

# Operation & Maintenance Manual

TEN00091-00

# GALEO WA470-5

## WHEEL LOADER

SERIAL NUMBERS WA470-70001 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.

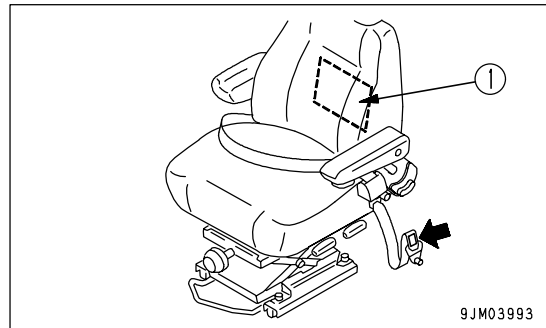
Keep this manual at the storage location for the Operation and Maintenance Manual given below so that all personnel involved in working on the machine can consult it periodically.

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:  
Pocket (1) at rear of operator's seat



**EMISSION CONTROL WARRANTY****EMISSION CONTROL WARRANTY STATEMENT (APPLIES TO CANADA ONLY)****1. Products Warranted**

Komatsu America International Company, Komatsu Mining Systems Inc. and Komatsu Utility Corporation (collectively "Komatsu") produce and/or market products under brand names of Komatsu, Dresser, Dressta, Haulpak and Galion. This emissions warranty applies to new engines bearing the Komatsu name installed in these products and used in Canada in machines designed for industrial off-highway use. This warranty applies only to these engines produced on or after January 1, 2000. This warranty will be administered by Komatsu distribution in Canada.

**2. Coverage**

Komatsu warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built and equipped so as to conform, at the time of sale by Komatsu, with all U.S. Federal emission regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations within five years or 3,000 hours of operation, whichever occurs first, as measured from the date of delivery of the engine to the ultimate purchaser.

**3. Limitations**

Failures, other than those resulting from defects in materials or workmanship, are not covered by this warranty. Komatsu is not responsible for failures or damage resulting from what Komatsu determines to be abuse or neglect, including, but not limited to: operation without adequate coolant or lubricants; over fueling; over speeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the engine. Komatsu is also not responsible for failures caused by incorrect fuel or by water, dirt or other contaminants in the fuel. Komatsu is not responsible for non-engine repairs, "downtime" expense, related damage, fines, all business costs or other losses resulting from a warrantable failure.

**KOMATSU IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

This warranty, together with the express commercial warranties, are the sole warranties of Komatsu. **THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

**GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS****ÉNONCÉ DE GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS (APPLICABLE AU CANADA SEULEMENT):****1. Produits garantis:**

Komatsu America International Company, Komatsu Mining Systems Inc. et Komatsu Utility Corporation (collectivement Komatsu) produisent et/ou font la mise en marché de produits portant les noms de marque Komatsu, Dresser, Dressta, Haulpak et Galion. Cette garantie sur les émissions s'applique à tous les nouveaux moteurs portant le nom Komatsu, installés dans ces produits et utilisés au Canada dans des machines conçues pour utilisation industrielle non-roulière. Cette garantie s'applique seulement sur les moteurs produits à partir du 1er Janvier 2000. Cette garantie sera administrée par la distribution de Komatsu au Canada.

**2. Couverture:**

Komatsu garantit à l'acheteur ultime et chaque acheteur subséquent que le moteur est conçu, construit et équipé en toute conformité, au moment de la vente par Komatsu, avec toutes les Réglementations fédérales américaines sur les émissions applicables au moment de la fabrication et qu'il est exempt de défauts de construction ou de matériaux qui auraient pour effet de contrevenir à ces réglementations en dedans de 5 ans ou 3000 heures d'opération, mesuré à partir de la date de livraison du moteur au client ultime.

**3. Limitations:**

Les bris, autres que ceux résultant de défauts de matériaux ou de construction, ne sont pas couverts par cette Garantie. Komatsu n'est pas responsable pour bris ou dommages résultant de ce que Komatsu détermine comme étant de l'abus ou négligence, incluant mais ne se limitant pas à: l'opération sans lubrifiants ou agent refroidissants adéquats; la suralimentation d'essence; la survitesse; le manque d'entretien des systèmes de lubrification, de refroidissement ou d'entrée; de pratiques non-propices d'entreposage, de mise en marche, de réchauffement, de conditionnement ou d'arrêt; les modifications non-autorisées du moteur. De plus, Komatsu n'est pas responsable de bris causés par de l'essence inadéquate ou de l'eau, des saletés ou autres contaminants dans l'essence. Komatsu n'est pas responsable des réparations non-relées au moteur, des dépenses encourues suite aux temps d'arrêts, des dommages relatifs, amendes, et de tout autre coût d'affaires ou autres pertes résultant d'un bris couvert par la garantie.

**KOMATSU N'EST PAS RESPONSABLE DES INCIDENTS OU DOMMAGES CONSÉQUENTS.**

Cette garantie, ainsi que les garanties expresses commerciales, sont les seules garanties de Komatsu. **IL N'Y A AUCUNE AUTRE GARANTIE, EXPRESSE OU SOUS-ENTENDUE, MARCHANDABLE OU PROPICE A UNE UTILISATION PARTICULIÈRE.**



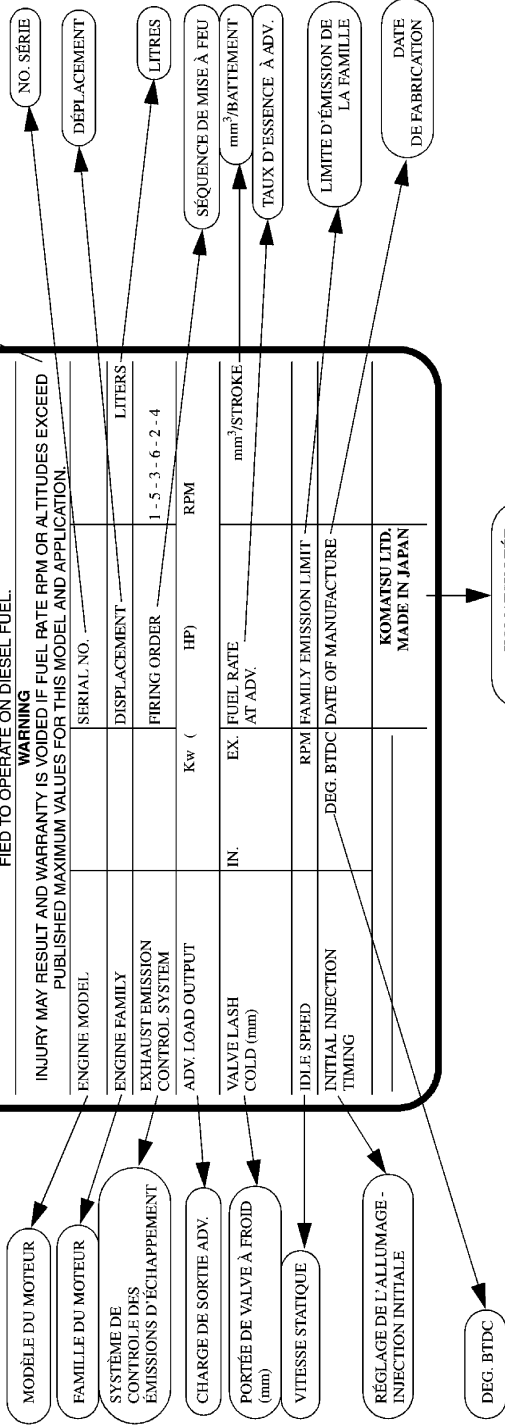
**INFORMATION IMPORTANTE SUR LE MOTEUR**  
 CE MOTEUR EST CONFORME AUX NORMES AMÉRICAINES DE L'EPA (ANNÉE DU MODÈLE) ET DE LA CALIFORNIE POUR LES MOTEURS LARGES NON-ROUTIERS À IGNITION PAR COMPRESSION. CE MOTEUR EST CERTIFIÉ POUR OPÉRER À ESSENCE DIESEL.

**AVERTISSEMENT**  
 DES BLESSURES PEUVENT RÉSULTER ET LA GARANTIE S'ANNULER SI LES RPM DU TAUX D'ESSENCE OU L'ALTITUDE EXCÈDENT LES VALEURS MAXIMALES PUBLIÉES POUR CE MODÈLE ET SON APPLICATION.

**IMPORTANT ENGINE INFORMATION**  
 THIS ENGINE CONFORMS TO YYYY MODEL YEAR U.S. EPA REGULATION AND THE CALIFORNIA REGULATIONS LARGE NON ROAD COMPRESSION IGNITION ENGINES. THIS ENGINE IS CERTIFIED TO OPERATE ON DIESEL FUEL.

**WARNING**  
 INJURY MAY RESULT AND WARRANTY IS VOIDED IF FUEL RATE RPM OR ALTITUDES EXCEED PUBLISHED MAXIMUM VALUES FOR THIS MODEL AND APPLICATION.

ENGINE MODEL	SERIAL NO.	DISPLACEMENT	LITERS
ENGINE FAMILY		FIRING ORDER	1 - 5 - 3 - 6 - 2 - 4
EXHAUST EMISSION CONTROL SYSTEM		ADV. LOAD OUTPUT	Kw ( HP) RPM
VALVE LASH COLD (mm)	IN. EX.	FUEL RATE AT ADV.	mm <sup>3</sup> /STROKE
IDLE SPEED	RPM	FAMILY EMISSION LIMIT	mm <sup>3</sup> /STROKE
INITIAL INJECTION TIMING	DEG. BTDC	DATE OF MANUFACTURE	TAUX D'ESSENCE À ADV.
			LIMITÉ D'ÉMISSION DE LA FAMILLE
			DATE DE FABRICATION
			KOMATSU LTD. MADE IN JAPAN



KOMATSU LTD.  
 FABRIQUÉ AU JAPON

ENGINE DATAPLATE - ENGLISH / FRENCH




## 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 work equipment lock lever in the LOCK position. 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.

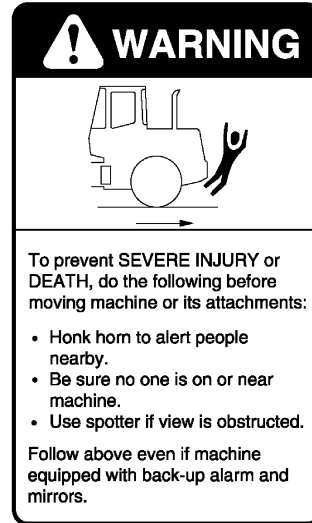
**REMARKS** This word is used for information that is useful to know.

• 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



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))

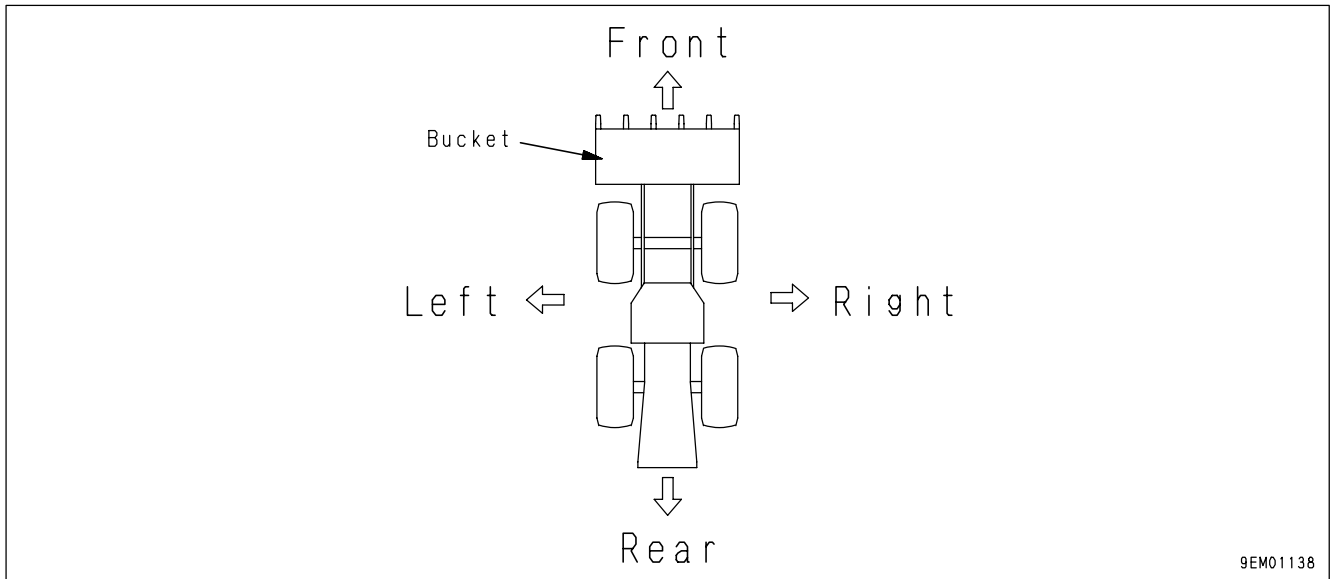
## INTRODUCTION

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

- Digging work
- Smoothing
- Pushing work
- Loading work

For details of the operating procedure, see "WORK POSSIBLE USING WHEEL LOADER (PAGE 3-130)".

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



In this manual, the directions of the machine (front, rear, left, right) are determined according to the view from the operator's seat in the direction of travel (front) of the machine.

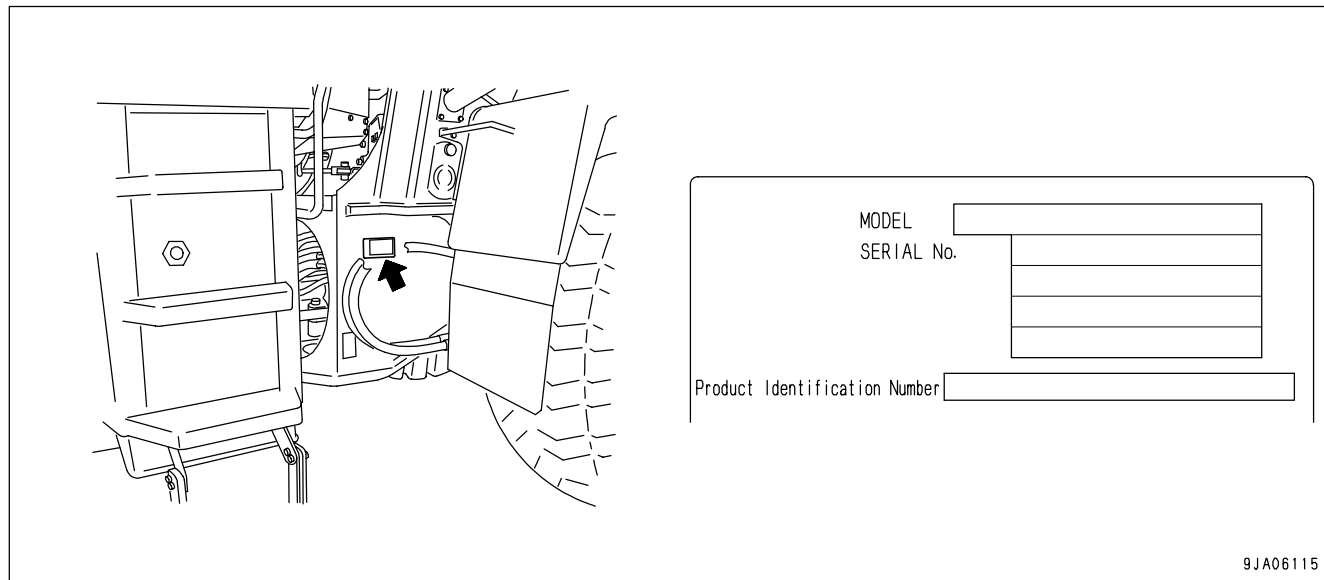
## NECESSARY INFORMATION

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

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

On the center right of the front frame.

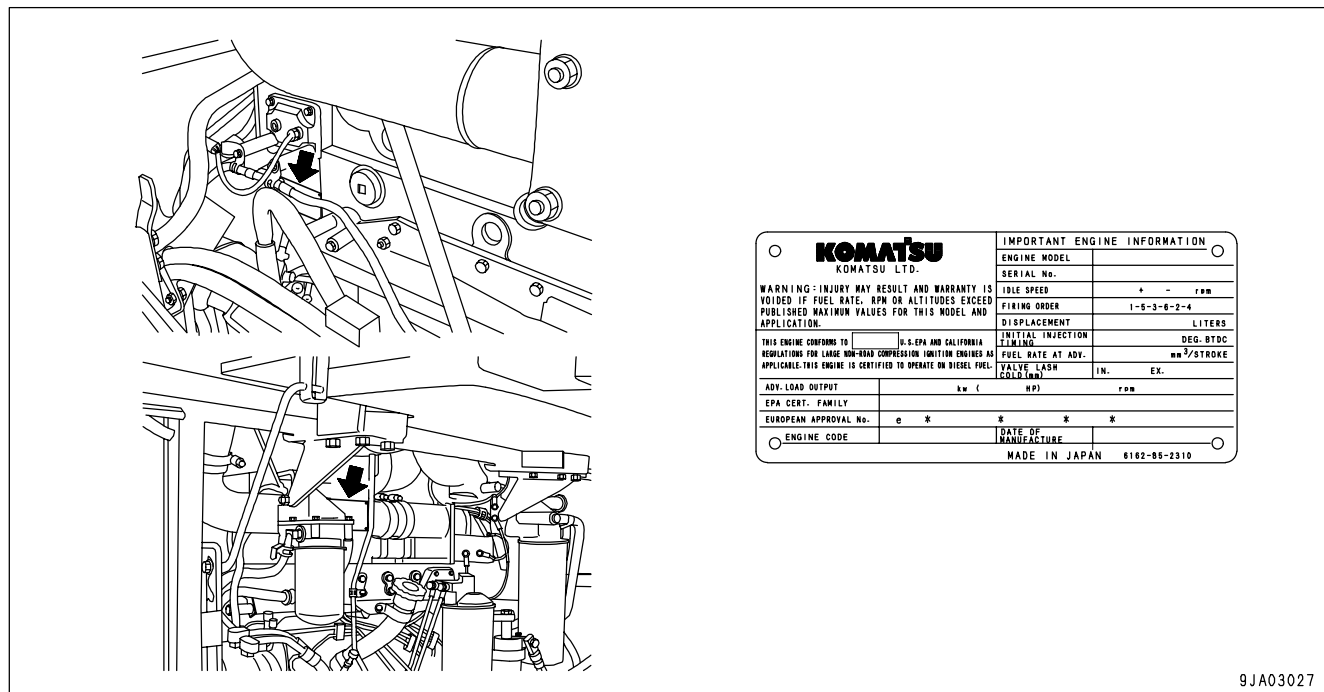
The design of the nameplate differs according to the territory.



9JA06115

### ENGINE SERIAL NO. PLATE

One is located on the left side of machine, i.e. on the upper left surface of the engine cylinder block and the other on the muffler bracket on the right side of machine.

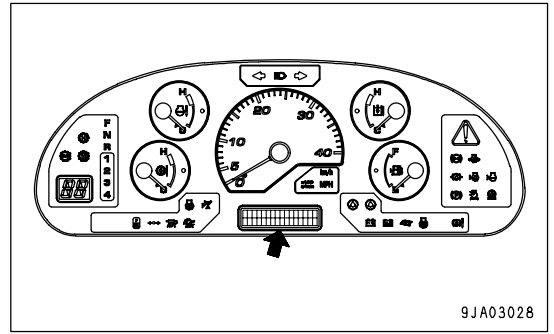


9JA03027

EPA: Environmental Protection Agency, U.S.A.

**POSITION OF SERVICE METER**

It is at the center bottom of the machine monitor.



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

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

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# 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.

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## SAFETY LABELS

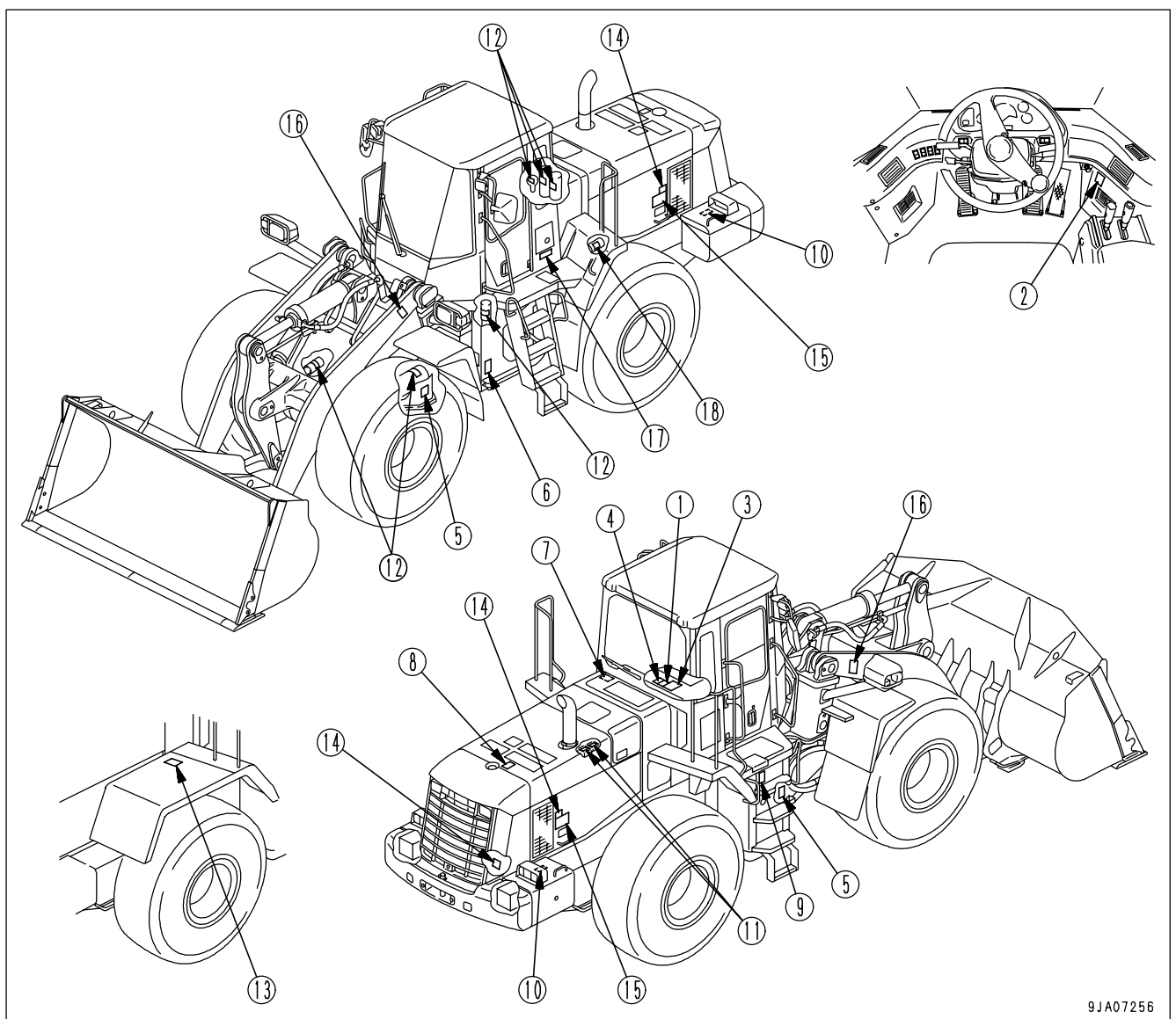
The following safety labels are used on this machine. Be sure that you fully understand the correct position and content of these safety labels.

To ensure that the content of these safety labels can be read properly, be sure that they are in the correct place and always keep them clean. When cleaning them, use soap and water. Do not use organic solvents or gasoline. These may cause the safety labels to peel off.

If the safety labels are damaged or lost, or cannot be read, replace them with new parts. For details of the part numbers, see this manual or check on the actual part, and order the new part from your Komatsu distributor.

There are also other labels in addition to the safety labels. Handle these labels in the same way.

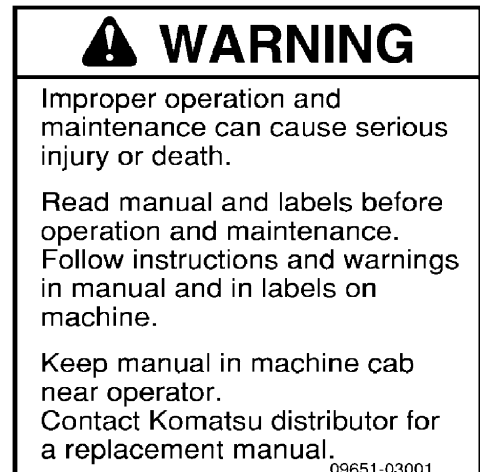
### LOCATION OF SAFETY LABELS



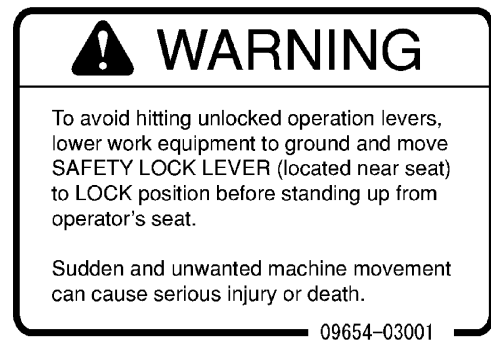
9JA07256

**SAFETY LABELS**

(1) Caution before starting (09651-03001)

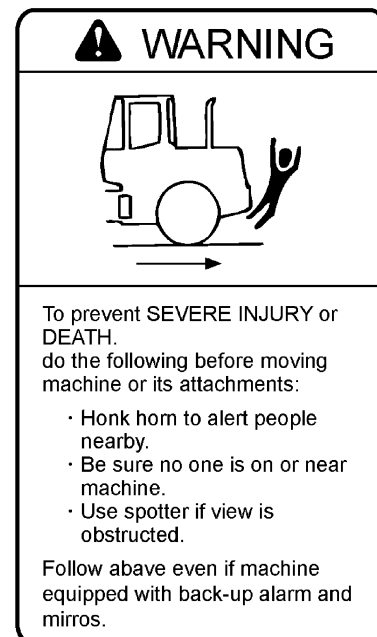


(2) Caution for leaving the operator's seat (09654-03001)

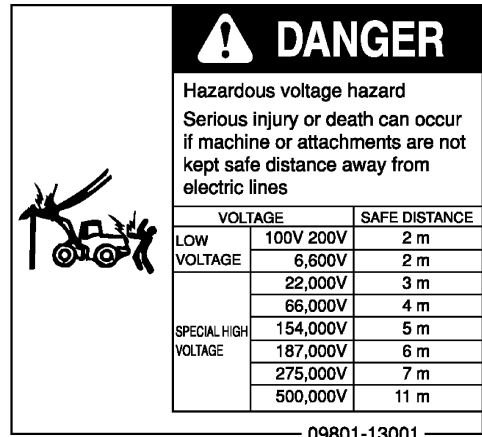


(3) Caution when traveling in reverse

Please request part No. 421-93-23251 for this safety label.



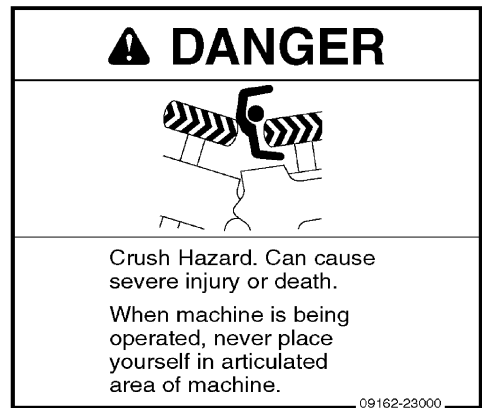
(4) Caution for going close to electric cables (09801-13001)



VOLTAGE		SAFE DISTANCE
LOW VOLTAGE	100V 200V	2 m
	6,600V	2 m
SPECIAL HIGH VOLTAGE	22,000V	3 m
	66,000V	4 m
	154,000V	5 m
	187,000V	6 m
	275,000V	7 m
	500,000V	11 m

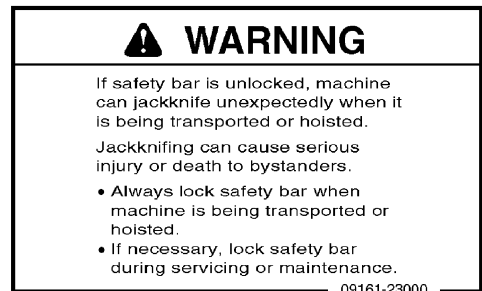
09801-13001

(5) Do not enter (09162-23000)



09162-23000

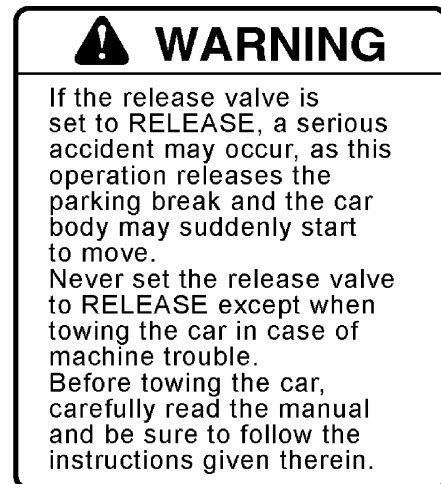
(6) Caution for frame lock bar (09161-23000)



09161-23000



(7) Caution for parking brake (421-93-23351)



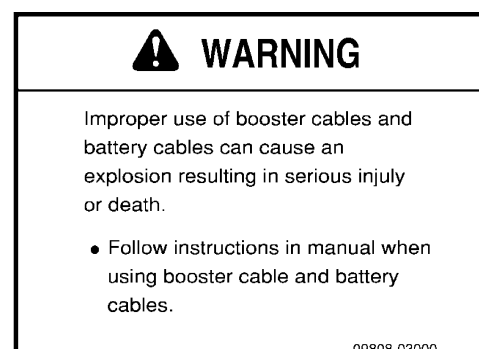
(8) Warning for hot cooling water (09668-03001)



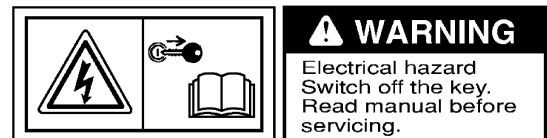
(9) Caution when oil is at high temperature (09653-03001)



(10) Caution when handling battery cable (09808-03000)



(11) Caution for high voltage (7872-10-1600)



There is danger of electrocution.  
Turn the starting switch OFF before starting inspection or repairs, and read the Operation and Maintenance Manual.

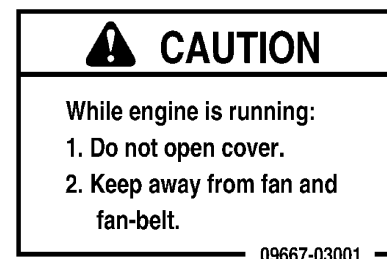
(12) High pressure warning (09659-53000)



(13) Do not climb on fender (09805-03000)  
(Machines with equipped with rear full fender)



(14) "Do not open when engine is running" sign  
(09667-03001)



(15) "Do not come near machine" sign (09812-13000)



(16) "Do not go under work equipment" sign (09807-C0883)



Sign indicates a crush hazard from falling off of working device.

Keep away when the working device is raised.

(17) "Do not modify ROPS" sign (09620-30201)



(18) Jump start prohibited (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.

## GENERAL PRECAUTIONS

### SAFETY RULES

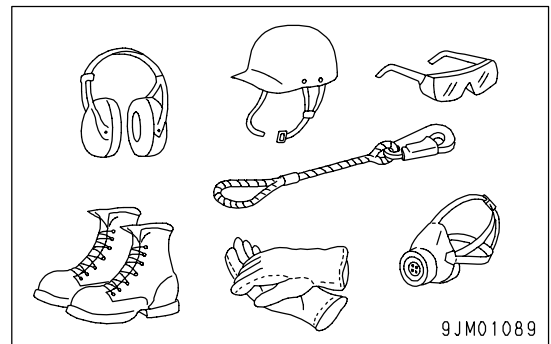
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine may be severely impaired putting yourself and everyone else on your jobsite in danger.
- When working with another operator or with a person on worksite traffic duty, be sure that all personnel understand all hand signals that are to be used.

### IF ABNORMALITIES 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

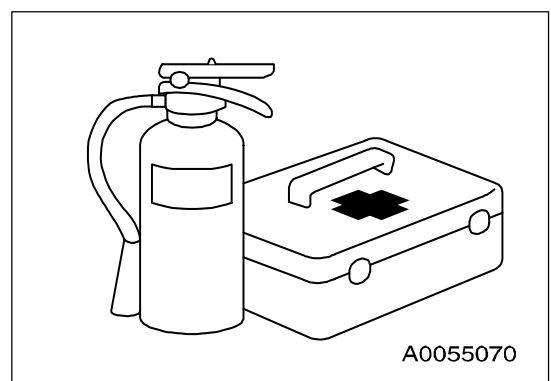
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get 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.

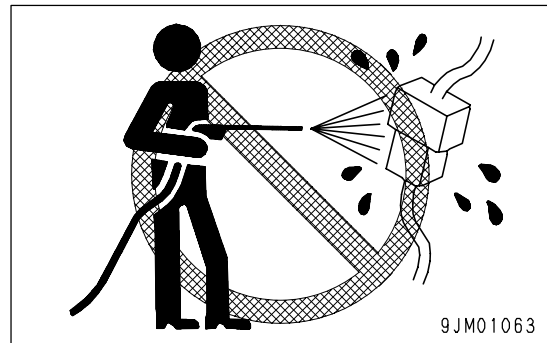


### SAFETY FEATURES

- Be sure that all guards and covers 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**

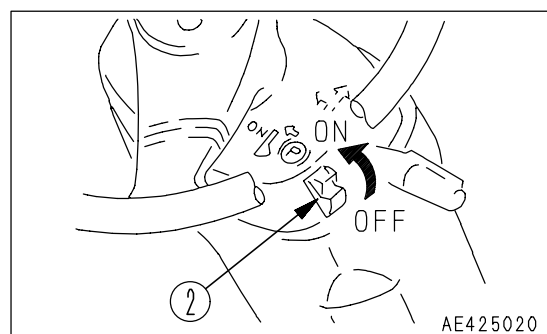
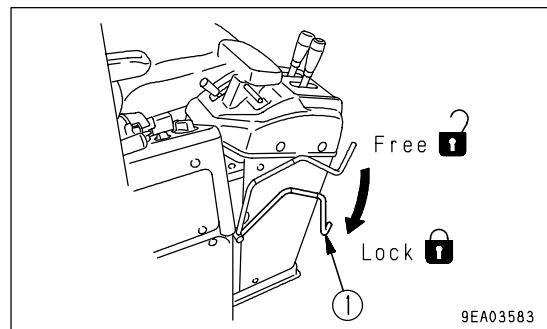
- If water gets into the electrical system, there is a hazard that it will cause malfunctions or misoperation. Do not use water or steam to wash the electrical system (sensors, connectors).
- If inspection and maintenance is carried out when the machine is still dirty with mud or oil, there is a hazard 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**

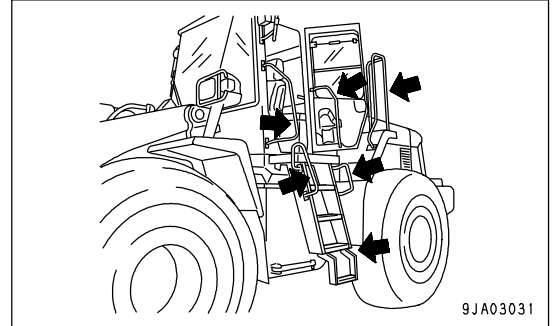
- Before standing up from the operator's seat to adjust the operator's seat, always lower the work equipment, set work equipment lock lever (1) to the LOCK position and parking brake switch (2) to the ON position, then stop the engine. If you accidentally touch the travel or swing lever when they are not locked. The work equipment may suddenly move and cause serious injury.
- When leaving the machine, always lower the work equipment to the ground, set work equipment lock lever (1) to the LOCK position and parking brake switch (2) to the ON position, then stop the engine. Lock all places and always take the key with you and leave it in the specified location.



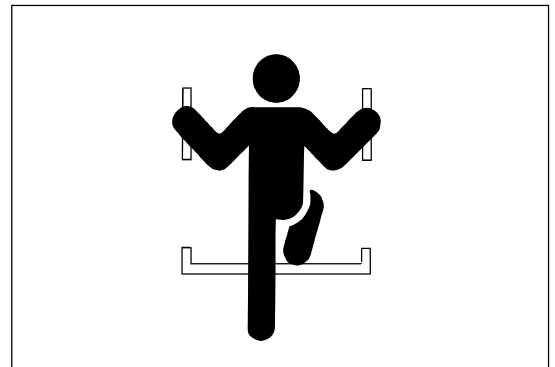
**HANDRAILS AND STEPS**

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.



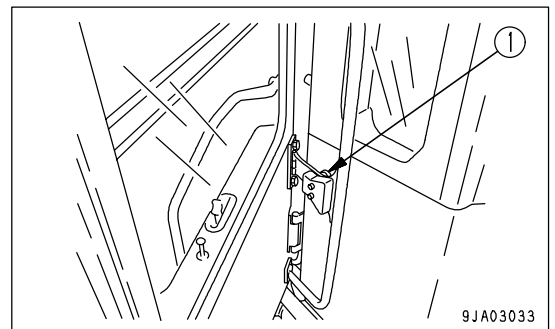
- To ensure safety, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps to ensure that you support yourself.



- When entering the cab, open the cab door, push the door securely into catcher (1) to hold in position, then use the handrail on the inside to get on the machine.

For details of the method of releasing the door lock, see "CAB DOOR OPEN LOCK (PAGE 3-60)".

- Do not grip the control levers and 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.
- Never move from the step at the rear of the machine or the step at the side of the cab to stand on top of the tire.



- Before getting on or off the machine, check the handrails and steps, and if there is any oil, grease, or mud on them, wipe it off immediately. In addition, 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.

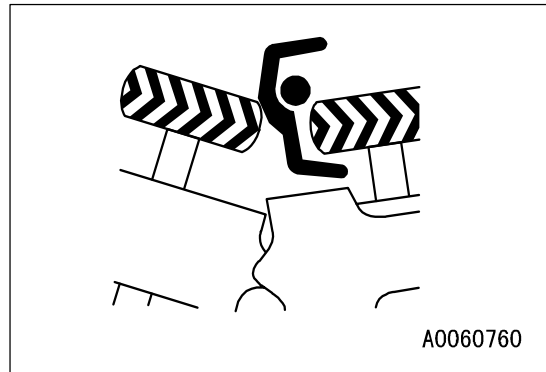
**DO NOT GET CAUGHT IN ARTICULATED PORTION**

- If the clearance at the articulating portion changes, it will lead to serious personal injury.

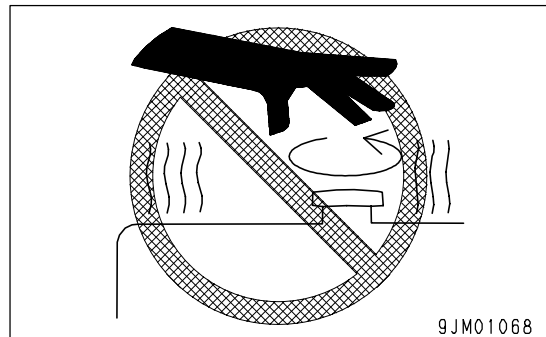
Do not allow anyone to come inside the articulation range.

- Never enter or put your hand, arm, or any part of your body in the movable portion between the work equipment and machine or between the cylinder and the work equipment. If someone operates the control levers by mistake, the gap between the work equipment and machine and between the cylinder and work equipment will change, and you, your hand, or arm will be caught and you may suffer serious injury.

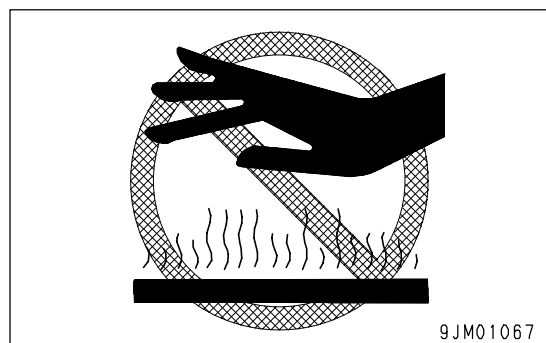
If you have to go into a movable portion, always take action to secure the work equipment and ensure that it cannot move.

**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**

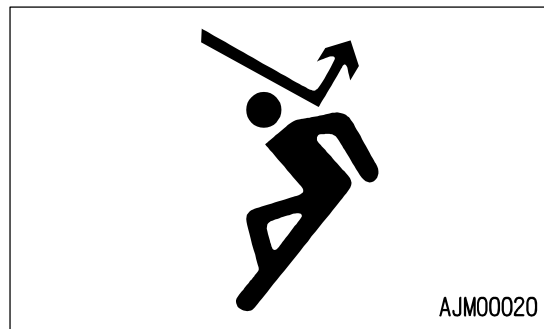
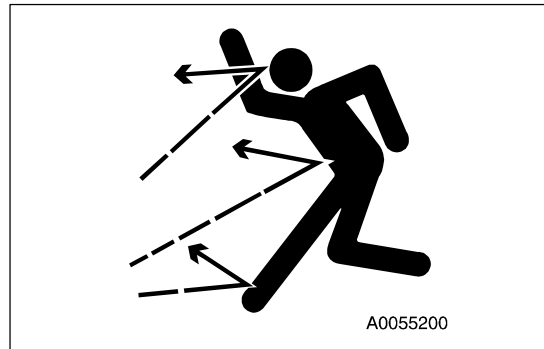
Use an ethyl alcohol base washer liquid.

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

**PRECAUTIONS WHEN USING ROPS (Roll Over Protective Structure)**

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 the ROPS is welded, or holes are drilled in it, or it is modified in any other way, its strength may drop. Consult your Komatsu distributor before carrying out any modification.
- 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, OPTIONS**

- 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, or product failures 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.

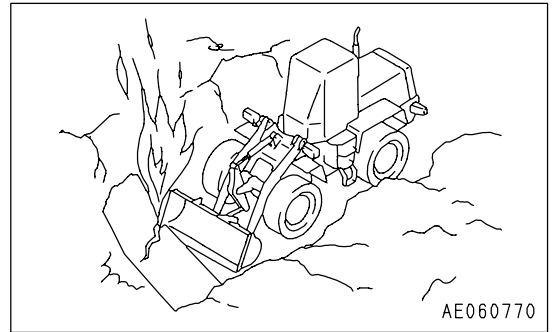
**SAFETY AT WORKSITE**

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 carry out operations at places 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.
- Always design and maintain the roads on the jobsite so that the machines can travel safely.

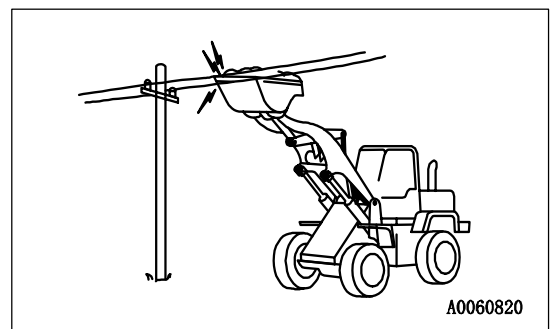
**WORKING ON LOOSE GROUND**

- 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 injury or property damage. 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 come close to 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 come close to 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**

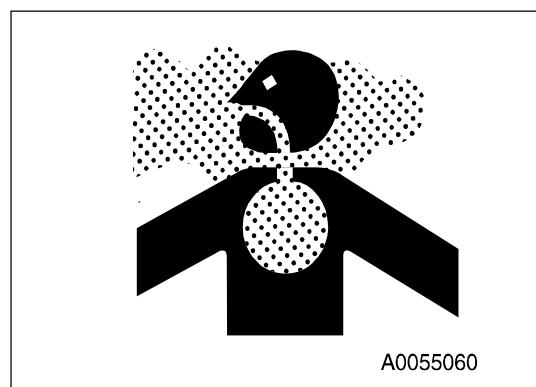
Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.

- 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**

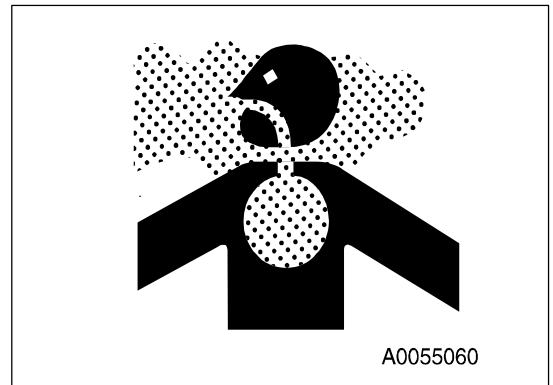
Machines equipped with a cab have doors on the left and right sides. If the door on the one side does not open, escape from the door on the other side.

**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.

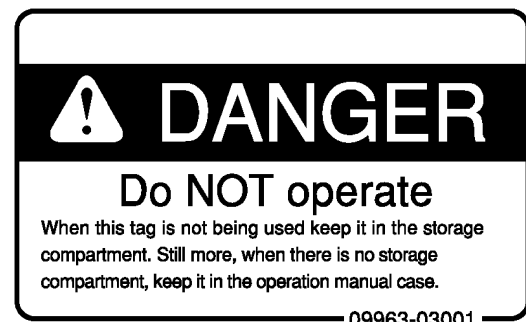
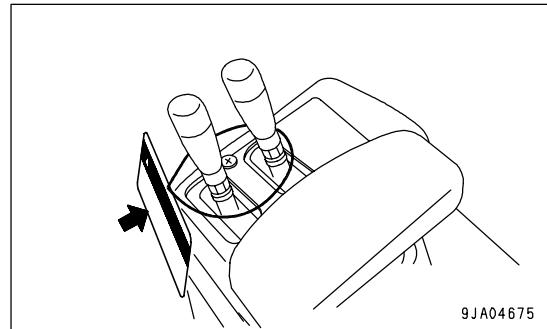
This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.



## 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, working lamps, and rear combination lamp, 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.
- Check that there is no mud or dust accumulated around the movable parts of the accelerator pedal or brake pedal, and check that the pedals work properly.
- 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 the operation of the instruments and gauges, check the angle of the mirror, and check that the control levers are all at the Neutral position.
- Before starting the engine, make sure that the work equipment lock lever is in the LOCK position.
- Adjust the mirrors so that the rear of the machine can be seen clearly from the operator's seat. See "ADJUST REAR VIEW MIRROR (PAGE 3-104)".
- 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.
- When starting the engine, always check that the work equipment control levers are at the HOLD position.

**PRECAUTIONS IN COLD AREAS**

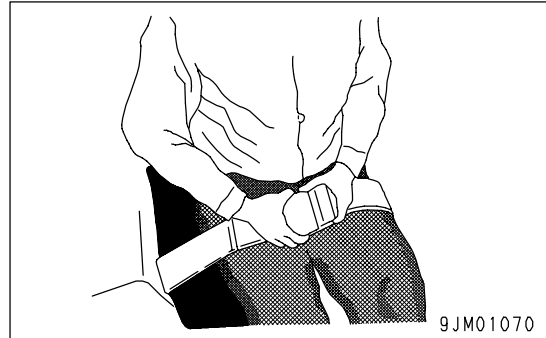
- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.
- If the battery electrolyte is frozen, do not charge the battery or start the engine 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

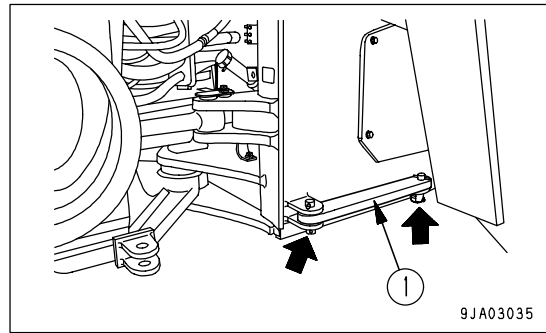
### CHECKS BEFORE OPERATION

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.



- Before driving the machine or starting operations, check that frame lock bar (1) is securely fixed at the FREE position.



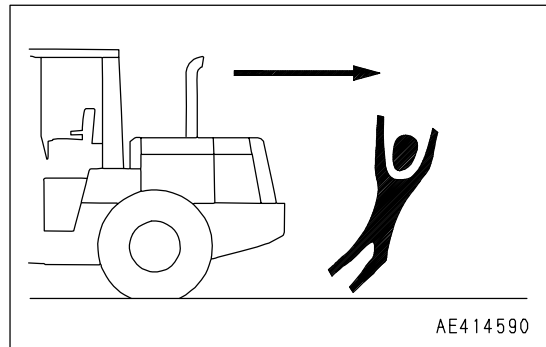
### PRECAUTIONS WHEN TRAVELING IN FORWARD OR REVERSE

- 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.
- Always lock the door and windows of the operator's compartment in position (open or closed).

On jobsites where there is a hazard of flying objects or of objects entering the operator's compartment, check that the door and windows are securely closed.

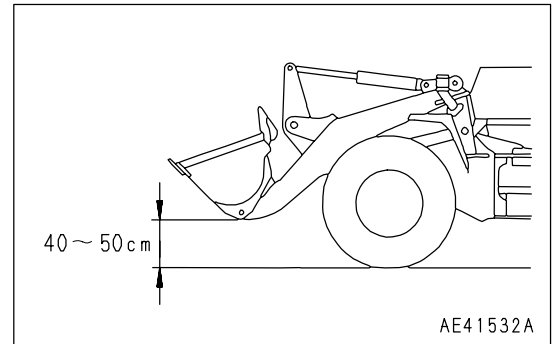
- If there is an area to the rear of the machine which cannot be seen, position a signal person. Take special care not to hit other machines or people when turning or swinging the machine.

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



**PRECAUTIONS WHEN TRAVELING**

- Never turn the key in the starting switch to the OFF position. It is dangerous if the engine stops when the machine is traveling, because the steering becomes heavy. If the engine stops, depress the brake pedal immediately to stop the machine.
- When traveling on level ground, keep the work equipment at height of 40 to 50 cm (16 to 20 in) from the ground. When traveling, do not operate the work equipment control levers. If the work equipment control levers have to be operated, stop the machine first, then operate the levers.



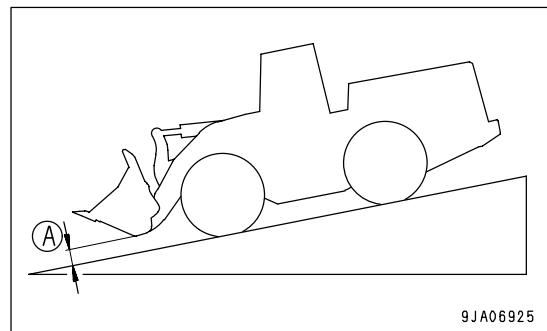
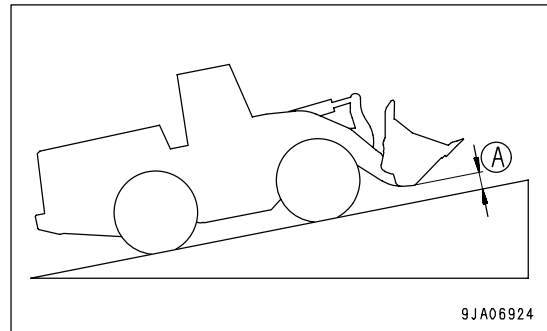
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is danger that the machine may turn over. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.
  - Avoid traveling 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 work equipment hit anything.
  - Always obey the traffic regulations when traveling on public roads. This machine travels at a lower speed than normal automobiles, so keep to the side of the road and be careful to leave the center of the road free for other vehicles.
  - If you drive the machine at high speed continuously for a long time, the tires will overheat and the internal pressure will become abnormally high. This may cause the tires to burst. If a tire bursts, it produces an extremely large destructive force, and this may cause serious injury or accident.
- If you are going to travel continuously, please consult your Komatsu distributor.



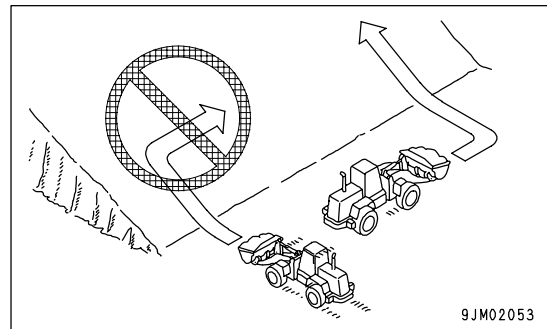
**TRAVELING ON SLOPES**

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 (A). In case of emergency, lower the work equipment to the ground immediately to help stop the machine.



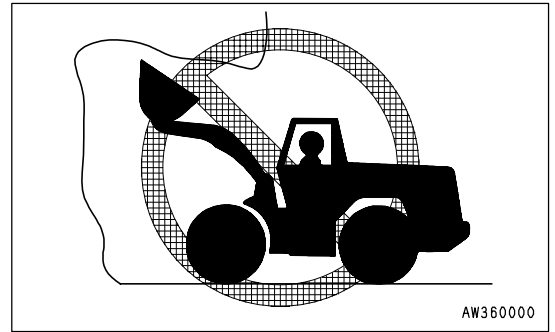
- Always travel straight up or down a slope. Traveling at an angle or across the slope is extremely dangerous.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine, then travel on to the slope again.



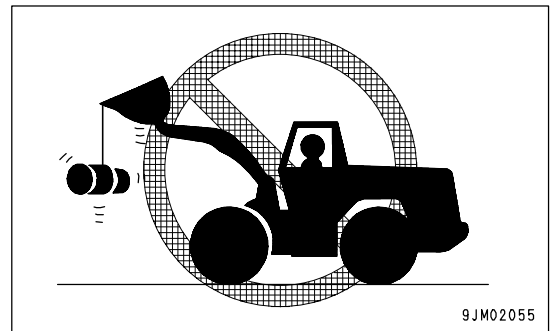
- Travel on grass, fallen leaves, or wet steel plates with low speed. Even with slight slopes there is a hazard that the machine may slip.
- If the engine stops, depress the brake pedal immediately, lower the bucket to the ground, and apply the parking brake to stop the machine.
- When traveling downhill, never shift gear or place the transmission at neutral. It is dangerous not to use the braking force of the engine. Always place the transmission in a low gear before starting to travel downhill.
- When traveling downhill, travel slowly. If necessary, use the braking force of the engine together with the brake pedal to control the travel speed.
- When traveling up or down hills with a loaded bucket, always travel with the bucket facing uphill. If the machine travels with the bucket facing downhill, there is danger that the machine may tip over.

