. Always wear safety glasses and gloves.
- When hitting pins or bucket teeth, there is a hazard that broken pieces might be sent flying and injure people in the surrounding area. Always check that there is no one in the surrounding area.



- There is a hazard that the pin hit with strong force may fly out and injure people in the surrounding area.

**REPAIR WELDING**

Welding operations must always be carried out by a qualified welder and in a place equipped with proper equipment. There is a hazard of gas, fire, or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

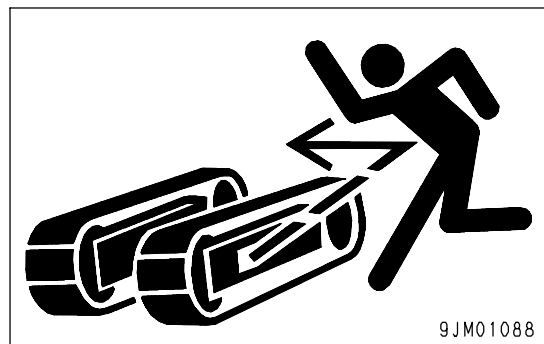
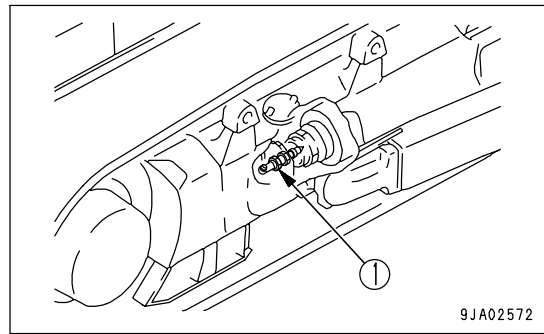
**REMOVING BATTERY TERMINAL**

When repairing the electrical system or when carrying out electrical welding, remove the negative (-) terminal of the battery to prevent the flow of current.



**PRECAUTIONS WHEN USING HIGH-PRESSURE GREASE TO ADJUST TRACK TENSION**

- Grease is pumped into the track tension adjustment system under high pressure.  
If the specified procedure for maintenance is not followed when making adjustment, grease drain plug (1) may fly out and cause serious injury or property damage.
- When loosening grease drain plug (1) to loosen the track tension, never loosen it more than one turn. Loosen the grease drain plug slowly.
- Never put your face, hands, feet, or any other part of your body close to grease drain plug (1).



**DO NOT DISASSEMBLE RECOIL SPRING**

Never attempt to disassemble the recoils spring assembly. It contains a spring under high pressure which serves as a shock absorber for the idler. If it is disassembled by mistake, the spring will fly out and cause serious injury. When it becomes necessary to disassemble it, ask your Komatsu distributor to do the work.

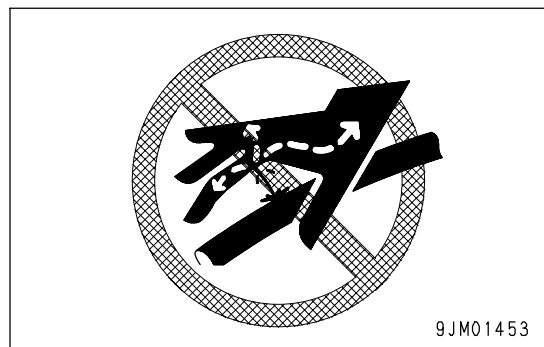
**PRECAUTION WITH HIGH-PRESSURE OIL**

The hydraulic system is always under internal pressure. When inspecting or replacing piping or hoses, always check that the pressure in the hydraulic circuit has been released. If the circuit is still under pressure, it will lead to serious personal injury, so always do as follows.

- Always release the pressure before starting any inspection or replacement operation.
- If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.

When carry out inspection, wear safety glasses and leather gloves.

- There is a hazard that high-pressure oil leaking from small holes may penetrate your skin or cause blindness if it contacts your eyes directly. If you are hit by a jet of high-pressure oil and suffer injury to your skin or eyes, wash the place with clean water, and consult a doctor immediately for medical attention.



### HANDLING HIGH-PRESSURE HOSES

- If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury. If any loose bolts are found, stop work and tighten to the specified torque. If any damaged hoses are found, stop operations immediately and contact your Komatsu distributor.

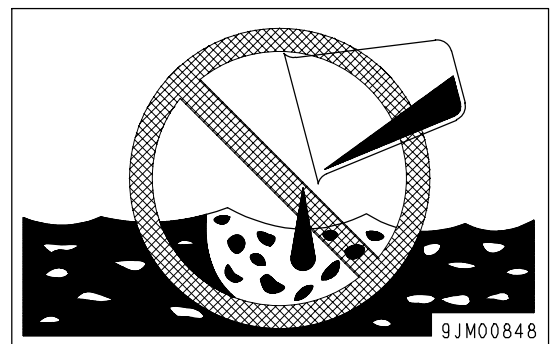
Replace the hose if any of the following problems are found.

- Damaged or leaking hydraulic fitting.
- Frayed or cut covering or exposed reinforcement wire layer.
- Covering swollen in places.
- Twisted or crushed movable portion.
- Foreign material embedded in covering.

### WASTE MATERIAL

To prevent pollution, pay careful attention to the method of disposing of waste materials.

- Always put oil drained from your machine in containers. Never drain oil directly onto the ground or dump into the sewage system, rivers, the sea, or lakes.
- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, and batteries.



### MAINTENANCE FOR AIR CONDITIONER

If air conditioner refrigerant gets into your eyes, it may cause blindness; if it touches your skin, it may cause frostbite. Never touch refrigerant.

### COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious injury caused by flying particles.
- When using compressed air to clean elements or the radiator, always wear safety glasses, dust mask, gloves, and other protective equipment.

### PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- In order for the machine to be operated safely for a long time, it is necessary to add oil and to carry out service and maintenance at periodic intervals. In order to further increase safety, components with a strong relationship to safety, such as hoses and seat belts, must be replaced at periodic intervals.

Replacement of safety critical parts: See "PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS (PAGE 4-15)".

- The material of these components naturally changes over time, and repeated use causes deterioration, wear, and fatigue. As a result, there is a hazard that these components may fail and cause serious injury or death. It is difficult to judge the remaining life of these components from external inspection or the feeling when operating, so always replace them at the specified interval.
- Replace or repair safety-critical parts if any defect is found, even when they have not reached the specified replacement time.



# OPERATION

## **WARNING**

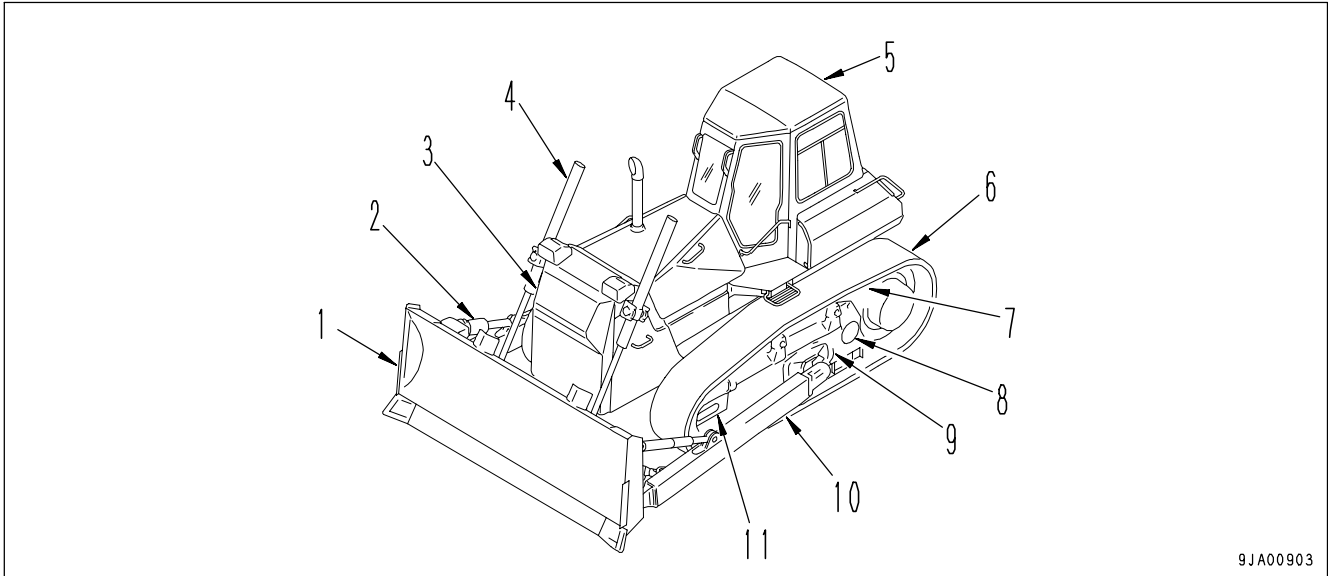
Please read and make sure that you understand the SAFETY section before reading this section.

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## GENERAL VIEW

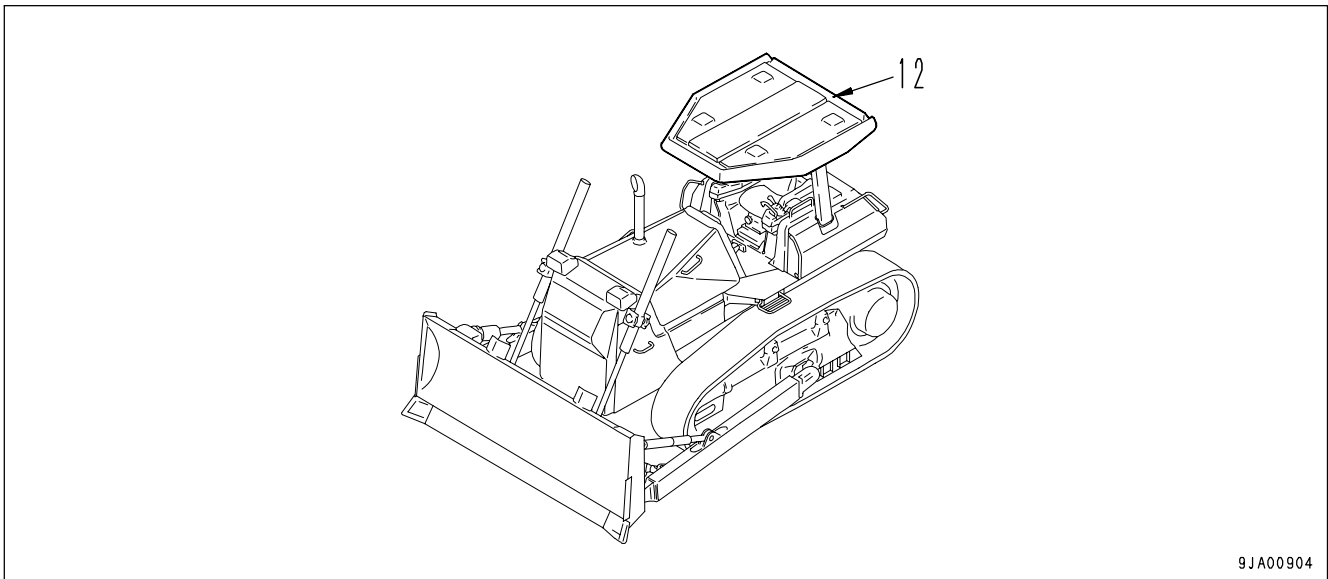
### GENERAL VIEW OF MACHINE

Machine equipped with cab



9JA00903

Machine equipped with canopy

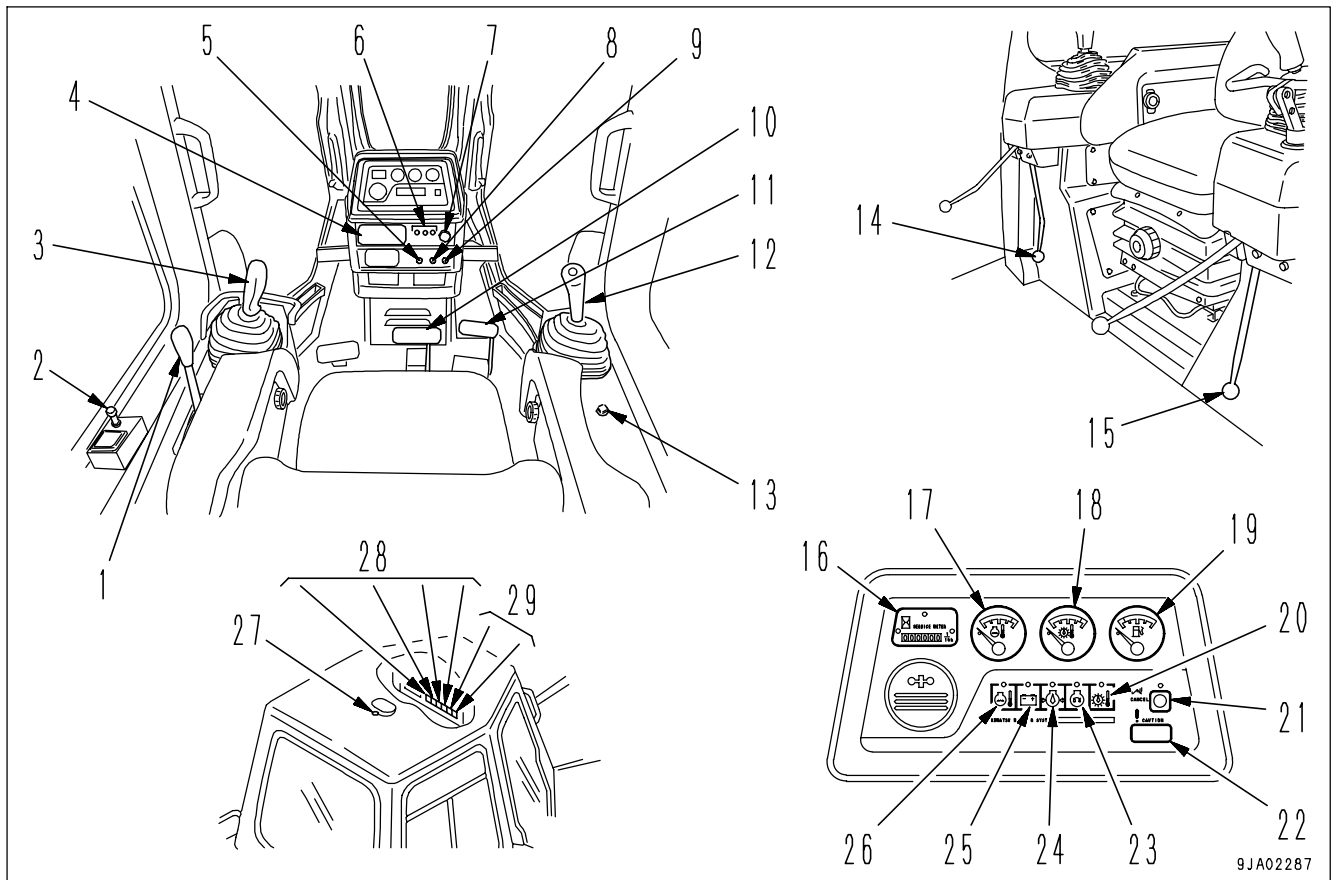


9JA00904

- |                   |                 |
|-------------------|-----------------|
| (1) Blade         | (7) Sprocket    |
| (2) Tilt cylinder | (8) Pivot shaft |
| (3) Radiator mask | (9) Track frame |
| (4) Lift cylinder | (10) Frame      |
| (5) Cab           | (11) Idler      |
| (6) Track shoe    | (12) Canopy     |

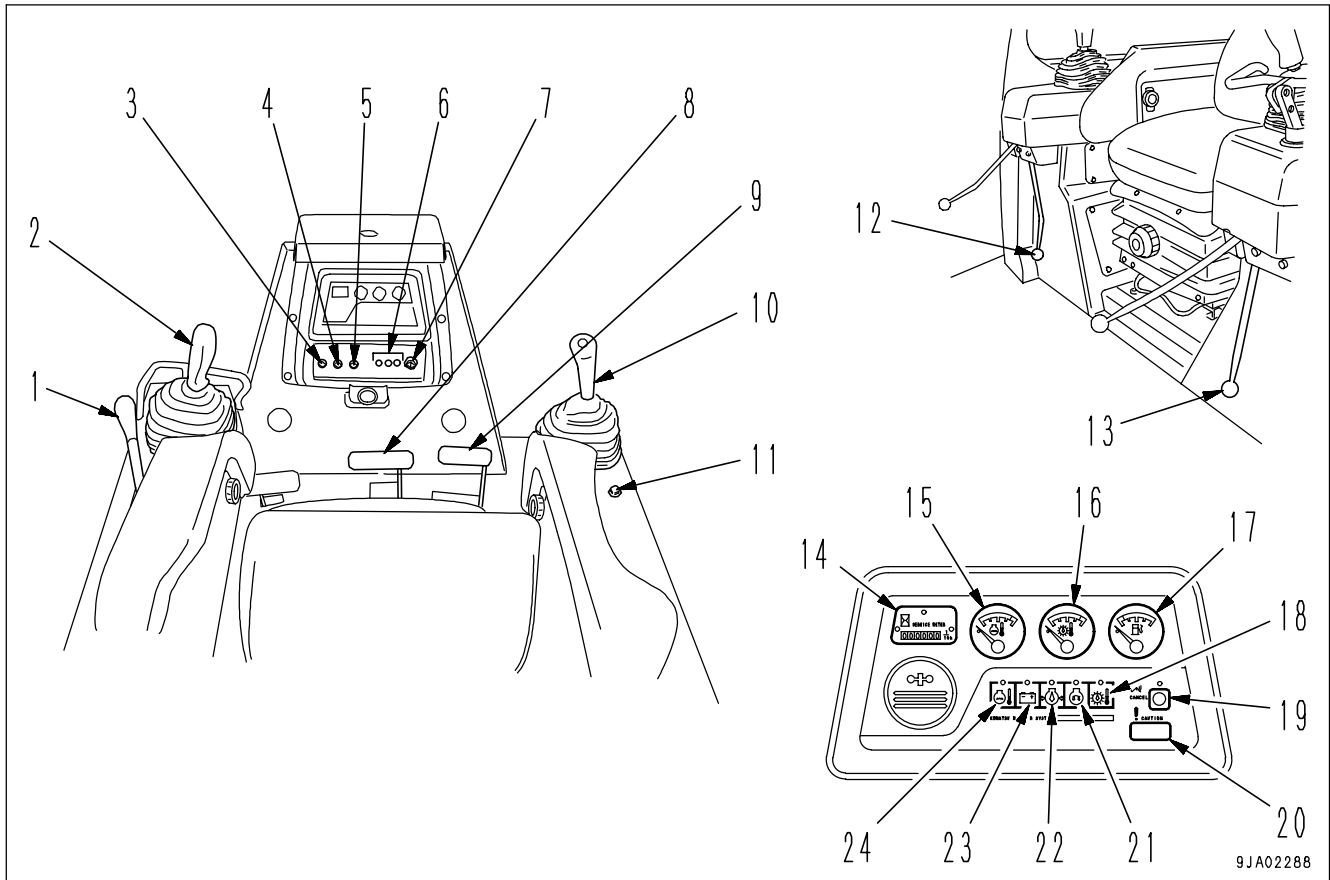
### GENERAL VIEW OF CONTROLS AND GAUGES

Machine equipped with cab



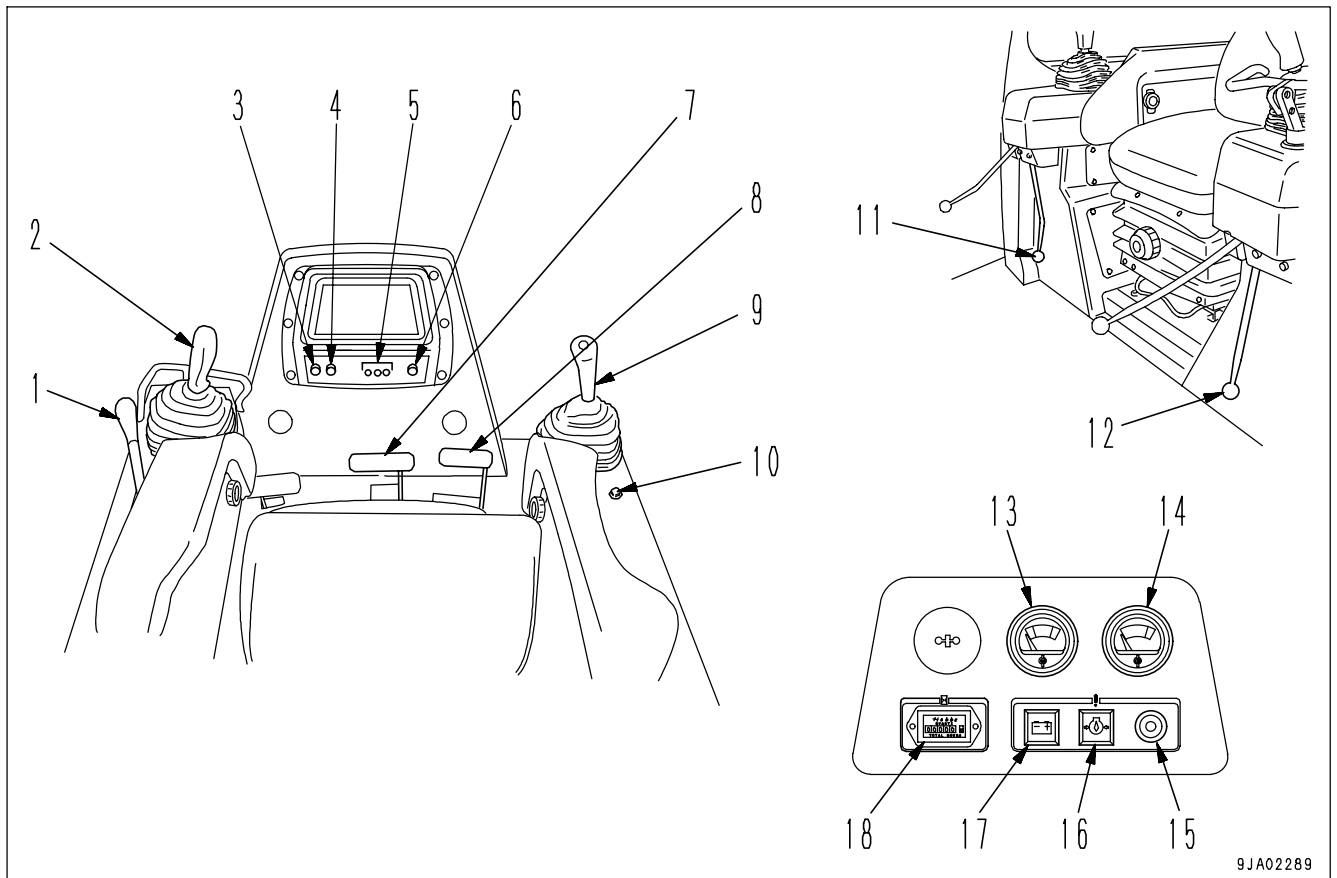
- |  |   |
|--|---|
| (1) Fuel control lever                                     | (15) Parking brake lever                          |
| (2) Cigarette lighter                                      | (16) Service meter                                |
| (3) Joystick (steering, forward-reverse, gear shift lever) | (17) Engine coolant temperature gauge             |
| (4) Air conditioner panel or heater panel                  | (18) Transmission oil temperature gauge           |
| (5) Head lamp switch                                       | (19) Fuel gauge                                   |
| (6) Speed range display lamp                               | (20) Transmission oil pressure caution lamp       |
| (7) Starting switch  | (21) Monitor caution cancellation switch          |
| (8) Rear lamp switch                                       | (22) Monitor caution lamp                         |
| (9) Glow switch  | (23) Glow signal lamp                             |
| (10) Brake pedal   | (24) Engine oil pressure caution lamp             |
| (11) Decelerator pedal                                     | (25) Charge lamp                                  |
| (12) Blade control lever                                   | (26) Engine coolant temperature caution lamp      |
| (13) Horn switch   | (27) Room lamp                                    |
| (14) Work equipment lock lever                             | (28) Wiper switch                                 |
|  | (29) Additional working lamp switch (if equipped) |

Machines equipped with canopy  
 Monitor panel specification



- |  |  |
|--|--|
| (1) Fuel control lever                                     | (13) Parking brake lever                     |
| (2) Joystick (steering, forward-reverse, gear shift lever) | (14) Service meter                           |
| (3) Head lamp switch                                       | (15) Engine coolant temperature gauge        |
| (4) Rear lamp switch                                       | (16) Transmission oil temperature gauge      |
| (5) Glow switch  | (17) Fuel gauge                              |
| (6) Speed range display lamp                               | (18) Transmission oil pressure caution lamp  |
| (7) Starting switch  | (19) Monitor caution cancellation switch     |
| (8) Brake pedal  | (20) Monitor caution lamp                    |
| (9) Decelerator pedal                                      | (21) Glow signal lamp                        |
| (10) Blade control lever                                   | (22) Engine oil pressure caution lamp        |
| (11) Horn switch   | (23) Charge lamp                             |
| (12) Work equipment lock lever                             | (24) Engine coolant temperature caution lamp |

Machines equipped with canopy  
Gauge panel specification



9JA02289

- |  |   |
|--|---|
| (1) Fuel control lever                                     | (10) Horn switch                        |
| (2) Joystick (steering, forward-reverse, gear shift lever) | (11) Work equipment lock lever          |
| (3) Head lamp switch                                       | (12) Parking brake lever                |
| (4) Rear lamp switch                                       | (13) Engine coolant temperature gauge   |
| (5) Speed range display lamp                               | (14) Transmission oil temperature gauge |
| (6) Starting switch  | (15) Glow signal                        |
| (7) Brake pedal  | (16) Engine oil pressure caution lamp   |
| (8) Decelerator pedal                                      | (17) Charge lamp                        |
| (9) Blade control lever                                    | (18) Service meter                      |



# EXPLANATION OF COMPONENTS

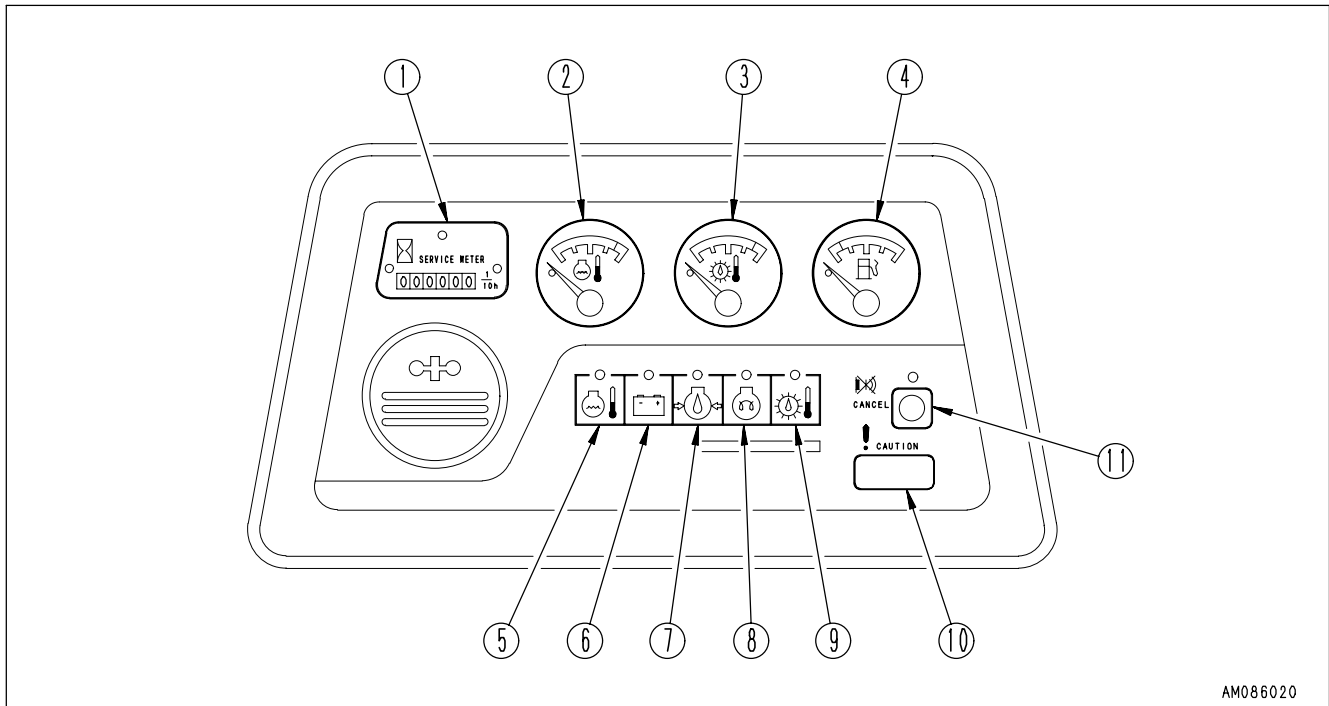
The following is an explanation of devices needed for operating the machine.

To perform suitable operations correctly and safely, it is important to completely understand methods of operating the equipment, and the meanings of the displays.

## MONITOR PANEL

### MONITOR PANEL

(Monitor panel specification)



AM086020

- (1) Service meter
- (2) Engine coolant temperature gauge
- (3) Transmission oil temperature gauge
- (4) Fuel gauge
- (5) Engine coolant temperature caution lamp
- (6) Charge lamp
- (7) Engine oil pressure caution lamp
- (8) Glow signal lamp
- (9) Transmission oil pressure caution lamp
- (10) Monitor caution lamp
- (11) Monitor caution cancel switch

### SERVICE METER

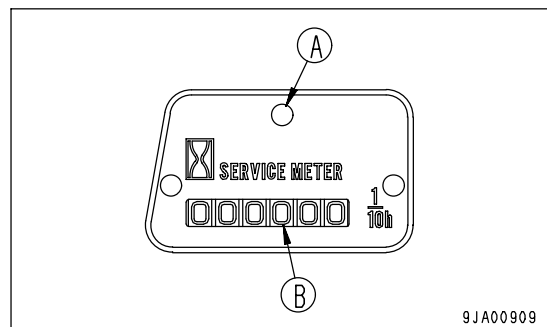
This meter (1) shows the total operation hours of the machine.

Set the periodic maintenance intervals using this display.

The service meter advances while the engine is running, even if the machine is not traveling.

While the engine is running, the pilot lamp (A) at the top of the meters keeps flashing to indicate that the meter is advancing.

Meter (B) will advance by 1 for each hour of operation regardless of the engine speed.



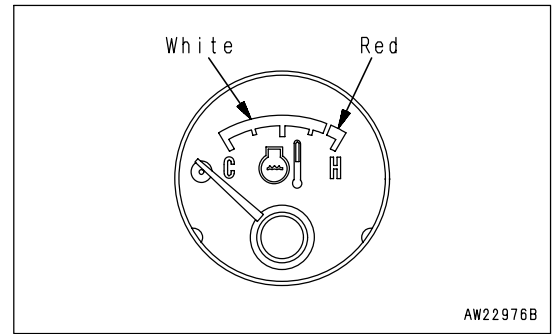
9JA00909

**ENGINE COOLANT TEMPERATURE GAUGE**

This gauge (2) indicates the coolant temperature.

When the indicator is in the white range during operation, the coolant temperature is normal.

If the indicator moves from the white range into the red range during operation, stop the machine immediately, run the engine under no load at a midrange speed, and wait for the indicator to go down to the white range. After starting the engine, warm up it until the indicator moves into the white range.

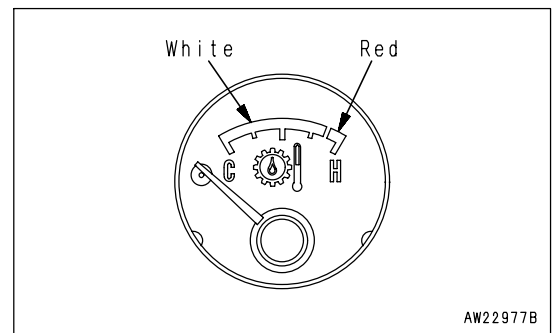


**TRANSMISSION OIL TEMPERATURE GAUGE**

This meter (3) indicates the temperature of the transmission lubricating oil.

When the indicator is in the white range during operation, the oil temperature is normal.

If the indicator moves from the white range into the red range during operation, stop the machine, run the engine under no load at a midrange speed, and wait for the indicator to go down to the white range.



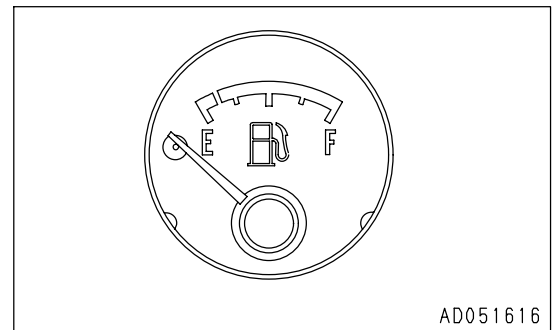
**FUEL GAUGE**

When the starting switch is turned ON, this meter (4) displays the amount of fuel remaining in the fuel tank.

F indicates a full tank.

When the indicator points to E, it indicates that there is less than 43 liters (11.35 US gal) remaining, so add fuel.

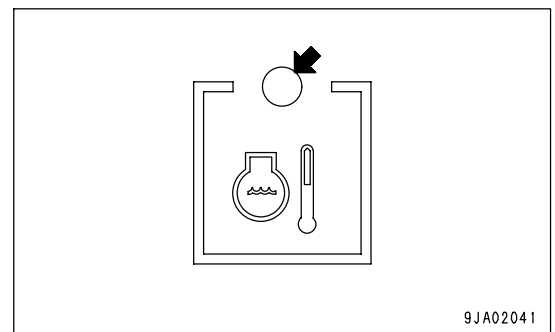
Always fill the tank after finishing operations.



**ENGINE COOLANT TEMPERATURE CAUTION LAMP**

This lamp (5) warns of a rise in the temperature of the engine coolant.

If the lamp lights up, stop the machine, run the engine under no load at a midrange speed, and wait for the indicator of the engine coolant temperature gauge (2) to go down to the white range.

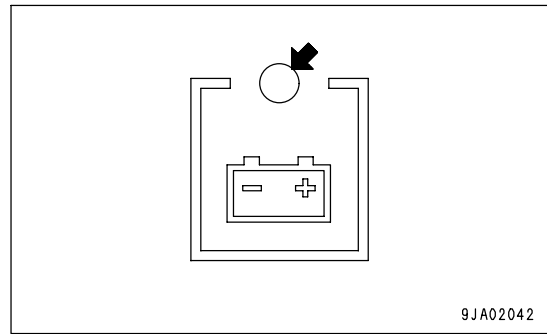


**CHARGE LAMP**

This lamp (6) indicates malfunction of the alternator.

When the starting switch is turned ON, it will light up, but it should go out when the engine speed rises.

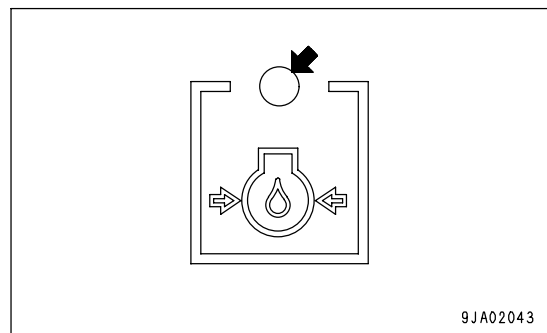
If the lamp lights up during operation, stop the engine and check the V-belt tension. If any abnormality is found, see "OTHER TROUBLE (PAGE 3-116)".

**ENGINE OIL PRESSURE CAUTION LAMP**

This lamp (7) warns that the engine lubricating oil pressure has dropped. When the starting switch is turned ON, it will light up.

When the lamp goes off after the engine is started, the oil pressure is normal.

When the lamp lights up during operation, the oil pressure is lower. Immediately stop the engine and look for the cause. For details, see "OTHER TROUBLE (PAGE 3-116)".

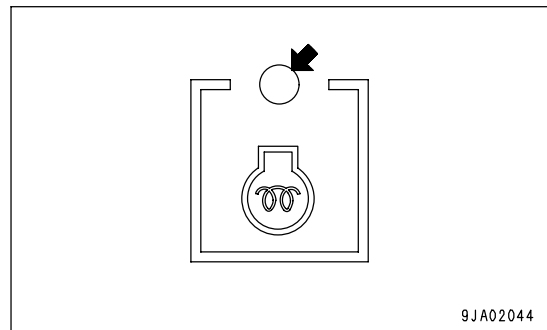
**GLOW SIGNAL LAMP**

This lamp (8) indicates the electrical intake air heater is red-heated.

While preheating is being carried out with the glow switch, the lamp lights up.

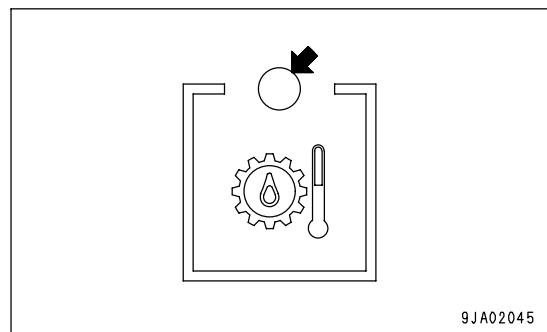
In the case of automatic preheating, the lamp goes out when the preheating is completed.

In the case of manual preheating, the lamp goes out when the glow switch is released.

**TRANSMISSION OIL PRESSURE CAUTION LAMP**

This lamp (9) warns the operator that the oil temperature at the transmission outlet port has risen.

If the lamp lights up, stop the machine, run the engine under no load at a midrange speed, and wait for the transmission oil temperature gauge (3) to go down to the white range.

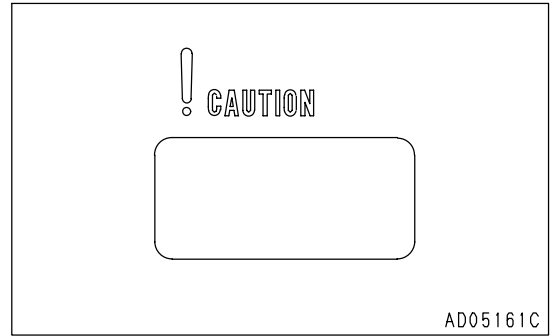


**MONITOR CAUTION LAMP**

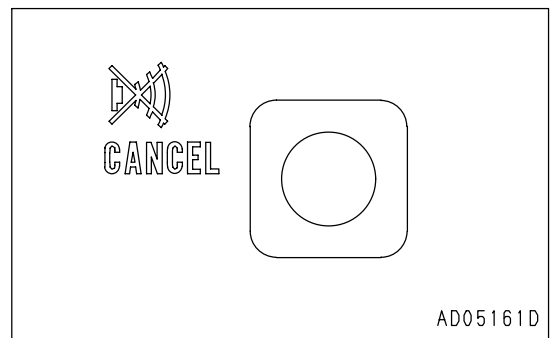
This lamp (10) lights up when any of the following caution lamps lights up.

In addition, the alarm buzzer sounds at the same time.

- Engine coolant temperature caution lamp (5)
- Charge lamp (6)
- Engine oil pressure caution lamp (7)
- Transmission oil temperature caution lamp (9)

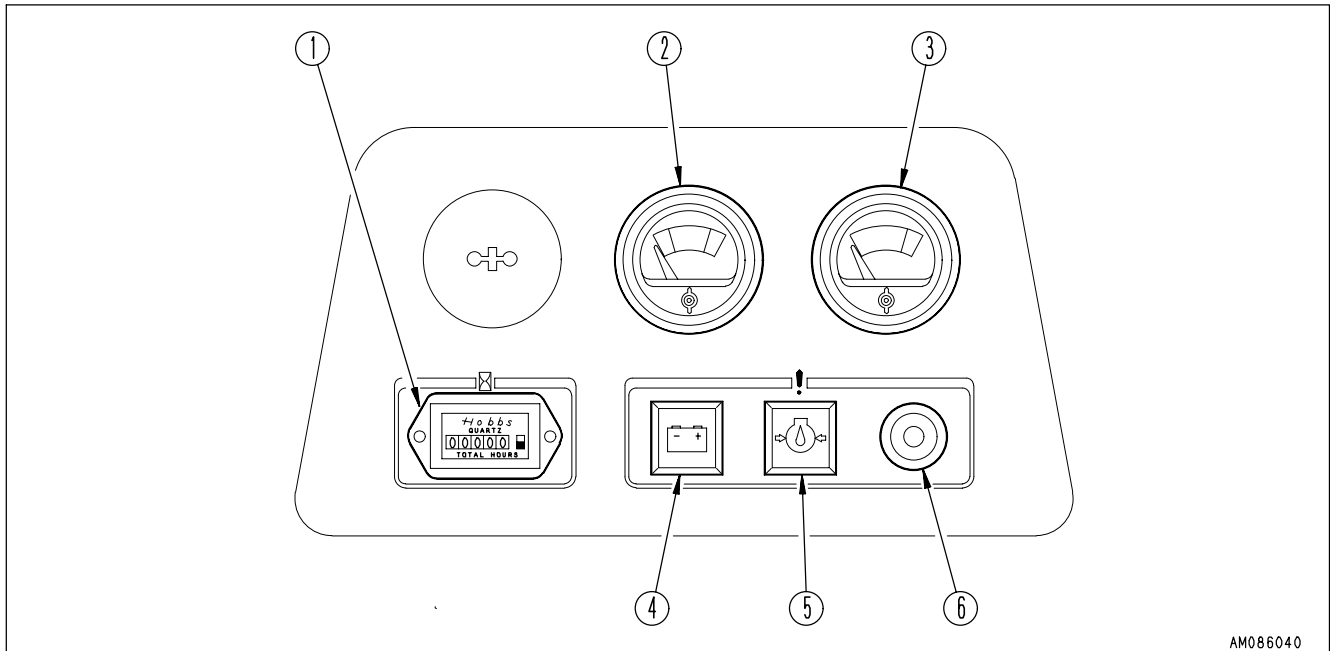
**MONITOR CAUTION CANCELLATION SWITCH**

This switch (11) is used to cancel the monitor caution lamp. Press the switch to turn the monitor caution lamp out and to stop the alarm buzzer.



**GAUGE PANEL**

(Gauge panel specification)

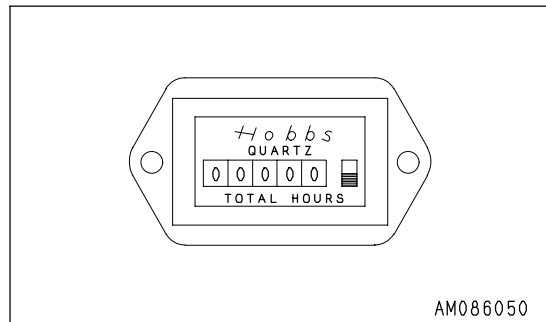


AM086040

- (1) Service meter
- (2) Engine coolant temperature gauge
- (3) Transmission oil temperature gauge
- (4) Charge lamp
- (5) Engine oil pressure caution lamp
- (6) Glow signal

**SERVICE METER**

This meter (1) shows the total number of hours the machine has operated. Set the periodic service interval using this display. The service meter advances while the engine is running, even if the machine is not traveling. Meter will advance by 1 for each hour of operation regardless of the engine speed.

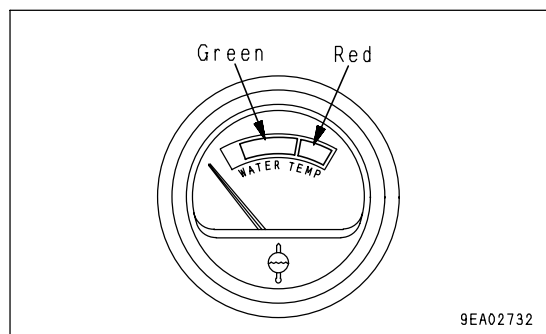


AM086050

**ENGINE COOLANT TEMPERATURE GAUGE**

This gauge (2) indicates the coolant temperature. When the indicator is in the green range during operation, the coolant temperature is normal.

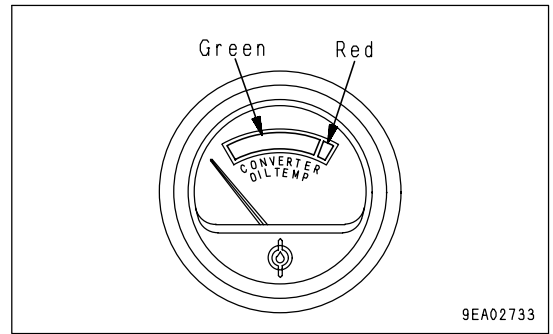
If the indicator moves from the green range into the red range during operation, stop the machine immediately, run the engine under no load at a midrange speed, and wait for the indicator to go down to the green range. After starting the engine, warm it up until the indicator moves into the green range.



9EA02732

**TRANSMISSION OIL TEMPERATURE GAUGE**

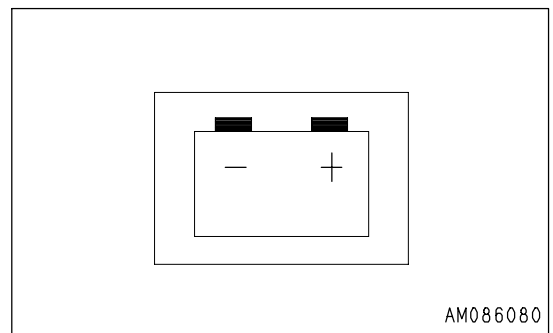
This meter (3) shows transmission lubrication oil temperature. The temperature is normal, if the needle remains in the green range while in operation. If the needle goes into the red range while operating, stop the machine and let the engine idle with middle rpm and wait until the needle drops to the green range.



**CHARGE LAMP**

This lamp (4) indicates a malfunction of the alternator. When the starting switch is turned ON, it will light up, but it should go out as the engine speed rises.

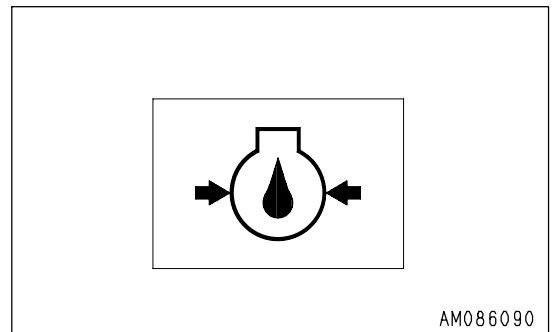
If the lamp lights up during operation, stop the engine and check the V-belt tension. If any abnormality is found, see "OTHER TROUBLE (PAGE 3-116)".



**ENGINE OIL PRESSURE CAUTION LAMP**

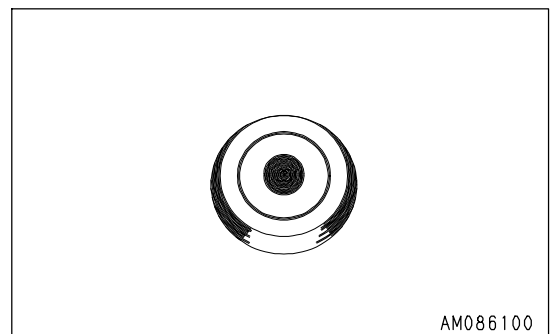
This lamp (5) warns that the engine lubricating oil pressure has dropped. When the starting switch is turned ON, it will light up. When the lamp goes off after the engine is started, the oil pressure is normal.

When the lamp lights up during operation, oil pressure is too low. Immediately stop the engine and look for the cause. For details, see "OTHER TROUBLE (PAGE 3-116)".



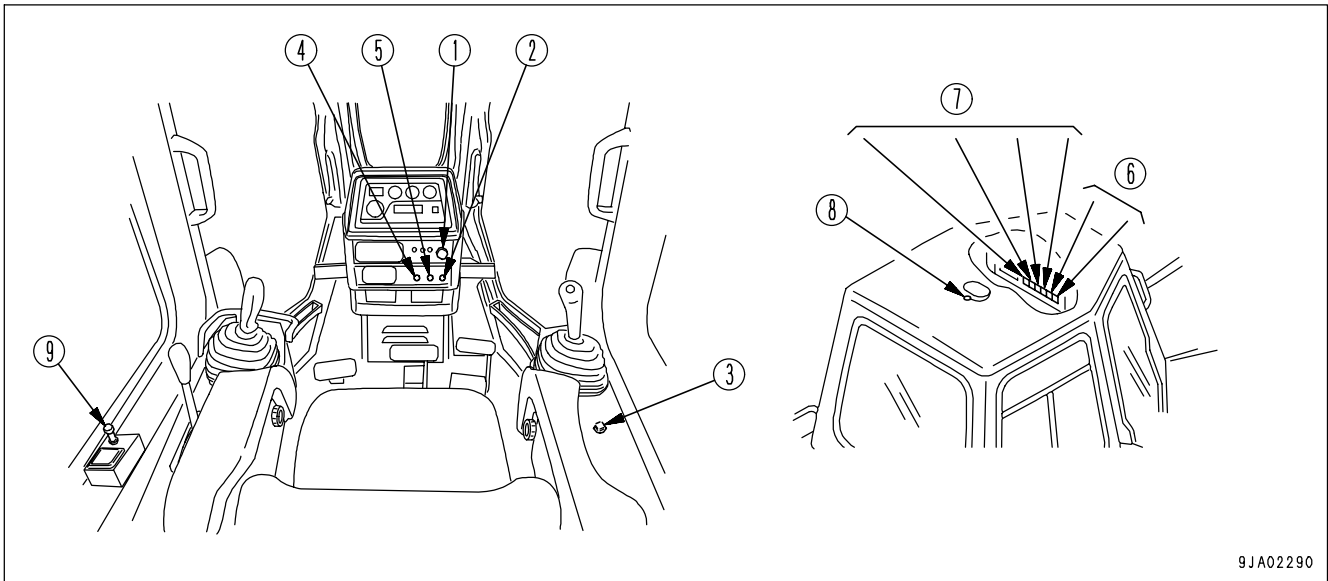
**GLOW SIGNAL**

This lamp (6) indicates that the electrical intake air heater is on. When preheating is carried out with the glow switch, the lamp will light up in approx. 15 to 45 seconds. The lamp goes out when the glow switch is released.



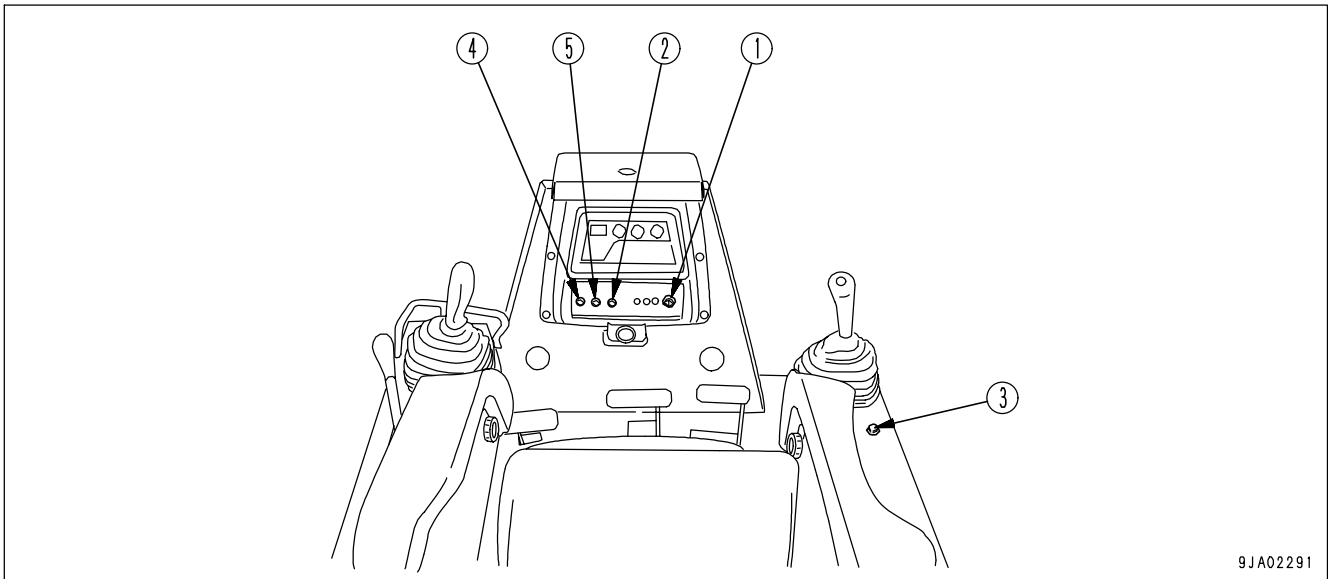
**SWITCHES**

Machine equipped with cab



9JA02290

Machine equipped with canopy



9JA02291

- |                      |   |
|----------------------|---|
| (1) Starting switch  | (6) Additional working lamp switch<br>(machine equipped with cab) (if equipped) |
| (2) Glow switch      | (7) Wiper switch (machine equipped with cab)                                    |
| (3) Horn switch      | (8) Room lamp switch (machine equipped with cab)                                |
| (4) Head lamp switch | (9) Cigarette lighter (machine equipped with cab)                               |
| (5) Rear lamp switch |   |

**STARTING SWITCH**

This switch (1) is used to start or stop the engine.

**OFF Position**

At this position, the starting switch key can be inserted or removed. When the switch is turned to this position, all the electric circuits are turned off and the engine stops.

Do not the starting swtich key at the OFF position while the engine is running.

**ON position**

In this position, electric current flows in the charging and lamp circuits.

Keep the starting switch key at the ON position while the engine is running.

**START position**

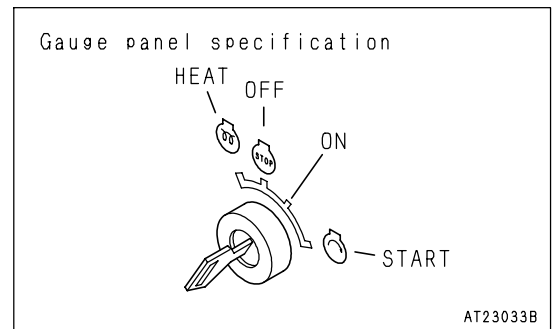
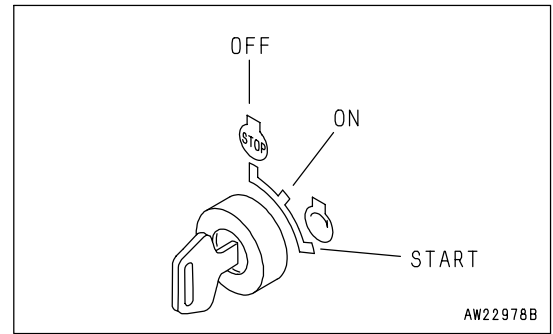
This is the position to start the engine. Hold the key at this position while cranking the engine. Release the key immediately after the engine has been started. The key will return to ON position when released.

**HEAT position (Gauge panel specification)**

Turn the starting switch key to the HEAT position when starting in cold weather.

If the key is held at the HEAT position, the electrical heater is heated and the glow signal lights up or glows red. If the glow signal flashes or glows red, release the key immediately.

When the key is released, it will return to OFF, so turn it immediately to the START position to start the engine.





**GLOW SWITCH**

(Monitor panel specification)

This switch (2) actuates the electrical heater to warm up the engine intake air.

OFF position: The preheating is not actuated.

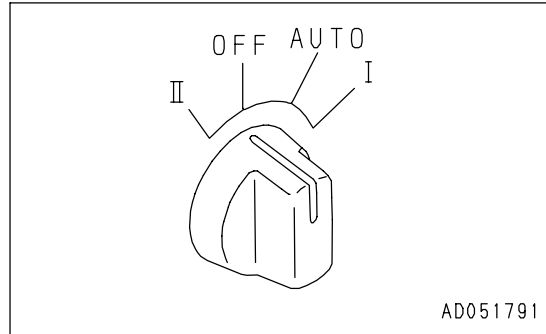
AUTO position: AUTO preheating is actuated. The length of the preheating time varies according to the ambient temperature when the ambient temperature is below approx. -5°C (9°F).

I position: This is used when AUTO preheating is not enough to start the engine in cold weather simply with the glow switch at the AUTO position.

When the switch is released, it will return to the AUTO position.

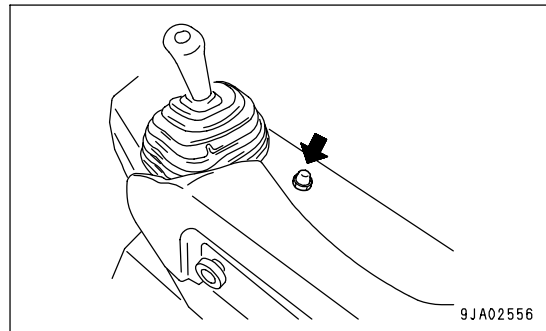
II position: This is used when carrying out preheating manually without using AUTO preheating.

When the switch is released, it will return to the OFF position.



**HORN SWITCH**

The horn sounds when the button (3) at the rear of the blade control lever at the right side of the operator's seat is pressed.

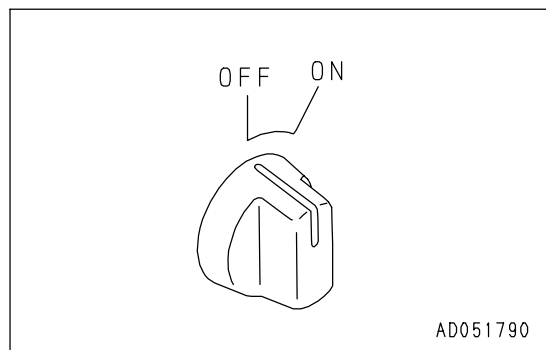


**HEAD LAMP SWITCH**

This switch (4) lights up the head lamps.

OFF position: Lamps are out

ON position: Lamps light up

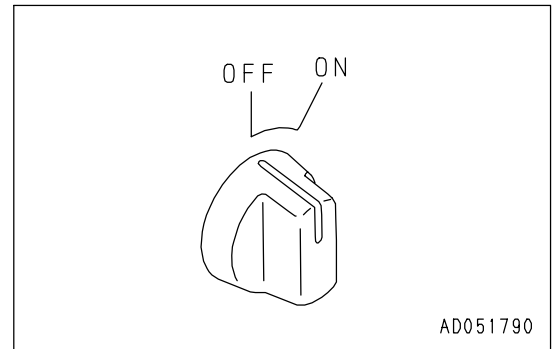


**REAR LAMP SWITCH**

This switch (5) lights up the rear lamps.

OFF position: Lamps are out

ON position: Lamps light up



**ADDITIONAL WORKING LAMP SWITCH**

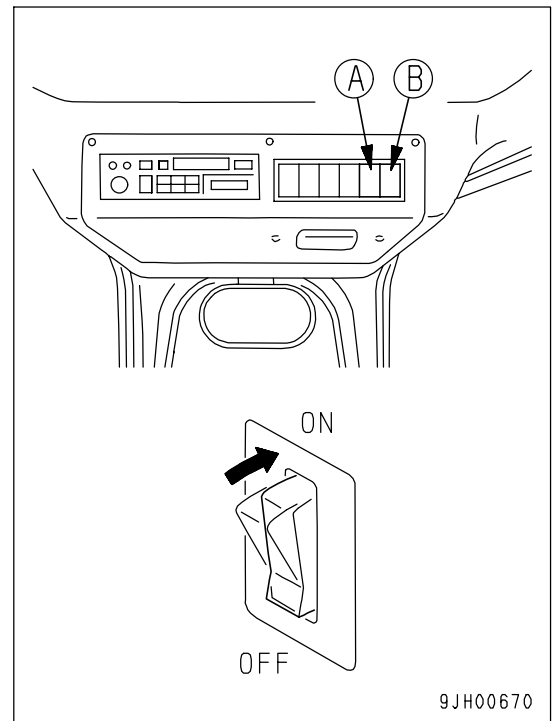
(Machine equipped with cab) (If equipped)

This switch (6) is used to turn on the additional working lamp.

(A) Head lamp switch

(B) Rear lamp switch

Push in the direction of the arrow to turn on the lamps.



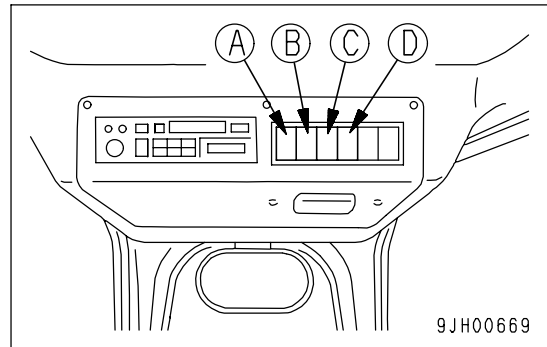
**WIPER SWITCH**

(Machine equipped with cab)

This switch (7) activates the wipers.

The wiper switches are as follows.

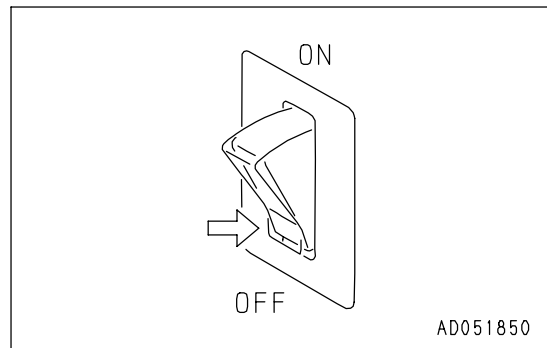
- (A) L.H. door
- (B) Front window
- (C) R.H. door
- (D) Rear window



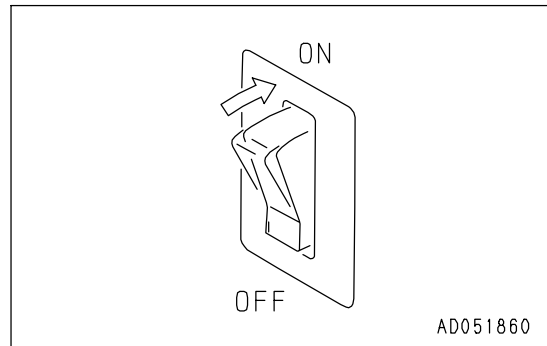
This is also used as the window washer switch.

The switch is operated as follows.

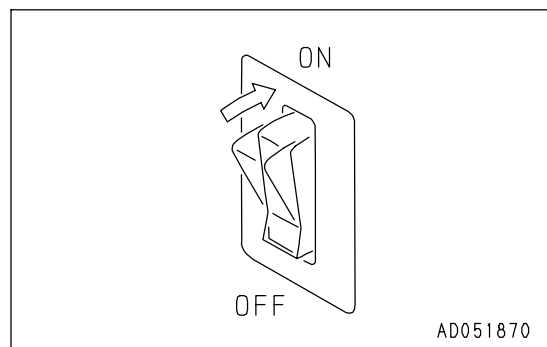
- Window washer only  
Keep the switch pressed to the OFF position to spray out water.



- Wiper only  
If this is switched on, the wiper will start.



- Wiper and window washer  
If this is kept pressed to the ON position while the wiper is working, water will be sprayed out.



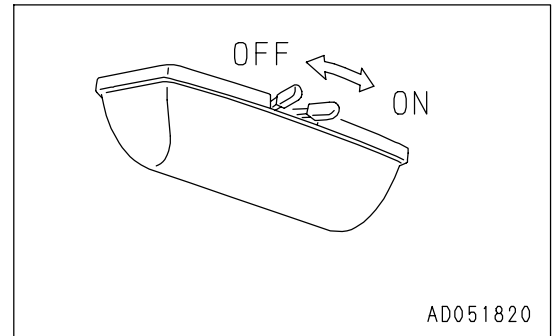
**ROOM LAMP SWITCH**

(Machine equipped with cab)

This lamp is used to turn on and off room lamp (8).

ON position: Lamp lights up

OFF position: Lamp is out

**CIGARETTE LIGHTER**

(Machine equipped with cab)

This lighter (9) is used to light cigarettes.

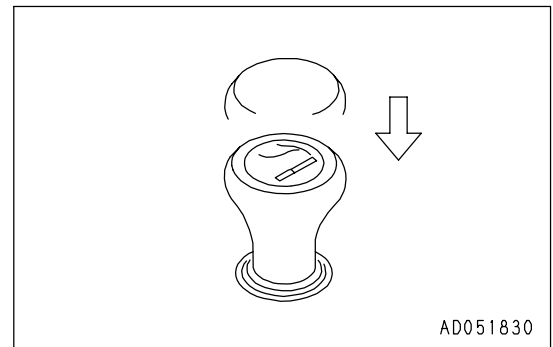
When the cigarette lighter is pushed in, it will return to its original position after a few seconds, so take it out to light your cigarette.

If the cigarette lighter is removed, the socket can be used as a power source.

**NOTICE**

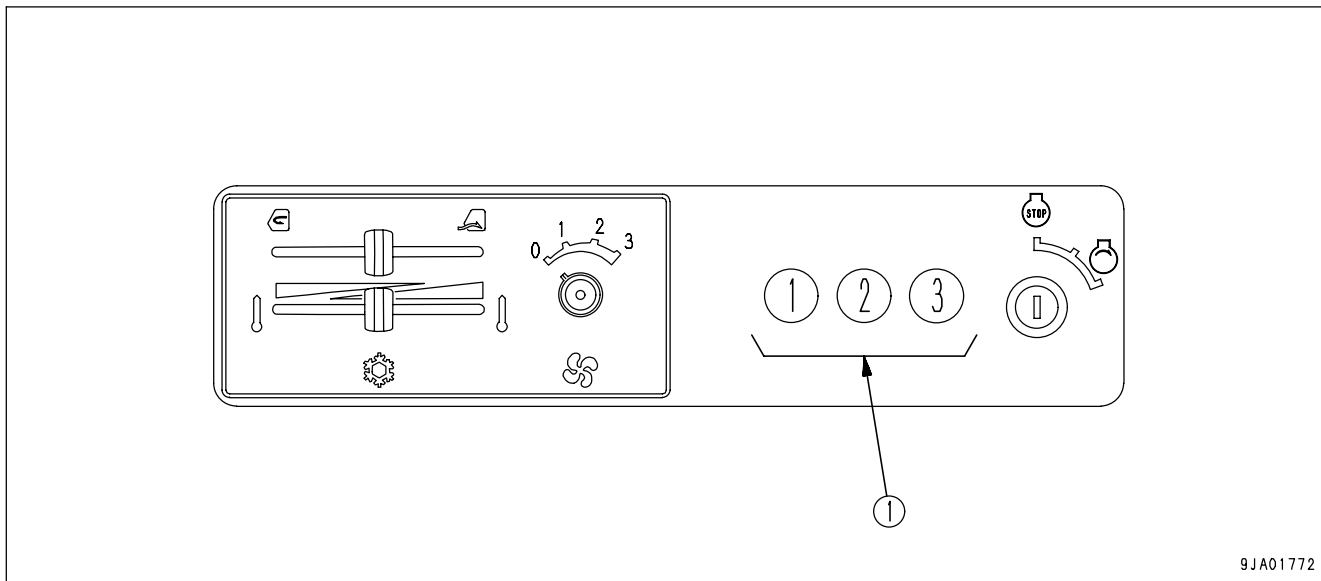
**This cigarette lighter is 24V. Do not use it as the power supply for 12V equipment. This will cause failure of the equipment.**

**The capacity of the cigarette lighter is 120W (24V x 5A).**



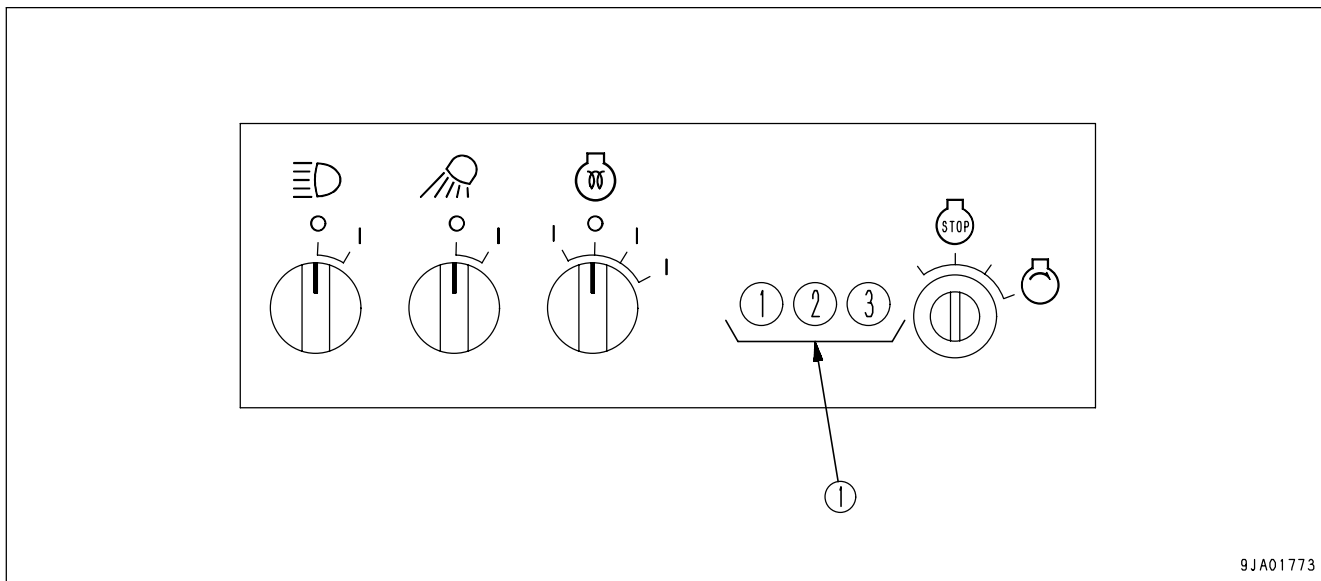
**LAMP**

Machine equipped with cab. Following illustration shows machine equipped with air conditioner.



9JA01772

Machine equipped with canopy



9JA01773

(1) Speed range display lamp

**SPEED RANGE DISPLAY LAMP**

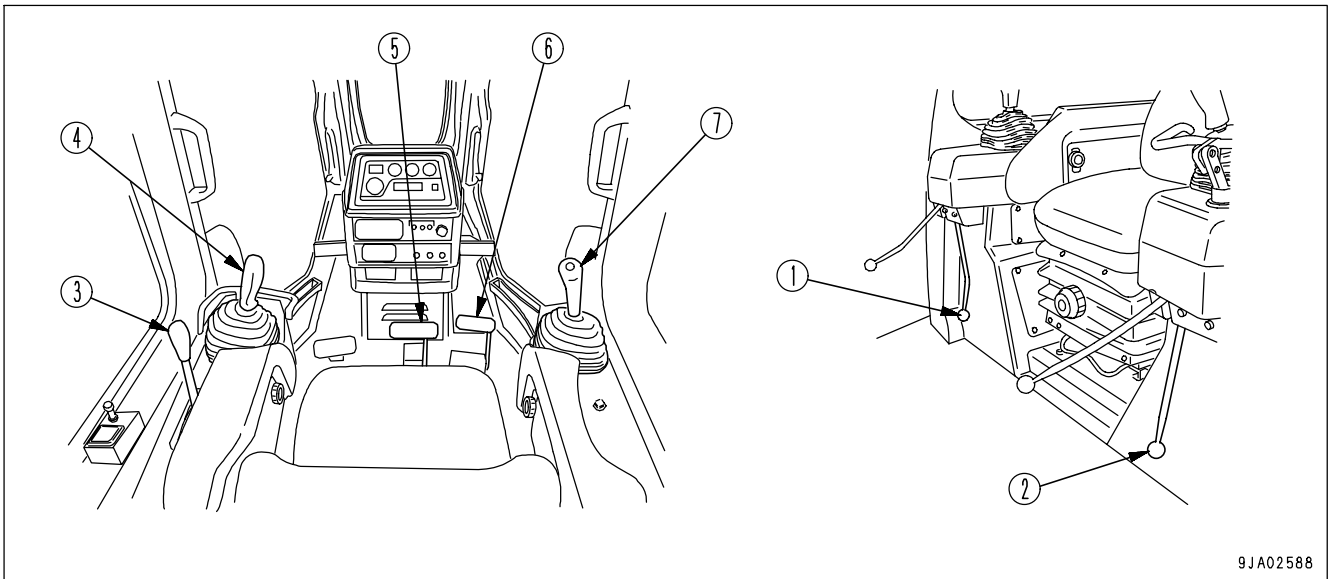
This lamp (1) indicates the currently selected gear speed range.

When lamp 1 lights up: 1st

When lamp 2 lights up: 2nd

When lamp 3 lights up: 3rd

## CONTROL LEVERS AND PEDALS



- |   |                         |
|---|-------------------------|
| (1) Work equipment lock lever                   | (5) Brake pedal         |
| (2) Parking brake lever                         | (6) Decelerator pedal   |
| (3) Fuel control lever                          | (7) Blade control lever |
| (4) Steering, forward-reverse, gear shift lever |                         |

## WORK EQUIPMENT LOCK LEVER

**WARNING**

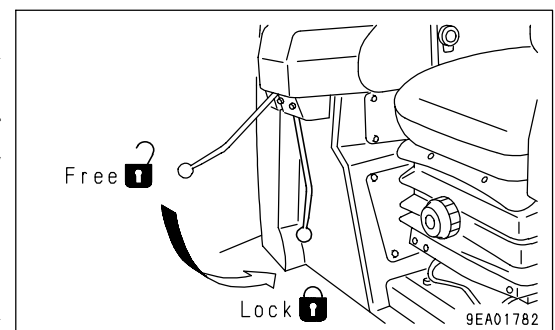
- When leaving the operator's compartment, set the work equipment lock lever securely to the LOCK position. If the work equipment lock lever is not at the LOCK position and the control levers are touched by mistake, it may lead to serious personal injury.
- If the work equipment lock lever is not set securely to the LOCK position, the work equipment may move and cause serious injury. Check that it is in the position shown in the diagram.
- When parking the machine or when carrying out maintenance, always lower the work equipment to the ground, then set the work equipment lock lever to the LOCK position.

This lever (1) is a lock device for the work equipment control levers. When it is set to the LOCK position, operation of the work equipment is locked.

If the lever is set to the LOCK position when the blade control lever is at the FLOAT position, the blade control lever automatically returns to the HOLD position.

**REMARK**

When starting the engine, to ensure safety, always set the work equipment lock lever to the LOCK position.



## PARKING BRAKE LEVER



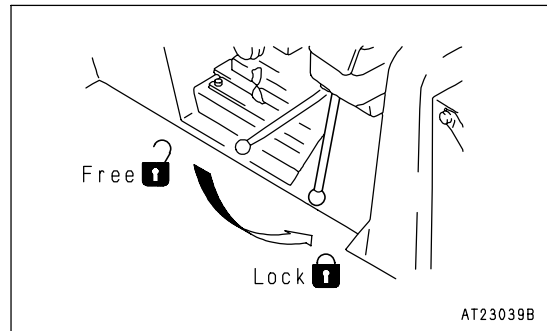
### WARNING

- When parking the machine, always set the parking brake lever in the LOCK position.
- If the parking brake lever is operated, the brake is applied, even when the machine is traveling.  
The machine will suddenly stop, so this is dangerous. For this reason, do not operate the parking brake lever when the machine is moving, except in emergencies.

This lever (2) operates the parking brake. The parking brake is applied when it is in the LOCK position.

### REMARK

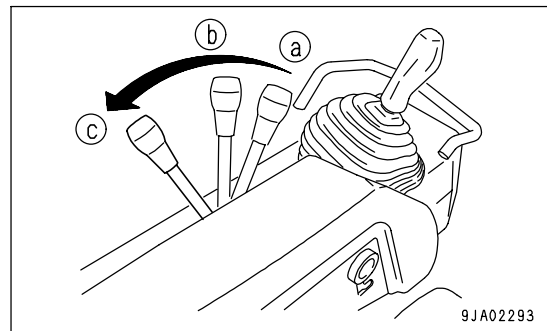
- Before moving the parking brake lever to the LOCK position, return the steering, forward-reverse, gear shift lever to the NEUTRAL position.
- When starting the engine, if the parking brake lever is not in the LOCK position, the limit switch is actuated and it is impossible to start the engine.



## FUEL CONTROL LEVER

This lever (3) is used to control the engine speed and output.

- Engine stop position: Push the lever forward fully.
- Low idling position: Pull the lever from engine stop position (a) until you feel the operating force falls off.
- High idling position: Pull the lever fully from low idling position (b).



**STEERING, FORWARD-REVERSE, GEAR SHIFT LEVER**

This lever (4) is used to select the direction of travel, to shift gear, and to steer the machine.

• **Forward-reverse shifting**

Position (a): FORWARD

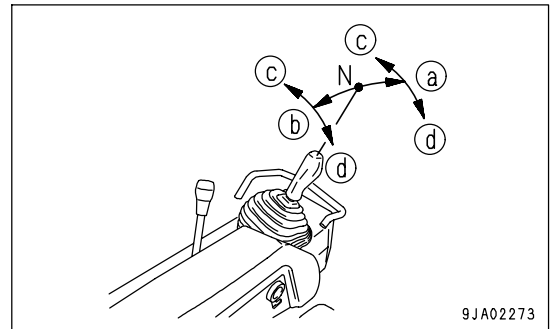
Position (b): REVERSE

Position N: NEUTRAL

• **Steering**

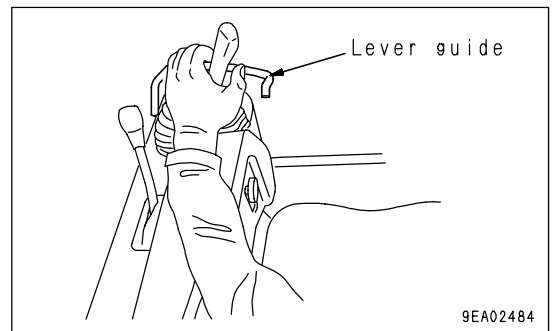
Position (c): LEFT TURN

Position (d): RIGHT TURN



9JA02273

If the lever is set in the forward or reverse travel position and moved to the left or right, the machine will turn in the direction that the lever is moved. The turning radius changes according to the amount that the lever is moved. If the lever is moved fully to the left or right, the turning radius will become smaller.



9EA02484

**REMARK**

- When the joystick is released during the steering operation, it returns to position (a) or position (b).
- When the hand is steadied with the lever guide during the steering operation, a sharper turn can be achieved.

• **Gear shifting**

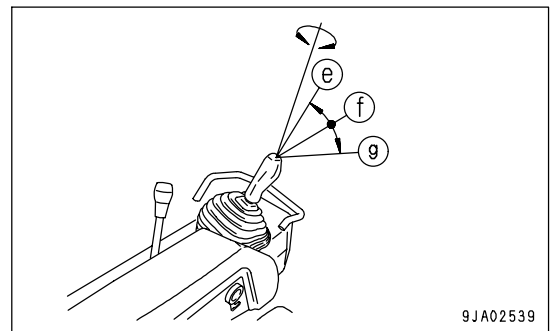
Rotate joystick 30° to carry out gear shifting operation.

Position (e): 1st

Position (f): 2nd

Position (g): 3rd

For details of the maximum speed at each speed range, see "SPECIFICATIONS (PAGE 5-2)".



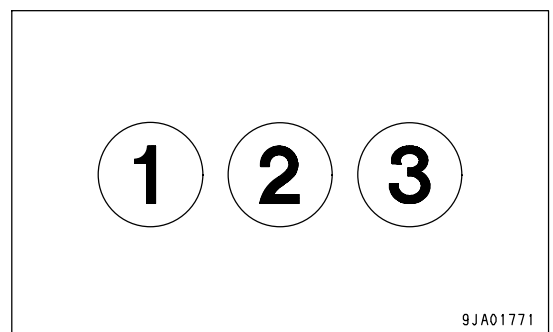
9JA02539

As the gear is shifted, one of the gear speed lamps on the front panel lights up.

1st: Lamp 1 lights up.

2nd: Lamp 2 lights up.

3rd: Lamp 3 lights up.



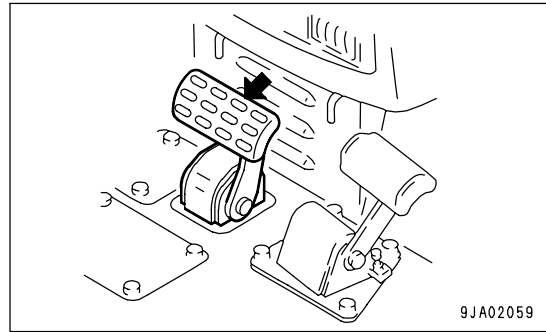
9JA01771



**BRAKE PEDAL****WARNING**

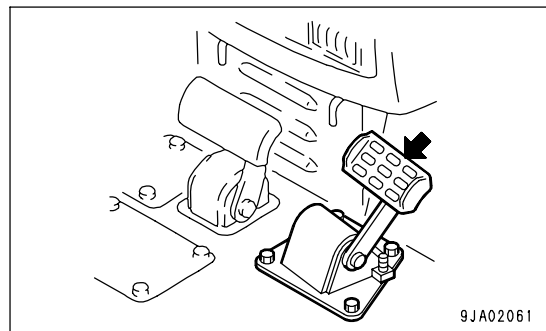
Do not place your foot on this pedal unnecessarily.

If this pedal (5) is depressed, the left and right brakes are applied simultaneously.

**DECELERATOR PEDAL****WARNING**

- Do not place your foot on this pedal unnecessarily.
- When passing over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, so there is danger that the travel speed will also increase suddenly. To prevent this, depress the decelerator pedal to reduce the travel speed.

This pedal (6) is used when reducing the engine speed. When switching between forward and reverse, or when stopping the machine, use this pedal to reduce speed.

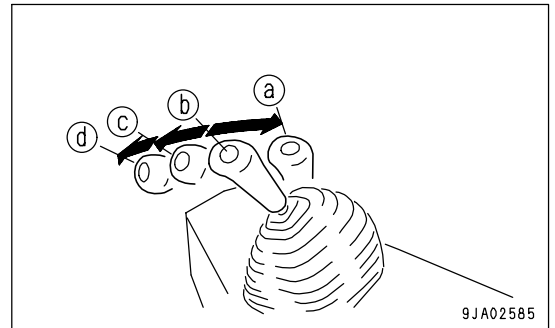


**BLADE CONTROL LEVER**

**POWER TILTDOZER**

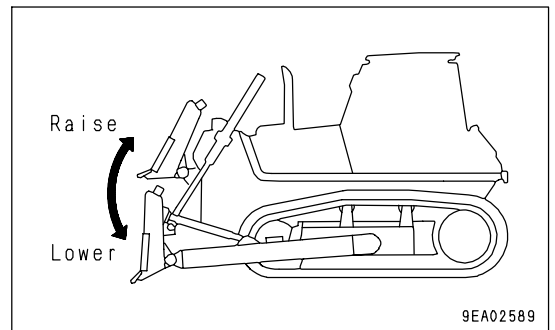
This lever (7) is used to lift or tilt the blade.

- Lifting control
- (a) RAISE:
- (b) HOLD: Blade is stopped and held in this position.
- (c) LOWER:
- (d) FLOAT: Blade will move freely according to external force.

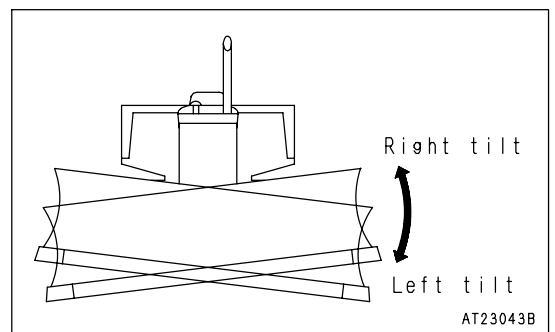
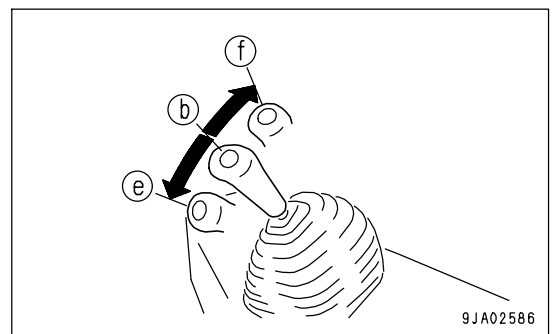


**REMARK**

- When the control lever is at the FLOAT position and it is released, it does not automatically return to HOLD, so return it by hand.
- If the engine is stopped when the control lever is at the FLOAT position, it returns automatically to the HOLD position.
- When starting the engine, check that the blade control lever is at the HOLD position.
- In cold temperatures, it takes a short time until the blade control lever is held at the FLOAT position, so hold the control lever in position by hand for at least 1 second.



- Tilting control
- (b) HOLD: Blade is stopped and held in this position.
- (e) LEFT TILT
- (f) RIGHT TILT

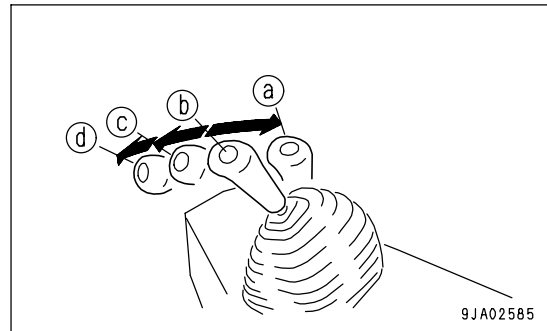


**POWERTILT POWER PITCHDOZER**

This lever (7) is used to lift or tilt and pitch the blade.

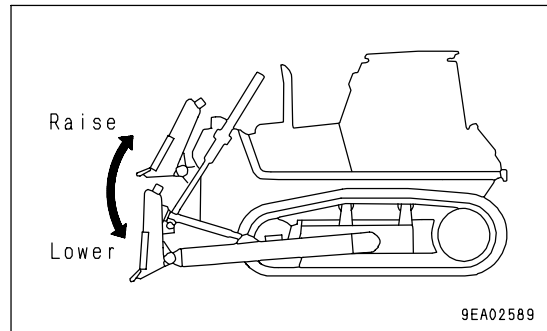
- Lifting control

- (a) RAISE:
- (b) HOLD: Blade is stopped and held in this position.
- (c) LOWER:
- (d) FLOAT: Blade will move freely according to external force.



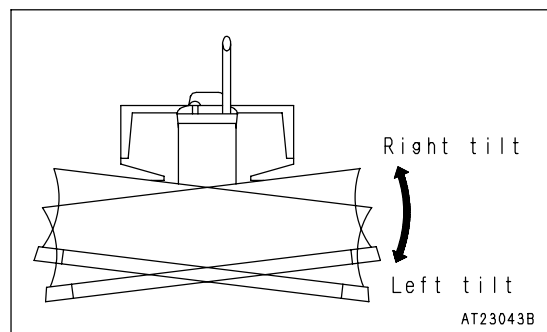
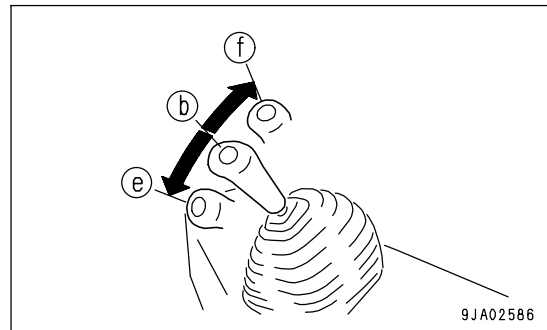
**REMARK**

- When the control lever is at the FLOAT position and it is released, it does not automatically return to HOLD, so return it by hand.
- If the engine is stopped when the control lever is at the FLOAT position, it returns automatically to the HOLD position.
- When starting the engine, check that the blade control lever is at the HOLD position.
- In cold temperatures, it takes a short time until the blade control lever is held at the FLOAT position, so hold the control lever in position by hand for at least 1 second.



- Tilting control

- (b) HOLD: Blade is stopped and held in this position.
- (e) LEFT TILT
- (f) RIGHT TILT



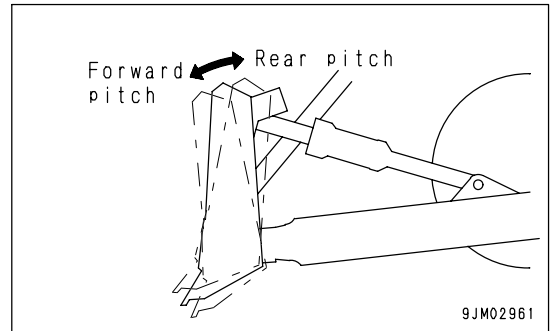
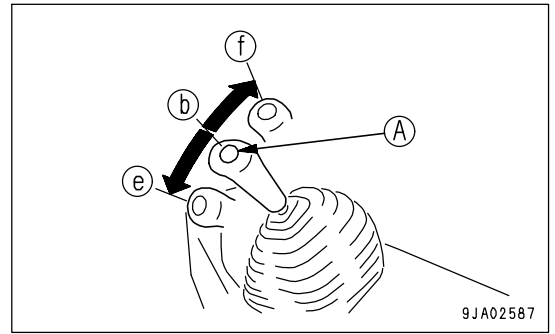
• Pitch control

First set the lever to the neutral position, then keep switch (A) in the center of the knob pushed down and carry out the tilt operation to change the cutting angle of the blade.

(b) HOLD: Blade is stopped and held in this position.

(e) REAR PITCH: Min. digging angle

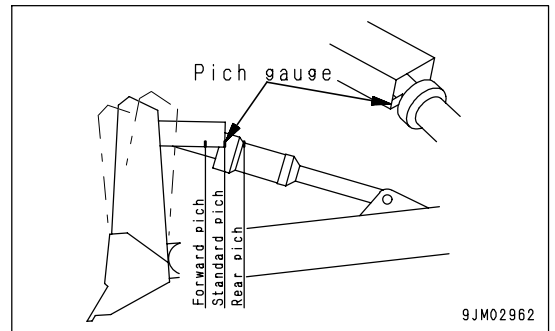
(f) FORWARD PITCH: Max. digging angle



• Precautions when using pitch control

When using the pitch operation, the tilt operation changes as follows.

| Pitch condition    | Tilt operation                                   | Amount of tilt  |
|--------------------|--|---|
| Max. forward pitch | Only left tilt operation is possible             | Max. 890 mm (35.1 in)   |
| Forward pitch      | Both left and right tilt operations are possible | Compared with standard:<br>LEFT tilt is LARGER<br>RIGHT tilt is SMALLER |
| Standard pitch     |  | 460 mm (18.1 in)<br>(both left and right)                               |
| Rear pitch         |  | Compared with standard:<br>LEFT tilt is SMALLER<br>RIGHT tilt is LARGER |
| Max. rear pitch    | Only right tilt operation is possible            | Max. 890 mm (35.1 in)   |



**ANGLE DOZER**

This lever (7) is used to raise the blade.

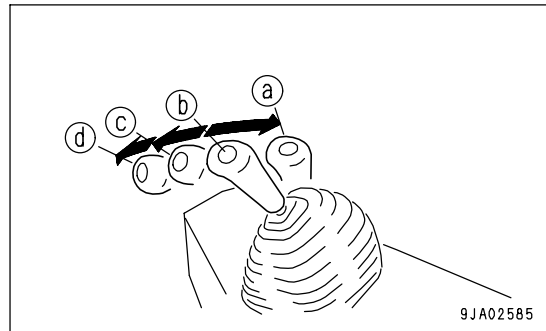
- Lifting control

(a) RAISE:

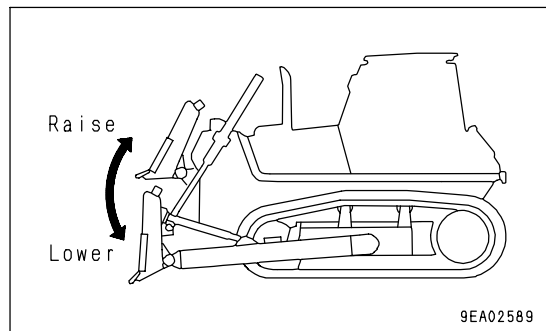
(b) HOLD: Blade is stopped and held in this position.

(c) LOWER:

(d) FLOAT: Blade will move freely according to external force.

**REMARK**

- When the control lever is at the FLOAT position and it is released, it does not automatically return to HOLD, so return it by hand.
- If the engine is stopped when the control lever is at the FLOAT position, it returns automatically to the HOLD position.
- When starting the engine, check that the blade control lever is at the HOLD position.
- In cold temperatures, it takes a short time until the blade control lever is held at the FLOAT position, so hold the control lever in position by hand for at least 1 second.



## FUSE

### NOTICE

Before replacing a fuse, be sure to turn starting switch to the OFF position.

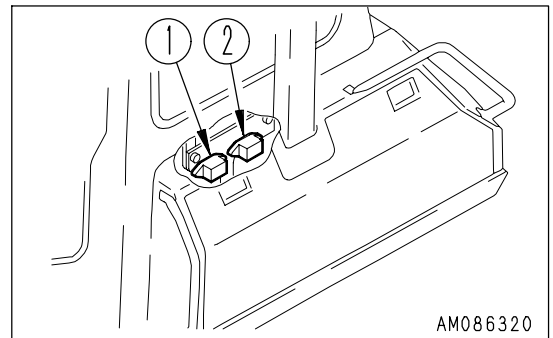
The fuses protect the electrical equipment and wiring from burning out.

If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace the fuse with another of the same capacity.

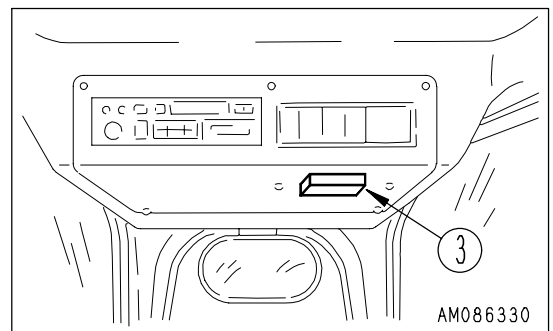
- Chassis

Fuse boxes (1) and (2) are installed under the battery cover.



- Cab (machines equipped with cab)

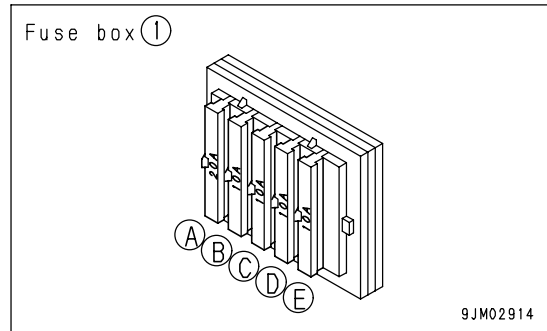
Fuse box (3) is installed at the bottom of the overhead panel.



**FUSE CAPACITY AND CIRCUIT NAME**

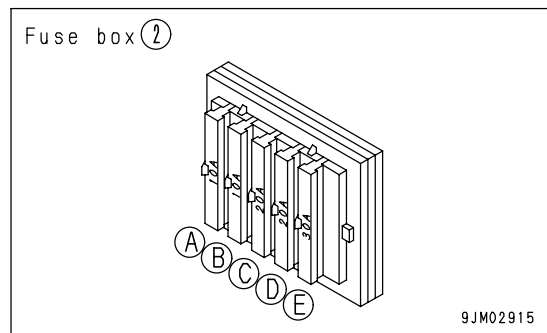
Fuse box (1)

| No. | Fuse Capacity | Circuit Name                  |
|-----|---------------|-------------------------------|
| (A) | 20A           | Front lamp, rear working lamp |
| (B) | 10A           | Chassis power source          |
| (C) | 10A           | Engine control system         |
| (D) | 10A           | Horn                          |
| (E) | 10A           | Backup alarm                  |



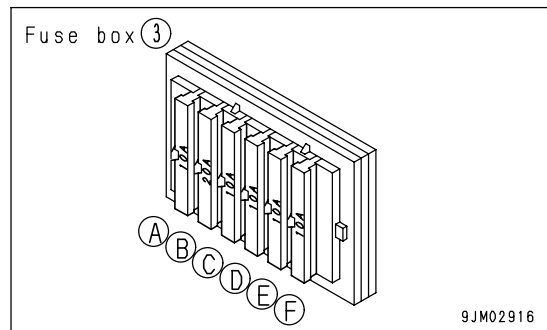
Fuse box (2)

| No. | Fuse Capacity | Circuit Name          |
|-----|---------------|-----------------------|
| (A) | 10A           | Cab radio             |
| (B) | 10A           | Power pitch switching |
| (C) | 20A           | Air Conditioner       |
| (D) | 20A           | Spare power source    |
| (E) | 10A           | Chassis power source  |



Fuse box (3) (Machine equipped with cab)

| No. | Fuse Capacity | Circuit Name                   |
|-----|---------------|--------------------------------|
| (A) | 10A           | Radio memory                   |
| (B) | 20A           | Radio, lamp, cigarette lighter |
| (C) | 10A           | Rear window windshield wiper   |
| (D) | 10A           | Right door windshield wiper    |
| (E) | 10A           | Front window windshield wiper  |
| (F) | 10A           | Left door windshield wiper     |

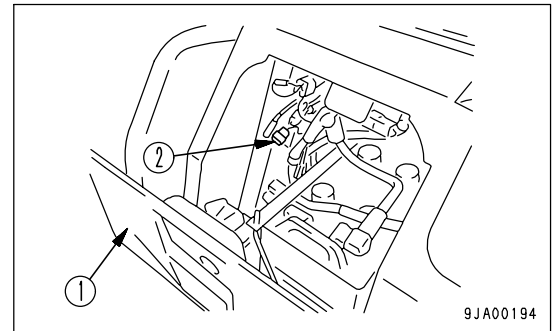


## ELECTRIC POWER TAKE-OUT ADAPTER

### NOTICE

- Do not use as a power supply for 12V equipment.  
This will cause failure of the equipment.
- When using as a power supply pickup, do not install equipment which exceeds 120W (24V x 5A).

1. Open battery cover (1) on the left side of the machine.
2. A connector for power source for extra-electrical equipment is provided, so take it out for use, as required. (A single terminal type connector, CN24 (2), is provided for use)  
This connector, CN24 (2), is fastened to the main wiring harness with a band. Unfasten the band when using it and fasten it again with a tape after use.  
Connector capacity: 480W (24V x 20A)



### Machine equipped with cab

An operator's cab, if installed, has a cigarette lighter, which may be used as another power source.  
Maximum usable electric power is 120W (24V x 5A).

### REMARK

- Ground the negative wire to the body work or ROPS. Do not ground it to the rubber mounted engine or valves. This will cause failures.
- If the wire is grounded to a point where there is still paint, the electricity will not flow smoothly, so remove the paint.

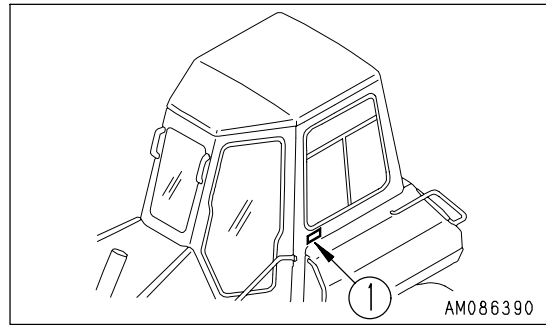


### DOOR - OPEN LOCK

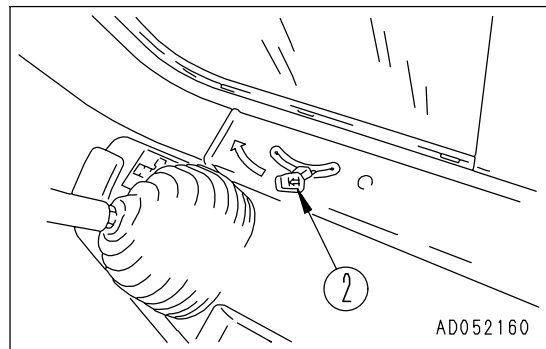
(Machine equipped with cab)

Use this when you want to keep the door held open.

1. Push the door against the door catch (1). The door will be held by the door catch.



2. To release the door, move lever (2) inside the cab to the front of the cab. This will release the catch.



**NOTICE**

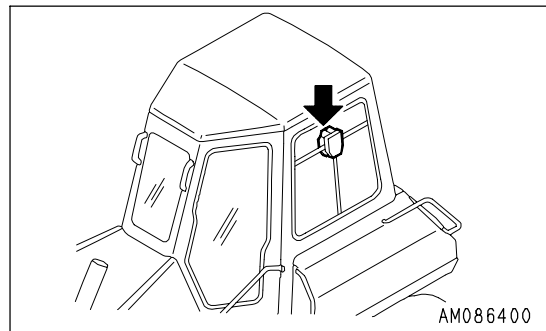
- When keeping the door open, fix it securely to the catch.
- Always close the door when traveling or carrying out operations. Leaving the door open will cause the door to break.
- Keep the door locked open securely. The door may swing closed because of the vibration.

### SASH GLASS INTERMEDIATE LOCK

(Machine equipped with cab)

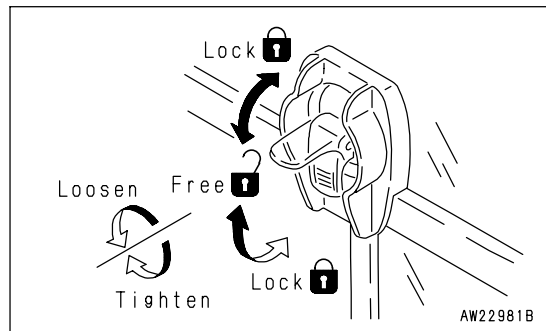
When working with the cab sash glass open, use this lock to prevent the glass from chattering.

- When the lever is in the FREE position, the glass can be opened or closed.
- When the lever is moved to the LOCK (up or down) position, the glass is fixed in position.
- If the glass is not held securely, set the lever in the FREE position and rotate clockwise to strengthen the holding power.
- To reduce the holding power, turn counterclockwise.



**NOTICE**

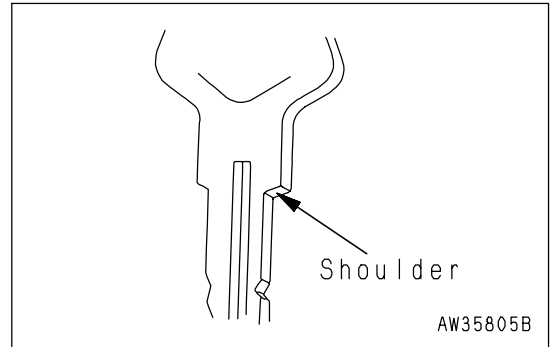
Always close the window when traveling or carrying out operations. Leaving the window open will cause the window to break.



## CAP, COVER WITH LOCK

Use the starting switch key to open and close the caps and covers. For their locations, see "LOCKING (PAGE 3-97)".

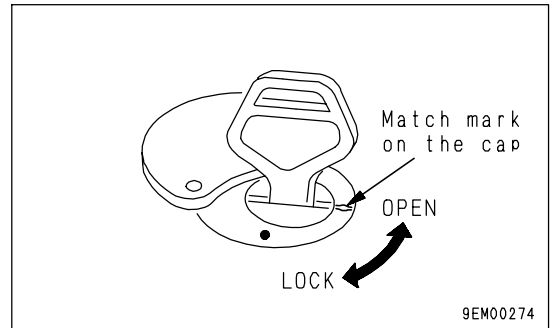
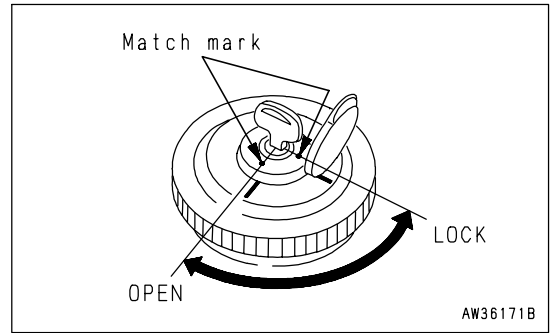
Insert the key as far as it will go to the shoulder. If the key is turned before it is inserted all the way, it may break.



## METHOD OF OPENING AND CLOSING CAP WITH LOCK

### TO OPEN THE CAP

1. Insert the key into the key slot.
2. Turn the key in the OPEN direction, align the key slot with the counter mark on the cap, then open the cap.



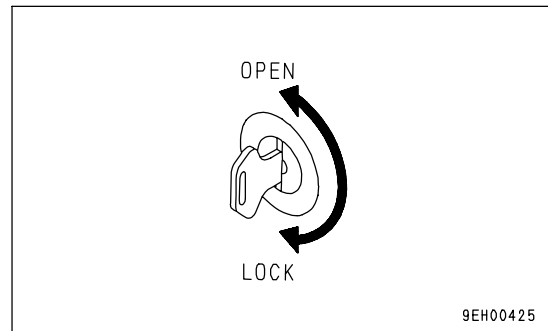
### TO LOCK THE CAP

1. Turn the cap until tight, then insert the key into the key slot.
2. Turn the key in the LOCK direction and take out the key.

## METHOD OF OPENING AND CLOSING COVER WITH LOCK

### TO OPEN THE COVER (LOCKED COVER)

1. Insert the key into the key slot.
2. Turn the key counterclockwise and open the cover by pulling the cover grip.



### TO LOCK THE COVER

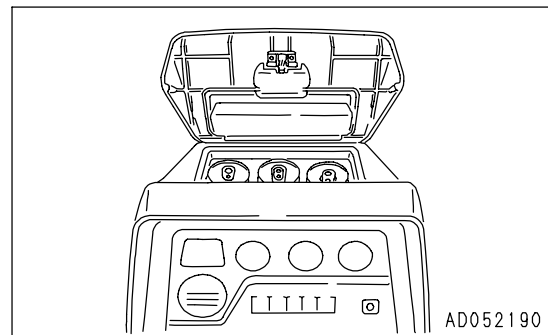
1. Close the cover and insert the key into the key slot.
2. Turn the key clockwise and take the key out.

## HOT AND COOL BOX

(Machine equipped with cab)

This is at the top of the front panel. It can be used to warm or cool three canned drinks.

This is interconnected with the air conditioner: During heating, it warms up the drinks; during cooling, it cools the drinks.



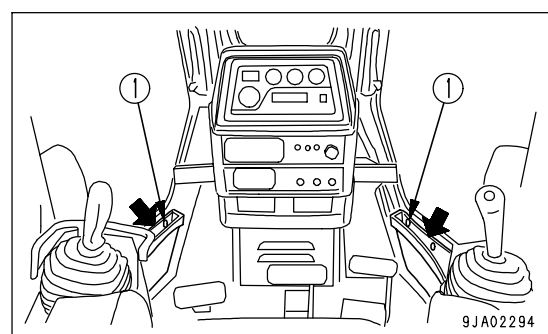
## DOOR POCKET

Machine equipped with cab

These are on the inside of the left and right doors, and can be used for keeping things or Operation & Maintenance manual.

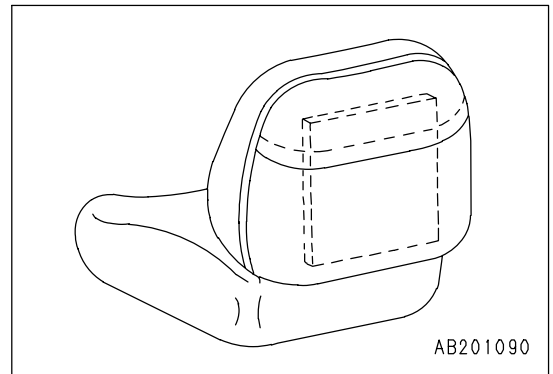
However, do not put tools or other heavy objects in the pocket.

If the pocket becomes dirty, turn three clips (1), remove the pocket and wash it.



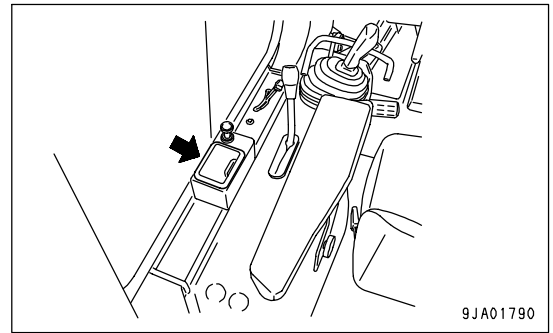
**Machine not equipment with cab**

There is a pocket on the back of the operator's seat.  
Keep the Operation & Maintenance manual in this pocket so that the operator can read it whenever necessary.

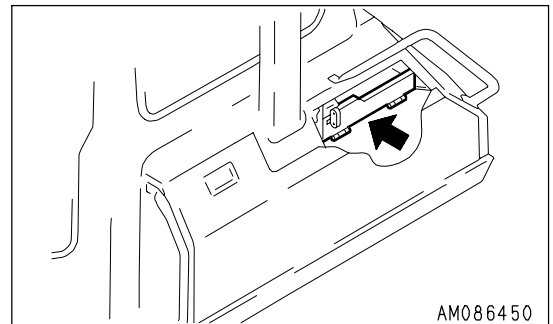
**ASHTRAY**

(Machine equipped with cab)

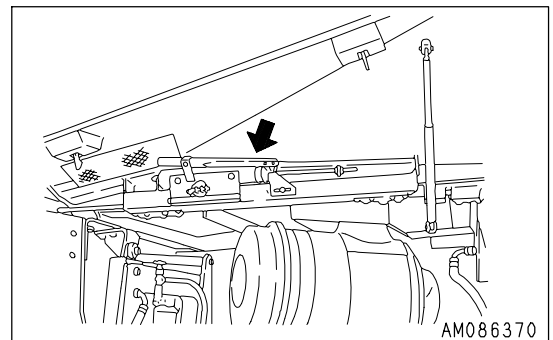
This is on the left side of the operator's seat.  
Always make sure that you extinguish the cigarette before closing the lid.

**TOOL BOX**

The tool box is inside the battery check cover at the rear left.  
Keep the tools in this box.

**GREASE PUMP HOLDER**

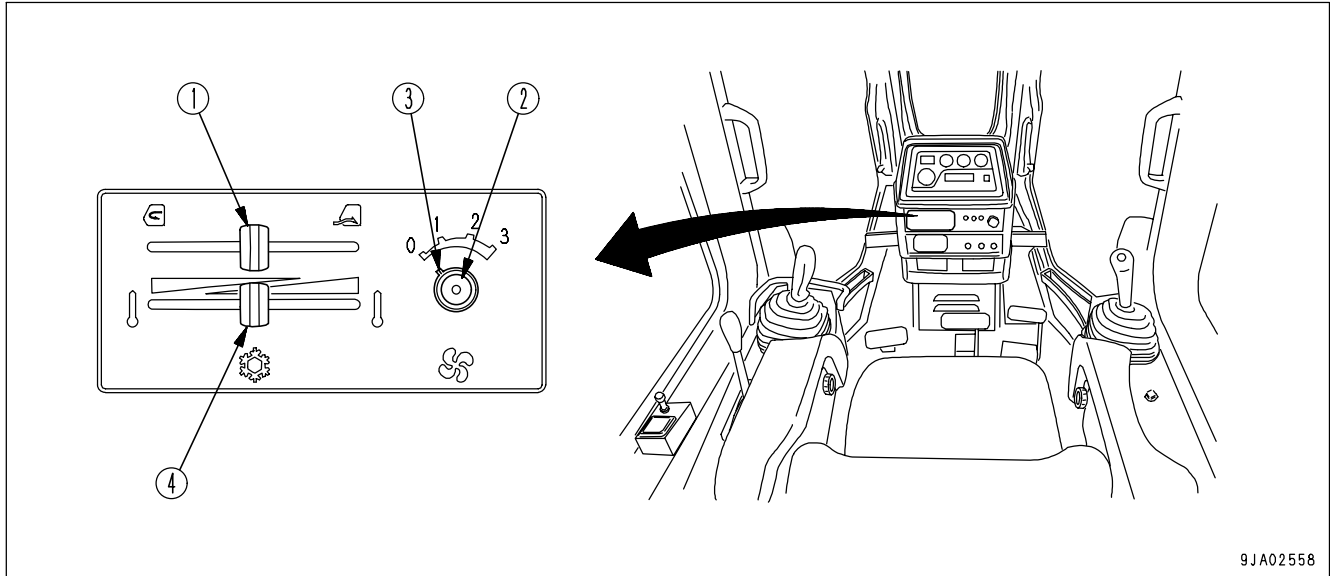
This is inside the left engine side cover.  
Fit the grease pump to the holder when it is not being used.



### AIR CONDITIONER, HANDLING

(Machine equipped with cab)

### EXPLANATION OF PARTS



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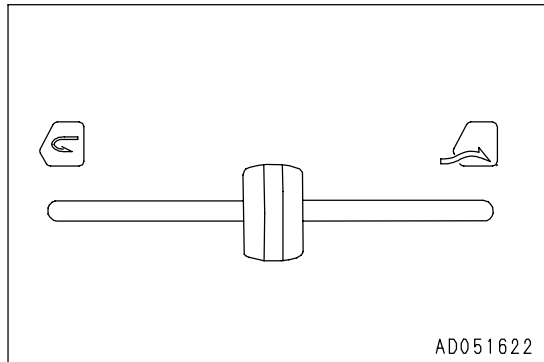
- (1) FRESH/RECIRC selector lever
- (2) Air conditioner switch

- (3) Blower switch
- (4) Temperature control lever

#### FRESH/RECIRC SELECTOR LEVER

This lever (1) changes the air intake port used when cooling or heating.

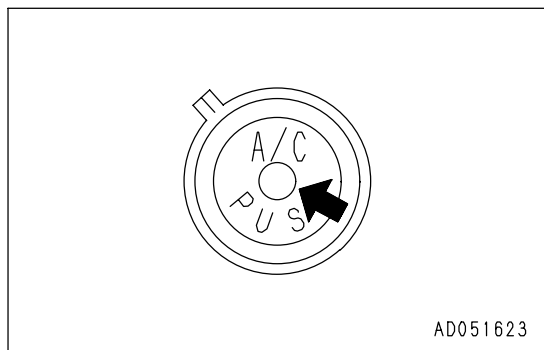
- RECIRC: If lever (1) is shifted to the left, the air conditioner sucks inside air. Set the lever to this position to cool or heat strongly. Ventilation or pressurizing function is not applied at this position.
- FRESH: If lever (1) is shifted to the right, the air conditioner sucks outside air. Set the lever to this position for normal cooling or heating. In this position, the cab is ventilated. It is also pressurized to prevent entry of dust.



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#### AIR CONDITIONER SWITCH

When the switch (2) is pressed and the blue lamp lights up, the cooling function is actuated. Use this switch for cooling or dehumidifying.

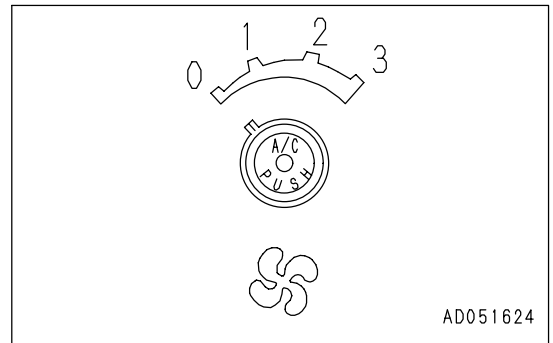


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**BLOWER SWITCH**

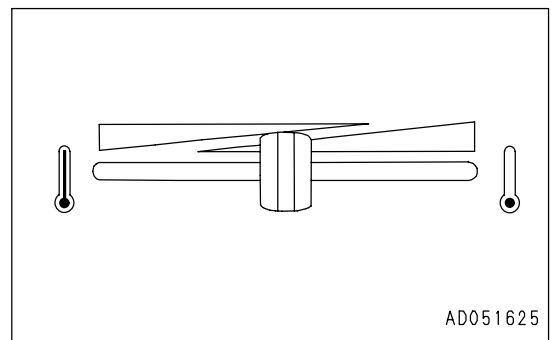
This switch (3) acts as the wind flow control switch and main switch when cooling or heating.

- The air flow can be set to three stages:  
1 (LOW) → 2 (MEDIUM) → 3 (HIGH).
- If the switch is set to 0, the power is switched off and the air conditioner stops.

**TEMPERATURE CONTROL LEVER**

This lever (4) is used to control the temperature for cooling or heating.

- When the temperature control lever is moved to the right, the temperature of the air coming from the vents becomes lower. (The water valve is closed and the heating function is stopped.)
- When the temperature control lever is moved to the left, the temperature of the air coming from the vents becomes higher. (The water valve is opened and the heating function is started.)



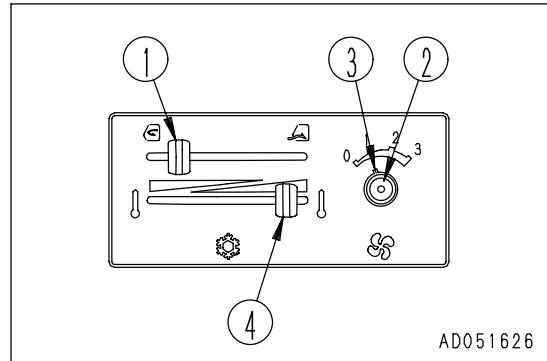
## COOLING OPERATION

When the cooling operation is carried out, the inside of the cab is cooled, and at the same time the drinks inside the hot and cool box can be cooled.

### COOLING (RECIRC)

When the control switch and lever are operated as shown in the diagram, a cool breeze is sent out. Use this position when strong cooling is needed.

- Press switch (2).
- Place levers (1) and (4) in the position shown in the diagram.
- Set switch (3) to the desired position.

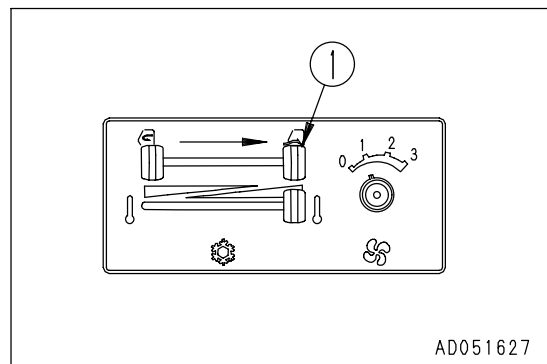


### COOLING (FRESH)

If the air inside the cab is no longer fresh, set FRESH/RECIRC selector lever (1) to FRESH to bring in fresh air. Keep the other switches at the same positions as for cooling (RECIRC). In this position, the inside of the cab is pressurized to prevent the entry of dust.

#### REMARK

If the cooling effect is reduced, set FRESH/RECIRC selector lever(1) to RECIRC again. This increases the cooling effect.



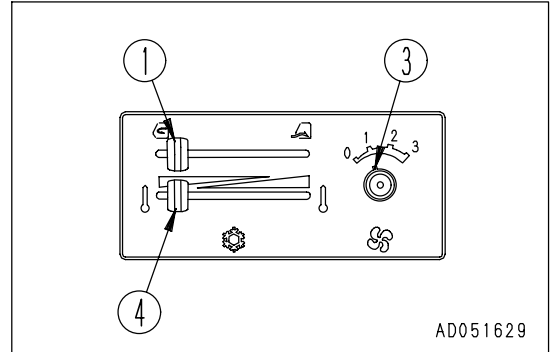
**HEATING OPERATION**

When the heating operation is carried out, the inside of the cab is heated, and at the same time the drinks inside the hot and cool box can be heated.

**HEATING (RECIRC)**

When the control switch and lever are operated as shown in the diagram, warm air is sent out. Use this position when strong cooling is needed.

- Place levers (1) and (4) in the position shown in the diagram.
- Set switch (3) to the desired position.

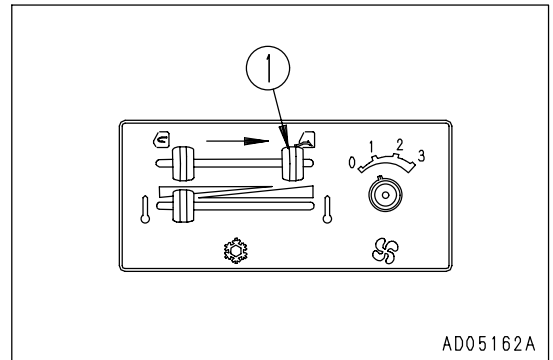


**HEATING (FRESH)**

If the air inside the cab is no longer fresh, set FRESH/RECIRC selector lever (1) to FRESH to bring in fresh air. Keep the other switches at the same positions as for cooling (RECIRC). In this position, the inside of the cab is pressurized to prevent the entry of dust.

**REMARK**

If the cab is not heated up sufficiently, turn FRESH/RECIRC selector lever (1) back to RECIRC. This increases the heating effect.



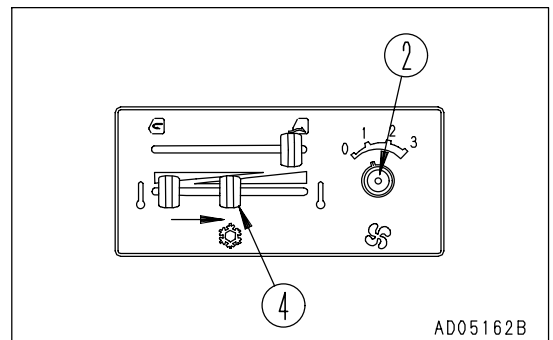
**DEHUMIDIFYING AND HEATING**

Push switch (2). When temperature control lever (4) is placed at the central position, dry warm air blows out.

Keep the other switches at the same positions as for heating (FRESH).

**REMARK**

If this is used in spring and fall on rainy days when the air inside the cab is damp, there is no problem of the windows misting up, and the cab be warmed up to a comfortable temperature.



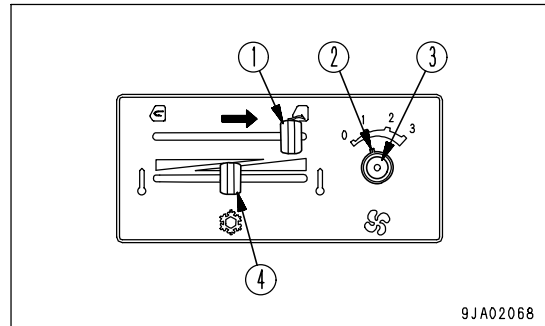


## PREVENTION METHOD OF ENTRY OF DUST

Entry of dust into the cab can be prevented by starting the blower fan for the air conditioner to raise the pressure in the cab a little higher than outside.

When working in a dusty job site or when preventing dust from entering the cab, use this function.

- Close the windows and doors.
- Set lever (1) to the FRESH position.
- Press swith (2).
- Set switch (3) to the desired position. Set lever (4) to the desired position.



## PRECAUTION WHEN USING AIR CONDITIONER

### CARRY OUT VENTILATION FROM TIME TO TIME WHEN USING THE COOLER

- If you smoke when the cooler is on, the smoke may start to hurt your eyes, so turn the lever to FRESH to remove the smoke while continuing the cooling.
- When the air conditioner is used for long periods, carry out ventilation once every hour.

### BE CAREFUL NOT TO MAKE THE TEMPERATURE IN THE CAB TOO LOW

- When the cooler is on, set the temperature so that it feels slightly cool when entering the cab (5 to 6°C (9 to 10.8 °F) lower than the outside temperature). This temperature difference is considered to be the most suitable for your health, so always be careful to adjust the temperature properly.

### DIRECTION OF VENTS WHEN COOLING

- If the vents (left and right) in the middle of the dashboard are turned so that cold air plays directly on the cab door glass, moisture may condense on the outside of the cab door glass and reduce the visibility. (This occurs particularly in high temperatures.)

If this happens, turn the vent fully to the rear and raise the air conditioner temperature setting slightly.

## INSPECTION DURING OFF-SEASON

Even during the off-season, run the compressor at low speed for several minutes once a week to prevent the loss of the oil film on the lubricated parts of the compressor. (Run the engine at low speed and set the temperature control lever to the central position.)

### REMARK

When the ambient temperature is low, if the compressor is suddenly run at high speed, it may cause failure of the compressor. Note that the system is set so that the compressor will not run when the cooler switch is turned on, if the ambient temperature is less than 2 to 6.5°C (35.6 to 43.7°F).

**PROCEDURE FOR REPLACING RECEIVER**

Replace the receiver once every 2 years.

After replacing the receiver, add compressor oil. Turn the receiver at an angle and measure the oil remaining inside the receiver, then add the same amount of oil (Denso Oil 6) to fill the receiver.

**REMARK**

- Depending on the condition of use, the replacement interval may be shorter.
- If the receiver is used when the desiccant has exceeded the water absorption limit, the refrigerant circuit may become clogged and cause failure of the compressor.

**PRECAUTIONS WHEN REPLACING RECEIVER**

- If the receiver is left for more than 15 minutes with the blind cover removed, the moisture in the air will be absorbed, and this will reduce the life of the desiccant. If you remove the blind cover, connect the piping quickly, evacuate the system and fill with refrigerant.
- When removing the refrigerant from the refrigerant circuit, release it gradually from the low pressure side to prevent oil from flowing out.

**CLEANING AIR FILTER**

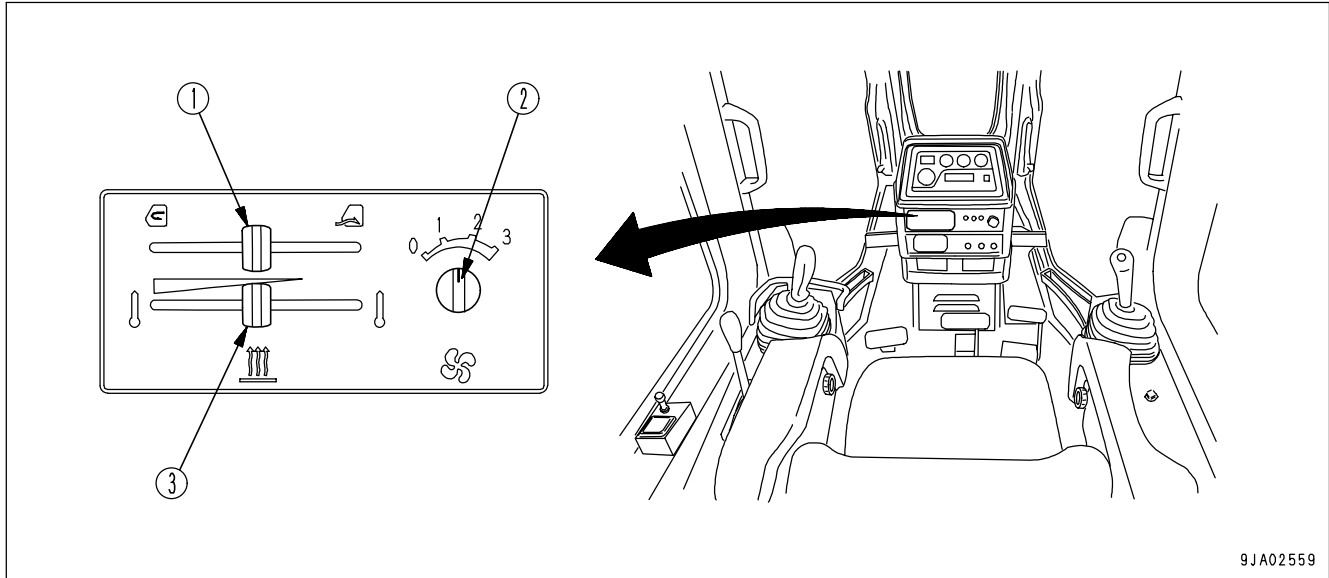
If the air filter for the FRESH or RECIRC air intake becomes clogged, the cooling or heating capacity will drop.

In places where there is a lot of dust, clean the air with compressed air once a week. For details of the cleaning method, see "CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER) (PAGE 4-56)".

### HANDLING HEATER

(Machine equipped with cab)

### EXPLANATION OF PARTS



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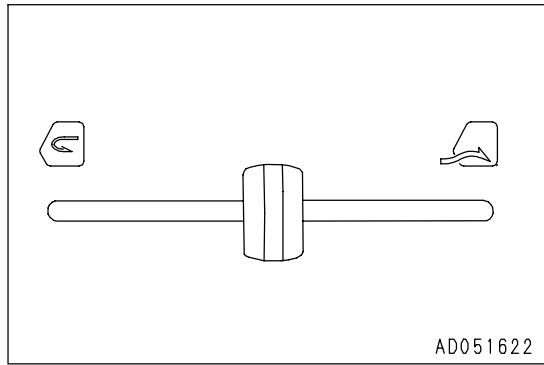
- (1) FRESH/RECIRC selector lever
- (2) Blower switch

- (3) Temperature control lever

### FRESH/RECIRC SELECTOR LEVER

This lever (1) changes the air intake port used when cooling or heating.

- RECIRC: If lever (1) is shifted to the left, the air conditioner sucks inside air. Set the lever to this position to cool or heat strongly. Ventilation or pressurizing function is not applied at this position.
- FRESH: If lever (1) is shifted to the right, the air conditioner sucks outside air. Set the lever to this position for normal cooling or heating. In this position, the cab is ventilated. It is also pressurized to prevent entry of dust.

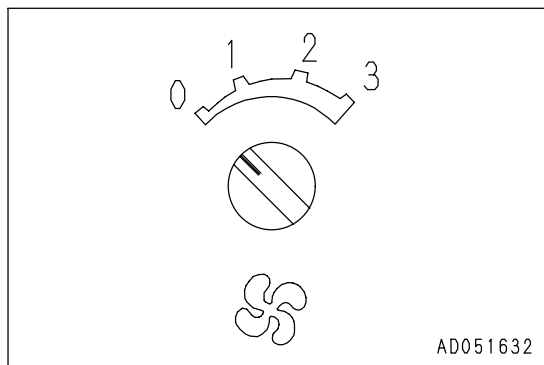


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### BLOWER SWITCH

This switch (2) acts as the wind flow control switch and main switch when cooling or heating.

- The air flow can be set to three stages:  
1 (LOW) → 2 (MEDIUM) → 3 (HIGH).
- If the switch is set to 0, the power is switched off and the heater stops.

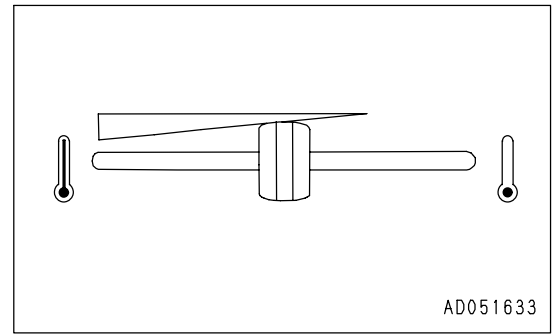


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**TEMPERATURE CONTROL LEVER**

This lever (3) is used to control the temperature for heating.

- When the temperature control lever is moved to the right, the temperature of the air coming from the vents becomes lower.
- When the temperature control lever is moved to the left, the temperature of the air coming from the vents becomes higher.



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**METHOD OF OPERATION**

**TO HEAT QUICKLY**

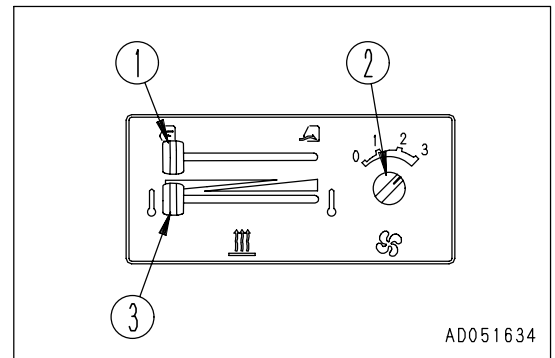
Set the switches to the position shown in the diagram on the right to carry out heating quickly.

- Set FRESH/RECIRC selector lever (1) and temperature control lever (3) to the position in the diagram on the right.
- Set blower switch (2) to position 3 (HIGH).

**NOTICE**

If heating is carried out continuously for a long period with the lever at the RECIRC position, the air inside the cab will become stale, so when the cab is warmed up, always set the FRESH/RECIRC selector lever(1) to the FRESH position.

In this position, the inside of the cab is pressurized to prevent the entry of dust.



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**NORMAL USE**

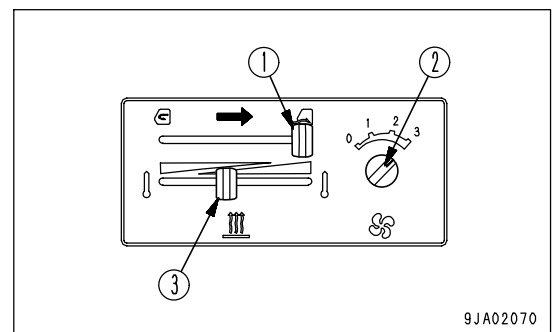
Set each switch to the desired position.

**PREVENTION METHOD OF ENTRY OF DUST**

Entry of dust into the cab can be prevented by starting the blower fan for the heater to raise the pressure in the cab a little higher than outside.

When working in a dusty job site or when preventing dust from entering the cab, use this function.

- Close the windows and doors.
- Set lever (1) to the FRESH position.
- Press swith (2).
- Set lever (3) to the desired position.



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**CLEANING AIR FILTER**

If the air filter for the FRESH or RECIRC air intake becomes clogged, the cooling or heating capacity will drop. In places where there is a lot of dust, clean the air with compressed air once a week. For details of the cleaning method, see "CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER) (PAGE 4-56)".

## OPERATION

### CHECK BEFORE STARTING ENGINE, ADJUST

#### WALK-AROUND CHECK

Before starting the engine, walk around the machine and look at the underside of chassis for anything unusual like loose bolts and nuts, leakage of fuel, oil and coolant. Also check the condition of the work equipment and the hydraulic system.

Also check for loose wiring, play, and collection of dust at places that reach high temperature.



#### WARNING

- Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire.  
Check carefully, and if any abnormality is found, repair it or contact your Komatsu distributor.
- Do not get on or off the machine from the rear. Using this position is dangerous because it is easy to slip and you cannot be seen from the operator's compartment. Always use the handrail and step at the side when getting on or off the machine.

If the machine is at an angle, reposition it level before checking.

Perform the following inspections and cleaning every day before starting engine for the day's work.

1. Check for damage, wear, play in work equipment, cylinders, linkage, and hoses.  
Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any problem is found, repair it.
2. Remove dirt and debris from around the engine, battery, and radiator.  
Check for dirt accumulated around the engine and radiator. Also check for flammable material (dry leaves, twigs, etc.) around the battery, engine muffler, turbocharger, or other high temperature engine parts. If any dirt or flammable materials are found, remove them.
3. Check for coolant and oil leakage around the engine  
Check for oil leakage from the engine and coolant leaks from the cooling system. If any problem is found, repair it.
4. Check for oil leakage of oil from power train case, final drive case, hydraulic tank, hoses, and joints  
Check that there is no oil leakage. If any problem is found, repair the place where the oil is leaking.  
Check for leakage of oil from the undercover. Check the ground for traces of oil leakage.
5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers.  
If any problem is found, repair it.
6. Check for problems in handrails, steps, loose bolts.  
If any problem is found, repair it. Tighten any loose bolts.
7. Check for damage to gauges, lamps on instrument panel, loose bolts  
Check that there is no damage to the panel, gauges and lamps. If any problem is found, replace the parts. Clean off any dirt on the surface.

8. Seat belt and mounting clamps

Check for damage or wear to the seat belt and mounting clamps. If there is any damage, replace with new parts.