**PROHIBITED OPERATIONS**

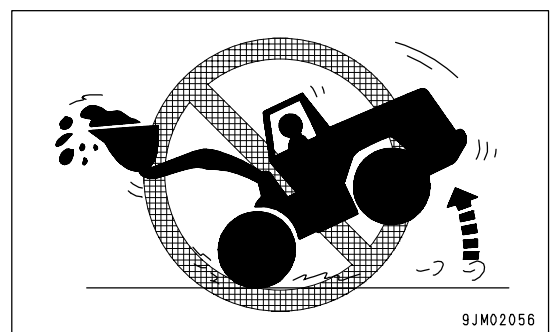
- It is dangerous to excavate the bottom of a rock face. Never do this.



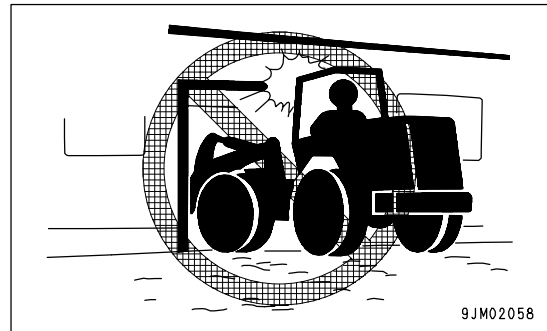
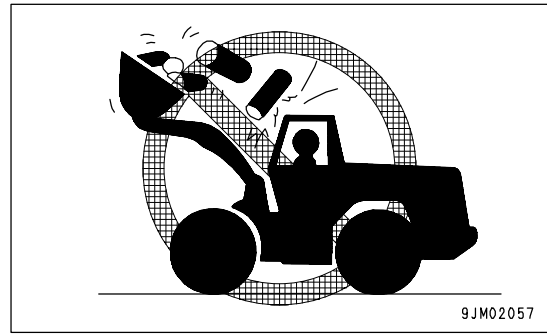
- It is dangerous to use the bucket or lift arm for crane operations, so do not carry out such operations.
- Do not pass the bucket over the head of other workers or over the operator's seat of dump trucks or other hauling equipment. The load may spill or the bucket may hit the dump truck and cause serious injury or property damage.

**PRECAUTIONS WHEN OPERATING**

- When using the machine, to prevent the machine from overturning due to overloading and to avoid damage to the work equipment, do not exceed the maximum permitted load or performance of the machine.
- If the engine cannot be started again after it has stopped, immediately operate the work equipment control levers to lower the work equipment to the ground. (After the engine stops, the accumulator allows the work equipment to be operated for a limited time.)
- Be careful not to approach too close to the edge of cliffs. When making embankments or landfills, or when dropping soil over a cliff, dump one pile, then use the next pile of soil to push the first pile.
- The load suddenly becomes lighter when the soil is pushed over a cliff or when the machine reaches the top of a slope. When this happens, there is danger that the travel speed will suddenly increase, so be sure to reduce the speed.
- When the bucket is fully loaded, never start, turn, or stop the machine suddenly. There is danger of the machine turning over.



- When handling unstable loads, such as round or cylindrical objects, or piled sheets, if the work equipment is raised high, there is danger that the load may fall on top of the operator's compartment and cause serious injury or damage.
- When handling unstable loads, be careful not to raise the work equipment too high or tip the bucket back too much.
- If the work equipment is suddenly lowered or suddenly stopped, the reaction may cause the machine to tip over. Particularly when carrying a load, be sure to operate the work equipment carefully.
- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, be extremely careful not to let the work equipment hit anything.
- To prevent accidents caused by hitting other objects, always operate the machine at a speed which is safe for operation, particular in confined spaces, indoors, and in places where there are other machines.



**METHODS OF USING BRAKE**

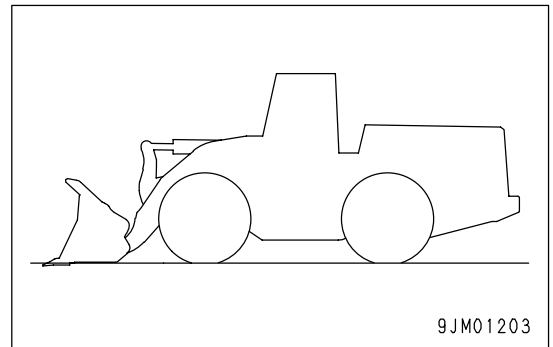
- When the machine is traveling, do not rest your foot on the brake pedal. If you travel with your foot resting on the pedal, the brake will always be applied, and this will cause the brakes to overheat and fail.
- Do not depress the brake pedal repeatedly if not necessary.
- When traveling downhill,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

**OPERATE CAREFULLY ON SNOW**

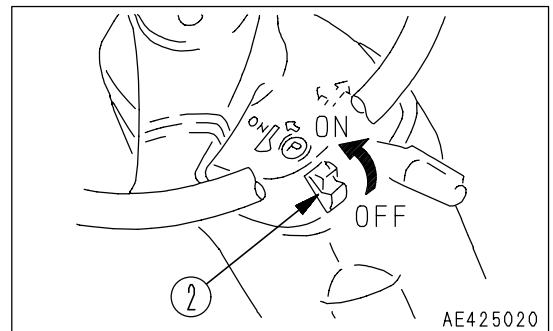
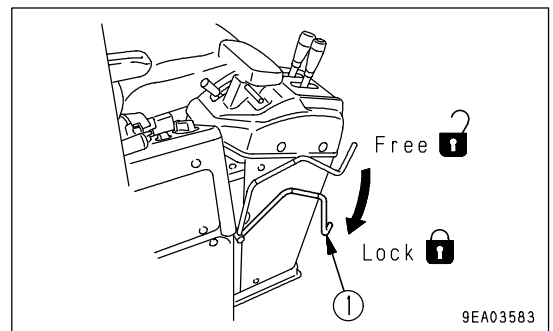
- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over.
- 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 roads, always fit tire chains.
- When traveling on snow-covered slopes, never apply the foot brake 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 bucket to the ground to stop the machine.

**PARKING MACHINE**

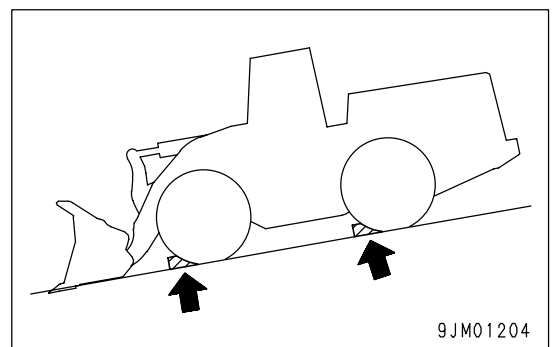
- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground.



- When leaving the machine, set work equipment lock lever (1) to the LOCK position and parking brake switch (2) to the ON position, 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, set blocks under the wheels to prevent the machine from moving.



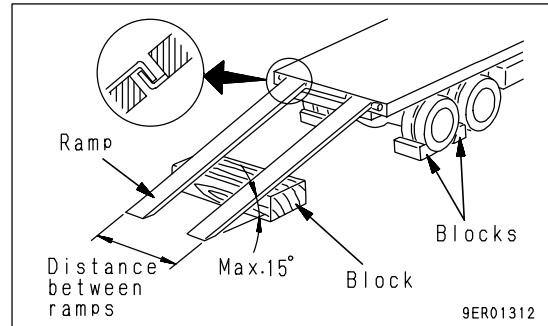
## TRANSPORTATION

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 the tire of the machine. On a rainy day, in particular, be extremely careful since the ramp surface is slippery.
- Run the engine at low speed and travel slowly.
- Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- 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 3-146)".



### SHIPPING

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

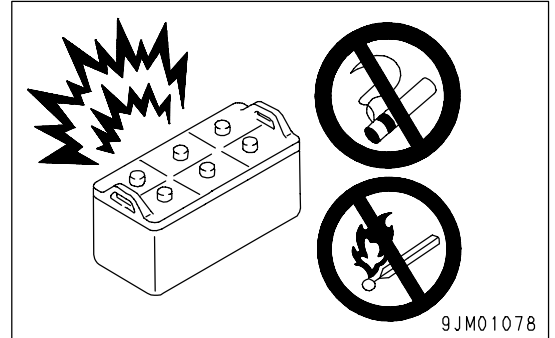
- The weight, transportation height, and overall length of the machine differ according to the work equipment, so be sure to confirm the dimensions.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- Lock the frame with the frame lock bar to prevent the machine from articulating.
- For details of the shipping procedure, see "TRANSPORTATION (PAGE 3-146)" in the OPERATION section.

## BATTERY

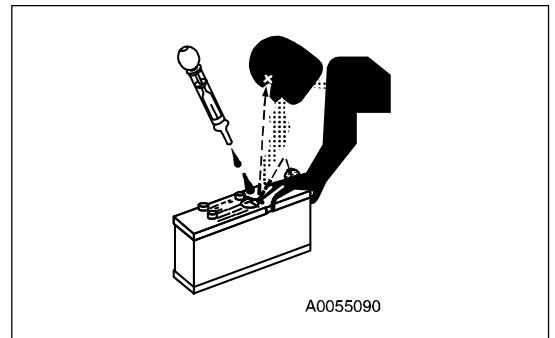
### BATTERY HAZARD PREVENTION

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.

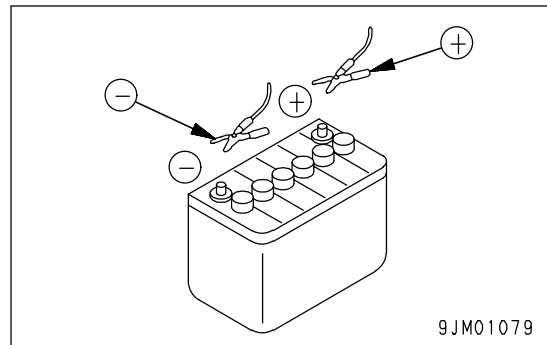
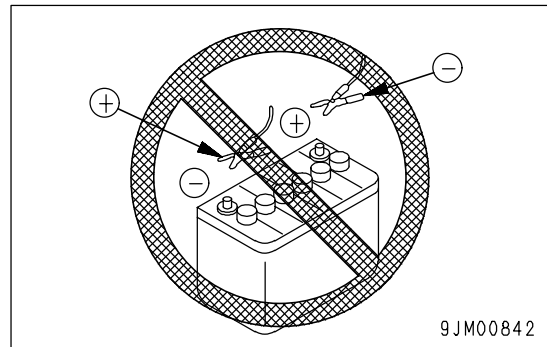
As there is a hazard that sparks will be generated, always do as follows.

- 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.
- Attach the battery terminal 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 CABLES**

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 goggles 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 3-163)" in the OPERATION section.



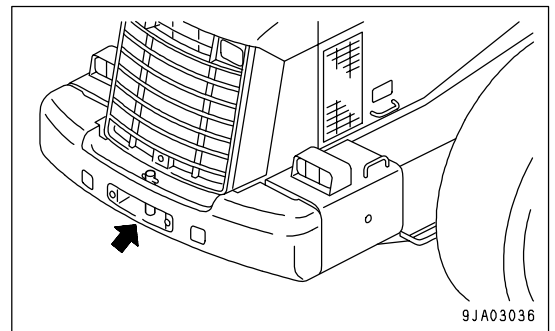
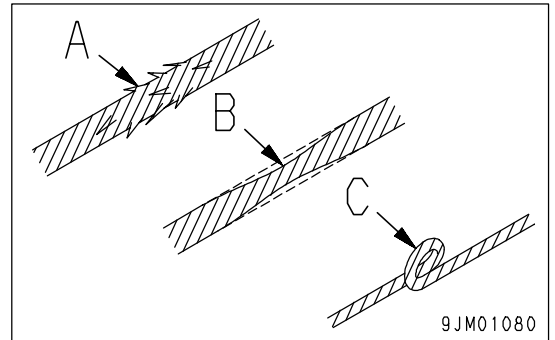
## TOWING

### WHEN TOWING

Serious injury or death could result if there is any mistake in the selection of wire rope or method of towing a disabled machine.

For towing, see "METHOD OF TOWING MACHINE (PAGE 3-157)".

- Always be sure to check carefully that the capacity of the wire rope used for towing is ample for the weight of the towed machine.
  - 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.
  - Always wear leather gloves when handling wire rope.
  - Never tow a machine on a slope.
  - During the towing operation, never stand between the towing machine and the machine being towed.
  - Move the machine slowly and be sure not to apply any sudden load on the wire rope.
- Connect a wire rope to the part indicated with the arrow in the diagram at right.

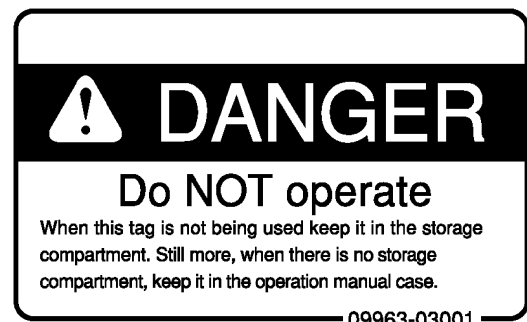
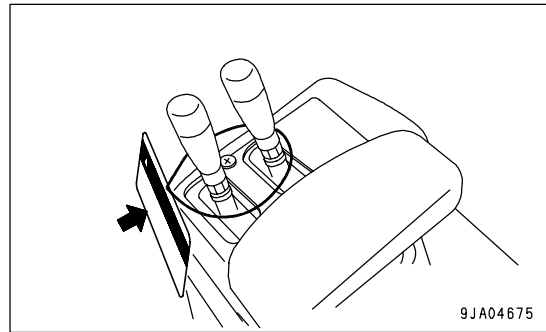




# PRECAUTIONS FOR MAINTENANCE

## 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.



## 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.

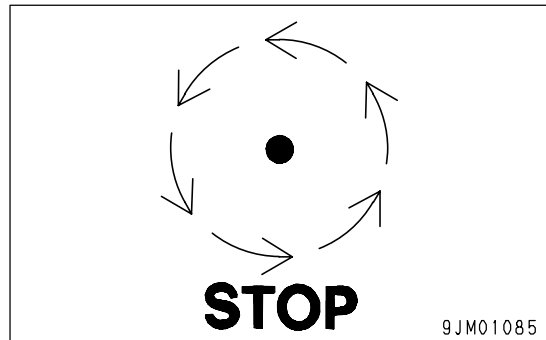
## APPOINT LEADER WHEN WORKING WITH OTHERS

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

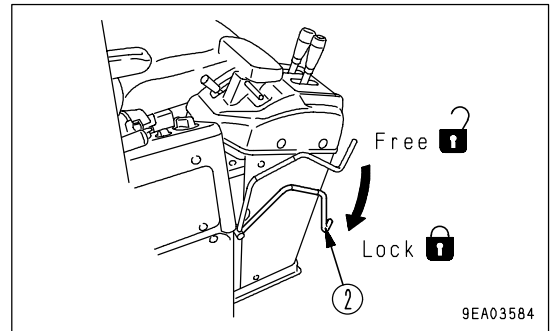
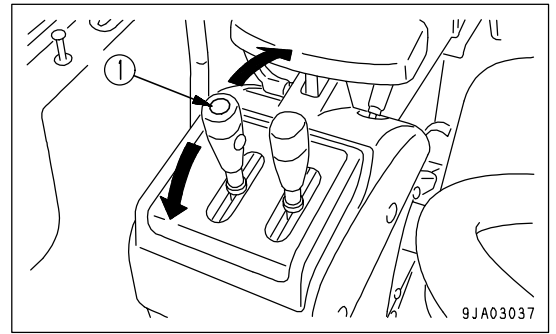
When working with others, misunderstandings between workers can lead to serious accidents.

## STOP ENGINE BEFORE CARRYING OUT MAINTENANCE

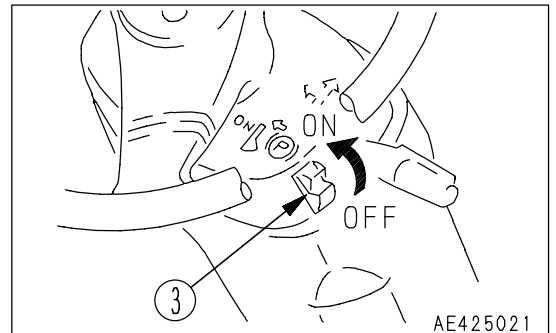
- Stop the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground and stop the engine.



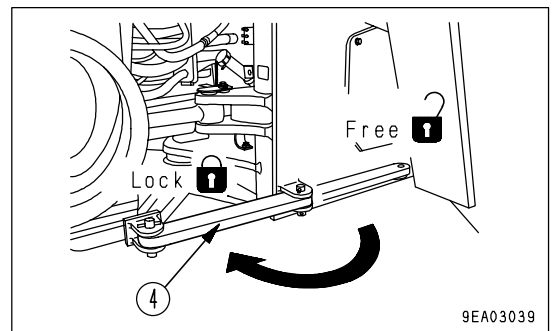
- After stopping the engine, operate work equipment control lever (1) 2 to 3 times fully to the RAISE and LOWER positions to release the pressure inside the hydraulic circuit, then set work equipment lock lever (2) to the LOCK position.



- Turn parking brake switch (3) to the ON position to apply the parking brake, then put blocks under the front and rear of the tires.



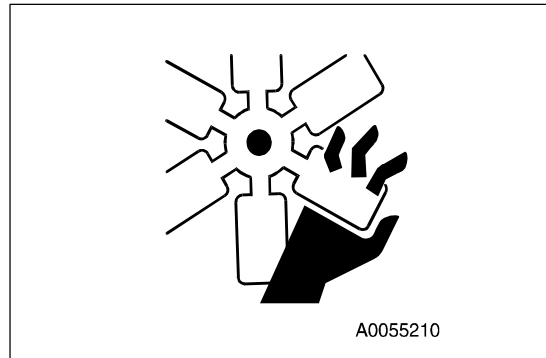
- Lock the front and rear frames with frame lock bar (4).



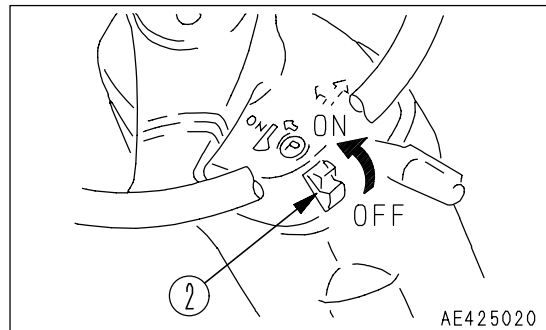
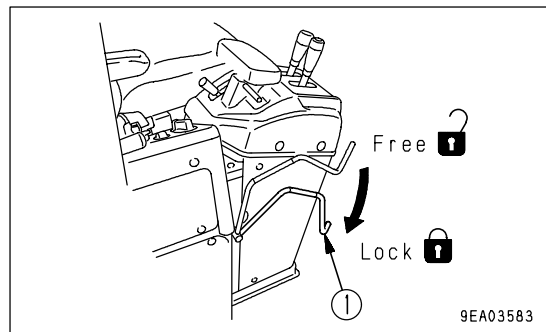
**TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING**

To prevent 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.
- 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.
- Never drop or insert tools or other objects into the fan or fan belt. Parts may break or be sent flying.



- Set work equipment lock lever (1) to the LOCK position to prevent the work equipment from moving. Turn parking brake switch (2) to the ON position to apply the parking brake.
- 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.

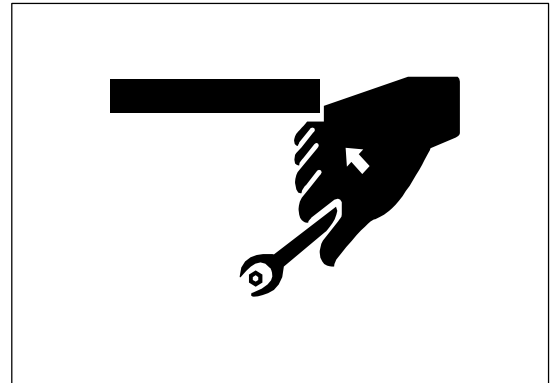


**INSPECTION AND MAINTENANCE AFTER TURNING E.C.S.S. SWITCH OFF**

For machines equipped with a E.C.S.S. lower the bucket to the ground, turn the E.C.S.S. switch OFF, and stop the engine before starting inspection or maintenance. NEVER turn the switch ON during inspection or maintenance.

**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.

**PERSONNEL**

Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.

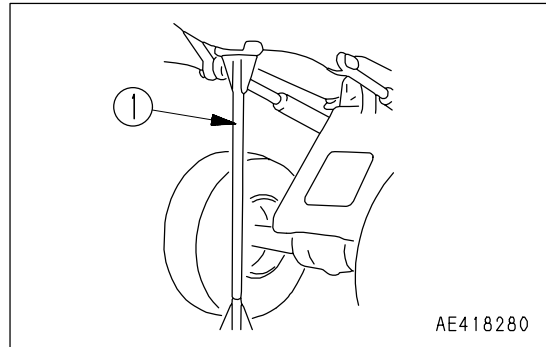
**ATTACHMENTS**

- 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**

When carrying out inspection and maintenance with the work equipment raised, use strong support (1) that can fully withstand the weight of the work equipment, and be sure to fix the stands in position securely.



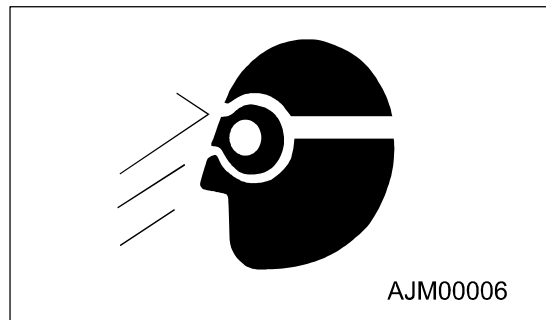
**NOISE**

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 injury. Always wear safety goggles 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.

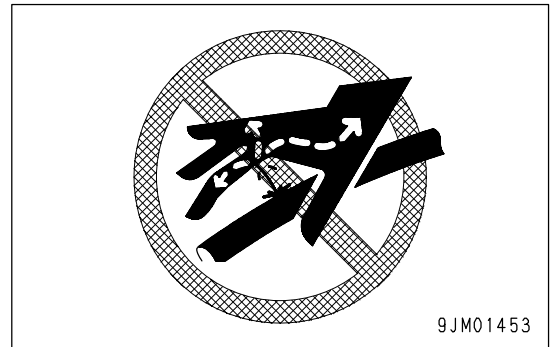
**PRECAUTIONS WITH HIGH-PRESSURE OIL**

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 injury, so always do as follows.

- When carrying out inspection and maintenance of the pressure, release the pressure before starting. For details, see "STOP ENGINE BEFORE CARRYING OUT MAINTENANCE (PAGE 2-32)". Do not carry out inspection or replacement work with the circuit under pressure.
- 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.
- The pressure in the E.C.S.S. circuit is stored by an accumulator. Do not remove the E.C.S.S. piping or components. If it is necessary to remove them, please ask your Komatsu distributor to carry out the removal operation.

**PRECAUTIONS FOR HIGH-PRESSURE FUEL**

High pressure is generated inside the engine fuel piping when the engine is running. When carrying out inspection or maintenance of the fuel piping system, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before starting inspection or maintenance.

**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 or property damage. 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.

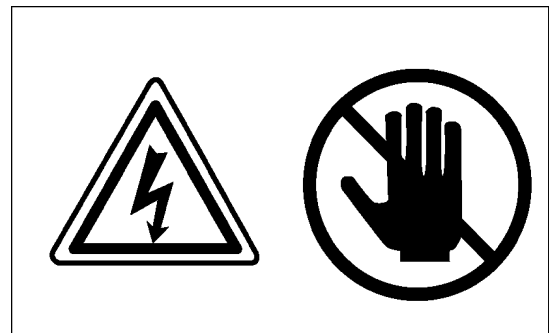
Replace the hose if any of the following problems are found.

- 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.

**PRECAUTIONS FOR HIGH VOLTAGE**

When the engine is running or immediately after it has stopped, high voltage is generated at the injector terminal and inside the engine controller, so there is danger of electrocution. Never touch the injector terminal or the inside of the engine controller.

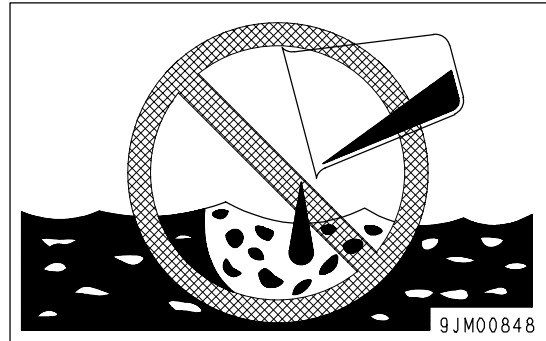
If it is necessary to touch the injector terminal or the inside of the engine controller, please contact your Komatsu distributor.



**WASTE MATERIALS**

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 OF 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 goggles, 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 4-13)".

- 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 time specified interval.

## PRECAUTIONS WITH TIRES

### HANDLING TIRES

If tires or rims are handled mistakenly, there is danger that the tire may explode or be damaged, or that the rim may fly off and cause serious injury or death.

To maintain safety, always do as follows.

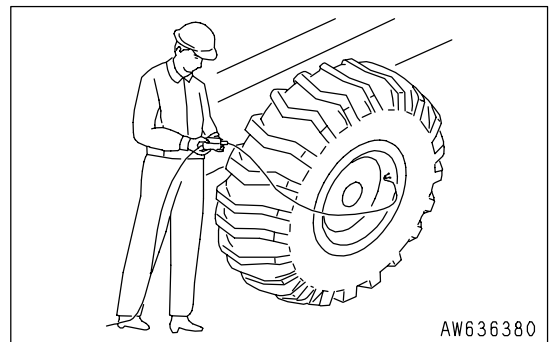
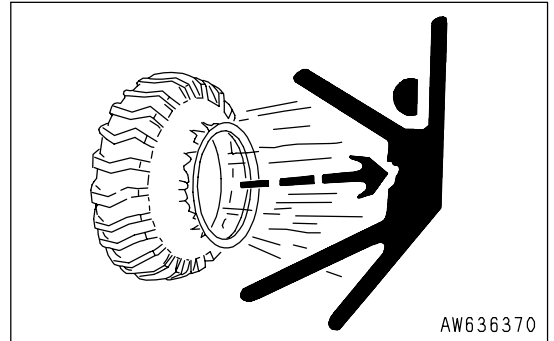
- Maintenance, disassembly, repair, and assembly of the tires and rims requires special equipment and special technology, so always ask your Komatsu distributor to carry out these operations.
- Always use the tires specified by Komatsu and maintain the specified inflation pressure.

Suitable tire inflation pressure: see "HANDLING THE TIRES (PAGE 3-144)"

- When pumping up the tires, check that no other person is standing near the tire, and install an air chuck with a clip that can be secured to the air valve.

To prevent the tire inflation pressure from becoming too high, measure the pressure from time to time with an air gauge while pumping up the tire.

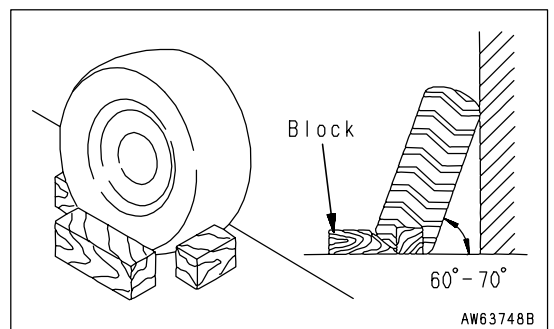
- If the tire pressure goes down abnormally or the rim parts do not fit the tire, there is a problem with the tire or rim parts. Always contact your Komatsu distributor for repairs.
- If the rim parts are not fitted properly when the tire is being pumped up, there is danger that the rim parts may fly off, so set up a protective fence around the tire, and do not stand directly in front of the rim. Stand beside the tread when pumping up the tire.
- Do not adjust the tire inflation pressure immediately after traveling at high speed or carrying out operations under heavy load.
- Never carry out welding or light a fire near the tire.



### PRECAUTIONS WHEN STORING TIRES

Tires for construction equipment are extremely heavy, so they may cause serious personal injury.

- As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter.  
If the tires must be stored outside, always erect a fence and put up "No Entry" signs.
- Stand the tire on level ground, and block it securely so that it cannot roll or fall over if any person should touch it.  
Do not lay the tire on its side. This will deform the tire and cause it to deteriorate.
- If the tire should fall over, do not attempt to stop it. Get out of the way quickly.





# OPERATION

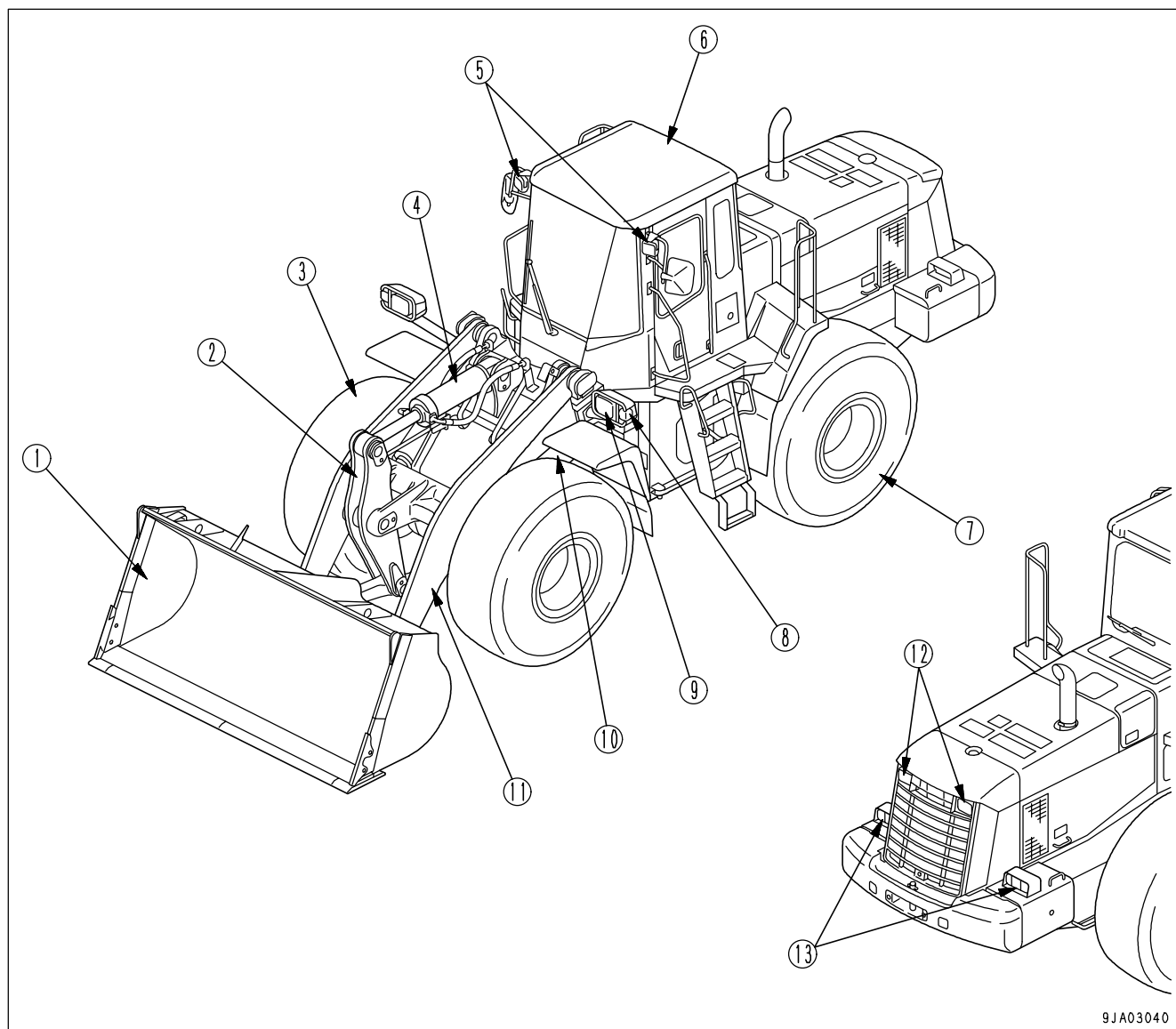
 **WARNING**

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

---

# GENERAL VIEW

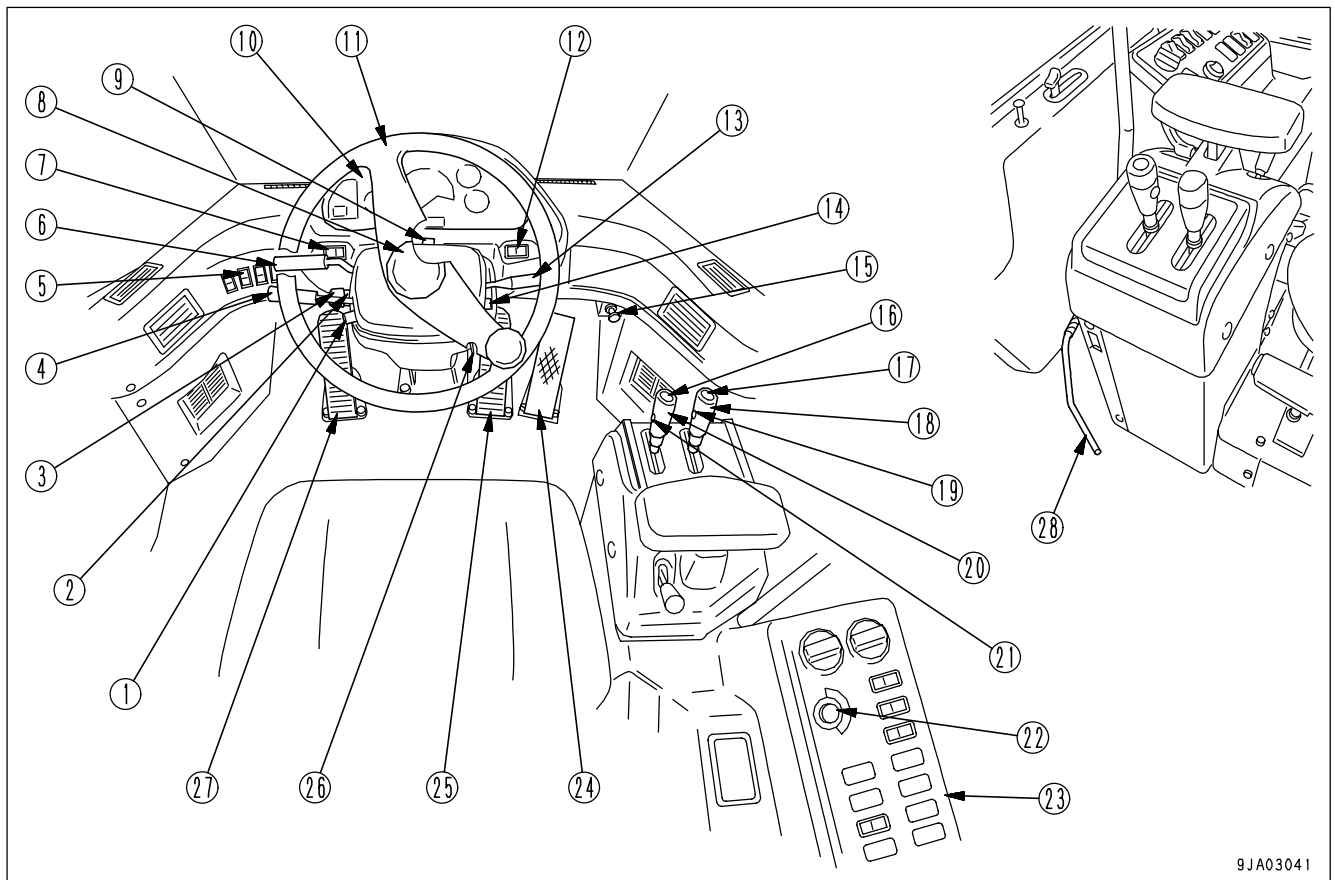
## GENERAL VIEW OF MACHINE



9JA03040

- |                        |                            |
|------------------------|----------------------------|
| (1) Bucket             | (8) Turn signal lamp       |
| (2) Tilt lever         | (9) Head lamp              |
| (3) Front wheel        | (10) Lift cylinder         |
| (4) Bucket cylinder    | (11) Lift arm              |
| (5) Front working lamp | (12) Rear working lamp     |
| (6) ROPS cab           | (13) Rear combination lamp |
| (7) Rear wheel         |                            |

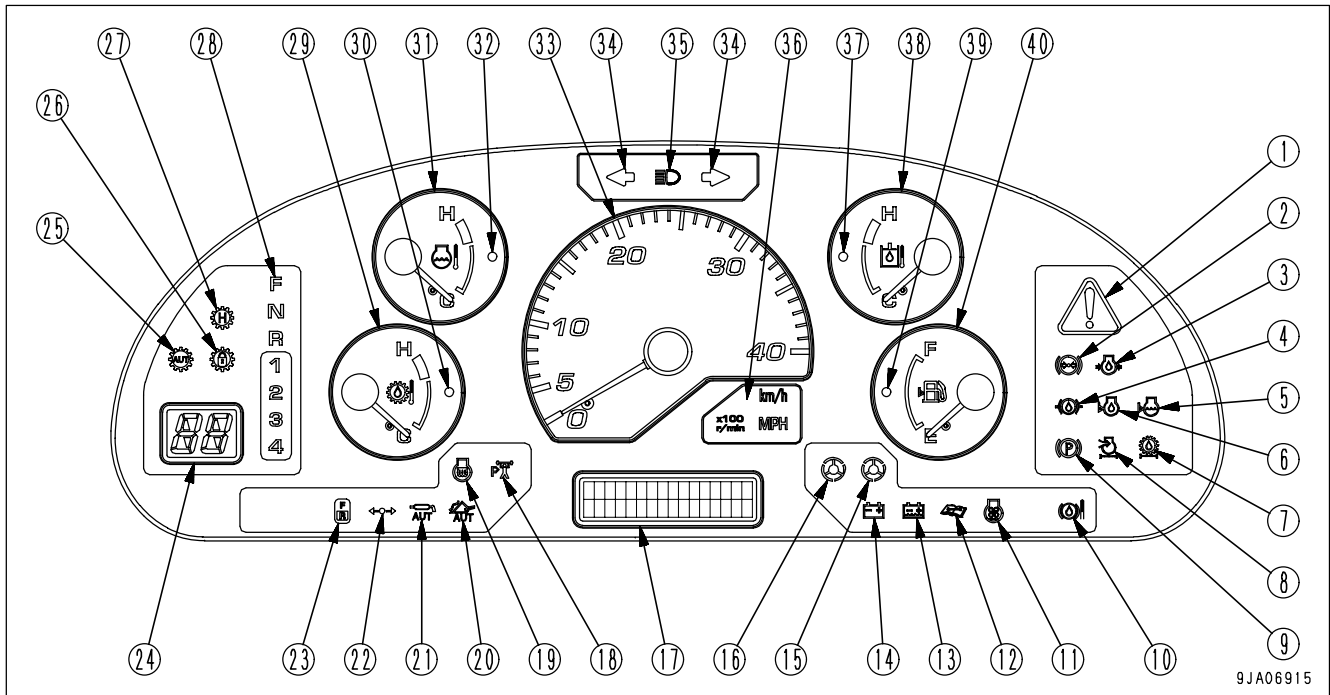
## GENERAL VIEW OF CONTROLS AND GAUGES



9JA03041

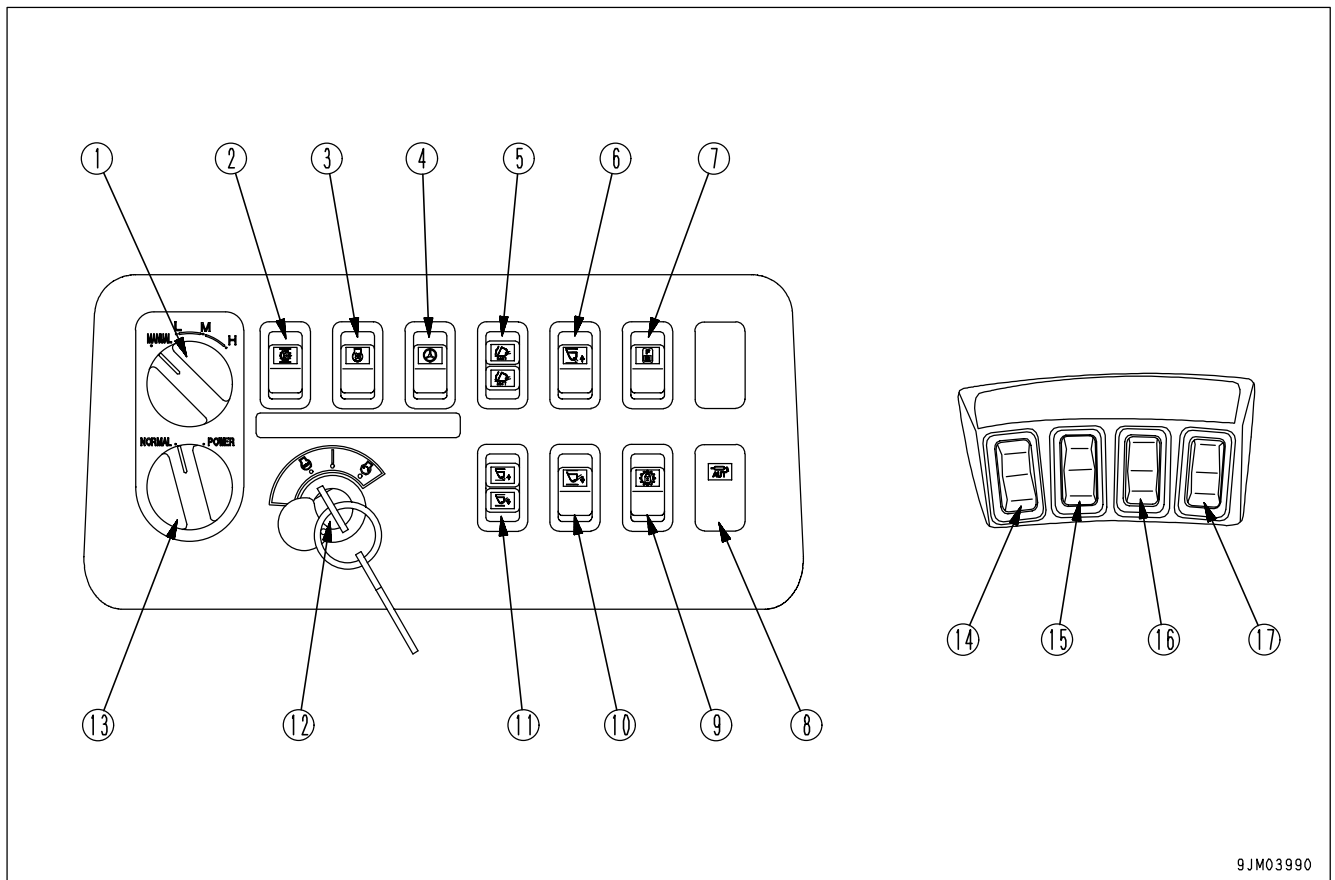
- |   |   |
|---|---|
| (1) Gearshift lever stopper   | (13) Dimmer switch                            |
| (2) Rear wiper switch   | (14) Parking brake switch                     |
| (3) Front wiper switch  | (15) Cigarette lighter                        |
| (4) Gearshift lever   | (16) Load meter cancel switch (if equipped)   |
| (5) Front switch panel  | (17) Kickdown switch                          |
| (6) Directional lever   | (18) Lift arm control lever                   |
| (7) E.C.S.S.<br>(electronic controlled suspension system)<br>switch (if equipped) | (19) Hold switch                              |
| (8) Horn button   | (20) Bucket control lever                     |
| (9) Hazard lamp switch  | (21) Load meter subtotal switch (if equipped) |
| (10) Machine monitor  | (22) Starting switch                          |
| (11) Steering wheel   | (23) Right switch panel                       |
| (12) Transmission cut-off switch  | (24) Accelerator pedal                        |
| (13) Lamp switch  | (25) Right brake pedal                        |
| (13) Turn signal lever  | (26) Steering tilt lock lever                 |
|   | (27) Left brake pedal                         |
|   | (28) Work equipment lock lever                |

MACHINE MONITOR



- |   |  |
|---|--|
| (1) Central warning lamp  | (21) Auto-greasing pilot lamp (if equipped)        |
| (2) Brake oil pressure caution lamp   | (22) Joystick pilot lamp (if equipped)             |
| (3) Engine oil pressure caution lamp  | (23) Directional selector pilot lamp (if equipped) |
| (4) Brake oil level caution lamp  | (24) Shift indicator                               |
| (5) Radiator coolant level caution lamp   | (25) Auto-shift pilot lamp                         |
| (6) Engine oil level caution lamp   | (26) Lockup pilot lamp (if equipped)               |
| (7) Transmission oil filter clogging caution lamp                                 | (27) Shift hold pilot lamp                         |
| (8) Air cleaner clogging caution lamp   | (28) Shift lever position pilot lamp               |
| (9) Parking brake pilot lamp  | (29) Torque converter oil temperature gauge        |
| (10) Axle oil temperature caution lamp  | (30) Torque converter oil temperature caution lamp |
| (11) Cooling fan reverse rotation pilot lamp                                      | (31) Engine coolant temperature gauge              |
| (12) Maintenance caution lamp   | (32) Engine coolant temperature caution lamp       |
| (13) Battery electrolyte level caution lamp (if equipped)                         | (33) Speedometer                                   |
| (14) Battery charge circuit caution lamp  | (34) Turn signal pilot lamp                        |
| (15) Steering oil pressure caution lamp   | (35) Head lamp high beam pilot lamp                |
| (16) Emergency steering pilot lamp<br>(Machines equipped with emergency steering) | (36) Meter display pilot lamp                      |
| (17) Character display portion  | (37) Hydraulic oil temperature caution lamp        |
| (18) Output mode pilot lamp (power mode)  | (38) Hydraulic temperature gauge                   |
| (19) Preheating pilot lamp  | (39) Fuel level caution lamp                       |
| (20) Semi auto digging pilot lamp (if equipped)                                   | (40) Fuel gauge                                    |

## SWITCH PANEL

**RIGHT SWITCH PANEL**

- (1) Transmission shift mode selector switch
- (2) Transmission cut-off set switch
- (3) Cooling fan reverse rotation switch
- (4) Emergency steering switch  
(mhines equipped with emergency steering)
- (5) Semi auto digging switch (if equipped)
- (6) Remote positioner raise mode switch (if equipped)
- (7) Directional selector actuation switch (if equipped)
- (8) Auto-greasing switch (if equipped)
- (9) Torque converter lock-up switch (if equipped)
- (10) Remote positioner lower mode switch  
(if equipped)
- (11) Remote positioner raise/lower set switch  
(if equipped)
- (12) Starting switch
- (13) Power mode selector switch

**FRONT SWITCH PANEL**

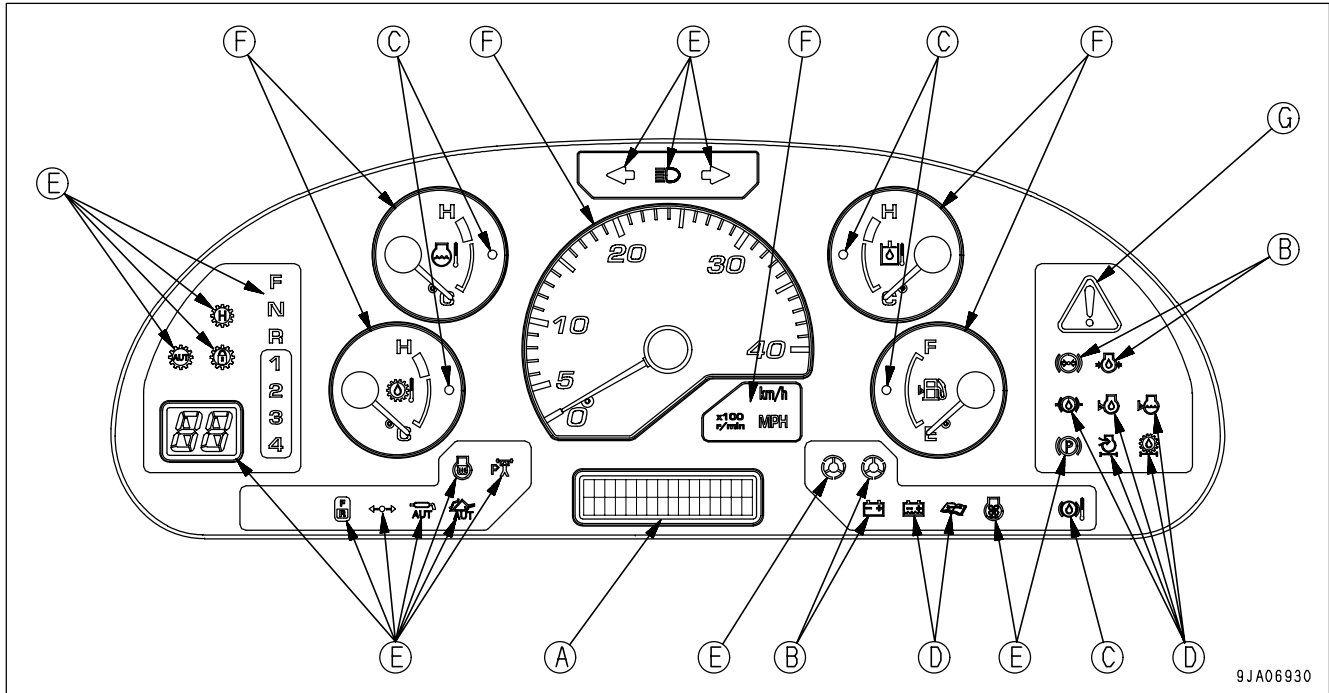
- (14) Monitor panel mode selector switch 1
- (15) Monitor panel mode selector switch 2
- (16) Front working lamp switch
- (17) Rear working lamp switch

# 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.

## MACHINE MONITOR



- |                                      |                           |
|--------------------------------------|---------------------------|
| (A) Character display portion        | (E) Pilot display portion |
| (B) Emergency stop items             | (F) Meter display portion |
| (C) Caution items                    | (G) Central warning lamp  |
| (D) Inspection and maintenance items |                           |

### NOTICE

When turning the starting switch to the ON position before starting the engine, the central warning lamp, caution lamps, and pilot lamps light up for 2 seconds to check the system.

- After the alarm buzzer sounds for 2 seconds, it goes off if the condition is normal.
- The shift indicator display shows "88" for 2 seconds.
- The indicator gauges and meters are actuated after the above system check is completed.
- The character display shows "KOMATSU SYSTEM CHECK" for 3 seconds.
- If the lamps do not light up, there is probably a failure or disconnection, so contact your Komatsu distributor for inspection.

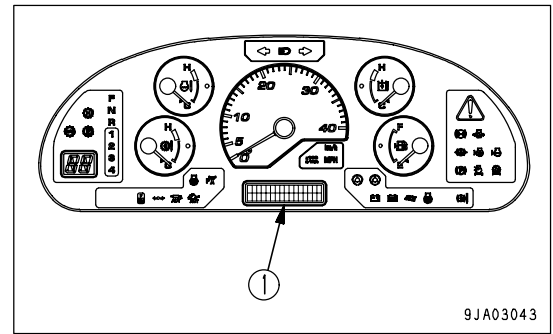
## TYPES OF WARNING

If an abnormality occurs on the machine, or if any switch or lever is operated accidentally, the monitor display and buzzer give a warning to inform the operator.

Following are the types of warning depending on the level of danger.

### REMARK

For details of action codes "E03" to "E00", see "ACTION CODE DISPLAY (PAGE 3-9)".



## EMERGENCY STOP

This warning is given if there is a serious failure that affects the normal operation of the machine or if the setting is incorrect.

The central warning lamp on the monitor and the caution lamp for the location of the abnormality light up. At the same time, the alarm buzzer sounds and action code "E03" is displayed on character display (1).

## CAUTION

This warning is given if the coolant or lubricating oil overheat.

The central warning lamp on the monitor and the individual caution lamps light up. At the same time, the alarm buzzer sounds and action code "E02" is displayed on character display (1).

## MISTAKEN OPERATION

This warning is given if any switch or lever is operated mistakenly.

The central warning lamp on the monitor lights up and the alarm buzzer sounds at the same time.

In addition, in the following case, action code "E00" is displayed on character display (1).

- When the machine has exceeded the travel speed limit.
- When the work equipment lock lever is at the LOCK position and the EPC control lever is at any position other than neutral. (Machines equipped with EPC)

## INSPECTION AND MAINTENANCE

This warning is given if it is necessary to inspect and maintain wear parts, or if it is necessary to check the oil or coolant level.

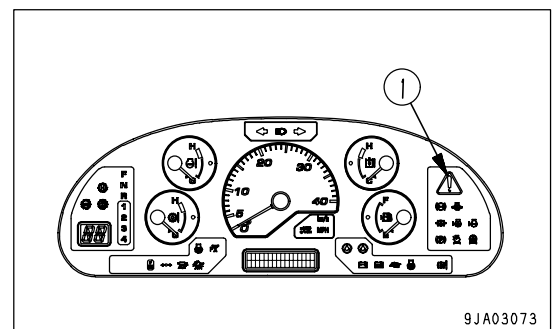
The individual caution lamp on the monitor lights up. At the same time, action code "E01" is displayed on character display (1).

With this warning, the central warning lamp does not light up and the alarm buzzer does not sound.