**CHECK BEFORE STARTING**

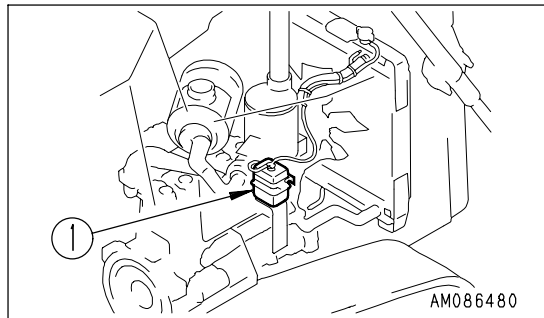
Always check the items in this section before starting the engine each day.

**CHECK COOLANT LEVEL, ADD COOLANT**

**! WARNING**

- Do not open the radiator cap unless necessary. When checking the coolant, always wait for the engine to cool down and check the sub tank.
- Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to check the coolant level in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure and remove it carefully.

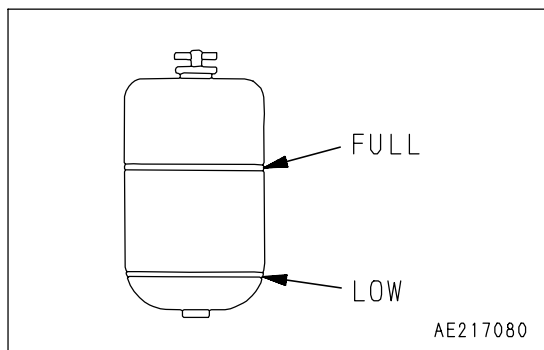
1. Open the engine side cover on the right side of the chassis, and check that the coolant is between the FULL and LOW marks on sub-tank (1). If the water level is low, add coolant to the FULL level through the water filler port in sub-tank (1).



**REMARK**

In summer, the coolant may overflow from the sub-tank drain hose. This is no problem. It occurs because too much coolant has been added.

2. After adding coolant, tighten the cap securely.
3. If the sub-tank is empty, check for leakage of coolant, then add it to the radiator and sub-tank.
4. After adding coolant, close the engine side cover.



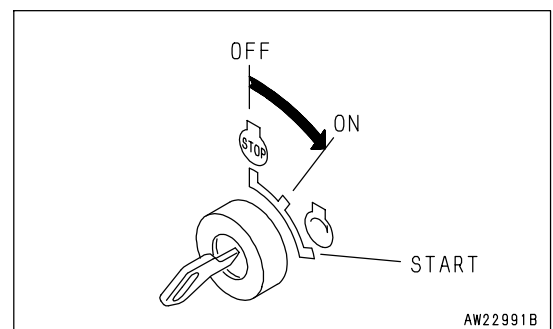
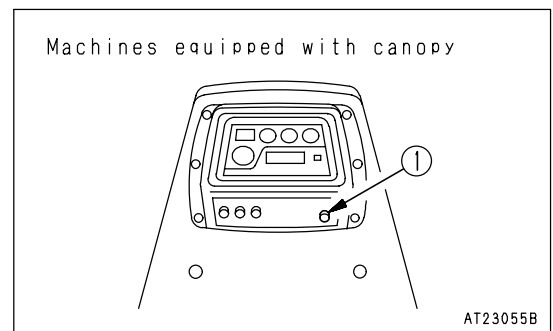
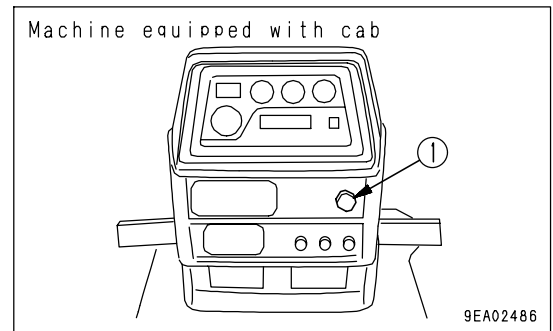
**CHECKING WITH MACHINE MONITOR**

(Monitor panel specification)

1. Turn starting switch (1) to the "ON" position.
2. Check that all monitor lamps light up for 3 seconds, the warning lamp lights up for 2 seconds, and the alarm buzzer sounds for 1 second.

**REMARK**

If the lamps do not light up, there may be a failure or disconnection in the monitor, please contact your Komatsu distributor.

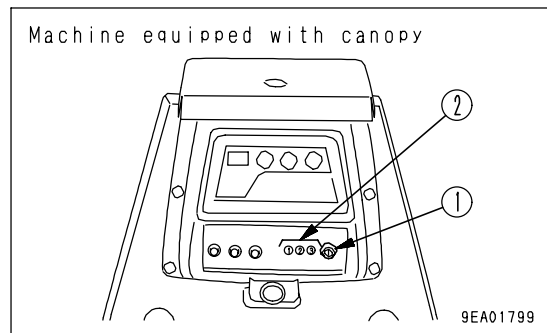
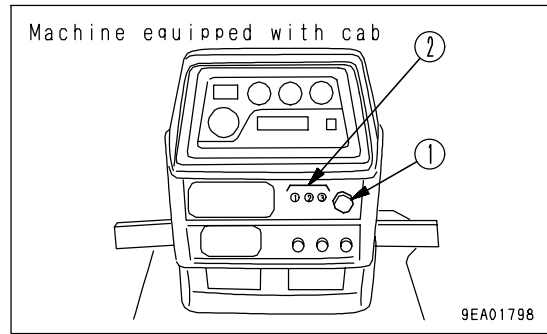




**CHECK SPEED RANGE DISPLAY LAMP**

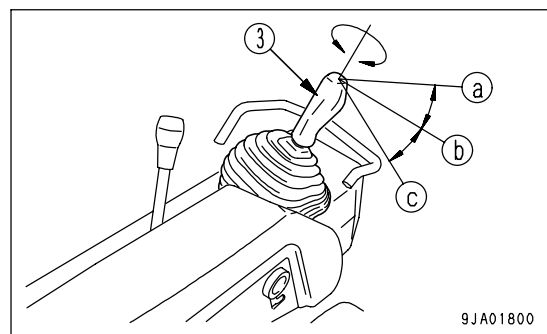
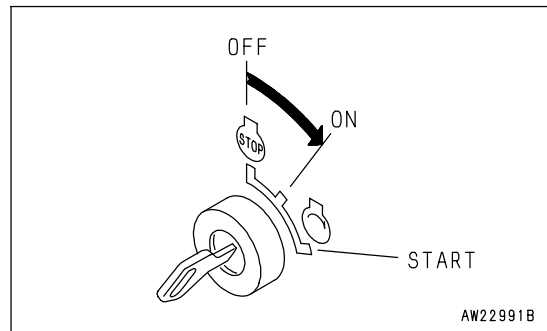
1. Turn starting switch (1) to the "ON" position.
2. Check that only one of speed range display lamps (2) is lighting.
3. Operate steering, directional and gear shift lever (3) to shift the gear, and check that the lighting lamp changes according to the operation.

- Position (a): 1st
- Position (b): 2nd
- Position (c): 3rd



**REMARK**

If any lamp does not light up or two or more lamps light up, or if the lighting lamp does not change even the gear is shifted, the gear speed lamp system or its wire may be broken. In this case, call your Komatsu distributor and ask for inspection.



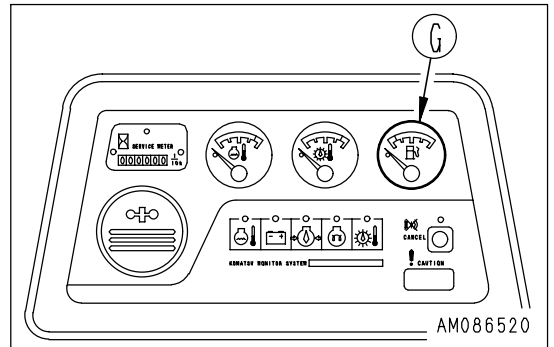
CHECK FUEL LEVEL, ADD FUEL

 **WARNING**

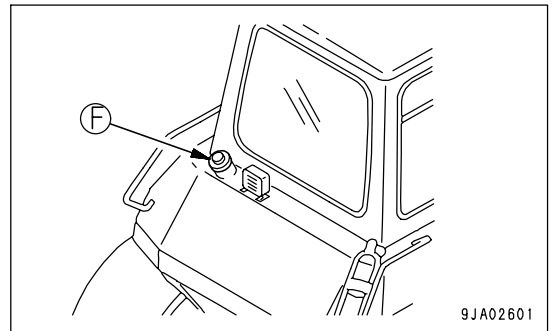
When adding fuel, never spill the fuel or let it overflow. It will cause fire.  
 If any fuel has spilled, wipe it up completely. If fuel has spilled over soil or sand, remove that soil or sand.  
 Fuel is highly flammable and dangerous. Never bring flames near fuel.

**MONITOR PANEL SPEC**

1. Turn the engine starting switch to the ON position and check the fuel level gauge (G) on the monitor panel for fuel level. After checking, turn the switch back to the OFF position.

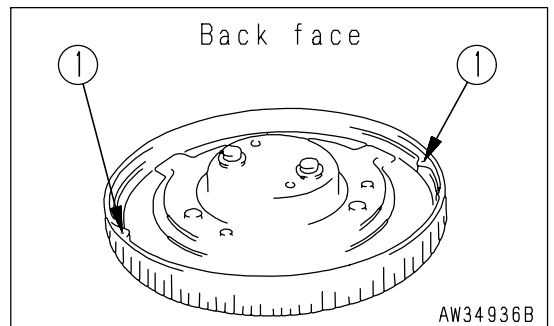


2. After completing work, fill the fuel tank through fuel filler port (F).  
 Fuel capacity: 410 liters (108.32 US gal)
3. After adding fuel, tighten the cap securely.



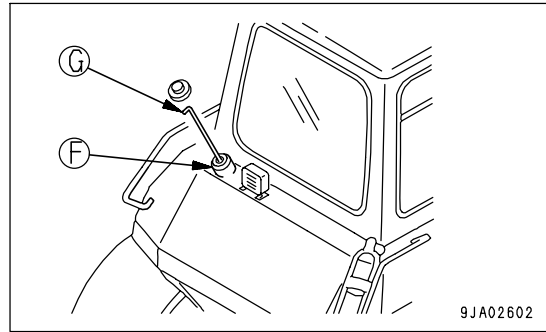
**REMARK**

- When dozing on a grade, make sure there is plenty of fuel in the tank so that the engine fuel line does not become aerated.
- If breather hole (1) on the cap is clogged, the pressure in the tank will drop and fuel will not flow. Clean the hole from time to time.

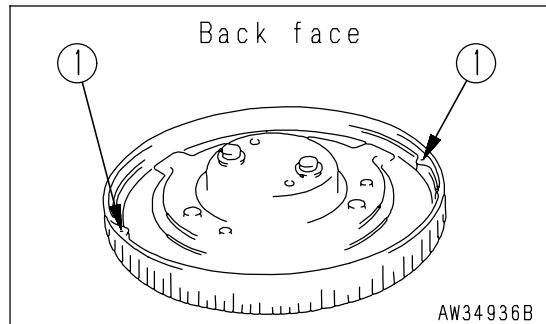


**GAUGE PANEL SPEC**

1. Remove the cap and check the fuel level using fuel gauge (G).
2. After completing work, fill the fuel tank through fuel filler port (F).  
Fuel capacity: 410 liters (108.32 US gal)
3. After adding fuel, tighten the cap securely.

**REMARK**

- When dozing on a grade, make sure there is plenty of fuel in the tank so that the engine fuel line does not become aerated.
- If breather hole (1) on the cap is clogged, the pressure in the tank will drop and fuel will not flow.  
Clean the hole from time to time.

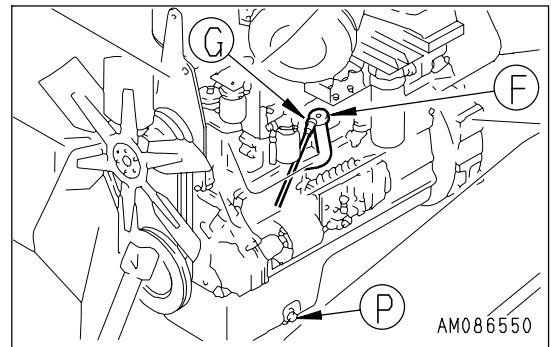


## CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

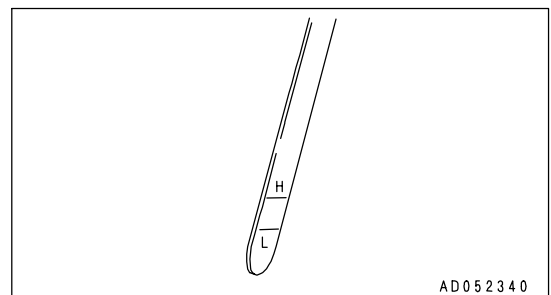
**WARNING**

Parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the oil temperature to go down before performing this operation.

1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick (G) and wipe the oil off with a cloth.
3. Fully insert dipstick (G) into filler pipe, then remove it.



4. The oil level should be between the H and L marks on dipstick (G).  
If the oil level is below the L mark, add oil through oil filler port (F).
5. If the oil is above the H mark, drain the excess engine oil from drain plug (P), and check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.

**REMARK**

- If the machine is at an angle, reposition it to level before checking.
- When checking the oil level after the engine has been operated, allow the engine to cool for 15 minutes before checking.

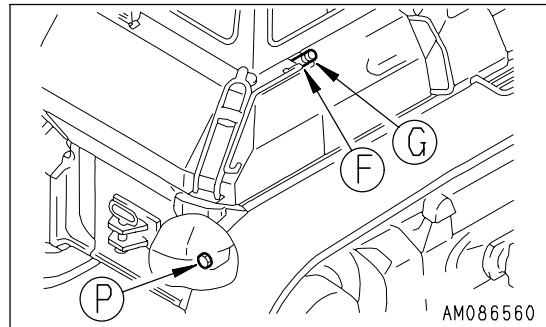
CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL



WARNING

The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

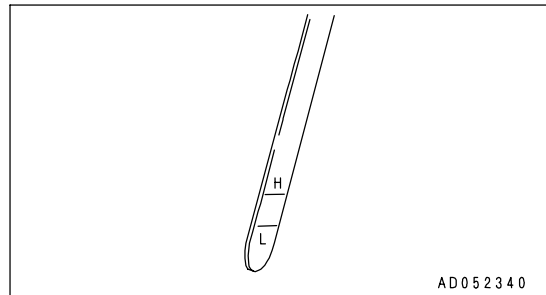
1. Open cover on the right side of the machine.
2. Remove dipstick (G), and wipe the oil off with a cloth.
3. Fully insert dipstick (G) into filler pipe, then remove it.
4. The oil level should be between the H and L marks on dipstick (G).  
If the oil level is below the L mark, add oil through oil filler port (F).
5. If the oil is above the H mark, drain the excess engine oil from drain plug (P), and check the oil level again.
6. If the oil level is correct, insert dipstick (G) fully into the dipstick guide again.



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REMARK

- If the machine is at an angle, reposition it to level before checking.
- When checking the oil level after the engine has been operated, allow the engine to cool for 15 minutes before checking.



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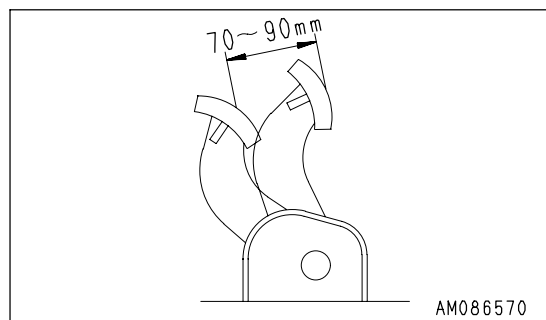
CHECK BRAKE PEDAL TRAVEL



WARNING

If the brake pedal stroke is not 70 to 90 mm (2.8 to 3.5 in) (below 70 mm or over 90 mm), the brake and steering force is too strong or insufficient. If the stroke is 91 mm (3.6 in) or longer, adjust it.

1. Depress the brake pedal all the way until it stops.
2. The distance of travel at the center of the pedal should be 70 to 90 mm (2.8 to 3.5 in).
3. When this value exceeds 91 mm (3.6 in), or the brake fails to work, please contact your Komatsu distributor for adjustment.



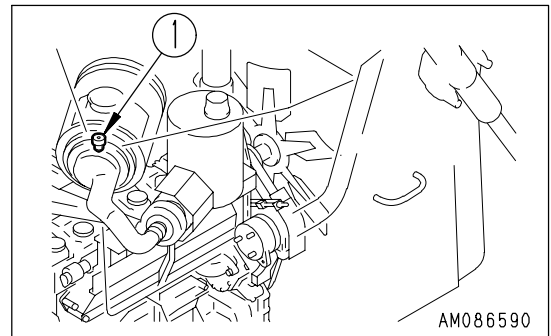
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**CHECK DUST INDICATOR**

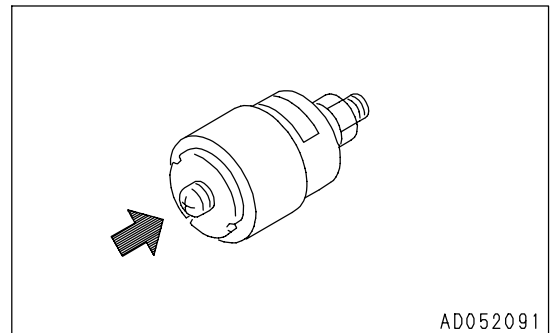
1. Open the engine side cover on the right side of the chassis, and check that the red piston has not appeared in the transparent portion of dust indicator (1).

2. If the red piston has appeared, clean or replace the element immediately.

For details of the method of cleaning the element, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-18)".



3. After checking, cleaning, and replacing, press the knob of dust indicator (1) to return the red piston to its original position.

**CHECK ELECTRIC WIRING****WARNING**

- If the fuses frequently blow or if there are traces of short circuits in the electrical wiring, locate the cause and immediately perform repairs, or contact your Komatsu distributor for repairs.
- Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clean the breather hole.

Check that there is no damage to the fuses; that fuses of the specified capacity are used; that there is no disconnection or trace of short-circuiting in the electric wiring and no damage to the covering. Check also that there is no loosened terminals. If any, tighten them.

Moreover, pay particular attention to the electric wiring when checking the battery, engine starting motor and alternator.

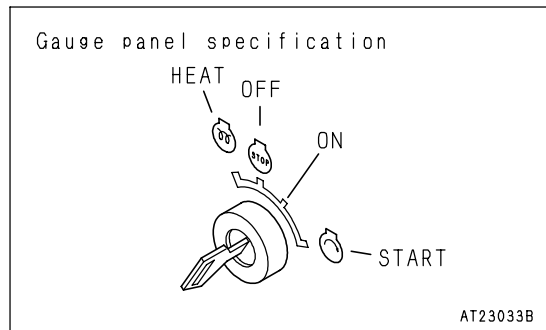
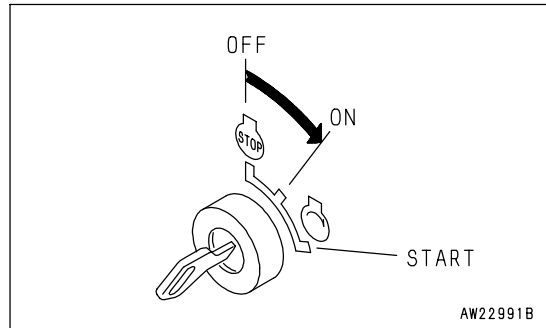
Be sure to check that there is no inflammable material accumulated around the battery. If any is found, remove immediately.

**CHECK THAT LAMPS LIGHT UP**

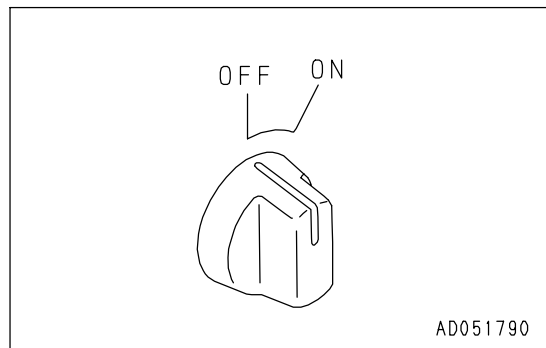
Check that the head lamp, rear lamp, additional working lamp (if equipped), and instrument lamp light up normally and they are free from stain and damage.

If the lamps do not light, check for a broken bulb or disconnected wire, contact your Komatsu distributor for repairs.

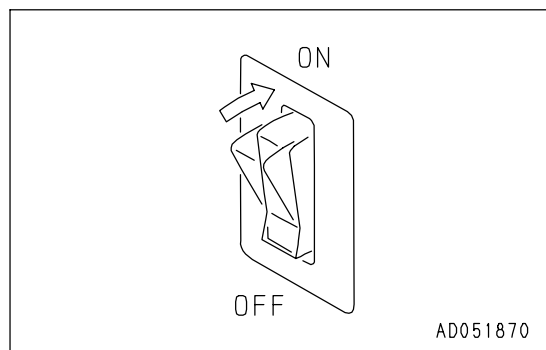
1. Turn the starting switch to the ON position.



2. Turn the head lamp and the rear lamp switches to the ON position, and check that all the lamps light up.



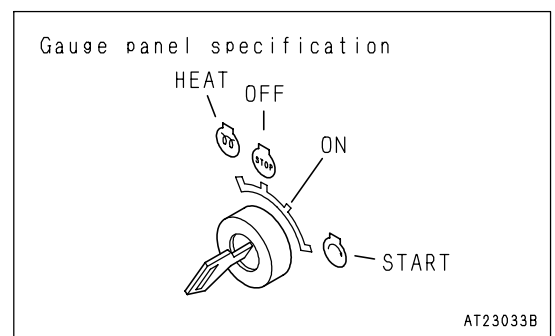
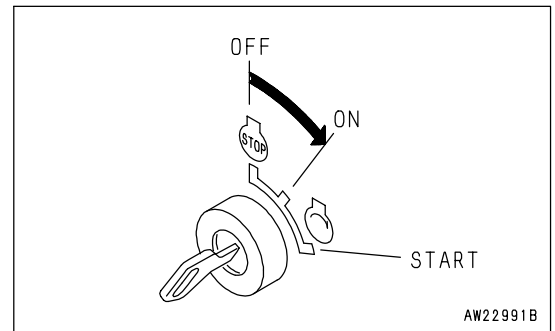
3. Turn the additional head and rear working lamp switches (if equipped) to the ON position, and check that all the lamps light up.



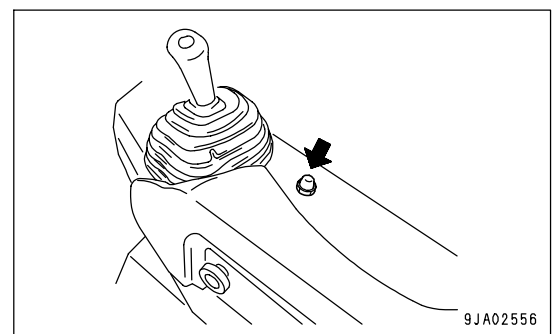
**CHECK HORN SOUND**

Check that the horn sounds. If it does not sound at all or the sound is extremely feeble, a defect or broken wire is suspected, ask your Komatsu distributor for possible repairs.

1. Turn the starting switch to the ON position.



2. Push the horn switch and check that the horn sounds.

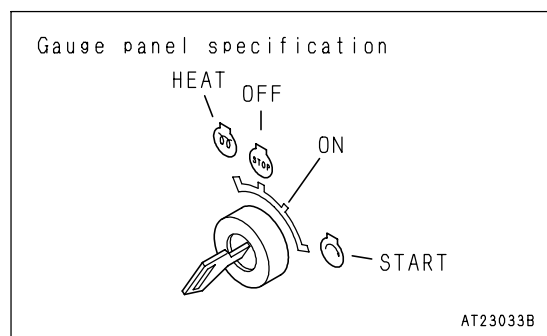
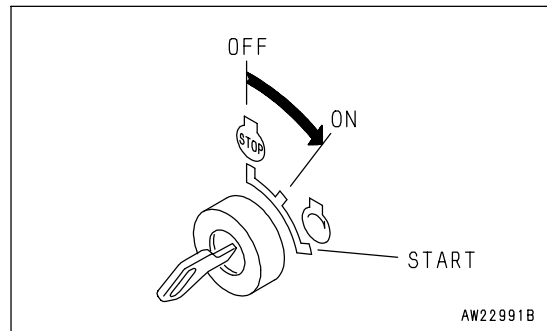




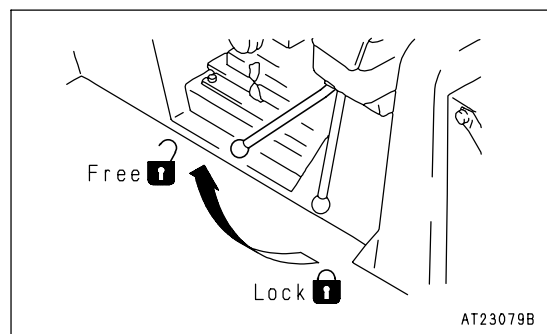
**CHECK OF OPERATION OF BACKUP ALARM**

Check that the backup alarm sounds normally. If it does not, a defect or broken wire is suspected, ask your Komatsu distributor for possible repairs.

1. Turn the starting switch to the ON position.

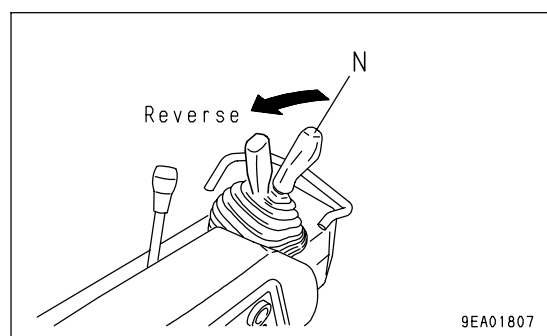


2. Set parking brake lever to the FREE position.



3. Set the steering, forward-reverse, gear shift lever in the REVERSE position.

The buzzer must sound immediately at this time. The buzzer keeps sounding until the steering, directional and gear shift lever is set to the NEUTRAL or FORWARD position.

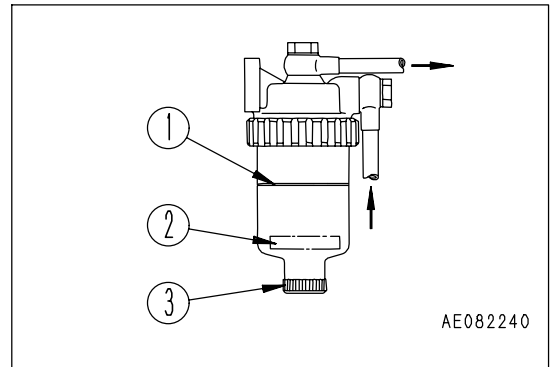


**CHECK, CLEAN WATER SEPARATOR**

(If equipped)

The water separator separates water mixed in the fuel. If float (2) is at or above red line (1), drain the water according to the following procedure.

1. Loosen drain plug (3) and drain the accumulated water until the float (2) reaches the bottom.
2. Tighten drain plug (3).
3. If the air is sucked into fuel line when draining and water, be sure to bleed air in the same manner as for the fuel filter. See "REPLACE FUEL FILTER CARTRIDGE (PAGE 4-57)".



## ADJUSTMENT

### ADJUST OPERATOR'S SEAT



## WARNING

When adjusting the position of the operator's seat, always set the lock lever to the LOCK position to prevent any accidental contact with the control levers.

- Always adjust the operator's seat before starting each operation or when the operators change shift.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

#### (A) Fore-and-aft adjustment

Pull lever (1), set the seat to a position where it is easy to operate, then release the lever.

Fore-aft adjustment: 160 mm (6.3 in) (8 stages)

#### (B) Weight adjustment of seat

Turn knob (2) under the seat to match the weight adjustment scale with your own weight.

The weight can be adjusted to 50 to 120 kg (110 to 265 lb).

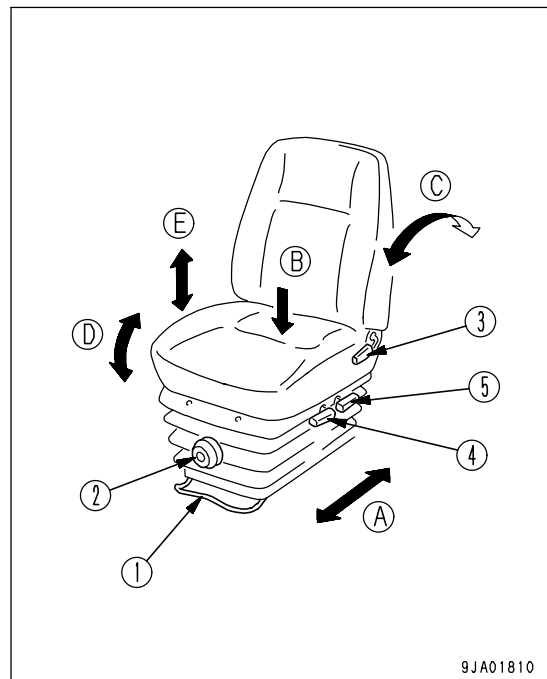
#### REMARK

To make the seat softer, adjust the weight to make it lighter; to make the seat harder, adjust the weight to make it heavier. When traveling on rough road surfaces, make the seat harder before starting operations.

#### (C) Adjust reclining angle

Pull up lever (3) and set the seat back to a position which is comfortable for operation, then release the lever.

Sit with your back against the seat back when adjusting. If your back is not touching the seat back, the seat back may suddenly move forward.



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#### REMARK

The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seatback to the upright position.

#### (D) Seat angle adjustment

- Front angle adjustment of seat (5 stages)

To raise the front of the seat, apply your weight to the seatback, while pulling up lever (4).

To lower the front of the seat, apply your weight to the front of the seat, while pulling up lever (4).

- Rear angle adjustment of seat (5 stages)

To raise the rear of the seat, stand up on your feet a little, while pulling up lever (5).

To lower the rear of the seat, apply your weight to the rear of the seat, while pulling up lever (5).

**(E) Seat height adjustment**

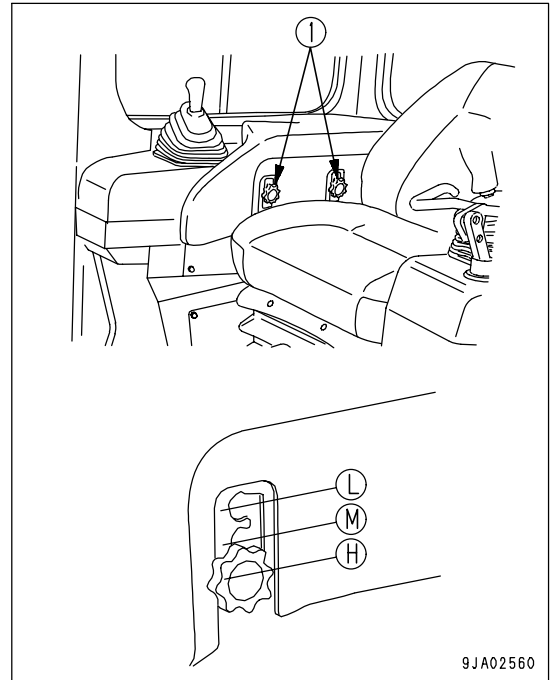
Pull up levers (4) and (5) alternately to adjust the angle of the seat.  
Then, release the levers to lock the seat.

(Height adjustment distance: 5 stages, 60 mm (2.4 in))

**ADJUST ARMREST**

The height of the armrests on both sides of the operator's seat can be adjusted to three levels. After adjusting the operator's seat, adjust the height of the armrests properly.

1. Loosen knobs (1) on both sides of the operator's seat.
2. Move the armrests on both sides of the operator's seat forward, then adjust their height to (H), (M), or (L).  
(H): High  
(M): Medium  
(L): Low
3. Move back both armrests.
4. Tighten knobs (1) securely.



**FASTENING AND REMOVING SEAT BELT**

Always install a seat belt on machines equipped with ROPS.

**WARNING**

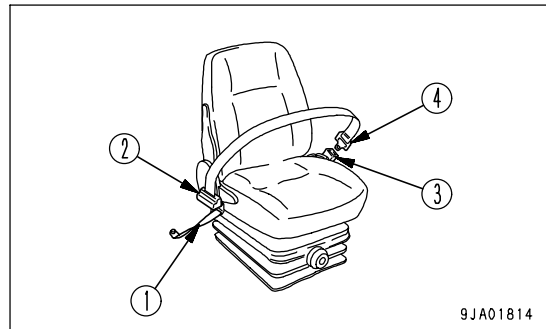
- Before fastening the seat belt, check that there is no problem in the securing brackets or belt. If there is any wear or damage, replace.
- Even if there appears to be no problem in the seat belt, replace the seat belt once every 3 years. The date of manufacture is woven on the reverse side of the belt.
- Adjust and fasten the seat belt before operating the machine.
- Always use the seat belt when operating the machine.
- Do not use the seat belt with either half of the belt twisted.

Check that the bolts of the clamp securing the belt to the chassis are not loose. Tighten them if they are loose. The tightening torque for the mounting bolt is  $24.5 \pm 4.9$  Nm ( $2.5 \pm 0.5$  kgm,  $18.1 \pm 3.6$  lbft).

If the belt surface is scratched or frayed or if the fittings are broken or deformed, replace the seat belt unit.

**FASTENING AND REMOVING SEAT BELT**

1. Sit on the seat, depress the brake pedal fully, and adjust the seat so that your back is pressed against the backrest.
2. After adjusting the seat position, adjust tether belt (1). Tense the tether belt and install it when there is no one sitting on the seat.
3. Sit on the seat and hold tongue (4) connected to wind-in mechanism (2) and pull out the belt slowly so that the belt will cover your abdomen sufficiently.
4. Insert tongue (4) in buckle (3) until it clicks. The belt is pulled back into wind-in mechanism (2) until it is fitted to your abdomen. The belt is locked under this condition and cannot be extended anymore. Fit the belt to your abdomen without twisting it.

**REMARK**

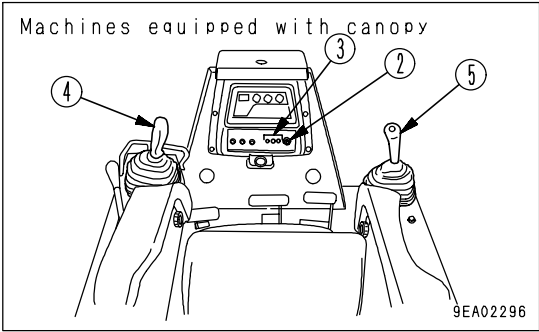
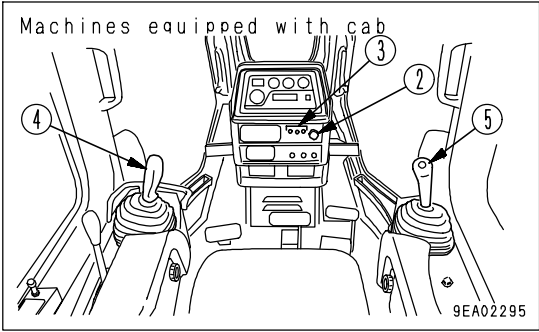
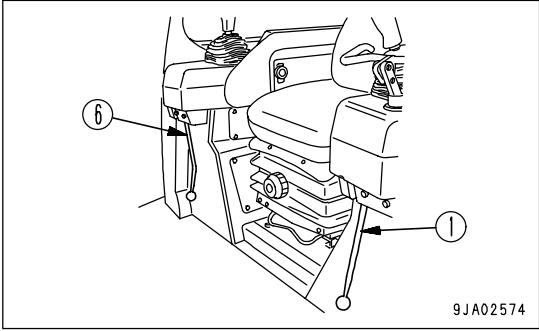
If the belt is locked before the tongue is inserted in the buckle, let it return to the wind-in mechanism, then repeat the above procedure from the start.

5. Pull the belt to check that it is securely locked in position.
6. When removing the belt, press the red button on buckle (3).  
The belt will automatically retract.

**OPERATION AND CHECK BEFORE STARTING ENGINE**

**⚠ WARNING**

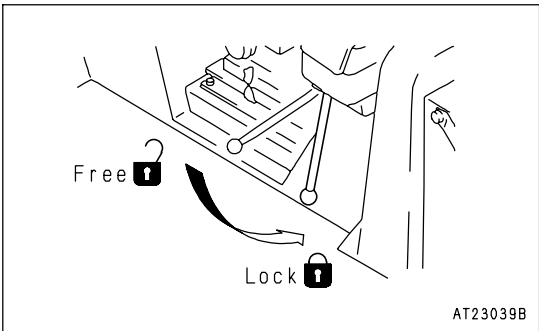
When starting the engine, check that the parking brake lever and work equipment lock lever are placed securely at the LOCK position. If the work equipment control lever is touched by accident when the engine is started, the work equipment may move unexpectedly and cause serious injury or damage.



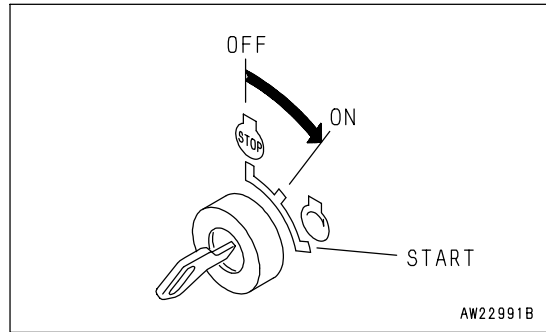
1. Check that parking brake lever (1) is in the LOCK position.

**REMARK**

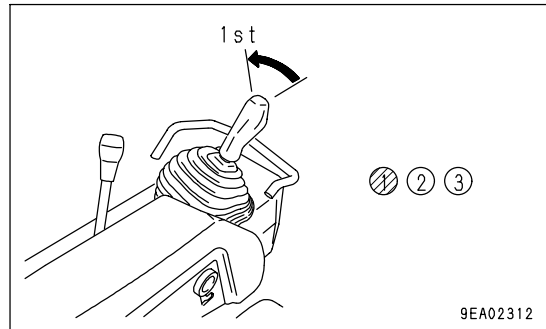
If this parking brake lever is not in the LOCK position, the engine will not start.



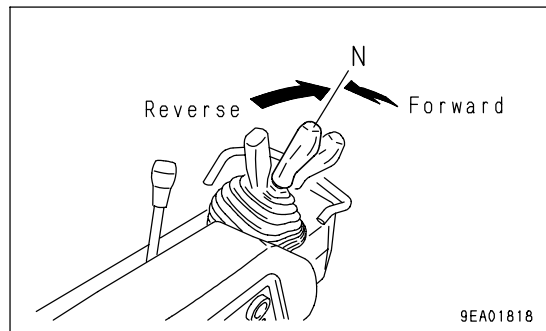
2. Insert the key into starting switch (2) and turn the key to the ON position.



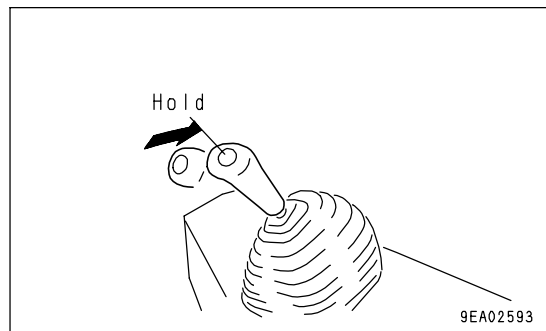
3. Check that speed range display lamp (3) shows 1st.



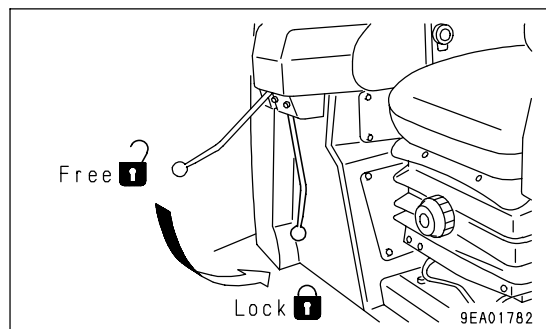
4. Check that steering, forward-reverse, gear shift lever (4) is at the N (neutral) position.



5. Check that the blade is lowered to the ground and that blade control lever (5) is at the HOLD position.



6. Check that the work equipment lock lever (6) is locked.

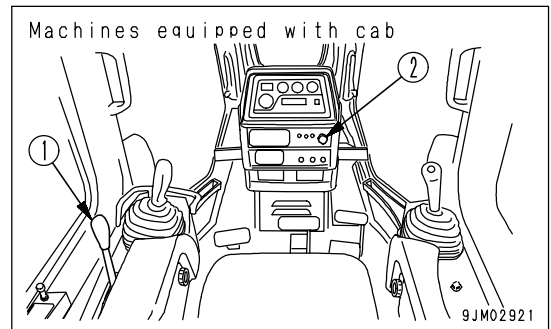


## STARTING ENGINE

### NORMAL STARTING

#### WARNING

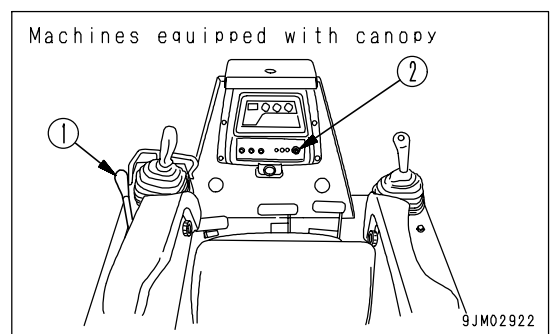
- Sit down in the operator's seat before starting the engine.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause serious bodily injury or fire.
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.



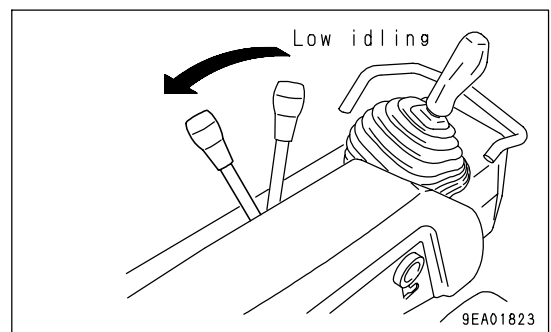
#### NOTICE

- Do not start the engine with the fuel control lever near the FULL position. It may lead to damage of the engine parts.
- Do not keep the starting motor rotating continuously for more than 20 seconds.

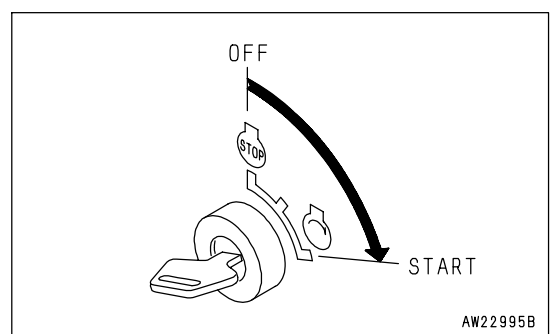
If the engine will not start, wait for at least 2 minutes before trying to start the engine again.



1. Before starting the engine, check that fuel control lever (1) is at the low idling position.
2. Pull fuel control lever (1) to a position midway between the low idling and full speed positions.

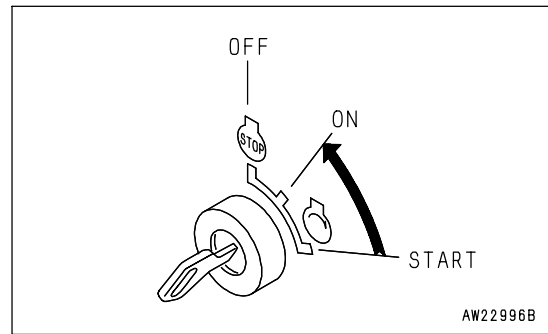


3. Insert the key into starting switch (2) and turn the key to the START position. The engine will start.





4. When the engine starts, release the key in starting switch (2).  
The key will return automatically to the ON position.



5. Continue to run the engine at idling for 15 seconds after starting.  
During this time, do not operate the control levers or fuel control lever.

STARTING IN COLD WEATHER

**! WARNING**

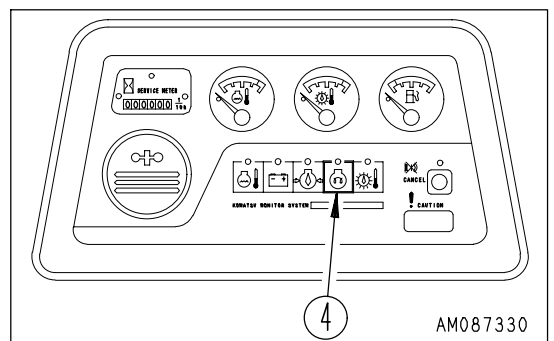
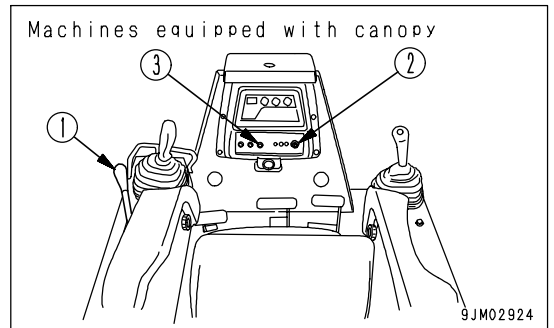
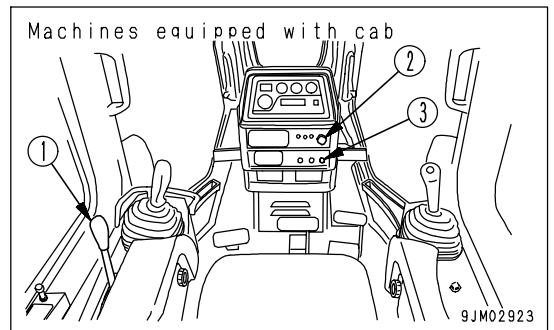
- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Never use starting aid fluids as they may cause explosions.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.

When starting in low temperatures, do as follows.

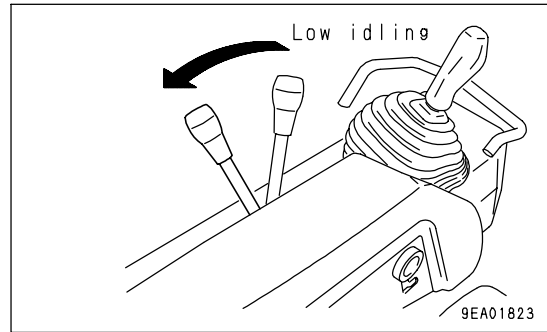
MONITOR PANEL SPEC

NOTICE

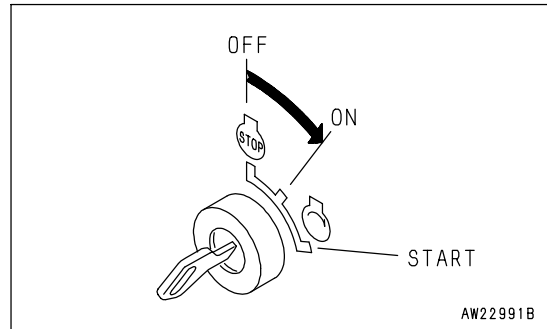
- Do not start the engine with the fuel control lever near the FULL position. It may lead to damage of the engine parts.
  - Do not keep the starting motor rotating continuously for more than 20 seconds.
- If the engine fails to start, repeat steps 3 and 4 after waiting for about 2 minutes.



1. Before starting the engine, check that fuel control lever (1) is at the low idling position.
2. Pull fuel control lever (1) to a position midway between the low idling and full speed positions.



3. Insert the key into starting switch (2) and turn the key to the ON position.



4. Carry out preheating.

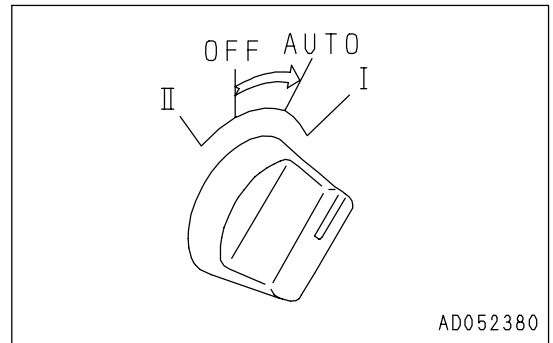
There are the following two ways of carrying out preheating. First use the convenient automatic preheating system.

For operating method, see the section of "AUTOMATIC PREHEATING (PAGE 3-65)" and "MANUAL PREHEATING (PAGE 3-66)".

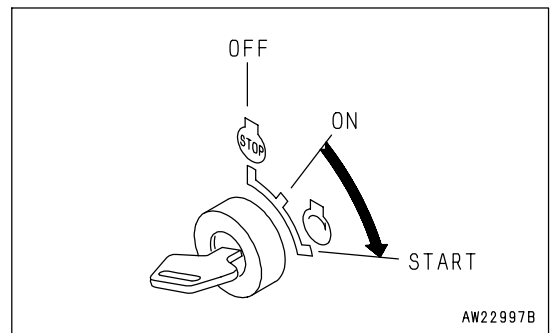
**AUTOMATIC PREHEATING**

1. Turn glow switch (3) to the AUTO position.

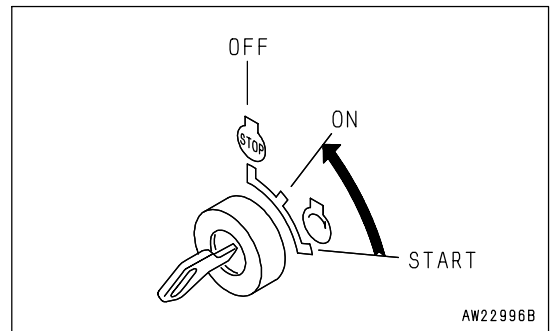
When it is turned to the AUTO position, preheating is automatically carried out according to the ambient temperature. Lamp (4) lights up during the preheating operation. When the preheating is completed, lamp (4) will go out.



2. When the preheating is completed, turn the key in starting switch (2) to the START position to start the engine.



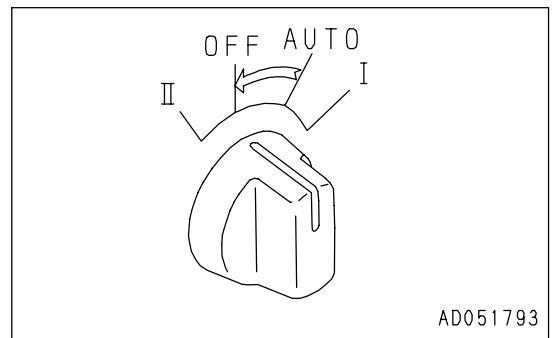
3. When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position.



4. Continue to run the engine at idling for 15 seconds after starting. During this time, do not operate the control levers or fuel control lever.
5. After starting the engine, return glow switch (3) to the OFF position.

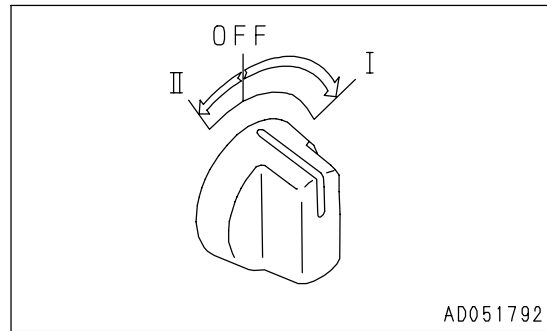
**REMARK**

If the engine can not start after automatic preheating, start it using manual preheating.



**MANUAL PREHEATING**

- 1. Turn glow switch (3) to position I or II.  
Lamp (4) lights up during the preheating operation.  
When the preheating is completed, release the switch. The key will then return automatically to the following position.  
From position I, it will return to AUTO  
From position II, it will return to OFF

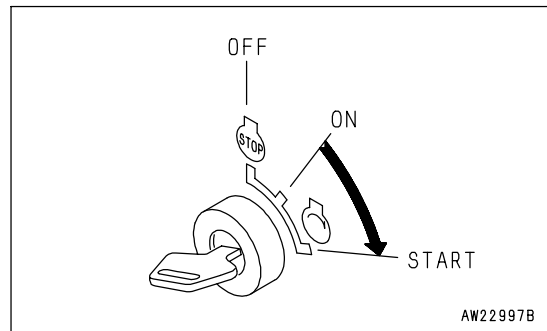


The pre-heating times are as shown below.

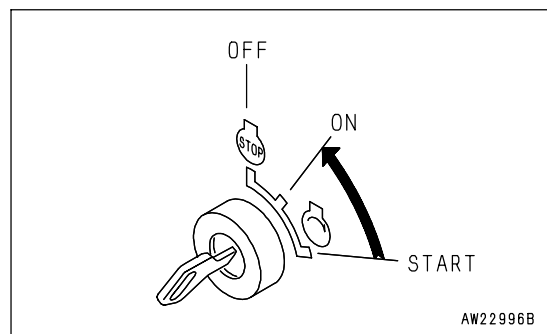
| Ambient temperature            | Preheat time |
|--------------------------------|--------------|
| 0°C to -5°C (32°F to 23°F)     | -            |
| -5°C to -10°C (23°F to 14°F)   | 15 seconds   |
| -10°C to -20°C (14°F to -4°F)  | 30 seconds   |
| -20°C to -30°C (-4°F to -22°F) | 45 seconds   |

If the preheating time is too long or too short, the engine will not start easily. Observe the correct preheating time.

- 2. When the preheating is completed, turn the key in starting switch (2) to the START position to start the engine.



- 3. When the engine starts, release the key in starting switch (2).  
The key will return automatically to the ON position.

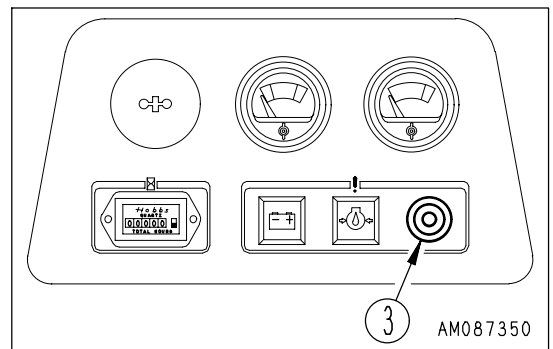
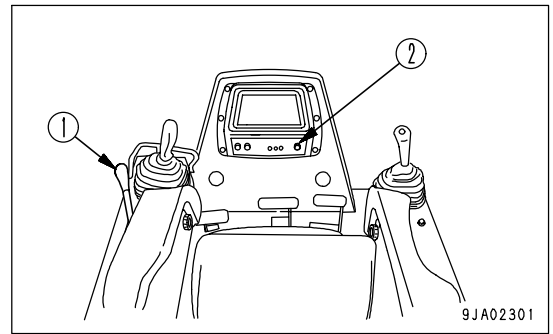


- 4. Continue to run the engine at idling for 15 seconds after starting.  
During this time, do not operate the control levers or fuel control lever.

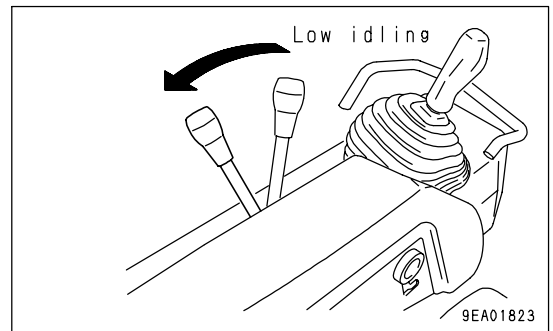
**GAUGE PANEL SPEC**

**NOTICE**

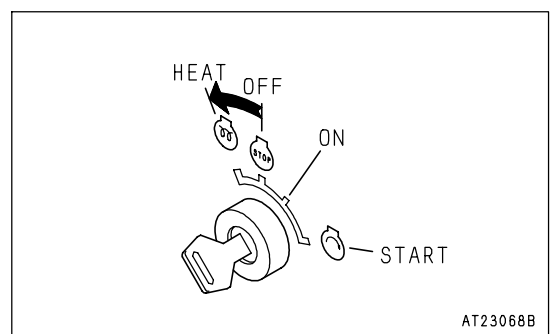
- Do not start the engine with the fuel control lever near the FULL position. It may lead to damage of the engine parts.
  - Do not keep the starting motor rotating continuously for more than 20 seconds.
- If the engine fails to start, repeat steps 3 and 4 after waiting for about 2 minutes.



1. Before starting the engine, check that fuel control lever (1) is at the low idling position.
2. Pull fuel control lever (1) to a position midway between the low idling and full speed positions.



3. Insert the key into starting switch (2), turn the key of starting switch (2) to the HEAT position and hold it until glow signal (3) glows red.

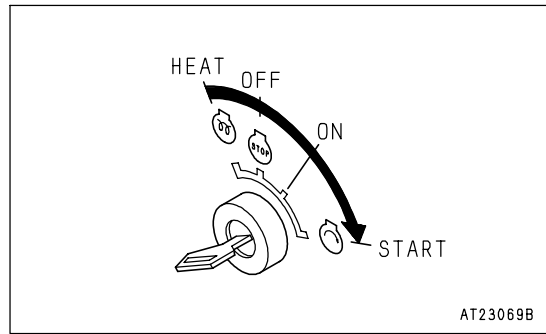


The pre-heating times are as shown below.

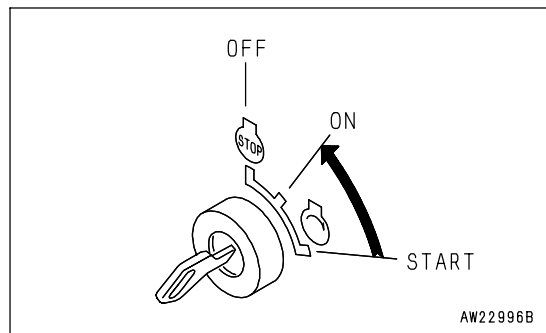
| Ambient temperature            | Preheat time |
|--------------------------------|--------------|
| 0°C to -5°C (32°F to 23°F)     | -            |
| -5°C to -10°C (23°F to 14°F)   | 15 seconds   |
| -10°C to -20°C (14°F to -4°F)  | 30 seconds   |
| -20°C to -30°C (-4°F to -22°F) | 45 seconds   |

If the preheating time is too long or too short, the engine will not start easily. Observe the correct preheating time.

4. When glow signal becomes red, turn the starting switch key (2) to the START position to start the engine.



5. When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position.



6. Continue to run the engine at idling for 15 seconds after starting. During this time, do not operate the control levers or fuel control lever.

## OPERATIONS AND CHECKS AFTER STARTING ENGINE



### WARNING

- If there has been any abnormal actuation or trouble, turn the starting switch key to the OFF position.
- If the work equipment is operated without warming the machine up sufficiently, the response of the work equipment to the movement of the control lever will be slow and the work equipment may not respond as the operator desires, so always carry out the warming-up operation. Particularly in cold areas, be sure to carry out the warm-up operation completely.

## BREAKING IN THE NEW MACHINE



### CAUTION

Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to break-in the machine for the initial 100 hours (as indicated by the service meter).

During break-in operations, follow the precautions described in this manual.

- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Immediately after starting the engine, avoid sudden starts, sudden acceleration, unnecessary sudden stops, and sudden changes in direction.

## WARMING UP OPERATIONS

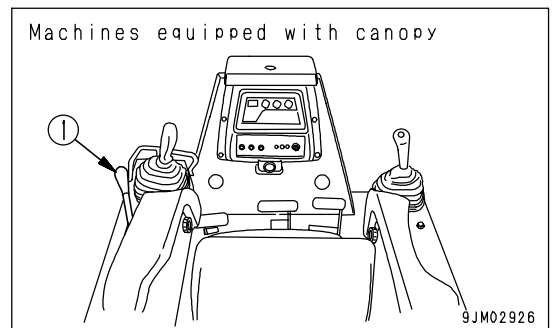
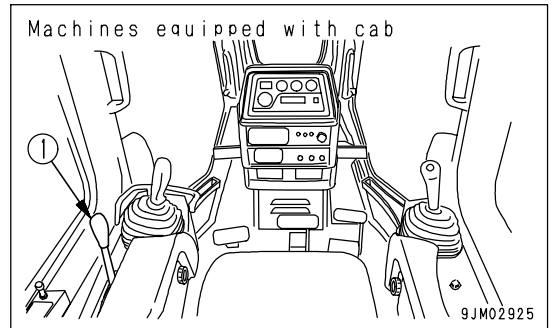
After the engine starts, do not start operating the machine immediately. First, carry out the following operations and checks.

### NOTICE

Do not accelerate the engine suddenly until the warming-up operation has been completed.

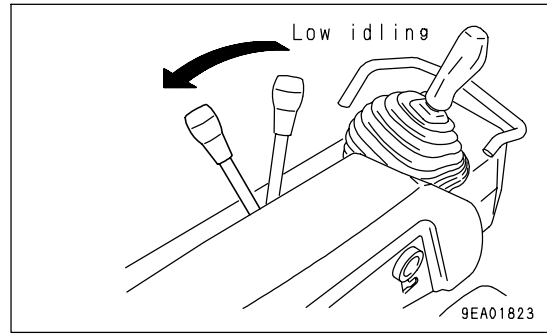
Do not run the engine at low idle or high idle continuously for more than 20 minutes.

If it is necessary to continue to run the engine at idle, apply a load from time to time or run the engine at a mid-range speed.

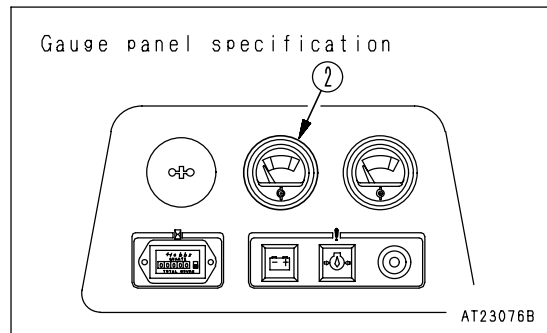
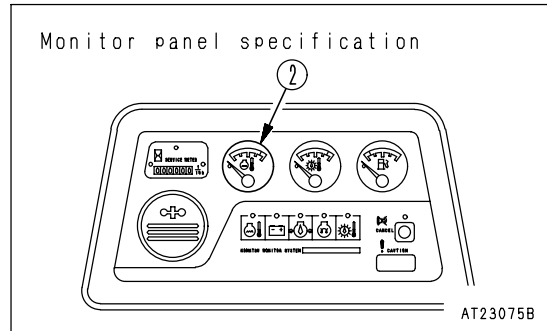




1. Pull fuel control lever (1) to the center position between low idling and high idling and run the engine at medium speed for about 5 minutes with no load.



2. After warm-up has completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.  
Continue to run the engine at low load until engine water temperature gauge (2) falls within the white range (Monitor Panel Spec.) or green range (Gauge Panel Spec.).
3. Check for abnormal exhaust gas color, noise, or vibration. If any problem is found, contact your Komatsu distributor.



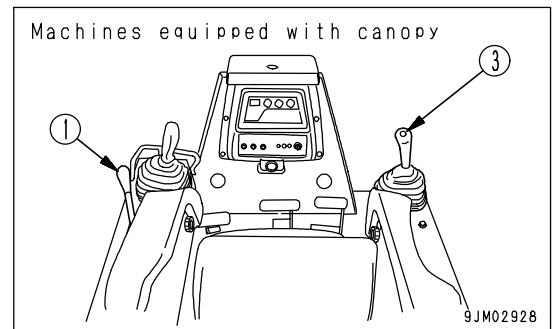
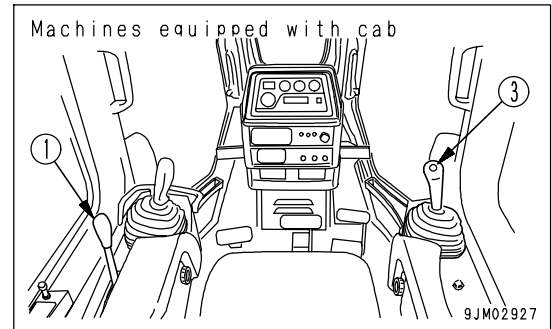
## STARTING IN COLD WEATHER

(Ambient temperature below 10°C (50°F))

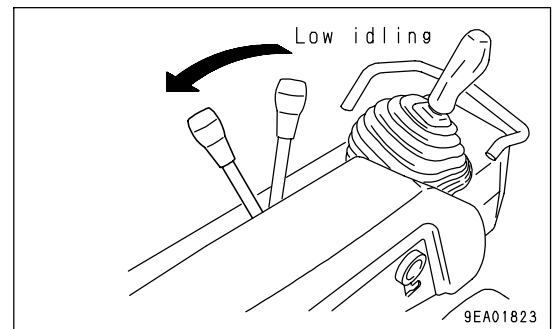
After the engine starts, do not start operating the machine immediately. First, carry out the following operations and checks.

### NOTICE

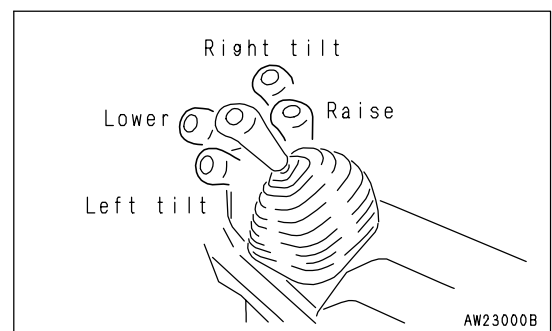
- When the hydraulic oil is at low temperature, do not carry out operations or move the levers suddenly. Always carry out the warming-up operation. This will help to extend the machine life.  
Do not accelerate the engine suddenly before the warming-up operation is completed.
- Do not run the engine at low idling or high idling continuously for more than 20 minutes. This will cause damage to the environment. It will also cause damage to the internal parts of the turbocharger and engine. If it is necessary to run the engine at idling, apply a load or run at mid-range speed from time to time.



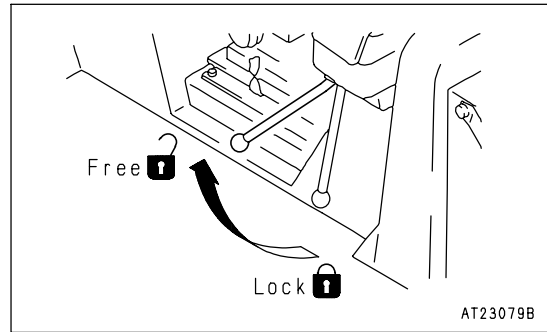
1. Pull fuel control lever (1) to a position midway between the low idling and full speed positions, run the engine at a mid-range speed, and continue to run under no load for approx. 10 minutes.



2. Operate blade control lever (3) fully to the RAISE position, then hold the lever in position, and operate slowly to the left tilt relief and right tilt relief in turn for 5 minutes.
3. After this, operate the blade control lever (3) fully to the RAISE position, hold the lever in position, and relieve the left and right tilt intermittently. Next, operate the lever to the LOWER position and lower the blade to the ground, then operate the lever fully to the FLOAT position, hold the lever in position, and relieve the left and right tilt in turn intermittently for 5 minutes.



- 4. Next, depress the brake pedal and move the parking lever from the LOCK position to the FREE position.  
(Continue this condition while carrying out the operation in Step 5.)

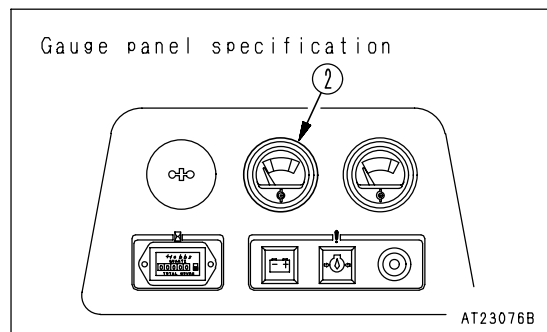
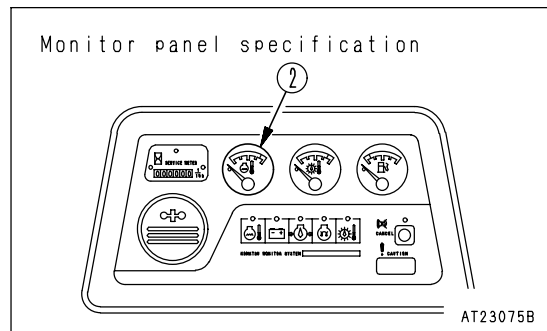


- 5. Lower the blade to the ground, move the control lever fully to the FLOAT position (lever stroke end) and hold the lever in position for 1 minute. Next, release the lever and check that it stays in the FLOAT position. After waiting for 3 minutes, return the lever to the HOLD position.

**REMARK**

If the work equipment oil is not up to operating temperature, the response of the work equipment or steering may be slow, the lever may become heavy or may not return properly. Also, if the blade control lever is set to the FLOAT position and released immediately, the lever may return to the HOLD position.

- 6. After warm-up has completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.  
Continue to run the engine at low load until engine water temperature gauge (2) falls within the white range (Monitor Panel Spec.) or green range (Gauge Panel Spec.).
- 7. Check for abnormal exhaust gas color, noise, or vibration. If any problem is found, contact your Komatsu distributor.

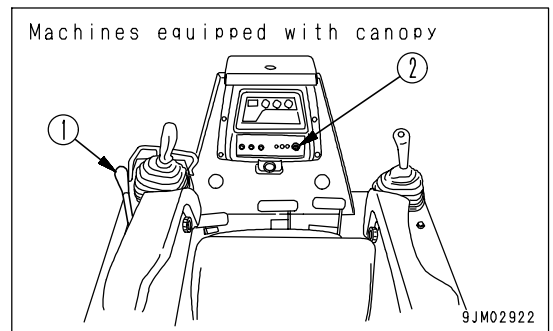
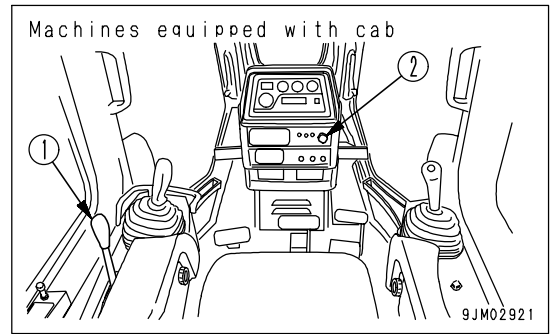


## STOPPING ENGINE

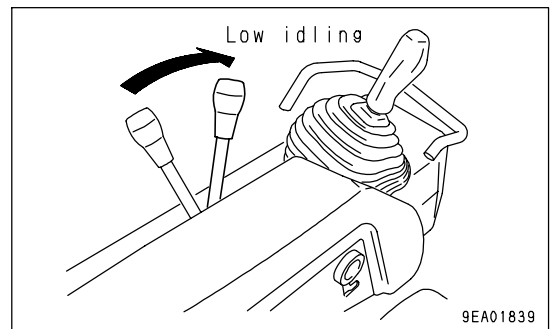
### NOTICE

If the engine is stopped without allowing it to cool down, there is danger that the service life of various parts of the engine will be reduced. Except in emergencies, never stop the engine suddenly.

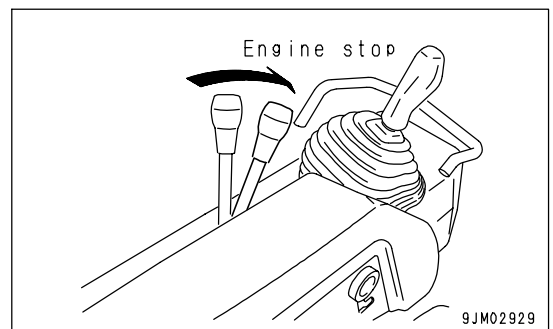
If the engine overheats, do not stop it suddenly. Run it at low speed to allow it to cool down gradually, then stop it.



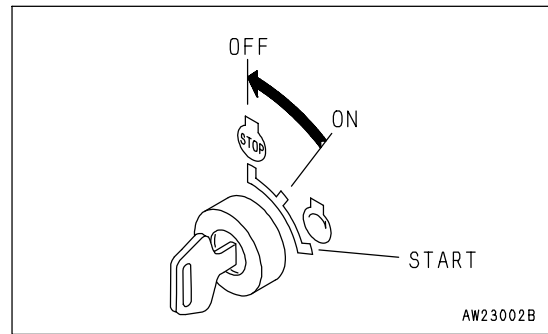
1. Lower the work equipment to the ground.
2. Place fuel control lever (1) in the low idling position and run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.



3. Place fuel control lever (1) in the engine stop position and stop the engine.



4. Turn the key in starting switch (2) to the OFF position and remove the key from starting switch (2).

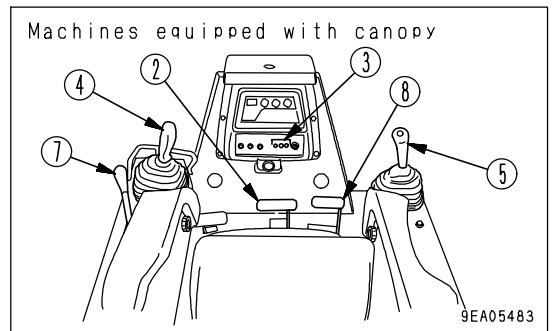
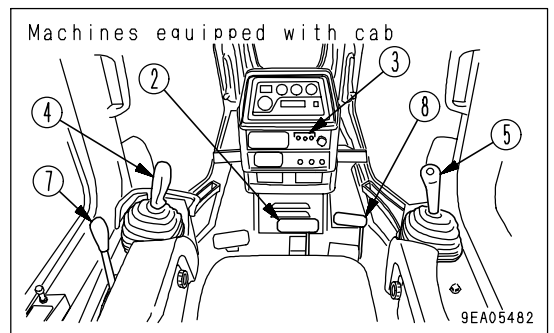
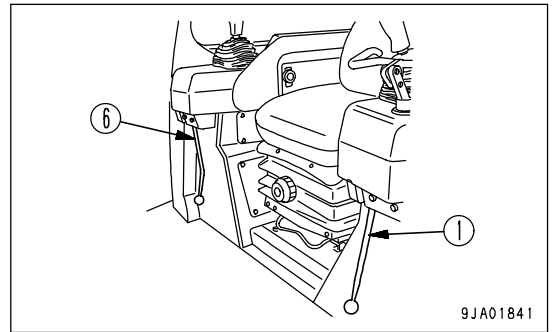


# MACHINE OPERATION

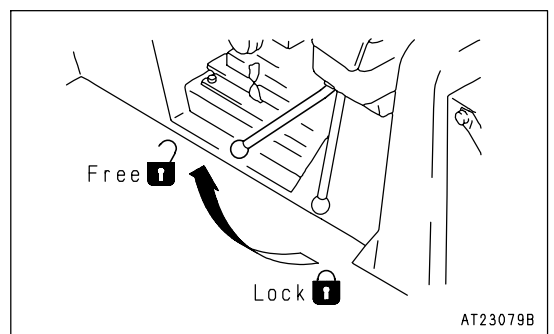
## MOVING MACHINE

**⚠ WARNING**

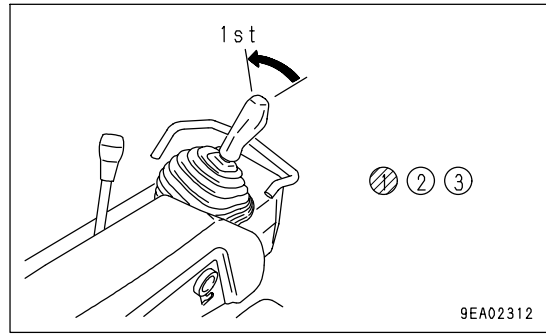
- Before moving the machine off, check that the area around the machine is a safe, then sound the horn when moving the machine off. Do not allow anybody to enter the area around the machine. The area behind the machine is a blind spot, so be particularly careful when driving in reverse.
- When starting the machine off on a slope, always keep brake pedal (2) depressed even after setting parking brake lever (1) to the FREE position.
- When starting the machine off up a steep slope, pull fuel control lever (7) fully and run the engine at full throttle. Keep brake pedal (2) depressed, set joystick (4) in 1st, then operate joystick (4) in the direction of travel. Let brake pedal (2) back slowly, and when the machine starts to move slowly (or the shoes start to slip), release brake pedal (2) fully.
- When decelerator pedal (8) is depressed on flat ground or fuel control lever (7) is at the low idling position, the machine is stopped, but the brake is not applied. On slopes, the machine may move even if the engine is running at low idling, so be particularly careful.
- On machines equipped with a backup alarm, set joystick (4) in reverse and check that the alarm sounds normally.



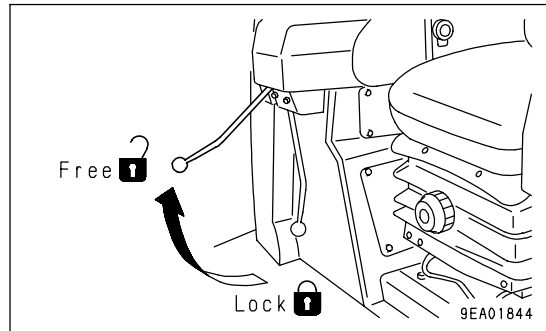
1. Set parking brake lever (1) to the FREE position.



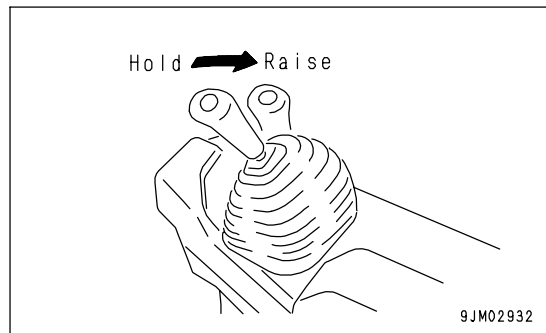
2. Operate joystick (4) to the desired position, and check that speed range display lamp (3) shows the correct position.



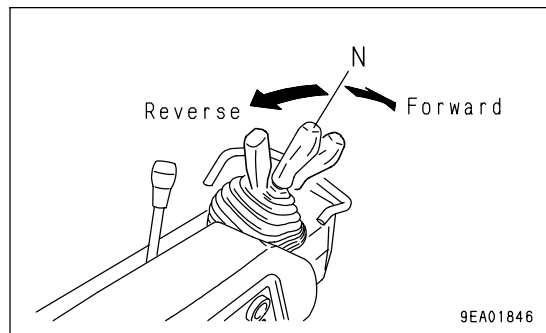
3. Set the work equipment lock lever (6) to the FREE position.



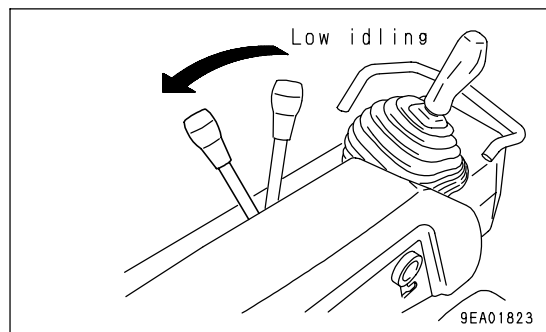
4. Put blade control lever (5) in the RAISE position to raise the blade 40 to 50 cm (16 to 20 in) off the ground.



5. Move joystick (4) to the F (forward) or R (reverse) position to move the machine off.

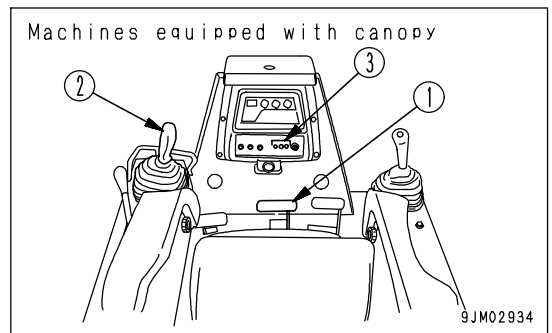
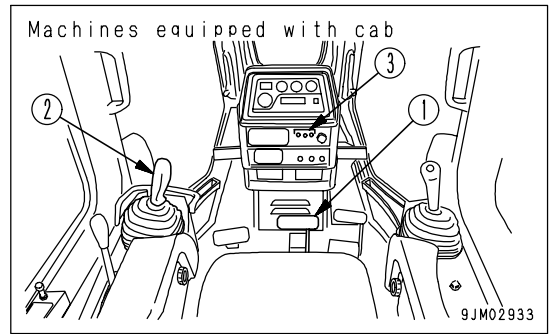


6. Pull fuel control lever (7) to increase engine speed.



STOPPING MACHINE

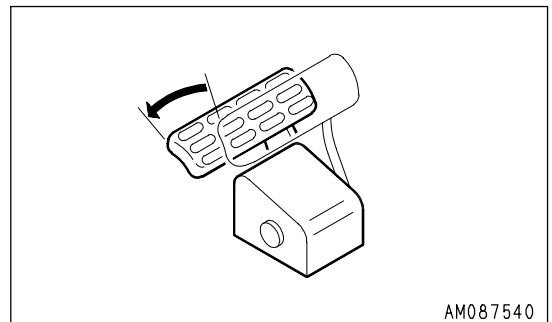
**! WARNING**  
 Avoid stopping suddenly. Give yourself ample room when stopping.



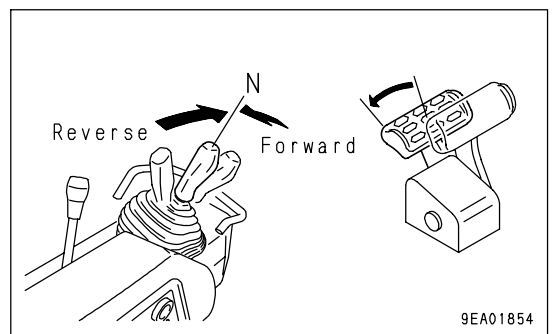
1. Depress brake pedal (1) to stop the machine.

NOTICE

If the brake is depressed when the engine speed or travel speed is high, the brake disc may make a slipping sound. Normally, depress decelerator pedal to reduce the engine speed and travel speed before depressing the brake.

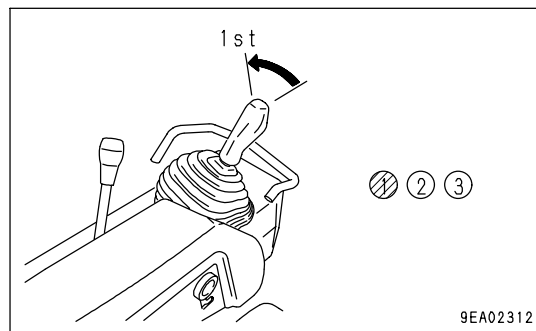


2. Return joystick (2) to the Neutral position, reduce the speed, then depress brake pedal (1) to stop the machine.



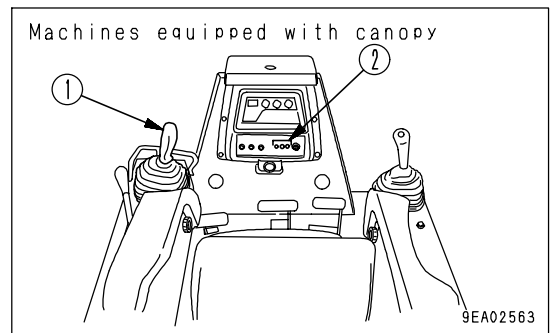
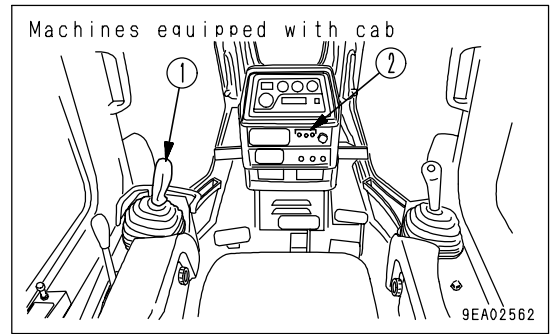


3. Operate joystick (2) to 1st, and check that speed range display lamp (3) shows the correct position.



### SHIFTING GEARS

The machine does not have to be stopped to shift gears.



1. Operate joystick (1) to the desired position.

• **Gear shifting**

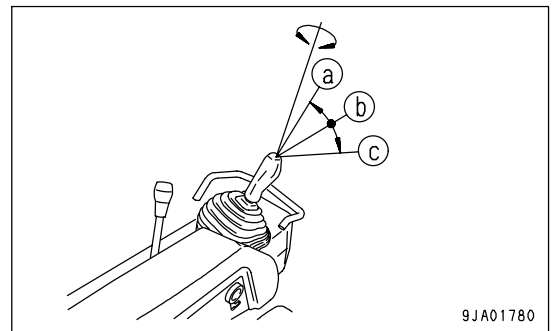
Rotate joystick 30° to carry out gear shifting operation.

Position (a): 1st gear

Position (b): 2nd gear

Position (c): 3rd gear

For the maximum travel speed in each gear speed, see "SPECIFICATIONS (PAGE 5-2)".

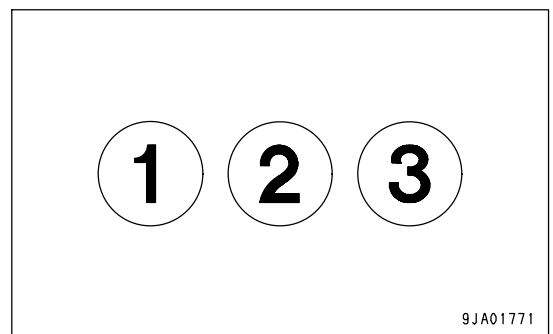


As the gear is shifted, one of the gear speed lamps (2) on the front panel lights up.

1st: Lamp 1 lights up.

2nd: Lamp 2 lights up.

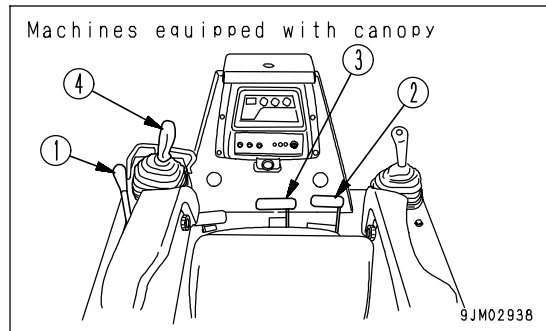
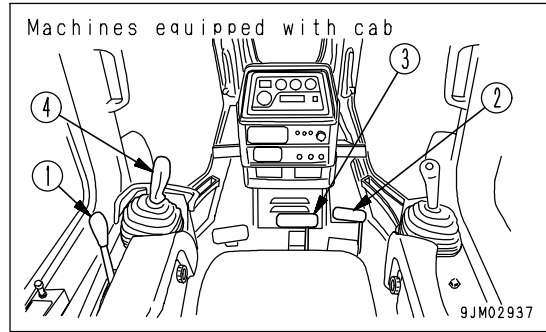
3rd: Lamp 3 lights up.



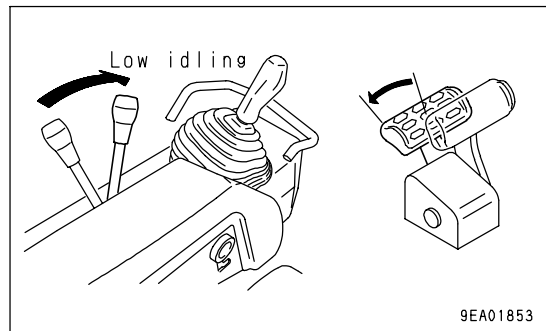
### SHIFTING BETWEEN FORWARD AND REVERSE

#### CAUTION

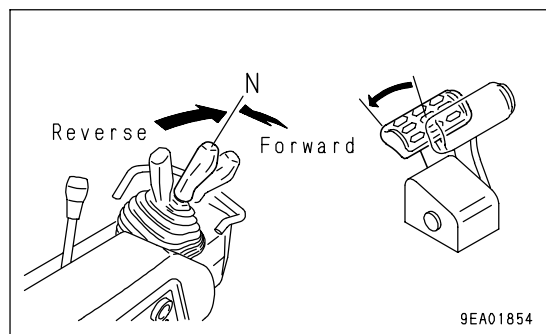
The travel direction can be changed without stopping the machine. Do not change it while the engine is running at the full speed, however, but depress the decelerator pedal to lower the engine speed before changing the travel direction for safety, comfort, and longer life of the power train.



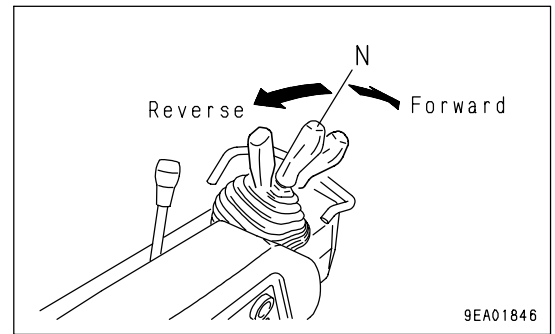
1. Set fuel control lever (1) to the LOW IDLING position or depress decelerator pedal (2) to reduce the engine speed.



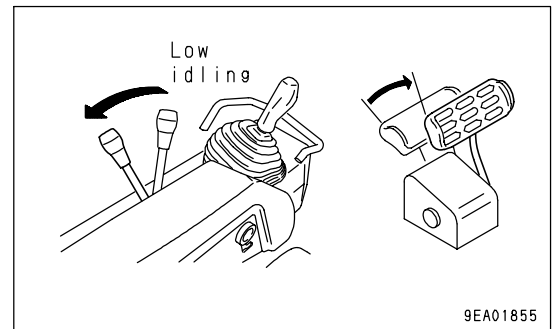
2. Depress brake pedal (3) to apply the brake.
3. Move joystick (4) to the N (neutral) position, depress brake pedal (3) further, and stop the machine.



4. Shift joystick (4) to the desired position.



5. Pull fuel control lever (1) or release decelerator pedal (2) to raise the engine speed.

**REMARK**

For machines equipped with a backup alarm, check that the backup alarm sounds when joystick is placed in REVERSE. If the alarm does not sound, please contact your Komatsu distributor.

## STEERING MACHINE

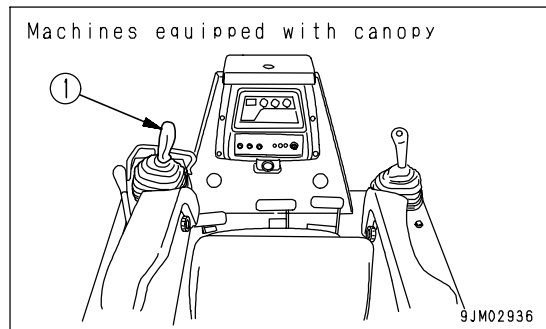
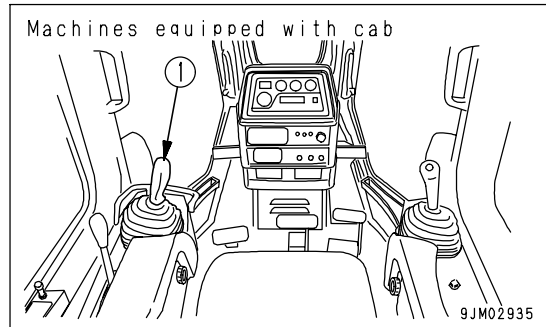


### WARNING

- Avoid as much as possible turning the machine on a slope. The machine will tend to slip sideways. Particular care should be taken on soft or clay land.
- Never try to turn the machine sharply when traveling at high speed.

## NORMAL TURNING

To turn the machine while traveling, incline steering, forward-reverse, gear shift lever (1) in the direction of the turn.



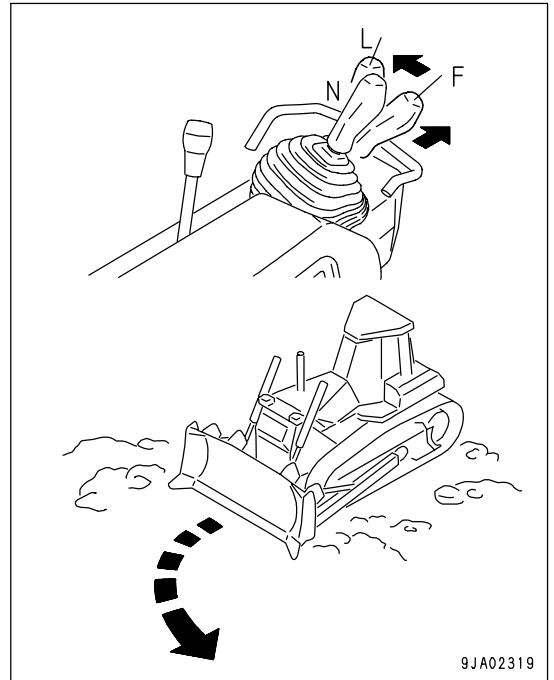
**TURNING LEFT WHILE TRAVELING FORWARD**

When steering, forward-reverse, gear shift lever (1) is operated to FORWARD and then half way to the left, the steering clutch is disengaged and the machine turns gradually to the left.

**REMARK**

To travel forward and turn gradually to the right, operate steering, forward-reverse, gear shift lever (1) to FORWARD and then move it half way to the right.

Operate in the same way when traveling in reverse.



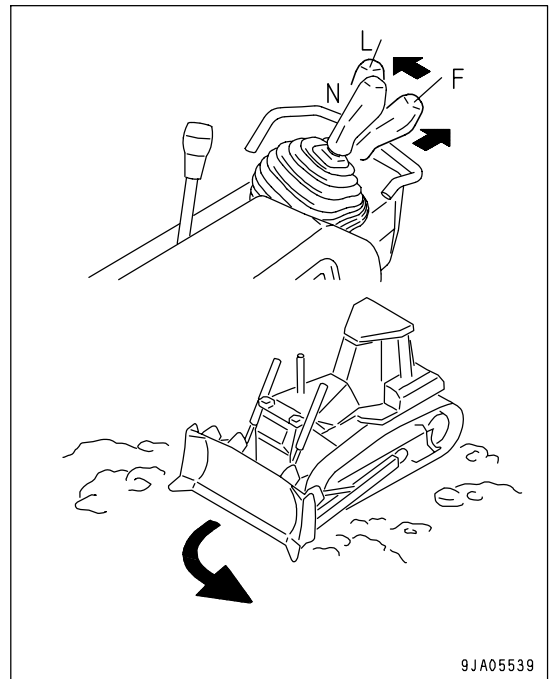
**WHEN MAKING A PIVOT TURN TO THE LEFT WHILE TRAVELING**

When steering, forward-reverse, gear shift lever (1) is operated to FORWARD and then fully to the left, the steering clutch is disengaged, the steering brake is applied, and the machine turns sharply to the left.

**REMARK**

To travel forward and turn sharply to the right, operate steering, directional, and gearshift lever (1) to forward and then move it fully to the right.

Operate in the same way when traveling in reverse.



## TURNING WHILE DESCENDING A SLOPE



### WARNING

Run the engine at low speed.

In addition, when moving very small distances, use the inching panel.

When traveling on slopes, the brake can be used even when the inching panel is being depressed, but always depress the brake with your right foot and take care to prevent the machine from falling.

### REMARK

Cross steering means the phenomenon that the machine turns in the opposite direction to the actual steering direction.

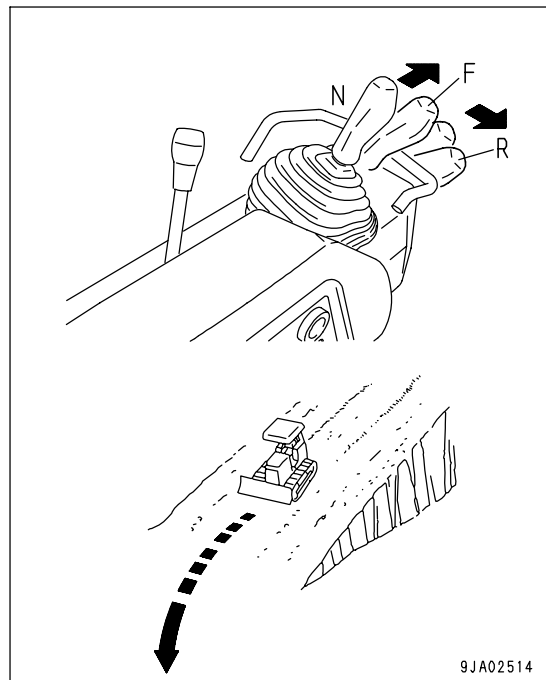
### WHEN TURNING TO THE LEFT GRADUALLY WHILE TRAVELING FORWARD

When steering, forward-reverse, gear shift lever (1) is operated to FORWARD and then half way to the right, the machine turns gradually to the left. (Reverse steering)

### REMARK

To travel forward and turn gradually to the right, operate steering, forward-reverse, gear shift lever (1) to forward and then move it half way to the left. (Reverse steering)

Operate in the same way when traveling in reverse.



9JA02514

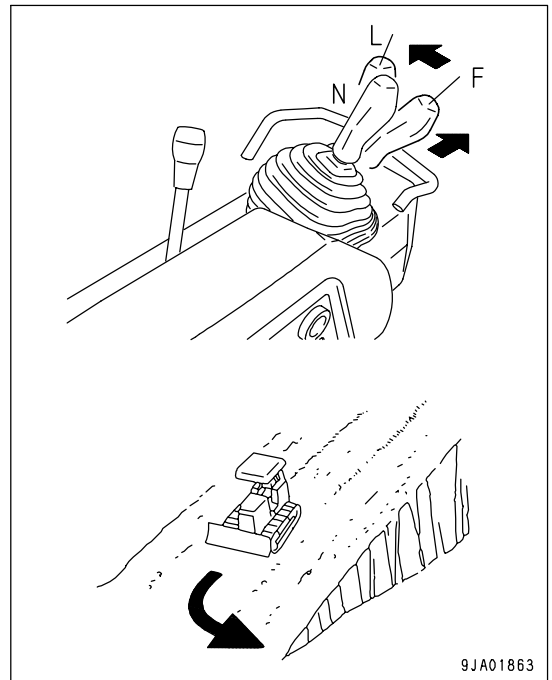
**WHEN TURNING TO THE LEFT SHARPLY WHILE TRAVELING FORWARD**

If the steering, forward-reverse, gear shift lever (1) is pushed forward and moved fully to the left (L), the machine turns sharply to the left. (Does not become cross steering)

**REMARK**

When making sharp turns to the right, push the steering, forward-reverse, gear shift lever (1) forward, and move it fully to the right. (Does not become cross steering)

Do the same when traveling in reverse.





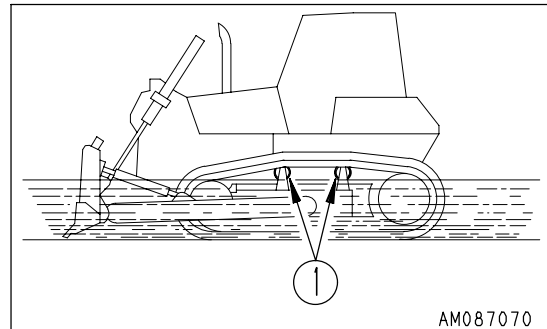
## PRECAUTIONS FOR OPERATION

### PAY ATTENTION TO GAUGES

If the transmission oil temperature gauge enters the red range during operations, reduce the load and wait for the temperature to go down.

### PERMISSIBLE WATER DEPTH

When operating in water, always keep the bottom of carrier rollers (1) above the surface of the water. Also, be careful that the engine cooling fan will not come in contact with water. The fan can be damaged.



## PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

### METHOD OF USING DECELERATOR PEDAL

When stepping on the decelerator pedal while going uphill, climbing ability will be reduced and the machine will stop. Furthermore, the engine may stall.

### USE ENGINE AS BRAKE

When going downhill, move the steering, forward-reverse, gear shift lever into low speed to run engine at slow speed and travel down slope using the engine as a brake.

Do not move the steering, forward-reverse, gear shift lever to the N (neutral) position.

When traveling down hills of more than 15°, shift down to 1st speed.

### BRAKING WHEN TRAVELING DOWNHILL

While descending a slope using the engine as a brake, also apply the brakes.

Failure to brake may result in overrunning, causing engine trouble.

## PRECAUTIONS ON SLOPES

### BE CAREFUL OF FUEL LEVEL

If the fuel level in the fuel tank becomes low when working on slopes, the engine may suck in air because of the angle of the machine or the swaying of the machine. This makes the engine stop, so be careful not to let the fuel level in the fuel tank become too low.

### BE CAREFUL OF OIL LEVEL

When operating machine on sloped areas of more than 20°, fill all appropriate components with oil to H level.

### PRECAUTIONS WHEN ENGINE STOPS ON SLOPES

If the engine stops while working or traveling on a hill, immediately depress the brake pedal to bring the machine to a complete stop.

## METHOD OF USING BRAKES

The following actions cause premature damage to the brakes, so avoid such operations.

- Using emergency brake at full speed
- Using brake with engine running at full speed in first gear (F1, R1) (Machine stall condition)

## REMARK

Always depress the decelerator pedal to lower the engine speed before actuating the brakes.

## IT IS PROHIBITED TO KEEP THE DOOR OPEN DURING OPERATIONS

(Machine equipped with cab)

Always keep the door closed when traveling or carrying out operations.

If the door is open, there is danger of damage from obstacles or strong vibration.

## IT IS PROHIBITED TO MODIFY THE CAB GLASS IN ANY WAY THAT WILL OBSTRUCT THE VIEW

(Machine equipped with cab)

- For safety reasons, do not install anything on the cab glass that will obstruct the view.
- Always keep the glass clean to ensure safety during operations.

## PRECAUTIONS FOR BLIND SPOTS CAUSED BY CAB AND ROPS STRUCTURES

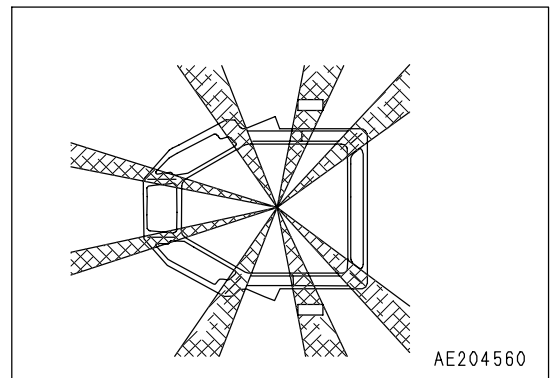
(Machine equipped with cab)



### WARNING

The cab structure may cause blind spots.

When operating, always be sure to check carefully that there is no obstacle or worker in the surrounding area.

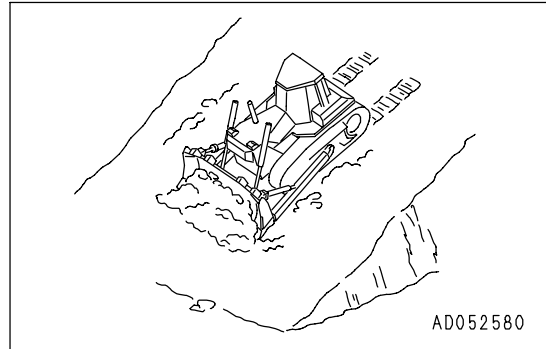


## WORK POSSIBLE USING BULLDOZER

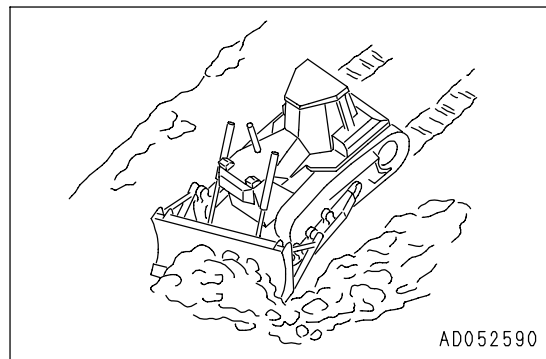
In addition to the following, it is possible to further increase the range of applications by using various attachments.

### DOZING

A bulldozer digs and transports dirt in a forward direction. Slope excavation can always be most effectively carried out by proceeding from the top downward.



When dozing toward one side only, operate with angled blade (angledozer only).

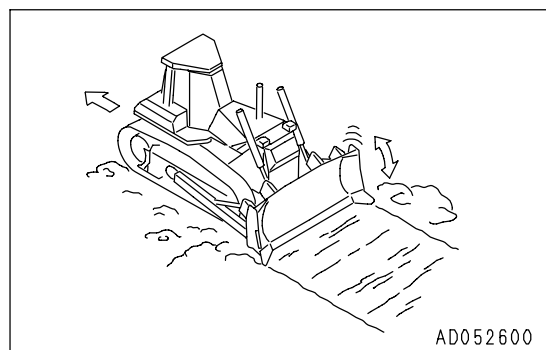


### SMOOTHING

#### NOTICE

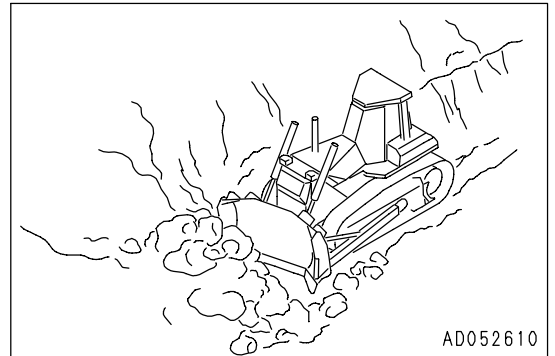
**Avoid smoothing on rocky or stony ground. It can damage the blade.**

To finish the ground to a flat surface after digging or leveling, put a full load of soil in front of the blade and operate the blade up and down in small movements while traveling forward. Finally, place the blade at FLOAT and travel at low speed in reverse while pulling the blade over the ground surface. Before doing this, hold the lever by hand at the FLOAT position for at least 1 second to make sure that it stays in position. To prevent damage to the blade, be careful not to travel over any stones or rocks.



### CUTTING INTO HARD OR FROZEN GROUND OR DITCHING

For digging and ditch excavation of hard or frozen ground, tilt the blade. Even hard ground can be dug effectively by a tilted or angled blade.



### FELLING TREES, REMOVING STUMPS

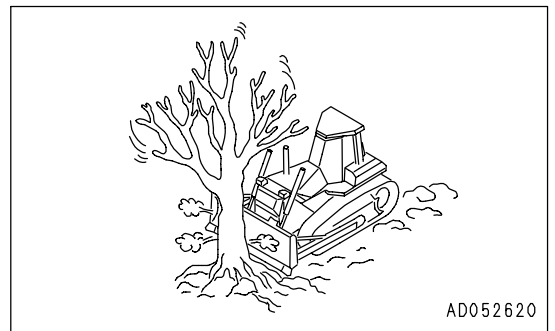
#### NOTICE

**Do not uproot trees or stumps or fell trees by angling or tilting the blade.**

For trees with a diameter of 10 to 30 cm (3.9 to 11.8 in), raise the blade high and push 2 or 3 times to fell the tree.

Next, travel in reverse, and dig the corner of the blade into the ground to cut and dig up the roots.

When doing this, never hit the tree at high speed or apply shock to fell the tree.



## ADJUSTING POSTURE OF WORK EQUIPMENT

### METHOD OF ANGLING BLADE

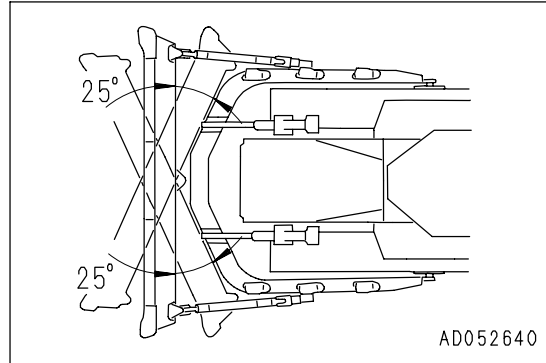
Angledozer only

When dozing toward one side only, operate with angled blade.



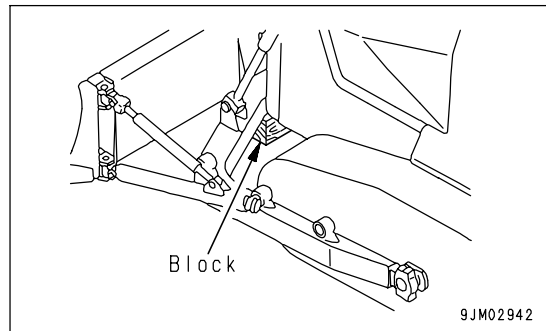
### WARNING

- When adjusting the amount of angling, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.
- Be careful when removing arm (2). After arm (2) is removed, the blade can move freely.



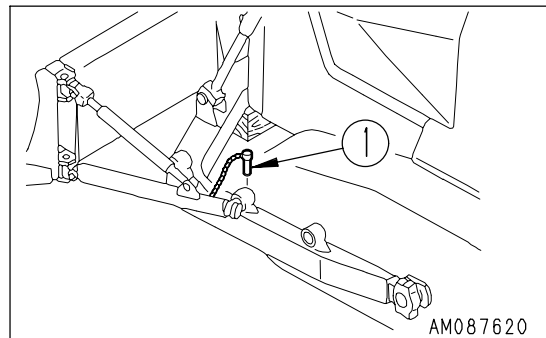
AD052640

1. Raise the blade 400 to 500 mm (15.8 to 19.7 in) above the ground, then put blocks under the frame so that the blade does not come down.

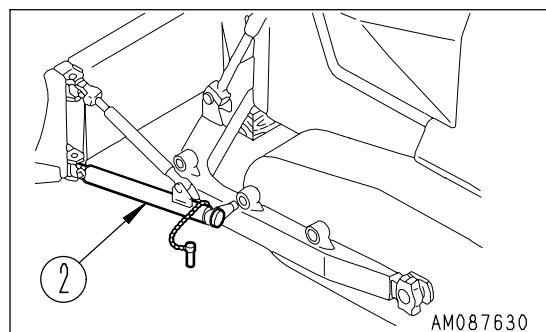


9JM02942

2. Remove pins (1) on the left and right sides, then remove arm (2) from the frame.

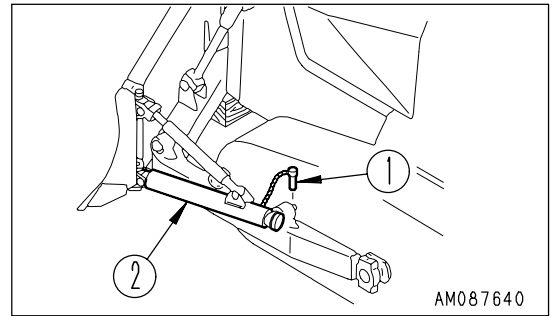


AM087620



AM087630

3. Insert arm (2) into the desired position on the bracket on top of the frame (3 places on each side), and insert pins (1).



**ADJUST AMOUNT OF TILT**

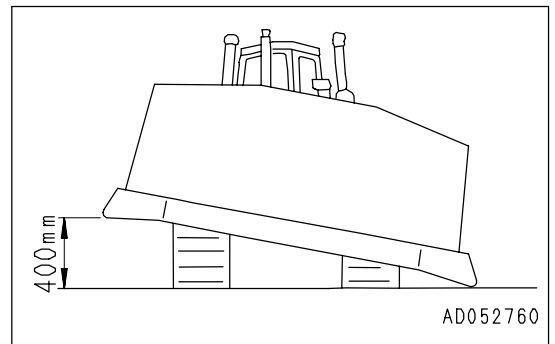
Angledozers only

**! WARNING**

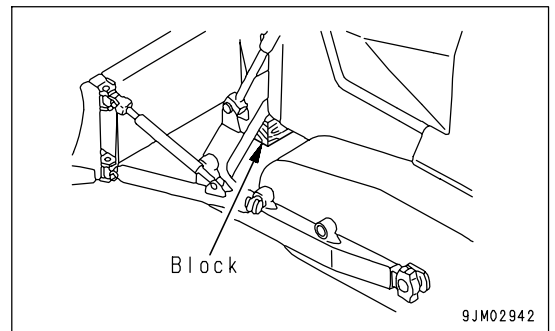
When adjusting the amount of tilt, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.

**NOTICE**

The maximum amount of tilt is 400 mm (15.8 in). Be sure not to exceed 400 mm (15.8 in).



1. Raise the blade 400 to 500 mm (15.8 to 19.7 in) above the ground, then put blocks under the frame so that the blade does not come down.



2. Loosen the bolt (1) of the brace, insert a suitable bar into hole (2) of the brace, and turn it.

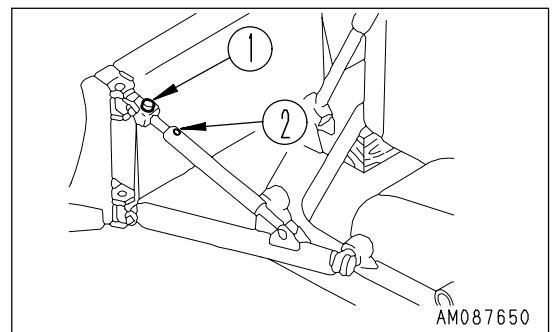
**REMARK**

When turning the brace with bar, keep the blade above the ground.

Right tilt: Make right side shorter, left side longer

Left tilt: Make left side shorter, right side longer

3. Tighten set bolt (1).



### ADJUST ANGLE OF BLADE EDGE

(Power tilt dozer)

**! WARNING**

It is dangerous if the work equipment moves by mistake when adjusting angle of the blade edge. Set the work equipment in a stable condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.

Adjust the angle ( $\theta$ ) of the blade edge to match the type of soil.

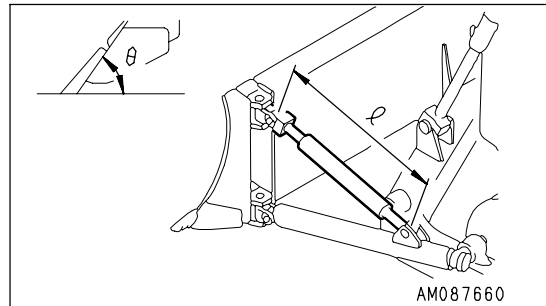
#### ANGLE DOZER

The angle of the blade edge of the angle dozer cannot be adjusted.

The standard for the cutting angle is 55 degrees.

The standard for the distance between the joints is shown below ( $\ell$ ).

| Model | Standard<br>mm (in) | Use Range<br>mm (in)         |
|-------|---------------------|------------------------------|
| D65E  | 1127<br>44.4        | 1117 - 1137<br>(44.0 - 44.8) |
| D65P  | 1096<br>(43.2)      | 1086 - 1106<br>(42.8 - 43.6) |



#### POWER TILTDOZER

Power tilt dozer with screw-adjustable tilt brace.

Turn the brace with bar handle (1) and the distance ( $\ell$ ) between the joints to change the cutting angle ( $\theta$ ) as follows.

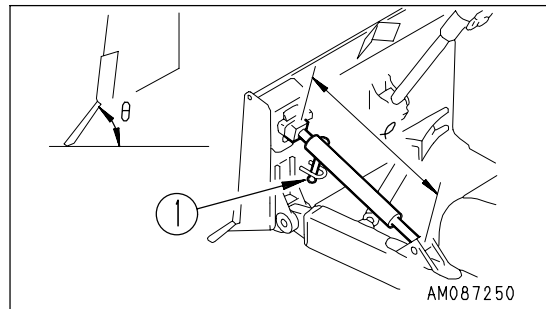
INCREASE distance ( $\ell$ ) to INCREASE angle ( $\theta$ )  
 DECREASE distance ( $\ell$ ) to DECREASE angle ( $\theta$ ).

The standard for the cutting angle is 55 degrees.

The standard for the distance between the joints is shown below ( $\ell$ ).

D65E: 1150 mm (45.3 in)

D65P: 1146 mm (45.2 in)



#### REMARK

It is impossible to adjust blade angle of stable tilt brace.

The standard for the cutting angle is 55 degrees.

**ADJUSTING SHIMS IN ASSEMBLING WORK EQUIPMENT**

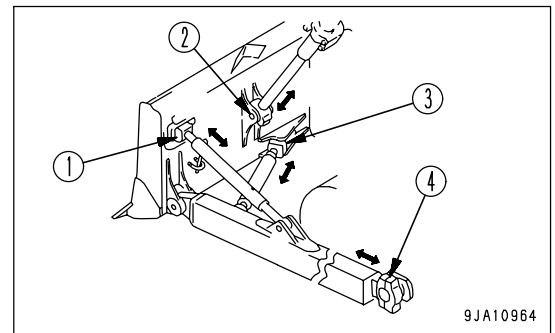
When assembling the work equipment, if the adjustment of the play is not carried out properly, excessive bending stress will be generated at all parts, and this will lead to cracks or breakage.

Adjust the play of parts (1) to (4) to the correct value. For details, see "ADJUSTING SHIMS, ADJUSTING TENSION AT WORK EQUIPMENT LINKS (PAGE 4-36)".

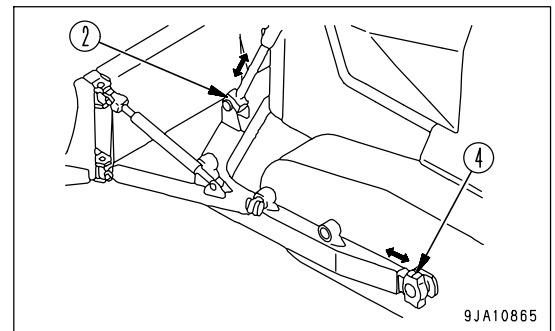
- When disassembling the machine for transportation, be careful not to lose the shims.

| Shim adjusting position     |            | (1)<br>Tilt                  | (2)<br>Lift                  | (3)<br>Center                | (4)<br>Trunnion              |
|-----------------------------|------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Item                        |            |                              |                              |                              |                              |
| Optimum value               | mm<br>(in) | 0.2 - 0.7<br>(0.008 - 0.028) | 0.2 - 0.7<br>(0.008 - 0.028) | 0.2 - 0.7<br>(0.008 - 0.028) | 0.2 - 1.2<br>(0.008 - 0.047) |
| Thickness of standard shims | mm<br>(in) | 5<br>(0.197)                 | 4<br>(0.158)                 | 5<br>(0.197)                 | 10<br>(0.4)                  |

- Power tiltdozer
- Powertilt, Power pitch dozer
- Semi U-dozer



- Angledozer



**ADJUSTING TENSION OF CENTER BRACE**

- (Power tilt dozer)
- (Powertilt, Power pitch dozer)
- (Semi-U dozer)

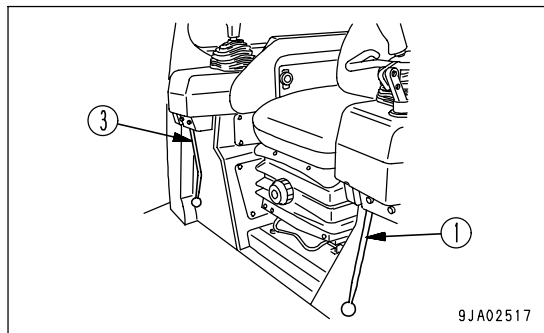
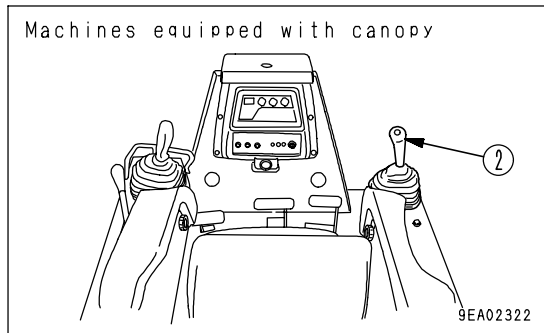
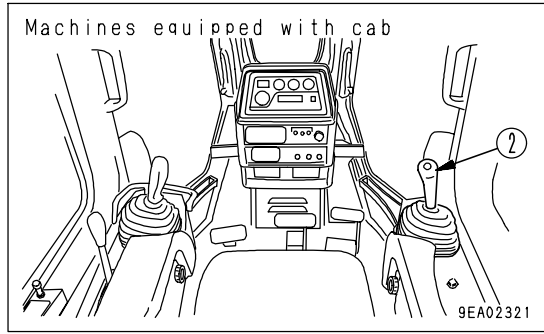
If the work equipment assembly is removed for transportation and is assembled again after transportation, the tension of the center brace must be adjusted. If this is not done, the bushing at the connecting part of the blade and straight frame will come out, and sand and soil will enter. This will cause premature wear or damage of the bushing. Adjust the tension of the center brace. For details, see "ADJUSTING SHIMS, ADJUSTING TENSION AT WORK EQUIPMENT LINKS (PAGE 4-36)".



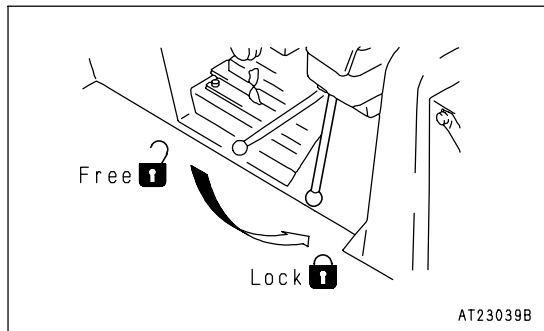
# PARKING MACHINE

## WARNING

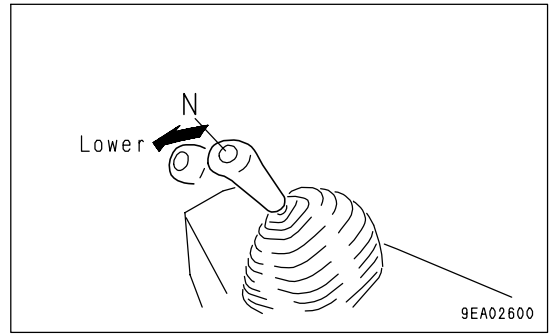
- When stopping the machine, select flat hard ground and avoid dangerous places.  
If it is unavoidably necessary to park the machine on a slope, place the parking brake lever in the LOCK position and insert blocks underneath the track shoes. As an additional safety measure, thrust the blade into the ground.
- If the work equipment control lever is touched by accident, the work equipment may move suddenly, and this may lead to a serious accident. Before leaving the operator's seat, always operate the work equipment lock lever and parking brake lever to place it securely at the LOCK position.



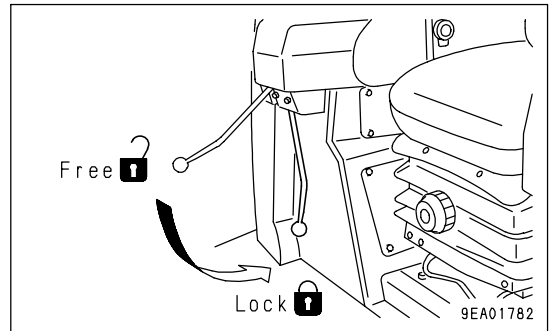
1. Stop the machine. For details, see "STOPPING MACHINE (PAGE 3-77)".
2. Set parking brake lever (1) to the LOCK position and apply the parking brake.



3. Move blade control lever (2) to the LOWER position, and lower the blade to the ground.



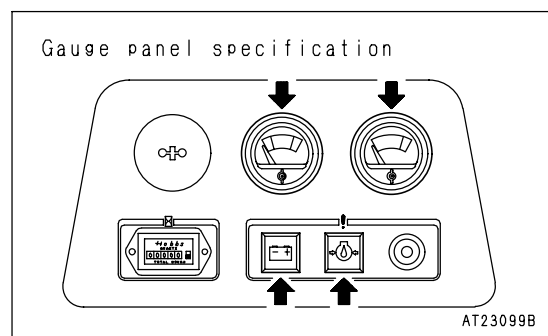
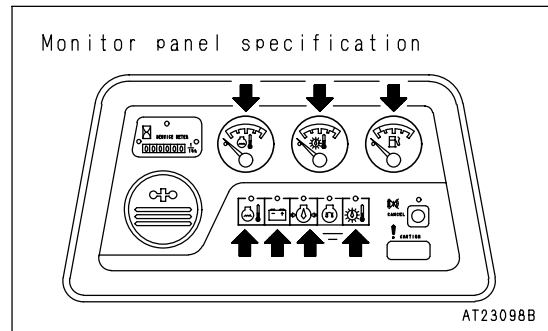
4. Set the work equipment lock lever (3) in the LOCK position.



## CHECK AFTER FINISHING WORK

### BEFORE STOPPING ENGINE

Use the meters and caution lamps to check the engine coolant temperature, engine oil pressure, fuel level, and transmission oil temperature.



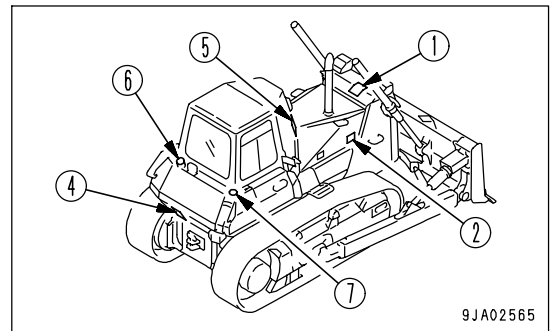
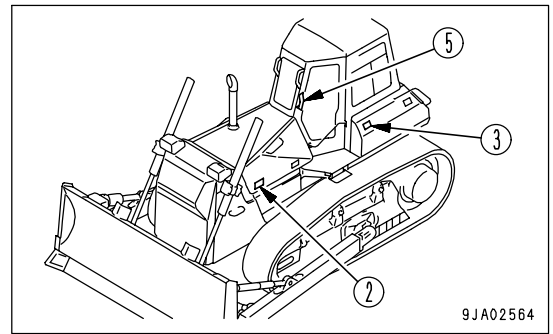
### AFTER STOPPING ENGINE

1. Walk around the machine and check the work equipment, machine exterior, and undercarriage, also check for any leakage of oil or coolant. If any problems are found, repair them.
2. Fill the fuel tank.
3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.
4. Remove any mud affixed to the undercarriage.

## LOCKING

To prevent vandalism, there are locks in the following places.  
Places that can be locked with the starting switch key.

- Top cover at front of chassis (1)
- Right and left engine side covers (2)
- Battery inspection cover (3)
- Inspection cover for fuel tank drain valve(4)
- Cab door opener (5) (machines equipped with cab)
- Fuel tank filler cap (6)
- Hydraulic tank filler cap (7)

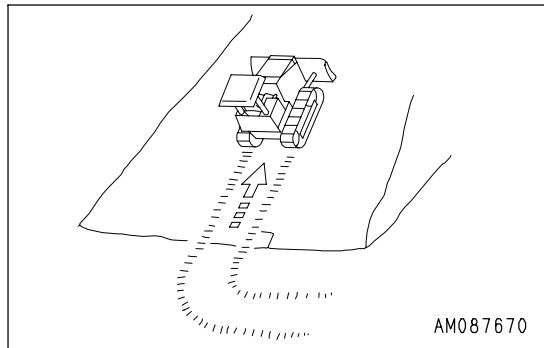


### TIPS FOR LONGER UNDERCARRIAGE LIFE

Undercarriage life greatly varies depending on operation method, inspection and maintenance. For most efficient operation, keep the following points in mind.

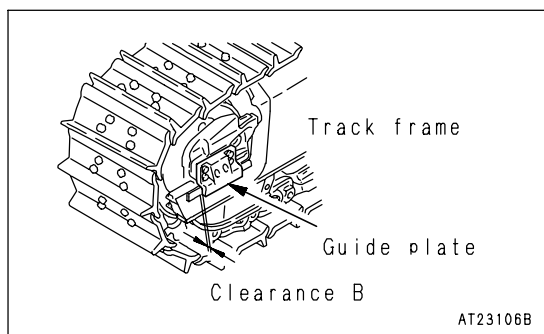
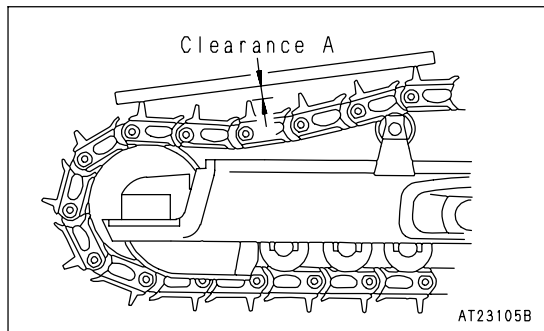
### OPERATION METHOD

- Select the track shoe that best suits the type of soil to be encountered in service.  
Please consult your Komatsu distributor when selecting track shoes.
- Do not allow shoe slipping to occur during operation.  
If shoe slipping occurs, reduce load on the blade until slipping stops.
- Avoid sudden starts, acceleration or stops, unnecessary high speeds and sharp turns.
- Always operate machine in a straight line whenever possible. When making turns, be careful not to allow the machine to stay to one side, so operation in both turning directions can be done properly. Make turns with the largest possible radius.
- Prior to operation, clear boulders and obstacles to prevent machine from riding over them while operating.
- On a slope, operate the machine parallel to the inclination of the slope. Do not operate across the slope. Also when stopping the machine on a slope, the machine should face the top of the slope.
- When ground inclines to the left or right during digging operations, do not continue to dig with the incline. Move the machine back to level ground and start to dig again.
- Do not force the machine to carry out work that exceeds its working capability. Such work includes cases where the idler or sprocket come off the ground when the machine meets obstacles that resist the power of the machine during dozing or ripping operations.



### INSPECTION AND ADJUSTMENT

- Properly adjust the track tension.  
The tension should be measured at clearance (A) between the idler and carrier roller shown in the right diagram - usually 20 to 30 mm (0.8 to 1.2 in) at this point. For rocky terrain, tighten the tracks slightly. In clay or sandy areas, loosen them slightly. (For inspection and adjustment procedures, refer to "CHECK TRACK SHOE TENSION, ADJUST (PAGE 4-24)")
- Check idler rollers for oil leakage as well as for loose bolts and nuts. If any trouble is detected, repair immediately.
- Check clearance (B) between the idler guide plate and track frame. If clearance (B) increases, idler may move sideways and the tracks may come off. (For inspection and adjustment procedure, refer to "ADJUST IDLER CLEARANCE (PAGE 4-34)".)



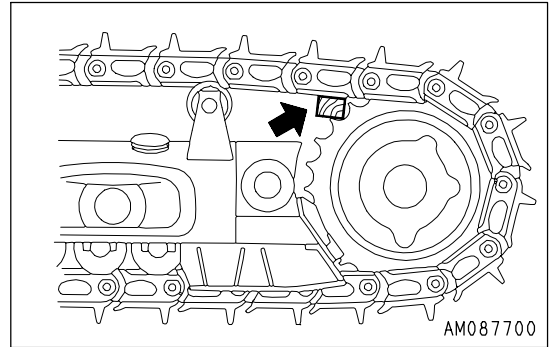
**INSPECTION AND REPAIR**

Frequent inspection and prompt repair will reduce repair costs.

The following items for inspection will serve as a guide to maintenance service of each undercarriage part. Perform periodical inspection and contact the Komatsu distributor in your area when machine has approached repairable limits and reversing limits.

**MEASURING LINK PITCH**

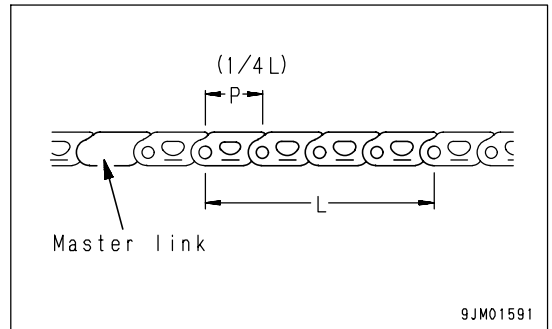
1. Insert a wooden block between track shoe and sprocket to take up the slack in track shoes.



2. Measure pitch length of 4 links in stretched portion at least 2 links away for master pin. Of length obtained, 1/4 is the link pitch.

- Basic link pitch (P): 203 mm (8.0 in)
- Link pitch limit for turning: 206 mm (8.1 in)

There is no link window on the master link.



**REMARK**

The measured value under decimal of link pitch is different from the basic value depending upon the precision of measure or the tolerance of product even if it isn't worn out.

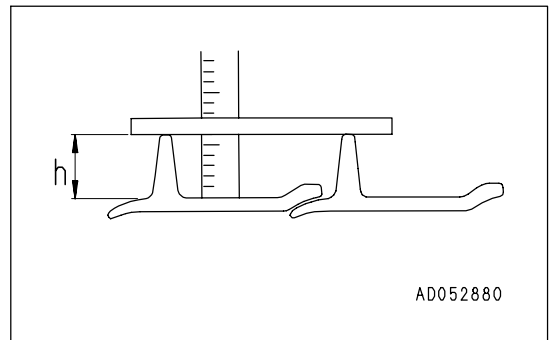
Don't judge it's worn out too soon, do it with the trend of measured value after that.

**MEASURING HEIGHT OF GROUSER**

(D65E)

After taking up slack in track shoes, measure height at center of shoe as shown below.

- Standard height (h): 65 mm (2.6 in)
- Repair limits: 25 mm (1.0 in)

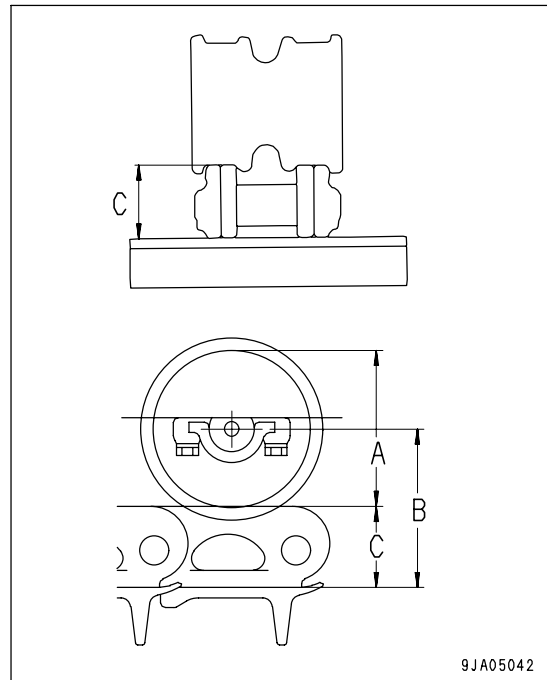


**MEASURING OUTSIDE DIAMETER OF TRACK ROLLER**

1. Measure the height (dimension C) of the link tread as shown in the diagram.
2. Stop machine at position where link tread, whose size C has been measured completely, contacts roller tread. Then measure size B.
3. Calculate outside diameter of tread (size A):

$$A = (B - C) \times 2$$

- Standard size (A): 210 mm (8.3 in)
- Repair limits: 174 mm (6.9 in)



## TRANSPORTATION

When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

### TRANSPORTATION MEANS

As a rule, transport the machine on a trailer.

Select a trailer according to the mass and dimensions of the machine shown in "SPECIFICATIONS (PAGE 5-2)".

Note that the mass and dimensions for transportation shown in SPECIFICATIONS depend on the types of shoe, blade, etc.

### REMOVING CAB

If it is necessary to remove the cab for transportation, there is danger that the seal may be damaged when removing or installing the cab, so please contact your Komatsu distributor.

When installing the cab, please contact your Komatsu distributor, too.



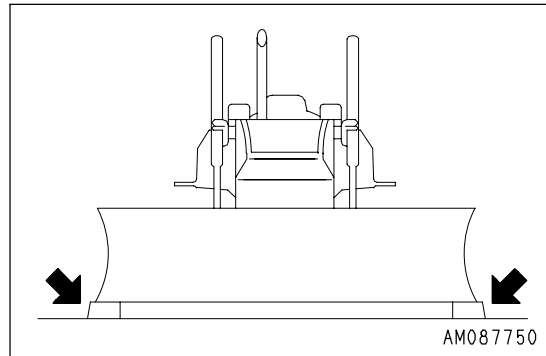
**PRECAUTIONS WHEN REMOVING WORK EQUIPMENT**

If there is any pressure remaining in the tilt piping after the work equipment has been removed, it may be difficult to remove the quick coupler of the tilt hose, so remove the work equipment as follows.