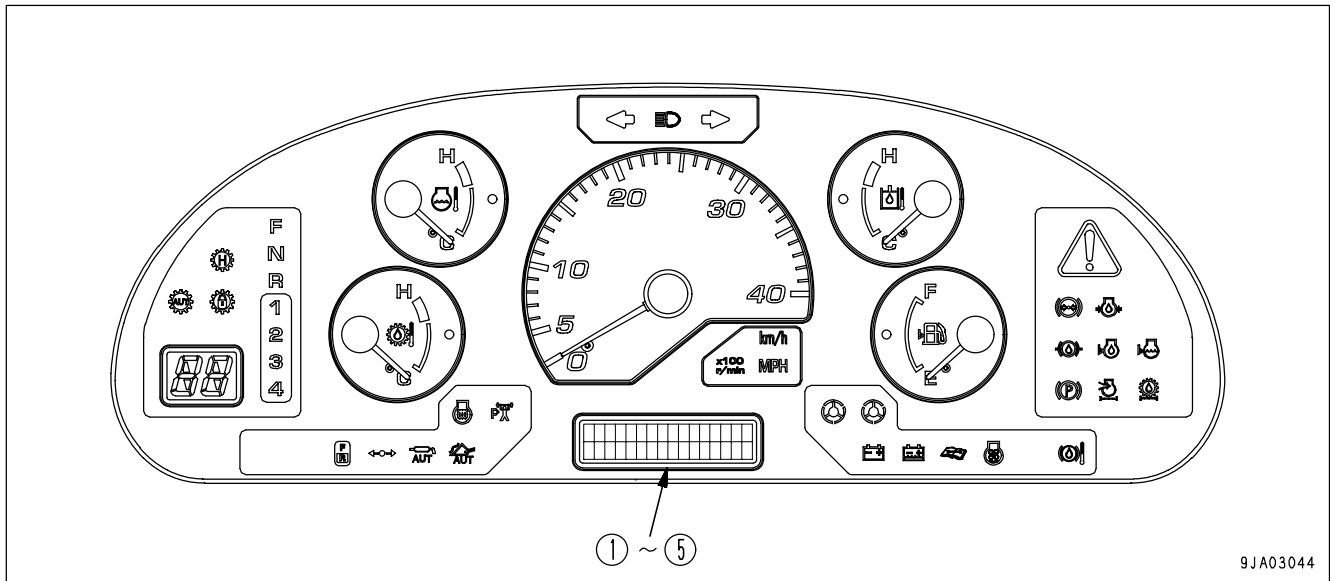
## CENTRAL WARNING LAMP

This display (1) lights up if any emergency stop item, caution item, or mistaken operation of any switch or lever occurs. At the same time the alarm buzzer sounds.

Check the display content and perform the specified action for that item.



CHARACTER DISPLAY PORTION



9JA03044

- (1) Service meter
- (2) Clock (Machines equipped with load meter)
- (3) Action code display
- (4) Failure code display
- (5) Filter, oil replacement time display

Normally, the service meter is displayed on the character display.

If the machine has failed, if there has been an excessive load on the machine, or if inspection and maintenance are necessary, an action code is displayed to recommend suitable action.

When the time for replacing the filter or changing the oil is reached, the filter or oil to be replaced is displayed.

NOTICE

Information regarding the failure of the machine or maintenance is displayed on the character display when the starting switch is at the ON position. Check the display to confirm that there is no abnormality before starting to travel.

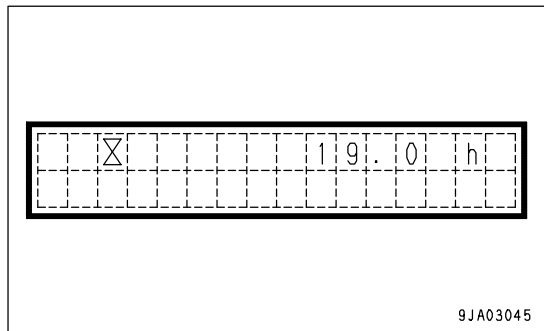
SERVICE METER

This meter (1) shows the total time that the machine has been operating.

The service meter advances while the engine is running, if the machine is moving or not.

The meter advances by 1 for every hour of operation, regardless of the engine speed.

Even if the starting switch is at the OFF position, the service meter will display as long as the top part (◇) of monitor panel mode selector switch 1 is being pressed.



9JA03045

NOTICE

When the starting switch is at the OFF position, if the service meter is displayed even though the top (◇) of monitor panel mode selector switch 1 is not being pressed, there is probably a failure in the machine, so please contact your Komatsu distributor for inspection.



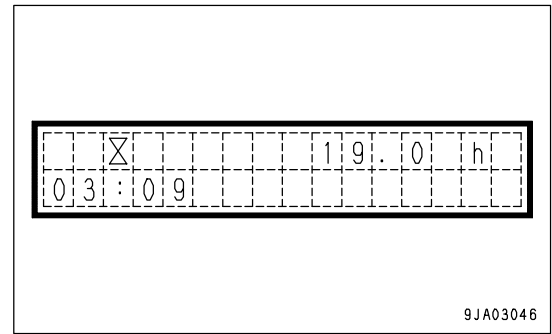
**CLOCK**

(Machines equipped with load meter)

This display (2) shows the time.

For details of the method of adjusting the time, see Section "METHOD OF SETTING TIME ON CLOCK (PAGE 6-23)".

Even when the starting switch is OFF, the time can be displayed by pressing the top (◇) of monitor panel mode selector switch 1.



9JA03046

**ACTION CODE DISPLAY**



If action code E03 is displayed, stop the machine immediately and check the failure code. For details, see "FAILURE CODE DISPLAY (PAGE 3-11)".

Inform your Komatsu distributor of the failure code and ask for repairs.

If there is a failure on the machine, or it is necessary to change the method of operation, or if inspection or maintenance must be carried out, action code E00, E01, E02, or E03 is displayed on the character display in display portion (3).

If different failures occur at the same time, the action code for the more serious problem is displayed.

The level of seriousness is as follows, starting with the most serious: E03, E02, E01, E00.

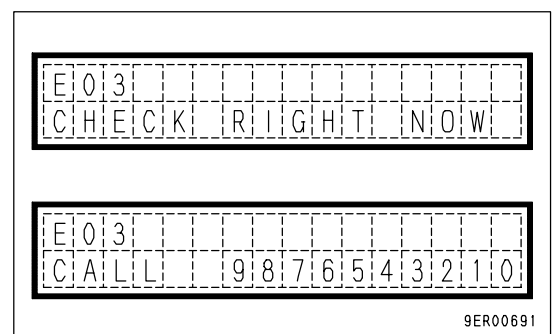
In the case of action codes E00, E02, and E03, the alarm buzzer sounds intermittently and the central warning lamp lights up.

If action codes E00, E01, E02, or E03 are displayed on the character display, stop operations, check the content of the display, and take the following action.

E03: When this code is displayed, stop the machine immediately, check the failure code, and contact your Komatsu distributor for repairs.

**REMARK**

- "E03" is displayed on the top line of the character display and "CHECK RIGHT NOW" and "CALL" are displayed in turn on the bottom line for 3 seconds each.
- The telephone number is displayed to the right of "CALL". If no telephone number has been set, the display is blank. For details of the method of inputting the telephone number, see Section "INPUT METHOD FOR TELEPHONE NUMBER (PAGE 3-33)".



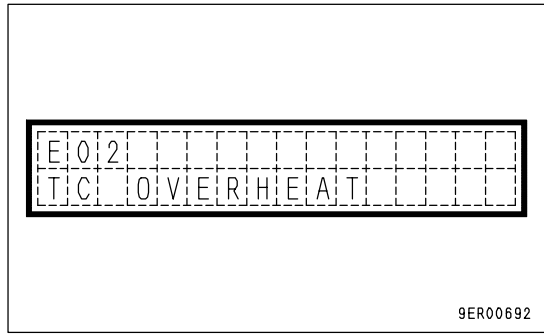
9ER00691

E02: If this code is displayed, stop the machine and run the engine under no load at a mid-range speed.

If an action code is still displayed after taking the necessary action, check the failure code and contact your Komatsu distributor for repairs.

**REMARK**

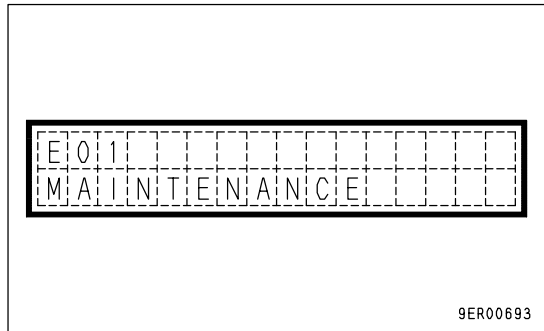
The top line of the character display displays "E02" and the bottom line displays the condition of the machine related to overheating.



E01: When a failure occurs in the mechanical system, such as a drop in the level of the engine coolant, the maintenance location is displayed. If the maintenance caution lamp lights up at the same time, inspect and perform maintenance of the item indicated after completion of the day's work or when changing shifts. If "MAINTENANCE" is displayed together with E01, check the failure code and ask for repairs to be carried out.

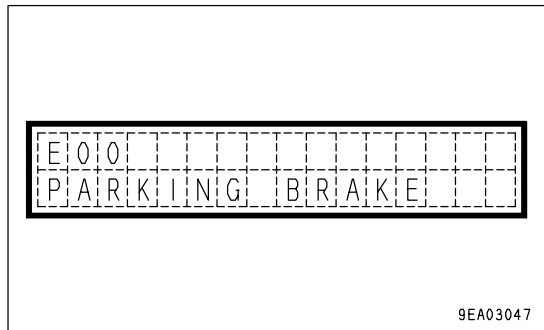
**REMARK**

"E01" is displayed on the top line of the character display and "MAINTENANCE" or the part of the machine requiring inspection, filling of fluid, or replacement is displayed on the bottom line.



E00: If an overrun related item is displayed, continue operations at reduced engine speed and travel speed.

If an item related to the work equipment control lever is displayed, return the lever to the HOLD position. (Machines equipped with EPC)



**FAILURE CODE DISPLAY**

If an action code is displayed on the character display, check the failure code according to the failure code display method given below.

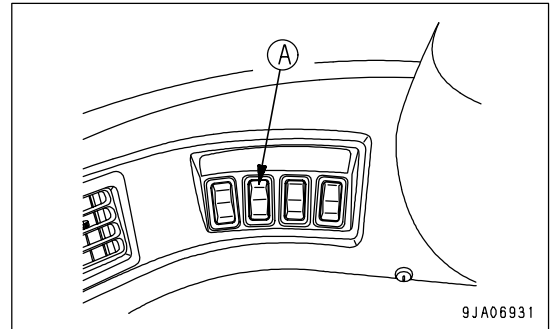
When contacting your Komatsu distributor to request repairs, inform your distributor of the failure code.

**Method of displaying failure code**

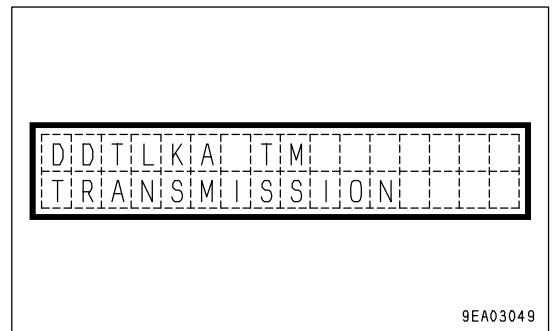
1. If an action code is displayed on the character display of display portion (4), press the top (>) of monitor panel mode selector switch 2 (A).

The action code will change to the failure code.

- The failure code is displayed with the first 6 digits on the left of the top line of the character display.
- The code displayed after the space on the right side of the failure code indicates the controller that detected the failure code.
- The component causing the failure is displayed on the bottom line of the character display.



Top right code	Controller detecting failure code
MON	Machine monitor
TM	Transmission controller
ENG	Engine controller
WRK	Work equipment controller (if equipped)



2. Press the top (>) of monitor panel mode selector switch 2 (A) again.

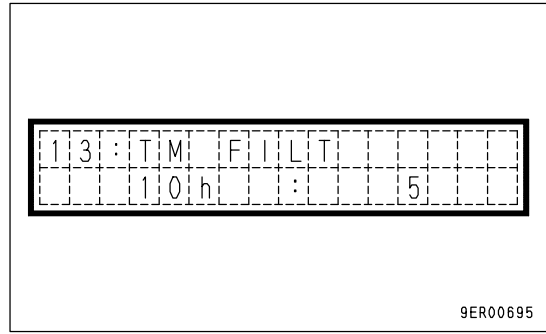
If the condition is normal, the service meter is displayed for several seconds, then the display returns to the action code.

If more than one failure has occurred at the same time, the next failure code is displayed.

**FILTER, OIL REPLACEMENT TIME DISPLAY**

After completion of the system check and when the starting switch is in the ON position, if any filter or oil item is approaching the replacement time, this display (5) shows the item for approx. 30 seconds. When this happens, the maintenance caution lamp also flashes or lights up.

After replacing the filter or changing the oil, reset the time for replacement. For details, see "RESET METHOD FOR FILTER, OIL REPLACEMENT TIME (PAGE 3-32)".



9ER00695

**REMARK**

- The top line of the character display shows the ID No. and item name for the item needing replacement; the bottom line shows the time remaining until replacement and the total number of times the replacement has been carried out.
- If the replacement time has already passed, a minus (-) sign appears before the time.
- After the display has been given for 30 seconds, it does not appear again until the starting switch is turned to the ON position.
- The message in the illustration above is not shown on the character display if an action code is being displayed.
- If there are two or more items to be displayed, the display changes repeatedly every three seconds. If there are more than 10 items, all the items are displayed once each, then the display returns to the normal display.
- The display appears when there is 30 hours remaining until the filter or oil replacement time. If the replacement time has passed, a minus (-) sign appears before the time for the first 30 hours. When more than 30 hours have passed, the display is no longer given.
- The maintenance caution lamp flashes as the replacement time approaches, and after the replacement time has passed, it lights up.

Items for display of filter, oil replacement time

Item	Replacement interval (H)	Character display	ID number
Engine oil	500	ENG OIL	01
Engine oil filter	500	ENG FILT	02
Fuel filter	500	FUEL FILT	03
Corrosion resistor	1000	CORR RES	06
Transmission oil	1000	TM OIL	12
Transmission oil filter	1000	TM FILT	13
Hydraulic filter	2000	HYD FILT	04
Hydraulic tank breather element	2000	HYD BREATH	05
Hydraulic oil	2000	HYD OIL	10
Axle oil	2000	AXLE OIL	15

**REMARK**

See the section below for details of the procedure for replacing the filter and oil.

- Engine oil  
"CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE (PAGE 4-53)"
- Engine oil filter  
"CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE (PAGE 4-53)"
- Fuel filter  
" (PAGE 888-888)"
- Corrosion resistor  
"REPLACE CORROSION RESISTOR CARTRIDGE (PAGE 4-58)"
- Transmission oil  
"CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER (PAGE 4-56)"
- Transmission oil filter  
"CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER (PAGE 4-56)"
- Hydraulic filter  
"CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT (PAGE 4-61)"
- Hydraulic tank breather element  
"REPLACE HYDRAULIC TANK BREATHER ELEMENT (PAGE 4-63)"
- Hydraulic oil  
"CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT (PAGE 4-61)"
- Axle oil  
"CHANGE AXLE OIL (PAGE 4-64)"

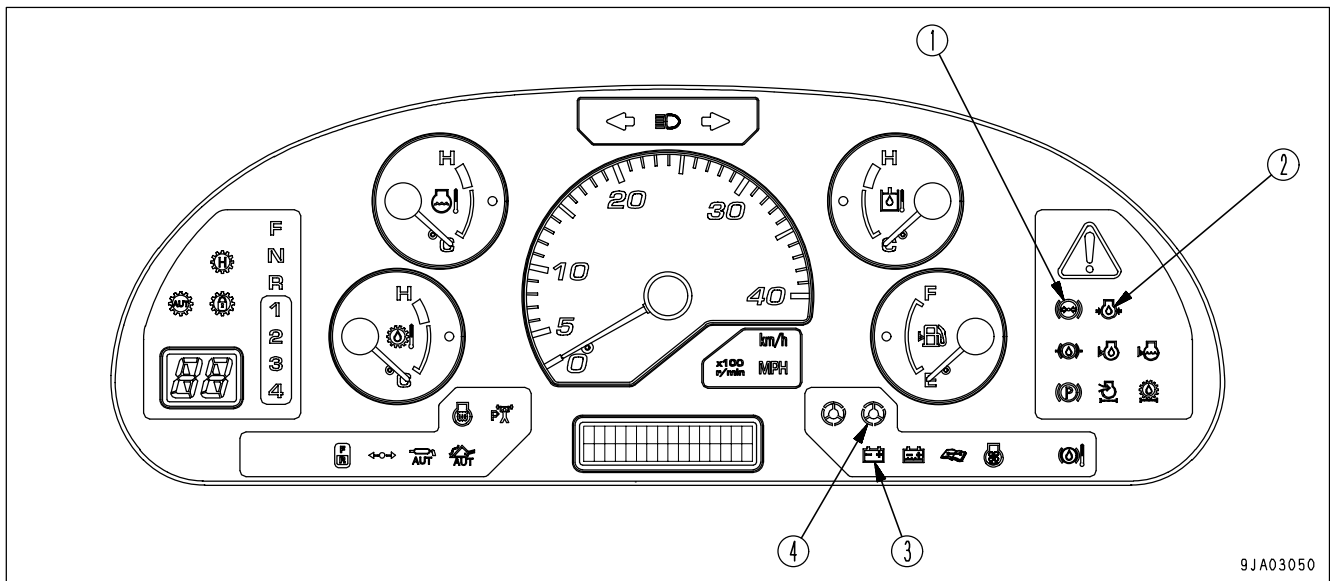
EMERGENCY STOP ITEMS



If these lamps light up and the buzzer sounds, stop operations immediately and carry out inspection and maintenance of the applicable location.

If any abnormality is found in the emergency stop items, the alarm buzzer will sound intermittently, and the lamp for the location of the abnormality and the central warning lamp will light up.

At the same time, the top line of the character display displays "E03" and the bottom line displays "CHECK RIGHT NOW" and "CALL" alternately for 3 seconds each, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.

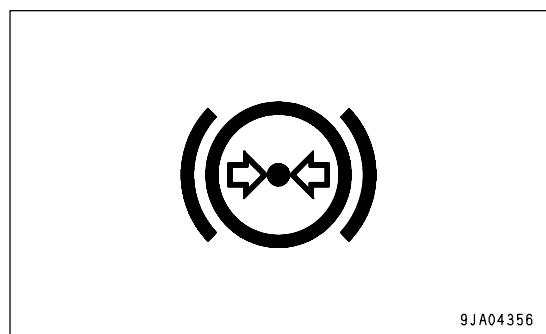


- (1) Brake oil pressure caution lamp
- (2) Engine oil pressure caution lamp
- (3) Battery charge circuit caution lamp
- (4) Steering oil pressure caution lamp

**BRAKE OIL PRESSURE CAUTION LAMP**

This lamp (1) lights up when the brake oil pressure goes below the specified value.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), the brake circuit is not actuated while the engine is stopped, so the brake oil pressure caution lamp and central warning lamp do not light up and the alarm buzzer does not sound.



During operation (engine running)

If the brake oil pressure goes down during operation, the brake oil pressure caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

At the same time, the top line of the character display displays "E03" and the bottom line displays "CHECK RIGHT NOW" and "CALL" alternately for 3 seconds each, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.

If the brake oil pressure caution lamp lights up, the footbrake may not work. Keep the parking brake applied to prevent the machine from moving.

In addition, when the accumulator is being charged immediately after starting the engine, the brake oil pressure caution lamp will light up, but the central warning lamp remains OFF and the alarm buzzer does not sound.

Keep the parking brake applied to prevent the machine from moving until the brake pressure becomes normal and the brake oil pressure caution lamp goes out.

### ENGINE OIL PRESSURE CAUTION LAMP

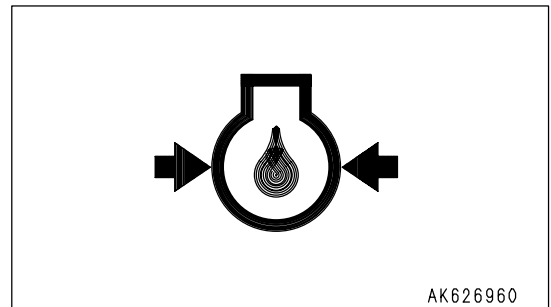
This lamp (2) lights up to warn the operator that the engine lubricating oil pressure has dropped.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If the engine lubricating oil pressure goes down during operation, the engine lubricating oil pressure caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

At the same time, the top line of the character display displays "E03" and the bottom line displays "CHECK RIGHT NOW" and "CALL" alternately for 3 seconds each, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.



### BATTERY CHARGE CIRCUIT CAUTION LAMP

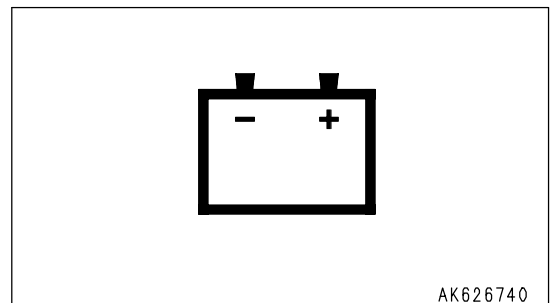
This lamp (3) lights up when the engine is running to warn the operator that an abnormality has occurred in the charging circuit.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If an abnormality occurs in the charging circuit during operation, the battery charge circuit caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

At the same time, the top line of the character display displays "E03" and the bottom line displays "CHECK RIGHT NOW" and "CALL" alternately for 3 seconds each, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.



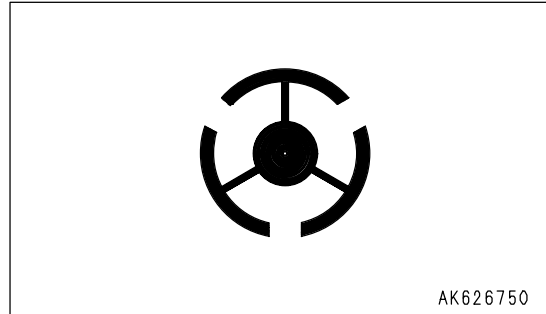
### STEERING OIL PRESSURE CAUTION LAMP

(Red)

This lamp (4) lights up to warn the operator that the steering oil pressure has dropped.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

However, it lights up during the self-check of the emergency steering.



During operation (engine running)

If the steering oil pressure goes down during operation, the steering oil pressure caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

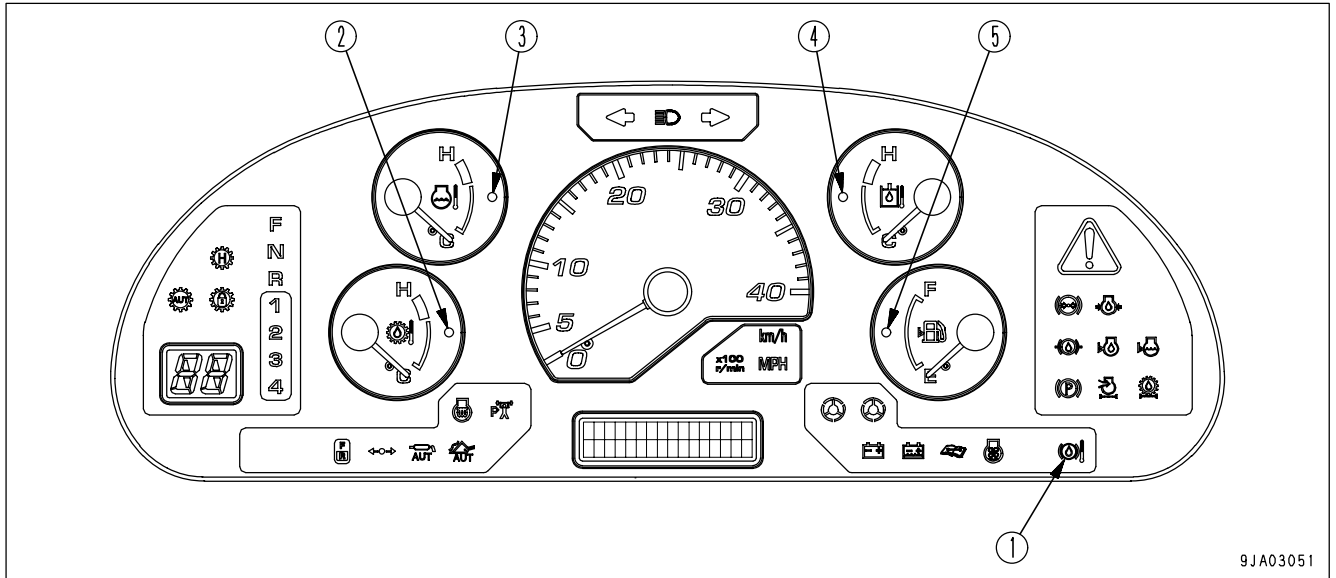
At the same time, the top line of the character display displays "E03" and the bottom line displays "CHECK RIGHT NOW" and "CALL" alternately for 3 seconds each, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.



CAUTION ITEMS

**! CAUTION**

If these lamps light up, stop operations quickly and carry out the following action.



- (1) Axle oil temperature caution lamp
- (2) Torque converter oil temperature caution lamp
- (3) Engine coolant temperature caution lamp
- (4) Hydraulic oil temperature caution lamp
- (5) Fuel level caution lamp

**AXLE OIL TEMPERATURE CAUTION LAMP**

This lamp (1) lights up to warn the operator that the brake oil temperature has risen.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

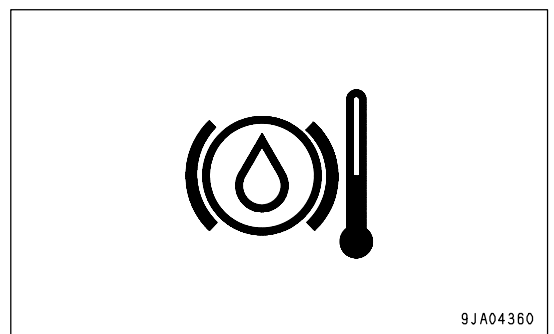
During operation (engine running)

In continuous heavy-duty operations or when traveling long distances downhill where the brake is used frequently, the axle oil temperature becomes high. The axle oil temperature caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

At the same time, the top line of the character display displays "E02" and the bottom line displays "BRAKE OVERHEAT", so take the following action.

1. Release the accelerator pedal and move the gearshift lever down one range to reduce the travel speed.
2. Avoid using the brake.
  - 1) Do not keep the brake pedal depressed continuously; use the brake only intermittently.
  - 2) When using the left brake pedal, turn the transmission cut-off switch ON to carry out operations.

If use of the brake is reduced for a short time in the way recommended above, the axle oil temperature will go down and the caution lamp will go out.



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**TORQUE CONVERTER OIL TEMPERATURE CAUTION LAMP**

This lamp (2) lights up to warn the operator that the torque converter oil temperature has risen.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

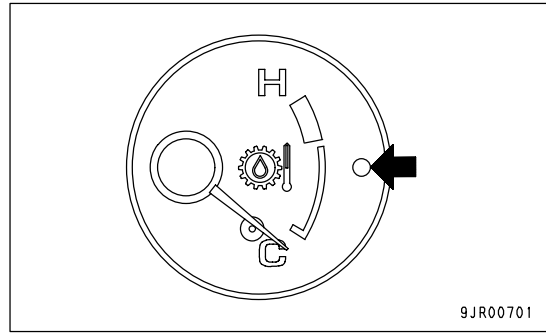
During operation (engine running)

If the torque converter oil temperature rises, the torque converter oil temperature caution lamp only will light up.

If the oil temperature rises further, the central warning lamp will light up and the alarm buzzer will sound intermittently.

At the same time, "E02" is displayed on the top line of the character display and "TC OVERHEAT" is displayed on the bottom line.

Stop the machine and run the engine under no load at a mid-range speed until the lamp goes out.



**ENGINE COOLANT TEMPERATURE CAUTION LAMP**

This lamp (3) warns the operator that the engine coolant temperature has risen.

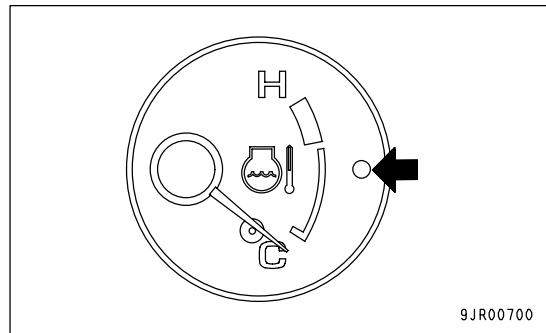
During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If the engine coolant temperature rises, only the engine coolant water temperature caution lamp will light up.

If the coolant temperature rises further, the central warning lamp will light up and the alarm buzzer will sound intermittently.

At the same time as the central warning lamp lights up, the top line of the character display displays "E02" and the bottom line displays "BRAKE OVERHEAT", so stop the machine and run the engine under no load at a mid-range speed until the lamp goes out.



**HYDRAULIC OIL TEMPERATURE CAUTION LAMP**

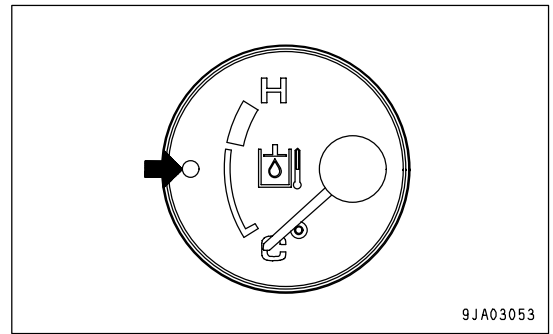
This lamp (4) lights up to warn the operator that the hydraulic oil temperature has risen.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If the hydraulic oil temperature rises, the hydraulic oil temperature caution lamp, the central warning lamp will light up, and the alarm buzzer will sound intermittently.

At the same time, "E02" is displayed on the top line of the character display and "HYD OVERHEAT" is displayed on the bottom line. Stop the machine and run the engine under no load at a mid-range speed until the lamp goes out.

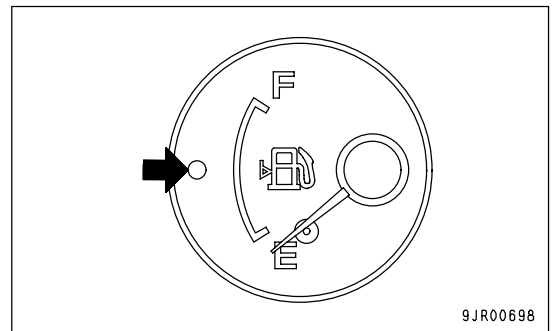
**FUEL LEVEL CAUTION LAMP**

This lamp (5) lights up if the amount of fuel remaining in the fuel tank goes below 36 liters (9.51 US gal).

If it lights up, check and add fuel and as soon as possible.

**REMARK**

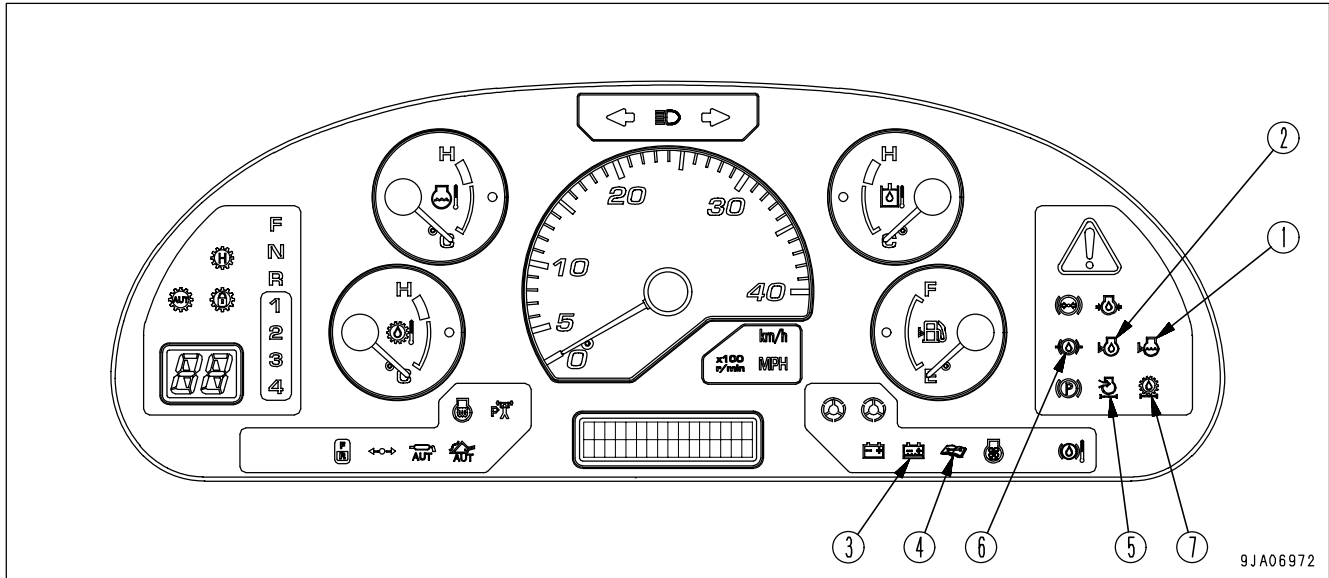
Even if the caution lamp lights up, action code "E02" is not displayed on the character display.



INSPECTION AND MAINTENANCE ITEMS

**CAUTION**

If these lamps light up, stop operations quickly and carry out the following action.



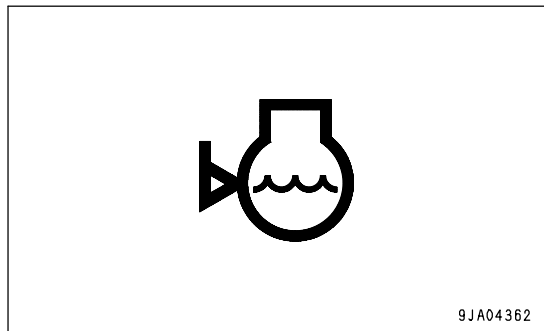
- (1) Radiator coolant level caution lamp
- (2) Engine oil level caution lamp
- (3) Battery electrolyte level caution lamp (if equipped)
- (4) Maintenance caution lamp
- (5) Air cleaner clogging caution lamp
- (6) Brake oil level caution lamp
- (7) Transmission oil filter clogging caution lamp

**RADIATOR COOLANT LEVEL CAUTION LAMP**

This lamp (1) lights up to warn the operator that the coolant level in the radiator has gone down.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor lights up if the coolant level in the radiator is low.

At the same time, the top line of the character display displays "E01" and the bottom line displays "COOLANT LOW", so check the water level in the radiator and add water.



During operation (engine running)

If the coolant level in the radiator becomes too low, the radiator coolant level caution lamp will light up.

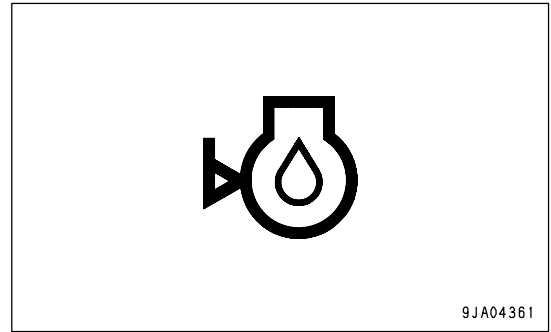
At the same time, the top line of the character display displays "E01" and the bottom line displays "COOLANT LOW", so stop the engine, check the water level in the radiator, and add water.

**ENGINE OIL LEVEL CAUTION LAMP**

This lamp (2) lights up to warn the operator that the oil level in the engine oil pan has gone down.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor lights up if the oil level in the engine oil pan is low.

At the same time, the top line of the character display displays "E01" and the bottom line displays "COOLANT LOW", so do not start the engine. Check the oil level in the engine oil pan and add oil.

**REMARK**

During checks before starting, if the engine is started with the engine oil level caution lamp lighted up, the lamp will stay lighted up.

Stop the engine, check the oil level in the engine oil pan, and add oil.

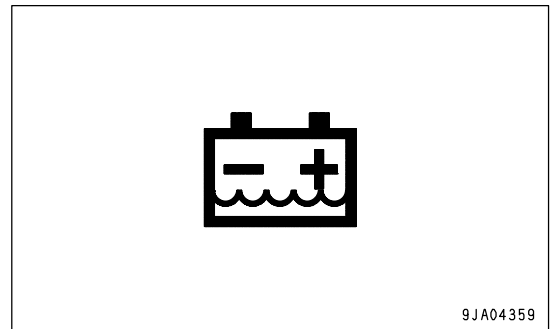
**BATTERY ELECTROLYTE LEVEL CAUTION LAMP**

(If equipped)

This lamp (3) lights up to warn the operator that the battery electrolyte level has gone down.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor lights up if the battery electrolyte level is low.

At the same time, "E01" is displayed on the top line of the character display and "BATTERY LEV LOW" is displayed on the bottom line, so check the electrolyte level and add distilled water.



During operation (engine running)

If the battery electrolyte level becomes too low, the battery electrolyte level caution lamp will light up.

At the same time, "E01" is displayed on the top line of the character display and "BATTERY LEV LOW" is displayed on the bottom line, so check the electrolyte level and add distilled water.

**MAINTENANCE CAUTION LAMP**

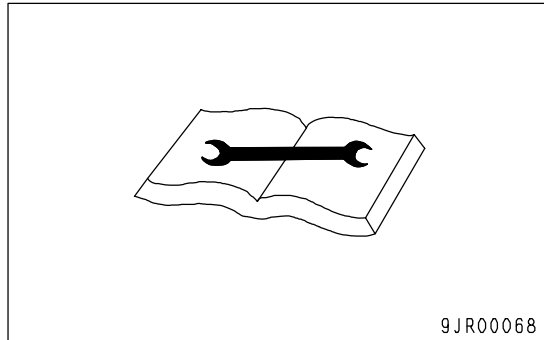
 **CAUTION**

If the caution lamp lights up, repair the problem as soon as possible. If this is left as it is, it will lead to failure.

When the time for oil change is reached, this lamp (4) flashes or lights up for approx. 30 seconds after completion of the system check when the starting switch is at the ON position.

**REMARK**

The maintenance caution lamp flashes when there are less than 30 hours to the replacement time, and after the replacement time has passed, it stays on.



For details of the items covered by filter and oil replacement, see "FILTER, OIL REPLACEMENT TIME DISPLAY (PAGE 3-12)".

After replacing the filter or changing the oil, reset time for the replacement. For details, see "RESET METHOD FOR FILTER, OIL REPLACEMENT TIME (PAGE 3-32)".

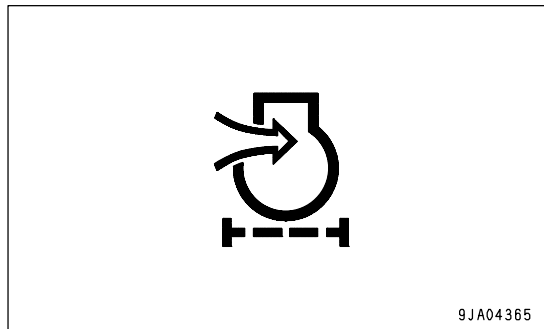
**AIR CLEANER CLOGGING CAUTION LAMP**

This lamp (5) lights up if the air cleaner element becomes clogged when the engine is running.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

The lamp lights up if the air cleaner element becomes clogged. At the same time, the top line of the character display displays "E01" and the bottom line displays "AIR FILTER", so stop the engine and clean or replace the element.



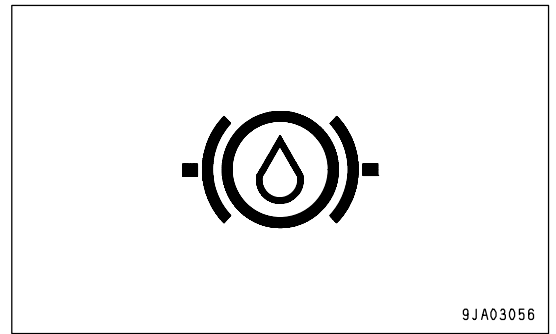
**REMARK**

It is possible to check the condition of clogging of the air cleaner with the dust indicator installed at the side of the air cleaner.

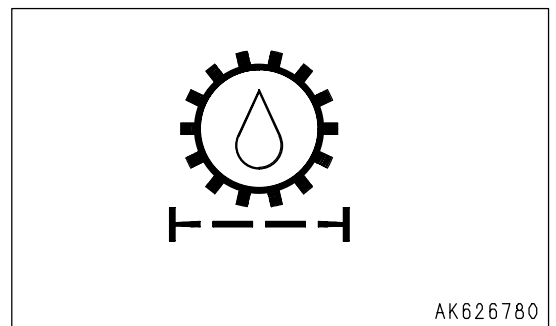
**BRAKE OIL LEVEL CAUTION LAMP**

This lamp (6) is not used.

On this machine, the hydraulic oil is used for the brake oil.

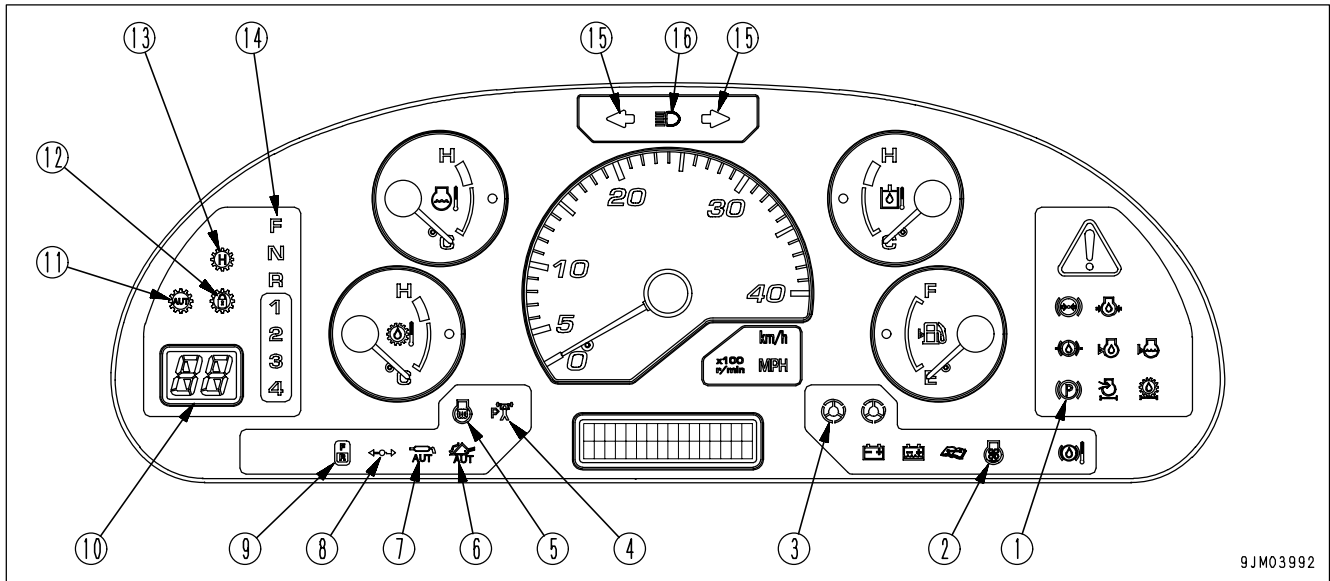
**TRANSMISSION OIL FILTER CLOGGING CAUTION LAMP**

This lamp (7) is not used.



**PILOT DISPLAY PORTION**

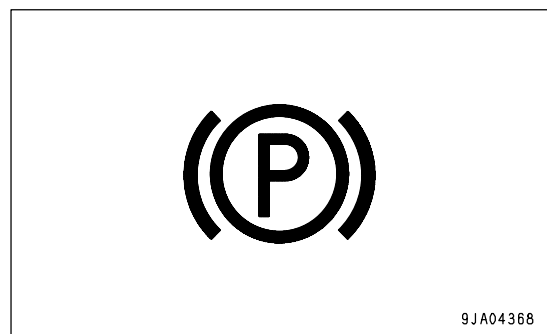
When the starting switch is ON, the pilot display lights up when the display items are functioning.



- |  |   |
|--|---|
| (1) Parking brake pilot lamp   | (9) Directional selector pilot lamp (if equipped) |
| (2) Cooling fan reverse rotation pilot lamp                                      | (10) Shift indicator                              |
| (3) Emergency steering pilot lamp<br>(Machines equipped with emergency steering) | (11) Auto-shift pilot lamp                        |
| (4) Output mode pilot lamp (power mode)  | (12) Lockup pilot lamp (if equipped)              |
| (5) Preheating pilot lamp  | (13) Shift hold pilot lamp                        |
| (6) Semi auto digging pilot lamp (if equipped)                                   | (14) Shift lever position pilot lamp              |
| (7) Auto-greasing pilot lamp (if equipped)                                       | (15) Turn signal pilot lamp                       |
| (8) Joystick pilot lamp (if equipped)  | (16) Head lamp high beam pilot lamp               |

**PARKING BRAKE PILOT LAMP**

This lamp (1) lights up when the parking brake is applied.





**COOLING FAN REVERSE ROTATION PILOT LAMP**

This lamp (2) lights up when the direction of rotation of the cooling fan is reversed.

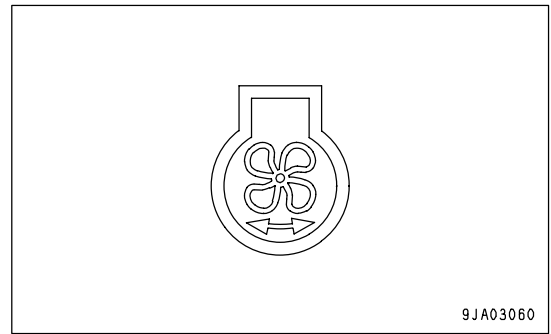
At the same time, "COOLING FAN REVERSE" is displayed on the character display.

**REMARK**

When the engine is running, even if the cooling fan reverse switch is operated, the fan does not rotate in reverse.

In this case, the position of the switch and the actual direction of rotation of the fan are different, so the cooling fan reverse rotation pilot lamp flashes.

Return the switch to its original position or stop the engine and operate the switch.

**EMERGENCY STEERING PILOT LAMP**

(Green)

(Machines equipped with Emergency steering)

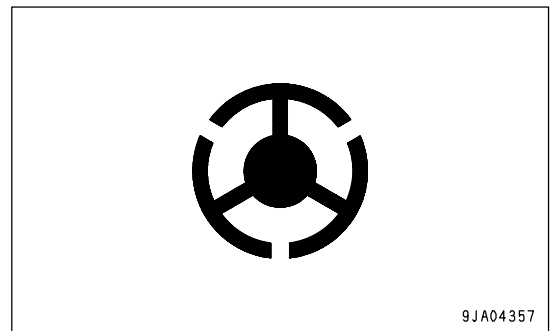
This lamp (3) lights up when the emergency steering is being actuated.

If the engine stops when the machine is traveling or an abnormality occurs in the steering oil pressure circuit, and the machine is traveling at a speed of more than 2 km/h (1.2 MPH), the emergency steering is automatically actuated and the lamp lights up.

If the lamp lights up, move the machine immediately to a safe place, stop the engine, and check the condition.

In addition, the lamp flashes if the emergency steering is actuated continuously for one minute.

At the same time, "E02 EMR S/T OVERRUN" is displayed on the character display, so move the machine immediately to a safe place, stop the engine, and check the condition.

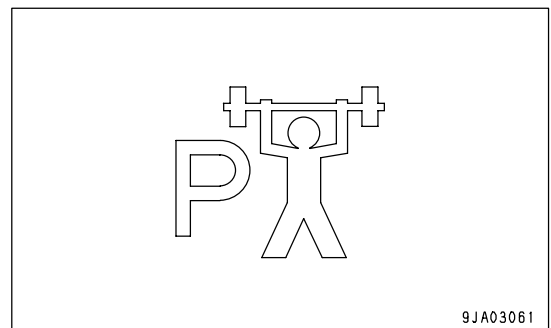


There is an emergency steering self-check function. For details, see "EMERGENCY STEERING SELF-CHECK FUNCTION (PAGE 3-127)" in the OPERATION section.

**OUTPUT MODE PILOT LAMP (POWER MODE)**

This lamp (4) lights up when the power mode is selected.

Use the power mode selector switch to select the output mode.

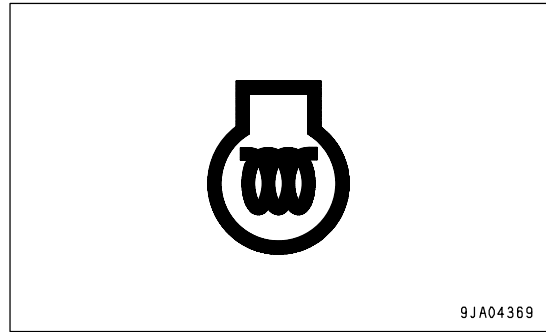


**PREHEATING PILOT LAMP**

This lamp (5) lights up when the engine preheating electric heater is actuated.

In cold weather, when the starting switch is turned to the ON position, this lamp lights up. When the preheating is completed, it goes out.

The preheating time differs according to the engine coolant temperature.

**SEMI AUTO DIGGING PILOT LAMP**

(If equipped)

For details, see "HANDLING EPC WORK EQUIPMENT LEVER (PAGE 6-46)" in the ATTACHMENTS, OPTIONS section.

**AUTO-GREASING PILOT LAMP**

(If equipped)

For details, see "HANDLING AUTO-GREASING SYSTEM (PAGE 6-31)" in the ATTACHMENTS, OPTIONS section.

**JOYSTICK PILOT LAMP**

(If equipped)

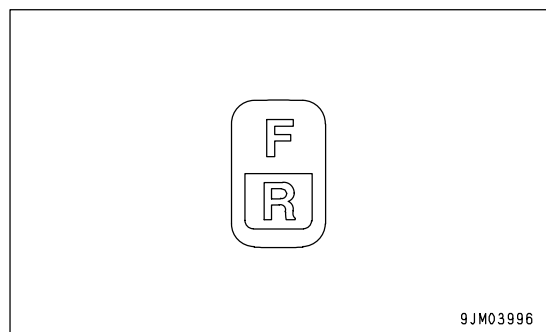
For details, see "HANDLING JOYSTICK STEERING SYSTEM (PAGE 6-38)".

**DIRECTIONAL SELECTOR PILOT LAMP**

(If equipped)

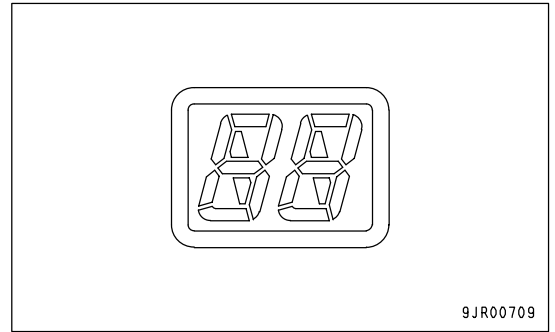
This lamp (9) lights up when the directional selector switch actuation switch on the right switch panel is turned ON. It shows that it is possible to switch the direction of travel between FORWARD and REVERSE with the directional switch at the side of the lift arm control lever.

For details, see Section "CHANGING DIRECTION (PAGE 3-119)".

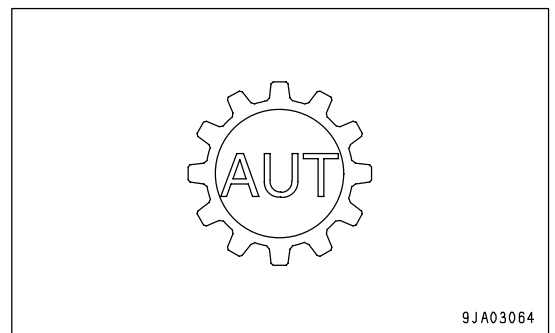


**SHIFT INDICATOR**

This indicator (10) indicates the transmission gear range (actual travel speed range).

**AUTO-SHIFT PILOT LAMP**

This lamp (11) lights up when the auto-shift function is selected. Use the transmission shift mode selector switch to select the shift mode.

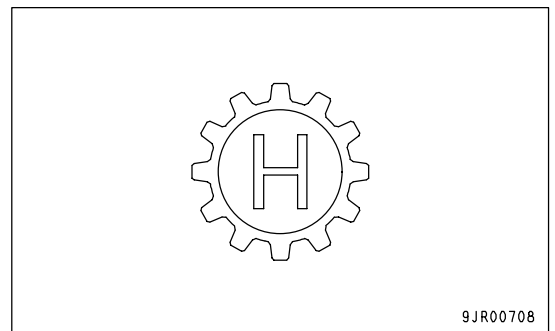
**LOCKUP PILOT LAMP**

(If equipped)

For details, see "HANDLING TORQUE CONVERTER LOCK-UP (PAGE 6-28)" in the ATTACHMENTS, OPTIONS section.

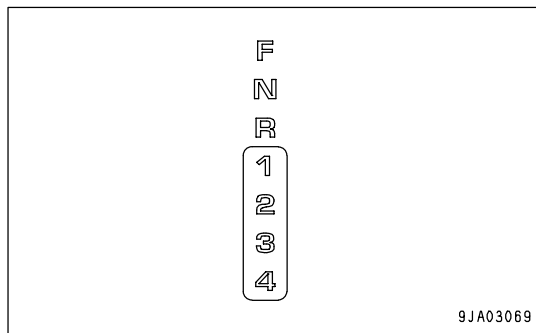
**SHIFT HOLD PILOT LAMP**

This lamp (13) lights up when the shift hold is actuated.



**SHIFT LEVER POSITION PILOT LAMP**

This lamp (14) displays the transmission position of the gearshift lever.

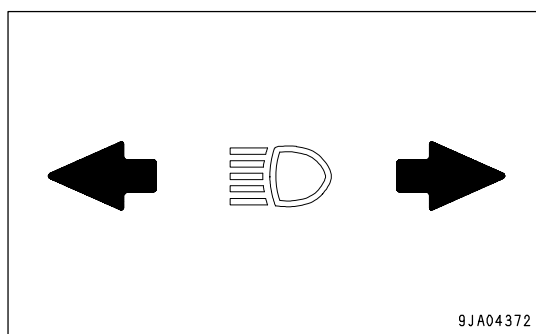


**TURN SIGNAL PILOT LAMP**

This lamp (15) flashes at the same time as the turn signal lamp flashes.

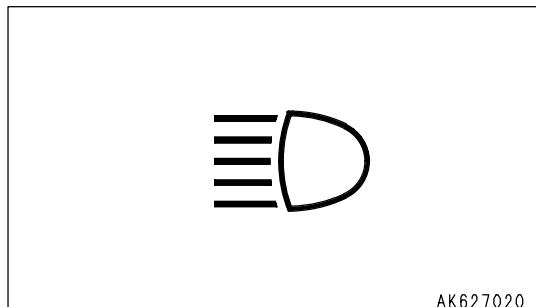
**REMARK**

If there is a disconnection in the turn signal lamp, the flashing interval becomes shorter.

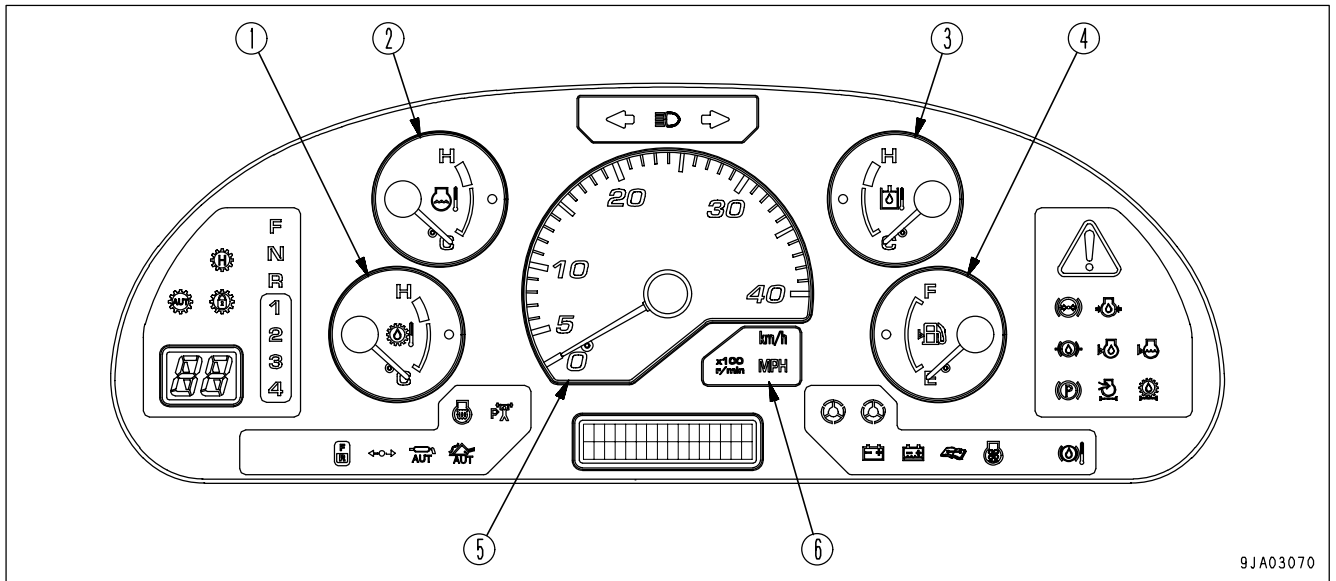


**HEAD LAMP HIGH BEAM PILOT LAMP**

This lamp (16) lights up when the head lamps are set to high beam.



METER DISPLAY PORTION



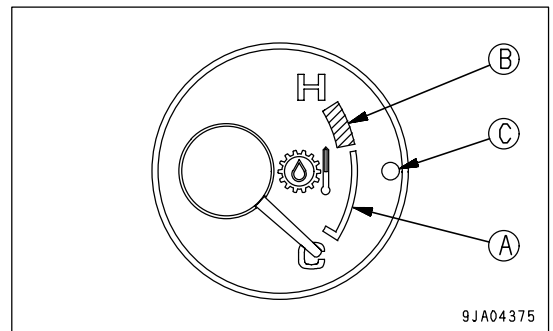
- (1) Torque converter oil temperature gauge
- (2) Engine coolant temperature gauge
- (3) Hydraulic temperature gauge
- (4) Fuel gauge
- (5) Speedometer
- (6) Meter display pilot lamp

TORQUE CONVERTER OIL TEMPERATURE GAUGE

This meter (1) indicates the torque converter oil temperature. It should be in white range (A) during operations.

If it enters red range (B) during operations, caution lamp (C) inside the torque converter oil temperature gauge will light up. At the same time, the central warning lamp lights up and the alarm buzzer sounds intermittently. In addition, "E02" is displayed on the top line of the character display and "TC OVERHEAT" is displayed on the bottom line.

Run the engine under no load at a mid-range speed and wait until the indicator goes down to white range (A).



ENGINE COOLANT TEMPERATURE GAUGE

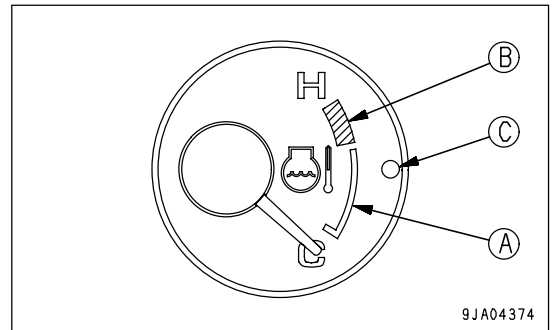
This meter (2) indicates the engine coolant temperature.

During normal operations, the indicator should be in the white range (A).

If the indicator enters red range (B) during operations, caution lamp (C) inside the engine coolant temperature gauge lights up. At the same time, the central warning lamp lights up and the alarm buzzer sounds.

In addition, the top line of the character display displays "E02" and the bottom line displays "ENGINE OVERHEAT".

Run the engine at a midrange speed under no load and wait for the indicator to return to the white range (A).

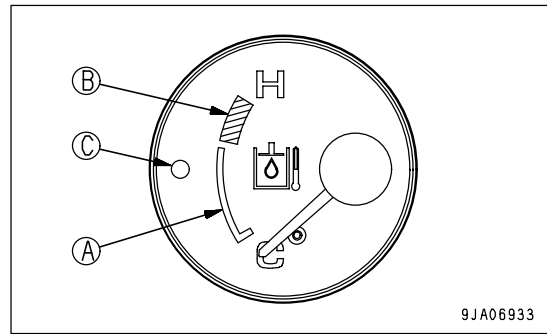


**HYDRAULIC TEMPERATURE GAUGE**

This meter (3) indicates the hydraulic oil temperature. It should be in white range (A) during operations.

If it enters red range (B) during operations, caution lamp (C) inside the hydraulic oil temperature gauge will light up. At the same time, the central warning lamp lights up and the alarm buzzer sounds intermittently. In addition, "E02" is displayed on the top line of the character display and "HYD OVERHEAT" is displayed on the bottom line.

Run the engine under no load at a mid-range speed and wait until the indicator goes down to white range (A).



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**FUEL GAUGE**

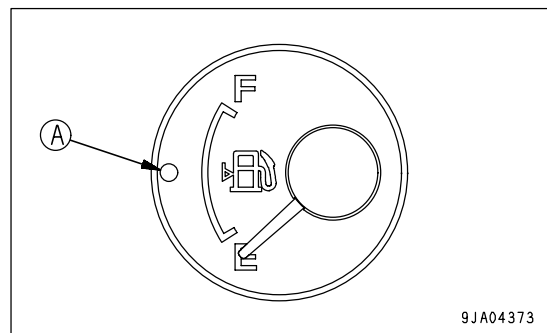
This meter (4) indicates the amount of fuel remaining in the fuel tank.

F: Full tank

E: Fuel level is low

When the remaining amount of fuel goes below 36 liters (9.51 US gal), caution lamp (A) inside the fuel gauge lights up.

If it lights up, check and add fuel.



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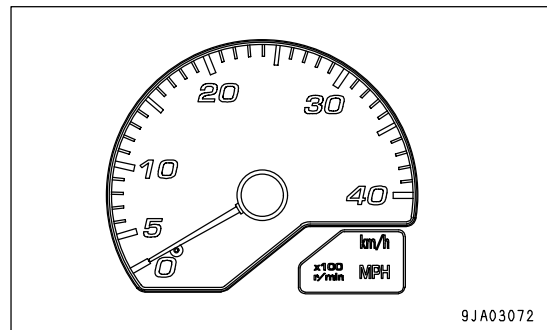
**SPEEDOMETER**

This meter (5) indicates the travel speed of the machine.

The display unit is indicated on meter display pilot lamp (6).

It is also possible to display the engine speed by switching meter (5).

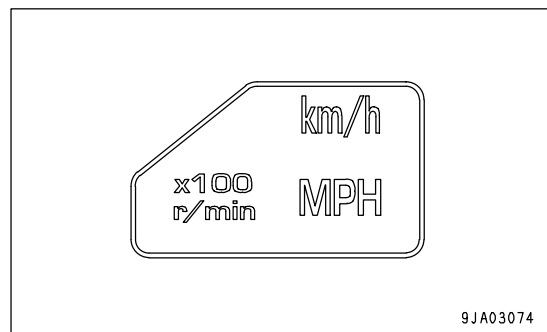
If you wish to switch between the speedometer and tachometer, please contact your Komatsu distributor to have it switched.



9JA03072

**METER DISPLAY PILOT LAMP**

This lamp (6) displays the unit for the travel speed or engine tachometer.



9JA03074

## OTHER FUNCTIONS OF MACHINE MONITOR

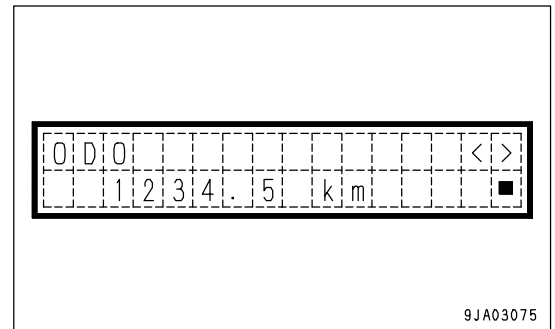
The machine monitor also has the following functions.

Odometer, filter/oil replacement time reset, telephone number input, language selection, monitor brightness adjustment

### METHOD OF DISPLAYING ODOMETER

Use this when checking the total distance that the machine has traveled.

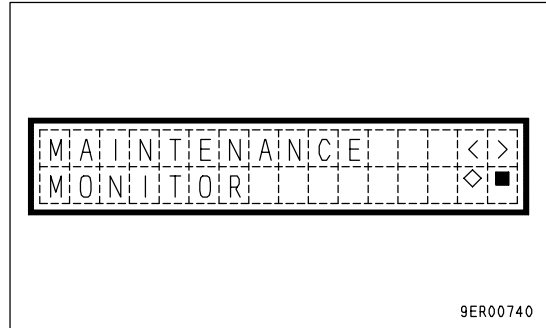
1. Check that the character display is displaying the service meter or an action code. If there is any other display, turn the starting switch OFF, then turn the starting switch ON again and wait for the service meter display or action code display to appear.
2. Press the (◇) of monitor panel mode selector switch 1. It displays the odometer.
3. When completing the operation, press (■) of monitor panel mode selector switch 1 or turn the starting switch OFF.



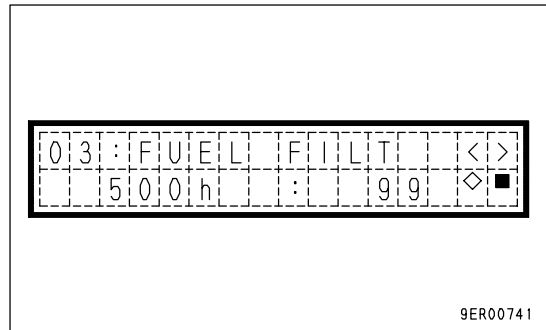
**RESET METHOD FOR FILTER, OIL REPLACEMENT TIME**

The filter and oil replacement time is displayed on the character display, so if the filter and oil have been replaced, reset the filter and oil change time.

- 1. Press the (◊) of monitor panel mode selector switch 1, and display the odometer.
- 2. Press (>) or (<) of monitor panel mode selector switch 2 and display "MAINTENANCE MONITOR".

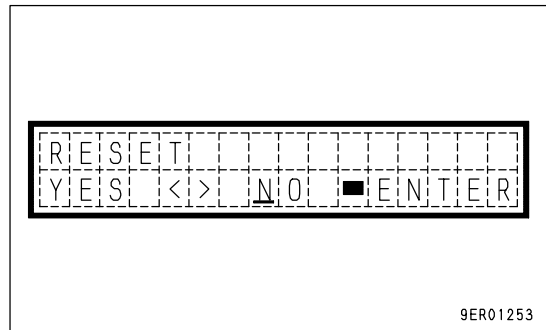


- 3. Press the (◊) of monitor panel mode selector switch 1. It will change to the display in the diagram on the right.  
The bottom line shows two items: the replacement time on the left and the total number of times the item has been replaced on the right.



- 4. Press the (>) or (<) of monitor panel mode selector switch 2 to display the item (filter or oil) which has reached the replacement time.

- 5. Press the (◊) of monitor panel mode selector switch 1. It will change to the display in the diagram on the right.  
The top line shows [Reset] and [Item to be reset] in turn.



- 6. When resetting the replacement time, press (>) or (<) of monitor panel mode selector switch 2, align the cursor with "YES", then press (■) of machine monitor mode selector switch 1. It will reset and return to the previous screen.  
To abort, align the cursor with "NO", then press (■) of monitor panel mode selector switch 1.

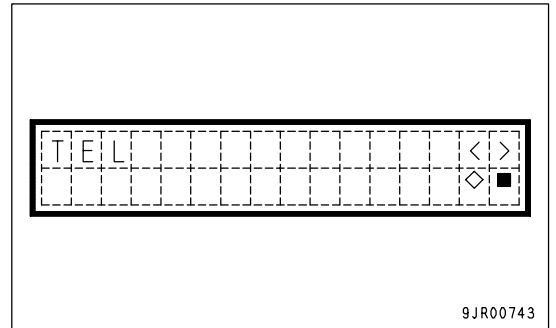
- 7. When resetting the replacement time for another item, use the procedure in Step 4. After completing, press (■) of monitor panel mode selector switch 1 twice or turn the starting switch OFF.



**INPUT METHOD FOR TELEPHONE NUMBER**

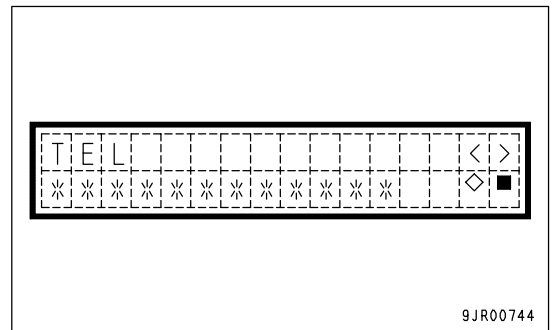
It is possible to display the telephone number on the right side of "CALL" displayed on the character display when action code "E03" is generated.

1. Press the (◇) of monitor panel mode selector switch 1, and display the odometer.
2. Press (>) or (<) of monitor panel mode selector switch 2 and display "TEL".



3. Press (◇) of monitor panel mode selector switch 1. It will change to the display in the diagram on the right.

Once the telephone number is input, the input number will be displayed next time.



4. Up to 12 digits can be displayed for the telephone number. Input from the first digits.  
The cursor is displayed at the input position. Press (>) or (<) of monitor panel mode selector switch 2 and display "0 to 9". To leave a blank, select "\*".

When the input value is decided, press (◇) of monitor panel mode selector switch 1. The cursor will move to the next position.

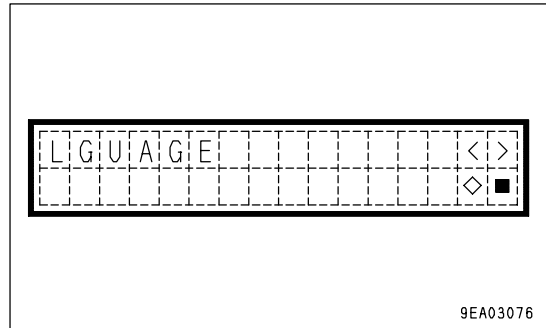
5. Repeat the procedure in Step 4 until the last digit. At the last digit, press (◇) of monitor panel mode selector switch 1 to return to the previous screen.  
If there is a mistake in the input or the input is to be stopped, press (■) of monitor panel mode selector switch 1 to return to the previous screen.
6. When completing the operation, press (■) of monitor panel mode selector switch 1 twice or turn the starting switch OFF.

**METHOD FOR SELECTING LANGUAGE**

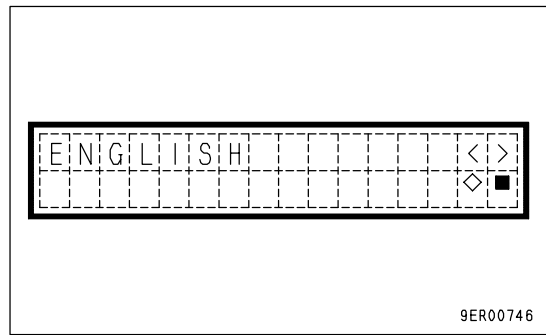
Use this when switching the language displayed on the character display.

The following explanation is for when English is set as the language for the character display.

1. Press the (◇) of monitor panel mode selector switch 1, and display the odometer.
2. Press (>) or (<) of monitor panel mode selector switch 2 and display "LGUAGE".



3. Press the (◇) of machine mode panel selector switch 1. The presently selected language is displayed.
4. Press (>) or (<) of monitor panel mode selector switch 2 and select the language.

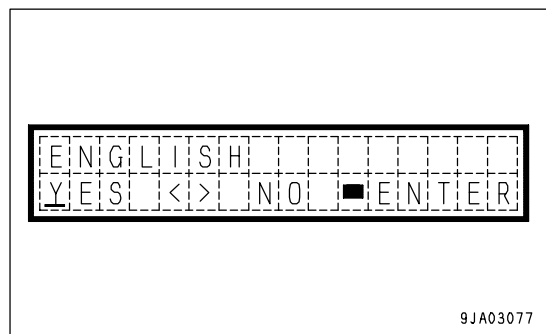


The available languages are English, Japanese, German, French, Italian, Spanish, and Swedish.

5. After selecting the language, press the (◇) of monitor panel mode selector switch 1.
 

To confirm, set the cursor at "YES", then press the (■) of monitor panel mode selector switch 1. The language will be selected and the screen will return to the previous screen.

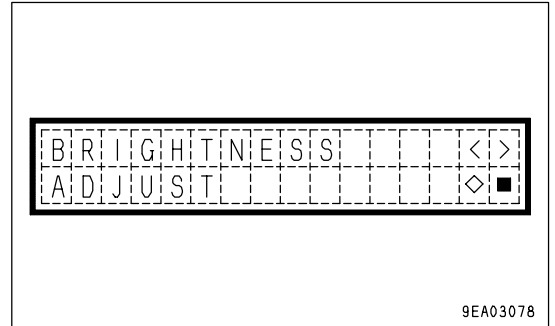
To abort, set the cursor at "NO", then press the (■) of monitor panel mode selector switch 1.
6. When completing the operation, press (■) of monitor panel mode selector switch 1 twice or turn the starting switch OFF.



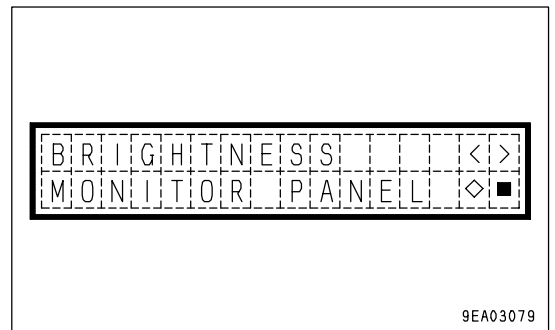
**METHOD OF ADJUSTING MONITOR BRIGHTNESS**

Do as follows to adjust the brightness of the monitor.

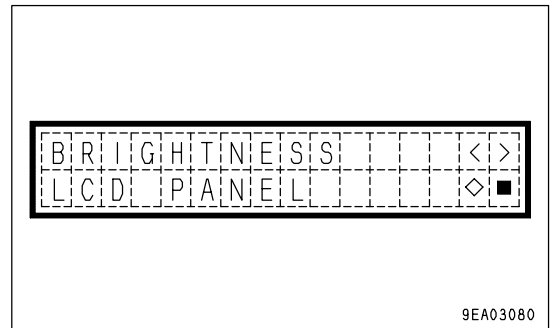
1. Press the (◇) of monitor panel mode selector switch 1, and display the odometer.
2. Press (>) or (<) of monitor panel mode selector switch 2 and display "BRIGHTNESS ADJUST".



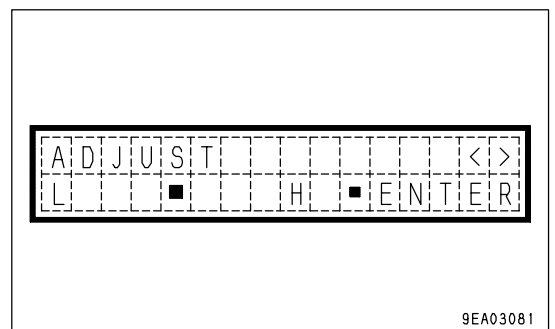
3. Press the (◇) of monitor panel mode selector switch 1. "MONITOR PANEL" will be displayed on the bottom line and it will be possible to adjust the brightness of the monitor.



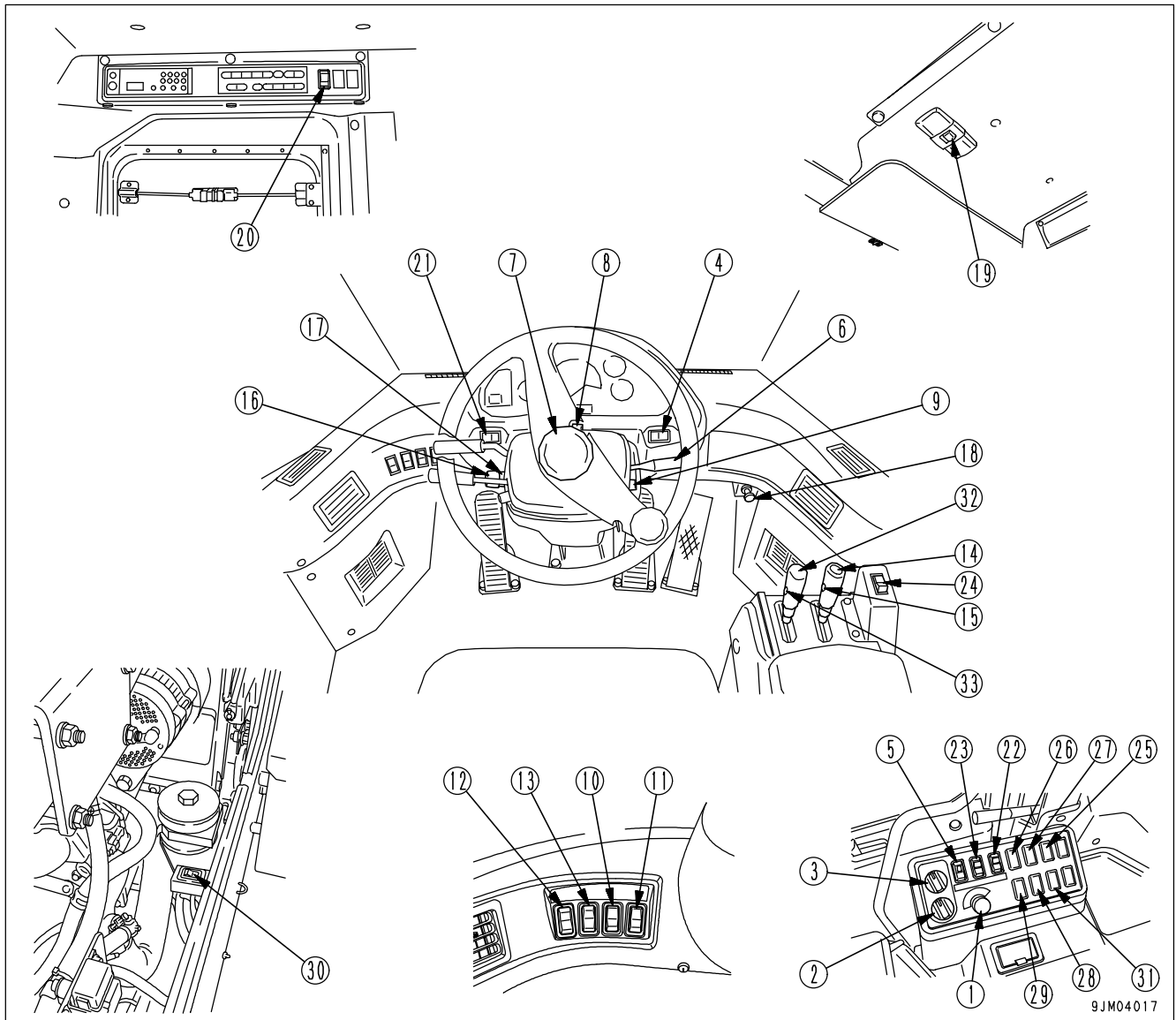
The brightness can be adjusted for the overall monitor or for the liquid crystal display only.  
 To adjust only the brightness of the liquid crystal display, press the (>) or (<) of monitor panel mode selector switch 2 to switch the display to "LCD PANEL".



4. Press the (◇) of monitor panel mode selector switch 1. The screen will change to the display shown on the right and it will be possible to adjust the brightness.
5. Press the (>) or (<) of monitor panel mode selector switch 2 to select a level between L and H (available range: 7 stages).
6. After selecting the brightness, press the (■) of monitor panel mode selector switch 1.  
 The brightness will be selected and the screen will return to the previous screen.
7. When completing the operation, press (■) of monitor panel mode selector switch 1 twice or turn the starting switch OFF.



# SWITCHES



9JM04017

- |   |  |
|---|--|
| (1) Starting switch                         | (19) Room lamp switch  |
| (2) Power mode selector switch              | (20) Rear heated wire glass switch   |
| (3) Transmission shift mode selector switch | (21) E.C.S.S.<br>(electronic controlled suspension system)<br>switch (if equipped) |
| (4) Transmission cut-off switch             | (22) Emergency steering switch<br>(Machines equipped with emergency steering)      |
| (5) Transmission cut-off set switch         | (23) Cooling fan reverse rotation switch   |
| (6) Lamp switch                             | (24) Directional selector switch (if equipped)                                     |
| (6) Turn signal lever                       | (25) Directional selector actuation switch (if equipped)                           |
| (6) Dimmer switch                           | (26) Semi auto digging switch (if equipped)  |
| (7) Horn button                             | (27) Remote positioner raise mode switch (if equipped)                             |
| (8) Hazard lamp switch                      | (28) Remote positioner lower mode switch<br>(if equipped)                          |
| (9) Parking brake switch                    | (29) Remote positioner raise/lower set switch<br>(if equipped)                     |
| (10) Front working lamp switch              | (30) Aftercooler tilt switch (if equipped)   |
| (11) Rear working lamp switch               | (31) Torque converter lock-up switch (if equipped)                                 |
| (12) Monitor panel mode selector switch 1   | (32) Load meter cancel switch (if equipped)  |
| (13) Monitor panel mode selector switch 2   | (33) Load meter subtotal switch (if equipped)                                      |
| (14) Kickdown switch                        |  |
| (15) Hold switch                            |  |
| (16) Front wiper switch                     |  |
| (17) Rear wiper switch                      |  |
| (18) Cigarette lighter                      |  |

### STARTING SWITCH

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

#### OFF position

It is possible to insert and remove the starting switch key, all the electric system switches are turned off, and the engine stops. In addition, the parking brake is automatically applied.

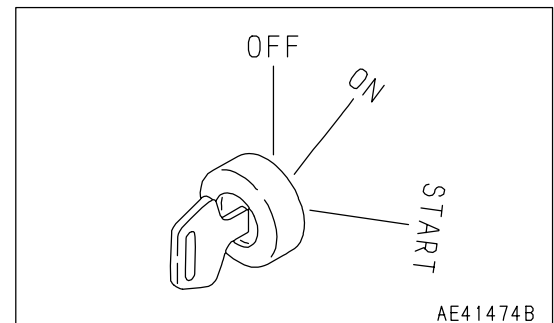
#### ON position

In this position, electric current flows to the charging circuit, lamp circuit, and accessory circuit.

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. Release the key immediately after the engine has been started. The key will return to the ON position when released.



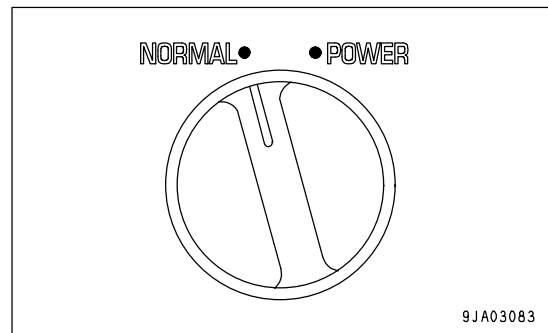
### POWER MODE SELECTOR SWITCH

This switch (2) can be used to switch the engine output to match the purpose of the operation.

When the POWER mode is selected, the output mode pilot lamp (POWER mode) on the machine monitor lights up.

**NORMAL position:** Normal mode (low engine output), operations where emphasis is on fuel consumption, such as operations on flat ground where high engine output is not needed.

**POWER position:** Power mode (high engine output), operations where emphasis is on production.



### REMARK

- To carry out operations with effective fuel consumption, normally set to the NORMAL mode.  
The maximum engine speed is set lower than in the POWER mode, but except for hard operations such as heavy-duty digging of rock, it can display ample power and can also display good fuel consumption. Furthermore, by pressing the accelerator pedal lightly, it is possible to reduce the fuel consumption.
- Set to the POWER mode when carrying out heavy-duty digging operations of rock or operations where the speed is required, or when traveling at high speed on flat ground or on slopes.

### TRANSMISSION SHIFT MODE SELECTOR SWITCH

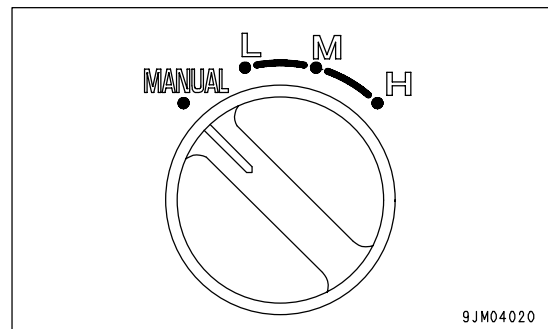
This switch (3) is used to change the shift point when the AUTO SHIFT/MANUAL selector switch has been switched to auto shift. At each of the L, M, and H positions, the system switches to auto shift and the auto shift pilot lamp on the machine monitor lights up. Normally, set to auto shift.

**MANUAL position:** System is set to manual shift and speed range is a position selected by gearshift lever

**L position:** This is suitable for operations on flat ground and for normal travel operations

**M position:** This is suitable for load and carry operations and traveling up slopes of 3° to 6°

**H position:** This is suitable for load and carry operations and traveling up slopes of more than 6°



If it is set to the L position when the work is mainly operations on flat ground, it is possible to shift up when the engine speed is low. This is effective in reducing fuel consumption.

### REMARK

For details of the manual shift, see "MANUAL SHIFT (PAGE 3-51)".

For details of the auto-shift, see "AUTOMATIC SHIFT (PAGE 3-52)".

TRANSMISSION CUT-OFF SWITCH

 **WARNING**

When moving the machine off on an uphill slope, set the transmission cut-off switch to the OFF position, depress the accelerator pedal while keeping the left brake pedal depressed, then gradually release the brake pedal and allow the machine to move. In this way the machine can be prevented from traveling backwards.

Press this switch (4) to turn on and off the transmission cut-off system.

When the switch is pressed, the pilot lamp lights up and the system is turned ON. The transmission is shifted to neutral at the adjusted brake pedal depression position.

Normally, keep the switch at the ON position.

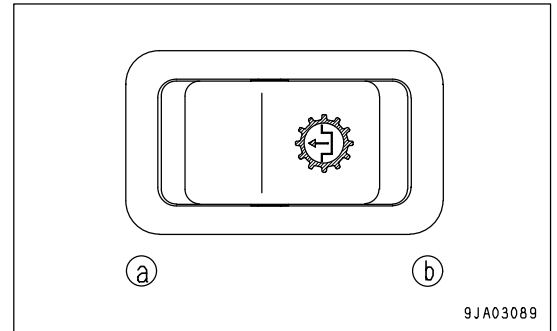
For details of the method of adjusting the cut-off position, see "ADJUSTING TRANSMISSION CUT-OFF POSITION (PAGE 3-125)" in the STOPPING MACHINE section.

Position (a): OFF

The left brake pedal acts in the same way as the normal brake (right brake pedal).

Position (b): ON

The left brake pedal acts in the same way as the normal brake, and at the same time, sets the transmission to neutral.



**REMARK**

The brake pedal position where the cut-off system is actuated can be adjusted by using the transmission cut-off set switch on the right switch panel.

TRANSMISSION CUT-OFF SET SWITCH

 **CAUTION**

Apply the parking brake before adjusting the transmission cut-off position.

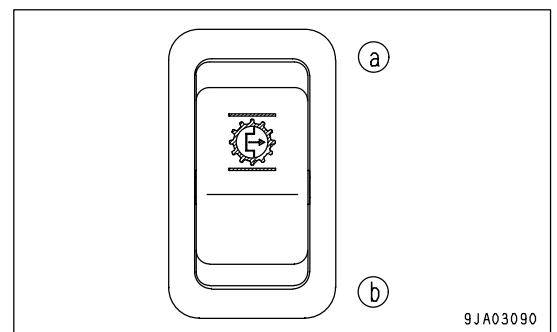
Turn this switch (5) ON to adjust the brake pedal position where the transmission is automatically shifted to Neutral.

Position (a): ON

Cut-off position can be adjusted

When the switch is released, it automatically returns to its original position.

For details of the method of adjusting the cut-off position, see "ADJUSTING TRANSMISSION CUT-OFF POSITION (PAGE 3-125)" in the STOPPING MACHINE section.



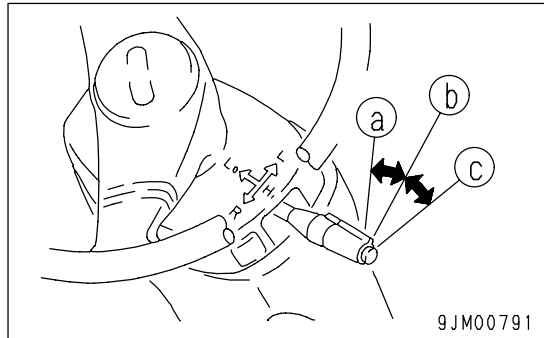
**LAMP SWITCH**

This switch (6) is used to light up the front lamps, side clearance lamps, tail lamps, and instrument panel.

Position (a): OFF

Position (b): Side clearance lamps, tail lamps, and instrument panel light up

Position (c): Head lamps light up in addition to lamps at (b) position



**REMARK**

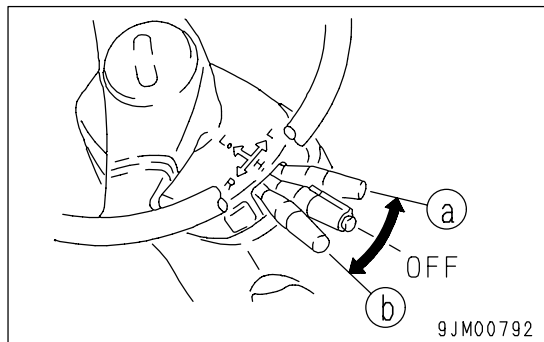
The lamp switch can be operated regardless of the position of the lever.

**TURN SIGNAL LEVER**

This switch (6) is used to operate the turn signal lamp.

(a) position: LEFT TURN (Push lever FORWARD.)

(b) position: RIGHT TURN (Pull lever BACK.)



**REMARK**

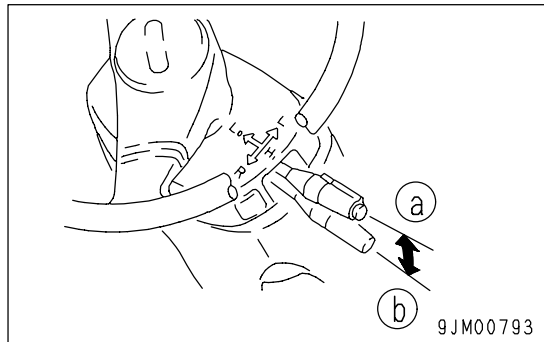
- When the lever is operated, the turn signal pilot lamp also flashes.
- When the steering wheel is turned back, the lever automatically returns to its original position. If it does not return, return it manually.

**DIMMER SWITCH**

This switch (6) is used to switch the head lamps between high beam and low beam.

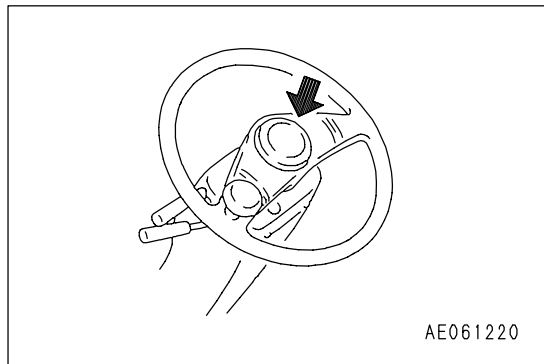
Position (a): Low beam

Position (b): High beam



**HORN BUTTON**

When the horn button (7) in the center of the steering wheel is pressed, the horn will sound.





## HAZARD LAMP SWITCH

**WARNING**

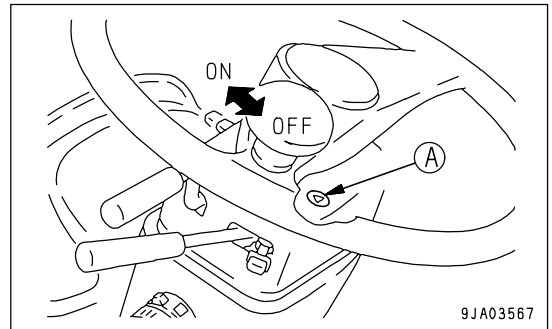
Use the hazard lamp only in emergencies. Using the hazard lamp when traveling may cause confusion for other machine operators.

This switch (8) is used in emergencies, such as when the machine breaks down and has to be parked on the road.

ON position: All turn signal lamps flash.

**REMARK**

When this switch is turned to the ON position, the turn direction indicator lamps and turn indicator pilot lamp flash, and display lamp (A) lights up at the same time.



**PARKING BRAKE SWITCH**



**WARNING**

Always apply the parking brake when leaving the machine or when parking it.

Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.

**NOTICE**

- Never use the parking brake switch to apply the brakes when traveling, except in an emergency. The parking brake may be damaged and this may lead to a serious accident. Apply the parking brake only after the machine has stopped.
- If the parking brake has been used as an emergency brake when traveling at high speed, contact your Komatsu distributor to have the parking brake checked for any abnormality.

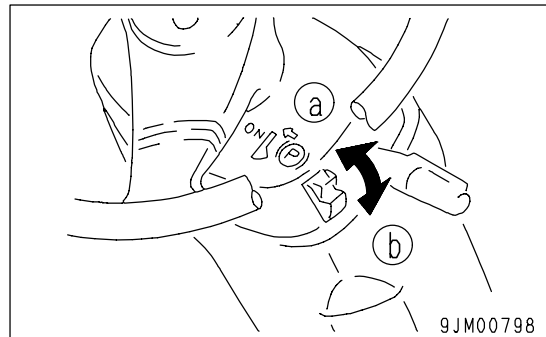
This switch (9) operates the parking brake.

Position (a): ON

The parking brake is applied, and the parking brake pilot lamp lights up.

Position (b): OFF

The parking brake is released.



**REMARK**

- When the parking brake is applied, the machine will not move off even if the directional lever is operated.
- If the directional lever is placed at the F or R position with the parking brake still applied, the central warning lamp will light up and the buzzer will sound.
- Before starting the engine, turn the parking brake switch ON, then turn it OFF again.

**FRONT WORKING LAMP SWITCH**



**WARNING**

Always turn the working lamp off before traveling on public roads.

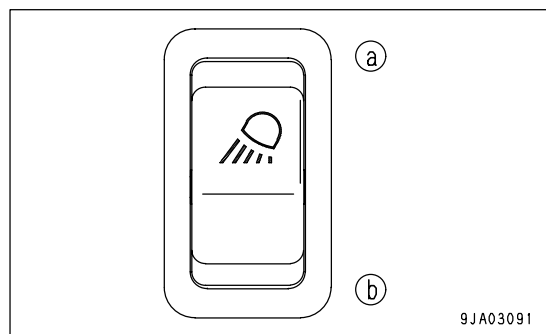
When turning the front working lamp ON, operate the lamp switch to turn the side clearance lamp ON or the head lamp ON, then operate this switch (10).

Position (a): Working lamp lights up

Position (b): Working lamp goes out

If position (a) is pressed, the pilot lamp will light up and the working lamp circuit will be switched ON.

If the lamp switch is not at the ON position for the side clearance lamp or head lamp, the working lamp will not light up.



## REAR WORKING LAMP SWITCH



### WARNING

Always turn the working lamp off before traveling on public roads.

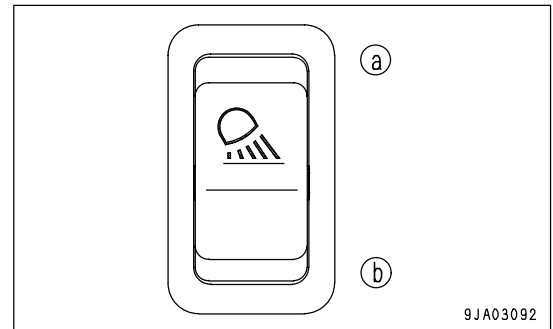
When turning the rear working lamp ON, operate the lamp switch to turn the side clearance lamp ON or the head lamp ON, then operate this switch (11).

Position (a): Working lamp lights up

Position (b): Working lamp goes out

If position (a) is pressed, the pilot lamp will light up and the working lamp circuit will be switched ON.

If the lamp switch is not at the ON position for the side clearance lamp or head lamp, the working lamp will not light up.



## MONITOR PANEL MODE SELECTOR SWITCH 1

This switch (12) is used to switch the function of the character display.

When the switch is released, it automatically returns to its original position.

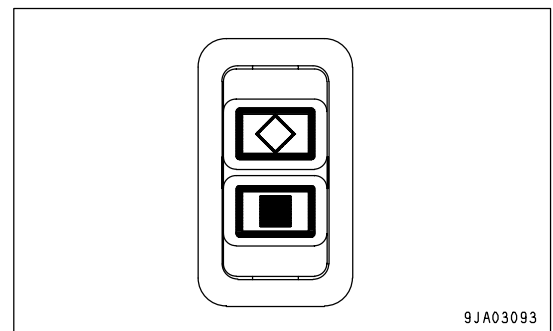
The basic operation is as follows.

Position (◇):

Press here to select (confirm) each mode or operation

Position (■):

Press here to cancel each mode or operation



## MONITOR PANEL MODE SELECTOR SWITCH 2

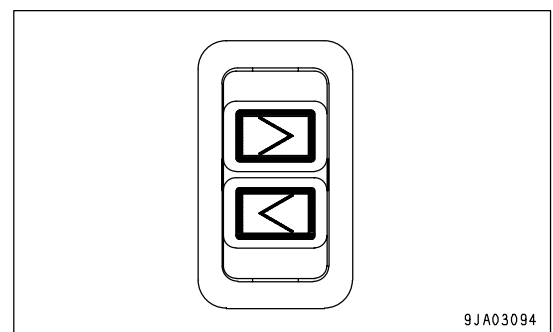
This switch (13) is used to switch the function of the character display.

When the switch is released, it automatically returns to its original position.

The basic operation is as follows.

Position (>): Press here to go on to the next screen, or to move the cursor forward, or to increase the number when entering numerals

Position (<): Press here to go back to the previous screen, or to move the cursor back, or to reduce the number when entering numerals



### KICKDOWN SWITCH

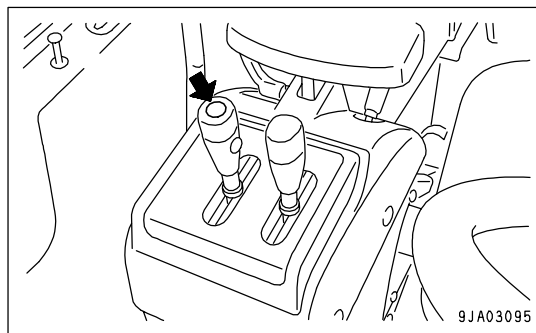
When the gearshift lever is in 2nd, if switch (14) on the head of the lift arm control lever is pressed, the transmission will shift down to 1st.

Use this when you need to increase the drawbar pull in digging operations.

If the transmission is in auto-shift, and the travel speed is below 12.5 km/h (7.8 MPH) in any speed range when traveling in either forward or in reverse, the kick-down switch is actuated and it is possible to shift down to 1st.

This makes it easy to carry out load and carry operations.

Even if the travel speed is more than 12.5 km/h (7.8MPH), this switch can be used to shift the transmission down. Each time the kick-down switch is pressed, the speed range will shift down one range at a time (F4 -> F3 -> F2). When the torque converter is in the lock-up condition (if equipped), the lock-up is canceled.



### REMARK

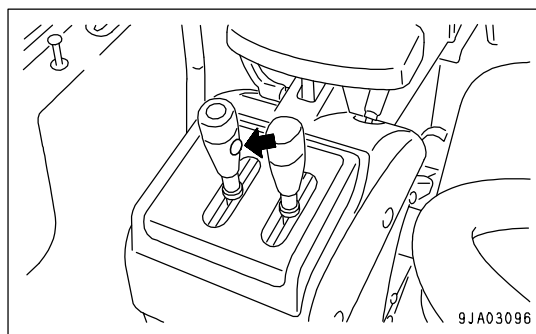
- When canceling the kick-down, operate the directional lever. In manual shift, the kick-down can be canceled by operating the gearshift lever to any position other than 2nd. It is also possible to cancel the kick-down by turning the starting switch OFF.
- In auto-shift, if the travel speed becomes high after the kick-down, the gear will be shifted up by the auto-shift.
- In auto-shift, when traveling at more than 25 km/h (15.5 MPH) in 3rd or at more than 35 km/h (21.7 MPH) in 4th, even if the kick-down switch is pressed, the transmission will not shift down. This is to prevent overrun of the engine.

### HOLD SWITCH

To fix the speed range when traveling in automatic transmission, press switch (15) at the side of the lift arm control lever knob. The transmission will be fixed in the speed range displayed on shift indicator (A) on the machine monitor and shift hold pilot lamp (B) will light up.

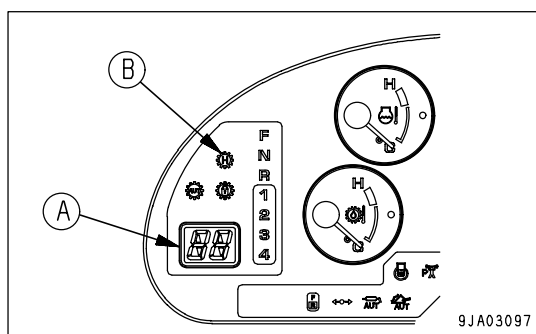
When the switch is pressed again, the display goes out.

Use this function to select the desired speed range when traveling up or down hills or when carrying out operations such as grading.



### REMARK

- When the torque converter is in the lock-up condition (if equipped), the transmission cannot be fixed.
- When canceling the shift hold, operate the directional lever or gearshift lever or operate the transmission shift mode selector switch to MANUAL. It is also possible to cancel the hold shift by turning the starting switch OFF.

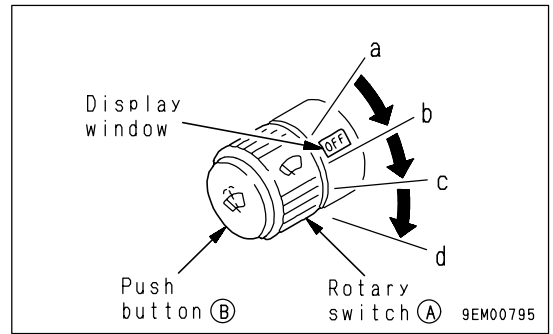


**FRONT WIPER SWITCH**

When rotary switch (A) of this switch (16) is turned, the front wiper will move.

If push button (B) is pressed, washer liquid will be sprayed out onto the front glass while the button is being pressed.

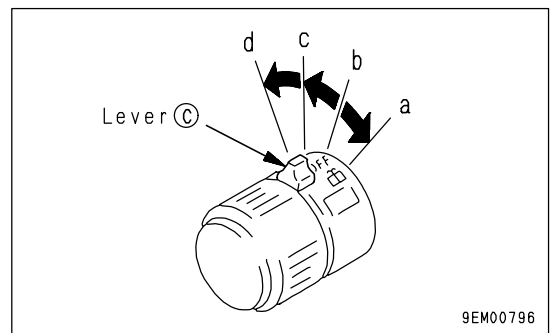
- Position (a): (OFF) Stop
- Position (b): (INT) Intermittent wiper
- Position (c): Low-speed wiper
- Position (d): High-speed wiper



**REAR WIPER SWITCH**

When lever (C) of this switch (17) is turned, the rear wiper will move.

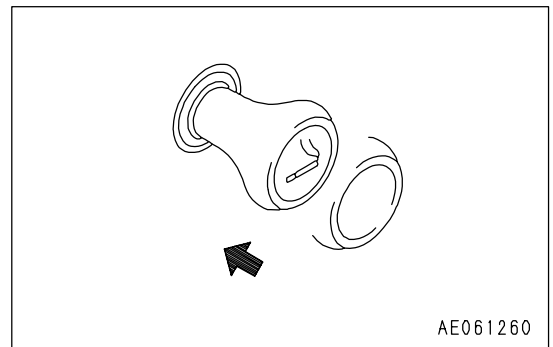
- Position (a): Washer liquid is sprayed out
- Position (b): OFF
- Position (c): Wiper is operated
- Position (d): Washer liquid is sprayed out, wiper is operated



**CIGARETTE LIGHTER**

This is used to light cigarettes.

After cigarette lighter (18) is pushed in, it will return to its original position after a few seconds, so pull it out and light your cigarette.



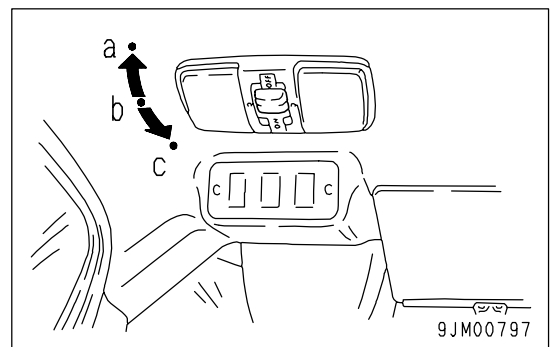
**ROOM LAMP SWITCH**

The switch (19) is used to turn the room lamp ON and OFF.

- Position (a): OFF
- Position (b): Lights up when the cab door opens
- Position (c): Lights up

**REMARK**

- The room lamp lights up even when the main switch is OFF, so when leaving the operator's compartment, turn the switch to position (a) (OFF) or (b).
- When operating with the cab door fully open, set the switch to position (a) (OFF).



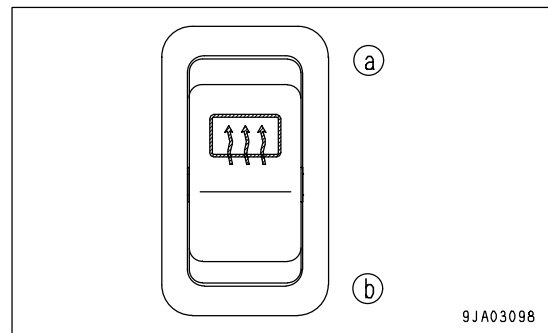
**REAR HEATED WIRE GLASS SWITCH**

(If equipped)

When this switch (20) is pressed, electric current flows through the heated wire glass at the rear and the mist is removed from the glass.

Position (a): ON (removes mist from glass)

Position (b): OFF



**E.C.S.S. (ELECTRONIC CONTROLLED SUSPENSION SYSTEM) SWITCH**

(If equipped)

**WARNING**

- If the machine is traveling or the work equipment is raised, the moment the E.C.S.S. switch is turned ON, the work equipment will move.
- If operations are carried out with the E.C.S.S. switch at the ON position, the moment the E.C.S.S. switch is operated, the work equipment may move.
- Never turn the E.C.S.S. switch ON during inspection or maintenance. The work equipment will move and this will create a dangerous situation.

**NOTICE**

- Always stop the machine and lower the work equipment to the ground before operating the E.C.S.S. switch.
- When carrying out inspection and maintenance, first lower the work equipment to the ground, then turn the E.C.S.S. switch OFF before starting the inspection and maintenance operation.
- When carrying out leveling work, turn the E.C.S.S. switch OFF.

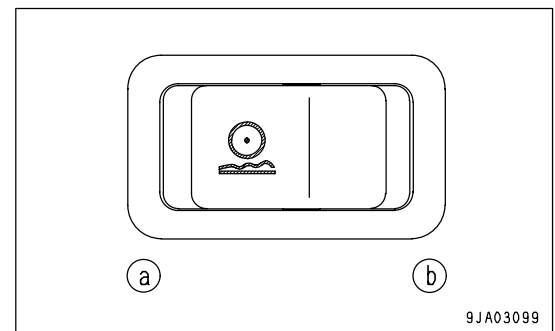
This switch (21) is used to turn the E.C.S.S. ON and OFF.

Position (a): ON

The pilot lamp lights up and the E.C.S.S. is actuated.

Position (b): OFF

The E.C.S.S. is not actuated.

**REMARK**

- The E.C.S.S. is a device that uses the hydraulic spring effect of an accumulator to absorb the vibration of the chassis during travel and allows the machine to travel smoothly and at high speed.
- When traveling in 1st, the E.C.S.S. is not actuated.
- When the speed range is 2nd to 4th, and the travel speed becomes more than 5 km/h (3.1 MPH), the E.C.S.S. is automatically actuated; when the travel speed goes below 3 km/h (1.9 MPH), it is automatically disengaged.