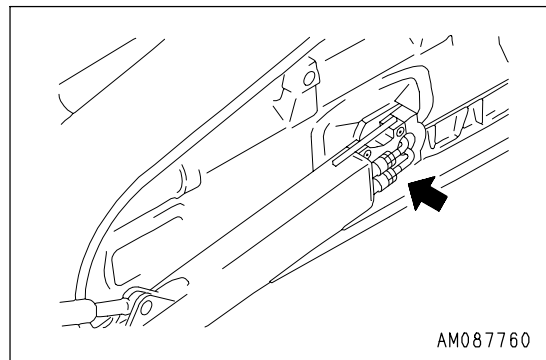
1. Lower the blade to the ground and set it horizontal to the ground surface.

**REMARK**

If the blade is tilted, the tilt piping will be under internal pressure, so set the blade horizontal to the ground.



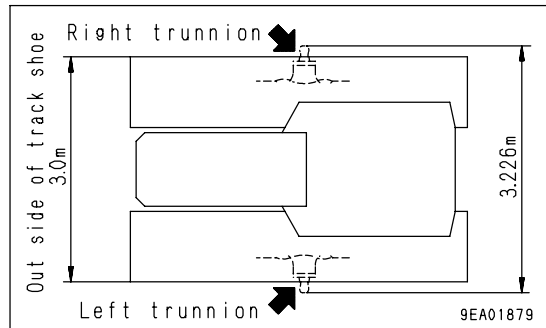
2. Remove the quick coupler, then remove the work equipment assembly.



3. Remove the left and right trunnions.  
(D65P)

**REMARK**

- In the case of D65P, remove the left and right trunnions.
- In the case of D65E, the width including the left and right trunnions is within 3.0 m (118.2 in), so there is no need to remove them.
- In the case of D65E with 3 m semi-U blade, the blade width is within 3.0 m (118.2 in), so there is no need to remove the work equipment.



4. Tie the tilt hose with a band to prevent it from being damaged.

**LOADING, UNLOADING WORK**

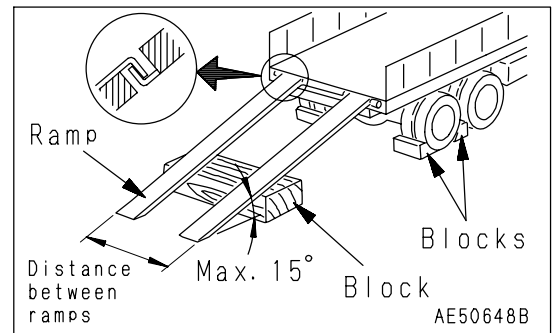
**! WARNING**

- Since loading and unloading of the machine is dangerous, be extremely careful.
- When loading or unloading the machine, operate it slowly with the engine speed low and the transmission in the 1st gear.
- Use ramps having sufficient width, length, thickness, and strength. Install them securely and set their angle to 15° or less. If the ramps are deflected appreciably, reinforce them with blocks.
- Perform the loading work of the machine on firm, level ground. Secure sufficient distance between the shoulder of the road and the trailer.
- Remove mud from the undercarriage of the machine so that the machine will not slip sideways on the ramps. In addition, remove water, snow, ice, grease, oil, etc. from the ramps.
- Never steer the machine on the ramps, since steering on the ramps can cause the machine to tip over. If it is necessary to change the travel direction, return to the ground or to the bed of the trailer, then change the travel direction.
- The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.

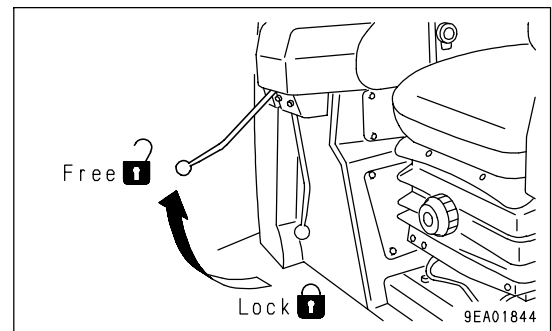
When loading or unloading, always use ramps or a platform. Proceed as follows.

**LOADING WORK**

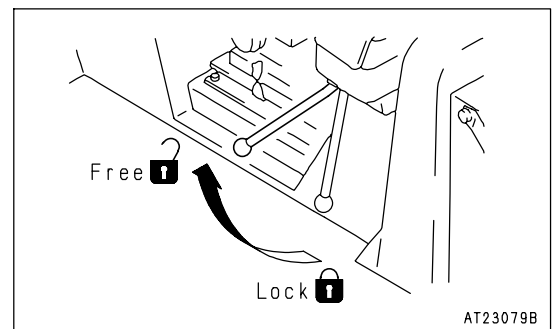
1. Load and unload on firm level ground only.  
Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move.  
Make the slope of the ramps a maximum of 15°.



3. Start the engine.  
In a cold weather, carry out an engine warming-up run, referring to the section, "STARTING IN COLD WEATHER (PAGE 3-71)", in this manual.
4. Set the work equipment lock lever to the FREE position.
5. Raise the blade.



6. Set parking brake lever to the FREE position.
7. Set the transmission in the 1st gear and run the engine at low idle.
8. Set the travel direction toward the ramps and drive slowly.
9. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
10. Stop the machine at the specified position on the trailer.



SECURING MACHINE

**! WARNING**

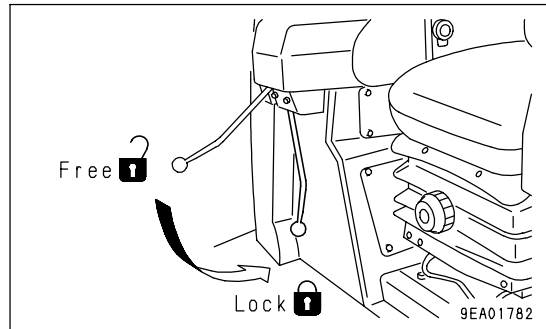
When the edge of the blade protrudes beyond the trailer, angle the blade. (Angledozer)

NOTICE

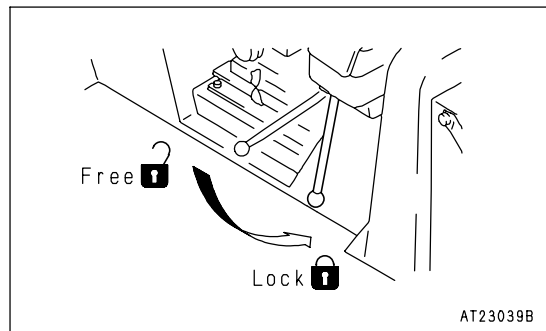
Be sure to retract the car radio antenna (if the machine equipped with cab).

Load the machine onto a trailer as follows:

1. Lower the work equipment slowly.
2. Lock brake control levers securely with the work equipment lock lever.



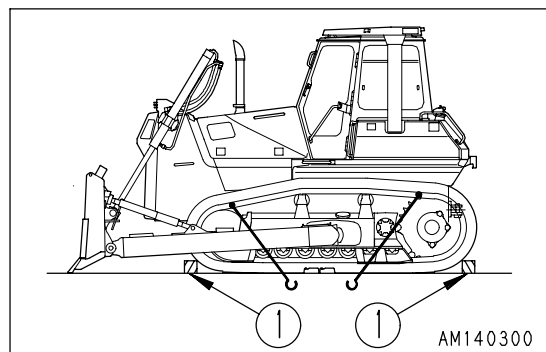
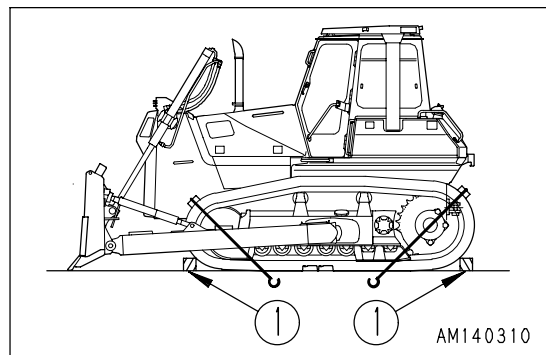
3. Set the parking brake lever to the LOCK position.
4. Set the fuel control lever to the ENGINE STOP position to stop the engine, then turn the starting switch to the OFF position and remove the key.



5. Fix the machine as explained below so that it will not move during transportation.

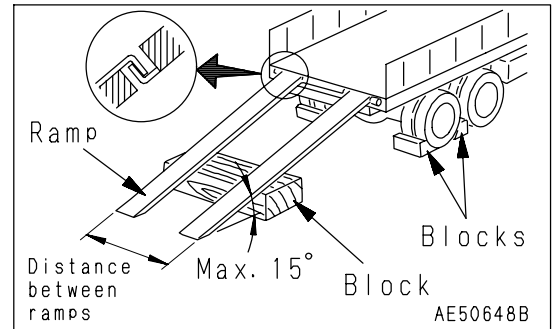
In particular, fix the machine securely to prevent it from slipping sideways.

- 1) Put blocks (1) in front and behind the track shoes of both sides.
- 2) Set up chain or wire, following (A) or (B).
  - A: Secure chain or wire around the track shoes.
  - B: Secure chain or wire through the holes of track links.
- 3) Protect the wire from contacting directly with angular parts of the machine, by inserting pads.



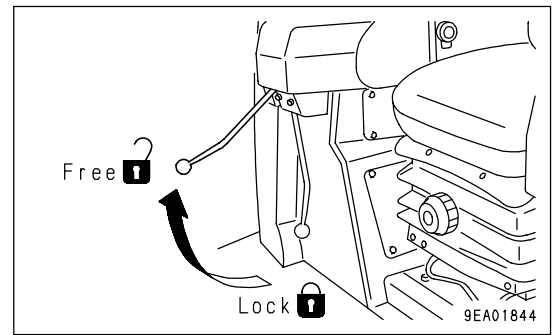
**UNLOADING WORK**

1. Load and unload on firm level ground only. Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move.  
Make the slope of the ramps a maximum of 15°.
3. Remove the chains and wire ropes fastening the machine.

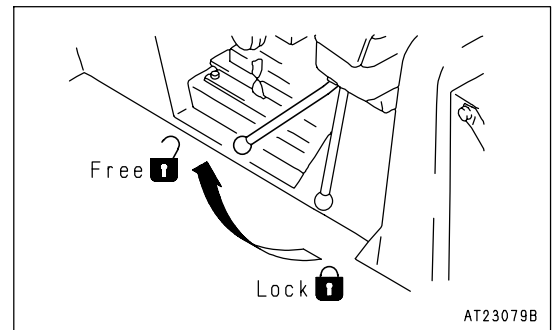


4. Start the engine.  
In a cold weather, carry out an engine warming-up run, referring to the section, "STARTING IN COLD WEATHER (PAGE 3-71)", in this manual.

5. Set the work equipment lock lever to the FREE position.
6. Raise the blade.



7. Set parking brake lever to the FREE position.
8. Set the transmission in the 1st gear and run the engine at low idle.
9. Set the travel direction toward the ramps and drive slowly.
10. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
11. Drive down the ramps slowly and carefully until the machine leaves the ramps perfectly.



## LIFTING MACHINE



### WARNING

- Do not lift the machine with any worker on it.
- Use wire ropes having sufficient strength for the weight of the machine.
- Lift the machine only in the position shown below. If it is lifted in another position, it may be unbalanced.
- Lift the machine level.

### NOTICE

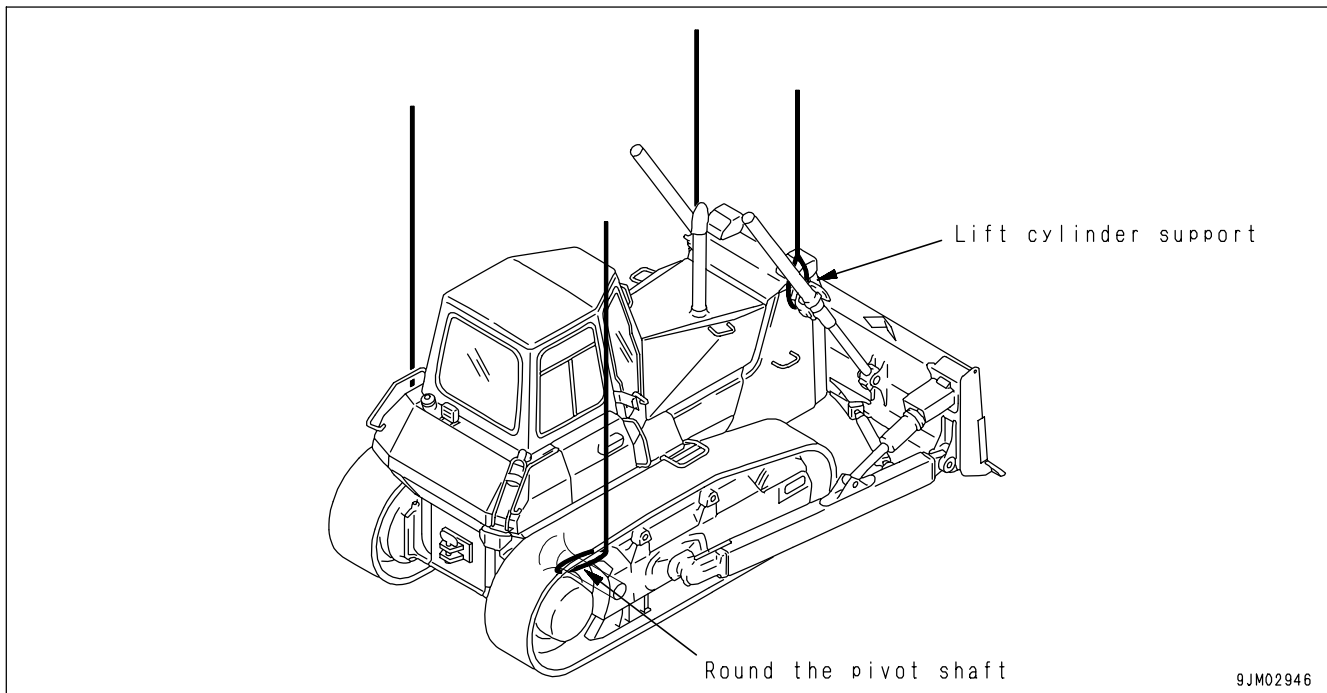
This method of lifting applies to the standard specification machine.

The method of lifting differs according to the attachments and options installed.

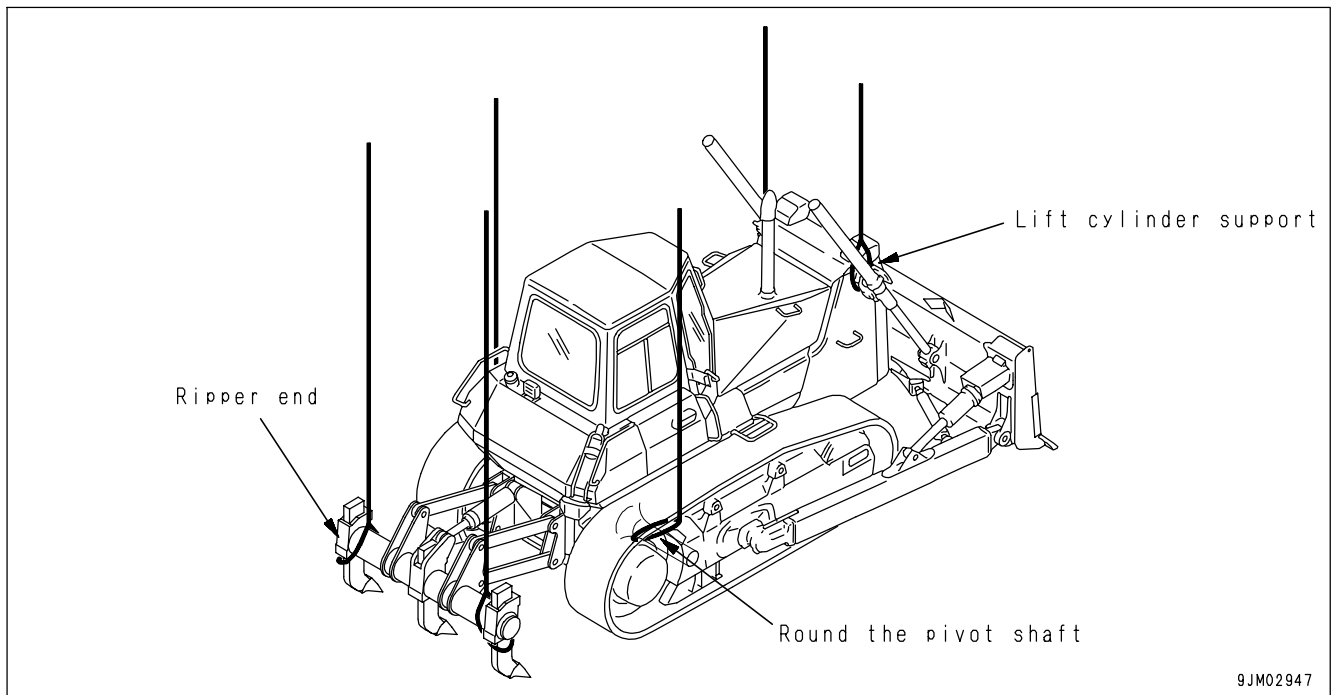
For details of the procedure for machines that are not the standard specification, please consult your Komatsu distributor.

For weight, see "SPECIFICATIONS (PAGE 5-2)".

### PROCEDURE FOR LIFTING OPERATIONS



For machine equipped with ripper

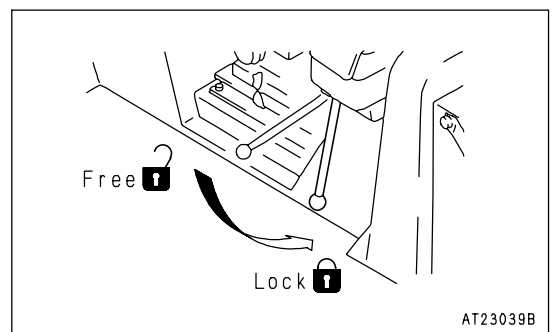


When lifting the machine, stop it on a level place, then observe the following procedure.

1. Stop the engine and set the parking brake lever to the LOCK position.
2. Install wire ropes, slings, etc. matched to the weight of the machine to the lifting points as shown in the above figure.

**NOTICE**

- Use protectors to prevent the wire rope from being cut on sharp corners and to prevent the wire rope from cutting into the machine bodywork.
- When using a spreader bar, select an ample width to prevent contact with the machine.



3. After setting the wire ropes, lift up the machine and stop at 100 to 200 mm (3.9 to 7.9 in) above the ground, and check that the wire ropes are not slack and the machine is level, then lift up slowly.

## COLD WEATHER OPERATION

### PRECAUTIONS FOR LOW TEMPERATURE

If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

#### FUEL AND LUBRICANTS

Change to oil with low viscosity for all components. For details of the specified viscosity, see "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-11)".

#### COOLANT



### WARNING

- Antifreeze is toxic. Be careful not to get it into your eyes or on your skin. If it should get into your eyes or on your skin, wash it off with large amounts of fresh water and see a doctor at once.
- When changing the coolant or when handling coolant containing antifreeze that has been drained when repairing the radiator, please contact your Komatsu distributor or request a specialist company to carry out the operation. Antifreeze is toxic. Do not let it flow into drainage ditches or spray it onto the ground surface.
- Antifreeze is flammable. Do not bring any flame close. Do not smoke when handling antifreeze.

#### NOTICE

- Use Komatsu Supercoolant wherever available, or use permanent type antifreeze coolant.
- Never use methanol, ethanol, or propanol-based antifreeze.
- Do not use any water leakage prevention agent, either alone, or in combination with antifreeze.
- Do not mix one brand of antifreeze with a different brand.

For details on the amount of antifreeze mixture and on when to change the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-21)".

**BATTERY**

 **WARNING**

- The battery generates flammable gas. Do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with a large amount of water and consult a doctor.
- Battery electrolyte dissolves paint. If it gets on the bodywork, wash it off immediately with water.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.
- Battery electrolyte is toxic. Do not let it flow into drainage ditches or spray it on to the ground surface.

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%. Insulate it against cold temperature to ensure the machine can be started easily the next morning.

**REMARK**

Measure the specific gravity and calculate the charging rate from the following conversion table.

| Electrolyte Temperature | 20°C<br>(68°F) | 0°C<br>(32°F) | -10°C<br>(14°F) | -20°C<br>(-4°F) |
|-------------------------|----------------|---------------|-----------------|-----------------|
| Charging Rate (%)       |                |               |                 |                 |
| 100                     | 1.28           | 1.29          | 1.30            | 1.31            |
| 90                      | 1.26           | 1.27          | 1.28            | 1.29            |
| 80                      | 1.24           | 1.25          | 1.26            | 1.27            |
| 75                      | 1.23           | 1.24          | 1.25            | 1.26            |

- As the battery capacity drastically drops in low temperatures, cover or remove the battery from the machine, store the battery in a warm place, and install it again the next morning.
- If the electrolyte level is low, add distilled water in the morning before beginning work. Do not add water after the day's work to prevent diluted electrolyte in the battery from freezing during the night.

**AFTER COMPLETION OF WORK**

To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, observe the following precautions.

- Remove all the mud and water from the machine body. In particular, wipe the hydraulic cylinder rods clean to prevent damage to the seal caused by mud, dirt, or drops of water on the rod from getting inside the seal.
- Park the machine on hard, dry ground.

If this is impossible, park the machine on boards.

The boards prevent the tracks from freezing to the ground, and allow the machine to be moved the next morning.

- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- Fill the fuel tank to capacity. This minimizes moisture condensation in the tank when the temperature drops.

**AFTER COLD WEATHER**

When the season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.  
For details, see "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-11)".



## LONG-TERM STORAGE

### BEFORE STORAGE

When keeping in long-term storage (more than one month), store as follows.

- Clean and wash all parts, then store the machine indoors. If the machine has to be stored outdoors, select level ground and cover the machine with a sheet.
- Completely fill the fuel tank. This prevents moisture from collecting.
- Lubricate and change the oil before storage.
- Apply a thin coat of grease to metal surface of the hydraulic piston rods and the idler adjusting rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- Place all control levers at the neutral position, operate the safety lever and parking lever to the LOCK position, then move the fuel control lever to the low idling position.
- To prevent corrosion, be sure to fill the cooling system with Supercoolant (AF-NAC) or permanent type antifreeze (density between 30% and 68%).

### DURING STORAGE



#### WARNING

If it is necessary to perform the rust-prevention operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

- During storage, operate and move the machine for a short distance once a month so that a new film of oil will coat moving parts. At the same time, also charge the battery.
- Before operating the work equipment, wipe the grease off the hydraulic piston rod.
- For machines equipped with an air conditioner, run the air conditioner.

### AFTER STORAGE

#### NOTICE

If the machine has been stored without carrying out the monthly rust-prevention operation, consult your Komatsu distributor before using it.

When using the machine after long-term storage, do as follows before using it.

- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease at all lubrication points.
- When the machine is stored for a long period, moisture in the air will mix with the oil. Check the oil before and after starting the engine. If there is water in the oil, change all the oil.

## TROUBLESHOOTING

### AFTER RUNNING OUT OF FUEL

When restarting the machine after running out of fuel, fill with fuel and bleed the air from the fuel system before starting.

For details of bleeding the air, see "REPLACE FUEL FILTER CARTRIDGE (PAGE 4-57)".

### MACHINE TOWING METHOD



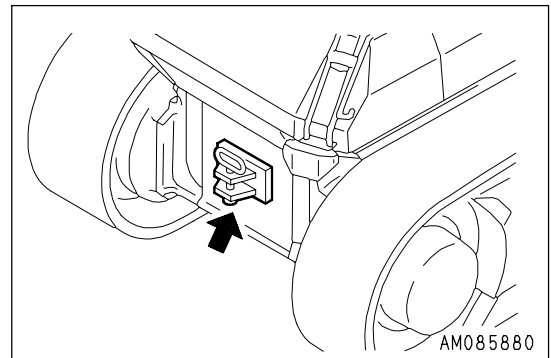
#### WARNING

- Be sure to use a wire rope sufficiently strong for the towing weight.
- When using the towing hook, be sure to use a shackle.
- Set the wire rope level and align it with the track frame.
- Tow the machine slowly.

#### NOTICE

The max. allowable drawbar pull of this machine is 138,500 N (14,123 kg).  
Do not attempt to pull anything beyond this limit.

If the machine gets stuck in the mud or a heavy thing needs to be towed, install a towing wire rope to the draw bar pin.

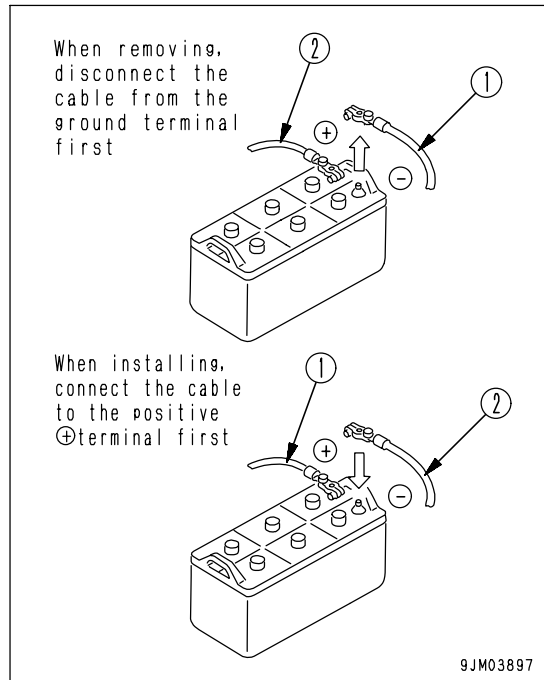


## IF BATTERY IS DISCHARGED



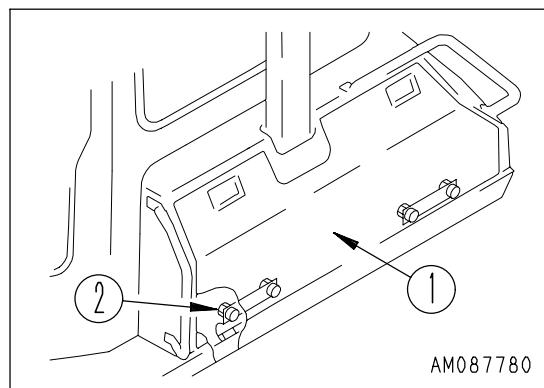
### WARNING

- It is dangerous to charge a battery when mounted on a machine. Make sure that it is dismantled before charging.
  - When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.
  - The battery generates hydrogen gas, so there is a hazard of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.
  - Battery electrolyte is dilute sulfuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, immediately wash it off with a large amount of water. If it gets in your eyes, wash it out with fresh water and consult a doctor.
  - When handling batteries, always wear safety glasses and rubber gloves.
  - When removing the battery, first disconnect the cable from the ground (normally the negative (-) terminal). When installing, install the positive (+) terminal first.
- If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark, so be extremely careful.
- If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.
  - When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.



## REMOVE AND INSTALL BATTERY

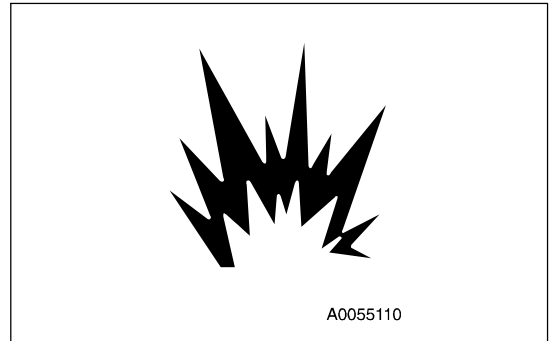
1. Open battery cover (1), remove 4 bolts (2) on the inside, then remove cover (1).
2. Before removing battery, remove the ground cable (normally connected to the negative (-) terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the nuts of the terminal and remove the wires from the battery.
3. After installing the battery, fix it with the battery hold down.  
Tightening torque: 1.47 to 1.96 Nm (0.15 to 0.2 kgm, 1.1 to 1.4 lbft)
4. When installing the battery, connect the ground cable last.  
Insert the hole of the terminal on the battery and tighten the nut.  
Tightening torque: 5.9 to 9.8 Nm  
(0.6 to 1.0 kgm, 4.3 to 7.2 lbft)
5. Install battery cover (1).



### PRECAUTIONS FOR BATTERY CHARGING

If the battery is charged improperly, it may explode. Accordingly, charge it according to "IF BATTERY IS DISCHARGED (PAGE 3-112)" and the instruction manual attached to the charger, and observe the following items.

- Set the voltage of the charger to match the voltage of the battery to be charged. If the correct voltage is not selected, the charger may overheat and cause an explosion.
- Connect the positive (+) charger clip of the charger to the positive (+) terminal of the battery, then connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery. Be sure to attach the clips securely.
- Set the charging current to 1/10 of the value of the rated battery capacity; when carrying out rapid charging, set it to less than the rated battery capacity.  
If the charger current is too high, the electrolyte will leak or dry up, and this may cause the battery to catch fire and explode.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a danger that this will ignite the battery electrolyte and cause the battery to explode.
- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.



## STARTING ENGINE WITH BOOSTER CABLE

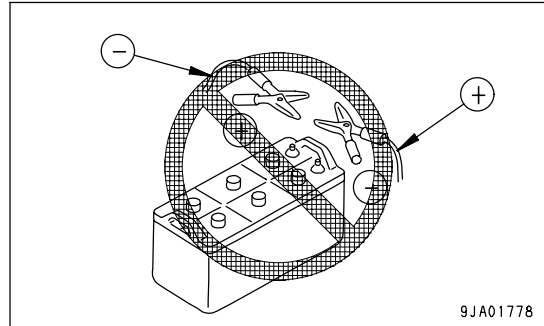
When starting the engine with a booster cable, do as follows.

### PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE



#### WARNING

- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, wear safety glasses and rubber gloves.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery.
- Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.
- When disconnecting the booster cable, take care not to bring the clips in contact with each other or with the machine body.



### NOTICE

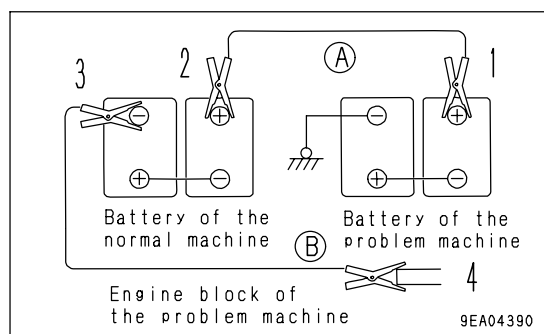
- The starting system for this machine uses 24V. For the normal machine, also use a 24V battery.
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.
- Check that the work equipment lock levers and parking brake levers of both machine are in the LOCK position.
- Check that each lever is in the NEUTRAL position.

### CONNECTING THE BOOSTER CABLE

Keep the starting switch of the normal machine and problem machine in the OFF position.

Connect the booster cable as follows, in the order of the numbers marked in the diagram.

1. Connect one clip of booster cable (A) to the positive (+) terminal of the problem machine.
2. Connect the other clip of booster cable (A) to the positive (+) terminal of the normal machine.
3. Connect one clip of booster cable (B) to the negative (-) terminal of the normal machine.
4. Connect the other clip of booster cable (B) to the engine block of the problem machine.



## STARTING ENGINE

**WARNING**

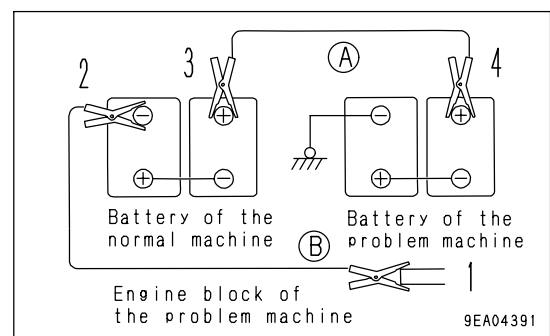
Always check that the work equipment lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are in the HOLD or NEUTRAL position.

1. Make sure the clips are firmly connected to the battery terminals.
  2. Start engine of the normal machine and run it at high idle speed.
  3. Turn the starting switch of the problem machine to the START position and start the engine.
- If the engine doesn't start at first, try again after 2 minutes or so.

**DISCONNECTING THE BOOSTER CABLE**

After the engine has started, disconnect the booster cables in the reverse of the order in which they were connected.

1. Remove one clip of booster cable (B) from the engine block of the problem machine.
2. Remove the other clip of booster cable (B) from the negative (-) terminal of the normal machine.
3. Remove one clip of booster cable (A) from the positive (+) terminal of the normal machine.
4. Remove the other clip of booster cable (A) from the positive (+) terminal of the problem machine.



## OTHER TROUBLE

## ELECTRICAL SYSTEM

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of problems or causes which are not listed below, contact your Komatsu distributor for repairs.

| Problem   | Main cause   | Remedy  |
|---|--|---|
| Lamp does not glow brightly even when the engine runs at high speed                                 | <ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Defective adjustment of fan belt tension</li> </ul>   | <ul style="list-style-type: none"> <li>( • Check, repair loose terminals, disconnections)</li> <li>• Adjust fan belt tension</li> </ul> For details, see EVERY 250 HOURS SERVICE              |
| Lamp flickers while engine is running   |  |   |
| Charge lamp does not go out even when engine is running   | <ul style="list-style-type: none"> <li>• Defective alternator</li> <li>• Defective wiring</li> </ul>   | <ul style="list-style-type: none"> <li>( • Replace)</li> <li>( • Check, repair)</li> </ul>  |
| Abnormal noise is generated from alternator   | <ul style="list-style-type: none"> <li>• Defective alternator</li> </ul>   | <ul style="list-style-type: none"> <li>( • Replace)</li> </ul>  |
| Starting motor does not turn when starting switch is turned to ON                                   | <ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Insufficient battery charge</li> <li>• Safety switch out of adjust</li> </ul>   | <ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>• Charge</li> <li>( • Adjust safety switch)</li> </ul>   |
| Pinion of starting motor keeps going in and out   | <ul style="list-style-type: none"> <li>• Insufficient battery charge</li> </ul>  | <ul style="list-style-type: none"> <li>• Charge</li> </ul>  |
| Starting motor turns engine sluggishly  | <ul style="list-style-type: none"> <li>• Insufficient battery charge</li> <li>• Defective starting motor</li> </ul>  | <ul style="list-style-type: none"> <li>• Charge</li> <li>( • Replace)</li> </ul>  |
| Starting motor disengages before engine starts  | <ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Insufficient battery charge</li> </ul>  | <ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>• Charge</li> </ul>  |
| Automatic preheating is not actuated  | <ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Defective glow switch</li> <li>• Defective timer</li> </ul>   | <ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>( • Replace)</li> <li>( • Replace)</li> </ul>  |
| Glow signal lamp does not go out (monitor panel specification only)                                 | <ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Defective heater relay</li> </ul>   | <ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>( • Replace)</li> </ul>  |
| Glow signal lamp does not become red (gauge panel specification only)                               | <ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Defective heater relay</li> <li>• Defective glow signal</li> </ul>  | <ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>( • Replace)</li> <li>( • Replace)</li> </ul>  |
| Oil pressure caution lamp does not light up when engine is stopped (starting switch at ON position) | <ul style="list-style-type: none"> <li>• Defective caution lamp</li> <li>• Defective caution lamp switch</li> <li>• Defective wiring</li> </ul>  | <ul style="list-style-type: none"> <li>( • Replace)</li> <li>( • Replace)</li> <li>( • Check, repair)</li> </ul>  |
| Charge lamp does not light up when engine is stopped (starting switch at ON position)               | <ul style="list-style-type: none"> <li>• Defective charge lamp</li> <li>• Defective wiring</li> </ul>  | <ul style="list-style-type: none"> <li>( • Replace)</li> <li>( • Check, repair)</li> </ul>  |
| Outside of electrical intake air heater is not warm when touched by hand                            | <ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Disconnection in electrical intake air heater</li> <li>• Defective operation of heater relay switch</li> </ul>                                  | <ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>( • Replace)</li> <li>( • Check, repair heater relay switch)</li> </ul>  |
| Air conditioner does not work properly  | <ul style="list-style-type: none"> <li>• Blown fuse</li> <li>• Insufficient battery charge</li> <li>• Defective air conditioner switch</li> <li>• Defective blower switch</li> <li>• Defective compressor</li> </ul> | <ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>• Charge</li> <li>( • Replace air conditioner switch)</li> <li>( • Replace blower switch)</li> <li>( • Replace)</li> </ul> |
| Speed range display lamp does not light up  | <ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Defective limit switch</li> <li>• Defective display lamp</li> </ul>   | <ul style="list-style-type: none"> <li>( • Check, repair)</li> <li>( • Replace)</li> <li>( • Replace)</li> </ul>  |

| Problem   | Main cause   | Remedy   |
|---|--|--|
| Speed range display lamp does not change when gear is shifted             | <ul style="list-style-type: none"><li>• Defective wiring</li><li>• Defective limit switch</li></ul>                              | <ul style="list-style-type: none"><li>( • Check, repair)</li><li>( • Replace)</li></ul>                      |
| Blade does not pitch when pitch is operated<br>(pitch specification only) | <ul style="list-style-type: none"><li>• Defective wiring</li><li>• Defective switch</li><li>• Defective solenoid valve</li></ul> | <ul style="list-style-type: none"><li>( • Check, repair)</li><li>( • Replace)</li><li>( • Replace)</li></ul> |



**CHASSIS**

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of problems or causes which are not listed below, contact your Komatsu distributor for repairs.

| Problem   | Main causes  | Remedy  |
|---|--|---|
| When brake pedal is depress, machine does not stop  | • Brake out of adjust, defective brake oil pressure  | ( • Adjust, check, repair)  |
| Track comes off   | • Track too loose  | • Adjust track tension, see WHEN REQUIRED   |
| Abnormal wear of sprocket   | • Track too loose or too tightened   |   |
| Blade, rises slowly, dose not rise  | • Lack of hydraulic oil<br>• Safety lock lever in LOCK position  | • Add oil to specified level, see EVERY 250 HOURS SERVICE<br>• Set lever in free position   |
| Dose not steer even when steering as operated   | • Brake lock lever in LOCK position<br>• Defective hydraulic pressure at steering clutch   | • Set lever in free position<br>( • Check, repair)  |
| Noise is generated from idler   | • Lack of oil in idler   | • Add oil to specified level, see WHEN REQUIRED   |
| Blade control lever is not held at FLOAT position   | • Insufficient warming up  | • Carry out warming-up operation  |
| Transmission oil pressure dose not rise   | • Wear, scuffing of gear pump<br>• Lack of oil in power train case<br>• Element strainer of oil filter in power train case clogged   | ( • Check, repair)<br>• Add oil to specified level, see CHECK BEFORE STARTING<br>• Clean<br>For details, see EVERY 1000 HOURS SERVICE   |
| Lacks drawber pull (cannot travel at full speed)  | • Lack of drive power from engine  | • See ENGINE RELATED PARTS  |
| Travel speed does not rise quickly  | • Low temperature of power train oil   | • Warm up machine<br>• See ENGINE RELATED PARTS   |
| Machine dose not move off when steering, directional and gear shift lever is placed in gear | • Lack of oil in power train case<br>• Transmission oil pressure dose not rise<br>• Parking lever in LOCK position<br>• Steering clutch slips<br>• Wear, scuffing of gear pump | • Add oil to specified level, see CKECK BEFORE STARTING<br>• See "Transmission oil pressure dose nor rise" above<br>• Set lever in free position<br><br>( • Check, repair)  |
| Torque converter overheats (indicator enters red range)                                     | • Lack of oil in power train case<br>• Transmission oil pressure dose not rise<br>• Steering clutch slips<br>• Wear, scuffing of gear pump<br>• Excessive load when operating  | • Add oil to specified level, see CHECK BEFORE STARTING<br>• See "Transmission oil pressure dose nor rise" above<br>( • Check, repair)<br><br>• Shift down one position, or reduce the load and increase the speed when operating |

**ENGINE**

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of problems or causes which are not listed below, contact your Komatsu distributor for repairs.

| Problem   | Main causes   | Remedy   |
|---|---|--|
| Engine oil pressure caution lamp remains alight when engine speed is raised after completion of warm-up | <ul style="list-style-type: none"> <li>• Engine oil pan oil level is low (sucking in air)</li> <li>• Clogged oil filter cartridge</li> <li>• Defective tightening of oil pipejoint, leakage from damaged part</li> <li>• Defective caution lamp</li> </ul>  | <ul style="list-style-type: none"> <li>• Add oil to specified level. See CHECK BEFORE STARTING</li> <li>• Replace cartridge. See EVERY 500 HOURS SERVICE</li> <li>( • Check, repair)</li> <li>( • Replace lamp)</li> </ul>   |
| Steam is emitted from top part of radiator (pressure valve)   | <ul style="list-style-type: none"> <li>• Coolant level low, water leakage</li> <li>• Loose fan belt</li> <li>• Dirt or scale accumulated in cooling system</li> </ul>   | <ul style="list-style-type: none"> <li>• Add coolant, repair, see CHECK BEFORE STARTING</li> <li>• Adjust fan belt tension, see EVERY 250 HOURS SERVICE</li> <li>• Change coolant, clean inside of cooling system, see WHEN REQUIRED</li> </ul>                                    |
| Indicator of coolant temperature gauge is in red range on right side of gauge                           | <ul style="list-style-type: none"> <li>• Clogged or damaged radiator fin</li> <li>• Defective thermostat</li> <li>• Loose radiator filler cap (high altitude operation)</li> <li>• Defective coolant temperature gauge</li> </ul>   | <ul style="list-style-type: none"> <li>• Clean or repair, see When REQUIRED</li> <li>( • Replace thermostat)</li> <li>• Tighten cap or replace packing</li> <li>( • Replace coolant temperature gauge)</li> </ul>  |
| Indicator of coolant temperature gauge is in white range on left side of gauge                          | <ul style="list-style-type: none"> <li>• Defective thermostat</li> <li>• Defective coolant temperature gauge</li> </ul>   | <ul style="list-style-type: none"> <li>( • Replace thermostat)</li> <li>( • Replace coolant temperature gauge)</li> </ul>  |
| Engine does not start when starting motor is turned   | <ul style="list-style-type: none"> <li>• Lack of fuel</li> <li>• Air in fuel system</li> <li>• Defective fuel injection pump or nozzle</li> <li>• Starting motor cranks engine sluggishly</li> <li>• Glow signal does not glow red</li> <li>• Defective compression</li> <li>• Defective valve clearance</li> </ul> | <ul style="list-style-type: none"> <li>• Add fuel. See CHECK BEFORE STARTING</li> <li>• Repair place where air is sucked in</li> <li>( • Replace pump or nozzle)</li> <li>• See ELECTRICAL SYSTEM</li> <li>• See ELECTRICAL SYSTEM</li> <li>( • Adjust valve clearance)</li> </ul> |
| Exhaust gas is white or blue  | <ul style="list-style-type: none"> <li>• Too much oil in oil pan</li> <li>• Improper fuel</li> </ul>  | <ul style="list-style-type: none"> <li>• Add oil to specified level. See CHECK BEFORE STARTING</li> <li>• Change to specified fuel</li> </ul>  |
| Exhaust gas occasionally turns black  | <ul style="list-style-type: none"> <li>• Clogged air cleaner element</li> <li>• Defective nozzle</li> <li>• Defective compression</li> </ul>  | <ul style="list-style-type: none"> <li>• Clean or replace. See WHEN REQUIRED</li> <li>( • Replace nozzle)</li> <li>( • Adjust valve clearance)</li> </ul>  |
| Combustion noise occasionally makes breathing sound   | <ul style="list-style-type: none"> <li>• Defective nozzle</li> </ul>  | <ul style="list-style-type: none"> <li>( • Replace nozzle)</li> </ul>  |

| Problem  | Main causes  | Remedy   |
|--|--|--|
| Abnormal noise is generated (combustion or mechanical) | <ul style="list-style-type: none"><li>• Low grade fuel being used</li><li>• Overheating</li><br/><li>• Damage inside muffler</li><li>• Excessive valve clearance</li></ul> | <ul style="list-style-type: none"><li>• Change to specified fuel</li><li>• See item "Indicator of coolant temperature gauge is in red range on right side of gauge"</li></ul> ( <ul style="list-style-type: none"><li>• Replace muffler)</li><li>( • Adjust valve clearance)</li></ul> |

# MAINTENANCE

## **WARNING**

Please read and make sure that you understand the SAFETY section before reading this section.

---

## GUIDE TO MAINTENANCE

Do not perform any inspection and maintenance operation that is not found in this manual.

### CHECK SERVICE METER:

Check the service meter reading every day to see if the time has come for any necessary maintenance to be performed.

### KOMATSU GENUINE REPLACEMENT PARTS:

Use Komatsu genuine parts specified in the Parts Book as replacement parts.

### KOMATSU GENUINE OILS:

For lubrication of the machine, use the Komatsu genuine lubricants. Moreover use oil of the specified viscosity according to the ambient temperature.

### ALWAYS USE CLEAN WASHER FLUID:

Use automobile window washer fluid, and be careful not to let any dirt get into it.

### CLEAN OIL AND GREASE:

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

### CHECKING FOREIGN MATERIALS IN DRAINED OIL:

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantity of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

### FUEL STRAINER:

Do not remove the strainer from the filler port when adding fuel.

### WELDING INSTRUCTIONS:

- Turn off the engine starting switch.
- Do not apply more than 200 V continuously.
- Connect grounding cable within 1 m (3.3 ft) of the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may malfunction.
- If a seal or bearing happens to come between the part being welded and grounding point, change the grounding point to avoid such parts.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

### DO NOT DROP THINGS INSIDE MACHINE:

- When opening inspection windows or the oil filler port of the tank to carry out inspection, be careful not to drop nuts, bolts, or tools inside the machine.  
If such things are dropped inside the machine, it may cause damage and/or malfunction of the machine, and will lead to failure. If you drop anything inside the machine, always remove it immediately.
- Do not put unnecessary things in your pockets. Carry only things which are necessary for inspection.

**DUSTY WORKSITES:**

When working at dusty worksites, do as follows:

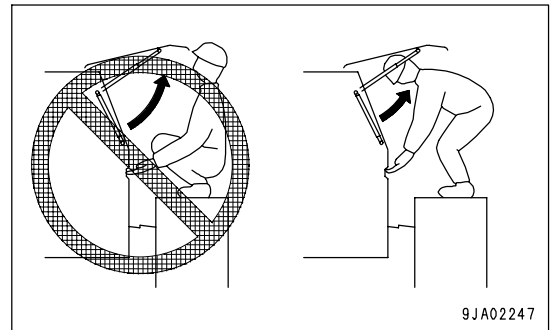
- Inspect the dust indicator frequently to see if the air cleaner is dirty or clogged.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.
- When inspecting or changing the oil, move the machine to a place that is free of dust to prevent dirt from getting into the oil.

**AVOID MIXING OILS:**

If a different brand or grade of oil has to be added, drain the old oil and replace all the oil with the new brand or grade of oil. Never mix different brand or grade of oil.

**PRECAUTIONS FOR OPENING AND CLOSING ENGINE SIDE COVER:**

- Open the engine side cover all the way and ensure that it is locked open before letting go.
- When standing on the track to open the engine side cover, bend at the knees and open the cover in a standing position to avoid back strain.
- Close the engine side cover before opening or closing the cab door.



**LOCKING THE INSPECTION COVER:**

Lock inspection cover securely into position with the lock bar. If inspection or maintenance is performed with inspection cover not locked in position, there is a danger that it may be suddenly blow shut by the wind and cause injury to the worker.

**HYDRAULIC SYSTEM-AIR BLEEDING:**

After repairing or replacing hydraulic equipment or after removing the hydraulic piping, it is necessary to bleed the air from the circuit. For details, see "PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM (PAGE 4-35)".

**PRECAUTIONS WHEN INSTALLING HYDRAULIC HOSES:**

- When removing parts at locations where there are O-rings or gasket seals, clean the mounting surface, and replace with new parts.  
When doing this, be careful not to forget to assemble the O-rings and gaskets.
- When installing the hoses, do not twist them or bend them sharply. If they are installed so, their service life will be shortened extremely and they may be damaged.

**CHECKS AFTER INSPECTION AND MAINTENANCE WORK:**

If you forget to perform the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do the following:

- Checks after operation (with engine stopped)
  - Have any inspection and maintenance points been forgotten?
  - Have all inspection and maintenance items been performed correctly?
  - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside the machine and get caught in the lever linkage mechanism.
  - Are there any leakage of coolant or oil? Have all nuts and bolts been tightened?
- Checks when engine is running
  - For the checks when the engine is running, see "TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (PAGE 2-27)" in the SAFETY section, and take care of safety sufficiently.
  - Check that the inspected and maintained parts work normally.
  - Raise the engine speed and check for fuel leakage and oil leakage.

## OUTLINE OF SERVICE

- Always use Komatsu genuine parts for replacement parts, grease or oil.
- When changing the oil or adding oil, do not mix different types of oil. When changing the type of oil, drain all the old oil and fill completely with the new oil. Always replace the filter at the same time. (There is no problem if the small amount of oil remaining in the piping mixes with the new oil.)
- Unless otherwise specified, when the machine is shipped from the factory, it is filled with the oil and coolant listed in the table below.

| Item  | Type  |
|---|---|
| Engine oil pan  | Engine oil EO15W40DH (Komatsu genuine parts)                        |
| Power train case<br>Final drive case<br>Damper case<br>Idler (each) | Power train oil TO30 (Komatsu genuine parts)                        |
| Hydraulic system  | Power train oil TO10 (Komatsu genuine parts)                        |
| Radiator  | Supercoolant AF-NAC (Density: 30% or above) (Komatsu genuine parts) |

## HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

### OIL

- Oil is used in the engine and hydraulic equipment under extremely severe conditions (high temperature, high pressure), and deteriorates with use.  
Always use oil that matches the grade and maximum and minimum ambient temperatures recommended in the Operation and Maintenance Manual. Even if the oil is not dirty, always change the oil at the specified interval.
- Oil corresponds to blood in the human body, always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.  
The majority of problems with the machine are caused by the entry of such impurities.  
Take particular care not to let any impurities get in when storing or adding oil.
- Never mix oils of different grades or brands.
- Always add the specified amount of oil.  
Having too much oil or too little oil are both causes of problems.
- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.
- When changing the oil, always replace the related filters at the same time.
- We recommend you have an analysis made of the oil periodically to check the condition of the machine. For those who wish to use this service, please contact your Komatsu distributor.
- When using commercially available oil, it may be necessary to reduce the oil change interval.  
We recommend that you use the Komatsu oil clinic to carry out a detailed checks of the characteristics of the oil.



## FUEL

- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities get in when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.  
Fuel may congeal depending on the temperature when it is used (particularly in low temperatures below -15°C (5°F)), so it is necessary to use the fuel that is suitable for the temperature.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.
- If there is any foreign material in the fuel tank, wash the tank and fuel system.

## COOLANT AND WATER FOR DILUTION

- The coolant has the important function of preventing corrosion as well as preventing freezing.  
Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.  
Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available.
- When diluting the antifreeze coolant, use distilled water or tap water (soft water).  
Natural water, such as a river water or well water (hard water), contains large amounts of minerals (calcium, magnesium, etc.), and this makes it easier for scale to form inside the engine or radiator. Once scale is deposited inside the engine or radiator, it is extremely difficult to remove. It also causes overheating due to poor heat exchange, so when you dilute the coolant, we recommend that you use water with an overall hardness of less than 100 PPM.
- When using antifreeze, always observe the precautions given in the Operation and Maintenance Manual.
- Antifreeze coolant is flammable, so be sure to keep it away from flame.
- The ratio of Supercoolant (AF-NAC) to water differs according to the ambient temperature.  
For details of the ratio when mixing, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-21)".  
Supercoolant (AF-NAC) may be supplied already mixed. In such cases, never dilute with water.
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating, and will also cause problems with corrosion due to air entering the coolant.

## GREASE

- Grease is used to prevent seizure and noises at the joints.
- This construction equipment is used under heavy-duty conditions. Always use the recommended grease and follow the change intervals and recommended ambient temperatures given in this Operation and Maintenance Manual.
- The nipples not included in the MAINTENANCE section are nipples used when overhauling, so they do not need grease.  
If any part becomes stiff or generates noise after being used for a long time, grease it.
- Always wipe off all of the old grease that is pushed out when greasing.  
Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause wear of the rotating parts.

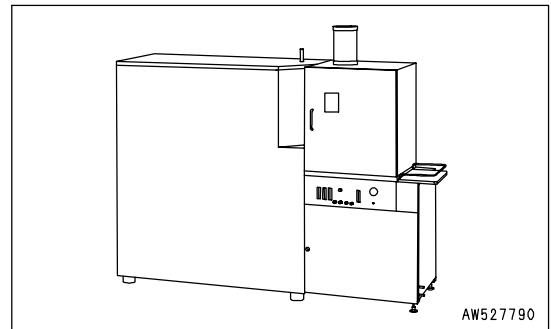
**CARRYING OUT KOWA (Komatsu Oil Wear Analysis)**

KOWA is a maintenance service that makes it possible to prevent machine failures and downtime. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other problems.

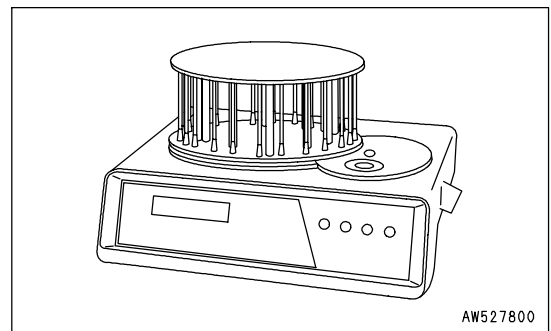
We strongly recommend you to use this service. The oil analysis is carried out at actual cost, so the cost is low, and the results of the analysis are reported together with recommendations which will reduce repair costs and machine downtime.

**KOWA ANALYSIS ITEMS**

- Measurement of density of metal wear particles  
This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of iron, copper, and other metal wear particles in the oil.



- Measurement of quantity of particles  
This uses a PQI (Particle Quantifier Index) measurer to measure the quantity of iron particles of 5µm or more, enabling early detection of failures.



- Others  
Measurements are made of items such as the ratio of water in the oil, density of the antifreeze coolant, ratio of fuel in the oil, and dynamic viscosity, enabling a highly precise diagnosis of the machine's health.

**OIL SAMPLING**

- Sampling interval  
250 hours: Engine  
500 hours: Other components
- Precautions when sampling
  - Make sure that the oil is well mixed before sampling.
  - Perform sampling at regular fixed intervals.
  - Do not perform sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your Komatsu distributor.

**STORING OIL AND FUEL**

- Keep indoors to prevent any water, dirt, or other impurities from getting in.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drums is at the side to prevent moisture from being sucked in.  
If drums have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long-term storage, be sure to use in the order of first in - first out (use the oldest oil or fuel first).

## FILTERS

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.

Replace all filters periodically. For details, see the Operation and Maintenance Manual.

However, when working in severe conditions, replace the filters at shorter intervals according to the oil and fuel (sulfur content) being used.

- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are attached to the old filter. If any metal particles are found, contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

## RELATING TO ELECTRIC SYSTEM

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause an electrical short circuit and may lead to malfunction of the machine. Do not wash the inside of the operator's cab with water. When washing the machine, be careful not to let water get into the electrical components.
- Service relating to the electric system is checking fan belt tension, checking damage or wear to the fan belt and checking battery fluid level.
- Never install any electric components other than those specified by Komatsu.
- External electro-magnetic interference may cause malfunction of the control system controller, before installing a radio receiver or other wireless equipment, contact your Komatsu distributor.
- Be careful to keep the electric system free of water when washing the machine or when it rains.
- When working at the seashore, carefully clean the electric system to prevent corrosion.
- When installing electrical equipment, connect it to the special power source connector.  
Do not connect the optional power source to the fuse, starting switch, or battery relay.

## WEAR PARTS LIST

Replace wear parts such as the filter element or air cleaner element at the time of periodic maintenance or before they reach the wear limit. The wear parts should be replaced correctly in order to ensure more economic use of the machine. When replacing parts, always use Komatsu genuine parts.

As a result of our continuous efforts to improve product quality, the part number may change, so inform your Komatsu distributor of the machine serial number and check for the latest part number when ordering parts.

**WEAR PARTS LIST**

The parts in parentheses are to be replaced at the same time.

| Item                               |                                       | Part No.                     | Part Name           | Weight<br>[kg (lb)] | Q'ty     | Replacement<br>frequency    |
|------------------------------------|---------------------------------------|------------------------------|---------------------|---------------------|----------|-----------------------------|
| Power train filter                 |                                       | 07063-01054<br>(07000-72100) | Element<br>(O-ring) | -<br>-              | 1<br>(1) | Every 250<br>hours service  |
| Fuel filter                        |                                       | 600-311-8293                 | Cartridge           | -                   | 1        | Every 500<br>hours service  |
| Engine oil filter<br>(D65P)        |                                       | 600-211-1231                 | Cartridge           | -                   | 1        |                             |
| Engine oil filter<br>(D65E)        |                                       | 6136-51-5121                 | Cartridge           | -                   | 1        |                             |
| Corrosion resistor                 |                                       | 600-411-1151                 | Cartridge           | -                   | 1        | Every 1000<br>hours service |
| Hydraulic oil filter               |                                       | 07063-01100<br>(07000-02135) | Element<br>(O-ring) | -<br>-              | 1<br>(1) | Every 2000<br>hours service |
| Hydraulic tank<br>breather element |                                       | 20Y-60-21470                 | Element             | -                   | 1        |                             |
| Air cleaner                        |                                       | 6125-81-7032                 | Element ass'y       | -                   | 1        | -                           |
|                                    |                                       | 600-181-4300                 | Outer element ass'y | -                   | 1        |                             |
| Air<br>conditioner                 | Fresh filter                          | 14X-911-7750                 | Filter              | -                   | 1        | -                           |
|                                    | Recirc filter                         | 14X-911-7741                 | Filter              | -                   | 1        |                             |
| Electrical intake air heater       |                                       | 6150-11-4820                 | Gasket              | -                   | 2        | -                           |
| Blade                              | D65E<br>Tiltdozer                     | 14X-71-11310                 | Cutting edge        | 38.4 (85)           | 2        | -                           |
|                                    |                                       | 14X-71-11330                 | End bit (left)      | -                   | 1        |                             |
|                                    |                                       | 14X-71-11340                 | End bit (right)     | -                   | 1        |                             |
|                                    |                                       | (02090-11270)                | (Bolt)              | -                   | (28)     |                             |
|                                    |                                       | (02290-11219)                | (Nut)               | -                   | (28)     |                             |
|                                    | D65P<br>Tiltdozer<br>Tilt pitch dozer | 14Y-71-11210                 | Cutting edge        | 45.5 (100)          | 2        | -                           |
|                                    |                                       | 14Y-71-11330                 | End bit (left)      | -                   | 1        |                             |
|                                    |                                       | 14Y-71-11340                 | End bit (right)     | -                   | 1        |                             |
|                                    |                                       | (02090-11270)                | (Bolt)              | -                   | (32)     |                             |
|                                    |                                       | (02290-11219)                | (Nut)               | -                   | (32)     |                             |
|                                    | D65E<br>Angle dozer                   | 144-70-11131                 | Cutting edge        | 45.5 (100)          | 2        | -                           |
|                                    |                                       | 14X-71-11330                 | End bit (left)      | -                   | 1        |                             |
|                                    |                                       | 14X-71-11340                 | End bit (right)     | -                   | 1        |                             |
|                                    |                                       | (02090-11270)                | (Bolt)              | -                   | (32)     |                             |
|                                    |                                       | (02290-11219)                | (Nut)               | -                   | (32)     |                             |
|                                    | D65E<br>Semi-U blade<br>(tilt dozer)  | 130-72-41130                 | Cutting edge        | 37.5 (83)           | 1        | -                           |
| 130-920-2180                       |                                       | Cutting edge                 | 34.0 (75)           | 1                   |          |                             |
| (02090-11270)                      |                                       | (Bolt)                       | -                   | (17)                |          |                             |
| (02290-11219)                      |                                       | (Nut)                        | -                   | (17)                |          |                             |
| 175-71-22272                       |                                       | End bit (left)               | 39.0 (86)           | 1                   |          |                             |
| 175-71-22282                       |                                       | End bit (right)              | 39.0 (86)           | 1                   |          |                             |
| (02090-11495)                      |                                       | (Bolt)                       | -                   | (14)                |          |                             |
| (02290-11422)                      | (Nut)                                 | -                            | (14)                |                     |          |                             |
| Hydraulic ripper (D65E)            |                                       | 141-78-11253                 | Point               | -                   | (3)      | -                           |
|                                    |                                       | 09244-02508                  | Pin                 | -                   | (3)      |                             |

**NOTICE**

When handling parts that weigh more than 25 kg (55 lb), remember that they are heavy objects, and take the necessary care.

## RECOMMENDED FUEL, COOLANT, AND LUBRICANT

- Komatsu genuine oils are adjusted to maintain the reliability and durability of Komatsu construction equipment and components.

In order to keep your machine in the best conditioner for long periods of time, it is essential to follow the instructions in this Operation and Maintenance Manual.

- Failure to follow these recommendations may result in shortened life or excess wear of the engine, power train, cooling system, and/or other components.
- Commercially available lubricant additives may be good for the machine, but they may also cause harm. Komatsu does not recommend any commercially available lubricant additive.
- Use the oil recommended according to the ambient temperature in the chart below.
- Specified capacity means the total amount of oil including the oil in the tank and the piping. Refill capacity means the amount of oil needed to refill the system during inspection and maintenance.
- When starting the engine in temperatures below 0°C (32°F), be sure to use the recommended multi-grade oil, even if the ambient temperature may become higher during the course of the day.
- If the machine is operated at a temperature below -20°C (-4°F), a separate device is needed, so consult your Komatsu distributor.
- When the fuel sulfur content is less than 0.5%, change the engine oil according to the period inspection table given in this Operation and Maintenance Manual.

If the fuel sulfur content is more than 0.5%, change the oil according to the following table.

| Fuel sulfur content | Engine oil change interval |
|---------------------|----------------------------|
| 0.5 to 1.0%         | 1/2 of regular interval    |
| Above 1.0%          | 1/4 of regular interval    |

USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

| Reservoir                   | Fluid Type                  | Ambient Temperature, degrees Celsius |     |     |    |    |    |    |     |        | Recommended<br>Komatsu Fluids |
|-----------------------------|-----------------------------|--------------------------------------|-----|-----|----|----|----|----|-----|--------|-------------------------------|
|                             |                             | -22                                  | -4  | 14  | 32 | 50 | 68 | 86 | 104 | 122 °F |                               |
|                             |                             | -30                                  | -20 | -10 | 0  | 10 | 20 | 30 | 40  | 50 °C  |                               |
| Engine oil pan              | Engine oil                  | SAE0W30EOS and HTS 3.5min. (Note.1)  |     |     |    |    |    |    |     |        | Komatsu<br>EOS0W30            |
|                             |                             | SAE5W40EOS and HTS 3.5min. (Note.1)  |     |     |    |    |    |    |     |        | Komatsu<br>EOS5W40            |
|                             |                             | SAE10W30DH                           |     |     |    |    |    |    |     |        | Komatsu<br>EO10W30DH          |
|                             |                             | SAE15W40DH                           |     |     |    |    |    |    |     |        | Komatsu<br>EO15W40DH          |
|                             |                             | SAE30DH                              |     |     |    |    |    |    |     |        | Komatsu<br>EO30DH             |
| Damper case<br>Idler (each) | Power train oil<br>(Note.2) | T030                                 |     |     |    |    |    |    |     |        | T030                          |
| Power train case            | Power train oil             | T010                                 |     |     |    |    |    |    |     |        | T010                          |
|                             |                             | T030                                 |     |     |    |    |    |    |     |        | T030                          |
| Final drive case<br>(each)  | Power train oil             | T030                                 |     |     |    |    |    |    |     |        | T030                          |
| Hydraulic system            | Power train oil             | T010                                 |     |     |    |    |    |    |     |        | T010                          |
|                             | Hydraulic oil               | HO46-HM                              |     |     |    |    |    |    |     |        | HO46-HM                       |
|                             | Engine oil                  | SAE10W30DH                           |     |     |    |    |    |    |     |        | Komatsu<br>EO10W30DH          |
|                             |                             | SAE15W40DH                           |     |     |    |    |    |    |     |        | Komatsu<br>EO15W40DH          |
| Grease fitting              | Hyper grease<br>(Note.3)    | G2-T, G2-TE                          |     |     |    |    |    |    |     |        | G2-T, G2-TE                   |
|                             | Lithium EP grease           | G2-LI                                |     |     |    |    |    |    |     |        | G2-LI                         |
| Cooling system              | Supercoolant<br>AF-NAC      | AF-NAC (Note.4)                      |     |     |    |    |    |    |     |        | AF-NAC                        |
| Fuel tank                   | Diesel fuel                 | No.2-D                               |     |     |    |    |    |    |     |        | ASTM No.2-D                   |
|                             |                             | No.1-D                               |     |     |    |    |    |    |     |        | ASTM No.1-D                   |

|                    |        | Engine oil pan | Damper case | Idler (each) | Power train case | Final drive case (each) |      | Hydraulic system | Cooling system (incl. sub-tank) | Fuel tank |
|--------------------|--------|----------------|-------------|--------------|------------------|-------------------------|------|------------------|---------------------------------|-----------|
|                    |        |                |             |              |                  | E                       | P    |                  |                                 |           |
| Specified capacity | Liters | 44             | 1.7         | 0.15         | 68               | 24                      | 27   | 95               | 58                              | 410       |
|                    | US gal | 11.62          | 0.45        | 0.04         | 17.97            | 6.34                    | 7.13 | 25.10            | 15.32                           | 108.32    |
| Refill capacity    | Liters | 38             | 1.7         | 0.15         | 48               | 24                      | 27   | 55               | -                               | -         |
|                    | US gal | 10.04          | 0.45        | 0.04         | 12.68            | 6.34                    | 7.13 | 14.53            | -                               | -         |

Note 1: SAE0W30EOS and SAE5W40EOS must be fully synthetic and HTHS ( High-Temperature High-Shear Viscosity 150°C) must be equal to or higher than 3.5 cP. Komatsu EOS0W30 and EOS5W40 are the most suitable oils. If these oils are not available, follow the instruction "RECOMMENDED BRANDS, RECOMMENDED QUALITY FOR PRODUCTS OTHER THAN KOMATSU GENUINE OIL (PAGE 4-13)" at the end of this chapter.

Note 2: Powertrain oil has different properties from engine oil. Be sure to use the recommended oils.

Note 3: Hyper grease (G2-T, G2-TE) has a high performance.

When it is necessary to improve the lubricating ability of the grease in order to prevent squeaking of pins and bushings, the use of G2-T or G2-TE is recommended.

Note 4: Supercoolant (AF-NAC)

1) Coolant has the important function of anticorrosion as well as antifreeze.

Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.

Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available.

2) For details of the ratio when diluting super coolant with water, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-21)".

When the machine is shipped from the factory, it may be filled with coolant containing 30% or more Supercoolant (AF-NAC). In this case, no adjustment is needed for temperatures down to -10°C (14°F). (never dilute with water)

3) To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.

**RECOMMENDED BRANDS, RECOMMENDED QUALITY FOR PRODUCTS OTHER THAN KOMATSU GENUINE OIL**

When using commercially available oils other than Komatsu genuine oil, or when checking the latest specifications, refer to the Komatsu web page or consult your Komatsu distributor.



# STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

## TORQUE LIST



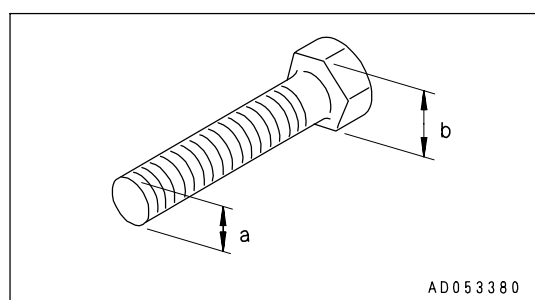
If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation.

Always pay careful attention when tightening parts.

Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below.

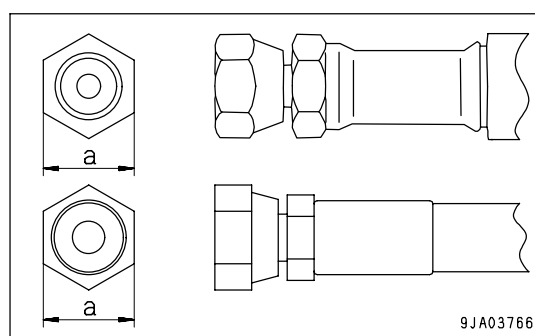
If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

| Thread diameter of bolt (a)(mm) | Width across flats (b)(mm) | Tightening torque |       |        |               |             |               |
|---------------------------------|----------------------------|-------------------|-------|--------|---------------|-------------|---------------|
|                                 |                            | Target value      |       |        | Service limit |             |               |
|                                 |                            | Nm                | kgm   | lbft   | Nm            | kgm         | lbft          |
| 6                               | 10                         | 13.2              | 1.35  | 9.8    | 11.8-14.7     | 1.2-1.5     | 8.7-10.8      |
| 8                               | 13                         | 31                | 3.2   | 23.1   | 27-34         | 2.8-3.5     | 20.3-25.3     |
| 10                              | 17                         | 66                | 6.7   | 48.5   | 59-74         | 6.0-7.5     | 43.4-54.2     |
| 12                              | 19                         | 113               | 11.5  | 83.2   | 98-123        | 10.0-12.5   | 72.3-90.4     |
| 14                              | 22                         | 172               | 17.5  | 126.6  | 153-190       | 15.5-19.5   | 112.1-141     |
| 16                              | 24                         | 260               | 26.5  | 191.7  | 235-285       | 23.5-29.5   | 170.0-213.4   |
| 18                              | 27                         | 360               | 37    | 267.6  | 320-400       | 33.0-41.0   | 238.7-296.6   |
| 20                              | 30                         | 510               | 52.3  | 378.3  | 455-565       | 46.5-58.0   | 336.3-419.5   |
| 22                              | 32                         | 688               | 70.3  | 508.5  | 610-765       | 62.5-78.0   | 452.1-564.2   |
| 24                              | 36                         | 883               | 90    | 651    | 785-980       | 80.0-100.0  | 578.6-723.3   |
| 27                              | 41                         | 1295              | 132.5 | 958.4  | 1150-1440     | 118.0-147.0 | 853.5-1063.3  |
| 30                              | 46                         | 1720              | 175.0 | 1265.8 | 1520-1910     | 155.0-195.0 | 1121.1-1410.4 |
| 33                              | 50                         | 2210              | 225.0 | 1627.4 | 1960-2450     | 200.0-250.0 | 1446.6-1808.3 |
| 36                              | 55                         | 2750              | 280.0 | 2025.2 | 2450-3040     | 250.0-310.0 | 1808.3-2242.2 |
| 39                              | 60                         | 3280              | 335.0 | 2423.1 | 2890-3630     | 295.0-370.0 | 2133.7-2676.2 |



Apply the following table for Hydraulic Hose.

| Hose nominal number | Width across flat a (mm) | Tightening torque |      |       |               |           |             |
|---------------------|--------------------------|-------------------|------|-------|---------------|-----------|-------------|
|                     |                          | Target valve      |      |       | Service limit |           |             |
|                     |                          | Nm                | kgm  | lbft  | Nm            | kgm       | lbft        |
| 02                  | 19                       | 44                | 4.5  | 32.5  | 35-54         | 3.5-5.5   | 25.3-47.0   |
| 03                  | 22                       | 74                | 7.5  | 54.2  | 54-93         | 5.5-9.5   | 39.8-68.7   |
|                     | 24                       | 78                | 8.0  | 57.9  | 59-98         | 6.0-10.0  | 43.4-72.3   |
| 04                  | 27                       | 103               | 10.5 | 75.9  | 84-132        | 8.5-13.5  | 61.5-97.6   |
| 05                  | 32                       | 157               | 16.0 | 115.7 | 128-186       | 13.0-19.0 | 94.0-137.4  |
| 06                  | 36                       | 216               | 22.0 | 159.1 | 177-245       | 18.0-25.0 | 130.2-180.8 |



## PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

For using the machine safely for an extended period of time, you must periodically replace the safety critical and fire prevention-related parts listed in the table of important parts.

Material quality of these parts can change as time passes and they are likely to wear out or deteriorate. However, it is difficult to determine the extent of wear or deterioration at the time of periodic maintenance. Hence, it is required to replace them with new ones regardless of their condition after a certain period of usage. This is important to ensure that these parts maintain their full performance at all times.

Furthermore, should anything abnormal be found on any of these parts, replace it with a new one even if the periodic replacement time for the part has not yet arrived.

If any of the hose clamps show deterioration like deformation or cracking, replace the clamps at the same time as the hoses.

Also perform the following checks with hydraulic hoses which need to be replaced periodically. Tighten all loose clamps and replace defective hoses, as required.

When replacing hoses, always replace O-rings, gaskets, and other such parts at the same time.

Have your Komatsu distributor replace the critical parts.

### SAFETY CRITICAL PARTS

| No. | Safety critical parts for periodic replacement       | Q'ty | Replacement interval                                |
|-----|--|------|---|
| 1   | Fuel hose (fuel tank - injection pump)               | 1    | Every 2 years or 4000 hours, whichever comes sooner |
| 2   | Fuel hose (injection pump - fuel filter)             | 2    |   |
| 3   | Fuel return hose (injection pump - fuel tank)        | 1    |   |
| 4   | Fuel return hose (injection nozzle - fuel tank)      | 1    |   |
| 5   | Hose (power train strainer - power train pump)       | 1    |   |
| 6   | Hose (power train pump - power train filter)         | 1    |   |
| 7   | Hose (power train filter - transmission)             | 1    |   |
| 8   | Hose (transmission case - steering relief valve)     | 1    |   |
| 9   | Hose (power train lubrication pump - steering case)  | 1    |   |
| 10  | Hose (scavenging pump - steering case)               | 1    |   |
| 11  | Hose (torque converter case - mission oil cooler)    | 1    |   |
| 12  | Hose (mission oil cooler - transmission case)        | 1    |   |
| 13  | Brake pressure detection hose                        | 2    |   |
| 14  | Steering clutch pressure detection hose              | 2    |   |
| 15  | Transmission modulation pressure detection hose      | 1    |   |
| 16  | Torque converter inlet post pressure detection hose  | 1    |   |
| 17  | Torque converter outlet post pressure detection hose | 1    |   |
| 18  | Seat belt  | 1    | Every 3 years                                       |

# MAINTENANCE SCHEDULE CHART

## MAINTENANCE SCHEDULE CHART

### WHEN REQUIRED

|  |       |
|--|-------|
| CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT .....               | 4- 18 |
| CLEAN INSIDE OF COOLING SYSTEM .....                             | 4- 21 |
| CHECK TRACK TENSION .....  | 4- 24 |
| CHECK AND TIGHTEN TRACK SHOE BOLTS .....                         | 4- 26 |
| CHECK ELECTRICAL INTAKE AIR HEATER .....                         | 4- 26 |
| REVERSE AND REPLACE END BITS AND CUTTING EDGES .....             | 4- 27 |
| CLEAN, CHECK RADIATOR FINS .....                                 | 4- 29 |
| CHECK, ADJUST AIR CONDITIONER .....                              | 4- 30 |
| GREASE DOOR HINGE .....  | 4- 31 |
| CHECK DOOR LOCK STRIKER .....                                    | 4- 31 |
| REPLACE DOOR DAMPER .....  | 4- 31 |
| CHECK DOOR LATCH .....   | 4- 32 |
| CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID .....                 | 4- 32 |
| REPLACE WIPER BLADE .....  | 4- 33 |
| CHECK IDLER OIL LEVEL, ADD OIL .....                             | 4- 34 |
| ADJUST IDLER CLEARANCE .....                                     | 4- 34 |
| PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM .....             | 4- 35 |
| ADJUSTING SHIMS, ADJUSTING TENSION AT WORK EQUIPMENT LINKS ..... | 4- 36 |

### CHECK BEFORE STARTING

#### EVERY 50 HOURS SERVICE

|  |       |
|--|-------|
| DRAIN WATER, SEDIMENT FROM FUEL TANK ..... | 4- 44 |
|--|-------|

#### EVERY 250 HOURS SERVICE

|  |       |
|--|-------|
| LUBRICATING .....  | 4- 45 |
| GREASE EQUALIZER BAR SIDE PIN .....                          | 4- 47 |
| GREASE EQUALIZER BAR CENTER PIN .....                        | 4- 47 |
| CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL .....           | 4- 47 |
| CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL .....             | 4- 48 |
| CHECK LEVEL OF BATTERY ELECTROLYTE .....                     | 4- 49 |
| DRAIN WATER, SEDIMENT FROM FUEL FILTER .....                 | 4- 51 |
| CHECK FAN BELT TENSION, ADJUST .....                         | 4- 52 |
| CHECK, CLEAN ADDITIOAL FUEL STRAINER .....                   | 4- 53 |
| REPLACE POWER TRAIN OIL FILTER ELEMENT .....                 | 4- 53 |
| CHECK BRAKE PERFORMANCE .....                                | 4- 55 |
| CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER) ..... | 4- 56 |

#### EVERY 500 HOURS SERVICE

|   |       |
|---|-------|
| REPLACE FUEL FILTER CARTRIDGE .....                                     | 4- 57 |
| CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE ..... | 4- 59 |

**EVERY 1000 HOURS SERVICE**

|  |       |
|--|-------|
| CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS (POWER TRAIN STRAINER, SCAVENGING PUMP STRAINER) ----- | 4- 60 |
| CHECK OIL LEVEL IN DAMPER CASE, ADD OIL -----  | 4- 62 |
| CHANGE OIL IN FINAL DRIVE CASE -----   | 4- 63 |
| CLEAN BREATHER -----   | 4- 63 |
| GREASE UNIVERSAL JOINT -----   | 4- 65 |
| CHECK ALL TIGHTENING PARTS OF TURBOCHARGER -----   | 4- 66 |
| CHECK PLAY OF TURBOCHARGER ROTOR -----   | 4- 66 |
| CHECK FOR LOOSE ROPS MOUNT BOLTS -----   | 4- 66 |

**EVERY 2000 HOURS SERVICE**

|  |       |
|--|-------|
| CHANGE OIL IN HYDRAULIC TANK, REPLACE OIL FILTER ELEMENT ----- | 4- 67 |
| REPLACE HYDRAULIC TANK BREATHER ELEMENT -----                  | 4- 69 |
| CLEAN ENGINE BREATHER ELEMENT -----                            | 4- 69 |
| CHANGE OIL IN DAMPER CASE -----                                | 4- 70 |
| CLEAN, CHECK TURBOCHARGER -----                                | 4- 71 |
| CHECK VIBRATION DAMPER -----                                   | 4- 71 |
| CHECK ALTERNATOR, STARTING MOTOR -----                         | 4- 71 |
| CHECK ENGINE VALVE CLEARANCE, ADJUST -----                     | 4- 71 |

**EVERY 4000 HOURS SERVICE**

|                        |       |
|------------------------|-------|
| CHECK WATER PUMP ----- | 4- 72 |
|------------------------|-------|

## SERVICE PROCEDURE

### WHEN REQUIRED

### CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT



#### WARNING

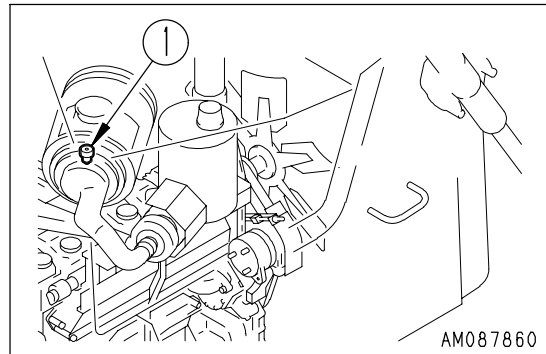
- If inspection, cleaning, or maintenance is carried out with the engine running, dirt will get into the engine and damage it. Always stop the engine before carrying out these operations.
- When using compressed air, there is danger that dirt may be blown around and cause serious injury. Always use protective glasses, dust mask, and other protective equipment.

### CHECKING

Whenever the red piston in dust indicator (1) appears, clean the air cleaner element.

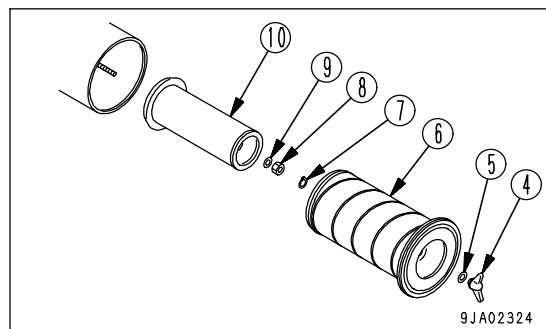
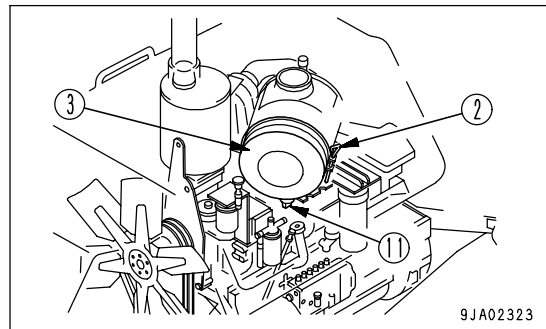
### NOTICE

Do not clean the air cleaner element before the dust indicator becomes red. If the element is cleaned frequently before the dust indicator becomes red, the performance of the air cleaner is diminished and the cleaning effect is lowered. In addition, dust sticking to the element falls into the inner element each time the element is cleaned.

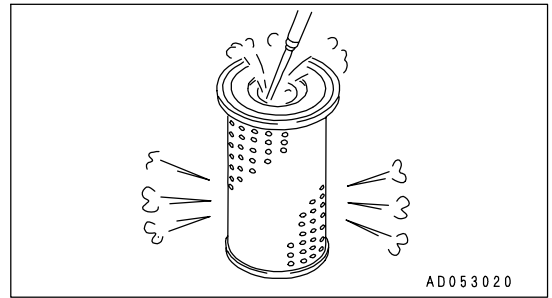


### CLEANING OUTER ELEMENT

1. Open the left engine side cover.
2. Loosen bolt (2), remove cover (3).
3. Remove the wing nut (4) and the seal washer (5), and take out the outer element (6).
4. Clean the air cleaner housing interior and the cover (3).



5. Direct dry compressed air (Max. 0.69 MPa (7 kg/cm<sup>2</sup>, 99.4 PSI)) from the inside of the outer element along its folds. Then direct the compressed air from the outside along the folds, and again from the inside.

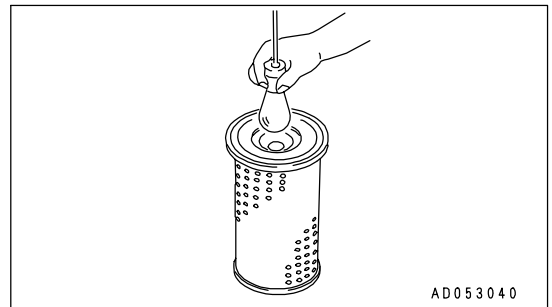


- 1) Remove one seal from the element whenever the element has been cleaned.
- 2) Replace the outer element if it has been cleaned 6 times repeatedly or used throughout a year. Replace the inner element at the same time.

3) Replace both inner and outer elements when the dust indicator red piston appears soon after installing the cleaned outer element even though it has not been cleaned 6 times.

4) Check inner element mounting nuts (8) for looseness and, if necessary, retighten.

6. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element.

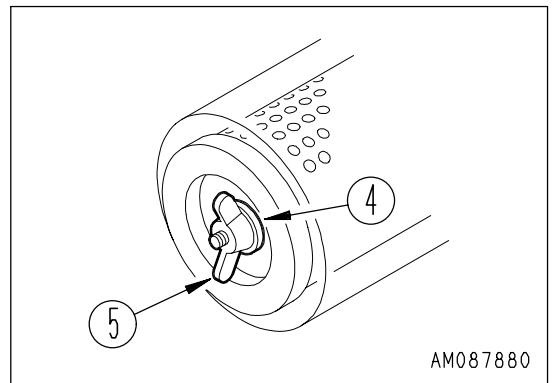


**NOTICE**

**When cleaning the element, do not hit or beat it against anything. Do not use an element whose folds, gasket or seal are damaged.**

7. Install the cleaned element and secure it with wing nut (5) and seal washer (4).

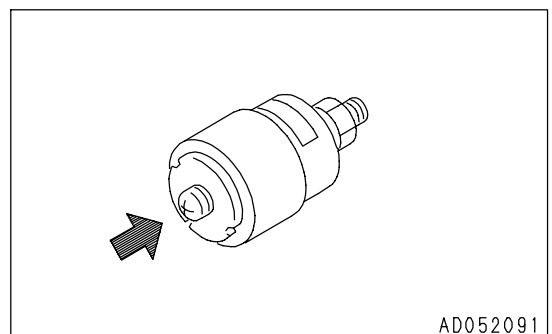
If seal washer (4) or threads of wing nut (5) are damaged or have any defect, replace with new one.



8. Remove the evacuator valve (11), clean with dry compressed air and then reinstall it.

9. Install the cover (3).

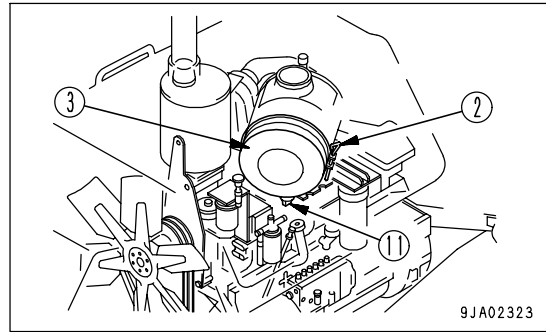
10. Press the button of dust indicator (1) to return the red piston to its original position.



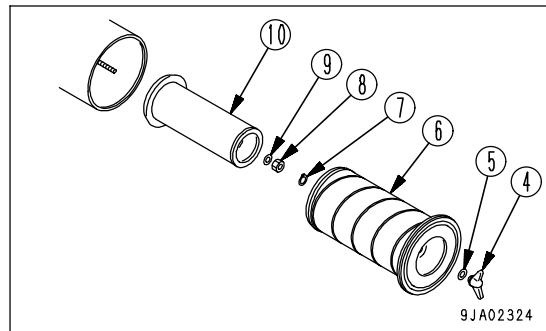
11. Close the left engine side cover.

**REPLACING ELEMENT**

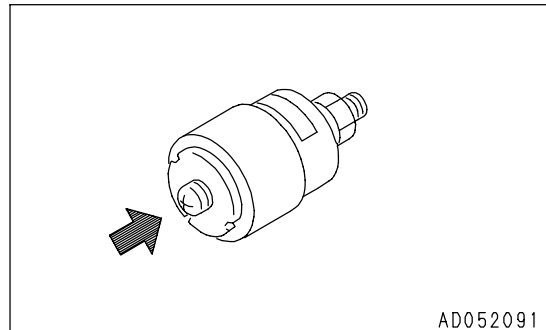
1. Open the left engine side cover.
2. Loosen bolt (2), remove cover (3).
3. Remove the wing nut (4) and the seal washer (5), and take out the outer element (6).
4. Remove the snap ring (7), nut (8) and washer (9), and then take out the inner element (10).
5. To prevent dust from getting in, use a clean cloth or tape to cover the air connector (outlet side).
6. Clean the air cleaner housing interior, then remove the cover installed in Step 5.
7. Fit a new inner element (10) to the air connector and tighten with nut (8) and washer (9).

**NOTICE**

- The inner element (10) must not be cleaned and used again. When replacing the outer element (6), replace the inner element (10) at the same time.
- The nut (8), washer (9), snap ring (7), wing nut (4) and seal washer (5) must not be used again. replace them with new ones.



8. Install the snap ring (7).
9. Set new outer element (6) in position, then secure in position with wing nut (4) and seal washer (5).
10. Remove the evacuator valve (11), clean with dry compressed air and then reinstall it.
11. Install the cover (3).
12. Press the button of dust indicator (1) to return the red piston to its original position.



13. Close the left engine side cover.

**CLEAN INSIDE OF COOLING SYSTEM**

 **WARNING**

- Just after the engine is stopped, the coolant is still hot and the internal pressure in the radiator is still high. If the radiator cap is removed under this condition, you may scald yourself. Accordingly, wait until the temperature goes down, then loosen the cap slowly to release the pressure.
- Start the engine to clean the cooling system. When standing up from the operator's seat or leaving the machine, set the work equipment lock lever and parking brake lever to the LOCK positions.
- For the starting method of the engine, see "CHECK BEFORE STARTING ENGINE, ADJUST (PAGE 3-43)" and "STARTING ENGINE (PAGE 3-61)" in the OPERATION section of the manual.
- Never go under the machine body while the engine is running. It is very dangerous since the machine may move suddenly.

Clean the inside of the cooling system, change the coolant and replace the corrosion resistor according to the table below.

| Antifreeze coolant                             | Interval of cleaning inside of cooling system and changing antifreeze coolant | Replacing corrosion resistor   |
|--|---|--|
| Komatsu supercoolant (AF-NAC)                  | Every two years or every 4000 hours whichever comes first                     | Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant. |
| Permanent type antifreeze (All-season type, *) | Every year (autumn) or every 2000 hours whichever comes first.                |  |

\*: Permanent type antifreeze shall meet the requirements of ASTM D3306-03.

Stop the machine on level ground when cleaning or changing the coolant.

The coolant has the important function of preventing corrosion as well as preventing freezing.

Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.

Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available.

To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.



When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing table given below.

It is actually better to estimate and temperature about 10°C (18°F) lower when deciding the mixing ratio.

The mixing ratio depends on the ambient temperature, but it should always be a minimum of 30% by volume (antifreeze/total amount of coolant x 100).

The freezing temperature of undiluted antifreeze is -15°C (5°F). Do not store undiluted antifreeze at a temperature of below -15°C (5°F).

Mixing rate of water and antifreeze

| Min. atmospheric temperature | °C     | Above -10 | -15  | -20  | -25  | -30  |
|------------------------------|--------|-----------|------|------|------|------|
|                              | °F     | Above 14  | 5    | -4   | -13  | -22  |
| Amount of antifreeze         | Liters | 17.4      | 20.9 | 23.8 | 26.7 | 29.0 |
|                              | US gal | 4.60      | 5.52 | 6.29 | 7.05 | 7.66 |
| Amount of water              | Liters | 40.6      | 37.1 | 34.2 | 31.3 | 29.0 |
|                              | US gal | 10.72     | 9.80 | 9.03 | 8.27 | 7.66 |
| Ratio                        | %      | 30        | 36   | 41   | 46   | 50   |

## ! WARNING

Antifreeze coolant is flammable, so keep it away from flame.

Antifreeze coolant is toxic. When removing the drain plug, be careful not to get water containing antifreeze coolant on you. If it gets in your eyes, flush your eyes with large amount of fresh water and see a doctor at once.

Use antifreeze and appropriate water for diluting (for details, see "COOLANT AND WATER FOR DILUTION (PAGE 4-6)")

We recommend use of an antifreeze density gauge to control the mixing proportions.

Prepare a container whose capacity is larger than the specified coolant volume to catch drained coolant.

Prepare a hose to supply antifreeze coolant and water.

1. Stop the engine and tighten 2 valves of the corrosion resistor.
2. Turn radiator cap (1) slowly until it hits the stopper and by so doing, relieving the internal pressure.
3. Turn radiator cap (1) until it hits the next stopper, while depressing it. Keep turning the radiator cap (1) until it hits the last stopper.

4. Put containers to catch the coolant under drain valve (2) at the bottom of the radiator and under drain valve (3) at the side of the cylinder block.

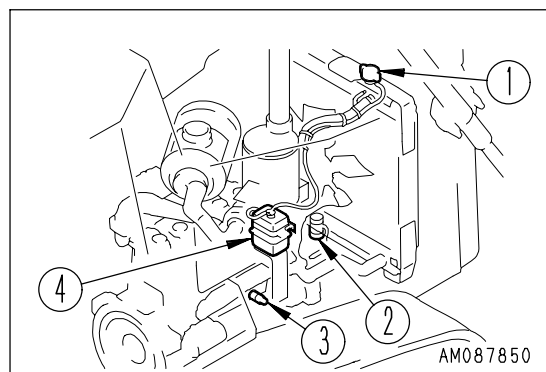
Open drain valve (2) and drain valve (3), and drain the water.

5. After draining the antifreeze solution, close drain valve (2), (3), then fill with clean water. After the radiator is filled with water, start and run the engine at low idling speed. After the water temperature rises above 90°C (194°F), run the engine for about 10 minutes.

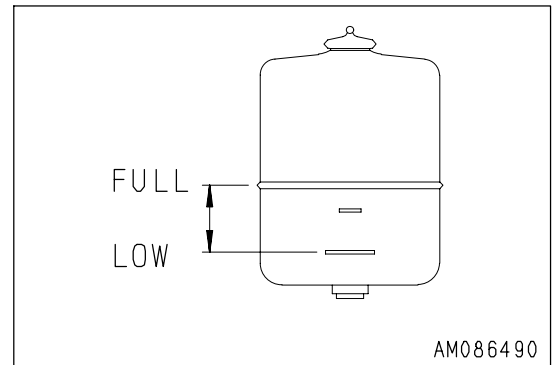
6. Stop the engine and open drain valve (2), (3) to drain the water.

7. After draining the water, clean the cooling system with cleaning agent.

For the cleaning method, see the instructions for the cleaning agent.



8. Replace the corrosion resistor, then open 2 valves.  
For details of the procedure for replacing the corrosion resistor, see "REPLACE CORROSION RESISTOR CARTRIDGE (PAGE 4-66)".
9. Close drain valve (2), (3).
10. Add coolant mixed with antifreeze until it overflows from the water filler.  
Decide the proportions of antifreeze and water according to the table for the mixing rate of water and antifreeze.
11. To remove air in the cooling system, run the engine for 5 minutes at low idle, then for 5 minutes at high idle.  
(While doing this, leave the radiator cap removed.)
12. Drain the coolant from sub-tank (4), clean the inside of the sub-tank, then add water until the coolant level is between the FULL and LOW marks.
13. Stop the engine, wait for approx. 3 minutes, then add coolant until the coolant level is near the coolant filler port, and tighten the cap. Check the coolant level and add coolant if necessary.



### CHECK TRACK SHOE TENSION, ADJUST

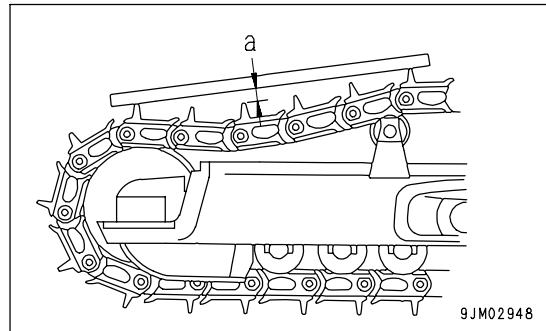
The wear of pins and bushings on the undercarriage will vary with the working conditions and types of soil. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

Carry out the check and adjustment under the same conditions as when operating (on jobsites where the track becomes clogged with mud, measure with the track clogged with mud).

#### INSPECTION

Stop the machine on level ground (stop with the transmission in FORWARD without applying the brake). Then place a straight bar on the track shoes between the carrier roller and the idler as shown in the figure, and measure the clearance between the bar and the grouser at the midpoint. If the clearance (a) is 20 to 30 mm (0.79 to 1.18 in), the tension is standard.

If the track tension is not at the standard value, adjust it in the following manner.



#### ADJUSTMENT

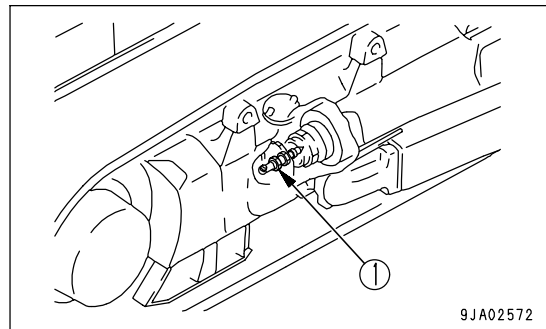


#### WARNING

There is danger of plug (1) flying out under the high internal pressure of the grease. Never loosen plug (1) more than 1 turn.

Never loosen any part other than plug (1). Never put your face in the mounting direction of plug (1).

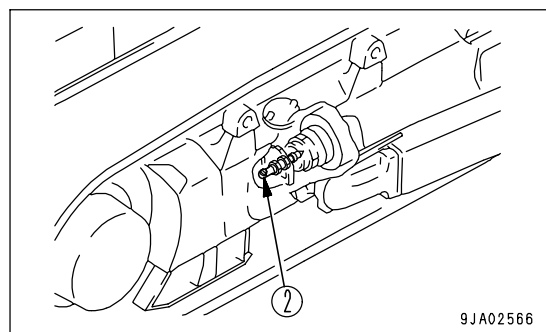
If the track tension cannot be loosened with the procedure given here, please contact your Komatsu distributor.



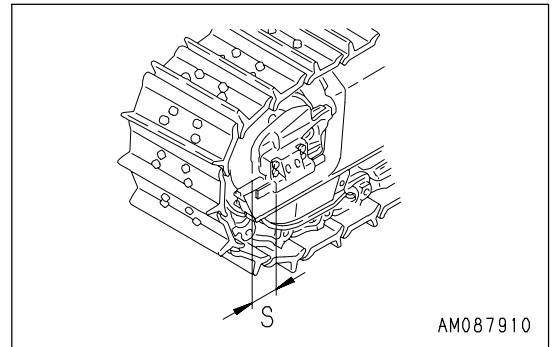
#### WHEN INCREASING TENSION

Prepare a grease pump.

1. Pump in grease through grease fitting (2) with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.



4. Continue to pump in grease until S becomes 0 mm. If the tension is still loose, the pins and bushings are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.

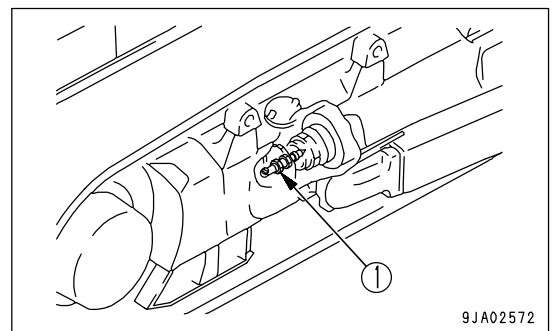


WHEN LOOSENING TENSION

**! WARNING**

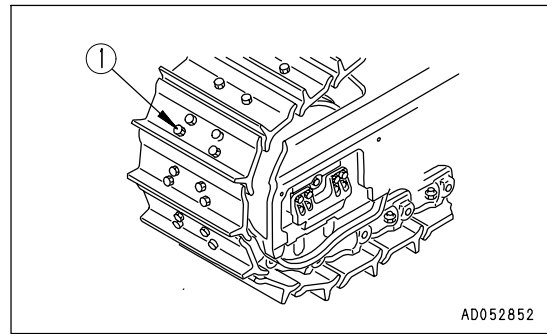
It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.

1. Loosen plug (1) gradually to release the grease.
2. When loosening plug (1), turn it a maximum of one turn.
3. If the grease does not come out smoothly, move the machine forwards and backwards a short distance.
4. Tighten plug (1).
5. To check that the correct tension has been achieved, move the machine backwards and forwards.
6. Check the track tension again, and if the tension is not correct, adjust it again.



## CHECK AND TIGHTEN TRACK SHOE BOLTS

Track shoes may be broken, if they are used with loosened shoe bolts (1). Hence whenever a loosened bolt is found, be sure to retighten it.



### METHOD OF TIGHTENING (TRACK SHOE BOLTS)

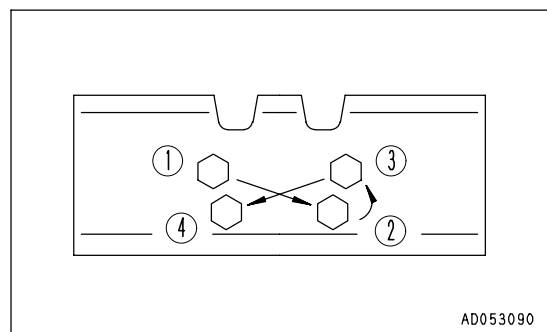
1. Torque the track shoe bolts to  $294 \pm 29$  Nm ( $30 \pm 3$  kgm ,  $217 \pm 21.7$  lbf). Then ensure the nut and shoe are in close contact with the link contact surface.
2. After checking, tighten a further  $120^\circ \pm 10^\circ$ .

### METHOD OF TIGHTENING (MASTER CONNECTING BOLT)

1. Torque the track shoe bolts to  $294 \pm 29$  Nm ( $30 \pm 3$  kgm ,  $217 \pm 21.7$  lbf). Then ensure the nut and shoe are in close contact with the link contact surface.
2. After checking, tighten a further  $180^\circ \pm 10^\circ$ .

### ORDER FOR TIGHTENING

Tighten the bolts in the order shown in the diagram on the right.



## CHECK ELECTRICAL INTAKE AIR HEATER

Before the start of the cold season (once a year), contact your Komatsu distributor to have the electrical intake air heater repaired or checked for dirt or disconnections.

REVERSE AND REPLACE END BITS AND CUTTING EDGES



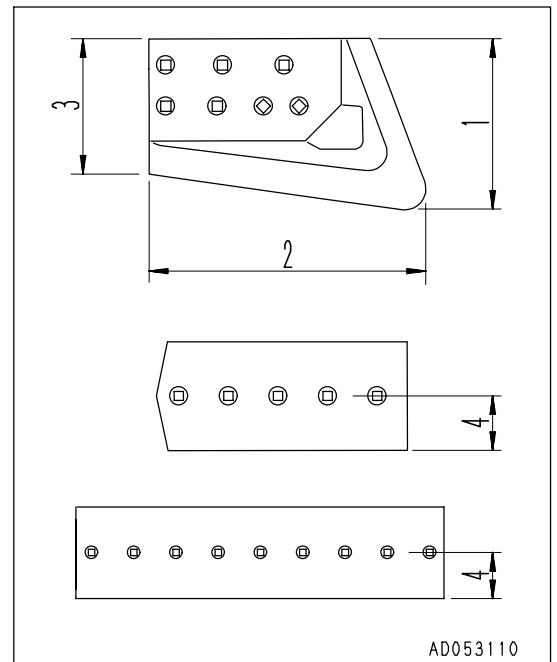
It is dangerous if the work equipment moves by mistake when the cutting edges and end bits are being reversed or replaced. Set the work equipment in a stable condition, then stop the engine and lock the blade control lever securely with the work equipment lock lever.

Reverse or replace the end bits and cutting edges before it is worn out to the blade end.

1. Raise the blade to a proper height, position a block under the frame to prevent the blade from falling.
2. Set the safety lock lever to the LOCK position and stop the engine.
3. Measure the wear of the end bit and cutting edge in accordance with the wear standards given below.

Wear standards

| Item |   |                | Judgement criteria |                      |
|------|---|----------------|--------------------|----------------------|
| No.  | Dimension to be measured                                      | Work equipment | Basic dimension    | Allowable max. value |
| 1    | Height of end bit (outside)                                   | A              | 237                | 204                  |
|      |   | B,C            | 204                | 187                  |
|      |   | D              | 292                | 254                  |
|      |   | E              | 315                | 254                  |
|      |   | F              | 237                | 204                  |
| 2    | Width of end bit  | A              | 325                | 300                  |
|      |   | B,C            | 325                | 300                  |
|      |   | D              | 435                | 410                  |
|      |   | E              | 540                | 515                  |
|      |   | F              | 325                | 310                  |
| 3    | Height of end bit (inside)                                    | A              | 204                | 187                  |
|      |   | B,C            | 204                | 187                  |
|      |   | D              | 254                | 237                  |
|      |   | E              | 254                | 237                  |
|      |   | F              | 204                | 187                  |
| 4    | Height of cutting edge (Center of bolt mounting hole to edge) | A              | 102                | 85                   |
|      |   | B,C            | 102                | 85                   |
|      |   | D              | 127                | 103                  |
|      |   | E              | 102                | 85                   |
|      |   | F              | 102                | 85                   |



AD053110

The symbols in the work equipment column have the following meaning.

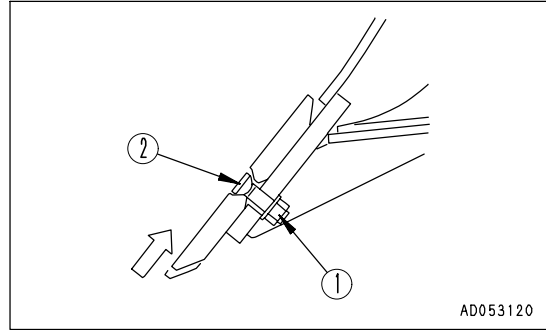
- A: Powertilt dozer (D65E)
- B: Powertilt dozer (D65P)
- C: Powertilt, Power pitch dozer (D65P)
- D: Semi-U blade (3m) (D65E)
- E: Semi-U blade (D65E)
- F: Angledozer (D65E)

**REMARK**

- If the cutting edge and the end bit on both sides are worn out, replace with new ones.
- If it has been worn out up to the fitting surface, repair the fitting surface and then reverse or replace.

4. Remove the cutting edge and the end bit and clean the mounting surface.
5. Reverse or replace the cutting edge and the end bit when worn out.

- 1) Remove nut (1) and bolt (2), then replace or reverse the cutting edge and the end bit.
- 2) Install the cutting edge on the blade and tighten the bolt temporarily. Press the blade against the ground to eliminate the play of bolt (2), then tighten the bolt to the specified torque.

**Nut tightening torque:**

Powerlift dozer:  $461 \pm 69$  Nm ( $47 \pm 7$  kgm ,  $340 \pm 51$  lbft.)

Powerlift, Power pitch dozer:  $461 \pm 69$  Nm ( $47 \pm 7$  kgm ,  $340 \pm 51$  lbft.)

Semi-U dozer:  $461 \pm 69$  Nm ( $47 \pm 7$  kgm ,  $340 \pm 51$  lbft.)

Angledozer:  $441 \pm 49$  Nm ( $45 \pm 5$  kgm ,  $325.5 \pm 36.2$  lbft.)

If bolt (2) and nut (1) are damaged, replace them with new ones at the same time.

6. After several hours of running, retorque the nuts.

**CLEAN, CHECK RADIATOR FINS**

If the radiator fins are clogged or dirty, clean and inspect them.

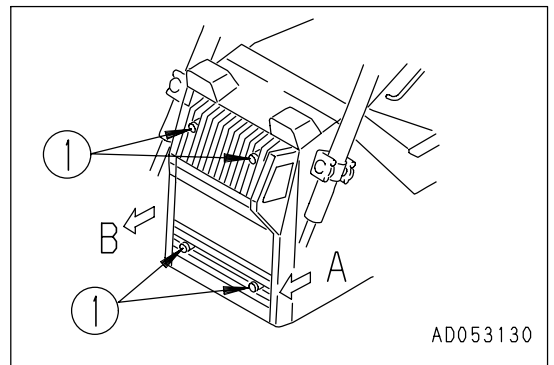
**CLEANING WITH COMPRESSED AIR**

**⚠ WARNING**

- Directing compressed air, pressurized water, or steam directly at your body, or using these and causing dust to fly may cause personal injury. Always wear protective glasses, anti-dust mask, and other protective equipment.
- When carrying out cleaning, always stop the engine and check that the fan is not rotating. If you touch the fan when it is rotating, it will cause serious personal injury.

If there is severe clogging of the radiator fins with dust, use compressed air to clean.

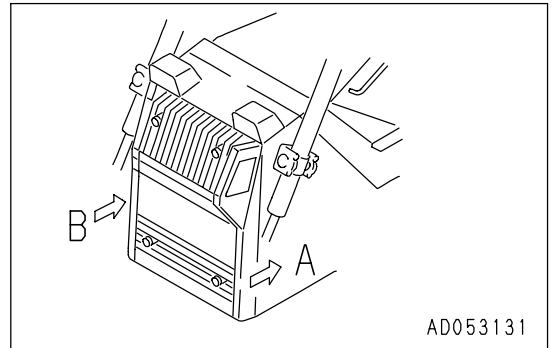
1. Remove bolts (1) (4 bolts).
2. Open the A side (hinge side) of the radiator mask. It opens approx. 10 mm (0.4 in).
3. Open the B side of the radiator mask.
4. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.



**REMARK**

Check the hydraulic cooler hoses. If any hose is cracked or hardened by age, replace with a new hose. Also check and tighten all loose hose clamps.

5. When closing the radiator mask, always push in the A side first, then push in the B side, align the bolt holes, and tighten bolts (1).



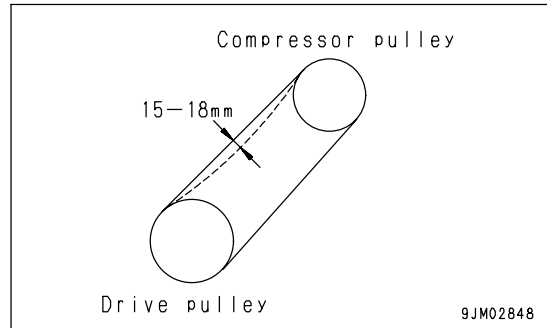


### CHECK, ADJUST AIR CONDITIONER

(Machine equipped with cab)

#### CHECKING TENSION OF COMPRESSOR BELT

If the belt is loose, it will slip and the cooling effect will be reduced. From time to time, press a point midway between the drive pulley and compressor pulley with your finger (approx. 98 N (10 kg)) and check that the tension is 15 to 18 mm (0.59 to 0.71 in). When the belt is new, there will be initial elongation, so always adjust again after 2 or 3 days.



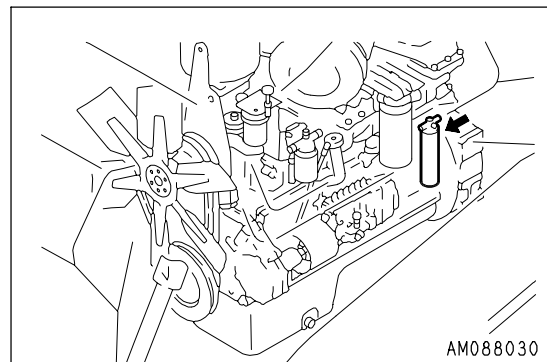
#### CHECK LEVEL OF REFRIGERANT



### WARNING

If the refrigerant used in the air conditioner gets into your eyes or on your hands, it may cause loss of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit. Do not bring any flame close to any point where the refrigerant gas is leaking.

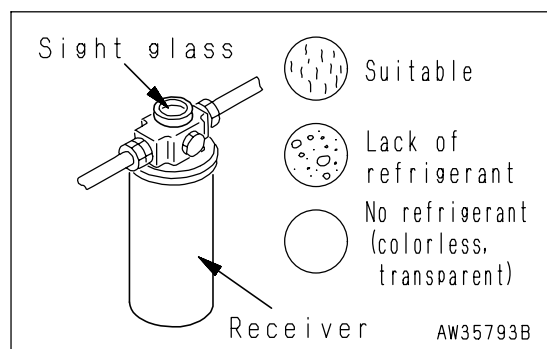
If the level of the refrigerant (gas) is low, the cooling effect will be reduced. Run the engine at high idle, and check the flow of the refrigerant in the refrigerant circuit through the sight glass of the receiver when the cooler is running at high speed.



- No bubbles in refrigerant flow: Suitable
- Some bubbles in flow (bubbles pass continuously): Lack of refrigerant
- Colorless, transparent: No refrigerant

#### REMARK

- When there are bubbles, the refrigerant gas level is low, so contact your refrigerant dealer to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.
- New Freon R134a is used as the refrigerant.



#### OPERATING AIR CONDITIONER OFF-SEASON

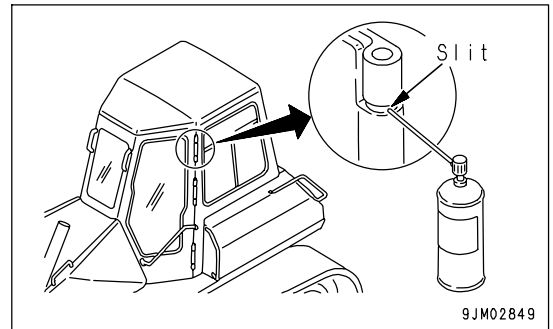
Even during the off-season, operate the air conditioner for 3 to 5 minutes once a month to maintain the oil film at all parts of the compressor.

**GREASE DOOR HINGE**

(Machine equipped with cab)

If the door makes a squeaking noise when it is opened or closed, spray lubricant in through the slit in the hinge bushing.

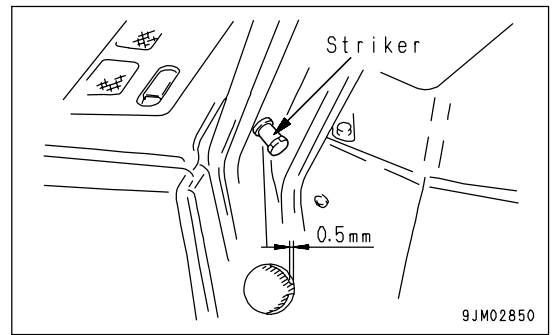
If the bushing is worn, replace the hinge.



**CHECK DOOR LOCK STRIKER**

(Machine equipped with cab)

If the wear of the door lock striker exceeds 0.5 mm (0.02 in), replace the striker. If it is used at it is, the play will increase and this may result in breakage of the hinge or door lock.

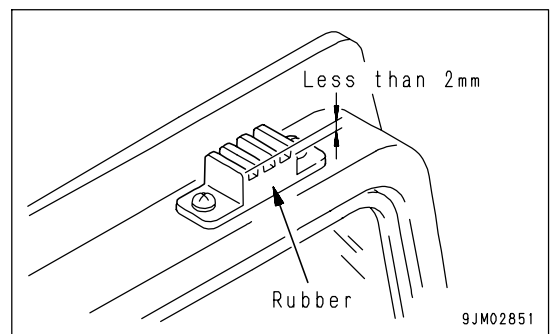


**REPLACE DOOR DAMPER**

(Machine equipped with cab)

If the depth of the door damper rubber groove is less than 2 mm (0.08 in), replace the damper.

There are four dampers each at the top and bottom on the left and right doors.



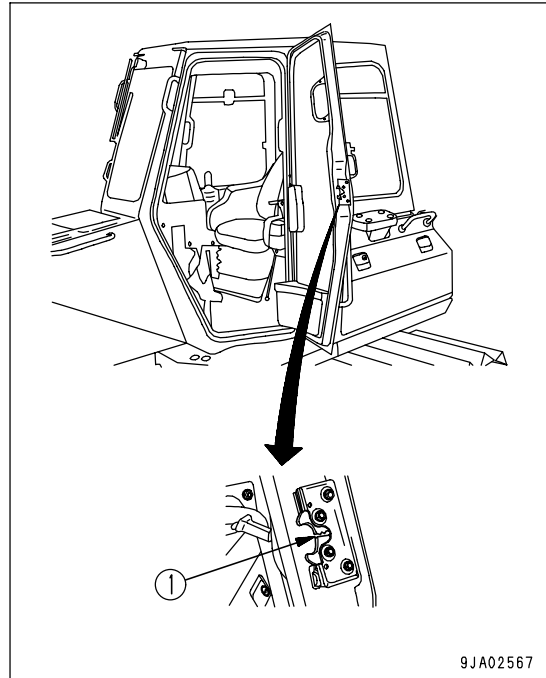
**CHECK DOOR LATCH**

(Machine equipped with cab)

Hold the door open and check that there is still grease inside the latch. If the amount of grease is low or there is no more grease, coat the inside of the latch with grease from portion (1).

**REMARK**

If there is no more grease inside the latch, the movement will become poor because of dust inside the latch, and the handle may be stiff when opening the door.



9JA02567

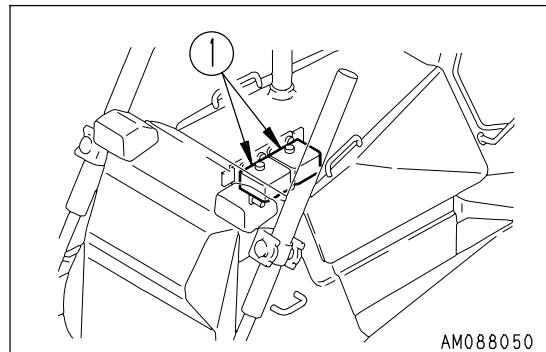
**CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID**

(Machine equipped with cab)

If there is air in the window washer fluid, check the level and add fluid.

Open the engine side cover on the right side, check the level of the fluid in window washer tank(1), and if it is low, add automobile window washer fluid.

When adding fluid, be careful not to let any dust get in.



AM088050

**PROPORTION FOR MIXING FLUID WITH WATER**

The proportion differs according to the ambient temperature, so dilute the washer fluid with water to the following proportions before adding.

| Area, season                  | Proportions                     | Freezing temperature |
|-------------------------------|---------------------------------|----------------------|
| Normal                        | Washer fluid 1/3:<br>water 2/3  | -10°C<br>(14°F)      |
| Winter in cold area           | Washer fluid 1/2 :<br>water 1/2 | -20°C<br>(-4°F)      |
| Winter in extremely cold area | Pure washer fluid               | -30°C<br>(-22°F)     |

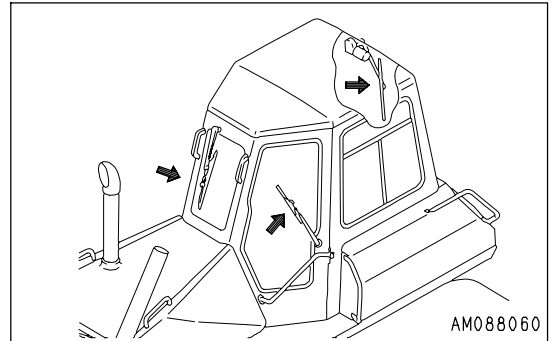
There are two types depending on the freezing temperature:

-10°C (14°F) (general use) and -30°C (-22°F) (cold area use), select according to the area and season.

**REPLACE WIPER BLADE**

(Machine equipped with cab)

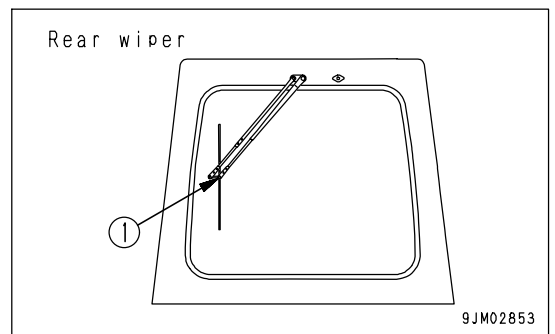
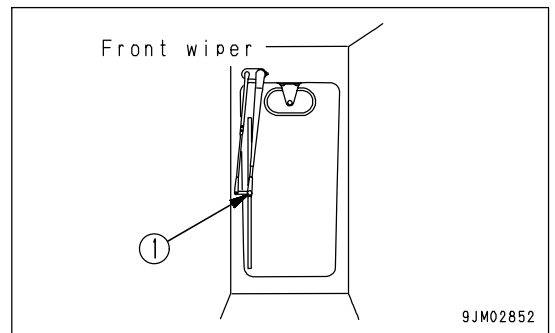
If the blade is damaged, it will not wipe the window clean, so replace the blade.



**REPLACEMENT**

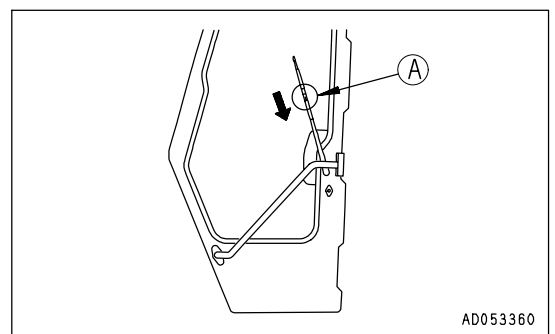
**FRONT AND REAR WIPERS**

1. Remove screw (1), then remove the blade.
2. Install a new blade, then tighten screw (1) securely.



**DOOR WIPER**

1. It is hooked at portion (A), so move the blade in the direction of the arrow to remove it.
2. Install the new blade and hook it securely.



## CHECK IDLER OIL LEVEL



### WARNING

If the oil level in the idler is low, new oil must be added, and the machine body must be inclined in this case. Since this work is dangerous, ask your Komatsu distributor.

If the oil level in the idler is low, noise will be generated and there will be seizure, so check the oil level and add oil as follows.

### INSPECTION

1. Remove bolt (1), then remove guide plate (2) and shim (3).

### REMARK

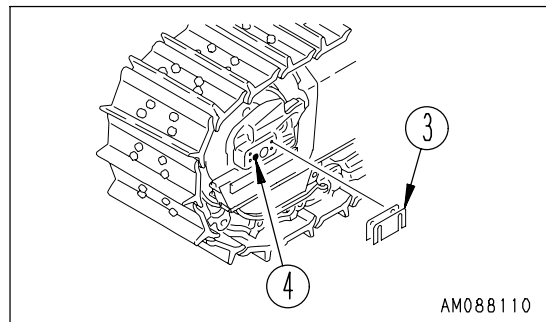
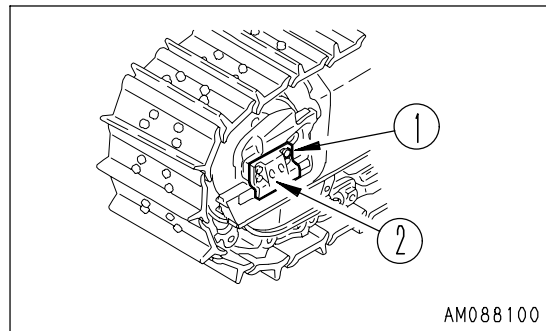
When removing shim (3) keep it in a safe place and be careful not to lose it.

2. Loosen plug (4) slowly. If oil oozes through the threads at this time, the quantity of oil is sufficient. Tighten plug (4).
3. If any oil does not flow out when plug (4) is removed, the quantity of oil is insufficient. In this case, ask your Komatsu distributor for repair.
4. Install guide plate (2) and shim (3) with bolt (1).

### REMARK

When installing guide plate (2), install the same number and thickness of shim (3) as removed in Step 1.

The optimum clearance may be obtained, if the adjustment is made at the same time. For details of adjusting the shim thickness, see "ADJUST IDLER CLEARANCE (PAGE 4-34)".



## ADJUST IDLER CLEARANCE

Since the idlers are forced to move forward and backward by an external force guide plates will be worn out.

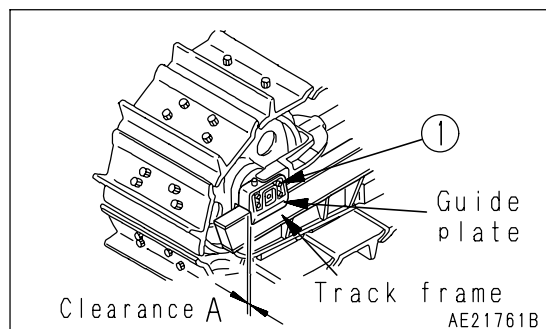
Wear of these plates will cause the vibration of idlers from side to side or inclination of the idlers, and running off of track links from the idlers or unevenly worn idler and links may result.

Therefore, adjust the idlers according to the following procedure.

### ADJUSTMENT

1. Move the machine by 1 to 2 m (3.3 to 6.6 ft) on a level place, then measure clearance (A) between the track frame and guide plate (at four places of both sides, inside, and outside).
2. If the clearance (A) exceeds 4.0 mm (0.16 in), loosen bolt (1), and pull out the shim to adjust the clearance at one end to 0.5 to 1.0 mm (0.02 to 0.04 in).

Thickness of one shim is 1.0 mm (0.04 in).



## PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM

See "STARTING ENGINE (PAGE 3-61)".

Since the engine must be started and the blade must be operated, see OPERATION.

### NOTICE

If the engine is run at high speed immediately after startup or a cylinder is pushed up to its stroke end, air taken inside the cylinder may cause damage to the piston packing.

1. Bleed air from left pitch cylinder  
(Powertilt, Power pitch dozer only)

Bleeding air from the hydraulic system is required when removing and installing the work equipment or when making the repairs.

- 1) Bring the blade to the RAISE position and run the engine under no load at low range.
- 2) Bleeding air in the tilt hydraulic circuit by repeating left and right tilt operation five to ten times.
- 3) Bleeding air from the bottom of left cylinder by operating the blade to pitch forward and backward 5 to 10 times repeatedly.
- 4) Set the left and right cylinders at the neutral position, then carry out the following operations 5 to 10 times to bleed the air from the head end of the left pitch cylinder.

(1) Forward pitch → (2) Left tilt → (3) Right tilt → (4) Backward pitch

2. Bleeding air from cylinders

- 1) Run the engine at low idle, and extend and retract each cylinder 4 to 5 times, taking care that a cylinder is not moved to the end of its stroke. (Stop the cylinder approx. 100 mm (3.9 in) short of its stroke end)
- 2) Next, operate each cylinder 3 to 4 times to the end of its stroke.
- 3) Finally, operate each cylinder 4 to 5 times to the end of its stroke to completely remove the air.

**ADJUSTING SHIMS, ADJUSTING TENSION AT WORK EQUIPMENT LINKS**

- When assembling the work equipment, carry out adjustment as follows.
- Check the play of the links periodically and carry out adjustment.
- When disassembling the machine for transportation, be careful not to lose the shims.

**NEED FOR ADJUSTING WORK EQUIPMENT LINKS**



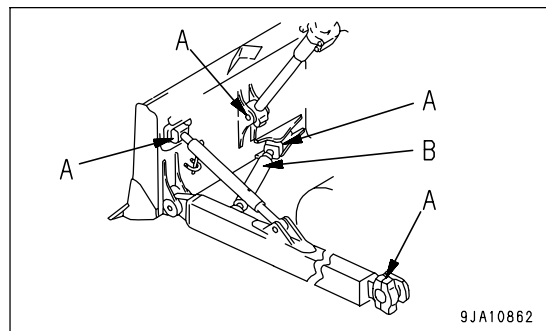
If the clearances at each ball joint of the work equipment and the tension of the center brace are not adjusted properly, it will lead to problems.

It is necessary to carry out adjustment properly regardless of whether the machine is new and regardless of the number of years that it has been used.

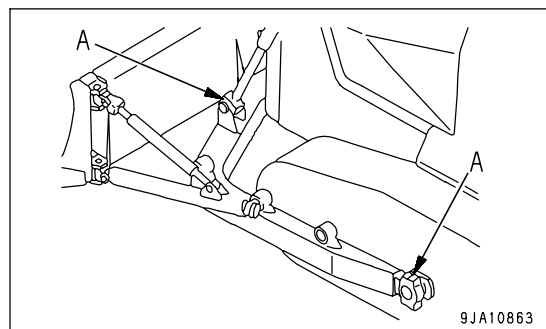
Problems that occur when adjustment is not correct

| Location   | Condition            | Problems that appear  |
|--|----------------------|---|
| Ball joint portion<br>(portion A in diagram below) | Excessive play       | <ul style="list-style-type: none"> <li>• Work equipment play becomes excessive and performance deteriorates</li> <li>• Sand or dust enters through gap and causes wear</li> <li>• Impact load at joints increases and durability is reduced</li> </ul>  |
|  | No play              | <ul style="list-style-type: none"> <li>• Ball cannot rotate, excessive bending stress is generated, and cracks or damage occur</li> </ul>   |
| Center brace<br>(portion B in diagram below)       | Insufficient tension | <ul style="list-style-type: none"> <li>• Work equipment play becomes excessive and performance deteriorates</li> <li>• Sand or dust enters bushing at blade connection and causes wear</li> <li>• Shaking to side increases, lift cylinder hose contacts bodywork and frame contacts track</li> </ul> |
|  | Excessive tension    | <ul style="list-style-type: none"> <li>• Excessive bending tension is generated, and cracks or damage occur</li> </ul>  |

- Power tiltdozer
- Powertilt, Power pitch dozer
- Semi U-dozer



- Angledozer  
(There is no portion B on the angledozer)

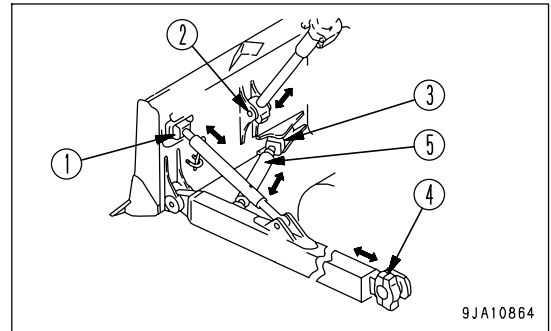


LOCATIONS FOR ADJUSTMENT AND NEED FOR ADJUSTMENT

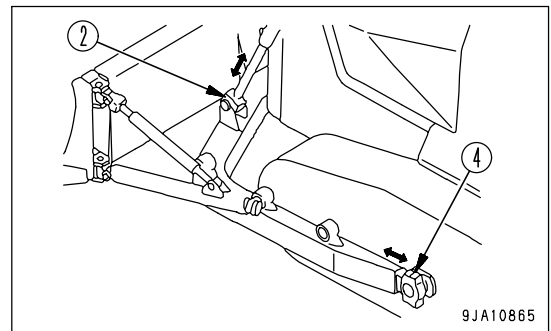
**! WARNING**

It is dangerous if the work equipment moves by mistake when it is being adjusted. Move the machine to a horizontal place, stop the machine, and set the work equipment in a stable condition. Then stop the engine and set the work equipment lock lever securely to the LOCK position.

- Power tiltdozer
- Powertilt, Power pitch dozer
- Semi U-dozer



- Angledozer



1. Adjust the play of each link ball joint at positions (1) to (4).
  - (1) Tilt brace, tilt cylinder head, pitch cylinder head
  - (2) Lift cylinder head
  - (3) Center brace
  - (4) Trunnion
2. Adjust the tension of center brace (5).

**REMARK**

For details of the procedure for adjusting each location, see the following items.

"ADJUSTING SHIMS AT TILT BRACE, TILT CYLINDER HEAD, PITCH CYLINDER HEAD (PAGE 4-38)"

"ADJUSTING SHIMS AT LIFT CYLINDER HEAD (PAGE 4-39)"

"ADJUSTING SHIMS AT CENTER BRACE (PAGE 4-40)"

"ADJUSTING SHIMS AT TRUNNION (PAGE 4-41)"

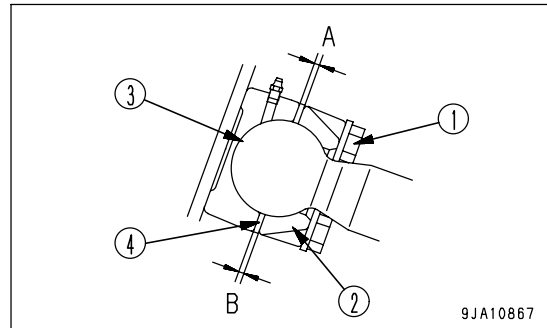
"ADJUSTING TENSION OF CENTER BRACE (PAGE 4-42)"



## METHOD OF ADJUSTING EACH LOCATION

### ADJUSTING SHIMS AT TILT BRACE, TILT CYLINDER HEAD, PITCH CYLINDER HEAD

- Correct value for play at ball joint: 0.2 - 0.7 mm
- Standard shim thickness: 5 mm

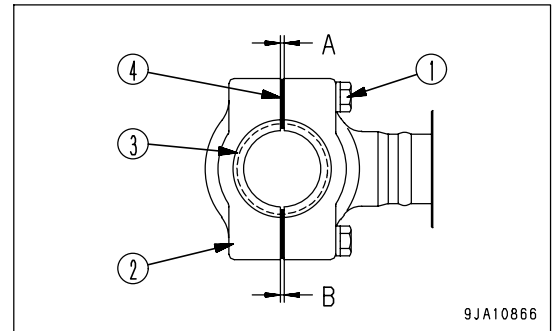


Use the following procedure to adjust the play at the ball joint to the correct value.

1. Remove bolts (1), then remove cap (2).
2. Wipe off the grease and dirt from the sliding surface of ball (3).
3. Remove all shims (4).
4. Install cap (2) and tighten bolts (1) temporarily.  
Temporary tightening torque: 19.6 to 29.4 Nm (2 to 3 kgm, 14.5 to 21.7 lbft)
5. Measure clearance at portion A (top) and portion B (bottom) of ball joint, and calculate average clearance C [ $C = (A+B)/2$ ].  
Set so that the shim thickness is  $(C + 0.2) - (C + 0.7)$  mm.  
The shim thickness can be set in units of 0.5 mm.
6. Remove bolts (1), then remove cap (2).
7. Install the thickness of shim measured in Step 5, then tighten cap (2) fully with bolts (1).  
Tightening torque: 455 to 565 Nm (46.5 to 58 kgm, 336.3 to 419.5 lbft)
8. Before filling with grease, operate the work equipment and check that there is no abnormal noise or abnormal play.
9. Pump in grease through the grease fitting of the ball joint.
10. After greasing, wipe off any old grease that was pushed out.

**ADJUSTING SHIMS AT LIFT CYLINDER HEAD**

- Correct value for play at ball joint: 0.2 - 0.7 mm
- Standard shim thickness: 4 mm

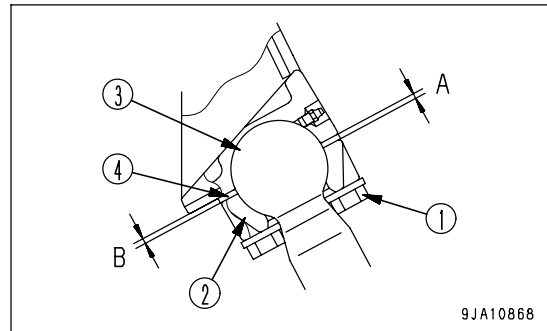


Use the following procedure to adjust the play at the ball joint to the correct value.

1. Remove bolts (1), then remove cap (2).
2. Wipe off the grease and dirt from the sliding surface of ball (3).
3. Remove all shims (4).
4. Install cap (2) and tighten bolts (1) temporarily.  
Temporary tightening torque: 19 .6 to 29.4 Nm (2 to 3 kgm, 14.5 to 21.7 lbft)
5. Measure clearance at portion A (top) and portion B (bottom) of ball joint, and calculate average clearance C [ $C = (A+B)/2$ ].  
Set so that the shim thickness is  $(C + 0.2) - (C + 0.7)$  mm.  
The shim thickness can be set in units of 0.5 mm.
6. Remove bolts (1), then remove cap (2).
7. Install the thickness of shim measured in Step 5, then tighten cap (2) fully with bolts (1).  
Tightening torque: 235 to 285 Nm (23.5 to 29.5 kgm, 170.0 to 213.4 lbft)
8. Before filling with grease, operate the work equipment and check that there is no abnormal noise or abnormal play.
9. Pump in grease through the grease fitting of the ball joint.
10. After greasing, wipe off any old grease that was pushed out.