**EMERGENCY STEERING SWITCH**

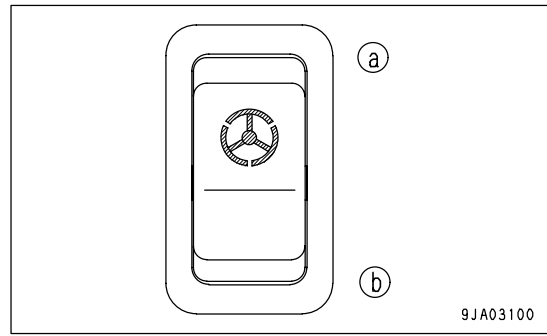
(If equipped)

This switch (22) is the manual control switch for the emergency steering.

Even when the engine has stopped, steering operations are made possible by pressing this switch.

Position (a): ON

The pilot lamp inside the switch and the emergency steering pilot lamp on the machine monitor light up and it becomes possible to operate the steering.



When the switch is released, it automatically returns to its original position.

Actuate the emergency steering only in cases of emergency or when checking the function.

The time for operating the emergency steering continuously is a maximum of 60 seconds.

When using the emergency steering, travel at a speed of less than 5 km/h (3.1 MPH).

For details, see "EMERGENCY STEERING (PAGE 3-126)" in the OPERATION section.

**COOLING FAN REVERSE ROTATION SWITCH**

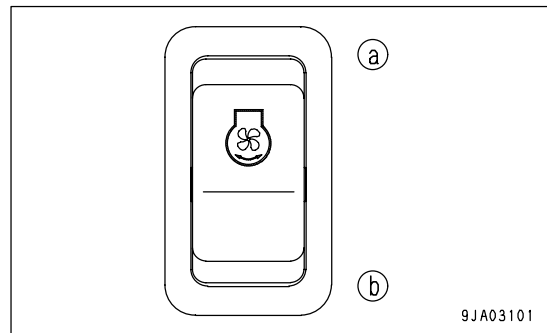
This switch (23) is used to rotate the cooling fan in the reverse direction when cleaning the radiator.

Position (a): ON

The pilot lamp inside the switch and the cooling fan reverse rotation pilot lamp on the machine monitor light up. At the same time, "COOLING FAN REVERSE" is displayed on the character display, and the fan is set to rotate in reverse.

Position (b): OFF

The cooling fan is set to rotate in the normal direction.



Stop the engine before operating the switch.

Switching normal rotation -> reverse rotation: With the engine stopped, do as follows: Starting switch ON -> reverse rotation switch ON -> check machine monitor -> starting switch START -> fan reverse rotation

Switching reverse rotation -> normal rotation: Engine at low speed -> starting switch OFF -> starting switch ON -> reverse rotation switch OFF -> starting switch START -> fan normal rotation

For details, see "CLEAN FINS BY ROTATING COOLING FAN IN REVERSE (PAGE 4-30)" in the WHEN REQUIRED section.

**REMARK**

- When the engine is running, even if the switch is pressed, the direction of rotation of the fan does not change, but the cooling fan reverse rotation pilot lamp on the machine monitor flashes.
- Use the reverse rotation of the fan only for cleaning. For normal operations, rotate the fan in the normal direction. If operations are carried out with the fan rotating in the reverse direction, the machine will not display its full function and will tend to overheat.



**DIRECTIONAL SELECTOR SWITCH**

(If equipped)

This switch (24) is used to switch the direction of travel of the machine between forward and reverse.

F Position: FORWARD

N Position: Neutral

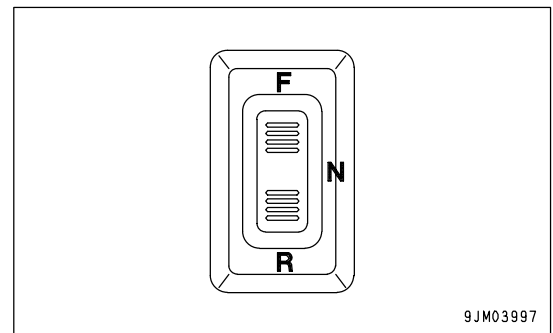
R Position: REVERSE

Before operating this switch, check that the condition is as follows.

- Directional lever is at N
- Directional selector switch actuation switch is at ON

If the condition is not as above, the switch will not work.

For details, see "CHANGING DIRECTION (PAGE 3-119)".

**DIRECTIONAL SELECTOR SWITCH ACTUATION SWITCH**

(If equipped)

When this switch (25) is turned on, the directional selector switch on the side of the lift arm control lever is actuated.

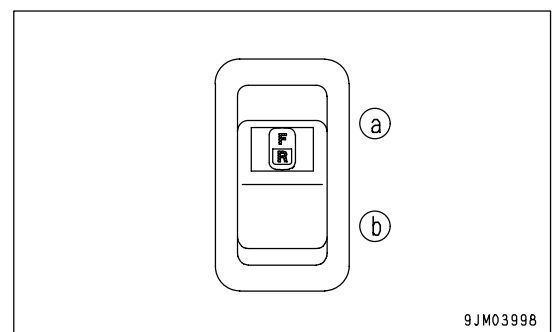
Position (a): ON

The directional selector switch is actuated.

The directional selector pilot lamp on the machine monitor lights up.

Position (b): OFF

The directional selector switch is turned off.

**SEMI AUTO DIGGING SWITCH**

(If equipped)

For details, see "HANDLING EPC WORK EQUIPMENT LEVER (PAGE 6-46)" in the ATTACHMENTS, OPTIONS section.

**REMOTE POSITIONER RAISE MODE SWITCH**

(If equipped)

For details, see "HANDLING EPC WORK EQUIPMENT LEVER (PAGE 6-46)" in the ATTACHMENTS, OPTIONS section.

**REMOTE POSITIONER LOWER MODE SWITCH**

(If equipped)

For details, see "HANDLING EPC WORK EQUIPMENT LEVER (PAGE 6-46)" in the ATTACHMENTS, OPTIONS section.

**REMOTE POSITIONER RAISE/LOWER SET SWITCH**

(If equipped)

For details, see "HANDLING EPC WORK EQUIPMENT LEVER (PAGE 6-46)" in the ATTACHMENTS, OPTIONS section.

**AFTERCOOLER TILT SWITCH**

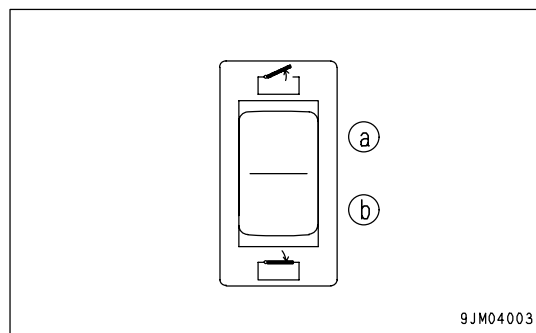
(If equipped)

This switch (30) can be used to tilt the aftercooler electrically.

Use this when cleaning the cooler fins.

Position (a): Cooler is tilted 17 degrees

Position (b): Cooler is returned to original position

**TORQUE CONVERTER LOCK-UP SWITCH**

(If equipped)

For details of the torque converter lock-up, see "HANDLING TORQUE CONVERTER LOCK-UP (PAGE 6-28)" in the ATTACHMENTS, OPTIONS section.

**LOAD METER CANCEL SWITCH**

(If equipped)

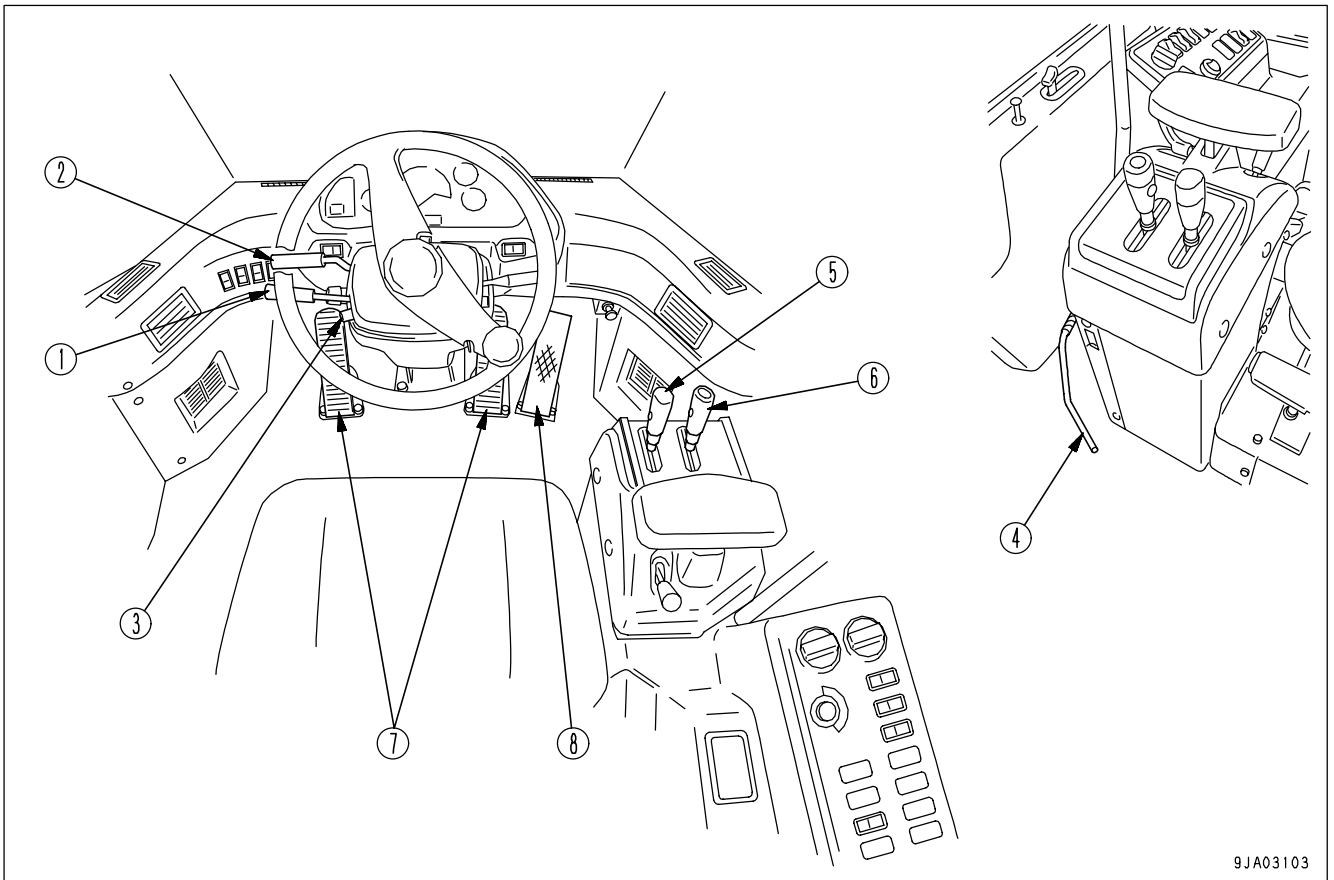
For details of the load meter, see "HANDLING LOAD METER (PAGE 6-2)" in the ATTACHMENTS, OPTIONS section.

**LOAD METER SUBTOTAL SWITCH**

(If equipped)

For details of the load meter, see "HANDLING LOAD METER (PAGE 6-2)" in the ATTACHMENTS, OPTIONS section.

**CONTROL LEVERS, PEDALS**



9JA03103

- |                               |                            |
|-------------------------------|----------------------------|
| (1) Gearshift lever           | (5) Bucket control lever   |
| (2) Directional lever         | (6) Lift arm control lever |
| (3) Gearshift lever stopper   | (7) Brake pedal            |
| (4) Work equipment lock lever | (8) Accelerator pedal      |

**GEARSHIFT LEVER**

This lever (1) changes the speed range of the transmission.

**MANUAL SHIFT**

This machine has a 4-FORWARD, 4-REVERSE speed transmission.

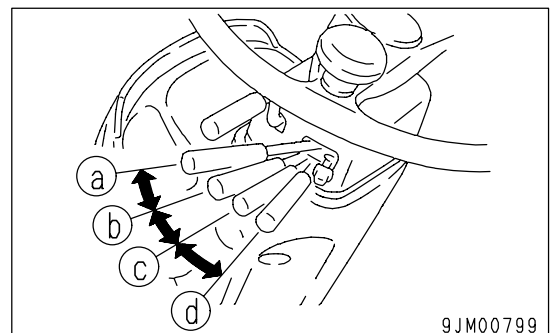
Place the gearshift lever in a suitable position to obtain the desired speed range.

1st and 2nd speeds are used for working.

3rd and 4th speeds are used for traveling.

However, when the gearshift lever stopper is being used, it is impossible to shift to 3rd or 4th. Disengage the gearshift lever stopper before trying to shift gear.

- Position (a): 1st
- Position (b): 2nd
- Position (c): 3rd
- Position (d): 4th

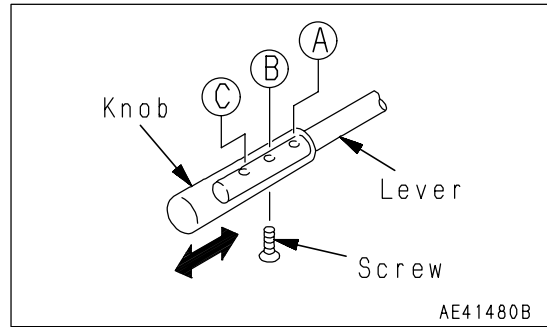


9JM00799

**REMARK**

The length of the lever can be adjusted to 3 stages (positions (A), (B), (C)). To adjust the length, remove the screw at the bottom of the lever knob, slide the knob to the desired position, then tighten the screw again.

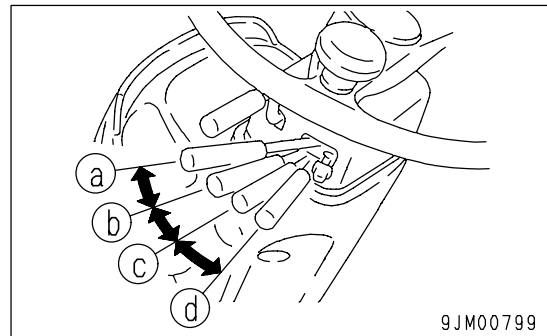
(The lever is installed to position (B) when it is shipped from the factory.)



**AUTOMATIC SHIFT**

Automatic gear shifting can be carried out in the 2nd through 4th speed range of the four forward and reverse speeds depending on the travel conditions.

- Position (a): 1st
- Position (b): 2nd
- Position (c): 3rd
- Position (d): 4th



The range of speeds during automatic gear shifting is determined by the position of the gearshift lever as shown in the chart on the right.

Gear shift lever position	4		○	→	○	→	○
	3		○	→	○		
	2		○				
		1	2	3	4		
Automatic speed range							

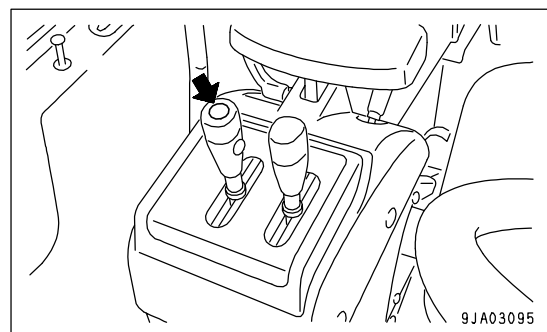
AD41887B

**REMARK**

- The 1st position for the gearshift lever fixes the transmission in 1st. There is no automatic shifting of the transmission.
- When shifting down from 2nd to 1st, press the kick-down switch on the lift arm control lever.
- If the transmission is in auto-shift and the travel speed is below 12.5 km/h (7.8 MPH) in any speed range when traveling in either forward or in reverse, the kick-down switch is actuated and makes it possible to shift down to 1st.

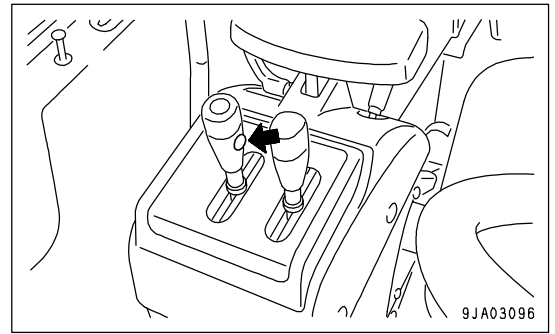
This makes it easy to carry out load and carry operations.

- Even if the travel speed is more than 12.5 km/h (7.8 MPH), this switch can be used to shift the transmission down. Each time the kick-down switch is pressed, the speed range will shift down one range at a time (when in 4th: F4 -> F3 -> F2; when in 3rd: F3 -> F2).



To set to the desired speed range when traveling uphill or downhill, or when carrying out grading, do as follows.

- When fixing the speed range  
Press the HOLD switch on the lift arm control lever.  
The speed range is fixed at the speed range displayed on the transmission indicator on the main monitor.
- When shifting up or down from set speed range  
Shift gear with the gearshift lever.



**REMARK**

When the transmission has been shifted down from 2nd to 1st with the kickdown switch, it will shift up from 1st to 2nd when the travel speed increases.

**DIRECTIONAL LEVER**

This lever (2) is used to switch the direction of travel of the machine between forward and reverse.

When starting the engine, if the directional lever is not at the N position, the engine will not start.

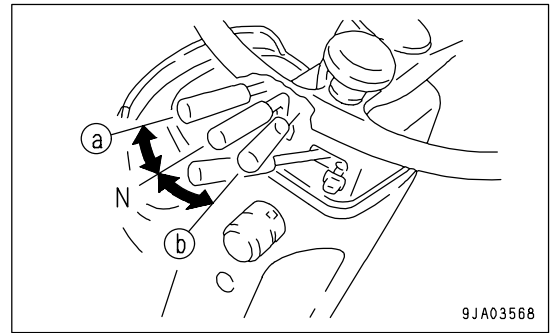
In this case, the central warning lamp will light up and the buzzer will sound.

Return the gearshift lever to the N position and start the engine.

Position (a): FORWARD

Position N: NEUTRAL

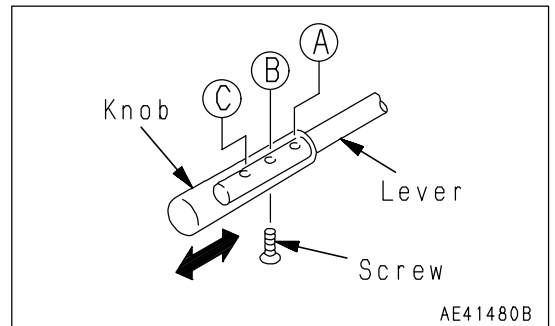
Position (b): REVERSE



**REMARK**

The length of the lever can be adjusted to 3 stages (positions (A), (B), (C)). To adjust the length, remove the screw at the bottom of the lever knob, slide the knob to the desired position, then tighten the screw again.

(The lever is installed to position (B) when it is shipped from the factory.)

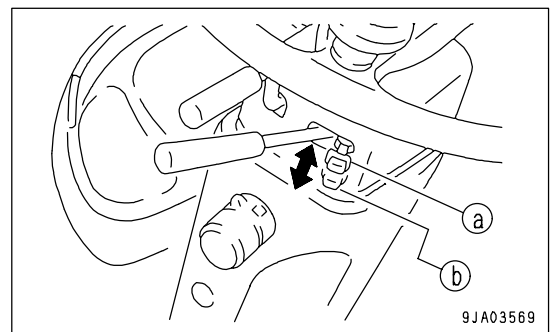


**GEARSHIFT LEVER STOPPER**

This stopper (3) prevents the gearshift lever from entering the 3rd or 4th positions when working.

Position (a): Stopper actuated.

Position (b): Stopper released.



WORK EQUIPMENT LOCK LEVER

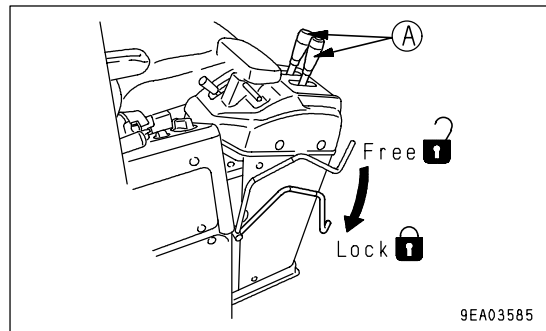
**! WARNING**

- Before standing up from the operator's seat, set the work equipment lock lever securely to the LOCK position. If the work equipment lock lever is not at the LOCK position, and work equipment control lever (A) is touched by mistake, it may lead to a serious accident.
- If the work equipment lock lever is not placed securely at the LOCK position, the work equipment may move, and this may lead to a serious accident or personal injury. Check that the lever is in the position shown in the diagram.
- When pulling up or pushing down the work equipment lock lever, be careful not to touch work equipment control lever (A).

This lever (4) is a lock device for the work equipment control lever. Push the work equipment lock lever down to lock it.

**REMARK**

This lever serves to shut off the hydraulic circuit for work equipment. When it is kept at the LOCK position, the work equipment does not move, even if work equipment control lever (A) is operated.



**BUCKET CONTROL LEVER**

This lever (5) operates the bucket.

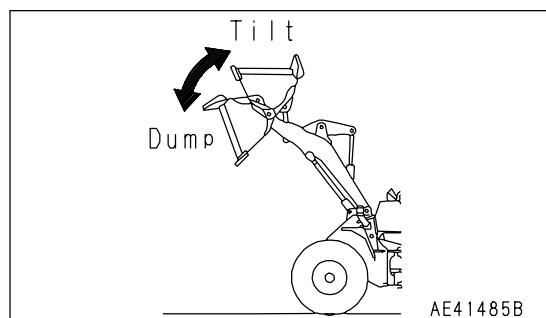
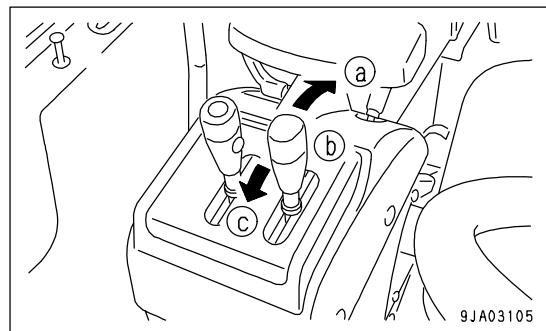
Position (a): TILT

When the bucket control lever is pulled further from the TILT position, the lever is stopped in this position until the bucket reaches the preset position of the positioner, and the lever is returned to the HOLD position.

Position (b): HOLD

The bucket is kept in the same position.

Position (c): DUMP



**LIFT ARM CONTROL LEVER**

This lever (6) is used to operate the lift arm.

**NOTICE**

Do not use the FLOAT position when lowering the bucket. Use the FLOAT position when leveling, see "LEVELING OPERATIONS (PAGE 3-134)".

Position (a): RAISE

When the lift arm control lever is pulled further from the RAISE position, the lever is stopped in this position until the lift arm reaches the preset position of the kickout, and the lever is returned to the HOLD position.

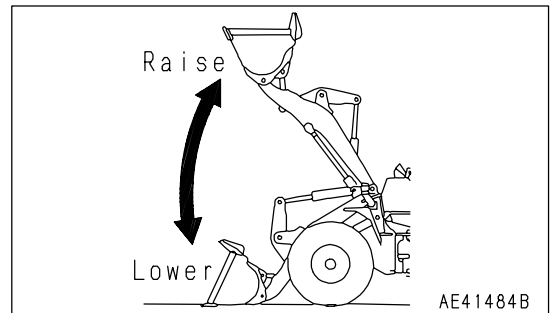
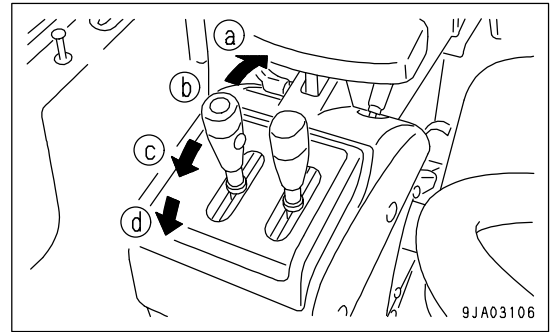
Position (b): HOLD

The lift arm is kept in the same position.

Position (c): LOWER

Position (d): FLOAT

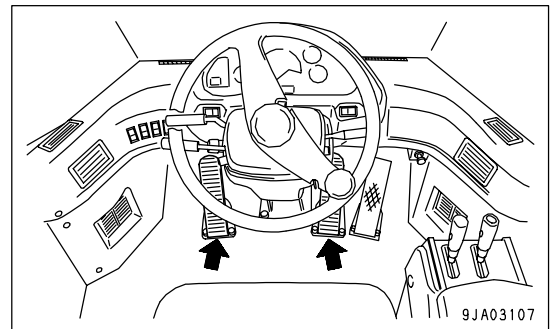
The lift arm moves freely under external force.



**BRAKE PEDAL**

**WARNING**

- When traveling downhill, always use the right brake pedal, and use the braking force of the engine together with the brake.
- Do not use the brake pedal repeatedly more than necessary. If the brake is used too frequently, the brake will overheat. If this happens, the brakes will not work, so this may lead to a serious accident.
- Do not put your foot on this pedal unless necessary.



These pedals (7) operate the brakes.

**RIGHT BRAKE PEDAL**

The right brake pedal operates the wheel brakes.

Use the right brake pedal for normal braking operations.

**LEFT BRAKE PEDAL**

The left brake pedal operates the wheel brakes.

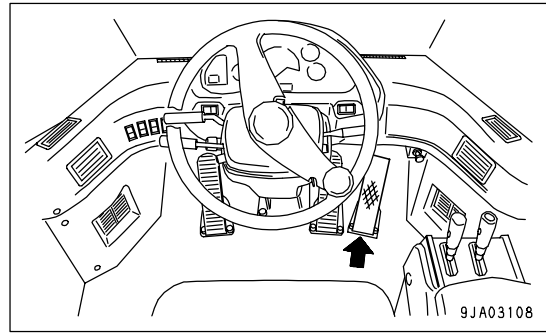
When the transmission cut-off switch is in the ON position, and if this brake pedal is depressed, wheel brakes are applied and the transmission is set to the neutral position at the same time. If the transmission cut-off switch is at OFF, the left brake pedal acts in the same way as the right brake pedal.

**REMARK**

When the accelerator is being used for operating the work equipment, always set the transmission cut-off switch to the ON position and use the left brake pedal to slow or stop the machine.

**ACCELERATOR PEDAL**

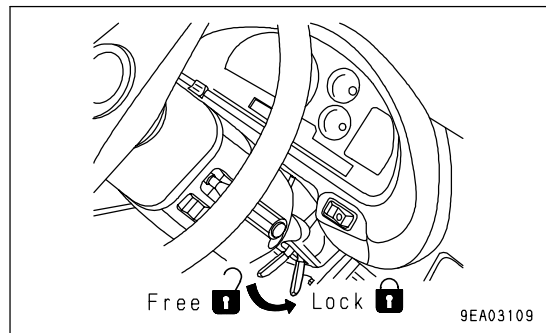
This pedal (8) controls the engine speed and output. The engine speed can be freely controlled between low idle and full speed.



**STEERING TILT LOCK LEVER**

 **WARNING**

Stop the machine before adjusting the tilt of the steering wheel. If this operation (adjustment) is carried out while the machine is moving, it may lead to a serious accident or personal injury.



This lever is used to unlock and lock the steering column when adjusting the position of the steering column to the front or rear or up or down.

Pull the lever up, set the steering wheel to the desired position, then push the lever down to lock the steering column securely in position.

The amount of adjustment is as follows.

Up-down movement	When at 0 mm (0 in)	When moved up to 40 mm (1.6 in)
Tilt amount	0 - 105 mm (0 - 4.1 in)	0 - 130 mm (0 - 5.1 in)



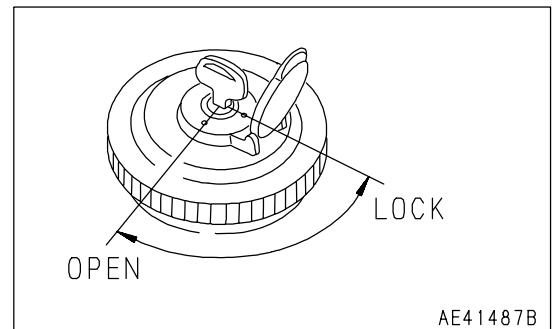
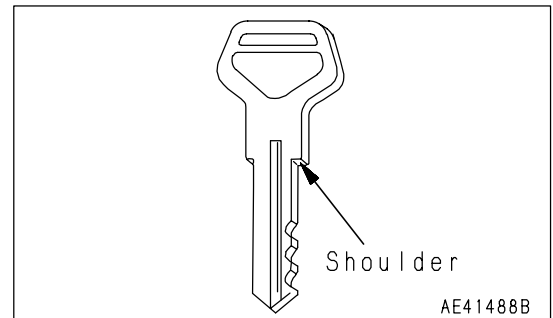
## CAP WITH LOCK

The fuel tank filler port and the hydraulic tank filler port (if equipped) are equipped with locks. Use the starting switch key to open and close the cap.

### METHOD OF OPENING AND CLOSING CAP WITH LOCK (FOR THE FUEL TANK FILLER PORT)

#### TO OPEN THE CAP

1. Insert the starting switch key into the cap as far as it will go (to the shoulder).  
If the starting switch key is turned before it is inserted all the way, it may break.
2. Turn the starting switch key clockwise, align the match mark on the cap with the rotor groove, then remove the cap.



#### TO LOCK THE CAP

1. Screw the cap into place.
2. Turn the key counterclockwise and take the key out.

**METHOD OF OPENING AND CLOSING CAP WITH LOCK (FOR THE HYDRAULIC TANK FILLER PORT)**

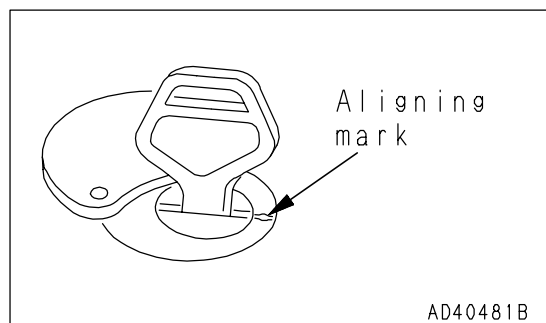
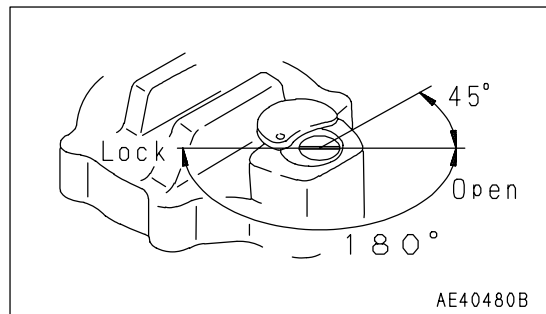
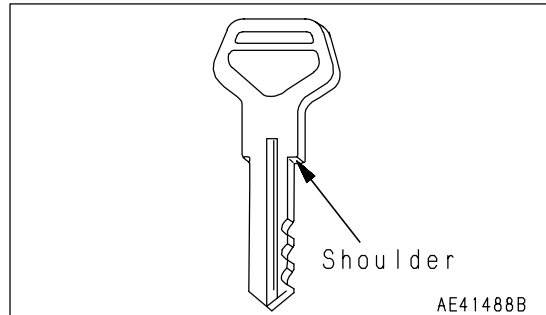
(If equipped)

**TO OPEN THE CAP**

1. Insert the starting switch key into the cap as far as it will go (to the shoulder).

If the starting switch key is turned before it is inserted all the way, it may break.

2. Turn the starting switch key counterclockwise and bring the rotor groove in line with the aligning mark on the cap. Turn the cap slowly until a "clicking" sound is made. This releases the lock and allows the cap to be opened.

**TO LOCK THE CAP**

1. Screw the cap into place.
2. Turn the starting switch key counterclockwise and take the key out.

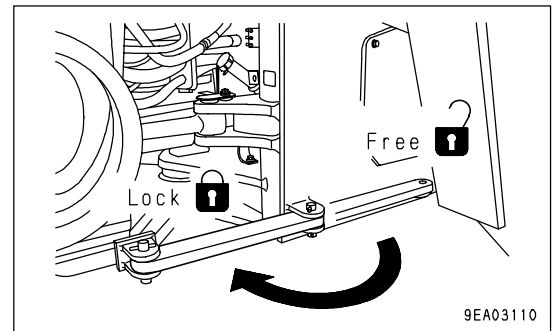
## FRAME LOCK BAR



### WARNING

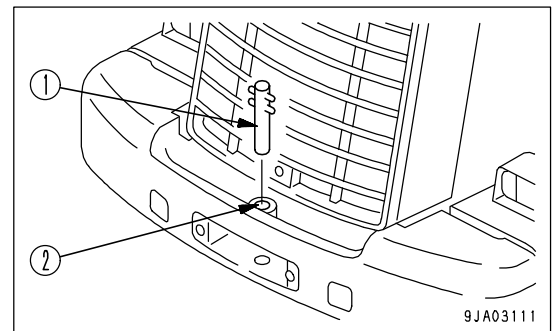
- When carrying out maintenance or transporting the machine, always set the frame lock bar to the LOCK position.
- Always remove the frame lock bar for travel operations. If it is not removed, the steering wheel cannot be used for steering, and this may lead to serious damage or injury.

This is a device used to lock the front and rear frames during maintenance or when transporting the machine. It prevents the front and rear frames from articulating.



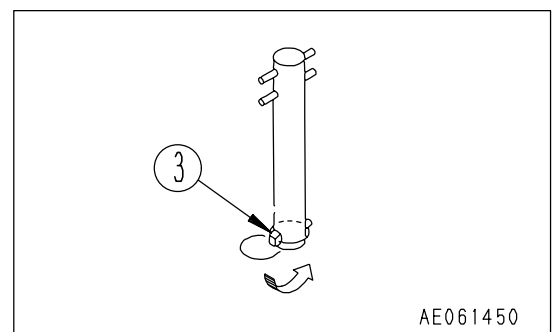
## TOWING PIN

1. Insert towing pin (1) into hole (2) in the counterweight.



2. Use linch pin (3) to set so that the towing pin does not come out.

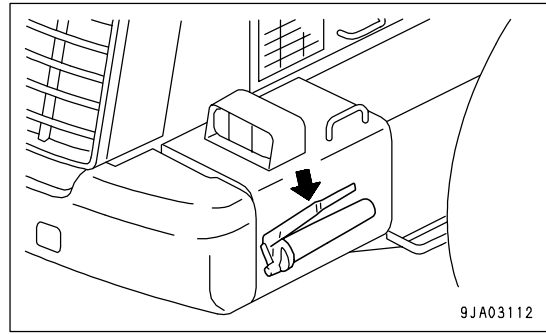
Reverse this operation to remove the pin.



### GREASE PUMP

The grease pump is stored inside the battery box at the rear of the machine. After using it, wipe off all grease stuck to the outside of the pump and then store it in the box.

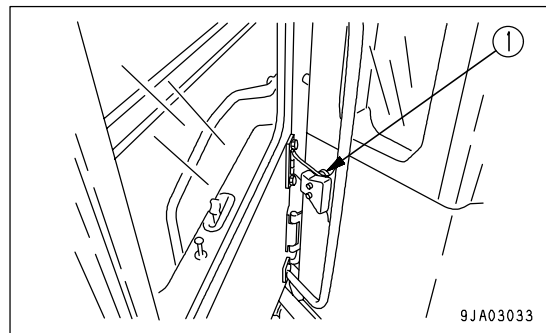
It can be stored in either the left or right battery box.



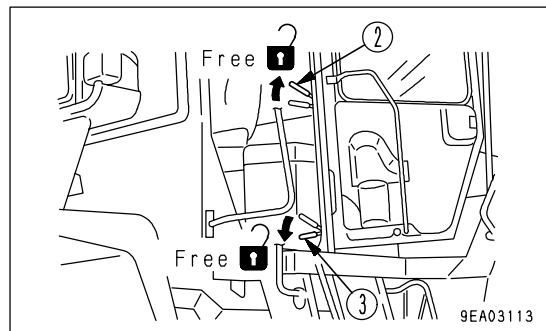
### CAB DOOR OPEN LOCK

When getting in or out of the operator's compartment, or when operating with the door open, use this lock to hold the door in position.

1. Push the door against catch (1) to lock it in position.
2. When attaching the door in position, lock it firmly to the catch.
3. When getting on or off the machine, hold the handrail on the inside.



4. When closing the door from the operator's seat, push lever (2) up to release the catcher.
5. When closing the door after getting off the machine, push lever (3) down to release the catcher.

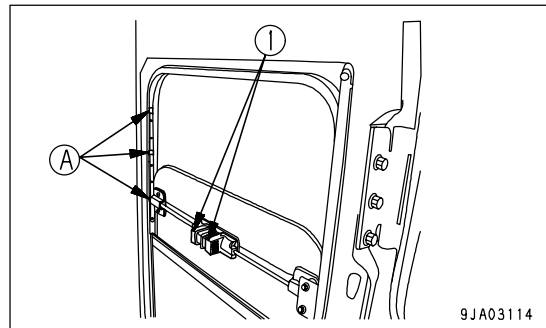


### CAB WINDOW OPEN LOCK CANCEL KNOB

Use this knob when you want to move the door window glass up or down to open or close it.

Grip lock cancel knob (1) to release the lock, and move it down to a lower lock position. Release lock cancel knob (1).

There are 3 points for lock position (A).



## FUSE

### NOTICE

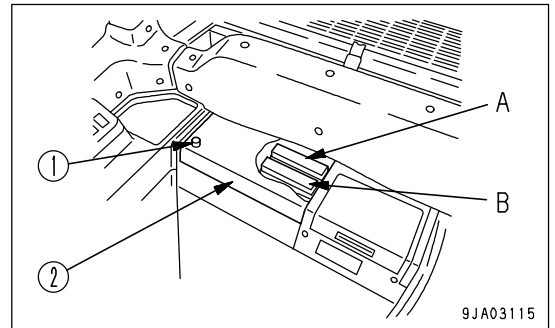
Before replacing a fuse, be sure to turn off the starting switch.

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.

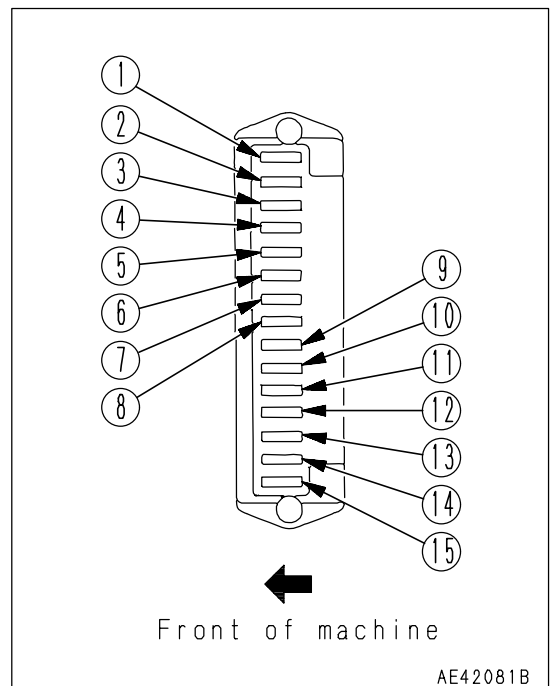
Loosen knob (1) at two places, then remove cover (2). The fuse boxes are A and B.



## FUSE CAPACITY AND NAME OF CIRCUIT

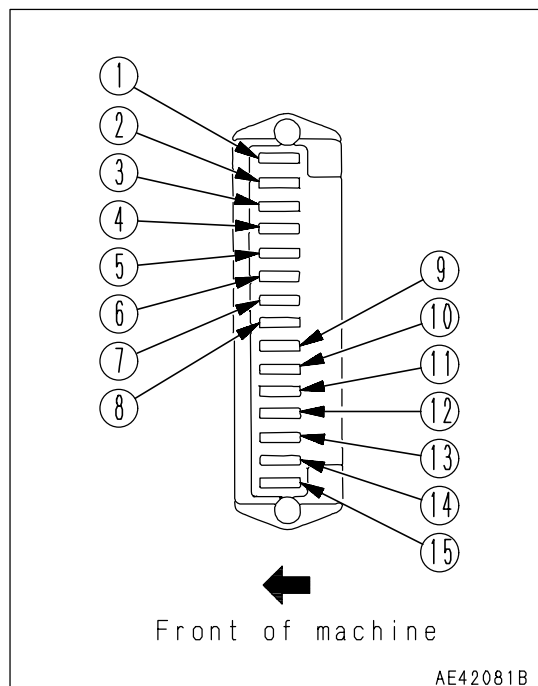
### FUSE BOX A

No.,	Fuse capacity	Name of circuit
(1)	10A	Horn, air suspension
(2)	20A	Transmission control
(3)	10A	Parking brake
(4)	10A	Emergency steering
(5)	20A	Work equipment positioner
(6)	20A	Rear heated wire glass
(7)	20A	Wiper, washer
(8)	10A	Rotating lamp (if equipped)
(9)	10A	(KOMTRAX)
(10)	10A	Backup lamp, brake lamp
(11)	20A	Main lamp circuit
(12)	10A	Right side clearance lamp
(13)	10A	Left side clearance lamp
(14)	10A	Right head lamp
(15)	10A	Left head lamp



**FUSE BOX B**

No.	Fuse capacity	Name of circuit
(1)	20A	Starting switch
(2)	10A	Hazard lamp
(3)	10A	Instrument panel A
(4)	10A	Room lamp
(5)	10A	Spare 1
(6)	20A	Engine controller
(7)	10A	Turn signal indicator
(8)	20A	Front working lamp
(9)	20A	Rear working lamp
(10)	10A	Instrument panel B
(11)	10A	Car radio
(12)	10A	Spare 2
(13)	10A	DC-DC converter
(14)	20A	Air conditioner A
(15)	20A	Air conditioner B

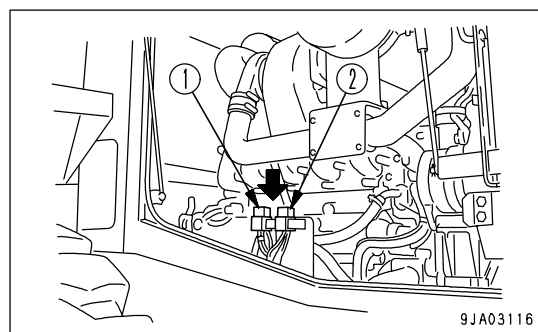


**SLOW BLOW FUSE**

If the power does not come on when the starting switch is turned ON, the slow blow fuse may be blown. Check and replace it. The slow blow fuse is beside the engine on the left side of the machine.

**SLOW BLOW FUSE**

- (1) 120A: Heater relay (electrical intake air heater)  
120A: Main power
- (2) 30A: Battery power (starting switch, hazard)



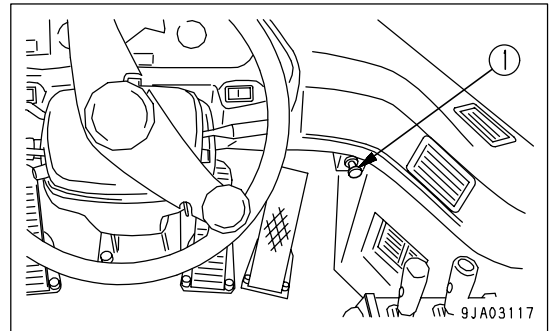
## POWER OUTLET

### NOTICE

- There are two power sources: 12V and 24V  
Check the voltage of the electrical equipment and select the appropriate power source.  
Mistaken use, such as using 24V as the power source for 12V equipment, will cause failure of the equipment.
- When using the electric power source, do not install any equipment which will exceed the maximum amperage.

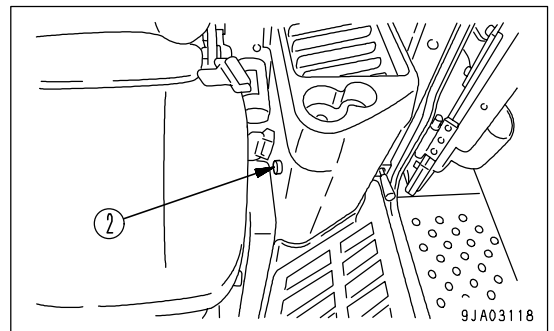
When cigarette lighter (1) is removed, the lighter socket can be used as a 24V power source.

Maximum amperage: 9A (216W)



Electric power source (2) can be used as a 12V power source.

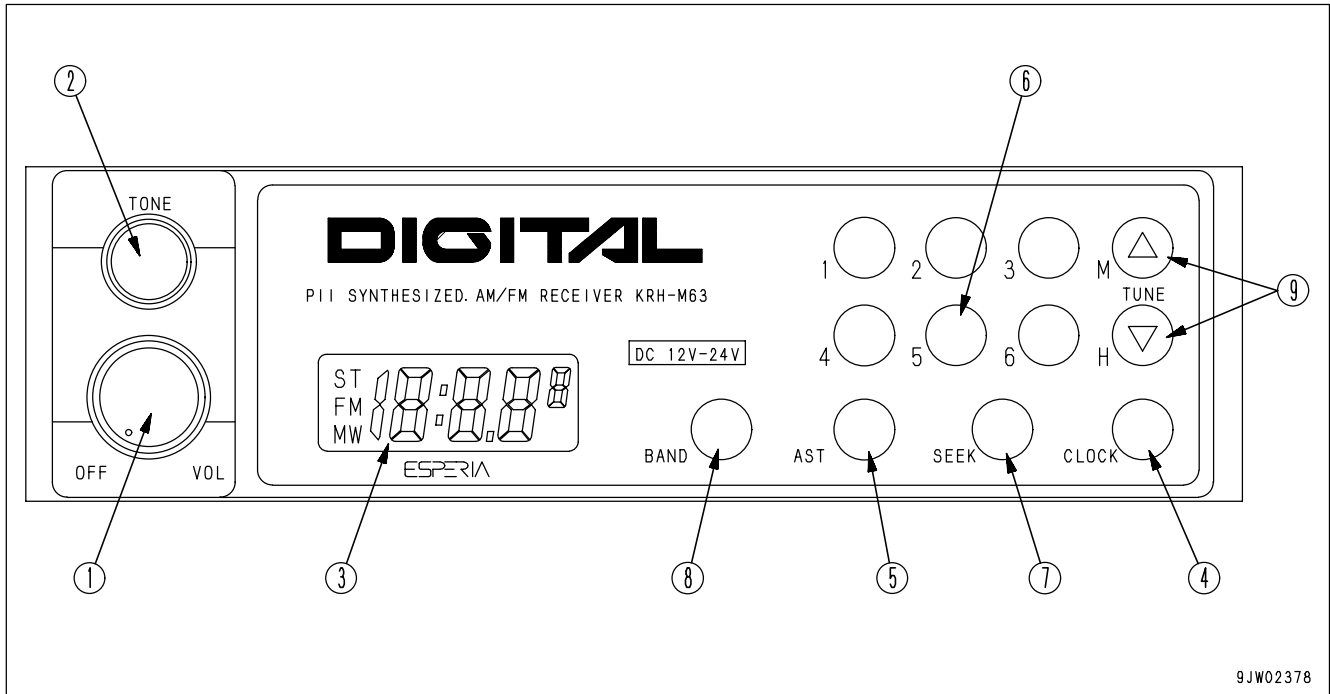
Maximum amperage: 10A (120W)



**AM/FM RADIO**

(Machine equipped with cab) (If equipped)

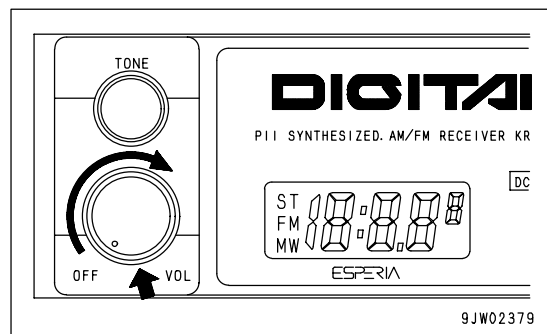
**EXPLANATION OF COMPONENTS**



- |                                       |                          |
|---------------------------------------|--------------------------|
| (1) Power switch/Volume               | (6) Preset switch        |
| (2) Tone control knob                 | (7) Seek                 |
| (3) Display                           | (8) Band selector switch |
| (4) Clock button/Displaying frequency | (9) Tuning switch        |
| (5) AST                               |                          |

**POWER SWITCH/VOLUME**

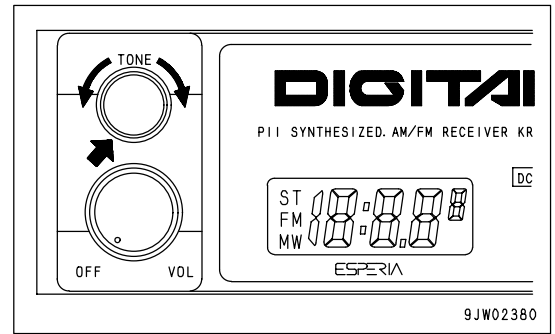
When this switch (1) is turned to the right, it clicks and the power is turned on. If it is turned further, the speaker volume is adjusted.





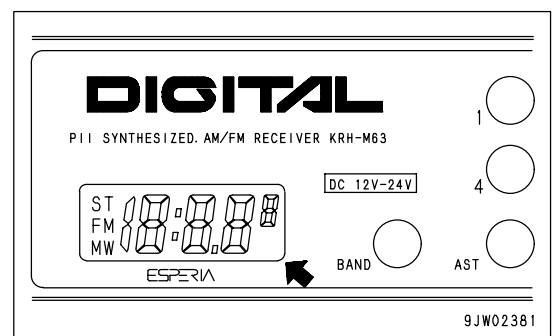
**TONE CONTROL KNOB**

If this knob (2) is turned to the right, the high tone is emphasized;  
if it is turned to the left, the high tone is reduced.



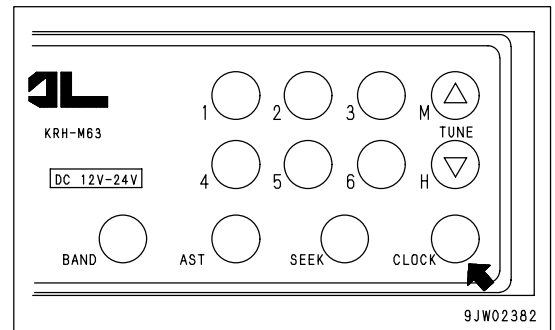
**DISPLAY**

This display (3) shows the radio reception frequency and the operating mode.



**CLOCK BUTTON/DISPLAYING FREQUENCY**

When this button (4) is pressed, the display changes to the time.  
If it is pressed again, it displays the frequency.

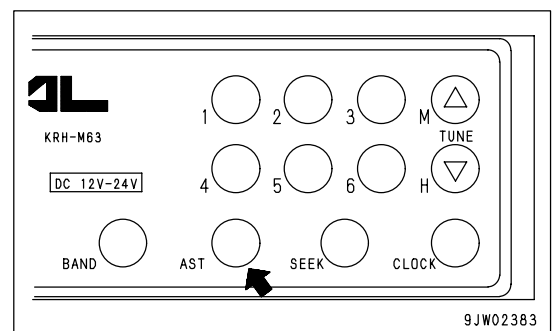


**AST**

When this button (5) is pressed, the preset stations are called up in turn.

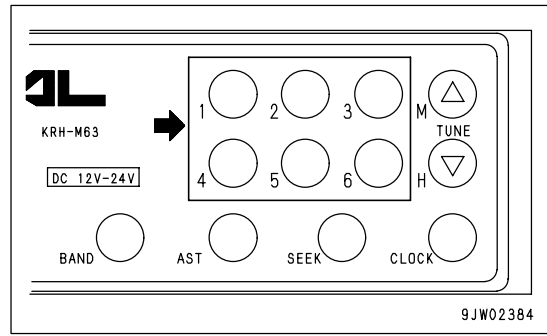
When the desired broadcasting station is reached, press the button again to stop it.

If the button is kept pressed continuously for 2 seconds, it is set to auto memory.



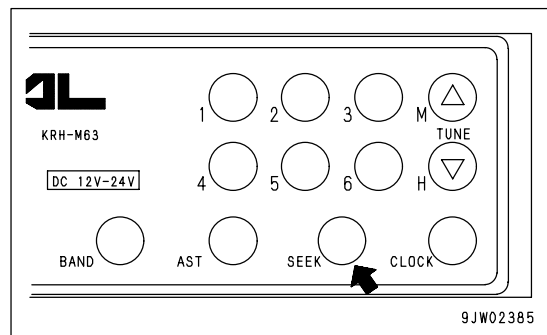
**PRESET SWITCH**

With this switch (6), each button can be preset to one station each for FM and MW (AM). (For details of the method of presetting, see Section "METHOD OF PRESETTING STATION (PAGE 3-68)".)



**SEEK**

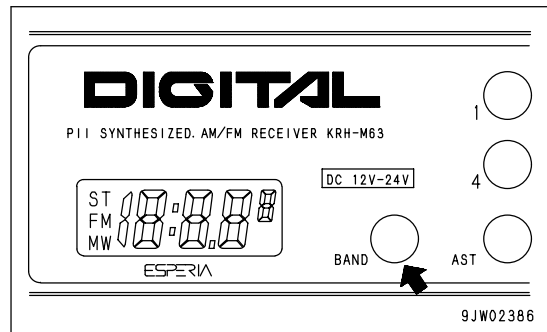
When this switch (7) ("SEEK") is pressed, it automatically searches for stations that can be received, and when it receives a station, it stops.



**BAND SELECTOR SWITCH**

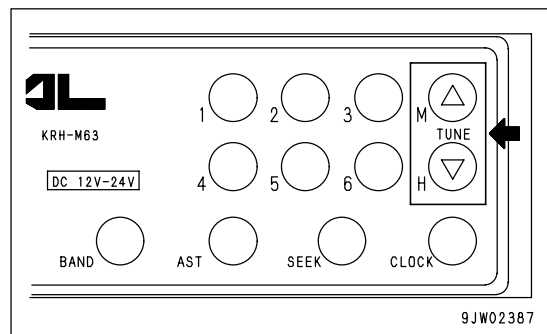
When this switch (8) ("BAND") is pressed, the band is switched between FM and MW (AM).