## ADJUSTING SHIMS AT CENTER BRACE

- Correct value for play at ball joint: 0.2 - 0.7 mm
- Standard shim thickness: 5 mm

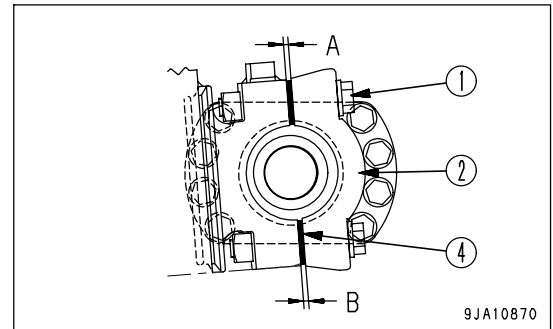


Use the following procedure to adjust the play at the ball joint to the correct value.

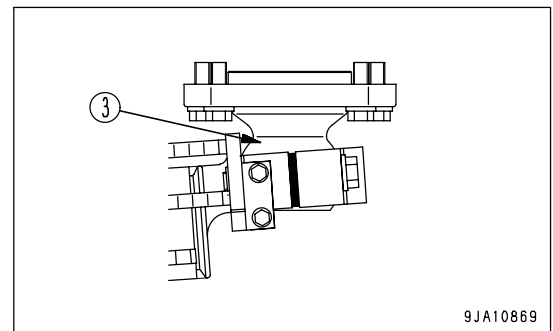
1. Remove bolts (1), then remove cap (2).
2. Wipe off the grease and dirt from the sliding surface of ball (3).
3. Remove all shims (4).
4. Install cap (2) and tighten bolts (1) temporarily.  
Temporary tightening torque: 19.6 to 29.4 Nm (2 to 3 kgm, 14.5 to 21.7 lbft)
5. Measure clearance at portion A (top) and portion B (bottom) of ball joint, and calculate average clearance C [ $C = (A+B)/2$ ].  
Set so that the shim thickness is  $(C + 0.2) - (C + 0.7)$  mm.  
The shim thickness can be set in units of 0.5 mm.
6. Remove bolts (1), then remove cap (2).
7. Install the thickness of shim measured in Step 5, then tighten cap (2) fully with bolts (1).  
Tightening torque: 455 to 565 Nm (46.5 to 58 kgm, 336.3 to 419.5 lbft)
8. Before filling with grease, operate the work equipment and check that there is no abnormal noise or abnormal play.
9. Pump in grease through the grease fitting of the ball joint.
10. After greasing, wipe off any old grease that was pushed out.

ADJUSTING SHIMS AT TRUNNION

- Correct value for play at ball joint: 0.2 - 1.2 mm
- Standard shim thickness: 10 mm



9JA10870



9JA10869

Use the following procedure to adjust the play at the ball joint to the correct value.

1. Remove bolts (1), then remove cap (2).
2. Wipe off the grease and dirt from the sliding surface of ball (3).
3. Remove all shims (4).
4. Install cap (2) and tighten bolts (1) temporarily.  
Temporary tightening torque: 39.2 to 49 Nm (4 to 5 kgm, 28.9 to 36.2 lbft)
5. Measure clearance at portion A (top) and portion B (bottom) of ball joint, and calculate average clearance C [ $C = (A+B)/2$ ].  
Set so that the shim thickness is  $(C + 0.2) - (C + 1.2)$  mm.  
The shim thickness can be set in units of 1 mm.
6. Remove bolts (1), then remove cap (2).
7. Install the thickness of shim measured in Step 5, then tighten cap (2) fully with bolts (1).  
Tighten bolts (1) in turn at the top and bottom to reach the specified torque.  
Tightening torque: 785 to 980 Nm (80 to 100 kgm, 578.6 to 723.3 lbft)
8. Operate the work equipment and check that there is no abnormal noise or abnormal play.

**ADJUSTING TENSION OF CENTER BRACE**

(Power tilt dozer)

(Powertilt, Power pitch dozer)

(Semi-U dozer)

In case the work equipment assembly is disassembled for transportation and reassembled at a worksite, tension of the center brace has to be adjusted anew. Otherwise the bushing at the connecting part of blade and straight frame will likely slip off, allowing sand and dirt to enter the bushing, which eventually leads to premature wear or damage of the bushing. Make this adjustment as follows:

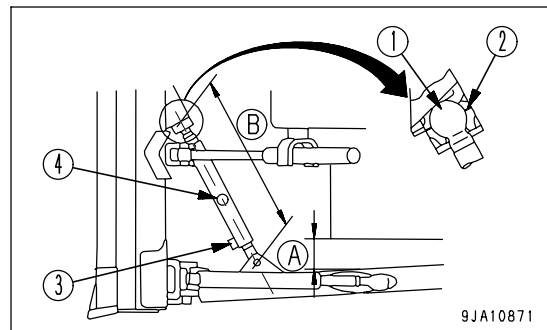
**WARNING**

Except when operating the blade in Step 4, always lock the blade control lever securely with the work equipment lock lever.

1. Adjust with shim (2) so that the play of ball joint (1) is 0.2 to 0.7 mm (0.008 to 0.028 in).

For details of the method of adjusting, see "ADJUSTING SHIMS AT CENTER BRACE (PAGE 4-40)".

2. Loosen bolt (3).
3. Install the blade assembly.
4. Operate the blade control lever to float the blade.



5. Insert the bar in center brace hole (4) and turn the bar to the protruding side. At that time, adjust clearance between the track shoe and frame (A) so that it is equal on the right and left sides.

Rotating torque: 24.5 to 49 Nm (2.5 to 5 kgm, 18.1 to 36.2 lbft) (Blade at FLOAT)

Standard distance between the joints (B) is as shown below.

D65E: 995mm (39.2 in)

D65P: 992mm (39.1 in)

6. Tighten bolt (3).  
Tightening torque: 490.3 to 608 Nm (50 to 62 kgm, 361.7 to 448.4 lbft)

**CHECK BEFORE STARTING**

For details of the following items, see "CHECK BEFORE STARTING (PAGE 3-44)" in the OPERATION section.

- Check coolant level, add coolant
- Checking with machine monitor
- Check speed range display lamp
- Check fuel level, add fuel
- Check oil level in engine oil pan, add oil
- Check oil level in power train case, add oil
- Check brake pedal travel
- Check dust indicator
- Check electric wiring
- Check that lamps light up
- Check horn sound
- Check of operation of backup alarm
- Check, clean water separator (if equipped)

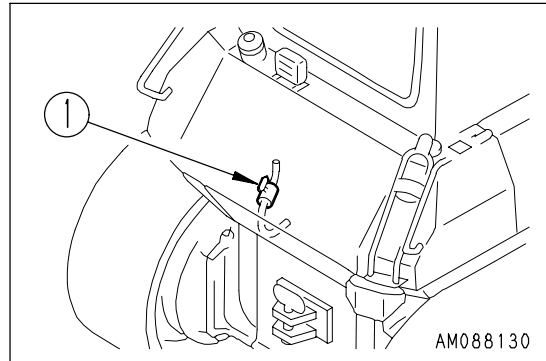
## EVERY 50 HOURS SERVICE

### DRAIN WATER, SEDIMENT FROM FUEL TANK

Carry out this procedure before operating the machine.

- Prepare a container to catch the fuel that is drained.

1. Open drain valve (1) at the bottom inside the inspection cover on the left side at the rear of the machine and drain the water and sediment accumulated at the bottom together with fuel. When doing this, be careful not to get fuel on yourself.
2. When clear fuel comes out, close drain valve (1).



**EVERY 250 HOURS SERVICE**

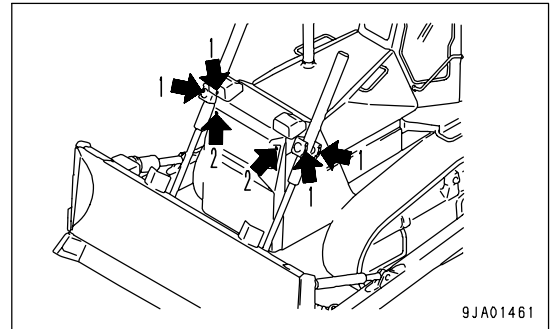
Maintenance for every 50 hours service should be carried out at the same time.

**LUBRICATING**

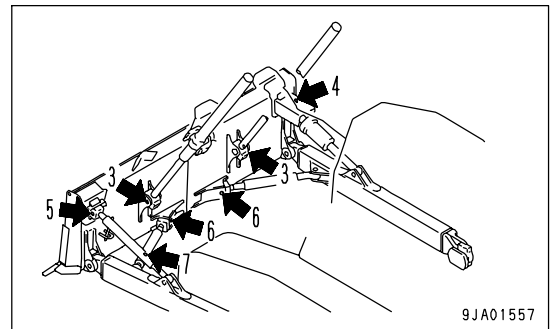
1. Lower the blade to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

**POWER TILTDOZER**

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)



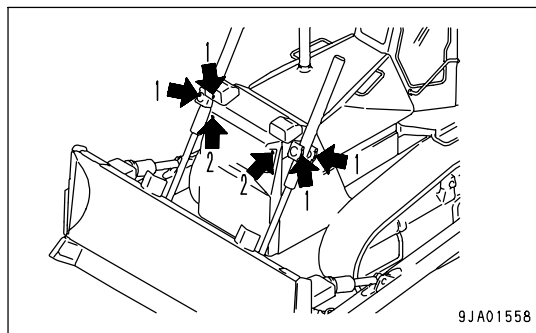
- (3) Lift cylinder ball joint (2 places)
- (4) Tilt cylinder ball joint (1 place)
- (5) Tilt brace ball joint (1 place)
- (6) Brace ball joint (2 places)
- (7) Tilt brace thread (1 place) (screw-adjustable)





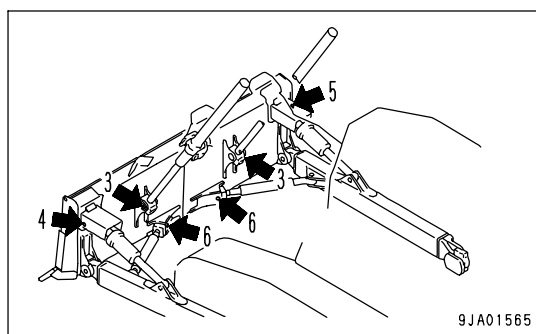
**POWER TILT-POWER PITCH DOZER**

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)



9JA01558

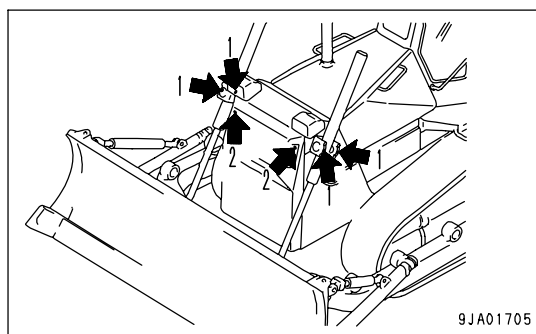
- (3) Lift cylinder ball joint (2 places)
- (4) Tilt cylinder ball joint (1 place)
- (5) Pitch cylinder ball joint (1 place)
- (6) Brace ball joint (2 places)



9JA01565

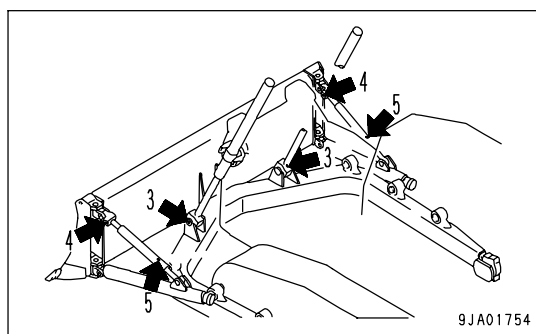
**ANGLE DOZER**

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)



9JA01705

- (3) Lift cylinder ball joint (2 places)
- (4) Tilt brace ball joint (2 places)
- (5) Tilt brace thread (2 places)



9JA01754

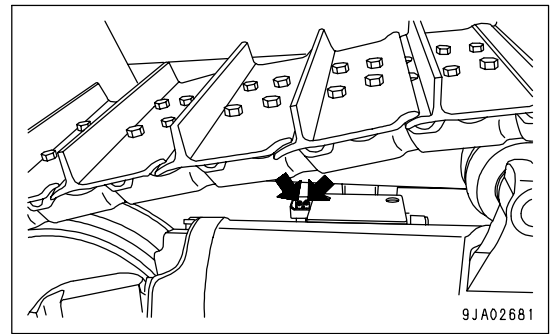
**GREASE EQUALIZER BAR SIDE PIN**

Left and right, 2 places each

1. Remove all dirt from the top of the track frame and cover.
2. Clean the grease fitting indicated with the arrow, then supply grease to that fitting with a grease pump.

**REMARK**

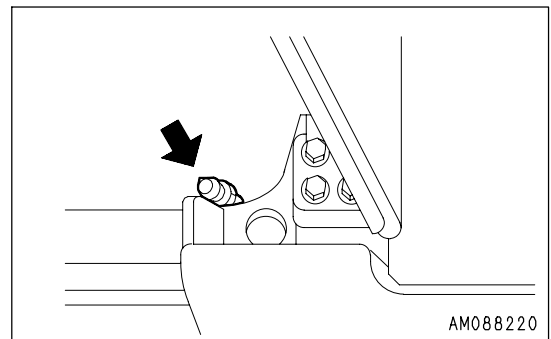
- Supply 3 shots of grease (Operate the grease pump lever 3 times) to each grease fitting, and check that grease is newly discharged through the seal lip.
- If grease is not newly discharged through the lip, continue supplying grease until it is discharged.



**GREASE EQUALIZER BAR CENTER PIN**

(1 place)

1. Open the engine side cover on the left side of the chassis.
2. Clean the grease fitting indicated with the arrow, then supply grease to that fitting with a grease pump.

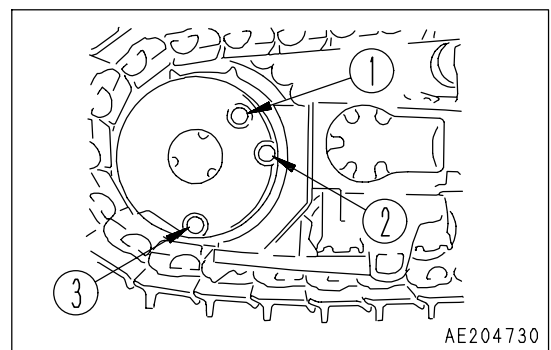


**CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL**

**! WARNING**

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- If there is still pressure remaining inside the case, the oil or plug may fly out.  
Loosen the plug slowly to release the pressure.

1. Stop the machine so that drain plug (3) is directly at the bottom.
2. Remove oil level plug (2) and check whether the final drive case is filled with oil to lower edge of the plug hole.
3. If the oil level is too low, add oil through the oil filler plug hole(1).
4. When oil starts to overflow from oil level plug (2), stop filling and install oil level plug (2) and oil filler plug (1).



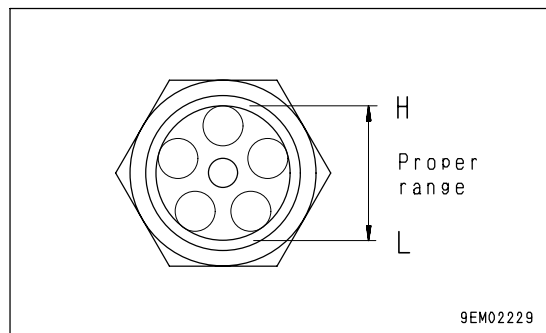
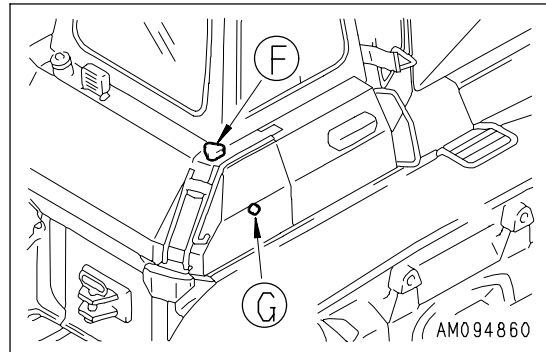
**CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL****WARNING**

- The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

**NOTICE**

- Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.
- Always lock the cap with the key.

1. Lower blade to the ground and stop the engine. Wait for 5 minutes before checking oil level. Oil level should be between the H and L in sight gauge (G).
2. If the level is below the L mark, add oil through oil filler (F).
3. After adding oil, be sure to screw on the oil filler cap and lock it with the key.



**CHECK LEVEL OF BATTERY ELECTROLYTE**

Carry out this procedure before operating the machine.

**! WARNING**

- Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. This will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may cause an explosion.
- The battery generates flammable gas and there is danger of explosion, do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with a large amount of water and consult a doctor.
- When adding distilled water to the battery, do not allow the battery electrolyte to go above the UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.

**NOTICE**

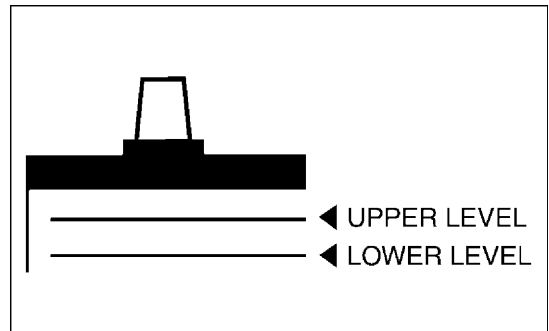
If there is a fear that the battery water may freeze after refilling with purified water (e.g. commercially available replenishment water for a battery), do the replenishment before the day's work on the next day.

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

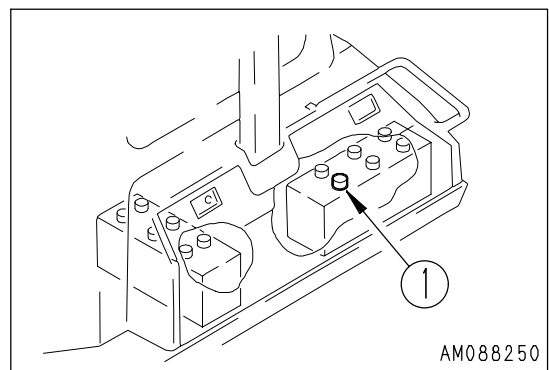
**WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY**

If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Open the battery cover on the left side of the machine body.
2. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL (U.L.) and LOWER LEVEL (L.L.) lines.  
If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.



3. If the electrolyte level is below the midway point between the U.L and L.L lines, remove cap (1) and add distilled water to the U.L line.
4. After adding distilled water, tighten cap (1) securely.



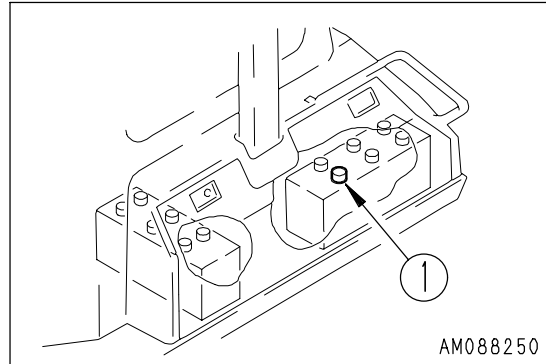
**REMARK**

If distilled water is added to above the U.L. line, use a syringe to lower the level to the U.L. line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.

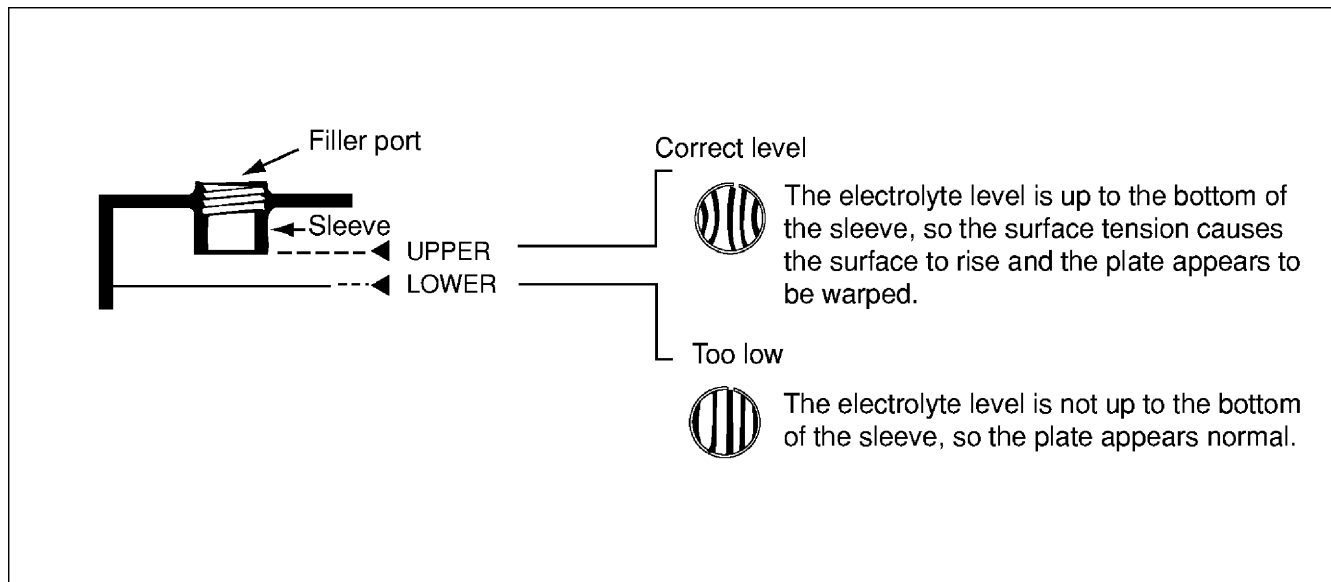
**WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY**

If it is impossible to check the electrolyte level from the side of the battery, or there is no display of the UPPER LEVEL line on the side of the battery, check as follows.

1. Open the battery cover on the left side of the machine body.
2. Remove cap (1) at the top of the battery, look through the water filler port, and check the electrolyte surface. If the electrolyte does not reach the sleeve, add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line) without fail.



Use the diagram below for reference, and check if the electrolyte reaches the bottom of the sleeve.



3. After adding distilled water, tighten cap (1) securely.

**REMARK**

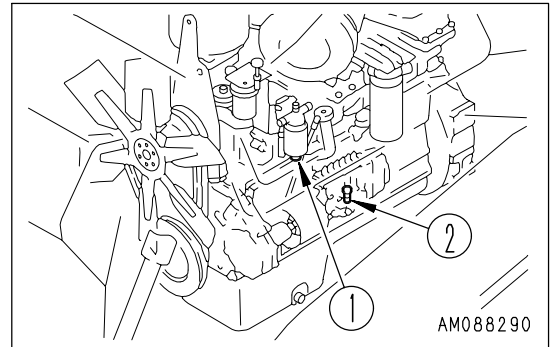
If water is added to above the bottom tip of the sleeve, use a pipette to remove electrolyte. Neutralize the removed electrolyte with sodium bicarbonate, then flush it away with a large amount of water. If necessary, contact your Komatsu distributor or your battery maker.

**WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL**

If it is possible to use an indicator to check the electrolyte level, follow the instructions given.

**DRAIN WATER, SEDIMENT FROM FUEL FILTER**

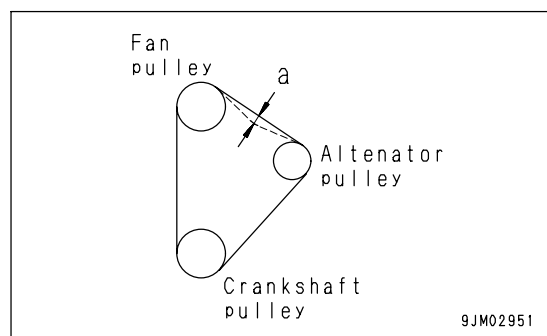
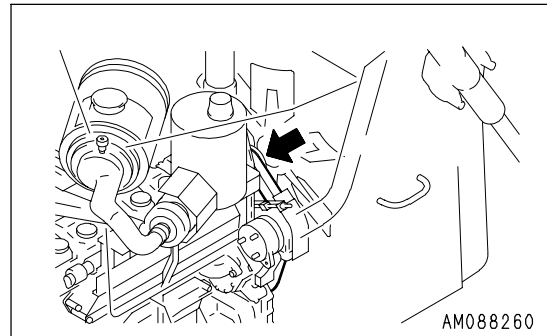
1. Open the engine side cover on the left side of the machine, then remove drain plug (1) on the bottom of the fuel filter and drain fuel with sediments and water contained in the fuel.
2. Tighten drain plug (1).
3. Loosen the knob of feed pump (2) and operate it 50 to 60 times up and down. This will bleed the air.
4. Push in the knob of feed pump (2) and tighten it.



## CHECK FAN BELT TENSION, ADJUST

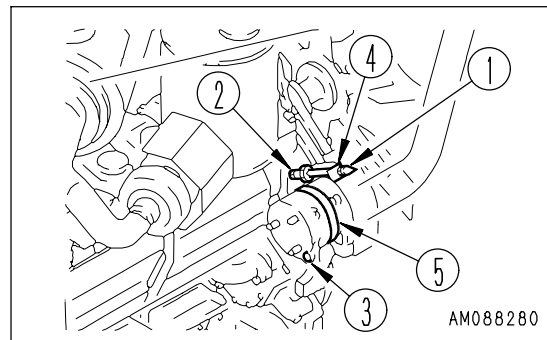
### INSPECTION

Deflection "a" should be 6 to 10 mm (0.2 to 0.4 in) when the belt is pressed with a finger force of approx. 59 N (6 kg) at a point midway between the alternator pulley and fan pulley.



### ADJUSTMENT

1. Loosen bolts and nuts (1), (2), (3).
2. Turn nut (4) clockwise, then move alternator (5) to adjust the belt tension so that the deflection is approx. 10 mm (0.4 in) when pushed with a force of approx. 59 N (6 kg).
3. Tighten the bolts and nuts (1), (2), and (3) to fix alternator (5) in position.



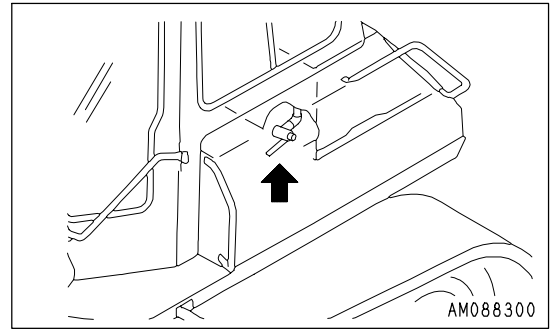
### REMARK

- Check each pulley for breakage and wear of the V-groove. In particular, check that the V-belt does not touch the bottom of the V-groove.
- If any abnormality is found, ask your Komatsu distributor for replacement of the pulley.
- If the V-belt is so lengthened that it cannot be adjusted any more or if it has any cuts or cracks, replace it.
- When adjusting the V-belt, do not press the alternator directly with a bar, but put a wood piece, etc. in-between them.
- If the V-belt has been replaced with a new part, there will be initial elongation, so inspect and adjust it again after one-hour of operation.

**CHECK, CLEAN ADDITIONAL FUEL STRAINER**

(If equipped)

1. Open the inspection cover at the bottom of the fuel tank.
2. Tighten the fuel supply valve, then remove the cap, and clean the strainer and strainer case.  
The strainer forms one unit with the cap.
3. After checking and cleaning the strainer, set it in the case, then tighten the cap.
4. After installing, open the fuel supply valve.

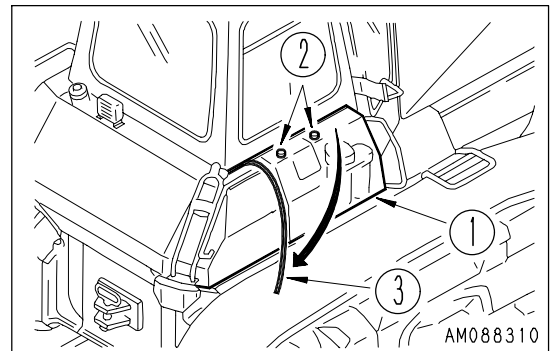


**REPLACE POWER TRAIN OIL FILTER ELEMENT**

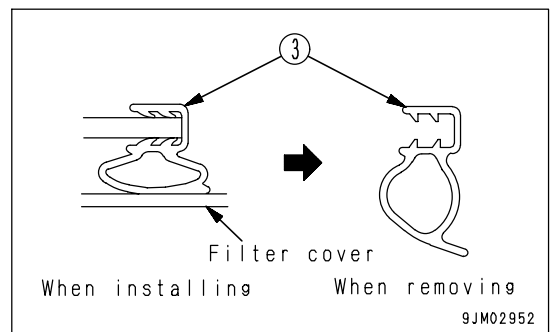
**! WARNING**

The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

1. Remove top mounting bolts (2) of filter cover (1), then use the bottom hinge as the fulcrum to open the cover to the outside.

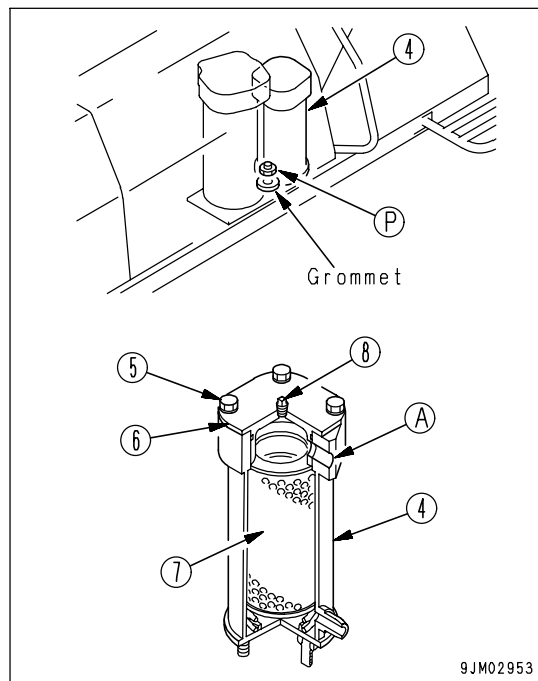


2. Remove seal (3) installed to the frame.





3. Remove mounting bolts (5) for filter (4), then remove cover (6).
4. Remove the grommet under the fender, loosen drain plug (P), and drain the oil from inside the filter case.
5. Take out element (7).
6. Clean the removed parts and the inside of the case, then install a new element.
- Use Komatsu genuine element.
7. Fix cover (6) with bolt (5) by making a horizontal hole of the cover with filter case hole (A).
8. Install drain plug (P).
9. Loosen air vent plug (8) and start engine. Tighten the plug when oil comes out.

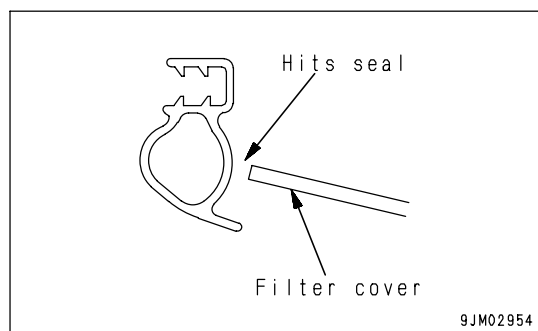
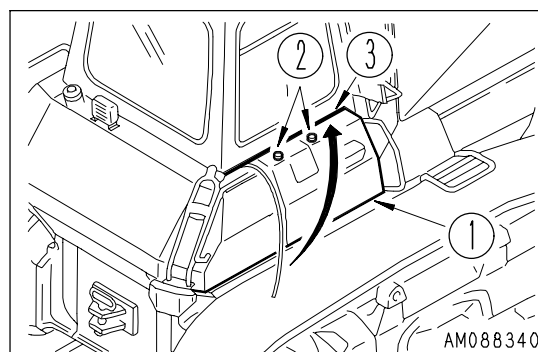


10. Tighten filter cover (1) and then bolt (2).

**NOTICE**

- When replacing seal (3), do it after closing cover (1).
- The seal will be damaged if the filter cover closes after replacing it.

11. Replace frame seal (3).



CHECK BRAKE PERFORMANCE

**! WARNING**

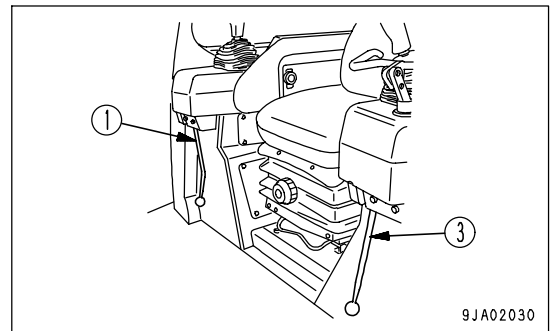
If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.

NOTICE

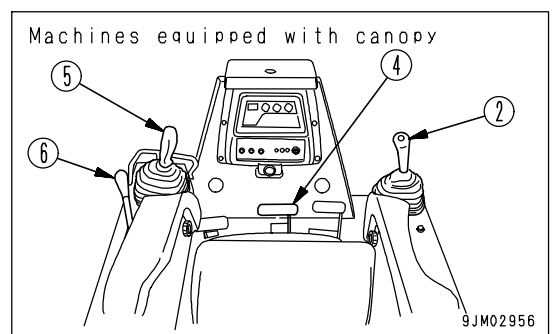
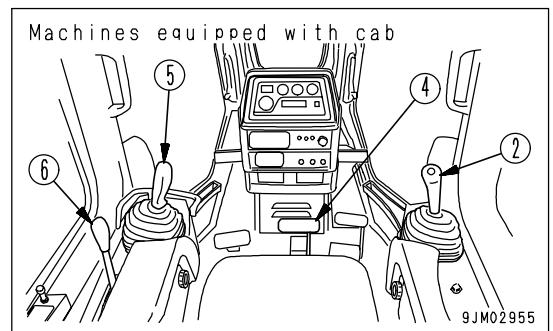
Do not place the gear shift lever in 1st under any circumstances. The machine will be damaged.

Before starting the engine, check that the area around the machine is safe, then do as follows:

1. Start the engine.
2. Set work equipment lock lever (1) to the FREE position then operate blade control lever (2) to raise the blade.  
Leave the work equipment lock lever to the FREE position.
3. Set parking brake lever (3) to the FREE position.



4. Depress brake pedal (4) and move steering, directional and gear shift lever (5) in 2nd.
5. Operate fuel control lever (6) to raise the engine speed gradually to full throttle.
6. Check that the machine does not move. This indicates that brake performance is normal.



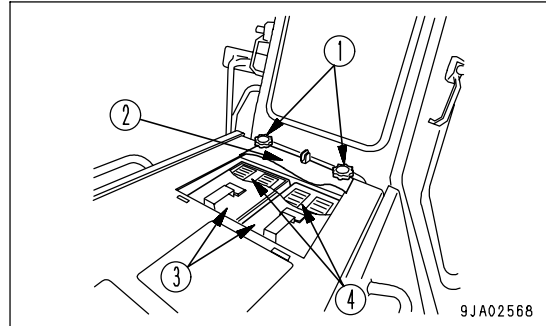
**CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER)**

(Machine equipped with cab)

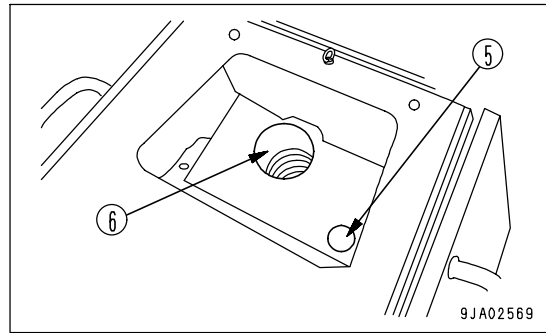
Clean the air conditioner air filter if it becomes clogged or if there is dirt or oil stuck to it.

In places where there is a lot of dust, clean the air filter once a week. In addition, clean the air conditioner air filter at the same time, when cleaning the engine air cleaner.

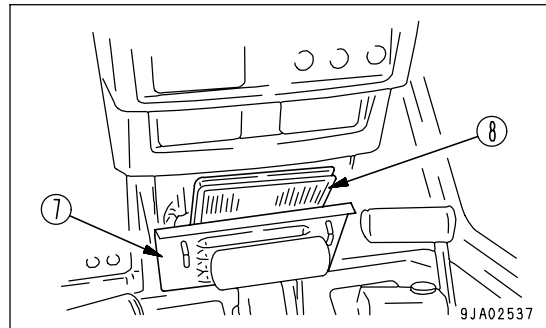
1. Loosen mounting bolts (1), pull up inspection cover (2) to the rear, and remove it.
2. Remove inside cover (3), then remove FRESH filter (4).



3. Remove the filter box, then brush out the dirt accumulated inside the box through the cleaning hole (5) in the hood. When doing this, be careful not to let any dirt or dust get into the fresh air intake port (6) leading to the cab.



4. Open inspection cover (7) under the front panel, then pull up RECIRC filter (8) and remove it.
5. Clean filters (4) and (8) with compressed air. If the filters are stained with oil or extremely dirty, wash them in neutral detergent. After washing the filters, dry them up, then install them.

**REMARK**

If the filters cannot be cleaned with air or in water, replace them with new ones.

## EVERY 500 HOURS SERVICE

Maintenance for every 50 and 250 hours service should be carried out at the same time.

### REPLACE FUEL FILTER CARTRIDGE

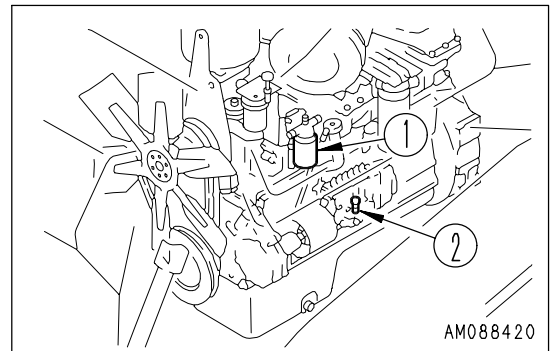


#### WARNING

- The engine is at high temperature immediately after the machine has been operated. Wait for the engine to cool down before replacing the filter.
- Do not bring fire or sparks near the fuel.

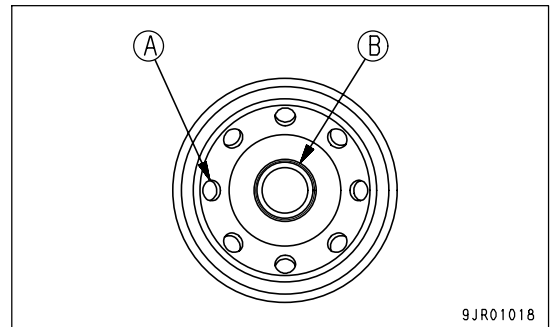
Prepare a filter wrench and a container to catch the fuel.

1. Set the container under the filter cartridge to catch the drained oil.
2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
3. Clean the filter holder, fill the new filter cartridge with clean fuel, then coat the packing surface with oil and install to the filter holder.



#### NOTICE

- When filling with fuel, use clean fuel and be careful not to let any dust or dirt get in. Portion (B) at the center is the clean side, so be particularly careful not to let any dust or dirt get in.
- When adding fuel, always add from small hole (A) at eight places on the dirty side.



4. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 to 3/4 of a turn.

If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.

5. Loosen the knob of feed pump (2) and operate it 50 to 60 times up and down. This will bleed the air.
6. Push in the knob of feed pump (2) and tighten it.

7. After replacing the filter cartridge, start the engine and check that there is no leakage of fuel from the filter seal surface. If there is any leakage of fuel, check the tightening of the filter cartridge. Whenever there is leakage of fuel, follow Steps 1 and 2 to remove the filter cartridge, then check the packing surface for damage or foreign material.

If any damage or foreign material is found in the packing, replace the packing with a new part, then repeat Steps 3 to 6 to install the filter cartridge.

**METHOD OF USING AUTOMATIC AIR BLEED MECHANISM**

(if equipped)



**WARNING**

The engine will start, so check carefully that the area around the engine is safe before cranking.

**NOTICE**

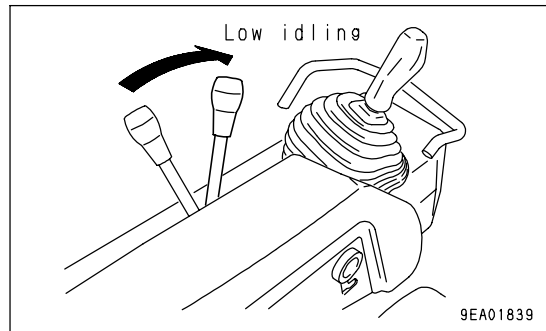
When the engine has run out of fuel, turn the starting switch key to the START position and rotate the starting motor for 15 to 20 seconds to crank the engine and bleed the air. Repeat this 2 to 3 times to bleed the air completely.

The time taken to bleed the air is shorter when the fuel tank is full.

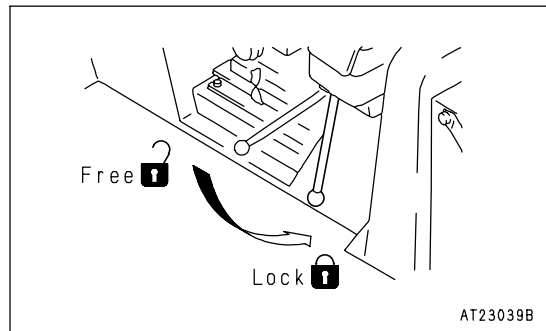
Do not rotate the starting motor continuously for more than 20 seconds. Wait for 1 to 2 minutes before rotating it again.

It is possible to bleed the air from the fuel circuit simply by rotating the starting motor with the starting switch. Bleed the air as follows;

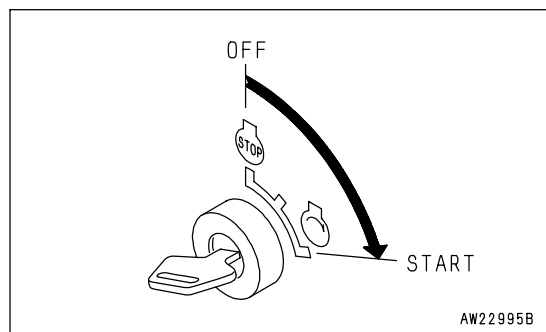
1. After replacing the filter cartridge, check that the fuel control lever is at the low idling position.



2. Set the parking brake lever to the LOCK position.



3. Turn the starting switch key to the START position and rotate the starting motor for 15 to 20 seconds to crank the engine and bleed the air.

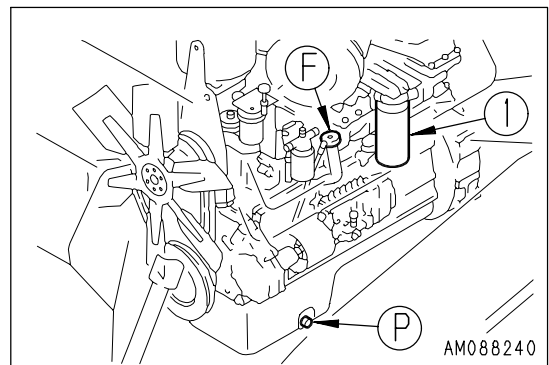


**CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE**

**! WARNING**

Parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the oil temperature to go down before performing this operation.

- Refill capacity: 38 liters (10.04 US gal)
  - Prepare a socket wrench and filter wrench.
1. Remove the cover on the bottom of the machine and set a container to catch the drained oil directly under the drain plug.
  2. Loosen drain plug (P) (with a slit) slowly to avoid getting oil on yourself, and drain the oil.
  3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
  4. Install drain plug (P).
  5. Using a filter wrench, turn filter cartridge (1) counterclockwise on remove it.  
To prevent getting oil on yourself, do not carry out this operation from immediately under the cartridge.
  6. Clean the filter holder, fill the new filter cartridge with clean oil, coat the thread and packing portion of the new filter cartridge with oil (or coat thinly with grease), then install.
  7. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 to 1 turn.
  8. After replacing the filter cartridge, add oil through oil filler (F) until the oil level is between the H and L marks on the dipstick (G).
  9. Run the engine at idle for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL (PAGE 3-49)".



**EVERY 1000 HOURS SERVICE**

Maintenance for every 50, 250 and 500 hours should be carried out at the same time.

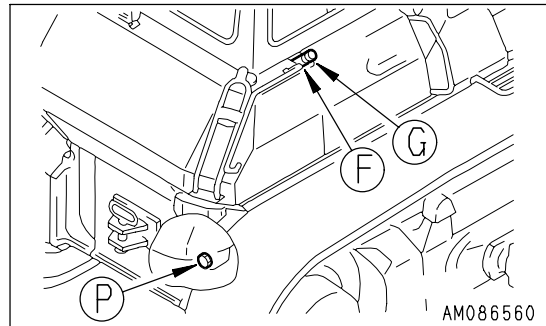
**CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS (POWER TRAIN PUMP STRAINER, SCAVENGING PUMP STRAINER)**

**WARNING**

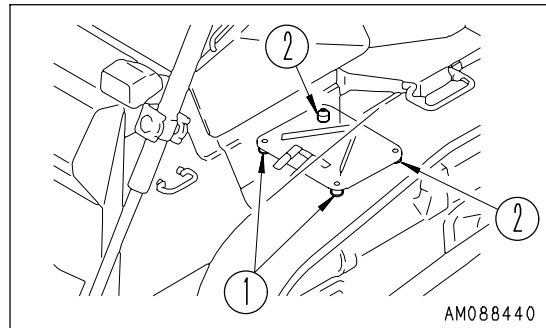
- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.

• Refill capacity: 48 liters (12.68 US gal)

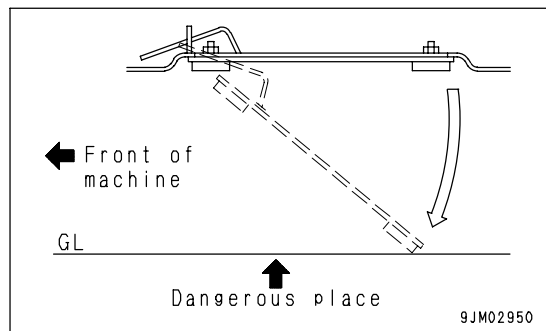
1. Loosen drain plug (P) (with a slit), drain the oil, then tighten drain plug (P) again.  
Do not remove drain plug (P).



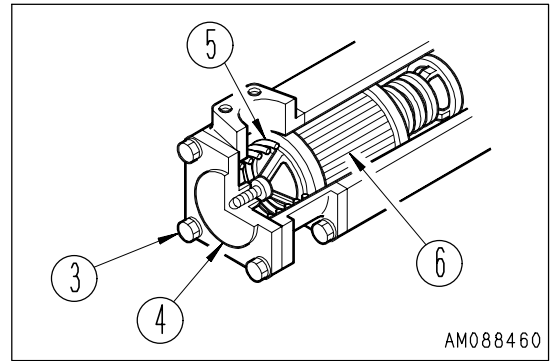
2. Remove the undercover from the rear bottom of the machine body as follows.
  - 1) Remove two bolts (1) from the front side of the machine body.
  - 2) Holding the cover, remove two bolts (2) from the rear side of the machine body.



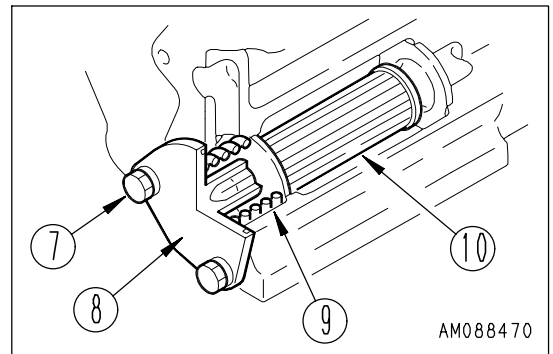
- 3) Lower and open the cover gradually.



3. Loosen mounting bolt (3) of the power train strainer, then remove cover (4).
4. Take out spring (5), then take out strainer (6).
5. Remove all dirt from strainer (6), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.

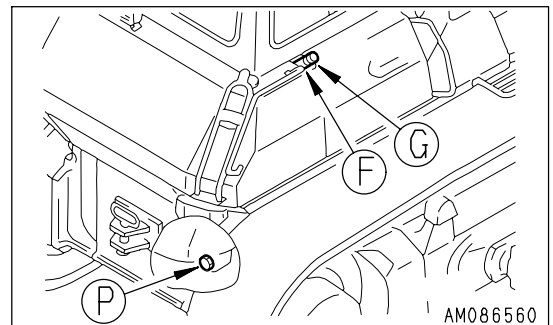


6. Loosen mounting bolt (7) of the scavenging pump strainer, then remove cover (8).
7. Take out spring (9), then take out strainer (10).
8. Remove all dirt from strainer (10), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.



If the spring or strainer are damaged, replace them.

9. Install the strainers in their original position.
10. After installing, replace the element in the power train oil filter. For details, see "REPLACE POWER TRAIN OIL FILTER ELEMENT (PAGE 4-53)".
11. Open cover on the right side of the machine.
12. Refill the specified quantity of oil through oil filler (F).
13. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL (PAGE 3-50)".
14. Close the cover at right side of machine.

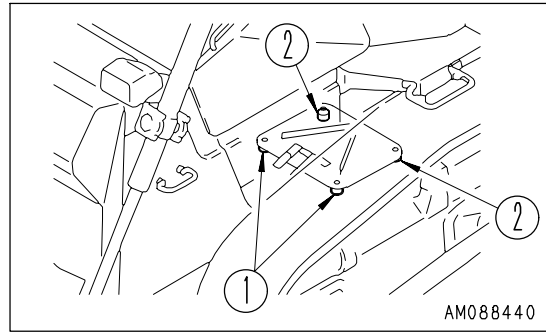




**CHECK OIL LEVEL IN DAMPER CASE, ADD OIL**

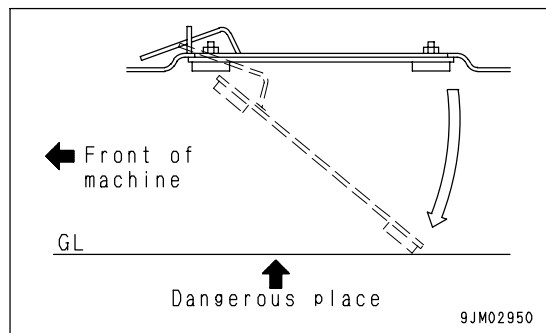
**! WARNING**

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.



If the quantity of the oil in the damper is insufficient, the damper may be seized. Accordingly, check, and add or replace the oil according to the following procedure.

1. Remove the undercover from the rear bottom of the machine body as follows.
  - 1) Remove two bolts (1) from the front side of the machine body.
  - 2) Holding the cover, remove two bolts (2) from the rear side of the machine body.
  - 3) Lower and open the cover gradually.

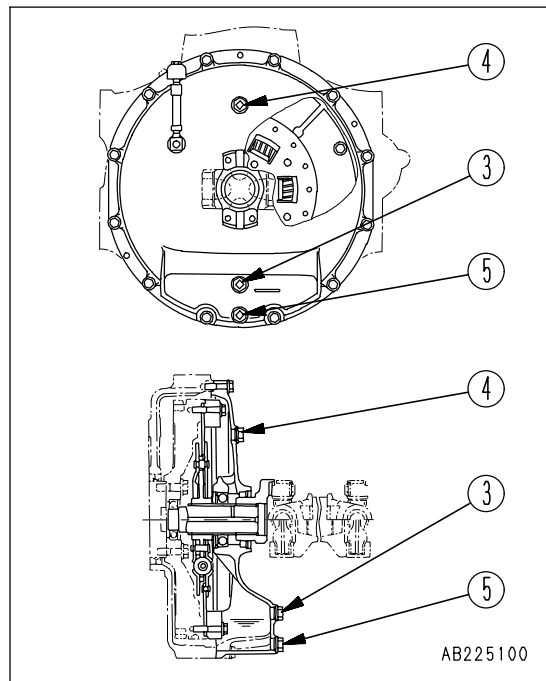


2. Remove oil level plug (3) and check the oil level. The proper oil level is the bottom edge of the plug hole. Tighten plug (3).

**REMARK**

- Check the oil level while the engine is stopped.
- If the machine is inclined, set it in a level position before checking the oil level.

3. If the oil level is below the bottom edge of the plug hole, remove oil filler plug (4) and add new oil. Add new oil until the oil level reaches the bottom edge of oil level plug (3).
4. After adding the oil, tighten plugs (3) and (4).

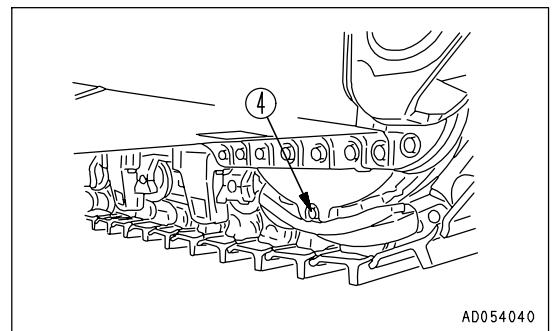
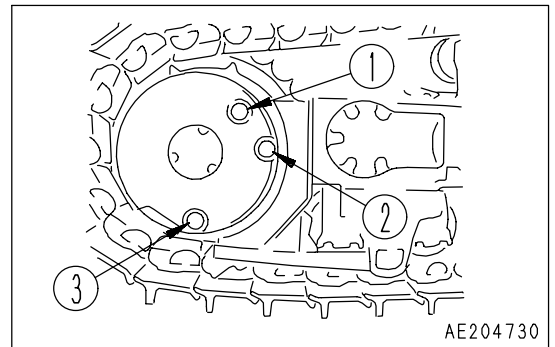


**CHANGE OIL IN FINAL DRIVE CASE**

**! WARNING**

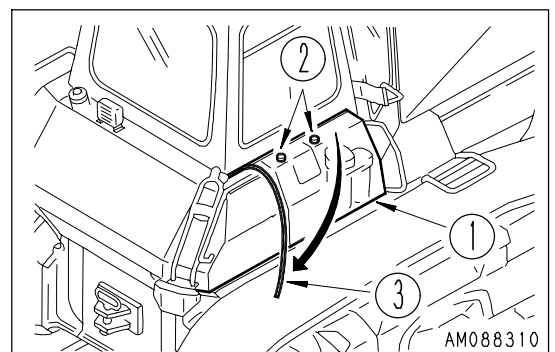
- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- If there is still pressure remaining inside the case, the oil or plug may fly out.  
Loosen the plug slowly to release the pressure.

- Refill capacity:  
D65E: (each) 24 liters (6.34 US gal)  
D65P: (each) 27 liters (7.13 US gal)
1. Stop the machine so that drain plug (3) is directly at the bottom.
  2. Remove oil level plug (2) and oil filler plug (1), then remove drain plugs (3) and (4), and drain the oil.
  3. After draining the oil, install drain plugs (3) and (4).
  4. Add oil to the specified level through the hole in oil filler plug (1).
  5. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL (PAGE 4-47)".

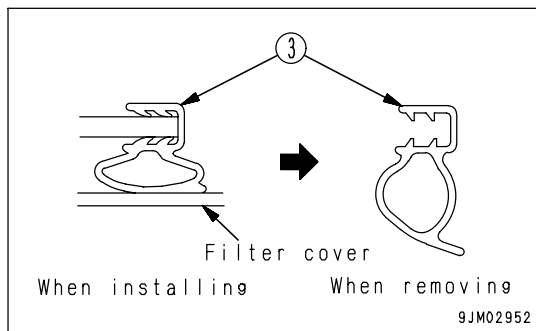


**CLEAN BREATHER**

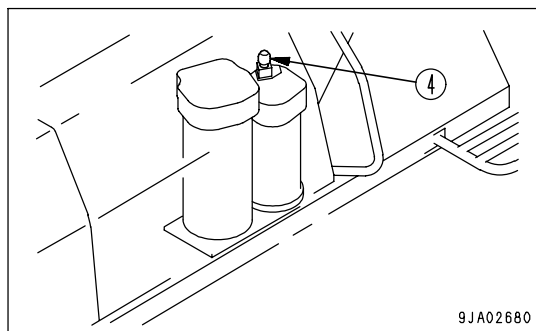
1. Remove top mounting bolts (2) of filter cover (1), then use the bottom hinge as the fulcrum to open the cover to the outside.



2. Remove seal (3) installed to the frame.



3. Remove the breather (4) and wash out dust remaining inside with diesel oil or flushing oil.  
Power train case breather (1 place)

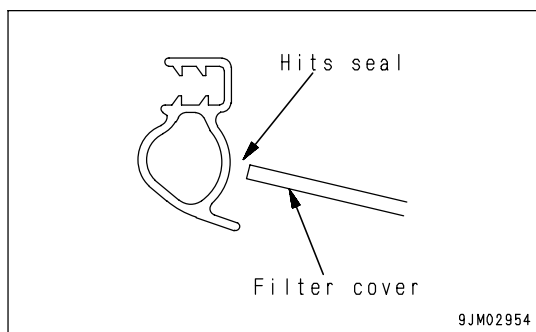
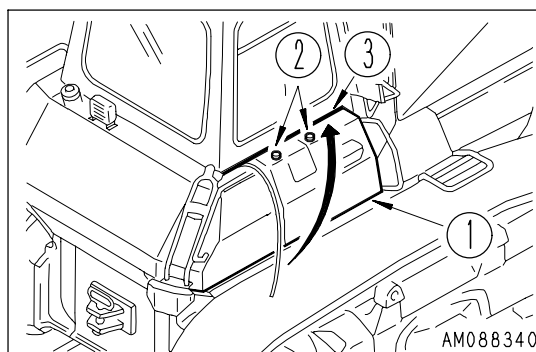


4. Tighten filter cover (1) and then bolt (2).

**NOTICE**

- When replacing seal (3), do it after closing cover (1).
- The seal will be damaged if the filter cover closes after replacing it.

5. Replace frame seal (3).



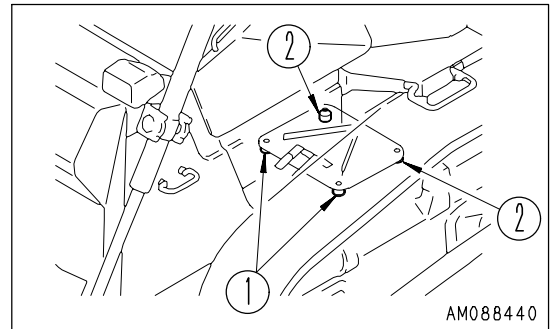
GREASE UNIVERSAL JOINT

**! WARNING**

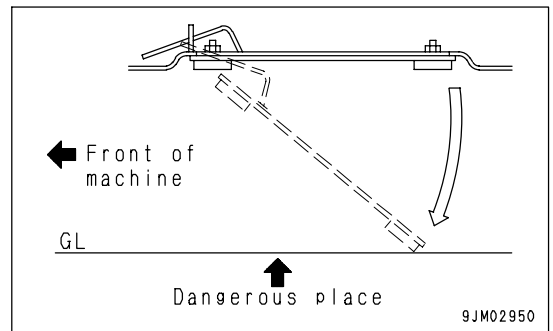
The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.

1. Remove the undercover from the rear bottom of the machine body as follows.

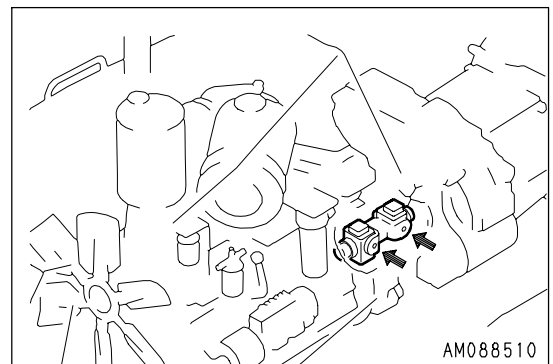
- 1) Remove two bolts (1) from the front side of the machine body.
- 2) Holding the cover, remove two bolts (2) from the rear side of the machine body.



3) Lower and open the cover gradually.

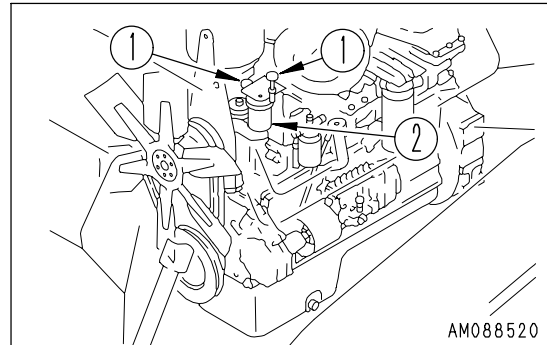


2. Apply grease to the grease fittings (2 places) shown by arrows.



**REPLACE CORROSION RESISTOR CARTRIDGE**

1. Screw in valve (1) at the top of the corrosion resistor.
2. Using a filter wrench, turn cartridge (2) to the left to remove it.
3. Apply engine oil to the sealing surface of a new cartridge, then install it to the filter holder.



4. When installing, screw in cartridge until seal comes in contact with sealing surface, then tighten approx. 2/3 turn.
5. Open valve (1).  
Use Komatsu genuine cartridge.

**CHECK ALL TIGHTENING PARTS OF TURBOCHARGER**

(D65P)

Contact your Komatsu distributor to have the tightening portions checked.

**CHECK PLAY OF TURBOCHARGER ROTOR**

(D65P)

Contact your Komatsu distributor to have the rotor play checked.

**CHECK FOR LOOSE ROPS MOUNT BOLTS**

(If equipped)

Check for loose and damaged bolts.

If a loose bolt is found, tighten it to a torque of  $927 \pm 103$  Nm ( $94.5 \pm 10.5$  kgm ,  $684 \pm 76$  lbft)

If a damaged bolt is found, replace the bolt with a genuine Komatsu bolt.

### EVERY 2000 HOURS SERVICE

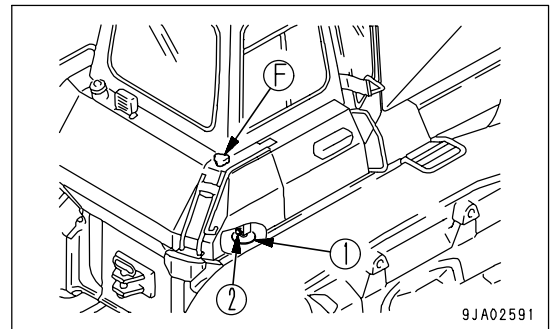
Maintenance for every 50, 250, 500 and 1000 hours service should be carried out at the same time.

### CHANGE OIL IN HYDRAULIC TANK, REPLACE OIL FILTER ELEMENT

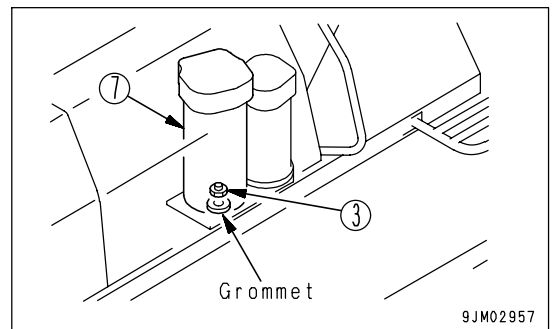
**! WARNING**

- The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

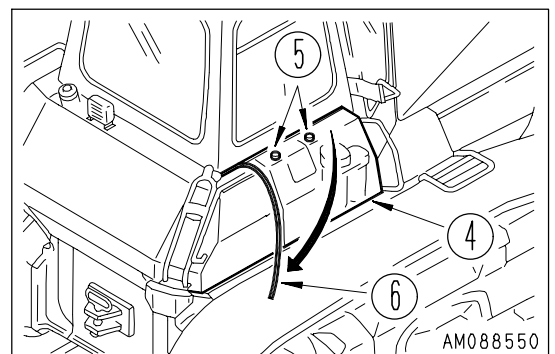
- Refill capacity: 55 liters (14.53 US gal)
1. Lower the blade to the ground securely, stop the engine and slowly turn the cap of oil filler (F) to release the internal pressure. Then, remove the cap.
  2. Remove the cover (1) at the bottom of the hydraulic tank.
  3. Loosen drain valve (2), drain the oil, tighten drain valve (2) again, then install cover (1). When loosening drain valve (2), be careful not to get oil on yourself.



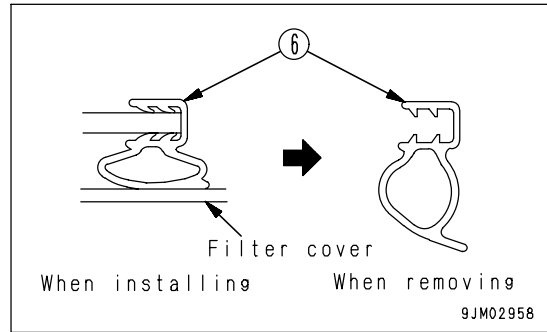
4. To drain the oil in hydraulic oil filter case (7), release the grommet under the fender and remove drain plug (3). Be careful to avoid getting oil on yourself when remove drain plug (3).



5. Remove top mounting bolts (5) of filter cover (4), then use the bottom hinge as the fulcrum to open the cover to the outside.



6. Remove seal (6) placed the frame.



7. Remove bolt (8) of filter case (7) and then cover (9).

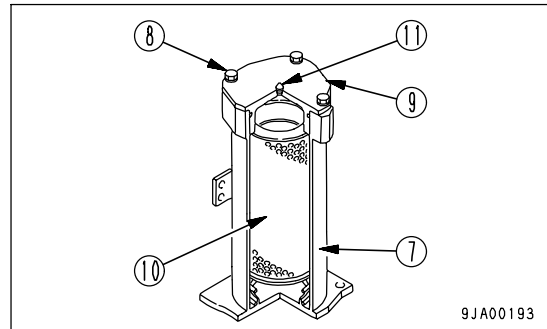
8. Remove filter (10).

9. Clean the inside of the case and removed parts.

Install a new filter. Always use Komatsu genuine filter.

10. Install drain plug (3).

11. After replacing, run the engine and leave the air-bleeding plug (11) loose, then tighten plug (11) when all air is released.



12. Close filter cover (4) and tighten bolt (5).

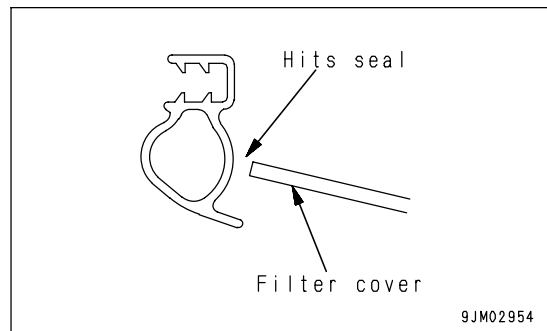
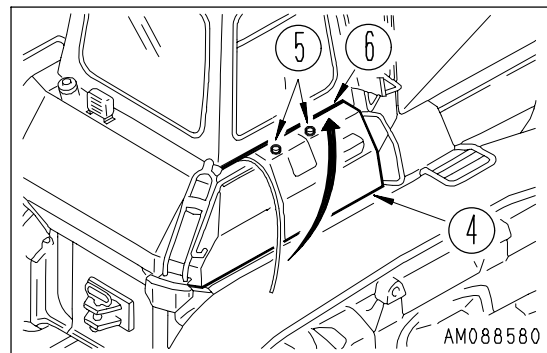
**NOTICE**

- When replacing seal (6), do it after closing cover (4).
- The seal will be damaged if the filter cover closes after replacing it.

13. Replace seal (6).

14. Refill the specified quantity of oil through oil filler (F).

15. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-48)".