The reception band and frequency are displayed on the display.



**TUNING SWITCH**

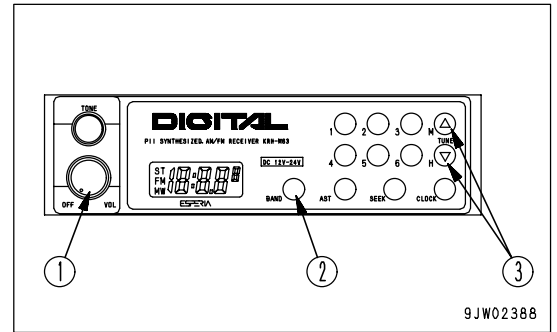
When the "TUNE" button Δ of switch (9) is pressed, the frequency goes up; when the ▽ button is pressed, the frequency goes down. If it is kept pressed, the frequency changes continuously.



**METHOD OF OPERATION**

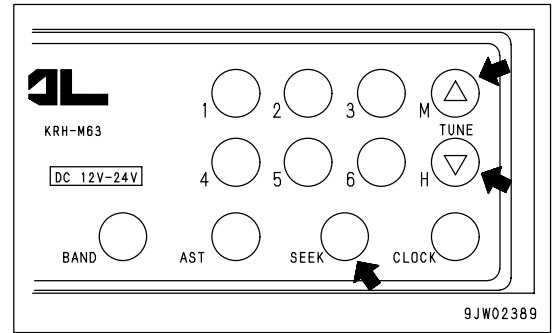
**LISTENING TO RADIO**

1. Turn radio power switch (1) ON.
2. "BAND" switch (2) is used to select MW (AM) or FM.
3. Use the preset switch or tuning switch (3) to select the station.
4. Adjust the volume and tone as desired.
5. To turn the radio OFF, turn VOL knob (1) to the left until a click is heard.



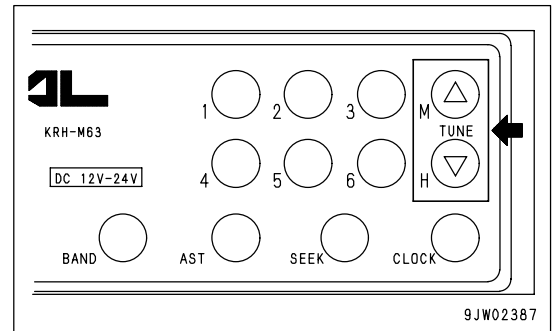
**METHOD FOR SELECTING STATION AUTOMATICALLY**

When the "SEEK" switch is pressed, it moves up to higher frequencies and when it finds a station that can be received, it stops automatically.



**METHOD FOR SELECTING STATION MANUALLY**

When the TUNE button  $\Delta$  is pressed, the frequency goes up; when the  $\nabla$  button is pressed, the frequency goes down. If it is kept pressed, the frequency changes continuously.



**METHOD OF PRESETTING STATION**

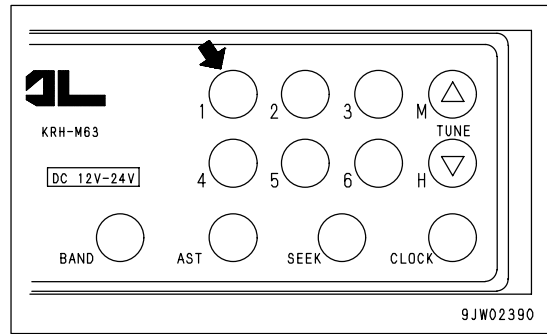
1. Select the desired preset station.

Use the "BAND" button to select MW (AM) or FM, and use the "TUNE" button to select the frequency of the broadcasting station.

2. Decide the number of the button to be preset, and keep it pressed for 2 seconds. The number of the button will be displayed and the presetting is completed.

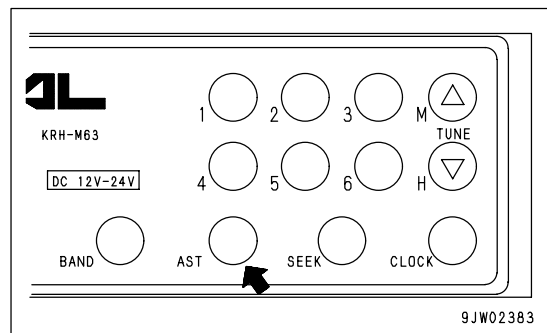
3. Repeat Steps 1 to 2 to preset other broadcasting stations.

- To change the setting of a preset switch to another station, repeat Steps 1 to 2.
- If the battery is replaced or the power is switched off, all the preset settings are deleted. Carry out the presetting operation again.
- It is possible to preset 6 AM (MW) stations and 6 FM stations.



**METHOD OF USING AUTO MEMORY**

If the "AST" button is pressed for 2 seconds, the broadcasting stations that can be received in the area are called up in turn, and the broadcasting stations are automatically saved in the preset memory.

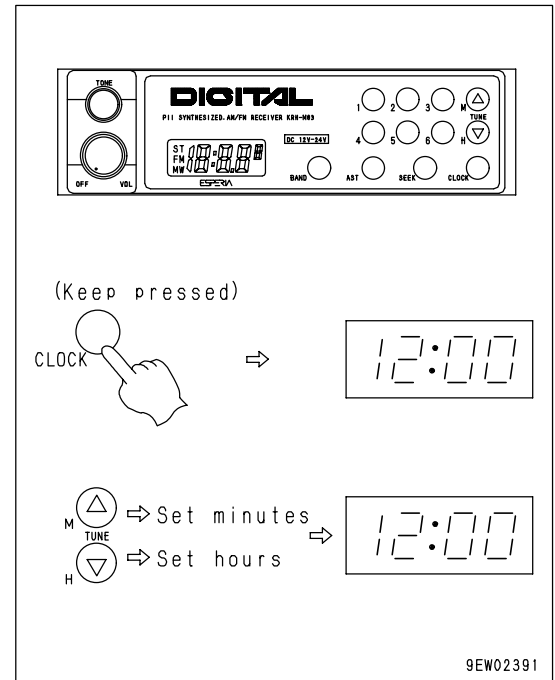


**AUTOMATIC SWITCHING OF MONAURAL/STEREO RECEPTION**

If the reception of the FM stereo broadcast being received is weak (when you are far from the broadcasting station or are surrounded by hills), the radio is automatically switched from stereo to monaural to reduce the interference. When the stereo broadcast becomes stronger, it automatically switches back to stereo broadcasting.

**METHOD OF SETTING TIME**

1. Turn the starting switch ON, then turn radio power source (1) ON. If the display is showing the frequency, press the CLOCK button to display the time.
2. To set the time, keep the CLOCK button pressed and Press the  $\Delta$  button to change the minutes  
Press the  $\nabla$  button to change the hours

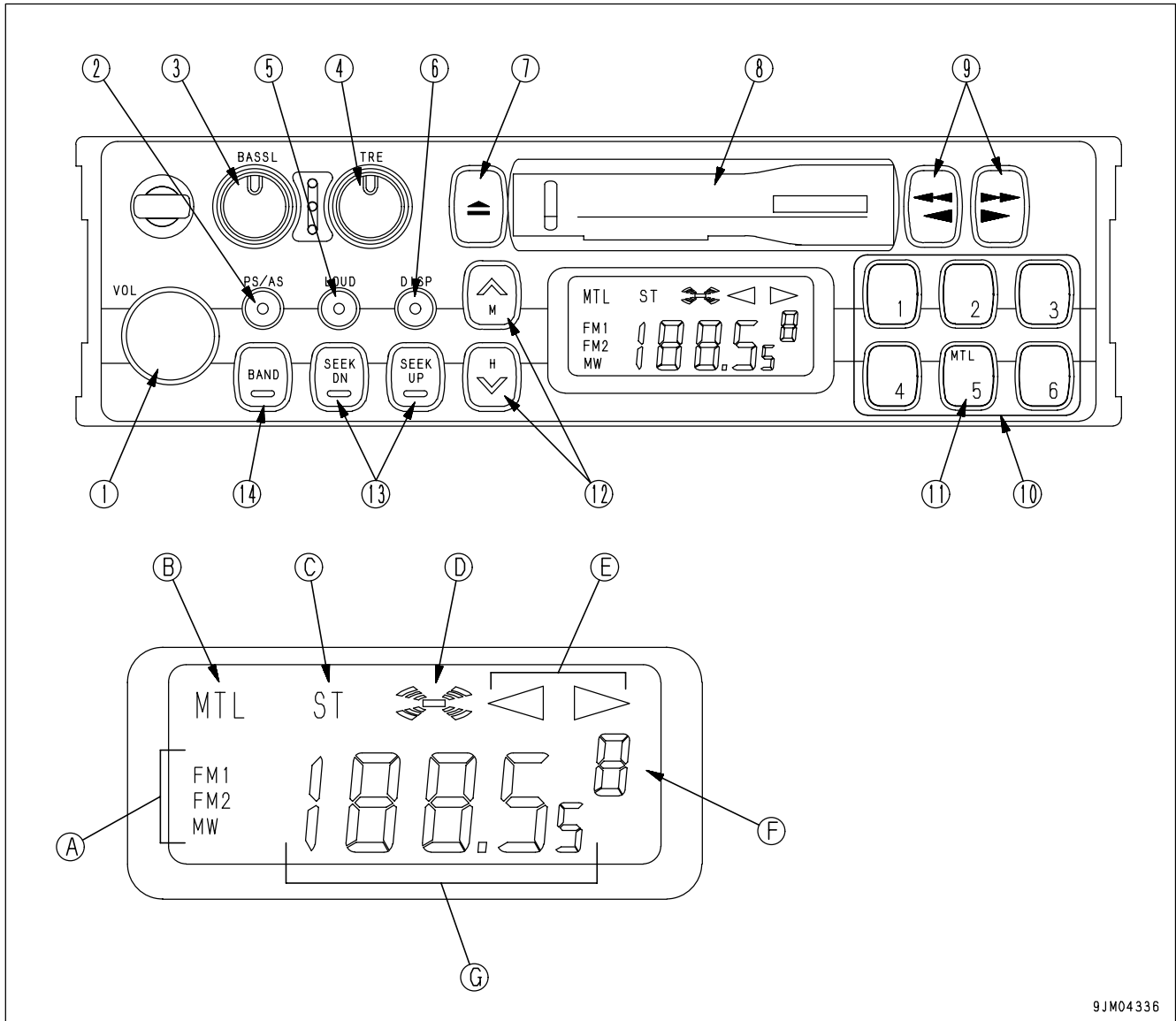
**PRECAUTIONS WHEN USING**

- Stow the antenna when traveling in places with low overhead clearance.
- To ensure safety, always keep the sound to a level where it is possible to hear outside sounds during operation.
- If water gets into the speaker case or radio, it may lead to an unexpected failure, so be careful not to get water on the equipment.
- Do not wipe the scales or buttons with benzene, thinner, or any other solvent. Wipe with a soft dry cloth. Use a cloth soaked in alcohol if the equipment is extremely dirty.

### AM/FM RADIO-CASSETTE STEREO

(Machine equipped with cab) (If equipped)

#### EXPLANATION OF COMPONENTS



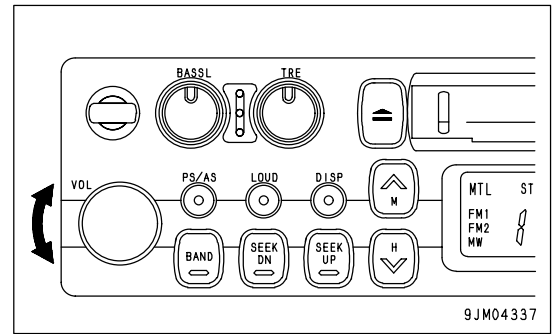
9JM04336

- (1) Power switch/volume
- (2) Auto-store/preset scan button
- (3) Bass control knob
- (4) Treble control knob
- (5) Loudness button
- (6) Time/radio display selector button
- (7) Tape eject button
- (8) Cassette door
- (9) Fast forward, rewind buttons
- (10) Preset buttons
- (11) Metal tape button
- (12) Manual tuning buttons
- (13) Seek tuning buttons
- (14) Band selector button

- (A) Band display
- (B) Metal tape display
- (C) FM stereo reception display
- (D) Loudness display
- (E) Tape direction display
- (F) Preset channel display
- (G) Time/frequency display

**POWER SWITCH/VOLUME**

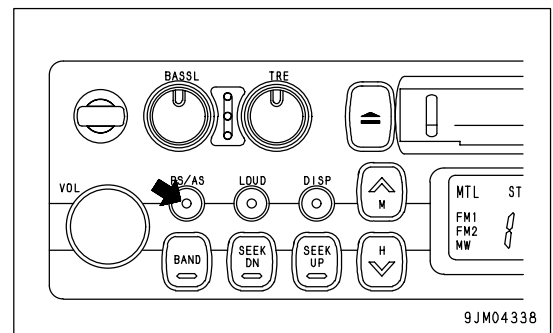
Turn this knob (1) to the right until it clicks to turn the power on.  
Turn it further to increase the volume.



**AUTO-STORE/PRESET SCAN BUTTON**

Use this button (2) to actuate the preset scan and auto-store functions.

- Auto-store  
Each time this button is pressed for more than 2 seconds while in radio reception, this auto-store function automatically starts to search for the desired station within a receivable band, and memorize the frequency in the preset memory. During this scanning process, the frequency shown in the right side of display continues to change. This indicates that each frequency is memorized in the auto-store.



**REMARK**

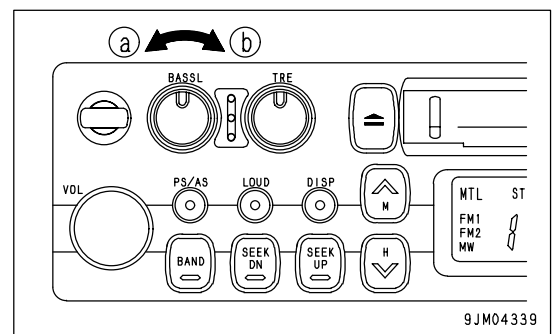
The auto-store function cannot be used when the channel display is flashing.  
When the display is flashing, the preset scan function is being used.

- Preset scan  
If this button is pressed for less than 0.5 second while in radio reception, programs from the six preset stations in the same band will be broadcast one after another for 5 seconds each, starting from No. 1 through No. 6 stations consecutively.  
When the desired station is found, press the button again. This stops the preset scan tuning process and switches to ordinary broadcasting. The same process will be repeated continuously until the button is pressed again.

**BASS CONTROL KNOB**

Turn this button (3) to the left to reduce the low tones; turn it to the right to emphasize the low tones.

- Direction (a): Low tone reduced
- Direction (b): Low tone emphasized

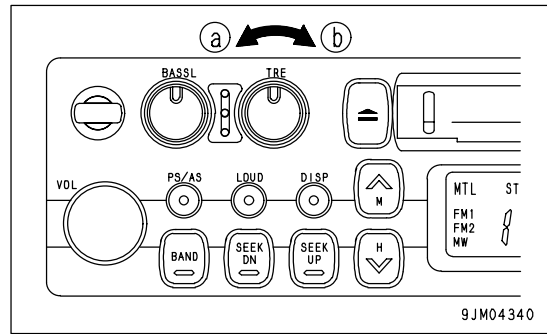


**TREBLE CONTROL KNOB**

Turn this button (4) to the left to reduce the low tones; turn it to the right to emphasize the high tones.

Direction (a): High tone reduced

Direction (b): High tone emphasized

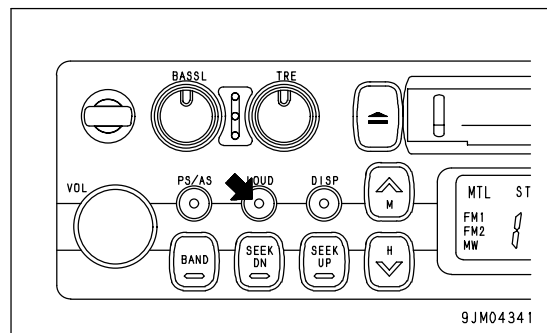


**LOUDNESS BUTTON**

This button (5) is used when playing at low volume. It makes it possible to hear more easily by emphasizing the low tone when the low tones are weak.

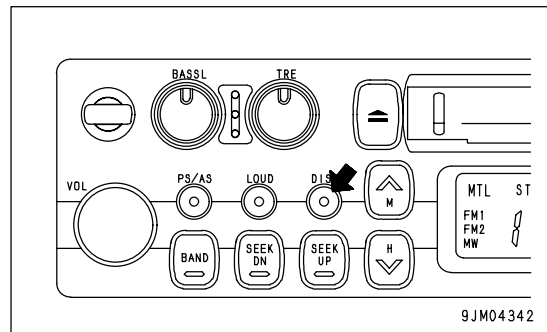
Push button: Actuated (ON)

Push button again: Canceled (OFF)



**TIME/RADIO DISPLAY SELECTOR BUTTON**

This button (6) is used to switch between the "Radio/tape display" and the "Time display".



- Correcting the time

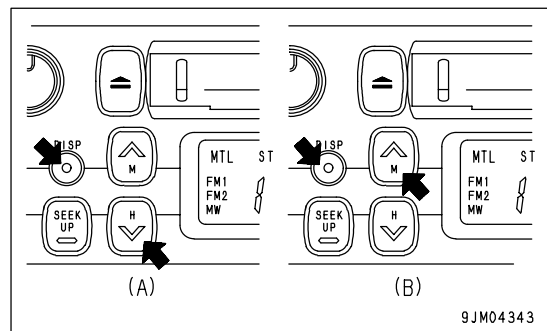
Press the button to set the time display.

(A) Correcting hour:

Keep the DISP button pressed and press the bottom (H) of the TUNING button to correct the hour.

(B) Correcting minute:

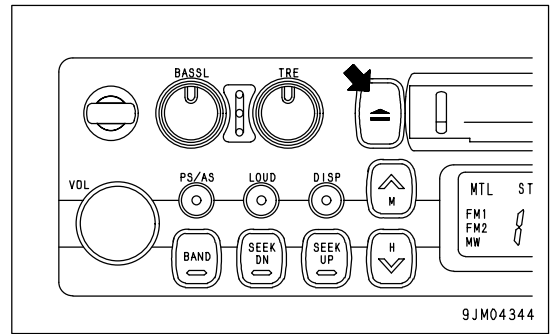
Keep the DISP button pressed and press the top (M) of the TUNING button to correct the minute.





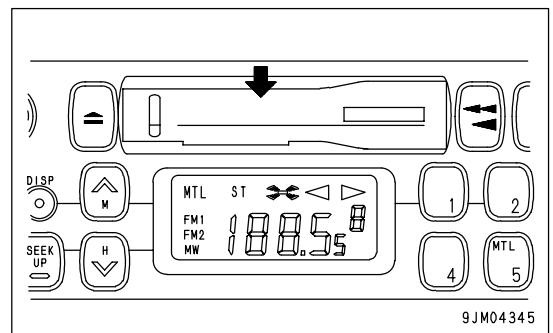
**TAPE EJECT BUTTON**

This button (7) is used to stop the tape and to eject the cassette. When this button is pressed, the tape is ejected and the radio plays.



**CASSETTE DOOR**

Set the cassette with the exposed portion of the tape on the right side and insert it through the cassette door (8).



**FAST-FORWARD, REWIND BUTTONS**

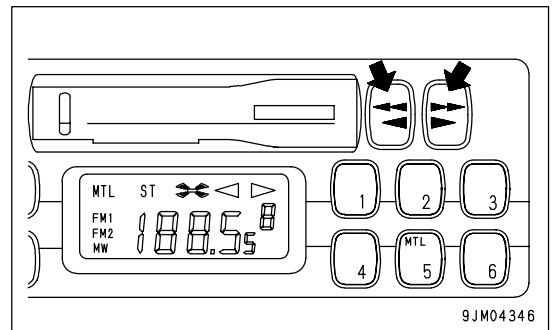
These buttons (9) are used to fast-forward or rewind the tape.

- Fast-forward/rewind

If you press the button pointing in the same direction as the lighted arrow indicating the direction of play, the tape will be fast-forwarded; if you press the button pointing in the opposite direction, the tape will rewind.

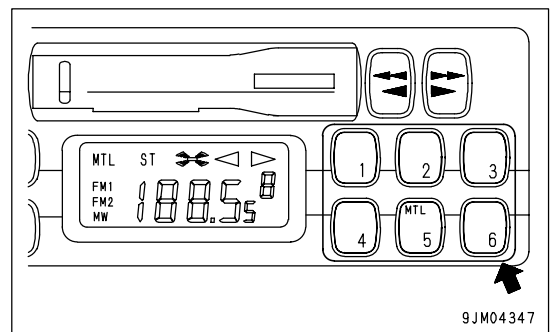
To stop the tape, lightly press the button that is not locked. The fast-forward or rewind operation will be canceled.

If the fast forward and rewind buttons are pressed at the same time, the tape will change sides.



**PRESET BUTTONS**

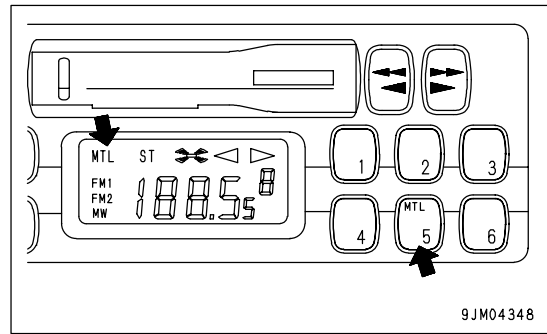
These buttons (10) are used to call up the broadcast station frequencies preset in memory for each of buttons No. 1 to No. 6. It is possible to preset 18 stations (FM: 12; AM: 6) with these buttons.



**METAL TAPE BUTTON**

(used also for preset button No. 5)

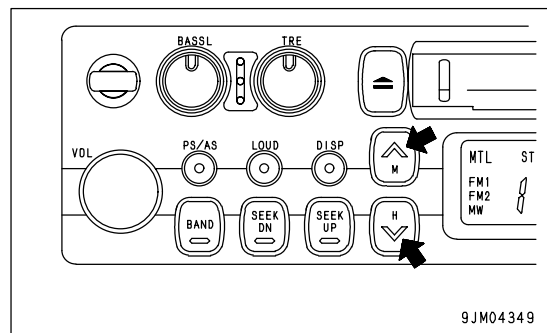
This button (11) is used when playing a metal or chrome tape. This button is also used for preset button No. 5. When it is pressed, "MTL" appears on the display.



**MANUAL TUNING BUTTONS**

These buttons (12) are used for manual tuning.

When "TUN ^" button is pressed, the frequency goes up; when "TUN v" button is pressed, the frequency goes down. If the button is pressed down and held, the frequency will change continuously.

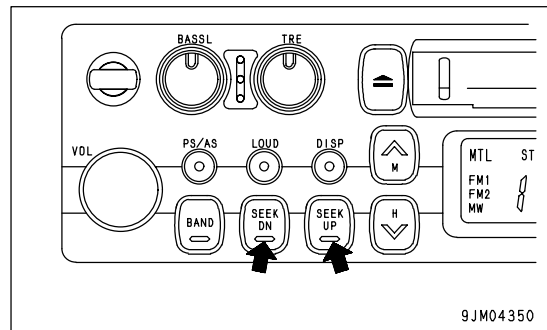


**SEEK TUNING BUTTONS**

These buttons (13) are used to seek tuning.

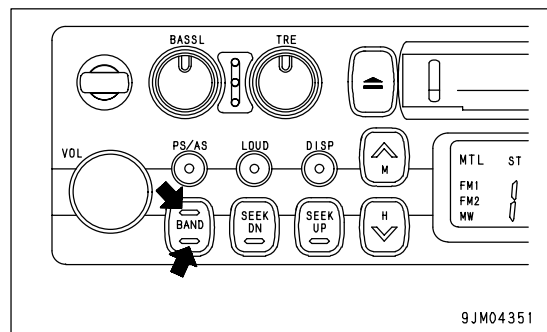
When the "SEEK UP" button is pressed, the search automatically goes up; when the "SEEK DOWN" button is pressed, the search automatically goes down.

When the next station that can be received is found, it automatically stops.



**BAND SELECTOR BUTTON**

When this button (14) is pressed, the band is switched between FM1, FM2, and MW (AM). The band is shown on the display.



**METHOD OF OPERATION**

**METHOD OF SETTING PRESET BUTTONS**

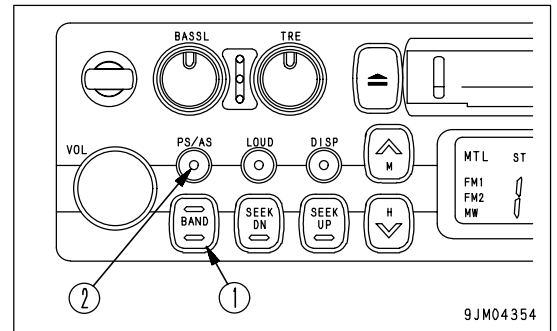
It is possible to preset 6 MW (AM) stations and 12 FM stations (FM1: 6 stations, FM2: 6 stations).

**REMARK**

If you are playing the cassette, press the tape eject button to stop the tape.

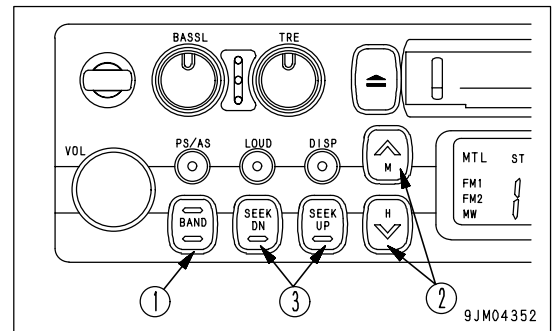
**METHOD OF AUTO PRESET**

1. Use band selector button (1) to select MW (AM), FM1 or FM2.
2. Press auto-store/preset scan button (2) for less than 0.5 second.
3. The preset scan tuning function automatically searches for the desired station within the same band and can memorize as many as 6 stations in the preset memory.



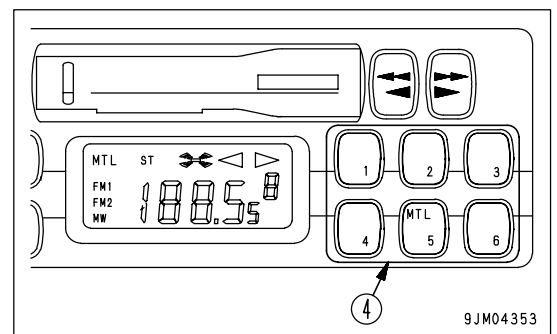
**METHOD OF MANUAL PRESET**

1. Use band selector button (1) to select MW (AM), FM1 or FM2.
2. Press manual tuning buttons (2) or seek tuning buttons (3).
3. Press preset button (4) of the number to be preset for 2 seconds while the frequency display is being shown on the display. (The preset channel and frequency are displayed and the presetting is completed).
4. Repeat the steps explained in Item 2 and 3 above to preset other stations to the subsequent numbers.
5. If you want to preset a station in the other bands, follow the steps explained in Item 1 through 4 above.



**REMARK**

- Also, use Steps 2 and 3 when changing the setting of a preset switch to another station.
- When the power is disconnected, such as when the battery is replaced, all the settings are deleted, so preset the stations again.



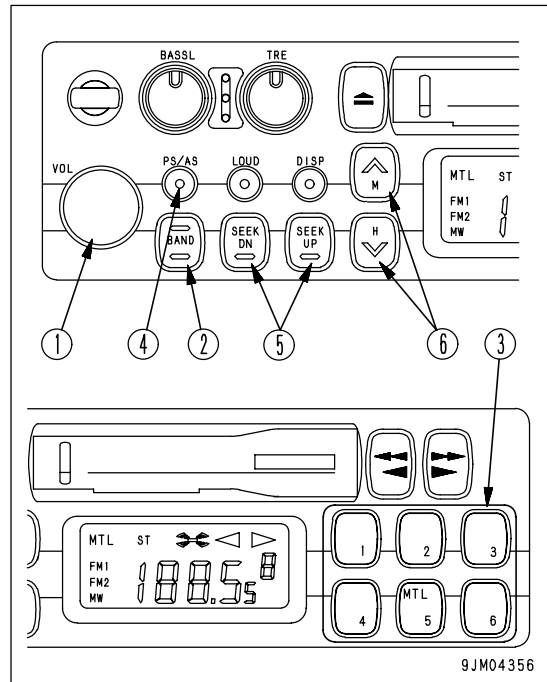
**LISTENING TO RADIO**

1. Turn the starting switch ON, then turn power switch (1) ON.
2. Use band selector button (2) to select MW (AM), FM1 or FM2.
3. Select the station with the preset buttons (3).

**REMARK**

In case you do not promptly remember the number assigned to a certain preset station, press auto-store/preset scan button (4) for less than 0.5 second. The preset 6 stations will broadcast one after another for 5 seconds each. When the desired station broadcasts, press the button again and scan tuning stops.

4. If you want to tune in to a station that is not preset, use either seek tuning button (5) or manual tuning button (6).
5. Adjust the volume, balance, and tone as desired.
6. When turning the radio OFF, turn power switch (1) to the left until it clicks.



**REMARK**

- To switch to the radio when listening to a cassette, press the cassette eject button to stop the tape.
- If you insert a cassette when listening to the radio, the tape will start to play.

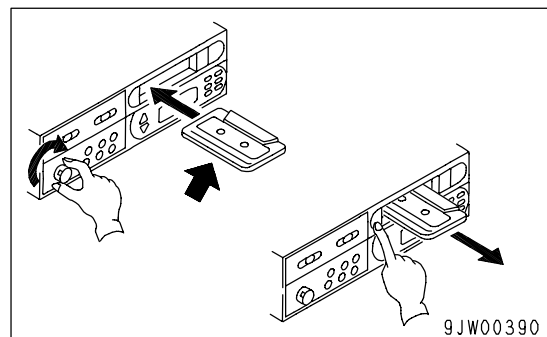
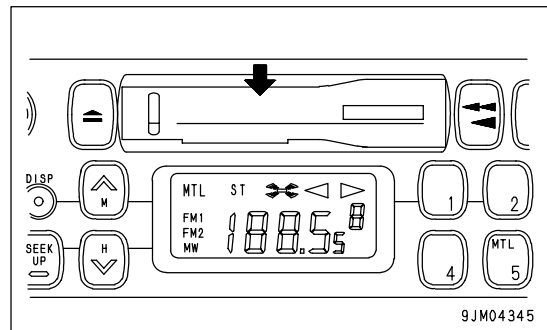
**LISTENING TO CASSETTE TAPE**

1. Turn the starting switch ON, then turn power switch (1) ON.
2. Set the cassette with the exposed portion of the tape on the right side and push it past the cassette door. The tape will automatically start playing.

If the arrow indicating the direction of play is pointing to the right, the top side is being played; if the arrow is pointing to the left, the bottom side is being played.

When the tape reaches the end, it is automatically reversed and the other side starts to play.

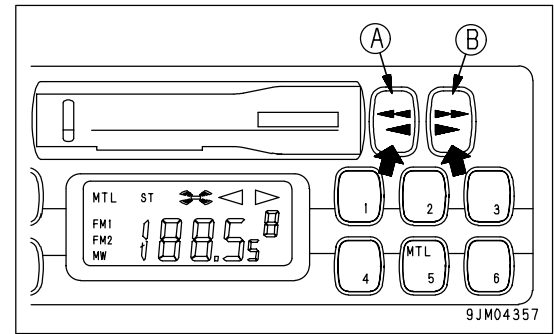
3. When finished with the tape, press the cassette eject button to eject the tape and automatically switch to the radio.



**REVERSING TAPE**

When listening to the tape, press both FAST FORWARD, REWIND buttons (A) and (B) at the same time lightly.

When this is done, the tape direction display will be reversed.

**PRECAUTIONS WHEN USING****WARNING**

- If a voltage greater than the specified voltage is input, it may cause fire, electrocution, or other failure. Never input any voltage other than the specified voltage.
- Places inside the radio are under high voltage. Do not remove the cover.
- Do not carry out any modifications. This may cause fire, electrocution, or other failure.
- If the sound cannot be heard, nothing is displayed, or any other problem occurs, turn off the power switch and ask your Komatsu distributor to make repairs without delay.

- Stow the antenna when traveling in places with low overhead clearance.
- To ensure safety during operations, keep the volume at a level where it is possible to hear other machines.
- If water gets inside the speaker case or radio (auto tuning), it may cause a serious problem, take care not to let water get in these items.
- Do not wipe the scales or buttons with benzene, thinner, or any other solvent. Wipe with a soft dry cloth. Use a cloth soaked in alcohol if the equipment is extremely dirty.

**NOTICE****Handling cassette tape**

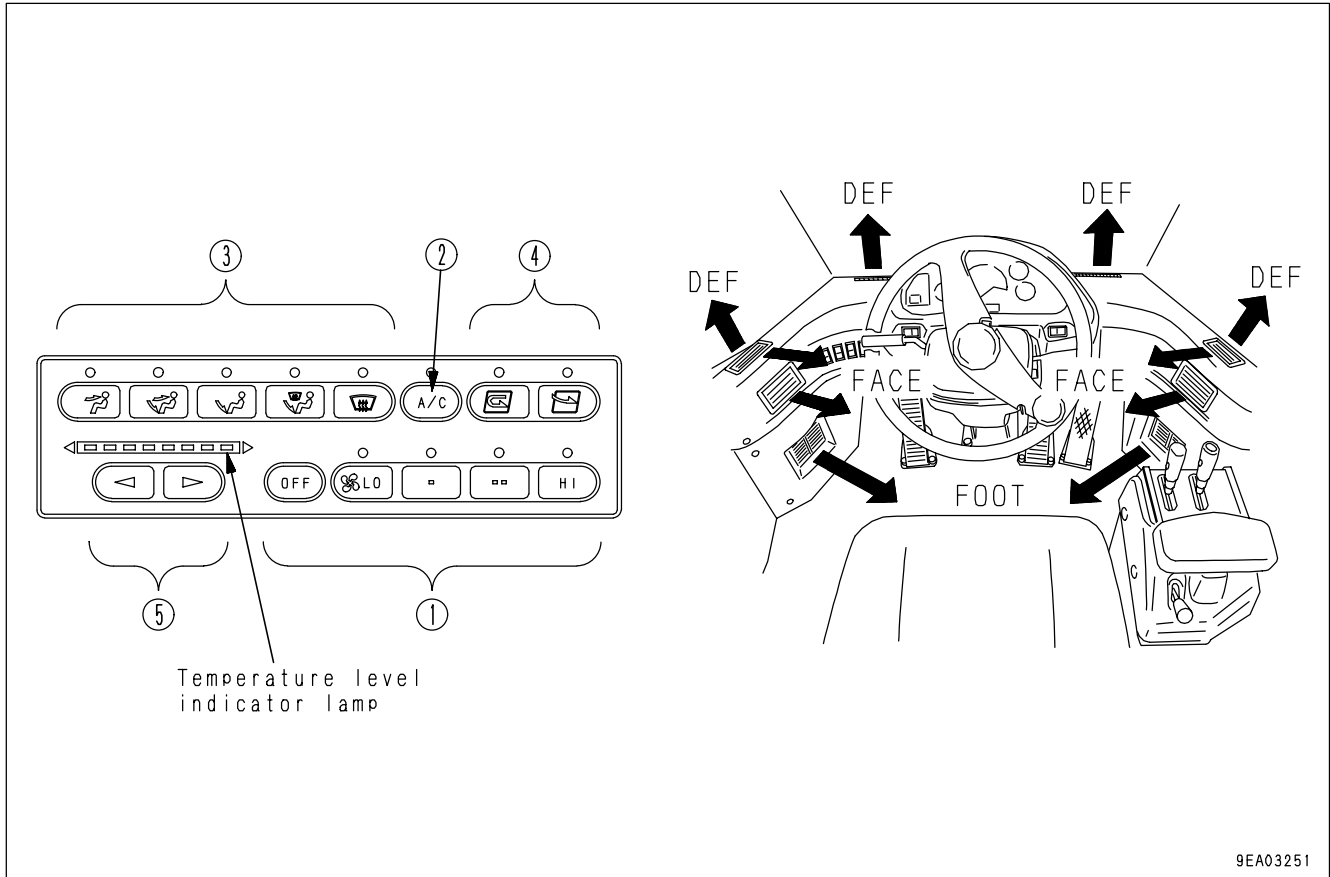
- Clean the tape head approx. once a month with a commercially available head cleaning tape.
- Do not leave the tape any place where it is exposed to direct sunlight, any place that is excessively dusty, or any place where there is a magnetic field.
- Do not use 120-minute tapes. The tape is thin and it easily gets caught up inside the machine.
- If the tape is slack, it easily gets caught up inside the machine. Use a pencil to wind in the tape to remove any slack.
- Do not use any cassette tape if the label has started to come off. It may cause defective rotation, or it may be impossible to get the tape out of the machine.

### AIR CONDITIONER

(Machine equipped with cab) (If equipped)

By taking fresh air into the cab through a filter, it is possible to raise the pressure inside the cab. This makes it possible to provide a pleasant working environment even on dusty jobsites.

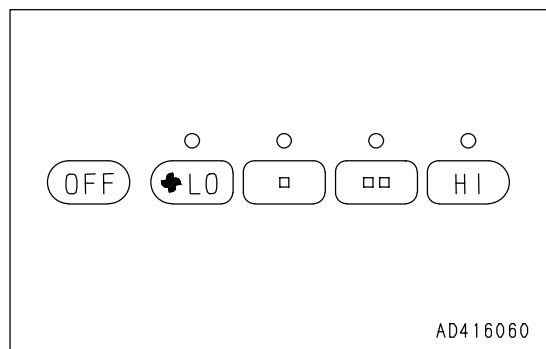
### GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL



- (1) Fan switch
- (2) Air conditioner switch
- (3) Mode selector switch
- (4) FRESH/RECIRC selector switch
- (5) Temperature control switch

### FAN SWITCH

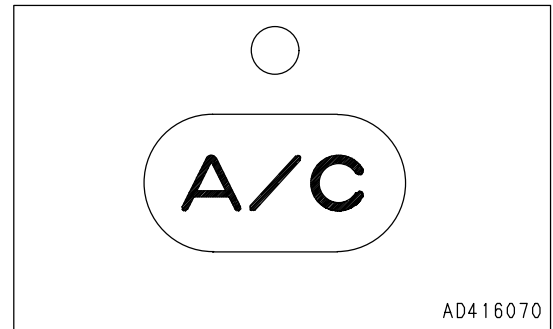
This switch (1) can be used to adjust the airflow in four stages. It also acts as the main switch for the air conditioner. When the OFF switch is pressed, the fan stops. When the switch is pressed, the indicator lamp above the switch lights up to display the airflow.



**AIR CONDITIONER SWITCH**

This switch (2) is used to start or stop the cooling or dehumidifying function.

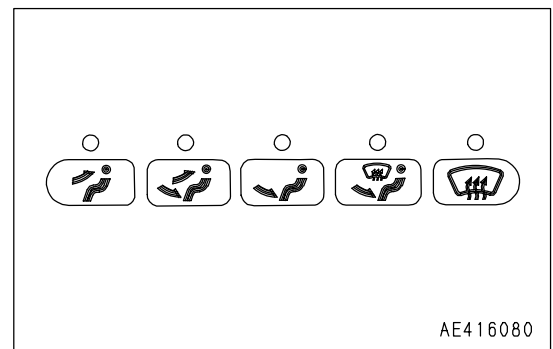
When the fan switch is turned ON and the air conditioner switch is pressed, the indicator lamp above the switch lights up. When the switch is pressed again, the switch is turned OFF and the indicator lamp goes out.

**MODE SELECTOR SWITCH**

This switch (3) is used to select the vents.

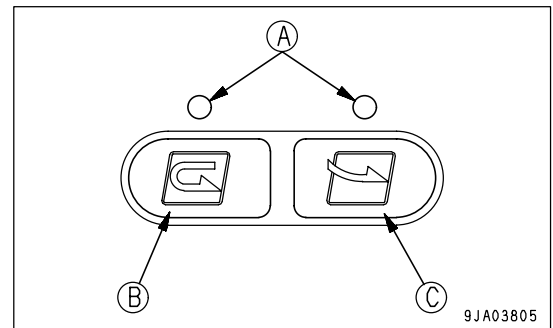
The following five vent modes are available: FACE, FACE/FOOT, FOOT, FOOT/DEF, DEF.

When the switch is pressed, the indicator lamp above the switch lights up to display the vent mode.

**FRESH/RECIRC SELECTOR SWITCH**

This switch (4) is used to select between recirculation of the air inside the cab or intake of fresh air from outside.

When the switch is pressed, indicator lamp (A) at the top of the switch lights up.

**Recirculation of air inside cab**

Press this switch (B) to use only the air inside the cab. Use this position to carry out rapid heating or cooling of the cab or when the outside air is dirty.

**Intake of fresh air from outside**

Press this switch (C) to carry out heating or cooling with fresh air taken in from the outside. Use this position when fresh air is taken in from outside the cab, or when removing the mist from the cab windows.

**REMARK**

When fresh air is taken into the cab, air pressure in the cab increases, which prevents the dust from entering. When neither heating nor cooling is needed, bring in clean fresh air, with your preferred air flow, to prevent dust from entering the cab.

### TEMPERATURE CONTROL SWITCH

The temperature can be adjusted with this switch (5) by pressing and holding the up or down button.

The temperature level indicator lamps (A) light up to display the temperature of the air coming from the vents.

The more blue lamps on, the lower the temperature is.

The color of the indicator lamp (A) changes while the switch is being pressed.

When the temperature reaches the desired level, release the switch to set the temperature.

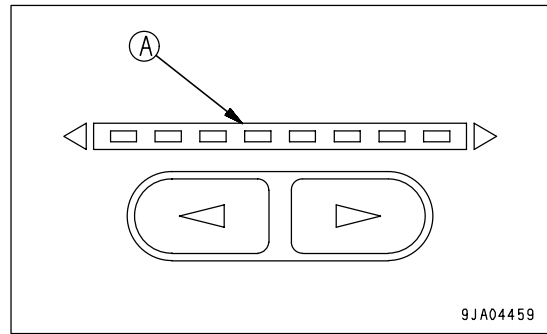
The settings for each mode are retained in memory even when the starting switch is turned OFF.

However, in the following cases, the settings must be reset.

- When the machine has been out of use for more than 7 days
- When the battery voltage is extremely low
- When there has been abnormal interference from outside
- When the fan switch is turned OFF (the setting is not kept in memory with only the air conditioner switch)

If the air conditioner is used in the FRESH position, the inside of the cab will be pressurized and this will prevent the entry of dust.

The higher the position of the fan switch, the more effective the pressurizing becomes.

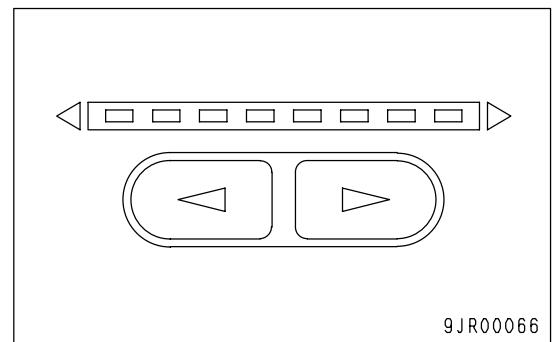




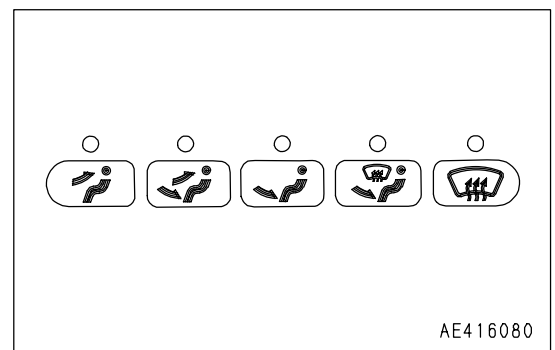
**METHOD OF OPERATION**

Switch		Fan switch	Air conditioner switch	Temperature control switch	FRESH/RECIRC selector switch	Mode selector switch
		Condition of use				
Cooling	Rapid	HI	ON	All blue	RECIRC	FACE
	Normal	HI - LO	ON	More than half are blue	FRESH	FACE
Dehumidifying, heating		HI - LO	ON	More than half are red	FRESH	FOOT
Heating	Rapid	HI	OFF	All red	RECIRC	FOOT
	Normal	HI - LO	OFF	More than half are red	FRESH	FOOT
Defroster		HI	ON	More than half are red	FRESH	DEF
Ventilation or pressurizing		HI - LO	OFF	All blue	FRESH	FACE

When defrosting, set the temperature control switch so that all lamps are red. This will improve defrosting and demisting.



Set the vent mode selector switch to the intermediate position to give the desired condition. With the FACE vents, it is possible to adjust the direction of the air flow and to turn it on or off. However, do not set to the FACE mode with the vents closed.



**WHEN NOT USING THE AIR CONDITIONER REGULARLY**

Run the air conditioner in cooling or dehumidification + heating mode for several minutes from time to time to prevent the loss of the oil film in various parts of the compressor.

**REMARK**

If the temperature inside the cab is low, the air conditioner may not work. In such cases, use the recirculated air to warm up the inside of the cab, then turn the air conditioner switch on. The air conditioner will be run.

**COOL BOX**

When the cooling is being used, this can be used for keeping drinks and other things cool.

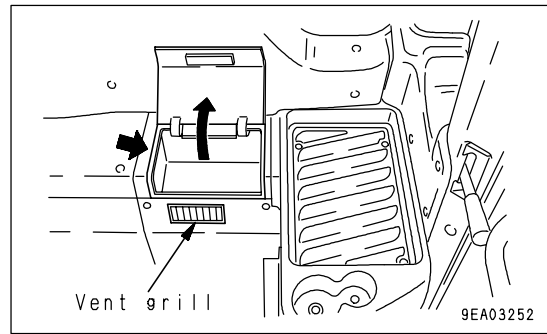
When the heating is being used, it can be used to keep things warm.

When using the box, open the vent grill.

When not using the box, close the grill.

Do not use the cool box for things which smell or leak water or break easily.

Do not use it as a holder for tools or other small objects.

**PRECAUTIONS WHEN USING****PRECAUTIONS WHEN USING THE COOLING**

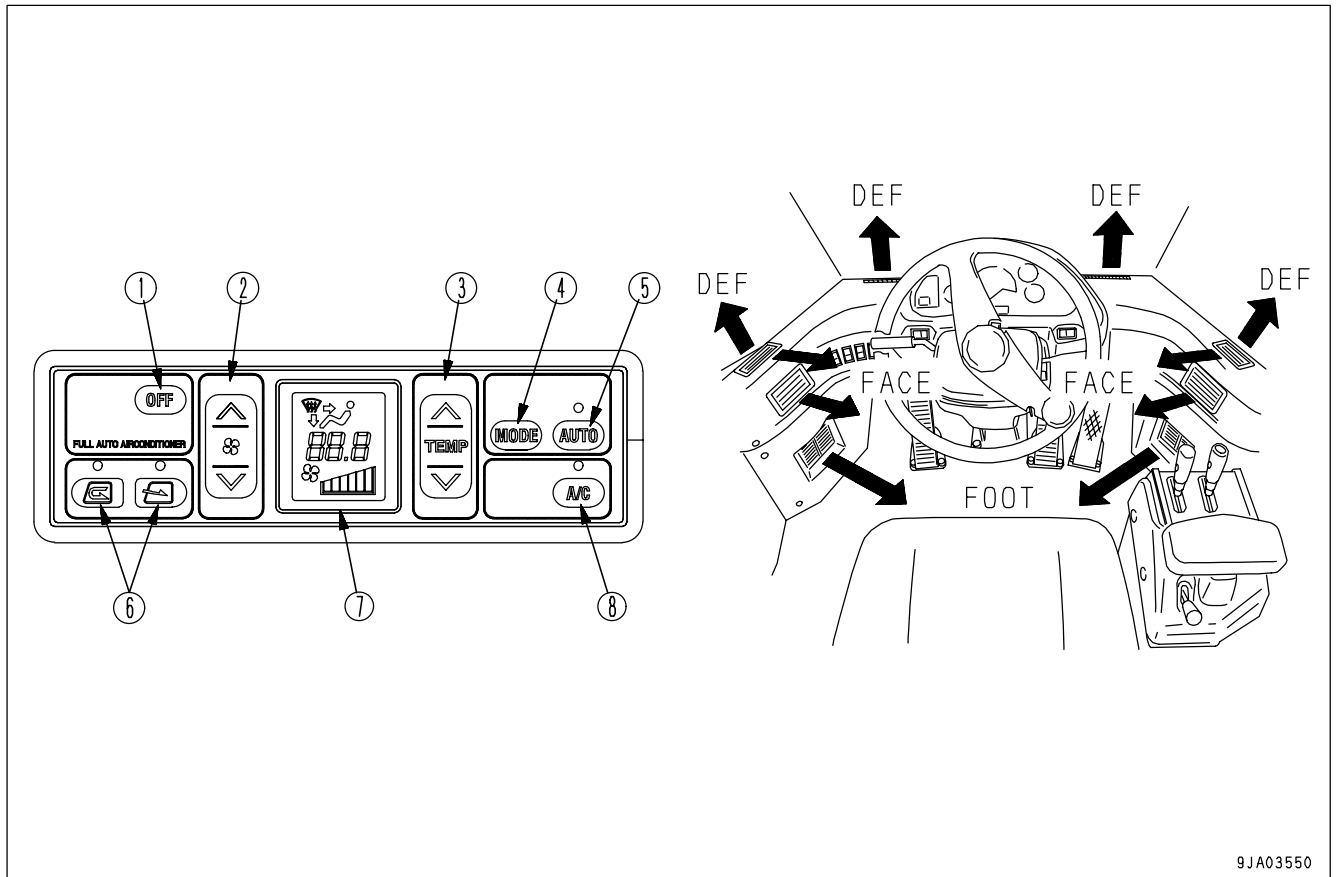
- If you smoke when using the air conditioner in the RECIRC mode, your eyes may start to itch or burn. Ventilate the cab ever so often to remove the smoke.
- When using the air conditioner for a long period of time, carry out ventilation process at least once every hour. When using the air conditioner, it is recommended for health reasons, that it should only feel slightly cooler (5 or 6 °C (9 or 10.8°F) lower than the outside temperature) when you enter the cab. Therefore, adjust the temperature to a suitable level.

### HANDLING AUTO AIR CONDITIONER

(Machine equipped with cab) (If equipped)

By taking fresh air into the cab through a filter, it is possible to raise the pressure inside the cab. This makes it possible to provide a pleasant working environment even on dusty jobsites.

### NAMES AND FUNCTIONS OF ITEMS ON CONTROL PANEL



- |                                |                                  |
|--------------------------------|----------------------------------|
| (1) OFF switch                 | (5) Auto switch                  |
| (2) Fan switch                 | (6) RECIRC/FRESH selector switch |
| (3) Temperature control switch | (7) Monitor panel                |
| (4) Mode selector switch       | (8) Air conditioner switch       |

Even when the starting switch is turned OFF, the mode settings are retained in memory.

#### OFF SWITCH

This switch (1) turns the fan OFF.

- When OFF switch (1) is pressed, the set temperature and air flow displays on machine monitor (7) and the lamp at the top of auto switch (5) go out.

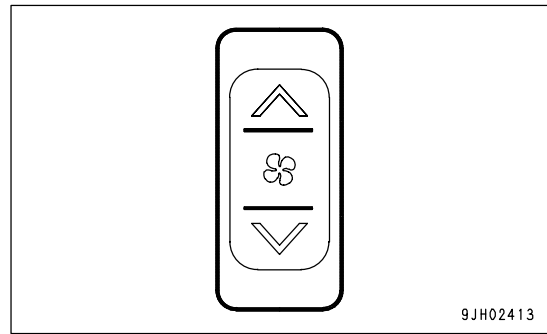


**FAN SWITCH**

Switch (2) is used to adjust the air flow.

The air flow can be adjusted to six levels.

- Press the ^ switch to increase the air flow; press the v switch to reduce the air flow.
- When the fan switch is pressed, the lamp at the top of the auto switch goes out.
- During auto operation, the air flow is automatically adjusted.



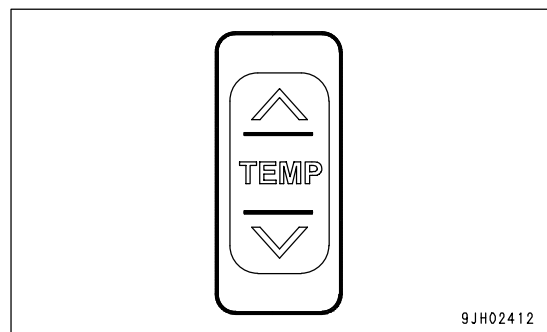
**<Monitor display and air flow>**

Liquid crystal display	Air flow
	Air flow "low"
	Air flow "medium 1"
	Air flow "medium 2"
	Air flow "medium 3"
	Air flow "medium 4"
	Air flow "high"

**TEMPERATURE CONTROL SWITCH**

Switch (3) is used to control temperature inside the cab. The temperature can be set between 18°C (64.4°F) and 32°C (89.6°F).

- Press the ^ switch to raise the set temperature; press the v switch to lower the set temperature.
- The temperature is generally set at 25°C (77°F).
- The temperature can be set in stages of 0.5°C (0.9°F).



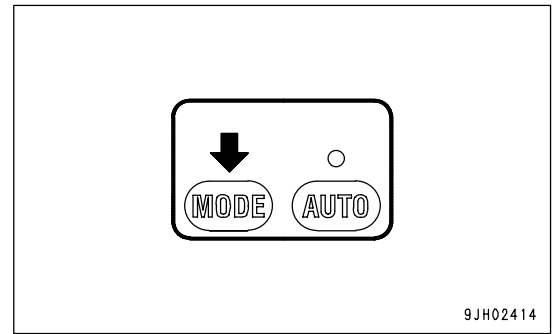
**<Monitor display and the function>**

Monitor display (°C)	Set temperature
18.0	Max. cooling
18.5 to 31.5	Adjusts temperature inside cab to set temperature
32.0	Max. heating

**MODE SELECTOR SWITCH**

Switch (4) is used to select the vents.