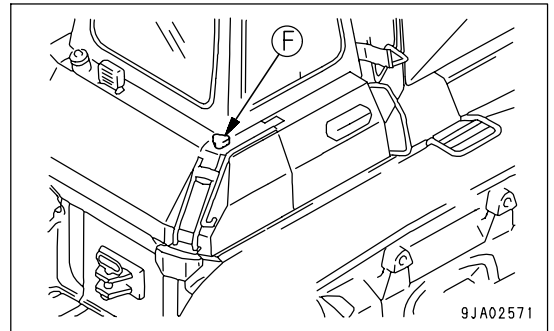


**REPLACE HYDRAULIC TANK BREATHER ELEMENT**

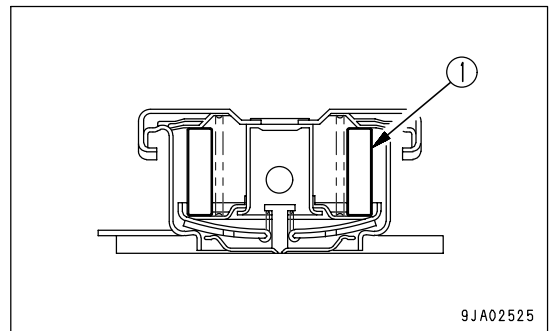
**! WARNING**

- The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

1. Remove the cap of oil filler (F) at the top of the hydraulic tank.



2. Replace element (1) inside the cap.

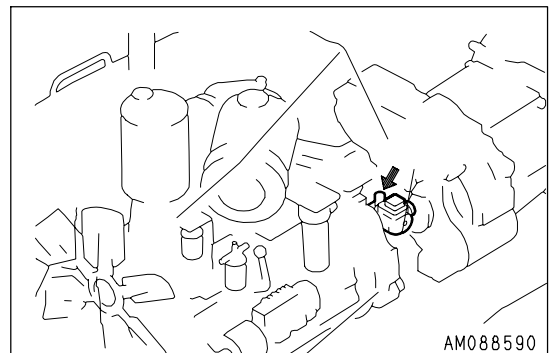


**CLEAN ENGINE BREATHER ELEMENT**

**! WARNING**

- The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before cleaning the engine breather.
- When using compressed air, there is a hazard that dirt may be blown up and cause serious injury. Always use safety glasses, dust mask, or other protective equipment.

1. Wipe away dust around the breather.
2. Remove breather.
3. Wash the whole breather in diesel oil or flushing oil, then blow it dry with compressed air.
4. Replace the breather O-ring with a new part, coat with oil, then install the breather.

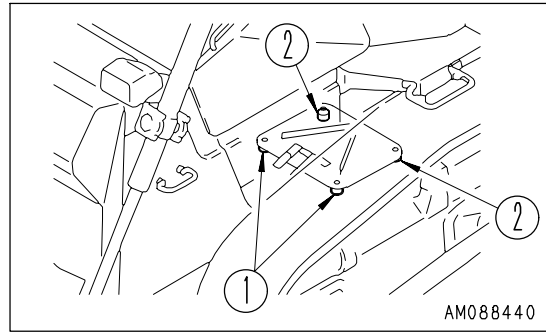




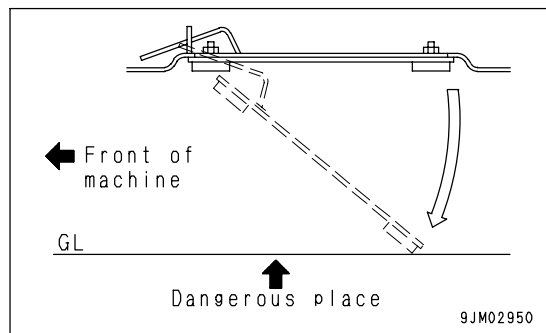
**CHANGE OIL IN DAMPER CASE**

**! WARNING**

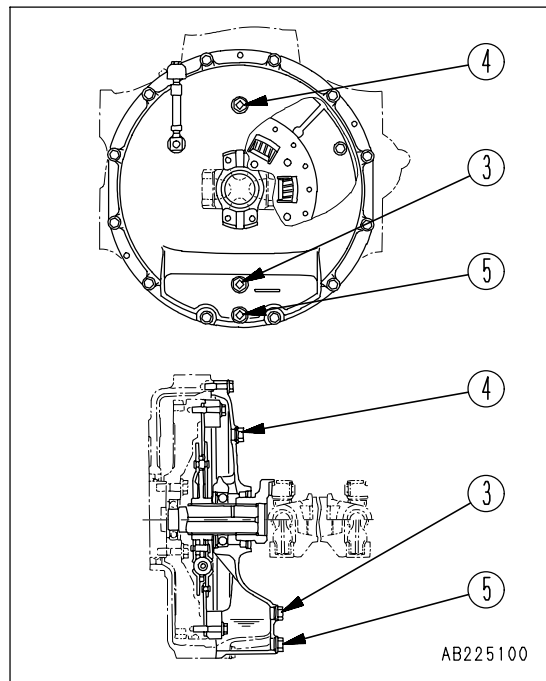
- The parts and oil is very hot just after the operation. Wait until the oil temperature drops, then start the work.
- The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts (2), carry out the work from the rear of the cover so that you can easily get out of the way.
- When removing drain plug (5) of the damper case, take care not to get oil over yourself.



- Refill capacity: 1.7 liter (0.45 US gal)
1. Remove the undercover from the rear bottom of the machine body as follows.
    - 1) Remove two bolts (1) from the front side of the machine body.
    - 2) Holding the cover, remove two bolts (2) from the rear side of the machine body.
    - 3) Lower and open the cover gradually.



2. Remove oil level plug (3) and oil filler plug (4), then remove drain plug (5) to drain the oil. After the all oil is drained, tighten plug (5).
3. Add oil through the hole of oil filler plug (4) until the oil level reaches the bottom edge of the hole of oil level plug (3).
4. After refilling the oil, tighten plugs (3) and (4).



**CLEAN, CHECK TURBOCHARGER**

(D65P)

Contact your Komatsu distributor for cleaning or inspection.

**CHECK VIBRATION DAMPER**

Check that there are no cracks or peeling in the outside surface of the rubber.

If any cracks or peeling are found, contact your Komatsu distributor to have the parts replaced.

**CHECK ALTERNATOR, STARTING MOTOR**

The brushes may be worn or the bearing may have run out of grease, contact your Komatsu distributor for inspection and repairs.

If the engine is started frequently, have this inspection carried out every 1000 hours.

**CHECK ENGINE VALVE CLEARANCE, ADJUST**

Special tools are needed for inspection and maintenance, please contact your Komatsu distributor.

**EVERY 4000 HOURS SERVICE**

Maintenance for every 50, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

**CHECK WATER PUMP**

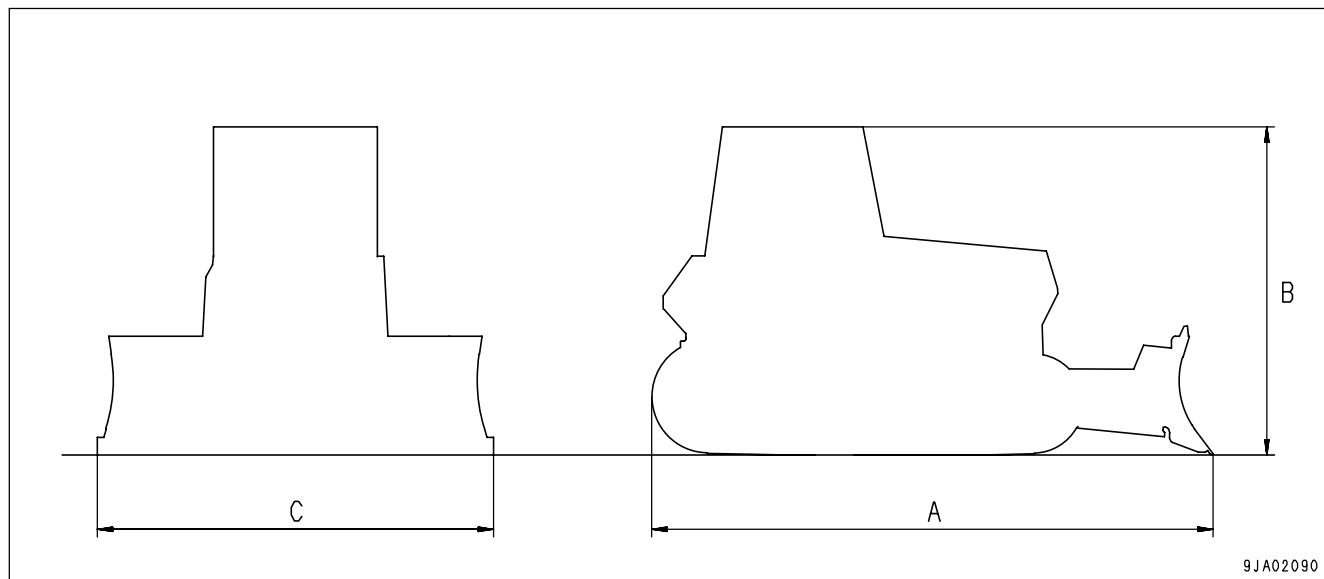
Check that there is no play in the pulley, leakage of oil or water, or clogging of the drain hole. If any problem is found, please contact your Komatsu distributor for repairs or replacement.

# **SPECIFICATIONS**

# SPECIFICATIONS

## POWER TILTDOZER WITH CAB

| Item   |                | Unit        | D65E-12                           | D65P-12                            |
|--|----------------|-------------|-----------------------------------|------------------------------------|
| Operating weight<br>(not including operator) |                | kg (lb)     | 18,700 (41,234)                   | 20,100 (44,321)                    |
| Name of engine                               |                | -           | Komatsu 6D125E-2<br>deisel engine | Komatsu S6D125E-2<br>deisel engine |
| Engine horsepower                            |                | kW (HP)/rpm | 132 (177)/1,950                   | 140 (187)/1,950                    |
| A  | Overall length | mm (ft in)  | 5,260 (17' 3")                    | 5,550 (18' 3")                     |
| B  | Overall height | mm (ft in)  | 3,055 (10')                       | 3,090 (10' 2")                     |
| C  | Overall width  | mm (ft in)  | 3,415 (11' 2")                    | 3,970 (13')                        |
| Travel speed (1st/2nd/3rd)                   |                | Forward     | 3.9/6.8/10.6 (2.4/4.2/6.6)        |                                    |
|  |                | Reverse     | 5.0/8.6/13.4 (3.1/5.3/8.3)        |                                    |



9JA02090

# ATTACHMENTS, OPTIONS

 **WARNING**

Please read and make sure that you understand the SAFETY section before reading this section.

---

## GENERAL PRECAUTIONS

### PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accidents or failures.



### WARNING

#### General precautions

- Read the instruction manual for the attachment carefully, and do not use the machine before you understand the operation method completely.

If you lose the instruction manual, be sure to order another copy from your Komatsu distributor.

- To prevent serious personal injury caused by misoperation, place your foot on the pedal only when operating the pedal.

#### Precautions for removal and installation

When removing or installing an attachment, observe the following items and work safely.

- Select a firm, level surface when installing or removing an attachment.
- When working in cooperation with one or more other workers, decide signs and observe them when carrying out the operation.
- When carrying a heavy part (25 kg (55 lb) or more), use a crane.
- When removing a heavy part, always place a support in position before removing it.

When lifting a load with a crane, be particularly careful of the center of gravity.

- It is dangerous to carry out operations when the load has been raised by a crane. Always lower the load onto a stand and check that it is safe.
- When leaving an attachment removed or installing it, place it in a stable position to prevent it from falling over.
- Never go under a load raised by a crane.

Always stand in a place which is safe even if the load should fall.

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#### NOTICE

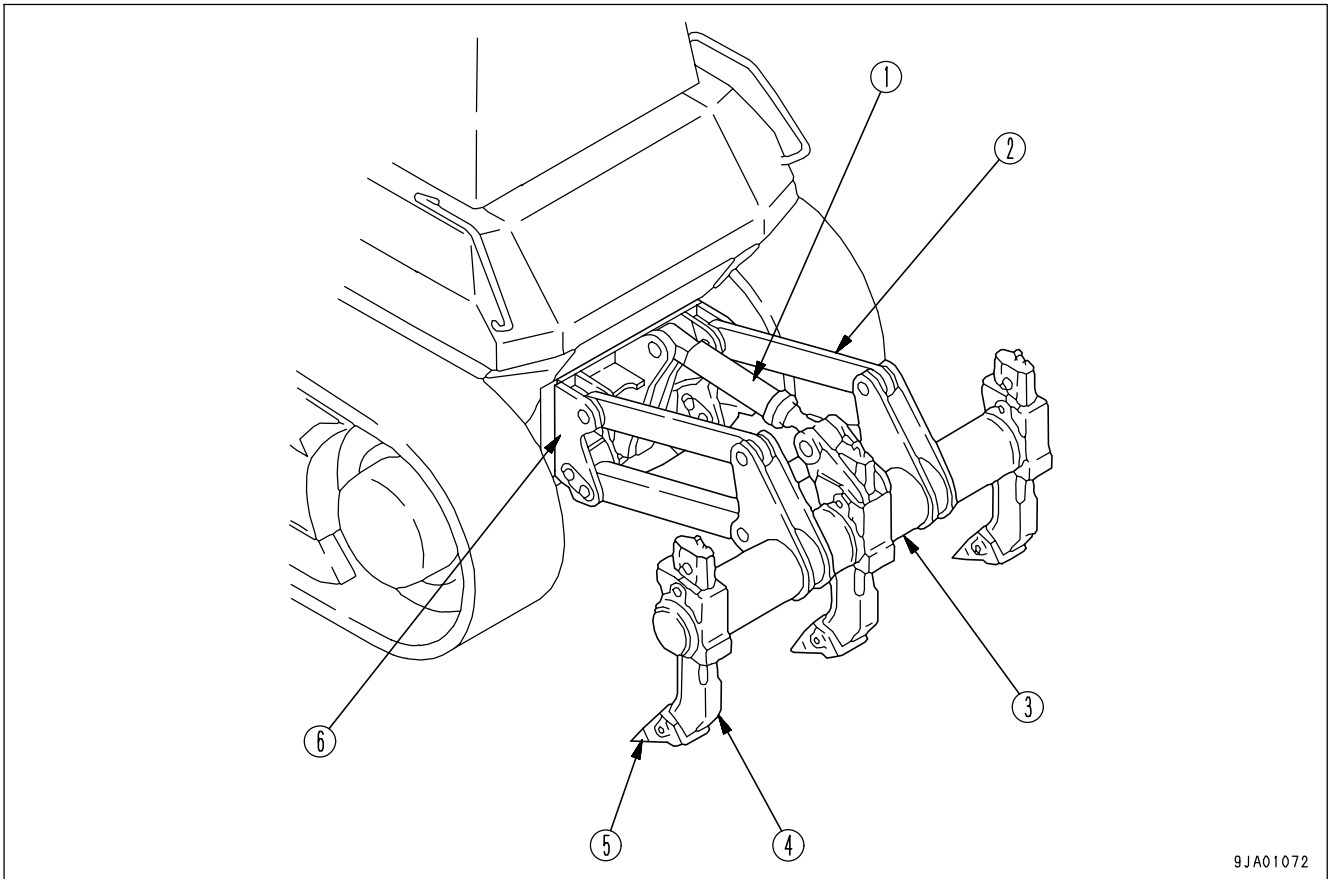
Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of removal and installation operations, contact your Komatsu distributor.

# HANDLING HYDRAULIC RIPPER

- This ripper is applicable for the D65E.

## GENERAL VIEW



9JA01072

- (1) Hydraulic cylinder
- (2) Link
- (3) Beam

- (4) Shank
- (5) Point
- (6) Support



## EXPLANATION OF COMPONENTS

### RIPPER CONTROL LEVER

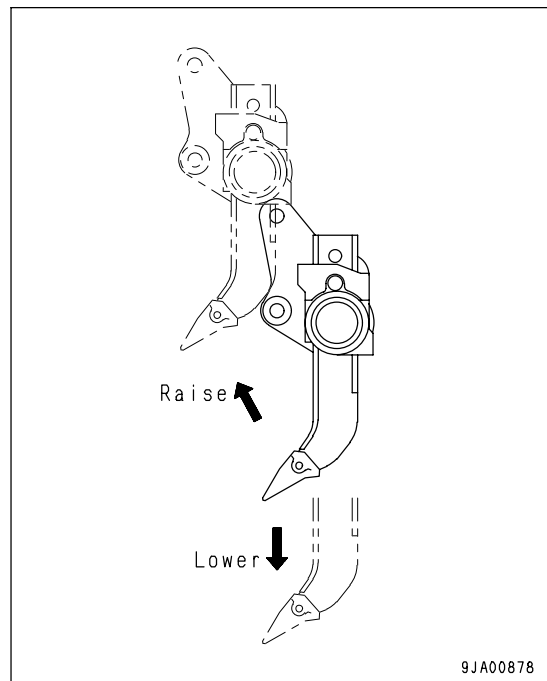
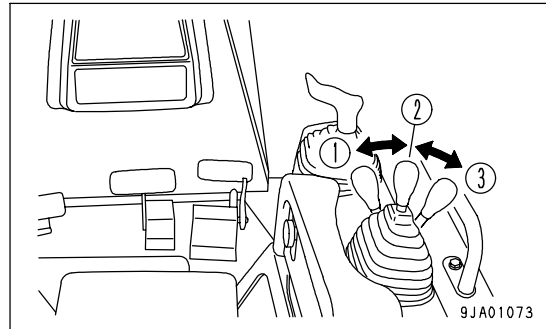


## WARNING

When carrying out inspection or maintenance of the machine, or when parking the machine, lower the ripper to the ground and set the work equipment lock lever to the LOCK position.

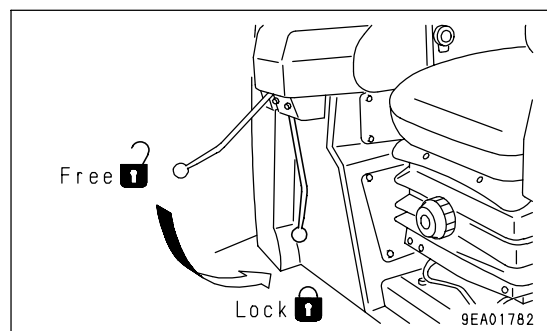
This lever is used to operate the ripper.

- (1) RAISE: The ripper is raised
- (2) HOLD: The ripper is held at the same position
- (3) LOWER: The ripper is lowered



### REMARK

The ripper operation is locked by the work equipment lock lever. For details of the operation of the work equipment lock lever, see "WORK EQUIPMENT LOCK LEVER (PAGE 3-19)".



## OPERATION

### CHECK BEFORE STARTING ENGINE, ADJUST

#### WALK-AROUND CHECK

1. Check for wear of the point at the tip of the shank, check the mounting condition, and check for damage to the rivets. If any problem is found, replace or repair.

#### PRECAUTIONS WHEN OPERATING

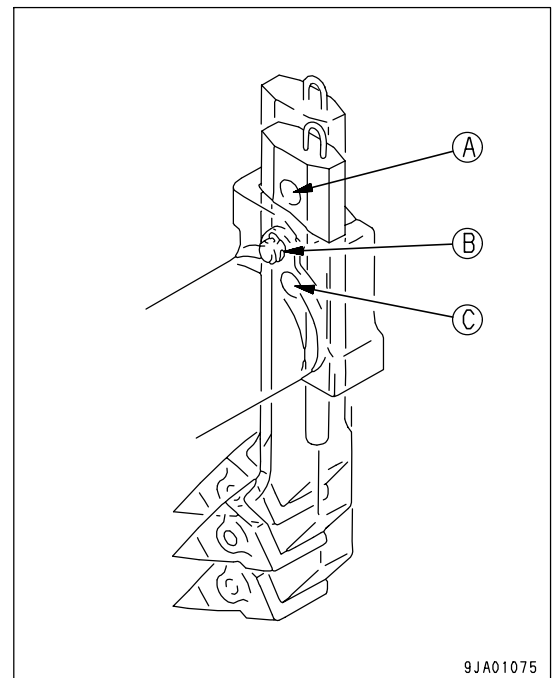
- Travel in low speed and lower the ripper gradually when starting to move the machine off. When the optimum digging depth is reached, move the control lever to the HOLD position.  
Do not dig the shank in deep when starting digging operations.
- During ripping operations, never turn the machine suddenly or travel in reverse. When turning the machine suddenly or traveling in reverse, raise the shank from the ground surface.
- When carrying out digging operations with only one shank, always use the center shank. Remove both side shanks.
- When starting to travel up a steep slope or when reaching the bottom of the slope, the point may touch the ground. On hard ground, there is danger of the point breaking if it touches the ground, so raise the shank to the maximum height.

### ADJUSTING POSTURE OF WORK EQUIPMENT

#### ADJUSTMENT OF DIGGING DEPTH

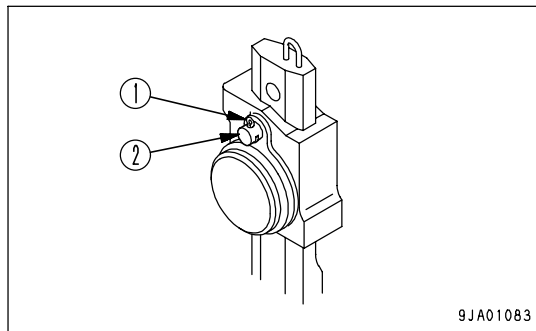
There are mounting holes for the pin in the shank. Select the mounting hole to match the digging depth.

| Pin hole position | Use                                      | Max. digging depth<br>mm (in) |
|-------------------|--|-------------------------------|
| (A)               | When there is special need to dig deeply | 595 (1' 11")                  |
| (B)               | Normal                                   | 485 (1' 7")                   |
| (C)               | When not using ripper                    | -                             |



When changing the digging depth, do as follows.

1. Remove cotter pin (1).
2. Remove pin (2), change the position of the shank hole, then insert pin (2).
3. Insert cotter pin (1).

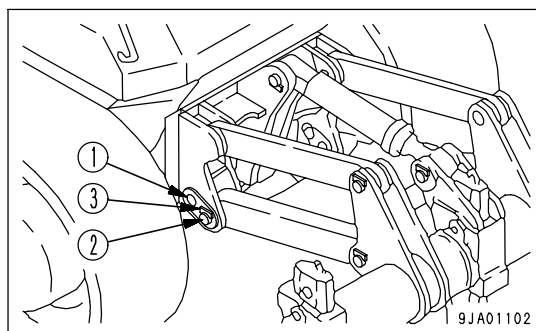


### ADJUSTING DIGGING ANGLE

Adjust the position of the mounting pin hole in the beam and upper link.

- Digging angle
  - Position (1): 45°
  - Position (2): 55°

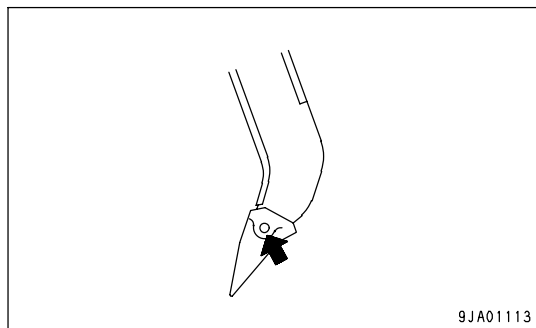
The pin is locked with lock plate (3).



### REPLACEMENT OF POINT

A point is installed to protect the shank. If the point is worn, replace it as follows.

1. Put a pin remover in contact with the pin marked by the arrow and tap with a hammer to remove.
2. Replace the point.
3. Insert the pin half way, then knock it in fully with a hammer.



**TROUBLESHOOTING**

**OTHER TROUBLE**

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of problems or causes which are not listed below, contact your Komatsu distributor for repairs.

| Problem   | Main causes   | Remedy  |
|---|---|---|
| Slow ripper raising and function, lack of ripping force | <ul style="list-style-type: none"> <li>• Improper hydraulic oil</li> <li>• Defective pump</li> <li>• Defective adjustment of relief valve</li> <li>• Defective control valve, safety valve                             <ul style="list-style-type: none"> <li>• Defective valve spool</li> </ul> </li> <li>• Defective piston ring, packing, valve</li> <li>• Clogging inside piping</li> </ul> | <ul style="list-style-type: none"> <li>• Add oil to specified level, see EVERY 250 HOURS SERVICE</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> </ul> |
| Cylinder lacks holding power                            | <ul style="list-style-type: none"> <li>• Leakage of oil from piping, hose</li> <li>• Defective piston ring, packing</li> <li>• Defective piston valve</li> <li>• Defective valve spool</li> <li>• Defective safety valve, suction valve</li> </ul>  | <ul style="list-style-type: none"> <li>• Tighten</li> <li>( • Replace)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> <li>( • Check, repair)</li> </ul>   |
| Oil pressure does not rise                              | <ul style="list-style-type: none"> <li>• Clogging inside piping</li> <li>• Defective adjustment of relief valve</li> </ul>  | <ul style="list-style-type: none"> <li>( • Repair)</li> <li>( • Check, adjust)</li> </ul>   |

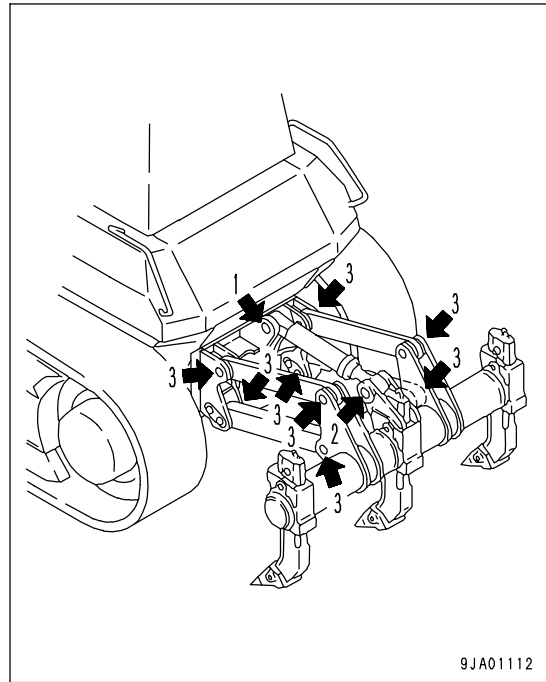
## MAINTENANCE

### EVERY 250 HOURS SERVICE

#### LUBRICATING

1. Lower the ripper to the ground and stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

- (1) Ripper cylinder foot pin (1 place)
- (2) Ripper cylinder rod end pin (1 place)
- (3) Link pin (8 places)

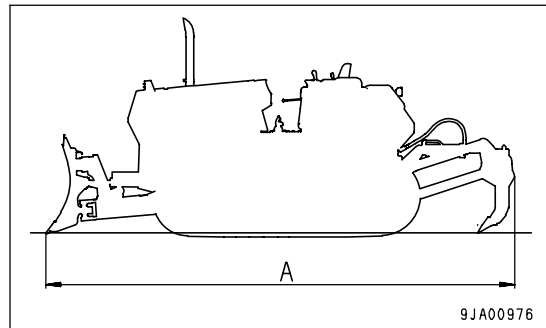


#### CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

1. Stop the machine on level ground.  
Set the blade perpendicular and lower it to the ground, lower the ripper to the ground, then stop the engine.
2. For details of checking the oil level in the hydraulic tank, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-48)".

## SPECIFICATIONS

|   | Item                                | Unit          | D65E-12           |
|---|-------------------------------------|---------------|-------------------|
|   | Weight of ripper as individual part | kg<br>(lb)    | 1,610<br>(3,550)  |
| A | Overall length                      | mm<br>(ft in) | 6,475<br>(21' 3") |
|   | No. of shanks                       |               | 3                 |

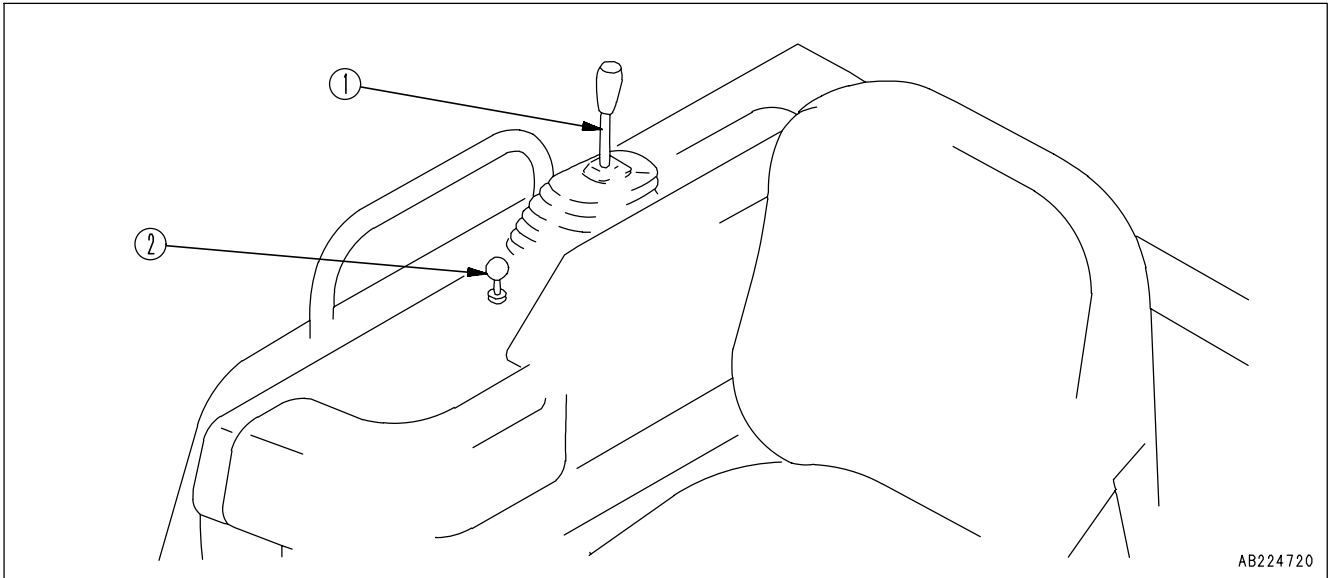


# HANDLING TOWING WINCH

The following is an explanation of devices needed for operating the machine.

To perform suitable operations correctly and safely, it is important to completely understand methods of operating the equipment, and the meanings of the displays.

## EXPLANATION OF COMPONENTS



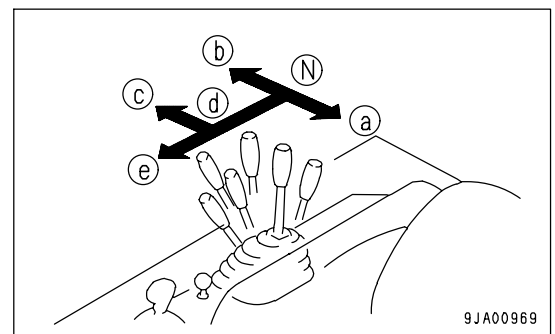
(1) Winch control lever

(2) Winch lock knob

### WINCH CONTROL LEVER

This lever (1) is used to operate the winch.

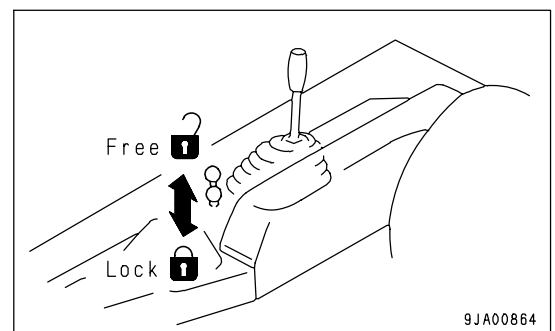
- (a) WIND IN: Winch winds in
- (b) WIND OUT: Winch winds out
- (c) SLOW WIND OUT: Winch winds out slowly
- (d) INCHING: Brake is partially applied.
- (e) FLOAT: Brake is released
- (N) NEUTRAL: Brake is locked



### WINCH LOCK KNOB

This lock (2) is used to lock the winch.

When it is moved to the LOCK position, the winch control lever is locked.

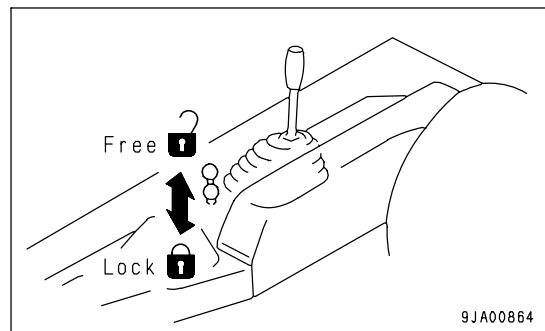
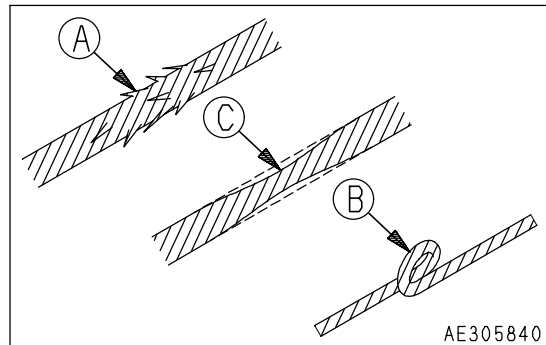


## OPERATION

**WARNING**

Injury death could result if the control lever is operated incorrectly during winch operations, so always do as follows.

- Do not operate in a different way from the method given in this manual.
- Always wear leather gloves when handling wire rope.
- Do not bring objects that can be caught up in the winch near any rotating part; be careful not to get caught up in the drum when it is rotating.
- When carrying out the winch operation with another worker, agree on signals before starting the operation.
- Do not use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). Always replace with a new wire rope.
- Except when operating the winch, always set the winch lock knob to the LOCK position to lock the winch control lever.
- Always stop the machine before operating the winch, except when releasing the brake.
- When moving the machine, always set the winch control lever to neutral, then set the winch lock knob to the LOCK position to lock the winch control lever.



## INSPECTION AND ADJUSTMENT BEFORE STARTING ENGINE

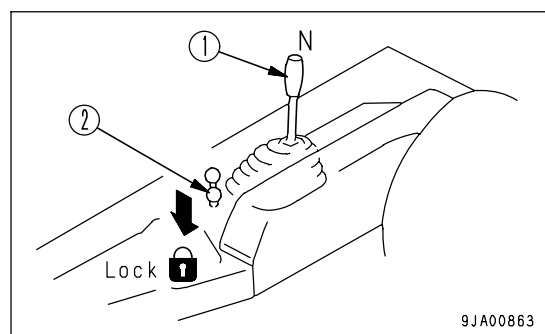
## WALK-AROUND CHECK

1. Check wire rope and hook.  
If any abnormality is found, replace it.

## OPERATIONS AND CHECKS BEFORE STARTING ENGINE

Before starting the engine, check the position of every lever.

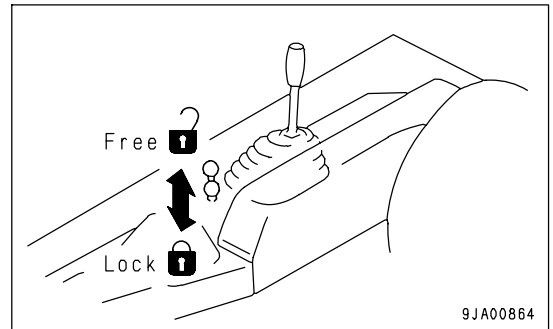
- Check that winch lever (1) is at the N position.
- Check that winch lock knob (2) is at the LOCK position.



## OPERATION

The over-winding method is used with the towing winch: the wire rope is wound in and out from the top of the drum.

1. After starting the engine, set the winch lock knob to the FREE position and release the winch control lever from the LOCK position.



## WINDING IN

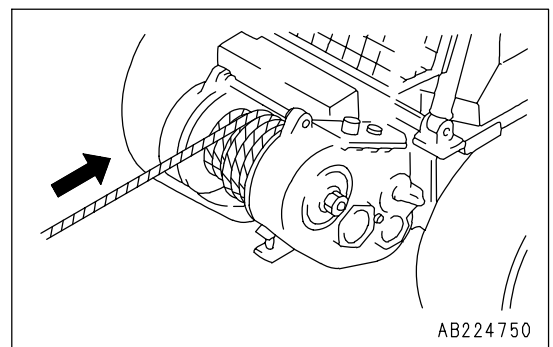
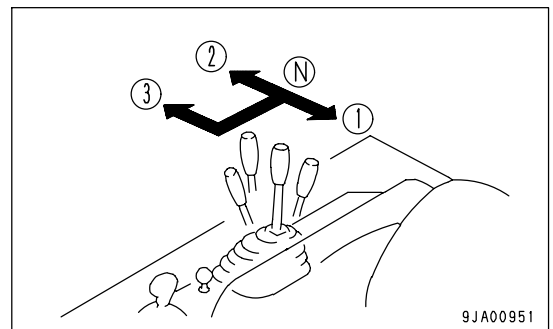
### NOTICE

- Keep the brake pedal depressed when raising the load to prevent the machine from moving.
- When raising a heavy load, there is a slight delay after releasing the brake before the clutch is engaged, and there is shock when the clutch is engaged.

When carrying out winding-in operations, always carry out the operation on a stable ground surface.

- When winding in, wind the wire in the carefully to ensure that the wire winds on straight and lies flat on the drum.

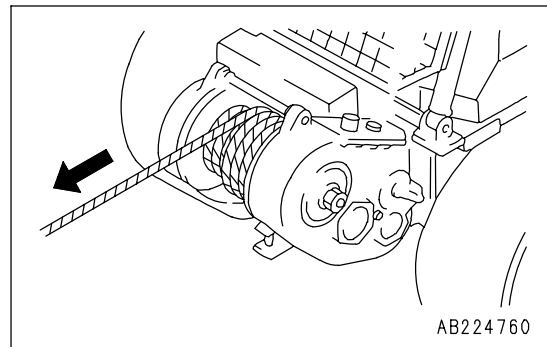
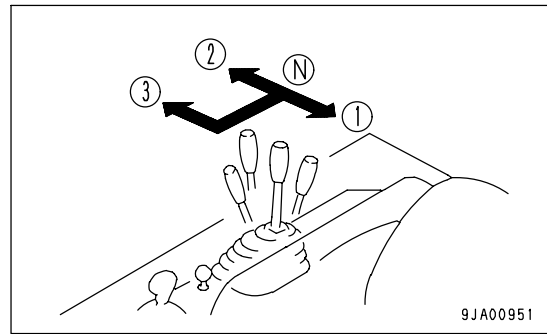
1. When the winch control lever is moved from the NEUTRAL position (N) to Normal rotation position (1), the brake is released and the wire rope is wound in.
2. Use the decelerator pedal to adjust the winding-in speed.
3. When stopping the winding-in operation, release the winch control lever. The lever is returned to the NEUTRAL position (N) and the free brake is applied to stop the winding in of the wire rope.



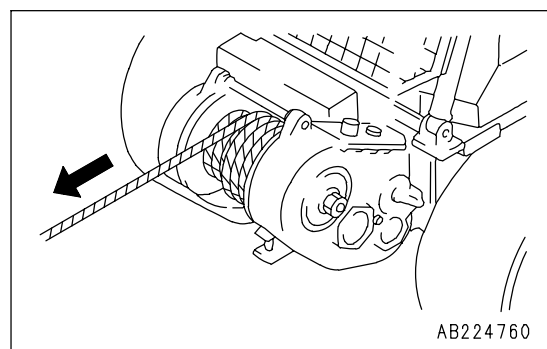
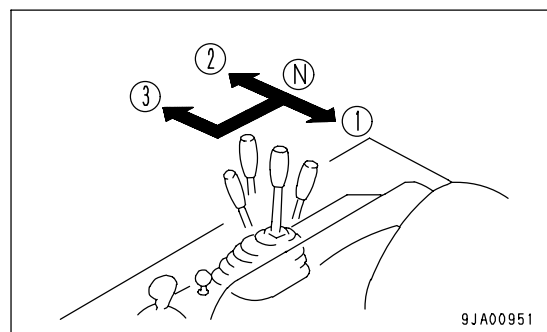


**WINDING OUT**

1. When the winch control lever is moved from the NEUTRAL position (N) to Reverse rotation position (2), the brake is released, the drum rotates in reverse, and the wire rope is wound out.
2. When stopping the winding-out operation, release and winch control lever. The lever is returned to the NEUTRAL position (N) and the free brake is applied to stop the winding out of the wire rope.

**SLOW WINDING IN**

1. Move the winch control lever from NEUTRAL position (N) to SLOW WIND OUT (3). The brake will be released and the drum will rotate slowly in reverse to wind the rope out.
2. To stop the SLOW WIND OUT operation, release the winch control lever. The lever will return to the NEUTRAL (N) position and the brake will be applied to stop the winding out operation.

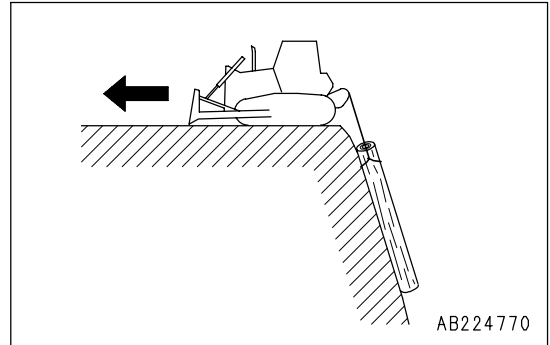


## INCHING (BRAKE PARTIALLY APPLIED)

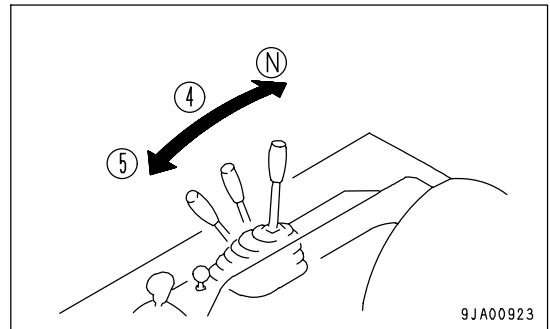
**WARNING**

If the winch lever is pushed in to the end, it is hitched at the brake releasing position (5). Since this is dangerous, do not push in the lever to the end. If it is hitched, return it by hand.

This mode is used to move the vehicle forward without changing the position of the load hung on the wire rope.



1. When the winch control lever is moved from the NEUTRAL position (N) towards position (4), the braking force on the drum is gradually reduced. Adjust the position of the control lever to match the weight of the load or the travel speed of the machine. If the lever is pushed too far forward, there is danger that the load will drop.
2. Release the winch lever, and it will return to NEUTRAL position (N) automatically and the brake will be applied to stop inching operation.



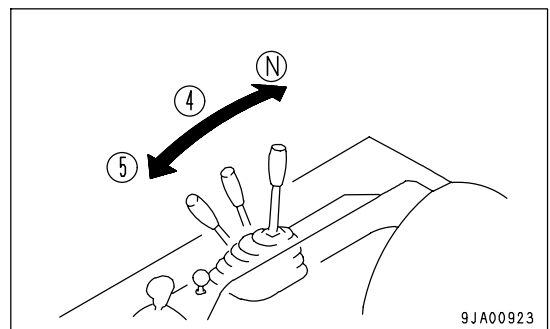
## FLOAT (BRAKE RELEASED)

**WARNING**

- When removing or installing the wire rope, always wear thick leather working gloves.
- Do not use the FLOAT position when lowering our load on a slope. The load will go down suddenly. Always wind out at low speed and lower the load slowly.

When winding out the wire rope under external force, do as follows.

1. When the winch control lever is moved fully forward from the NEUTRAL position (N), it catches in the notch and is held in FLOAT position (5). When this happens, the braking force on the drum is completely removed. To return the lever, pull it by hand.
2. This operation enables the wire rope to be wound out under external force.

**REMARK**

Even when the lever is at the FLOAT (BRAKE RELEASED) position, the wire rope cannot be pulled by human force.

## ADJUSTING

### ADJUSTING CLUTCH

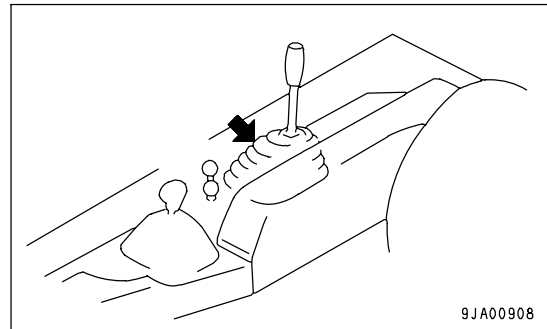
If any abnormality is found, please contact your Komatsu distributor for inspection and repairs.

### ADJUSTING BRAKE

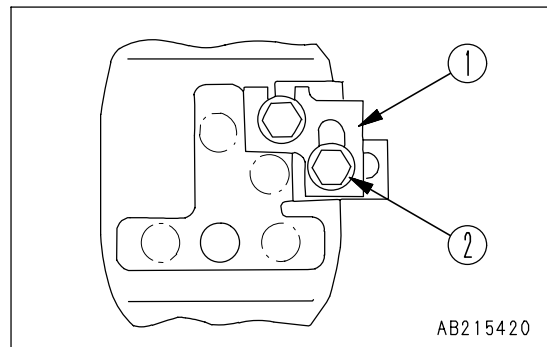
If the wire rope can be wound out from the drum when the winch control lever is at the N position, the brake is not working, so please contact your Komatsu distributor for inspection and repairs.

### ADJUST SLOW WINDING-OUT SPEED

1. Turn up the boot of the winch control lever.



2. Loosen bolt (2).
3. Watch the rotation of the drum and move adjustment plate (1) to the optimum position. After adjusting, tighten bolt (2) to hold the adjustment plate in position.



## HANDLING WIRE ROPE

If the wire rope is repeatedly tensed and slackened, it will rapidly become damaged, so check it for damage before and after operations, and replace it if it is in the following condition.

- Wire rope with marked loss of shape, broken strands, or corrosion.
- Wire rope that is twisted and has kinks.
- Wire rope where the normal diameter is worn more than 7%.

### REMARK

When replacing the wire rope, use a normal Z-lay seal type 19 wire, 6 strand lay 7 x 7 + 6 x S (19) core I.W.R.C.

## SERVICE PROCEDURE

### INITIAL 250 HOURS SERVICE

Perform the following maintenance only after the first 250 hours.

- Change gear case oil and clean strainer

For details of the method of replacing or maintaining, see the section on EVERY 1000 HOURS SERVICE.

### EVERY 1000 HOURS SERVICE

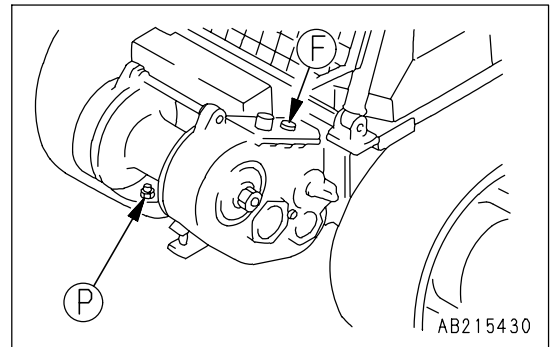
#### CHANGE GEAR CASE OIL AND CLEAN STRAINER



### WARNING

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

- Refill capacity: 76 liters (20.08 US gal)
1. Set the container to catch the oil immediately under drain plug (P).
  2. Loosen drain plug (P), drain the oil, then tighten drain plug (P) again.

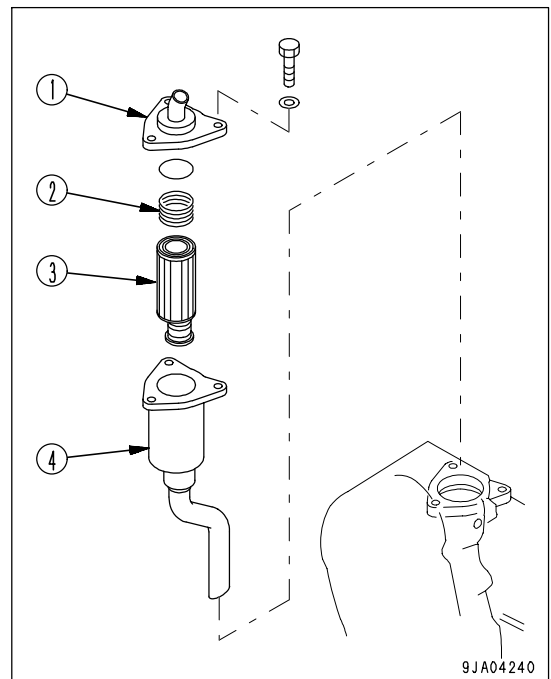


3. Remove strainer cover (1), then take out spring (2), strainer (3) and case (4) and clean them.

#### NOTICE

After washing the strainer with flushing oil, blow it with compressed air to completely remove all the dirt.

4. Install case (4), strainer (3), spring (2), and strainer cover (1), then add oil through oil filler (F).



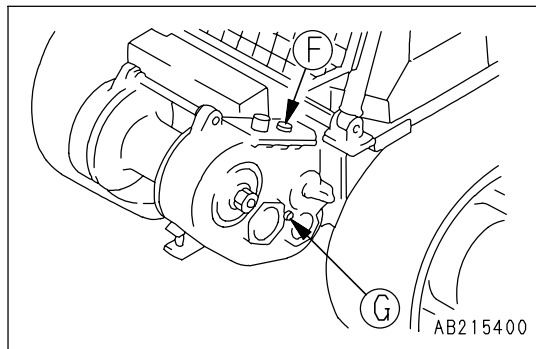
#### NOTICE

Use oil to match the ambient temperature.

More than 0°C (32°F): Engine oil CD class SAE30W

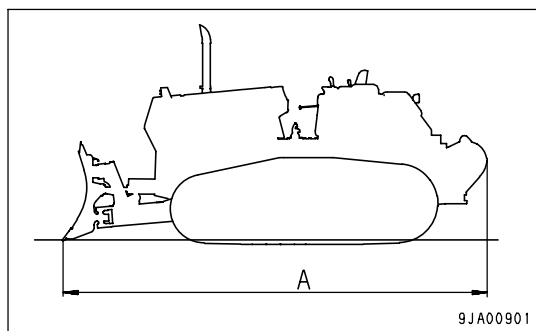
Less than 0°C (32°F): Engine oil CD class SAE10W

5. After adding oil, remove oil level plug (G) and check the oil level. If the oil is not near the bottom edge of the plug hole, add oil through oil filler port (F).



**SPECIFICATIONS**

| Item                                | Unit          | D65E-12                       | D65P-12                   |
|-------------------------------------|---------------|-------------------------------|---------------------------|
| Weight of winch (dry weight)        | kg (lb)       | 1,290 (2,844)                 |                           |
| A Overall length                    | mm (ft in)    | 6,095 (19' 12")               |                           |
| Tensile force of cable              |               |                               |                           |
| Bare drum                           | N (kgf) [lbf] | 292,240 (29,800) [65,700]     | 307,900 (31,400) [69,230] |
| Full drum                           | N (kgf) [lbf] | 168,670 (17,200) [37,920]     | 178,480 (18,200) [40,120] |
| Winding-in speed of cable           |               |                               |                           |
| Normal rotation                     | Bare drum     | m/min (yard/min)              | 28 (30.6)                 |
|                                     | Full drum     | m/min (yard/min)              | 48 (52.5)                 |
| Reverse rotation                    | Bare drum     | m/min (yard/min)              | 63 (68.9)                 |
|                                     | Full drum     | m/min (yard/min)              | 110 (120.3)               |
| Installed cable (diameter x length) |               | 26 mm x 65 m (1 in x 71 yard) |                           |



## DELUXE SEAT



### WARNING

When adjusting the position of the operator's seat, always set the work equipment lock lever to the LOCK position to prevent any accidental contact with the control levers.

- Always adjust the operator's seat before starting each operation or when the operators change shift.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

#### (A) Fore-and-aft adjustment

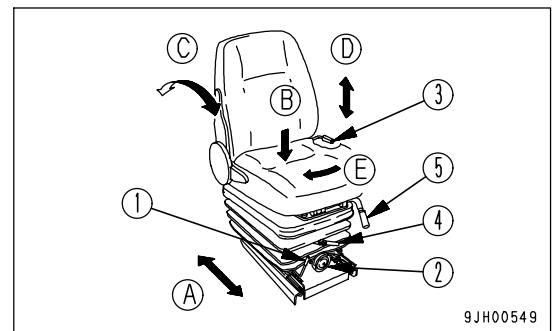
Pull lever (1), set the seat to a position where it is easy to operate, then release the lever.

Fore-aft adjustment: 160 mm (6.3 in) (8 stages)

#### (B) Weight adjustment of seat

Turn knob (2) under the seat to match the weight adjustment scale with your own weight.

The weight can be adjusted within a range of 50 to 120 kg (110 to 265 lb)



#### REMARK

To make the seat softer, adjust the weight to make it lighter; to make the seat harder, adjust the weight to make it heavier.

When traveling on rough road surfaces, make the seat harder before starting operations.

#### (C) Adjust reclining angle

Pull up lever (3) and set the seat back to a position which is comfortable for operation, then release the lever.

Sit with your back against the seat back when adjusting. If your back is not touching the seat back, the seat back may suddenly move forward.

#### REMARK

The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seatback to the upright position.

#### (D) Height adjustment of seat

- Turn lever (4) to adjust the height of the seat.
- If the lever is turned clockwise, the seat is heightened. If the former is turn counterclockwise, the latter is lowered. If you apply your weight to the seat, the lever becomes heavy. Accordingly, do not apply your weight. After adjusting the height, release the lever to lock the seat. (Height adjustment distance: Stepless, 50 mm (2.0 in))

(E) Adjusting direction of seat

**NOTICE**

Depending on the position of the seat, when changing the direction of the seat, it may contact the console or other parts.  
**Be extremely careful.**

Pull up lever (5) to unlock the seat. The seat can then be turned 15° to the right.

After changing the direction of the seat, return the lever securely to lock the seat.

- Change the direction of the seat to the right for the ease of operation of the ripper.

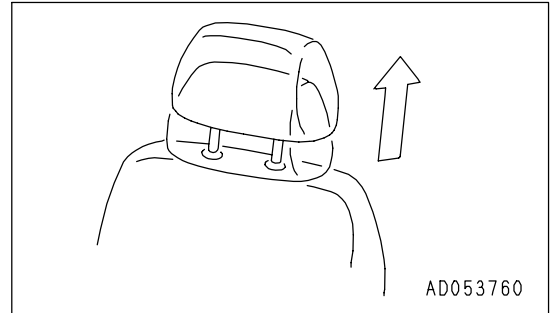
## HEADREST

### Removal of headrest

Pull up the headrest.

#### REMARK

The headrest cannot be fixed to halfway.



AD053760



## HANDLING ACCUMULATOR

### WARNING

On machines equipped with an accumulator, for a short time after the engine is stopped, if the blade control lever is moved to the LOWER position, the work equipment will move down under its own weight.

After stopping the engine, always place the work equipment lock lever in the LOCK position.

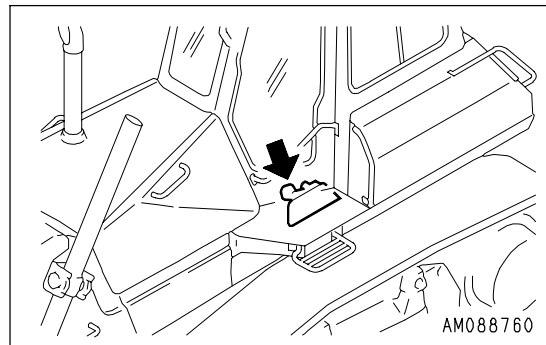
The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.

- Never make any hole in the accumulator or expose it to flame or fire.
- Do not weld any boss to the accumulator.
- When disposing the accumulator, it is necessary to release the gas from the accumulator, so please contact your Komatsu distributor.

The accumulator is a device to store the pressure in the control circuit, and when it is installed, the control circuit can be operated for a short time even after the engine is stopped.

Therefore, if the control lever is moved in the direction to lower the work equipment, it is possible for the work equipment to move under its own weight.

The accumulator is installed in the position shown in the diagram on the right.

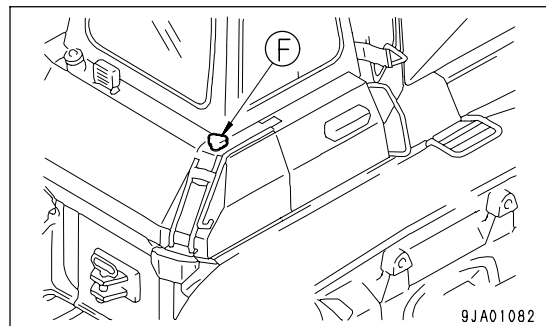


## METHOD OF RELEASING PRESSURE IN OPERATING CIRCUIT ON MACHINE EQUIPPED WITH ACCUMULATOR

### WARNING

- The hydraulic system is always under internal pressure, so when inspecting or replacing the piping or hoses, always release the pressure in the circuit before starting. If the pressure is not released, high pressure oil may spurt out and cause serious personal injury.
- When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the pressure before removing the cap.
- Take note, however, that the remaining internal pressure can hardly be released completely. When disconnecting the hydraulic circuit for the work equipment, therefore, loosen the screw slowly and do not stand in the direction that oil may spurt out.

1. Stop the machine on firm level ground.
2. Lower the blade to the ground, then stop the engine.
3. To release the internal pressure, operate the blade control lever in each direction to the end of its stroke within 15 seconds after stopping the engine.
4. Loosen oil filler cap (F) at the top of the hydraulic tank slowly to release the internal pressure.



## EQUIPPING FIRE EXTINGUISHER AND FIRST-AID KIT

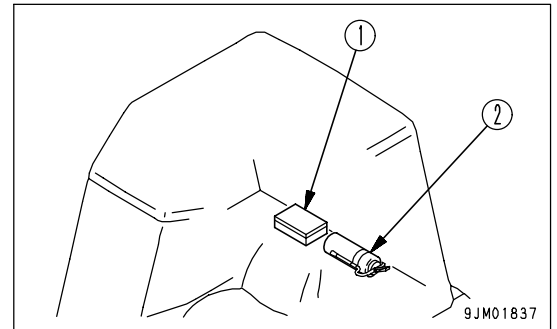
Equipping the fire extinguisher and the first-aid kit at the illustrated position needs brackets (if equipped).

The fire extinguisher and the first-aid kit can be installed to the positions shown in the following illustration.

(1) First Aid Kit

(2) Fire Extinguisher

For information on parts which are required to install these items on the machine, call your Komatsu distributor.





## INDEX

|   |       |                                  |       |
|---|-------|----------------------------------|-------|
| <A>                                       |       | <H>                              |       |
| ADJUSTING POSTURE OF WORK EQUIPMENT ..... | 3- 90 | HANDLING ACCUMULATOR .....       | 6- 20 |
| AIR CONDITIONER, HANDLING .....           | 3- 34 | METHOD OF RELEASING              |       |
| ASHTRAY .....                             | 3- 33 | PRESSURE IN OPERATING CIRCUIT    |       |
|   |       | ON MACHINE EQUIPPED WITH         |       |
|   |       | ACCUMULATOR .....                | 6- 20 |
| <C>                                       |       | HANDLING HEATER .....            | 3- 40 |
| CAP, COVER WITH LOCK .....                | 3- 31 | HANDLING HYDRAULIC RIPPER .....  | 6- 3  |
| CHECK BEFORE STARTING ENGINE,             |       | EXPLANATION OF COMPONENTS .....  | 6- 4  |
| ADJUST .....                              | 3- 43 | GENERAL VIEW .....               | 6- 3  |
| COLD WEATHER OPERATION .....              | 3-108 | MAINTENANCE .....                | 6- 8  |
| AFTER COLD WEATHER .....                  | 3-109 | OPERATION .....                  | 6- 5  |
| AFTER COMPLETION OF WORK .....            | 3-109 | SPECIFICATIONS .....             | 6- 8  |
| PRECAUTIONS FOR LOW                       |       | TROUBLESHOOTING .....            | 6- 7  |
| TEMPERATURE .....                         | 3-108 | HANDLING TOWING WINCH .....      | 6- 9  |
| CONTROL LEVERS AND PEDALS .....           | 3- 19 | EXPLANATION OF COMPONENTS .....  | 6- 9  |
|   |       | OPERATION .....                  | 6- 10 |
|   |       | SERVICE PROCEDURE .....          | 6- 15 |
| <D>                                       |       | SPECIFICATIONS .....             | 6- 16 |
| DELUXE SEAT .....                         | 6- 17 | HEADREST .....                   | 6- 19 |
| DOOR - OPEN LOCK .....                    | 3- 30 | HOT AND COOL BOX .....           | 3- 32 |
| DOOR POCKET .....                         | 3- 32 |                                  |       |
|   |       | <I>                              |       |
| <E>                                       |       | INTRODUCTION .....               | 1- 5  |
| ELECTRIC POWER TAKE-OUT                   |       |                                  |       |
| ADAPTER .....                             | 3- 29 | <L>                              |       |
| EQUIPPING FIRE EXTINGUISHER AND           |       | LAMP .....                       | 3- 18 |
| FIRST-AID KIT .....                       | 6- 21 | LONG-TERM STORAGE .....          | 3-110 |
| EXPLANATION OF COMPONENTS .....           | 3- 6  | AFTER STORAGE .....              | 3-110 |
|   |       | BEFORE STORAGE .....             | 3-110 |
| <F>                                       |       | DURING STORAGE .....             | 3-110 |
| FOREWORD .....                            | 1- 2  |                                  |       |
| FRONT/REAR, LEFT/RIGHT                    |       | <M>                              |       |
| DIRECTIONS OF MACHINE .....               | 1- 5  | MAINTENANCE SCHEDULE CHART ..... | 4- 16 |
| FUSE .....                                | 3- 27 | MAINTENANCE SCHEDULE CHART ..... | 4- 16 |
|   |       | MONITOR PANEL .....              | 3- 6  |
| <G>                                       |       |                                  |       |
| GENERAL PRECAUTIONS .....                 | 2- 9  | <N>                              |       |
| GENERAL PRECAUTIONS .....                 | 6- 2  | NECESSARY INFORMATION .....      | 1- 6  |
| PRECAUTIONS RELATED TO                    |       | ENGINE SERIAL NO. PLATE .....    | 1- 6  |
| SAFETY .....                              | 6- 2  | POSITION OF SERVICE METER .....  | 1- 7  |
| GENERAL VIEW .....                        | 3- 2  | PRODUCT IDENTIFICATION           |       |
| GENERAL VIEW OF CONTROLS AND              |       | NUMBER (PIN)/MACHINE SERIAL      |       |
| GAUGES .....                              | 3- 3  | NO. PLATE .....                  | 1- 6  |
| GENERAL VIEW OF MACHINE .....             | 3- 2  | TABLE OF ENTER SERIAL NO. AND    |       |
| GREASE PUMP HOLDER .....                  | 3- 33 | DISTRIBUTOR .....                | 1- 7  |
| GUIDE TO MAINTENANCE .....                | 4- 2  |                                  |       |

|                                   |    |    |                                    |    |     |
|-----------------------------------|----|----|------------------------------------|----|-----|
| <O>                               |    |    |                                    |    |     |
| OPERATION -----                   | 3- | 43 | SAFETY LABELS -----                | 2- | 5   |
| CHECK AFTER FINISHING WORK -----  | 3- | 96 | SASH GLASS INTERMEDIATE LOCK ----- | 3- | 30  |
| LOCKING -----                     | 3- | 97 | SERVICE PROCEDURE -----            | 4- | 18  |
| MACHINE OPERATION -----           | 3- | 75 | CHECK BEFORE STARTING -----        | 4- | 43  |
| OPERATIONS AND CHECKS AFTER       |    |    | EVERY 1000 HOURS SERVICE -----     | 4- | 60  |
| STARTING ENGINE -----             | 3- | 69 | EVERY 2000 HOURS SERVICE -----     | 4- | 67  |
| PARKING MACHINE -----             | 3- | 94 | EVERY 250 HOURS SERVICE -----      | 4- | 45  |
| PRECAUTIONS FOR OPERATION -----   | 3- | 86 | EVERY 4000 HOURS SERVICE -----     | 4- | 72  |
| SHIFTING BETWEEN FORWARD          |    |    | EVERY 50 HOURS SERVICE -----       | 4- | 44  |
| AND REVERSE -----                 | 3- | 80 | EVERY 500 HOURS SERVICE -----      | 4- | 57  |
| SHIFTING GEARS -----              | 3- | 79 | WHEN REQUIRED -----                | 4- | 18  |
| STARTING ENGINE -----             | 3- | 61 | SPECIFICATIONS -----               | 5- | 2   |
| STEERING MACHINE -----            | 3- | 82 | STANDARD TIGHTENING TORQUES        |    |     |
| STOPPING ENGINE -----             | 3- | 73 | FOR BOLTS AND NUTS -----           | 4- | 14  |
| WORK POSSIBLE USING               |    |    | TORQUE LIST -----                  | 4- | 14  |
| BULLDOZER -----                   | 3- | 88 | SWITCHES -----                     | 3- | 12  |
| OUTLINE OF SERVICE -----          | 4- | 5  | <T>                                |    |     |
| HANDLING OIL, FUEL, COOLANT,      |    |    | TIPS FOR LONGER UNDERCARRIAGE      |    |     |
| AND PERFORMING OIL CLINIC -----   | 4- | 5  | LIFE -----                         | 3- | 98  |
| RELATING TO ELECTRIC SYSTEM ----- | 4- | 8  | TOOL BOX -----                     | 3- | 33  |
| <P>                               |    |    | TRANSPORTATION -----               | 3- | 101 |
| PERIODIC REPLACEMENT OF SAFETY    |    |    | LIFTING MACHINE -----              | 3- | 106 |
| CRITICAL PARTS -----              | 4- | 15 | LOADING, UNLOADING WORK -----      | 3- | 103 |
| SAFETY CRITICAL PARTS -----       | 4- | 15 | PRECAUTIONS WHEN REMOVING          |    |     |
| PRECAUTIONS FOR OPERATION -----   | 2- | 17 | WORK EQUIPMENT -----               | 3- | 102 |
| BATTERY -----                     | 2- | 23 | REMOVING CAB -----                 | 3- | 101 |
| OPERATION -----                   | 2- | 19 | TRANSPORTATION MEANS -----         | 3- | 101 |
| STARTING ENGINE -----             | 2- | 17 | TROUBLESHOOTING -----              | 3- | 111 |
| TOWING -----                      | 2- | 25 | AFTER RUNNING OUT OF FUEL -----    | 3- | 111 |
| TRANSPORTATION -----              | 2- | 22 | IF BATTERY IS DISCHARGED -----     | 3- | 112 |
| <R>                               |    |    | MACHINE TOWING METHOD -----        | 3- | 111 |
| RECOMMENDED FUEL, COOLANT,        |    |    | OTHER TROUBLE -----                | 3- | 116 |
| AND LUBRICANT -----               | 4- | 11 | <W>                                |    |     |
| RECOMMENDED BRANDS,               |    |    | WEAR PARTS LIST -----              | 4- | 9   |
| RECOMMENDED QUALITY FOR           |    |    | WEAR PARTS LIST -----              | 4- | 10  |
| PRODUCTS OTHER THAN               |    |    |                                    |    |     |
| KOMATSU GENUINE OIL -----         | 4- | 13 |                                    |    |     |
| USE OF FUEL, COOLANT AND          |    |    |                                    |    |     |
| LUBRICANTS ACCORDING TO           |    |    |                                    |    |     |
| AMBIENT TEMPERATURE -----         | 4- | 12 |                                    |    |     |
| <S>                               |    |    |                                    |    |     |
| SAFETY -----                      | 2- | 2  |                                    |    |     |
| SAFETY INFORMATION -----          | 1- | 3  |                                    |    |     |
| SAFETY LABELS -----               | 2- | 4  |                                    |    |     |
| POSITIONS OF SAFETY               |    |    |                                    |    |     |
| PICTOGRAMS -----                  | 2- | 4  |                                    |    |     |



D65E-12, D65P-12 BULLDOZER

Form No. TEN0061-01

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