- The vent position can be selected from five modes: FACE, FACE/FOOT, FOOT, FOOT/DEF, DEF.
- When this switch (4) is pressed, the display on monitor panel (7) changes in turn, and the air blows out from the vents shown in the display.
- During automatic operation, the vents are automatically selected.

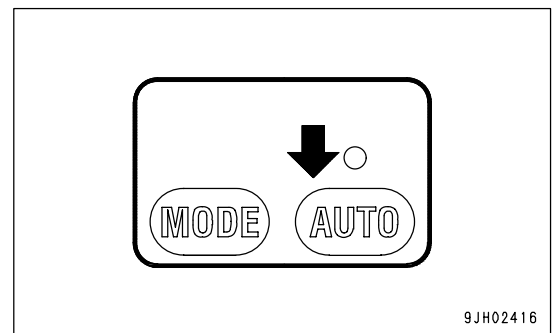


**AUTO SWITCH**

With switch (5), the air flow, vents, and air source (RECIRC/FRESH) are automatically selected according to the set temperature.

This switch also acts as the air conditioner main switch.

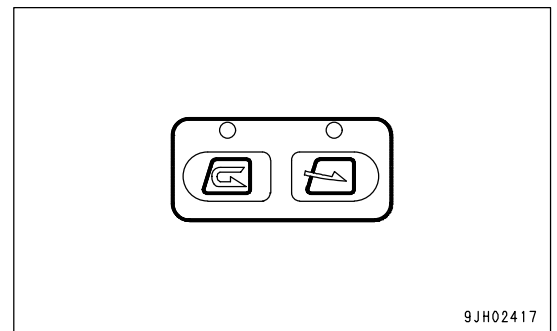
- When auto switch (5) is pressed, the lamp at the top of the auto switch lights up and the auto mode is displayed.
- When the fan switch is pressed, the lamp at the top of the auto switch goes out.
- Press switch (5), then use temperature control switch (3) to set the temperature, and run the air conditioner under automatic control.
- When the control is switched from automatic operation to manual operation, it is possible to operate the to change air flow, vents, and air source (RECIRC/FRESH). When manual control is used, lamp above the auto switch goes out.



**RECIRC/FRESH SELECTOR SWITCH**

Switch (6) is used to switch the air source between recirculation of air inside the cab and intake of from the outside.

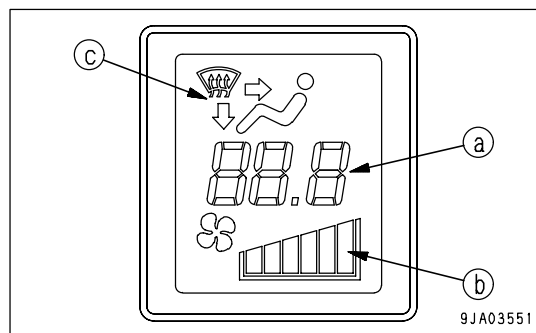
- When switch (6) is pressed, the lamp above the selector switch lights up to show that air is being blown out.
- During automatic operation, the selection of inside air (RECIRC) and outside air (FRESH) is performed automatically.



RECIRC	Outside air is shut off and only air inside the cab is circulated. Use this setting to perform rapid cooling of the cab or when outside air is dirty.
FRESH	Outside air is taken into the cab. Use this setting to take in fresh air when performing demisting.

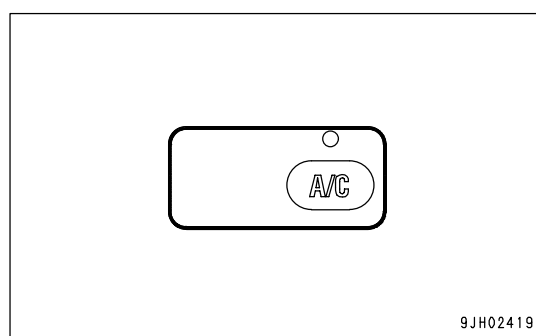
**MONITOR PANEL**

The monitor panel shows the temperature setting (a), air flow (b), and vent selection (c).

**AIR CONDITIONER SWITCH**

Switch (8) is used to turn the air conditioner (cooling, dehumidifying, heating) ON or OFF.

- When the auto switch or fan switch is turned ON and air conditioner switch (8) is pressed, the air conditioner is switched ON, the lamp at the top of the air conditioner switch lights up, and the air conditioner starts. When it is pressed again to the OFF position, the lamp at the top of the air conditioner switch goes out.
- Air conditioner cannot be operated while the fan is off.



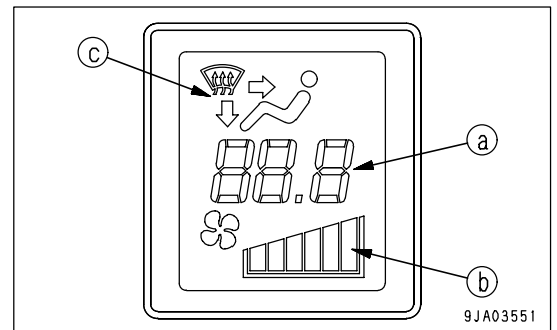
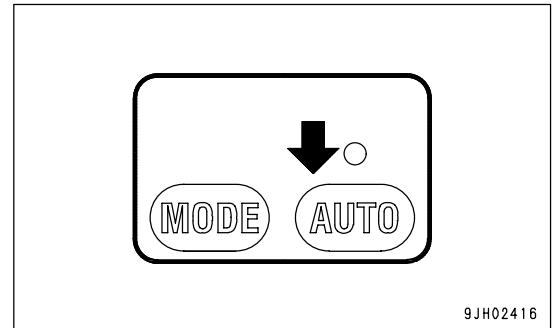
**CONTROL METHOD**

The air conditioner can be operated automatically or manually. Select the method of operation as desired.

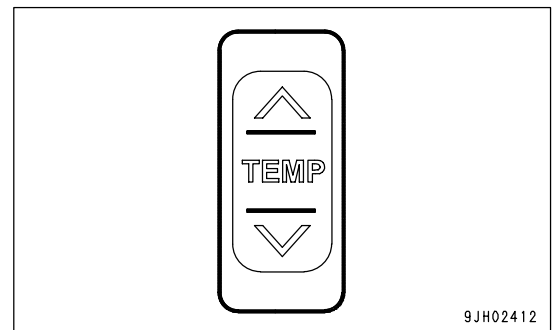
**AUTOMATIC WARMING-UP**

1. Turn auto switch (5) ON.

- The lamp above switch (5) lights up.
- The set temperature (a) and air flow (b) are displayed on the monitor.



2. Operate temperature control switch (3) to set to the desired temperature. The air flow, vents, and air source (RECIRC/FRESH) are selected automatically and the air conditioner is run automatically to bring the temperature to the set temperature.



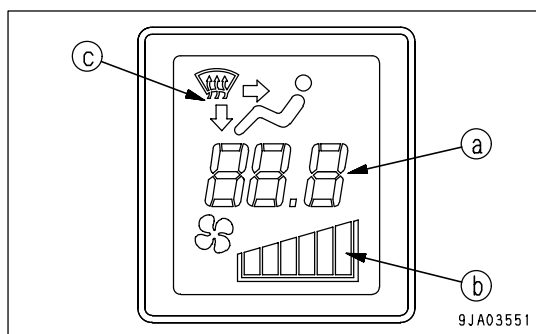
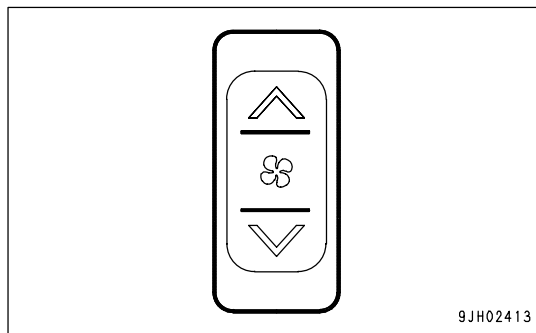
**STOPPING AUTOMATIC WARMING-UP**

Press OFF switch (1). The display of the set temperature (a) and air flow (b) on the monitor panel, and the lamps at the top of auto switch (5) and air conditioner switch (8) go out, and the air conditioner stops.

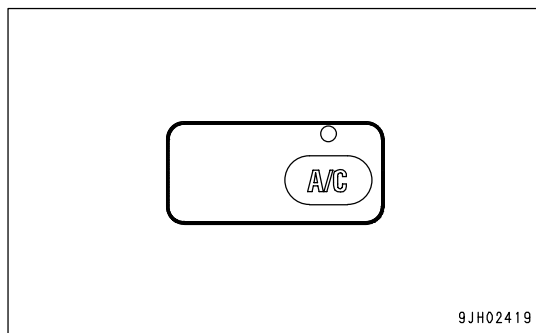


**MANUAL OPERATION**

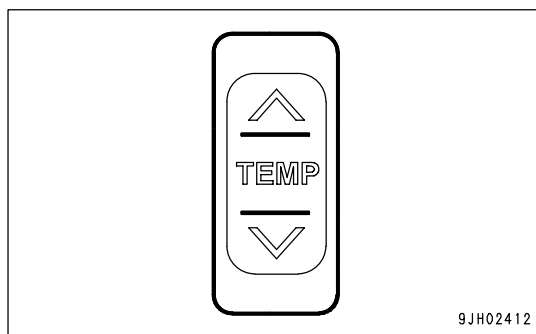
1. Press fan switch (2) and select the air flow. Check that the set temperature (a) and air flow (b) are displayed on the monitor panel.



2. Turn air conditioner switch (8) ON. Check that the lamp above air conditioner switch lights up.

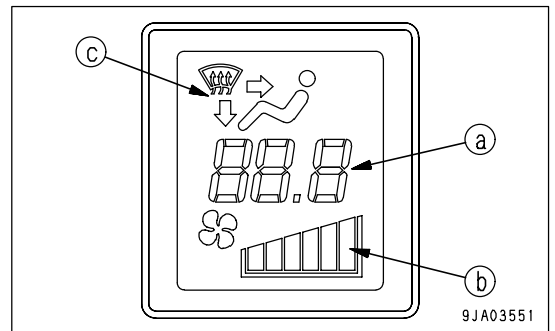
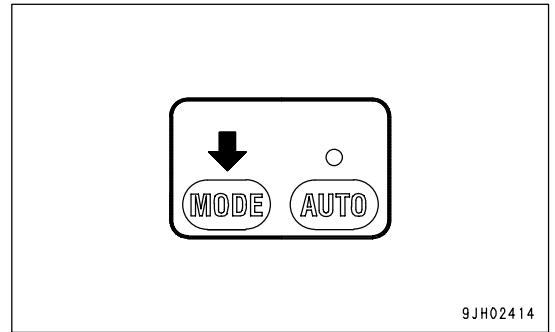


3. Press temperature control switch (3) to set the temperature inside the cab.

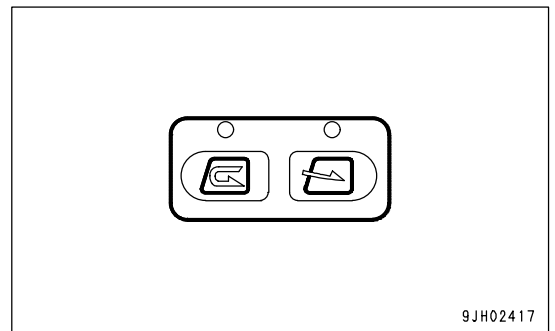




4. Press mode selector switch (4) and select the desired vent.  
The display of the vent selection (c) on the monitor panel will change according to the selection.



5. Press RECIRC/FRESH selector switch (6) and select recirculation of the air inside the cab (RECIRC) or intake of fresh air from outside (FRESH).



**STOPPING MANUAL OPERATION**

Press OFF switch (1). The display of the set temperature (a) and air flow (b) on the monitor panel, and the lamps at the top of auto switch (5) and air conditioner switch (8) go out, and the air conditioner stops.



**PRECAUTIONS WHEN USING**

For the precautions when using the air conditioner, see "PRECAUTIONS WHEN USING (PAGE 3-82)" in the section on the air conditioner in the OPERATION section.

**INSPECTION AND MAINTENANCE**

When carrying out inspection and maintenance of a machine equipped with air conditioner, see "MAINTENANCE SCHEDULE CHART (PAGE 4-14)".

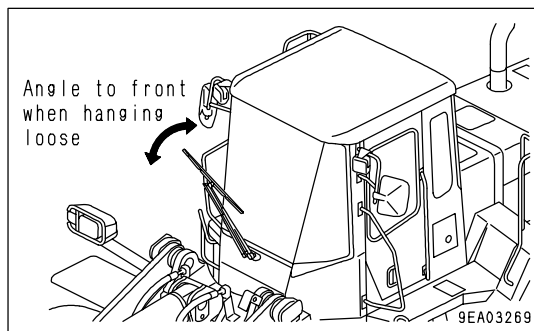
## HANDLING CAB WIPER

### PREVENTING DAMAGE TO WIPER ARM BRACKET

#### NOTICE

When angling the wiper arm to the front, check that the wiper blade is hanging free.

When angling the wiper arm to the front, such as when wiping the glass clean, if the wiper arm is angled with the wiper blade locked to the arm (the bottom of the blade is caught on the arm), abnormal force is brought to bear on the mounting bracket and the bracket may break.



## OPERATION

### CHECK BEFORE STARTING ENGINE, ADJUST

#### WALK-AROUND CHECK

Before starting the engine, look around and under the machine to check for loose nuts and bolts, or leakage of oil, fuel, or coolant, and check condition of the work equipment and hydraulic system. Also check for loose wiring, play, and accumulation of dust at places with high temperatures.



#### WARNING

**Remove any flammable materials from around the battery, engine, muffler, turbocharger, or other high temperature engine parts. Leakage of fuel or oil will cause the machine to catch fire. Check carefully, be sure to repair any problem, or contact your Komatsu distributor.**

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

Always perform the procedures in this section before starting the engine each day.

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 abnormality is found, repair it.
2. Remove dirt and dust from around engine, battery and radiator.  
Check if there is any dirt or dust accumulated around the engine or radiator. Also check if there is any flammable material (dead leaves, twigs, etc.) accumulated around the battery or high temperature engine parts, such as the engine muffler or turbocharger. Remove all such dirt or flammable material.
3. Check for coolant or oil leakage around the engine.  
Check that there is no oil leakage from the engine or coolant leakage from the cooling system. If any problem is found, repair it.
4. Check for leakage of oil from transmission case, axle, hydraulic tank, hoses, joints.  
Check that there is no oil leakage. If any abnormality is found, repair the leakage.
5. Check for oil leakage from the brake line.  
Check that there is no oil leakage. If any abnormality is found, repair the leakage.
6. Check for damage or wear to tires and loose mounting bolts.  
Check for cracks or peeling of the tires and for cracks or wear to the wheels (side rim, rim base, lock ring). Tighten any loose wheel nuts. If any abnormality is found, repair or replace the part.  
If any valve caps are missing, install new caps.
7. Check for damage and loose bolts on the handrail and steps.  
Repair any damage and tighten any loose bolts.
8. Check for damage to gauges, lamps on the instrument panel and loose bolts.  
Check for damage to the panel, gauges and lamps. If any problem is found, replace the parts. Clean off any dirt on the surface. Tighten any loose bolts.
9. Check for loose air cleaner mounting bolts.

Check for the loose bolts. If loose, tighten them.

10. Check for loose battery terminals.

Tighten any loose terminal.

11. Check for damage to the seat belt and mounting clamps.



## WARNING

Even if there appears to be no abnormality with the seat belt, replace it once every three years.

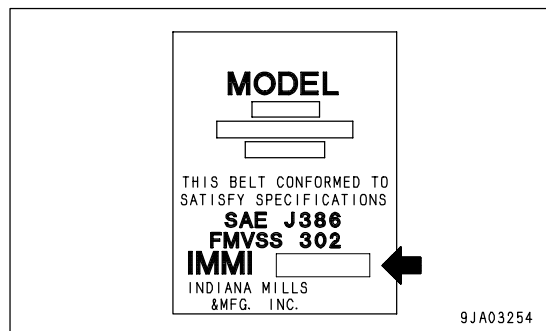
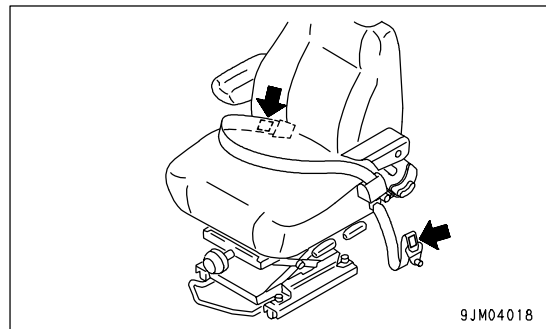
### REMARK

The date of manufacture of the seat belt is marked on the belt at the place indicated by the arrow in the diagram on the right.

Check that there are no loose bolts on the equipment mounting the seat belt to the machine, and tighten if necessary.

Tightening torque:  $24.5 \pm 4.9$  N·m ( $2.5 \pm 0.5$  kgf·m,  $18.1 \pm 3.6$  lbf)

If the belt is damaged or fluff is starting to form, or if there is any damage or deformation of the seat belt holders, replace the seat belt.



12. Clean cab window.

Clean the cab window to ensure good visibility when operating the machine.

## 13. Inspect tires.

**WARNING**

If worn or damaged tires are used, they may burst and cause serious injury or death.

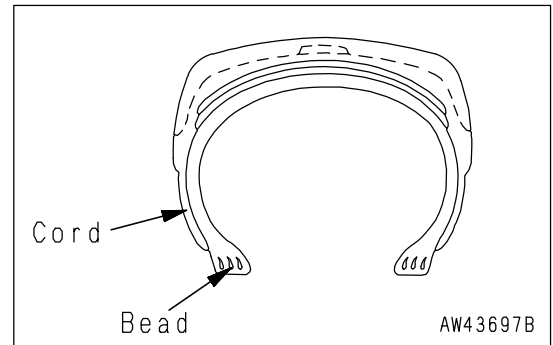
To ensure safety, do not use the following tires.

Wear:

- Tires with a tread grooves of less than 15% of that of a new tire
- Tires with extreme uneven wear or with stepped-type wear

Damage:

- Tires with damage that has reached the cords, or with cracks in the rubber
- Tires with cut or pulled cords
- Tires with peeled (separated) surface
- Tires with damaged bead
- Leaking or improperly repaired tubeless tires
- Deteriorated, deformed or abnormally damaged tires, which do not seem usable



## 14. Inspect rims.

**WARNING**

Check the rims (wheels) and rings for deformation, corrosion and cracks.

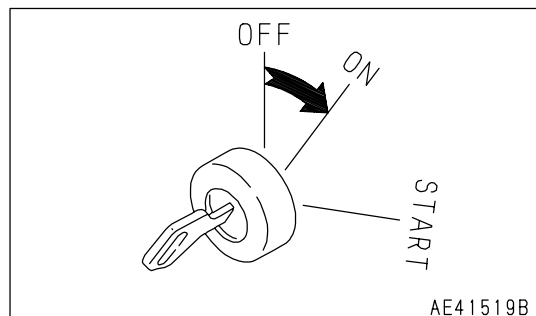
In particular, check the side rings, lock rings and rim flanges thoroughly.

## CHECK BEFORE STARTING

Always perform the procedures in this section before starting the engine each day.

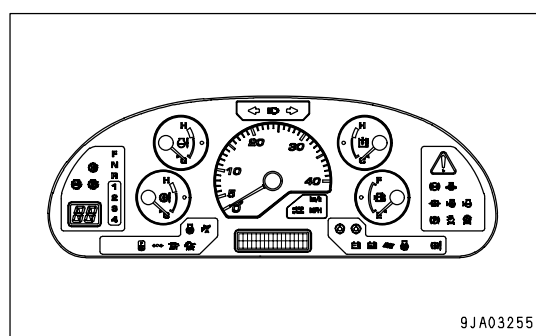
### CHECK MONITOR PANEL

1. Turn the starting switch ON.



2. Check that all the monitors, gauges, and the central warning lamp light up for approx. 3 seconds and the alarm buzzer sounds for approx. 1 sec.

If the lamps do not light up, there is probably a failure or disconnection. Contact your Komatsu distributor for inspection.



## CHECK COOLANT LEVEL, ADD COOLANT

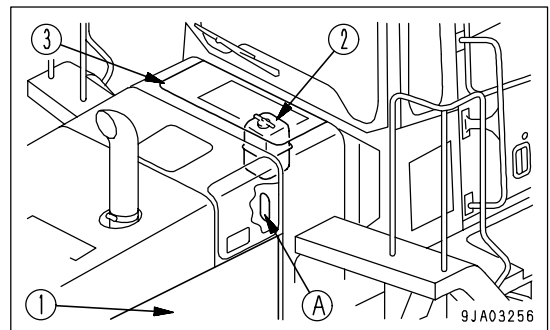
**WARNING**

- Do not open the radiator cap unless necessary. Wait for the engine to cool down before checking the coolant in 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 before removing it.

**CAUTION**

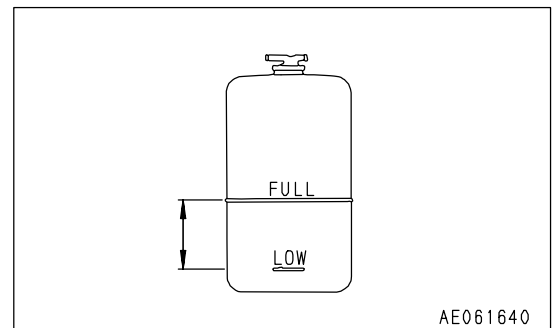
When adding coolant, use the step and handrail provided. Support your body securely.

1. Open side door (1) of the engine hood on the right side of the machine.
2. Look through inspection window (A) and check that the water level is in the range between FULL and LOW on sub tank (2). If the water level is low, open cover (3) and add water through the filler port of sub tank (2) until it reaches the FULL level.
3. After adding coolant, tighten the cap securely.
4. If sub tank (2) is empty, check for leaks, then check coolant level in the radiator. If the coolant level is low, add coolant to the radiator, then add coolant to sub tank (2).



If the volume of coolant added is more than usual, check for possible leakage.

Confirm that there is no oil in the coolant.



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

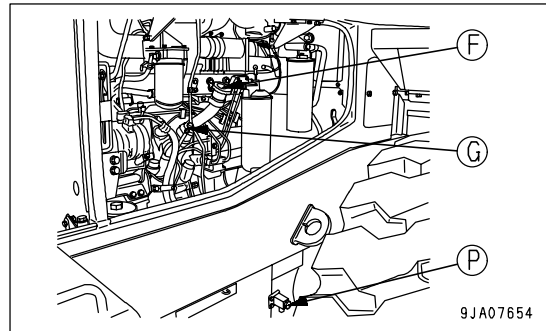
**WARNING**

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.

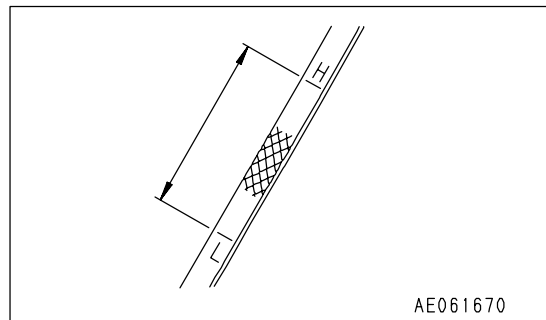
1. Open the inspection cover of the right side at the rear of the machine.
2. Take out the dipstick (G) and wipe off the oil with cloth.
3. Fully insert dipstick (G) into filler pipe (F), then remove it.
4. The oil level should be between the H and L marks on dipstick (G).

If the oil level is below the L mark, add oil through oil filler (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 oil filler cap (F) securely and close the inspection window.

**REMARK**

- Wait for at least 15 minutes, after stopping the engine, before checking the oil level.
- If the machine is at an angle, make it horizontal before checking.





CHECK FUEL LEVEL, ADD FUEL

 **WARNING**

When adding fuel, never let the fuel overflow. This may cause a fire. If any fuel is spilled, wipe it up completely. Never bring flames near fuel because it is highly flammable and dangerous.

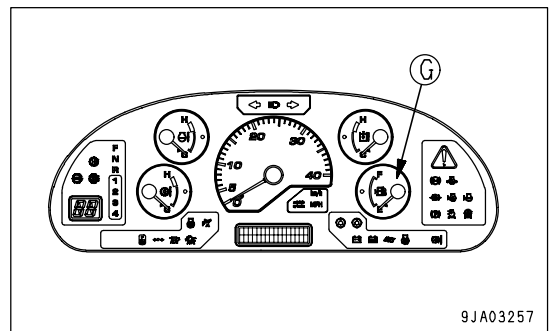
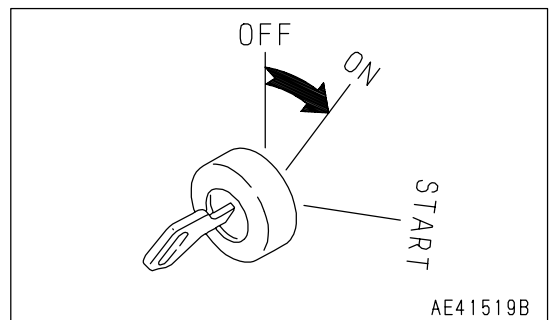
NOTICE

If the engine has run out of fuel and has stopped, it is necessary to operate the priming pump to bleed the air completely from the fuel line before starting the engine again.

Take care not to let the engine stop because of lack of fuel.

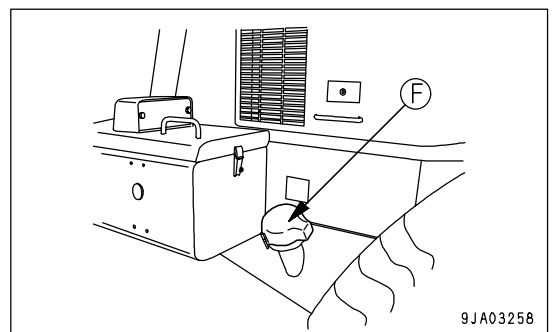
If the engine has run out of fuel, the air bleeding operation can be carried out more quickly on a full tank of fuel.

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



2. After completing operations, add fuel through fuel filler (F) to fill the tank.  
For details of the method for opening and closing the cap, see "CAP WITH LOCK (PAGE 3-57)".
3. After adding fuel, tighten the cap securely.

Fuel capacity: 390 liters (103.04 US gal)



**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 for damage, wrong fuse capacity, and any sign of disconnection or short circuit in the electric wiring. Also, check and tighten any loose terminals.

Particularly, check the wiring of the "battery", "starting motor" and "alternator" carefully.

When checking around the battery, make sure there is no accumulation of flammable materials. Remove all flammable materials.

Please contact your Komatsu distributor for investigation and correction of the cause.

**CHECK PARKING BRAKE**

Check that the parking brake works properly.

If there is any abnormality in the operation of the parking brake or the brake does not provide the proper braking effect, please contact your Komatsu distributor for adjustment.

**CHECK BRAKE PEDAL**

Drive the machine forward and check the effect of the brakes.

If there is any problem in the actuation of the brakes, please contact your Komatsu distributor to have the brakes adjusted.

**CHECK INFLATION PRESSURE OF TIRES**

Measure the inflation pressure with a tire pressure gauge, while the tires are cool, before starting work.

Check for damage or wear to the tires and the rims. Check for loose wheel hub nuts (bolts).

The appropriate inflation pressure differs according to the type of work. See Section "HANDLING THE TIRES (PAGE 3-144)" for details.

## ADJUSTMENT

### SEAT ADJUSTMENT



## 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.

### DELUXE SUSPENSION SEAT

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

Pull lever (1) up, set the seat to the desired position, then release the lever.

Fore-and-aft adjustment: 160 mm (6.3 in)  
(16 mm (0.6 in) x 10 stages)

#### (B) Adjusting seat angle

Move lever (2) up and push down on the rear of the seat to tilt it backward.

Move lever (2) down and push down on the front of the seat to tilt it forward.

Adjustment range: 13 degrees (Front tilt, rear tilt: 4 stages each)

#### (C) Setting seat for operator's weight

Turn grip (3) to adjust the strength of the suspension.

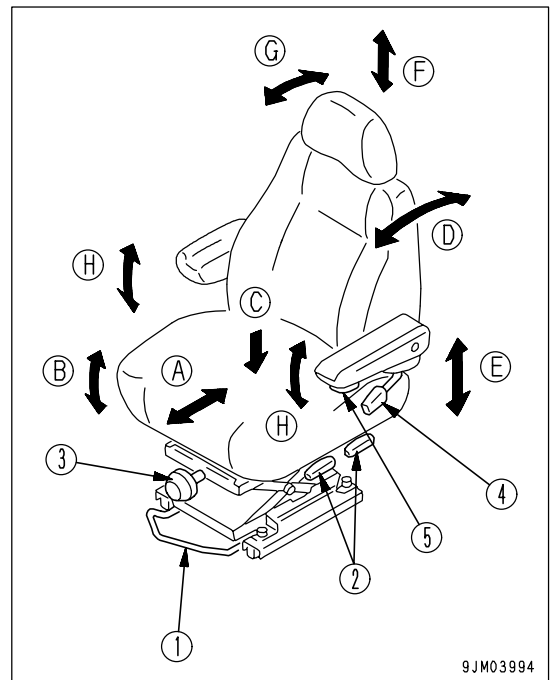
Adjustment range: (Target) 50 to 120 kg (110 to 265 lb)

#### (D) Adjusting backrest angle

Move lever (4) up and move the backrest to the front or rear.

Adjustment range: Front 66 degrees (3 degrees x 22 stages)

Rear 72 degrees (3 degrees x 24 stages)



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### NOTICE

If the backrest is reclined too far, the backrest may hit the rear glass, so use it in a position where it does not contact the glass. When reclining the seat fully to take a rest, set the seat in the following position.

- Fore-and-aft adjustment: Max. front position
- Up-down adjustment: Max. height
- Seat angle adjustment: Horizontal or fully tilted
- Reclining adjustment: Fully tilted backward 36 degrees (12 stages)

**(E) Seat height adjustment**

Move lever (2) up/down, then move the seat up or down as desired. Since lever (2) is also used for adjusting seat angle, set the seat to the desired height while adjusting the angle.

Adjustment range: 60 mm (2.4 in)

**(F) Adjusting headrest height**

Move the headrest up and down to the desired height.

Adjustment range: 50 mm (2.0 in)

**(G) Adjusting headrest angle**

Rotate the headrest to the front or rear.

**(H) Adjusting armrest angle**

Adjust angle of armrest by rotating knob (5) (left side only).

Adjustment range: 30 degrees (forward tilt: 25 degrees, backward tilt: 5 degrees)

Also, when armrest is turned, it will spring up. (Both left and right sides)

**LUMBAR SUPPORT TYPE SEAT****NOTICE**

- When pulling up levers (2) and (3), be careful not to pull up the switch box at the front by mistake. There is danger that the switch box may be damaged.
- When the left armrest is at the raised position, do not push down on the tip of the armrest with your hand to support your weight. There is danger that the armrest mount may be damaged.

Adjustments (E), (J), and (K) use the air compressor built into the seat, so turn the engine starting switch to the ON position when carrying out the adjustment.

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

Pull lever (1) up, set the seat to the desired position, then release the lever.

Amount of adjustment: 180 mm (7.1 in)  
(10 mm (0.4 in) x 18 stages)

**(B) Adjusting seat angle**

Move lever (2) up and apply your weight to the rear of the seat. The seat will tilt to the rear.

Move lever (3) up and apply your weight to the front of the seat. The seat will tilt to the front.

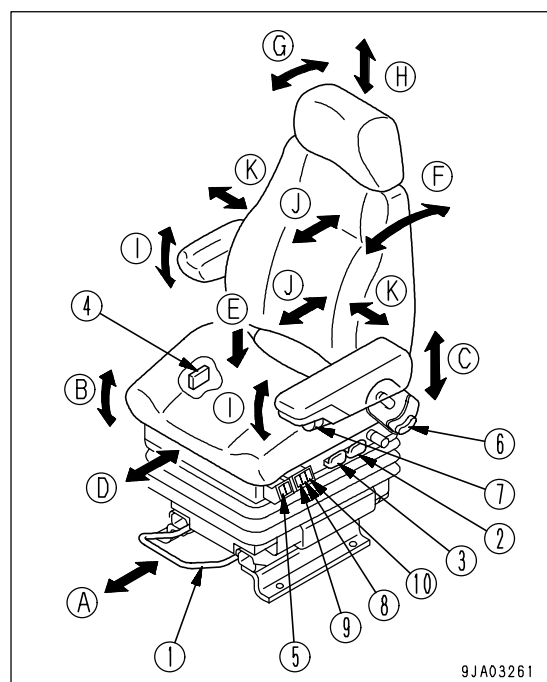
Amount of adjustment: 24 degrees (front and rear tilt: 3 stages each)

**(C) Adjusting height of seat**

Move levers (2) and (3) up and move the seat up or down to the desired position.

These levers are also used for adjusting the seat angle, so adjust the seat angle to set the seat to the desired height.

Amount of adjustment: 65 mm (2.6 in)



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(D) Adjusting fore-and-aft position of seat cushion

Push in lever (4), set the seat cushion to the desired position, then release the lever.

Amount of adjustment: 60 mm (2.4 in)

(E) Setting seat for weight

Sit on the seat, raise your body slightly, then operate switch (5) to adjust the strength of the suspension.

Amount of adjustment: 50 - 130 kg (110 - 287 lb)(target)

When + is pressed: Suspension becomes stronger

When - is pressed: Suspension becomes weaker

(F) Adjusting reclining angle

Move lever (6) up and move the backrest to the front or rear.

Push your back against the backrest when carrying out this adjustment. If your back is not pressing against the backrest, the backrest may suddenly spring forward.

Amount of adjustment: Front tilt: Free

Rear tilt: 40 degrees (2 degrees x 20 stages)

(G) Adjusting headrest angle (if equipped)

Rotate the headrest to the front or rear.

Amount of adjustment:

Front tilt: 13 degrees

Rear tilt: 13 degrees

(H) Adjusting headrest height (if equipped)

Move the headrest up or down.

Amount of adjustment: 80 mm (3.2 in)

(I) Adjusting armrest angle

Rotate the knob (7) and adjust the angle of the armrest. (Left side only)

Amount of adjustment: 73 degrees (front: 54 degrees; rear: 19 degrees)

If the arm rest is turned, it will spring up. (Both left and right sides)

(J) Lumbar support

Operate switch (8) to give a suitable tension to the lower lumbar region.

Operate switch (9) to give a suitable tension to the upper lumbar region.

When + is pressed: Tension becomes stronger

When - is pressed: Tension becomes weaker

(K) Side support

Operate switch (10) to give a suitable tension to the left and right lumbar region.

When + is pressed: Tension becomes stronger

When - is pressed: Tension becomes weaker

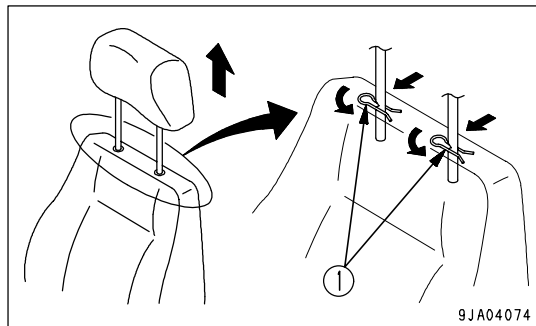
**REMOVAL AND INSTALLATION OF HEADREST**

(Lumbar support type only)

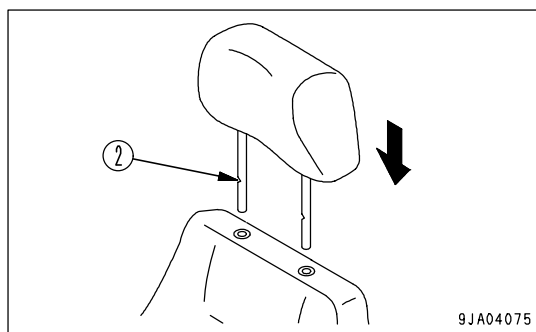
**REMOVAL**

If the headrest is not needed, remove it as follows.

1. Pull up the headrest to the position where it stops.
2. From the top of the seat back, turn stopper (1) (under the material at the top of the seat) of the headrest bar on one side in the direction of the arrow, and pull up the headrest.  
When stopper (1) is turned, it will come out of groove (2).
3. Turn stopper (1) on the other side in the direction of the arrow, and pull up the headrest.  
When both stoppers (1) come out of groove (2), the headrest can be removed.

**INSTALLATION**

1. Insert the bars into the holes in the top of the seat and push down.



**ADJUST SEAT BELT**

Always wear the seat belt.

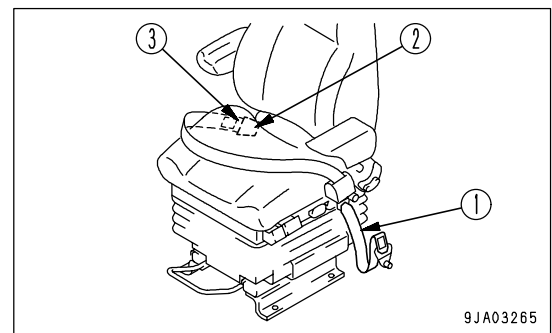
**WARNING**

- Before fastening the seat belt, check that there is no abnormality in the belt-mounting bracket or mounting of the belt. If the belt is worn or damaged, replace it.
- Fasten the seat belt before starting operations.
- Always wear the seat belt during operations.
- Make sure that the left and right belts are not twisted when fastening the seat belt.

**FASTENING AND REMOVING BELT**

Fasten the belt so that it is tight without being too tight.

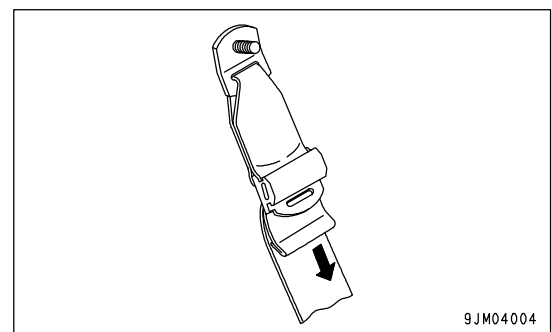
1. Sit on the seat, depress the brake pedal fully, and adjust the seat so that your back is pressed against the backrest.
2. After adjusting the seat position, adjust tether belt (1). Tense the tether belt and install it when there is no one sitting on the seat.
3. Sit on the seat, hold buckle (2) and tongue (3) with your left and right hands, insert tongue (3) into buckle (2), then pull the belt to check that it is securely locked.



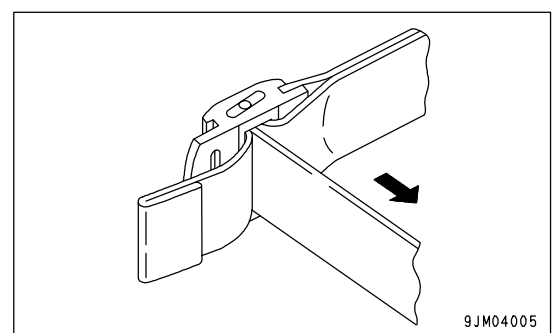
4. When removing the belt, press the red button in buckle (2) to free the belt.  
Fasten the belt along your body without kinking it. Adjust the lengths of the belt on both the buckle and the tongue sides so that the buckle is located at the front, mid-point of your body.

**ADJUST BELT LENGTH**

To make belt shorter: Pull the free end of the tether belt.



To make belt longer: Set the fixed end of the tether belt at 90 degrees to the holder, and pull.



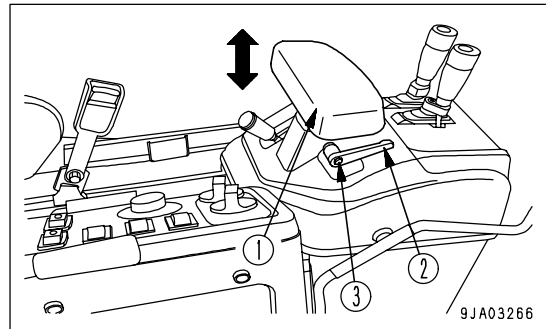
## ADJUST LEVER STAND

### ADJUST HEIGHT OF WRIST REST

Loosen lock lever (2) and adjust the height of wrist rest (1).  
Amount of adjustment: 55 mm (2.2 in)

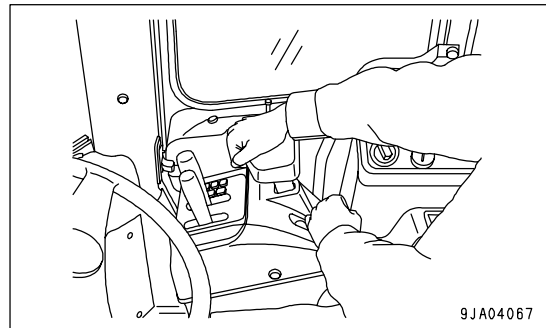
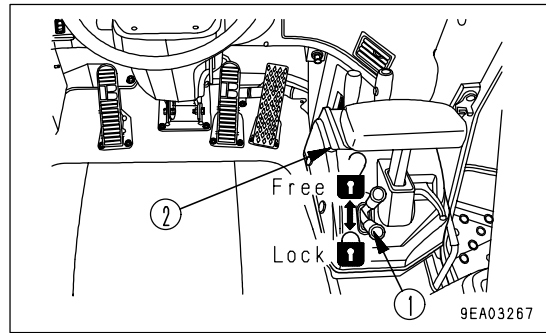
#### REMARK

Keep button (3) pressed and operate lock lever (2) to the FREE position. The lever can be turned in the desired direction.



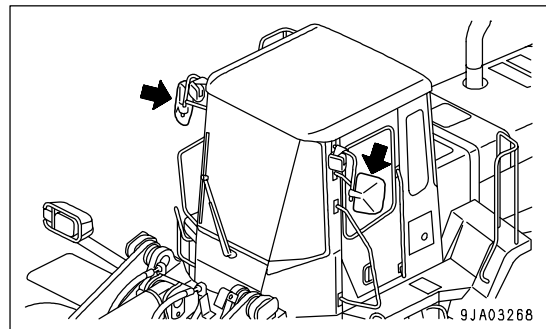
### ADJUST ANGEL OF LEVER STAND

Operate lock lever (1) with your left hand to the FREE position, grip the wrist rest with your right hand, tilt lever stand (2) to the front or rear, then return lock lever (1) to the LOCK position.  
Amount of adjustment: 65 mm (2.6 in)



### ADJUST REAR VIEW MIRROR

Sit in the operator's seat and adjust the rear view mirror so that you can see properly to the rear.

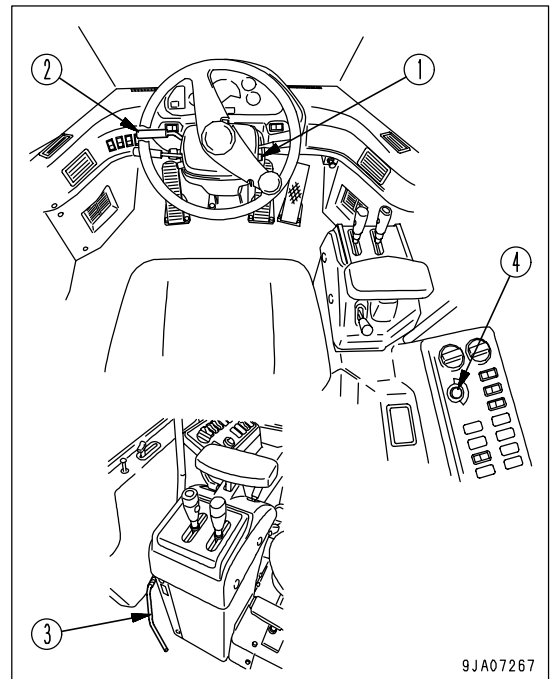




## OPERATIONS AND CHECKS BEFORE STARTING ENGINE

**WARNING**

When starting the engine, check that the 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.



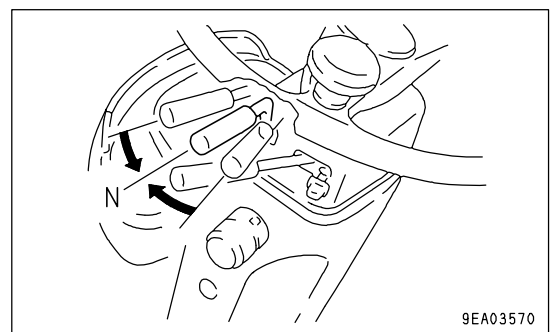
1. Check that parking brake switch (1) is at the ON position.



2. Check that directional lever (2) is at the N position.

**REMARK**

If directional lever (2) is not set to the N position, the engine will not start.

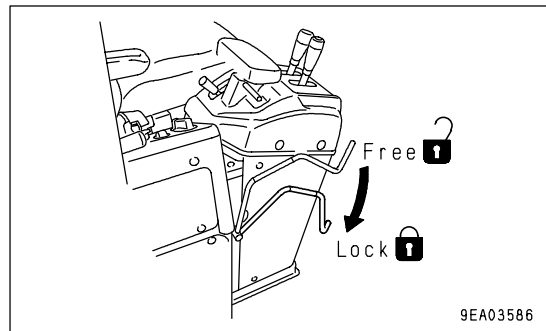
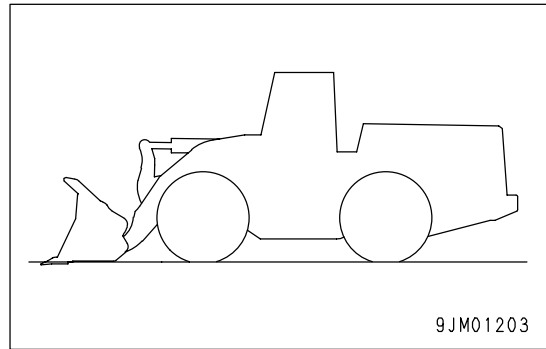


3. Check that the bucket is completely lowered to the ground.

If it is not completely lowered, lower the bucket to the ground as follows.

- 1) Check that the work equipment control lever is at the HOLD position, then set the work equipment lock lever to the FREE position.
- 2) Operate the work equipment control lever to lower the bucket to the ground.
- 3) Check that the work equipment control lever is at the HOLD position, then set the work equipment lock lever to the LOCK position.

4. Check that work equipment lock lever (3) is at the LOCK position.

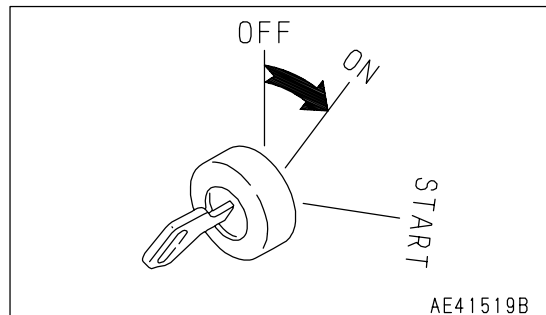


5. Insert the key in starting switch (4), turn the key to the ON position, and check that the machine monitor system works.

When the starting switch is turned to the ON position before starting the engine, all the monitors, gauges, and central warning lamp light up for approx. 3 seconds, and the alarm buzzer sounds for approx. 1 sec.

If any monitor does not light up, there is probably a failure or disconnection. Contact your Komatsu distributor for inspection.

In addition, after all the monitors, gauges, and central warning lamp light up, a self check is carried out to check that the emergency steering function works properly. For details, see "EMERGENCY STEERING SELF-CHECK FUNCTION (PAGE 3-127)" in the OPERATION section.

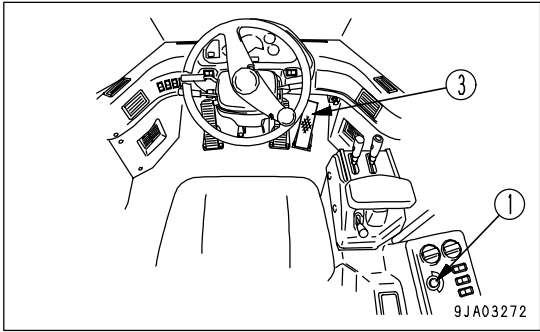


## STARTING ENGINE

### NORMAL STARTING

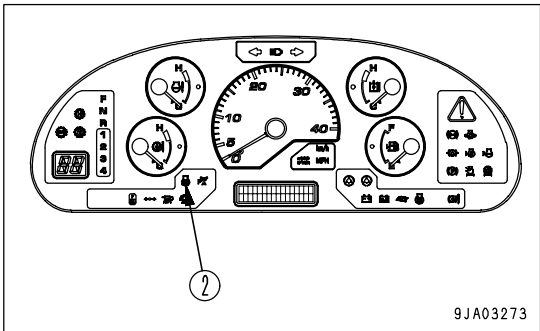
#### **WARNING**

- 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.

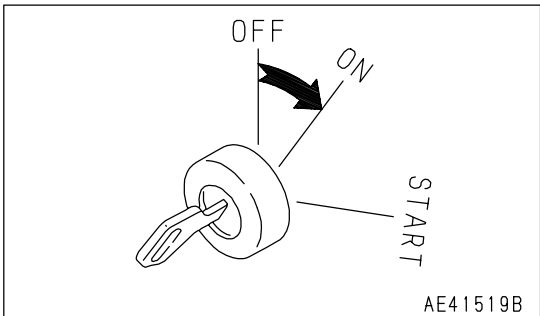


#### NOTICE

- Do not accelerate the engine suddenly before the warming-up operation is completed.
- Do not crank the starting motor continuously for more than 20 seconds.
- If the engine does not start, wait for at least two minutes before trying again.
- If the accelerator pedal is kept pressed after the engine is started, the engine speed will rise suddenly after the turbo protect time, and this may damage the turbocharger.

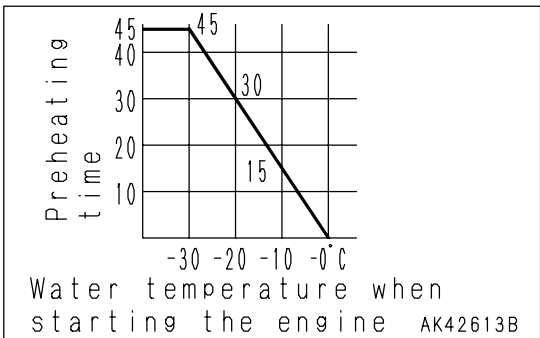


1. Turn the key in starting switch (1) to the ON position. Preheating will automatically start and preheating pilot lamp (2) will light up.

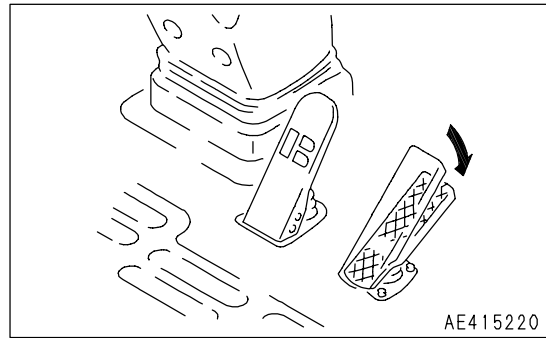


The preheating time varies according to the engine coolant temperature when the engine is started.

The table on the right gives a guide to the preheating time (sec) in cold weather.

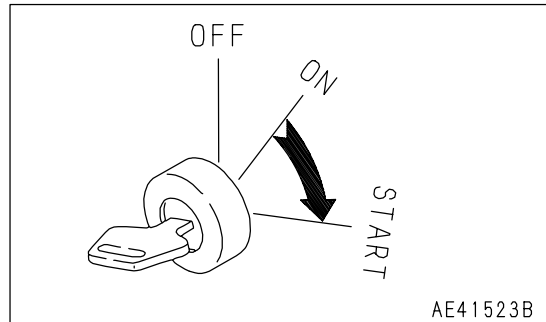


2. Depress accelerator pedal (3) lightly.



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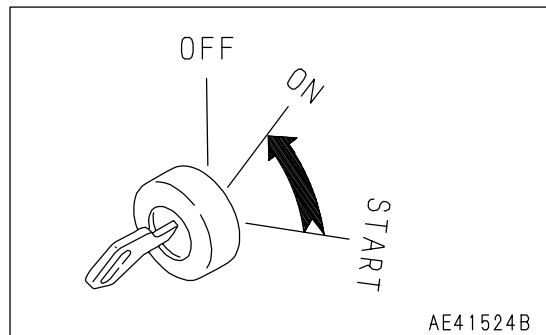
3. When preheating pilot lamp (2) goes out, turn the key in starting switch (1) to the START position.  
 The starting motor will crank the engine and after 2 or 3 seconds, the engine will start.



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4. After the engine starts, release the key in starting switch (1).  
 The key will automatically return to the ON position.

5. After the engine starts, if the engine water temperature is low (below 20 °C (68 °F)), the warming-up operation (engine speed: 1130 rpm) is automatically carried out.  
 For details, see "AUTOMATIC WARMING-UP OPERATION (PAGE 3-111)".



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**REMARK**

- Because of the turbo protect function, immediately after the engine starts, even if the accelerator pedal is depressed, the engine speed will not rise above 1130 rpm.

Engine water temperature	Turbo protect time
above 20°C (68°F)	0 sec.
-18°C to 20°C (-0.4°F to 68°F)	0 to 12 sec.
Below - 18°C (-0.4°F)	15 sec.

- The turbocharger rotates at extremely high speed. Immediately after the engine is started, the pressure of the lubricating oil has not risen sufficiently, so if the engine speed is suddenly raised, it may lead to damage or seizure of the turbocharger bearing. The turbo protect function acts to prevent this problem. It uses electronic control to prevent the engine speed from rising above a certain speed for the first few seconds after the engine started.

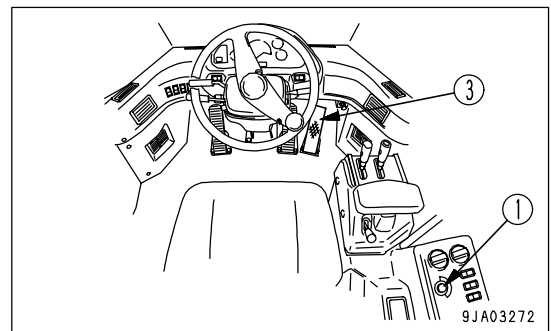
- To improve the ease of starting in cold weather, the low idling speed becomes slightly higher for the time given below and the engine sound is different. In addition, it functions to make the acceleration gradual during this time.

Engine water temperature	Injection characteristics change time
Above 20°C (68°F)	0 sec
0°C to 20°C (32°F to 68°F)	0 to 6 sec
-20°C to 0°C (-4°F to 32°F)	6 to 12 sec
-30°C to -20°C (-22°F to -4°F)	12 to 15 sec

**STARTING IN COLD WEATHER**

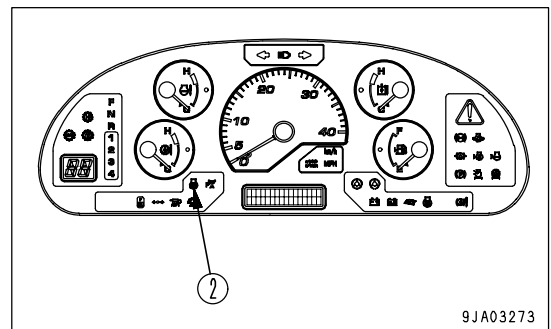
**WARNING**

- 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.



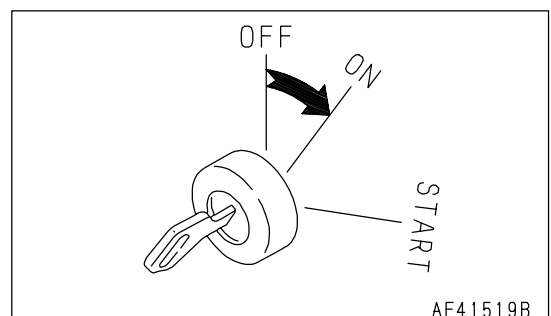
**NOTICE**

- Do not accelerate the engine suddenly before the warming-up operation is completed.
- Do not crank the starting motor continuously for more than 20 seconds.
- If the engine does not start, wait for at least two minutes before trying again.
- If the accelerator pedal is kept pressed after the engine is started, the engine speed will rise suddenly after the turbo protect time, and this may damage the turbocharger.



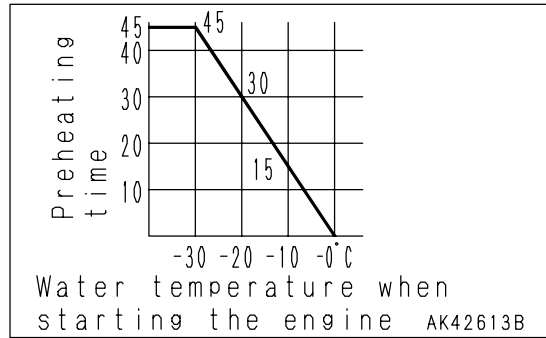
It takes some time to start up the engine when the machine is left unused for more than half a day in the ambient temperature of approx. -20°C (-4°F). In that case, use the engine starting switch and accelerator pedal in the following manner.

1. Turn the key of starting switch (1) to the ON position. The automatic preheating will start and the preheating pilot lamp (2) will light up.

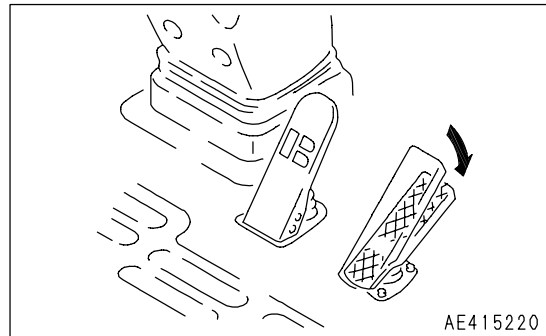


The preheating time varies according to the engine coolant temperature when the engine is started.

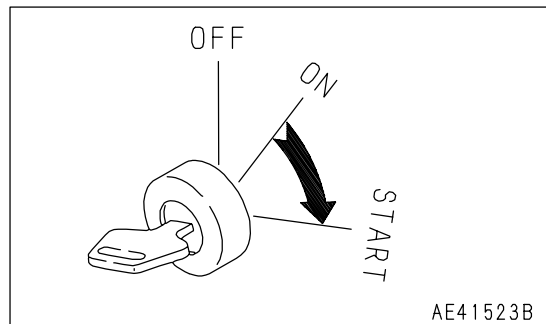
The table shown below gives a guide to preheating time.



2. Depress accelerator pedal (3).



3. When preheating pilot lamp (2) goes out, turn the key in starting switch (1) to the START position.



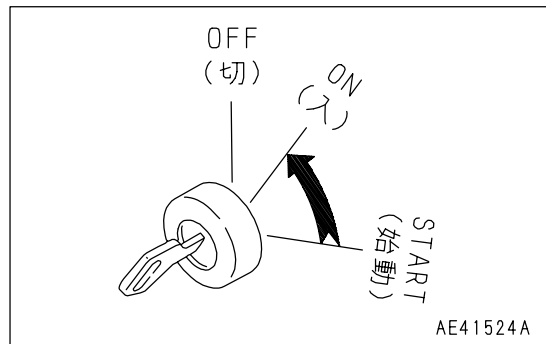
4. Method of starting engine in temperatures of approx. -20°C (-4°F).

- 1) Keep the engine starting motor running for the max. 20 seconds, holding the key of engine starting switch (1) in the START position, until the engine starts up.
- 2) If the engine fails to start up even after running the engine starting motor for about 20 seconds, stop the engine starting motor once (release the engine starting switch key), and try the same process again after a pause for a minute or so.
- 3) If the engine still fails to start up after the second attempt, try the same process for the third time after a pause for a minute or so.

5. When the engine has started up and the engine speed rises, release the key of engine starting switch (1). The key will automatically return to the ON position.

6. After the engine starts, if the engine water temperature is low (below 20 °C (68 °F)), the warming-up operation (engine speed: 1130 rpm) is automatically carried out.

For details, see "AUTOMATIC WARMING-UP OPERATION (PAGE 3-111)".

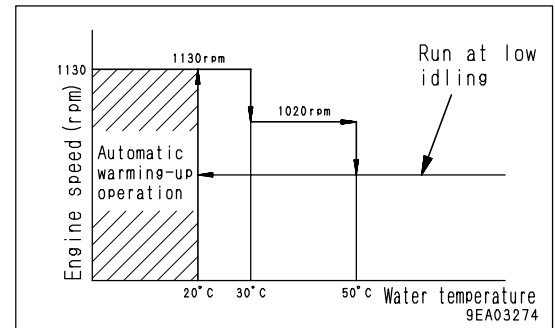


### AUTOMATIC WARMING-UP OPERATION

After the engine starts, if the engine water temperature is low (below 20°C (68°F)), the warming-up operation (engine speed: 1130 rpm) is automatically carried out. When the water temperature goes above 50°C (122°F), the warming-up operation is canceled.

#### REMARK

The automatic warming-up operation changes as shown in the diagram on the right according to the engine water temperature.



## OPERATIONS AND CHECKS AFTER STARTING ENGINE

### WARNING

- **Emergency stop**  
If the operation is abnormal or any other trouble occurs, turn the key in the starting switch to the OFF position.
- If the work equipment is operated without warming up the machine sufficiently, the response of the work equipment to the movement of the control lever will be slow. The work equipment may not move as the operator desires. Follow all warm-up procedures. Particularly in cold areas, make sure to warm up the machine properly.

## BREAKING-IN THE 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.

## NORMAL OPERATION

After starting the engine, do not immediately start operations. First, perform the following operations and checks.

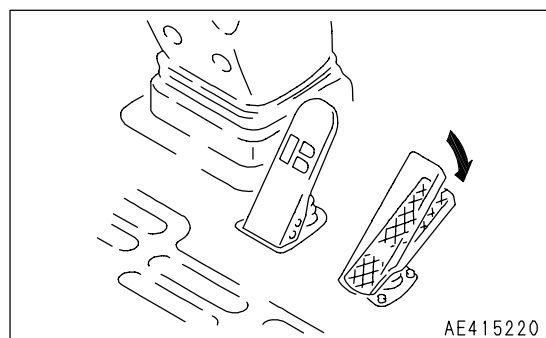
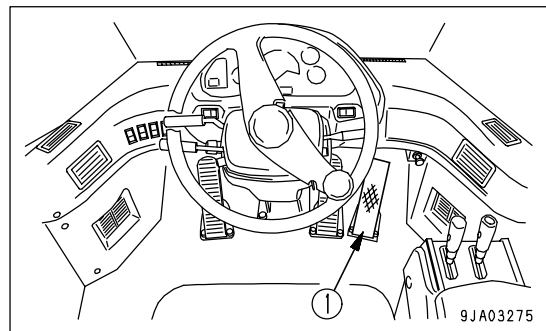
### NOTICE

Do not suddenly accelerate the engine before the warming-up operation is completed.

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

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

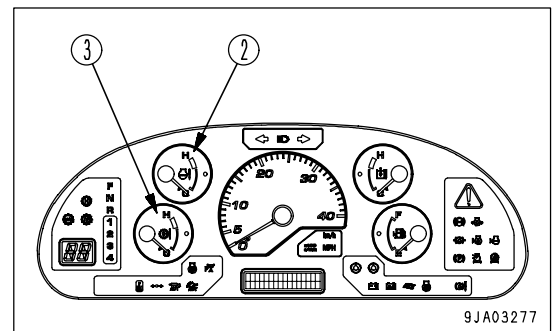
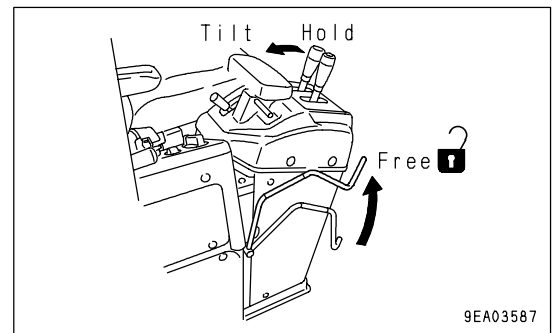
1. Depress accelerator pedal (1) lightly and run the engine with no load at midrange speed for about 5 minutes.





To warm up the hydraulic oil in cold areas, do as follows.

2. After completing the warming-up operation, check that the engine rotation is smooth, then check that the work equipment control lever is at the HOLD position and set work equipment lock lever to the FREE position.
3. Operate the bucket control lever to the TILT position and return it to the HOLD position repeatedly to warm up the hydraulic oil. Relieve the circuit at the TILT position for a maximum of 10 sec. This brings the oil to the relief pressure and makes it quicker warm up the oil.
4. After carrying out the warming-up operation, check that the gauges and caution lamps are normal. If there is any abnormality, carry out maintenance or repair. Run the engine under a light load until engine water temperature gauge (2) and torque converter oil temperature gauge (3) are in the green range.
5. Check for abnormal exhaust gas color, noise, or vibration. If any problem is found, contact your Komatsu distributor.



#### REMARK

The rotating speed of the cooling fan differs according to the following conditions, but this does not indicate any abnormality.

The cooling fan speed increases when the hydraulic oil temperature, engine coolant temperature, or transmission oil temperature are high.

However, when the cooling fan is rotating in reverse, it rotates at a fixed speed proportional to the engine speed, regardless of any oil or coolant temperature.

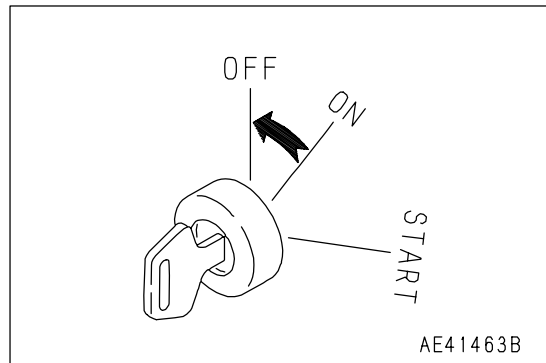
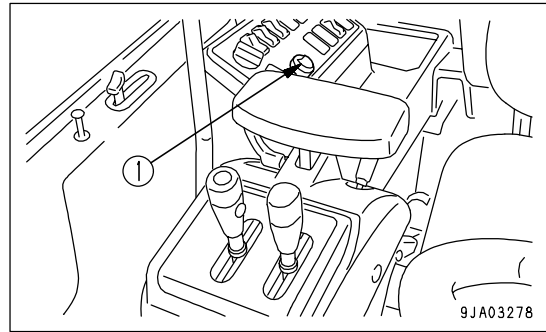
## STOPPING ENGINE

### NOTICE

If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine except for an emergency.

In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.

1. Run the engine at low idle for about 5 minutes to cool down gradually.
2. Turn the key of starting switch (1) to the OFF position to stop the engine.
3. Remove the key from starting switch (1).



## MOVING THE MACHINE (DIRECTIONAL, SPEED), STOPPING THE MACHINE

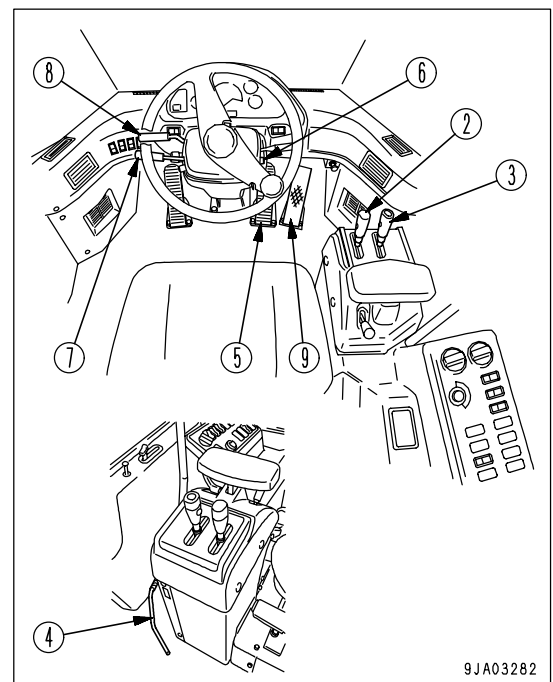
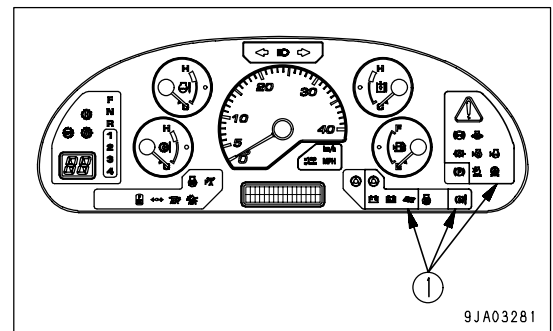


### WARNING

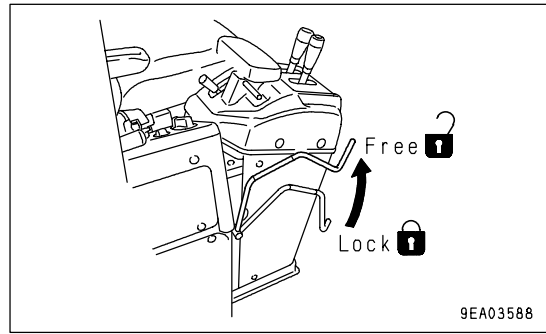
- Always remove the frame lock bar for travel operations. If it is not removed, the steering wheel cannot be used for steering, and this may lead to serious damage or injury.
- When moving the machine off, check that the area around the machine is safe, then sound the horn before starting.
- Do not allow people to get near the machine.
- Clear the machine's travel path of any obstacle.
- Pay a particular attention to the blind spot at the rear of the machine, when traveling the machine in reverse.
- When starting the machine off up a slope, set the transmission cut-off switch to the OFF position, depress the left brake pedal. Then depress the accelerator pedal and gradually release the brake pedal to start the machine off. This makes it possible to prevent the machine from rolling back.

## MOVING THE MACHINE

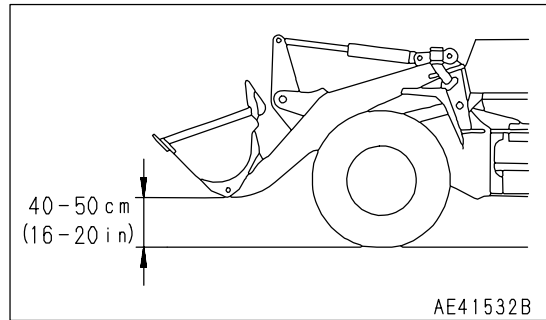
1. Check that caution lamp (1) is not lighted up.



2. Check that the bucket control lever (2) and lift arm control lever (3) is at the HOLD position, then set the work equipment lock lever (4) to the FREE position.



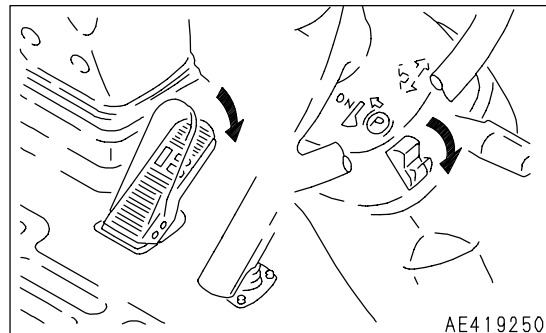
3. Operate lift arm control lever (3) to set the work equipment to the travel posture shown in the diagram on the right.



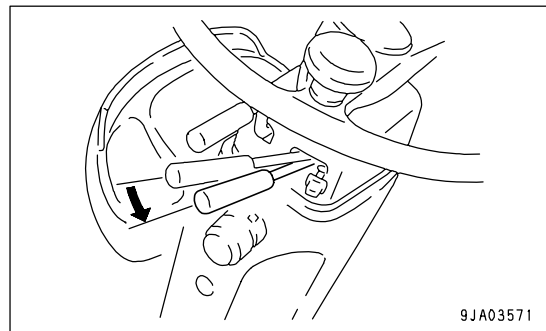
4. Depress right brake pedal (5) and turn parking brake switch (6) to the OFF (RELEASE) position to release the parking brake. Keep right brake pedal (5) depressed.

**REMARK**

If the parking brake is still actuated when parking brake switch (6) is at the OFF (RELEASE) position, turn the parking brake switch ON, then turn it OFF again.

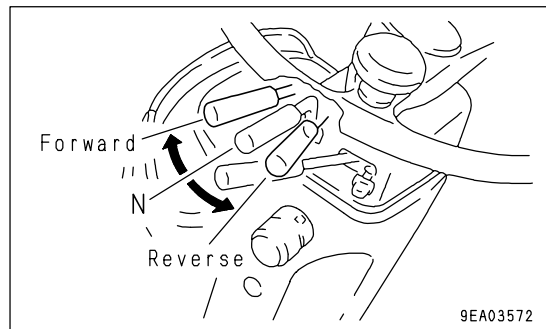


5. Set gearshift lever (7) to the desired position.

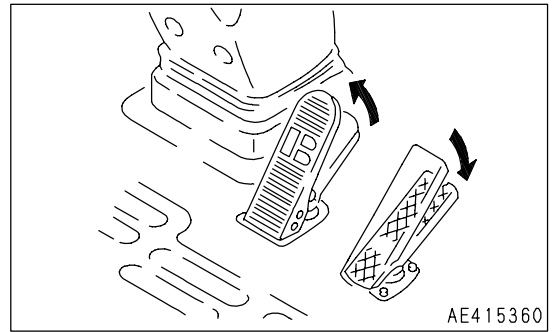


6. Set directional lever (8) to the desired position.

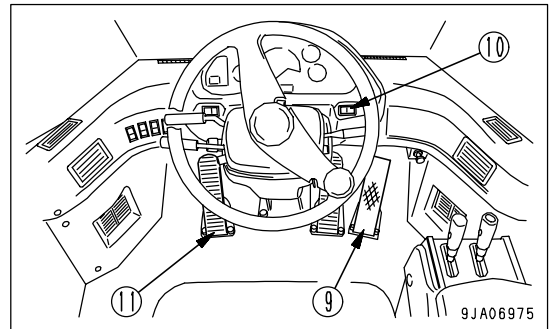
- Check that the backup alarm sounds when the directional lever is set to REVERSE. If the backup alarm does not sound, please contact your Komatsu distributor for repairs.



7. Release right brake pedal (5), then depress accelerator pedal (9) to move the machine off.

**REMARK**

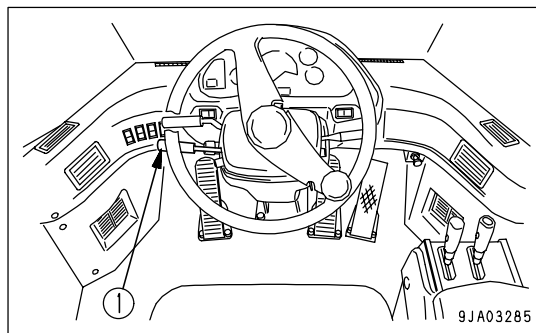
When moving the machine off on a hill, turn transmission cut-off switch (10) OFF, depress left brake pedal (11), operate the gearshift lever to the low speed range, then depress accelerator pedal (9) and gradually release left brake pedal (11) to let the machine move off. This makes it possible to prevent the machine from rolling back.



## CHANGING GEAR SPEED

**WARNING**

When traveling at high speed, do not shift gear suddenly. Use the brake to reduce the travel speed before shifting gear.



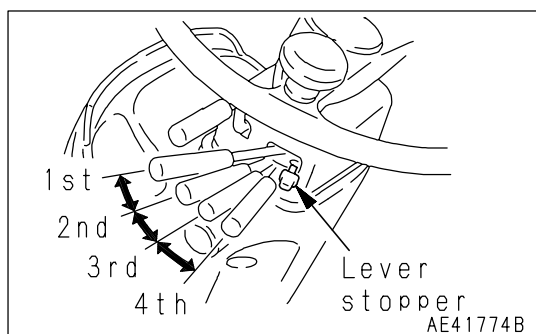
Shift gear as follows.

Move the gearshift lever (1) to the desired position to shift gear.

When carrying out digging or loading operations, the operation is carried out in 1st or 2nd, so use the gearshift lever stopper.

**REMARK**

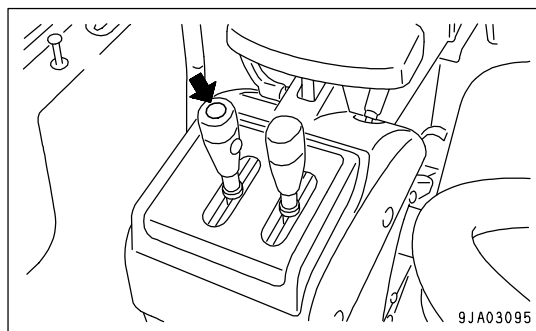
- If the gearshift lever is operated slowly or is stopped between gear positions, the central warning lamp may light up and the alarm buzzer may sound. In this case, there is no failure, but try to operate the gearshift lever so that the gearshifting is completed within 2 seconds.



- This machine is equipped with a kick-down switch. When the machine is traveling in 2nd speed, if the button at the tip of the lift arm control lever is pressed, the transmission will shift down to 1st speed.

We recommend that you use the kick-down switch when carrying out digging or loading operations using 1st and 2nd speed.

For details of the method of use, see "KICKDOWN SWITCH (PAGE 3-44)".

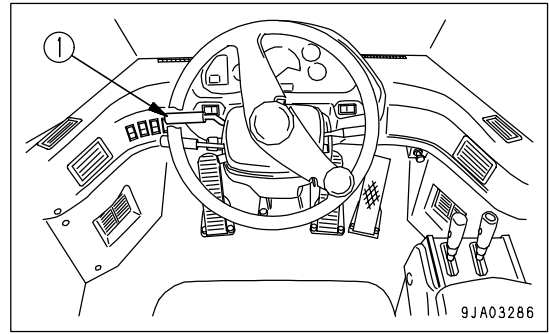


- This machine is equipped with an auto-shift system that automatically shifts the gear. For details of the method of use, see "TRANSMISSION SHIFT MODE SELECTOR SWITCH (PAGE 3-38)" and "AUTOMATIC SHIFT (PAGE 3-52)".
- When the machine is traveling at high speed, if the gearshift lever is operated to a lower speed, such as 4th -> 3rd or 4th -> 2nd, with the accelerator pedal still depressed, the shift down is not carried out in order to prevent the engine from overrunning. In this case, the central warning lamp lights up and the alarm buzzer sounds. At the same time, "E00 OVERRUN PROTECT" is displayed on the character display. If the alarm buzzer sounds, release the accelerator pedal immediately and depress the brake pedal to reduce speed, then carry out the gearshift operation.

**CHANGING DIRECTION**

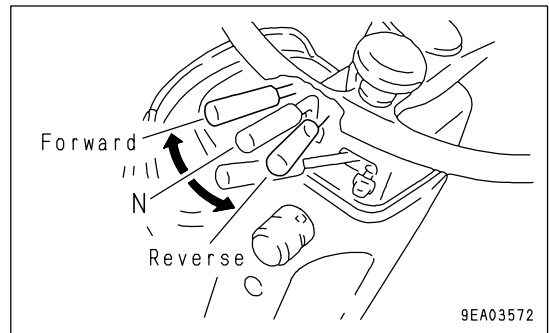
**⚠ WARNING**

- When changing direction between FORWARD and REVERSE, check that the new direction of travel is safe. There is a blind spot behind the machine, so be particularly careful when changing direction to travel in reverse.
- Do not switch between FORWARD and REVERSE when traveling at high speed.  
When switching between FORWARD and REVERSE, depress the brake to reduce the travel speed sufficiently, then change the direction of travel. (Max.speed for changing direction: 12 km/h (7.5 MPH))



There is no need to stop the machine even when switching between FORWARD and REVERSE.  
Place directional lever (1) in the desired position.

- Check that the backup alarm sounds when the directional lever is set to REVERSE. If the backup alarm does not sound, please contact your Komatsu distributor for repairs.



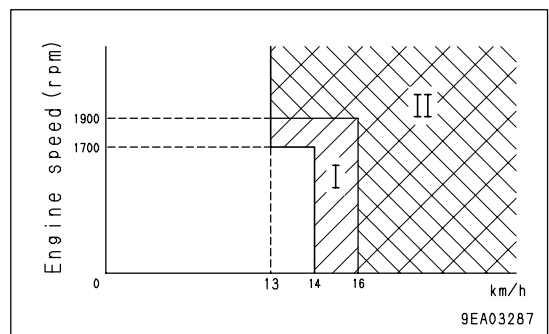
**REMARK**

- If the directional lever is operated slowly or is stopped midway between the forward and reverse directions, "E01 MAINTENANCE" may be displayed on the character display. In this case, there is no failure, but try to operate the directional lever so that the change in direction is completed within 2 seconds.
- There is a directional selector switch (if equipped) which makes it possible to change the direction of travel by operating a switch.

If an attempt is made to switch the direction between forward and reverse while traveling at high speed (when using 3rd or 4th), if the travel speed and engine speed are in ranges I or II in the chart on the right, the central warning lamp will light up and the buzzer will sound.

At the same time, "E00 OVERRUN PROTECT" is displayed on the character display.

If the alarm buzzer sounds, depress the brake immediately to reduce the travel speed, then operate the directional lever to switch between forward and reverse.



**WHEN USING AUTO-SHIFT**

If an attempt is made to switch the direction between forward and reverse when the auto-shift is ON, normally, the gearshift range will switch F3 -> R2, F4 -> R2, or R3 -> F2, R4 -> F2 to make it possible to move the machine off quickly.

However, if an attempt is made to shift between forward and reverse when the machine is traveling at high speed such as shown in ranges I or II in the chart on the right, the central warning lamp will light up and the buzzer will sound.

At the same time, "E00 OVERRUN PROTECT" is displayed on the character display.

If the alarm buzzer sounds, depress the brake immediately to reduce the travel speed, then operate the directional lever to switch between forward and reverse.

In particular, if it is attempted to switch between forward and reverse in range II, the gear range will not shift to 2nd, but will switch F3 -> R3, F4 -> R4, or R3 -> F3, R4 -> F4. As a result, the reduction in travel speed will be less than in range I, so care is necessary.



## USING SWITCH TO CHANGE BETWEEN FORWARD AND REVERSE

(If equipped)



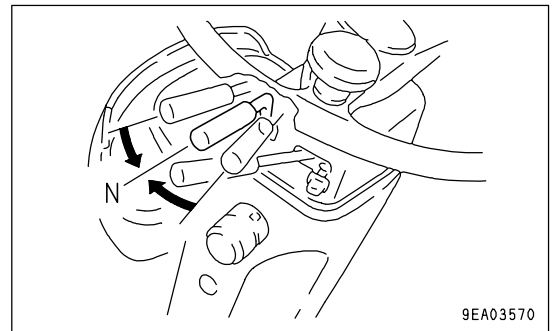
### WARNING

When the directional selector switch actuation switch is at the ON position, if the directional lever is operated to F or R, the machine will travel in forward or reverse according to the operation of the directional lever, regardless of the position of the directional selector switch at the side of the work equipment control lever.

Priority is given to the operation of the directional lever, so be careful when operating.

- When this is done, the central warning lamp lights up and the alarm buzzer sounds.
- Set the directional lever and directional selector switch at the side of the work equipment control lever to the N position.

1. Place the directional lever at the N position.



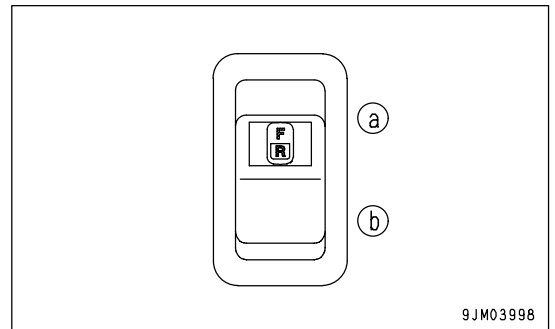
2. Turn on directional selector switch on the right side of switching panel that enables directional selection.

Position (a): ON

Position (b): OFF

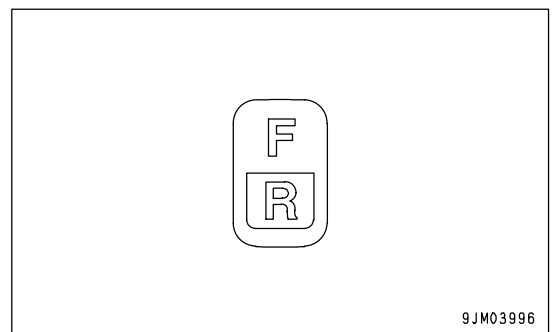
The two pilot lamps light up, i.e. one is the pilot lamp built in the actuating switch and another is the directional selector pilot lamp on the machine monitor.

Then the actuating switch enables the forward - reverse shifting to function.

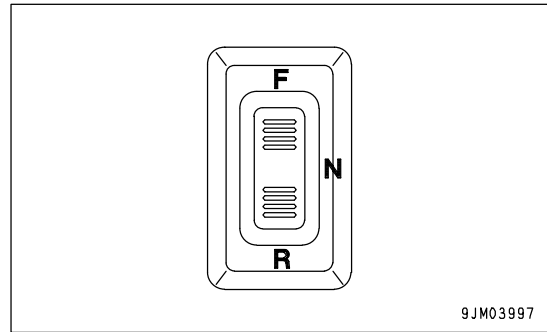


If the switch or the lever is in one of the following conditions, set it to the correct position.

- When directional lever is not at N position  
If the directional lever is not at the N position, the pilot lamp flashes, and at the same time, the central warning lamp lights up and the alarm buzzer sounds.  
In this condition, the machine will move forward or in reverse according to the set position of the directional lever.  
Return the directional lever to the N position.
- When directional selector switch is at F or R when engine is started  
If the directional selector switch is at F or R, the central warning lamp lights up and the alarm buzzer sounds.  
In this condition, the engine will not start, so set the directional selector switch to N.



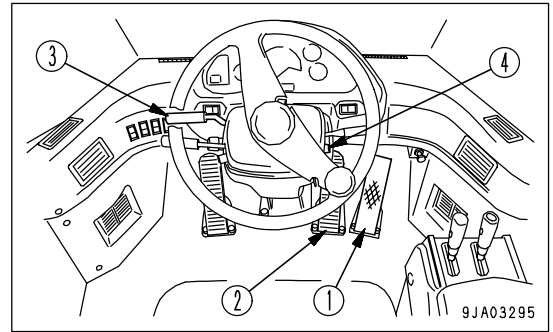
3. Press the directional selector switch on the side of the work equipment control lever to the desired position.



## STOPPING THE MACHINE

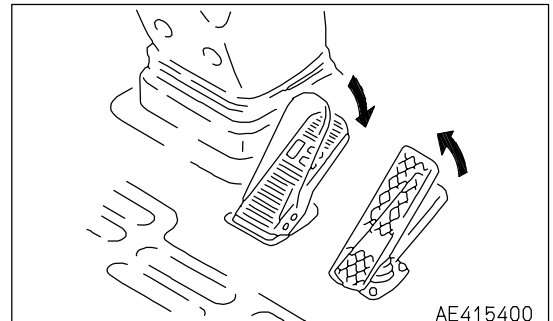
**WARNING**

- Avoid stopping suddenly. Give yourself ample room when stopping.
- Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.

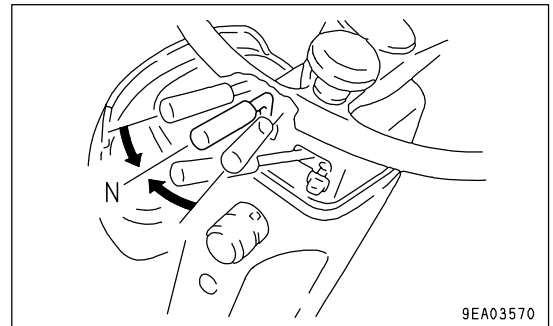
**NOTICE**

Never use the parking brake switch to brake the machine when traveling except in an emergency. Apply the parking brake only after the machine has stopped.

1. Release accelerator pedal (1), then depress brake pedal (2) to stop the machine.



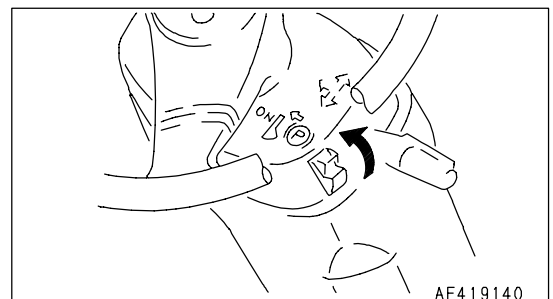
2. Place directional lever (3) in N (neutral) position.



3. Turn parking brake switch (4) to ON to apply the parking brake.

**REMARK**

When the parking brake is applied, the transmission is automatically returned to neutral.



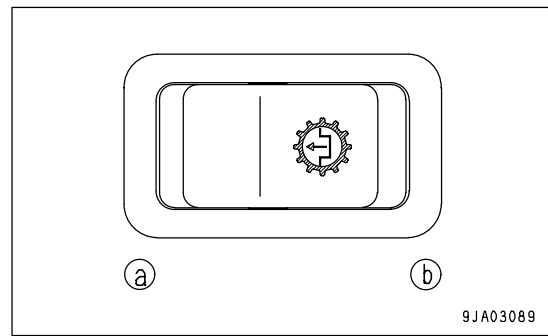
### TRANSMISSION CUT-OFF FUNCTION

When the transmission cut-off switch is turned ON, the pilot lamp lights up and the following transmission cut-off function is actuated.

Position (a): OFF

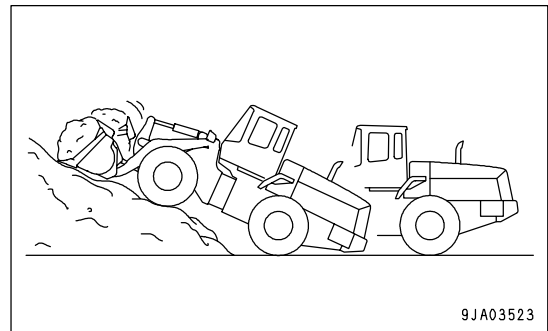
Position (b): ON

When the left brake pedal is depressed, the brake is actuated, and in addition, the transmission is shifted to neutral at the pre-selected brake pedal depression position.

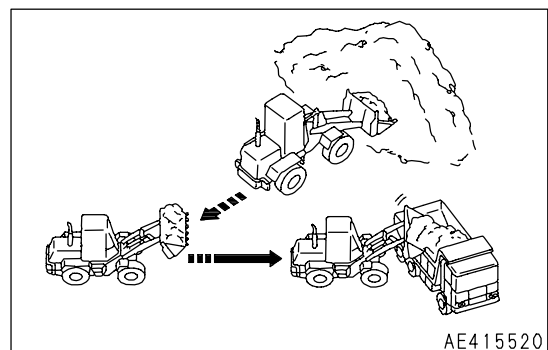


### REMARK

- The cut-off function is actuated only with the left brake pedal.
- When the transmission cut-off switch is at the OFF position, the left brake pedal works in the same way as the right brake pedal.
- For details of adjusting the brake pedal depression position, see "ADJUSTING TRANSMISSION CUT-OFF POSITION (PAGE 3-125)".
- Raise or lower the pre-selected brake pedal depression position to adjust the cut-off to match the type of work shown below.
- When carrying out scooping-up work, lower the brake pedal depression position for the cut-off (transmission shifted to neutral). In this setting, the transmission driving force is cut at a point where there is ample braking force, so this prevents the machine from slipping down.



- When approaching dump trucks during loading operations, raise the brake pedal depression position for the cut-off (transmission shifted to neutral). In this setting, the fine control of the braking immediately before dumping the load can be carried out with the brake only, so this makes it easy to control and allows the machine to be brought to a soft stop.



## ADJUSTING TRANSMISSION CUT-OFF POSITION

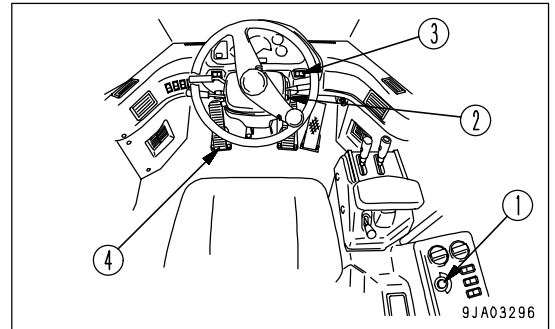


### CAUTION

Apply the parking brake before adjusting the transmission cut-off position.

Adjust the depression position of the left brake pedal used to shift the transmission to neutral at the position to match the operation.

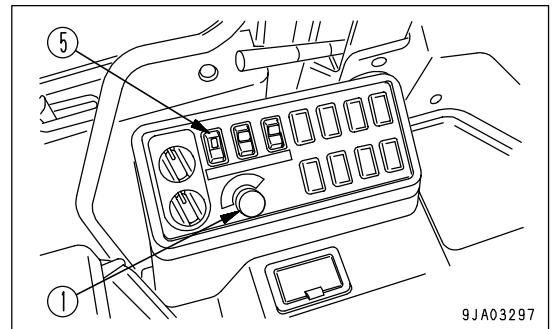
1. Start the engine with starting switch (1), then set parking brake switch (2) to the ON position.
2. Set transmission cut-off switch (3) to the ON position.
3. Depress left brake pedal (4) and set it to the desired position to shift the transmission to neutral.



4. Press transmission cut-off set switch (5), then release it. When the switch is released, the buzzer will sound with a repeated short sound, and the cut-off position is set.

#### Method of canceling cut-off position

5. After the buzzer sounds in Step 4 of the adjustment procedure, the transmission cut-off switch flashes for 2 seconds. While it is flashing, press transmission cut-off set switch (5) again and release it.
6. The buzzer will sound with a long sound and the adjusted cut-off position is canceled.



## STOPPING WHEN TRANSMISSION CUT-OFF IS ON

When the transmission cut-off switch is at the ON position and the left brake pedal is depressed, the transmission is shifted to neutral at the pre-selected brake pedal depression position.

The transmission is not shifted to neutral when the right brake pedal is operated.

#### REMARK

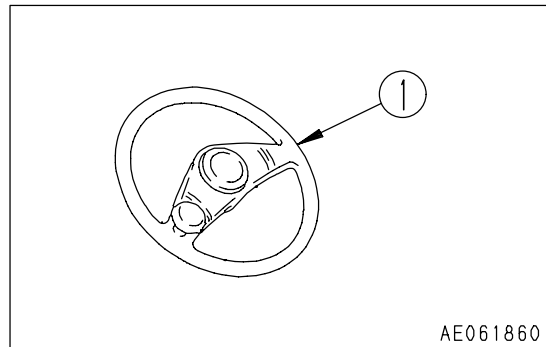
When the transmission cut-off switch is OFF, the left brake pedal acts in the same way as the right brake pedal, and the transmission is not shifted to neutral.

# TURNING

## WARNING

- Operating the steering wheel suddenly at high speed or operating the steering wheel on steep slopes is dangerous. Do not operate the steering wheel in such situations.
- If the engine stops when the machine is traveling, the emergency steering is actuated. Note that this system is only for steering in emergencies, so never stop the engine.  
It is particularly dangerous if the engine stops when the machine is traveling on slopes, so never let the engine stop when traveling on slopes.  
If the engine stops, stop the machine immediately at a safe place.

When traveling, use steering wheel (1) to turn the machine.  
With this machine, the front frame is joined to the rear frame at the center of the machine by the center pin. The front and rear frames bend at this point, and the rear wheels follow in the same track as the front wheels when turning.  
Turn the steering wheel lightly to follow the machine as it turns.



### NOTICE

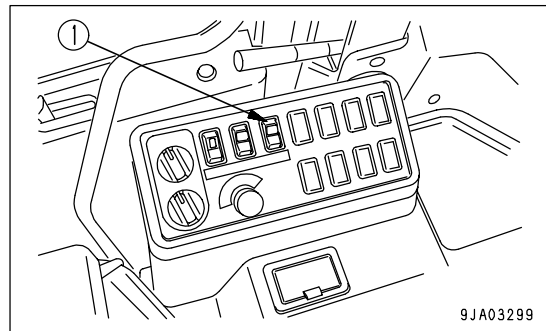
When the steering wheel is turned fully, if it reaches the end of its stroke, do not try to turn it further.  
Check that there is a play of 50 to 100 mm (2.0 to 3.9 in) in the steering wheel. Check also that the steering works properly. If any abnormality is found, please contact your Komatsu distributor for inspection.

## EMERGENCY STEERING

(If equipped)

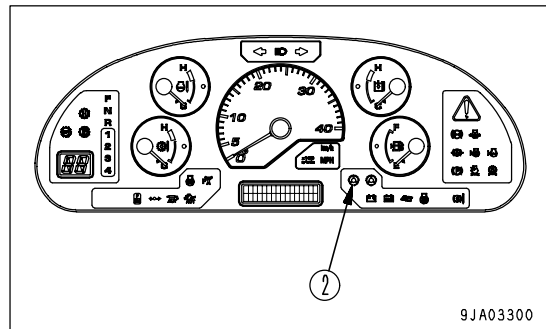
## CAUTION

- Never actuate the emergency steering except during emergencies or when checking the function.
- The emergency steering can be used continuously for a maximum of 60 seconds. Operating it continuously for more than 60 seconds may damage the system.
- When using the emergency steering, travel at less than 5 km/h (3.1 MPH).



During emergencies or when stopping the engine to check the function, press emergency steering switch (1). Emergency steering pilot lamp (green) (2) will light up and the steering can be operated.

Emergency steering pilot lamp (green) (2) lights up to inform the operator that the emergency steering system has been actuated.



The emergency steering system is provided to enable the machine to be steered under the following conditions.

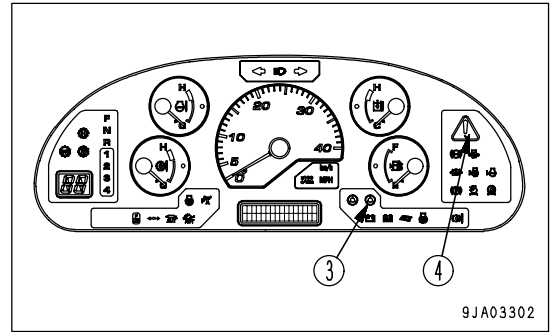
- The starting switch is at the ON position.

- The steering oil pressure is low or there is no pressure.  
(When the engine has stopped or there is a failure in the steering oil pressure pump, etc.)

When the starting switch is turned to the ON position, the emergency steering automatically carries out a self check for 3 seconds. For details, see "EMERGENCY STEERING SELF-CHECK FUNCTION (PAGE 3-127)".

When the emergency steering controller detects lack of oil pressure in the steering system, steering oil pressure caution lamp (red) (3) and central warning lamp (4) light up, and the alarm buzzer sounds intermittently.

When this happens, if the machine is traveling at a speed of more than 2 km/h (1.2 MPH), the electric pump motor is automatically actuated and emergency steering pilot lamp (green) (2) lights up. Steering oil pressure caution lamp (red) (3) lights up to inform the operator that there is a failure in the steering system.



If steering oil pressure caution lamp (red) (3) lights up, move the machine immediately to a safe place and stop it. Locate the cause and do not operate the machine until it has been repaired.

#### REMARK

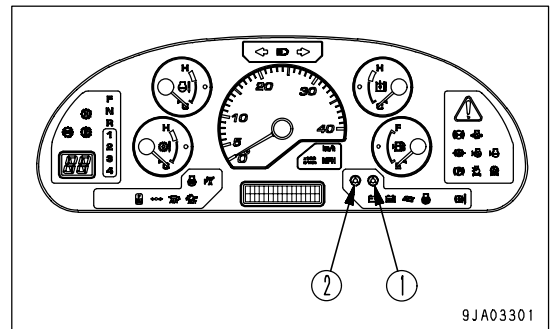
If any function of the oil pressure system is used when the engine is running at low speed, steering oil pressure caution lamp (red) (3) may light up for a moment, but if the lamp goes out again soon, there is no problem.

When the emergency steering controller detects that the oil pressure in the steering circuit has been restored, the actuation of the emergency steering system is stopped.

#### EMERGENCY STEERING SELF-CHECK FUNCTION

When the starting switch is turned ON, the emergency steering is automatically actuated for approx. 3 seconds to check that the emergency steering is functioning properly.

When this happens, steering oil pressure caution lamp (red) (1) and emergency steering pilot lamp (green) (2) light up.



The emergency steering function check is not carried out in the following cases.

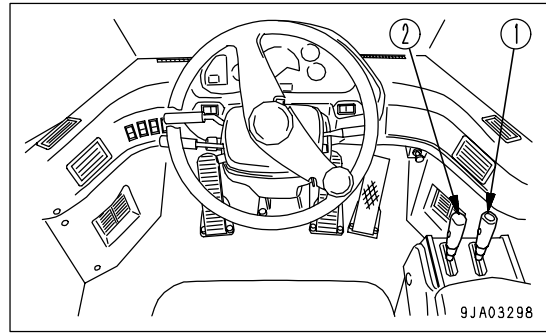
- If the starting switch is turned ON, turned OFF again without starting the engine, and is then turned ON again.
- If the starting switch is turned ON again immediately after stopping the engine when the steering oil pressure has not gone down completely.
- When automatic preheating is being carried out.

#### WHEN AUTOMATIC PREHEATING IS BEING CARRIED OUT

When automatic preheating is being carried out, the emergency steering self-check function is not actuated. To check the emergency steering function, press the emergency steering switch after completing the warming-up operation.

### OPERATION OF WORK EQUIPMENT

Lift arm control lever (1) and bucket control lever (2) can be used to operate the lift arm and bucket as follows.



### LIFT ARM CONTROL LEVER

#### NOTICE

Do not use the FLOAT position when lowering the bucket. Use the FLOAT position when leveling, see "LEVELING OPERATIONS (PAGE 3-134)".

Position (a): RAISE

When the lift arm control lever is pulled further from the RAISE position, the lever is stopped in this position until the lift arm reaches the preset position of the kickout, and the lever is returned to the HOLD position.

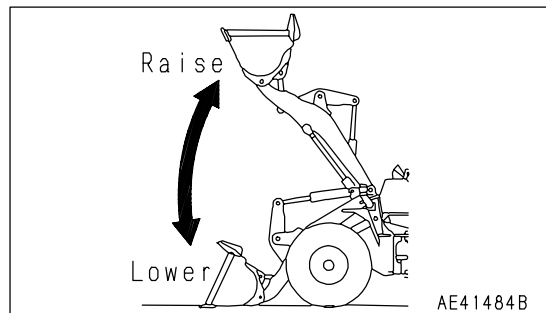
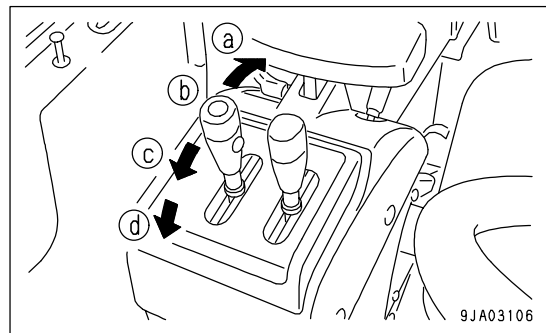
Position (b): HOLD

The lift arm is kept in the same position.

Position (c): LOWER

Position (d): FLOAT

The lift arm moves freely under external force.





**BUCKET CONTROL LEVER**

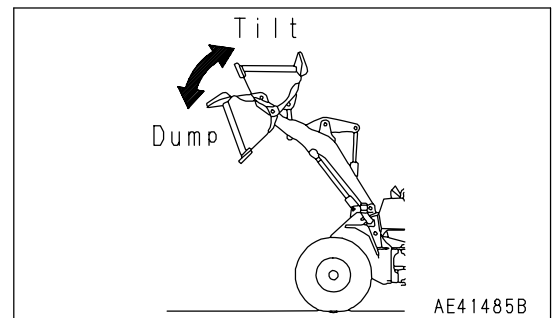
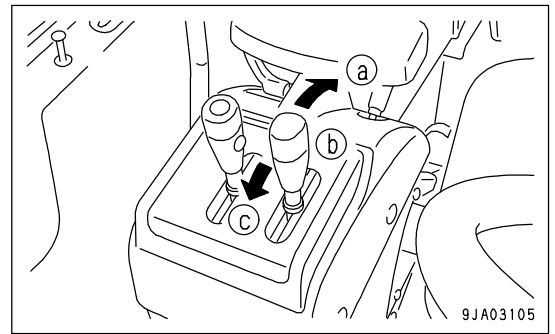
Position (a): TILT

When the bucket control lever is pulled further from the TILT position, the lever is stopped in this position until the bucket reaches the preset position of the positioner, and the lever is returned to the HOLD position.

Position (b): HOLD

The bucket is kept in the same position.

Position (c): DUMP



## WORK POSSIBLE USING WHEEL LOADER

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

## DIGGING OPERATIONS

For machines equipped with an EPC work equipment lever (option), refer to the section of "SEMI AUTO DIGGING OPERATIONS (PAGE 6-47)" in the chapter, ATTACHMENT AND OPTION, in this manual.



## WARNING

- Never carry out digging or scooping operations with the machine articulated. There is danger that the machine may tip over.
- When the machine is traveling or the work equipment is raised, the moment that the travel damper switch is turned ON, the work equipment will move.
- If operations are carried out with the travel damper switch left at the ON position, the moment that the travel damper switch is turned ON, the work equipment will move.

## NOTICE

If the tires slip, the tire life will be reduced, so do not allow the tires to slip during operation.

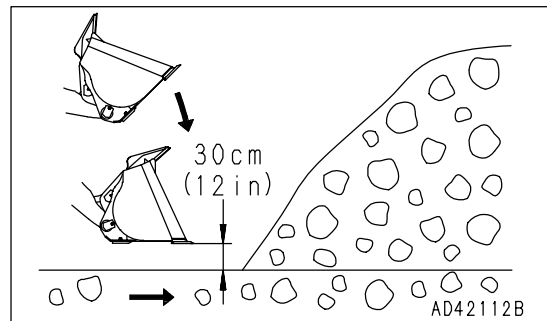
## LOADING PILED SOIL OR BLASTED ROCK

- When loading piled soil or blasted rock, drive the machine forward as follows to load. To prevent cutting of the tires caused by the tires slipping, be careful of the following points during the operation.
  - Always keep the operating jobsite flat, and remove any fallen rocks.
  - When working with stockpiles, operate the machine in 1st or 2nd gear; when loading blasted rock operate the machine in 1st gear.

1. When driving the machine forward and lowering the bucket, stop the bucket about 30 cm (12 in) from the ground, then lower it slowly.

## REMARK

If the bucket hits the ground, the front tires will come off the ground, and the tires will slip.



2. Shift down immediately in front of the material to be loaded. When completing the shift down, depress the accelerator pedal at the same time and thrust the bucket into the material.

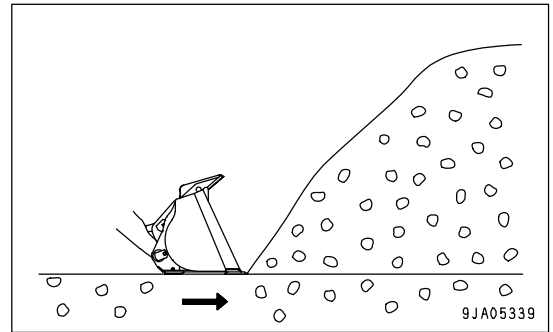
## REMARK

To reduce fuel consumption, depress the accelerator pedal the minimum possible amount. If it is depressed fully, the fuel consumption will increase, but there will be no increase in the amount loaded.

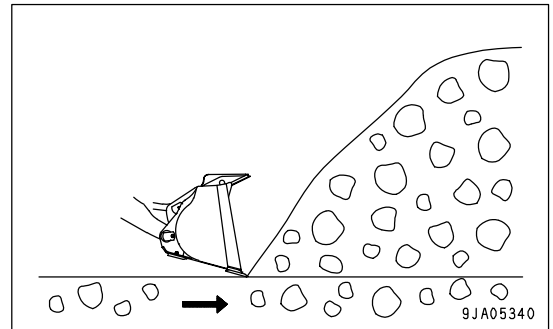
3. When the material is in a stockpile, keep the cutting edge of the bucket horizontal; when loading blasted rock, have the bucket tilting slightly down.

Be careful not to get blasted rock under the bucket. This will make the front tires come off the ground and slip. Try to keep the load in the center of the bucket; if the load is on one side of the bucket, the load will be unbalanced.

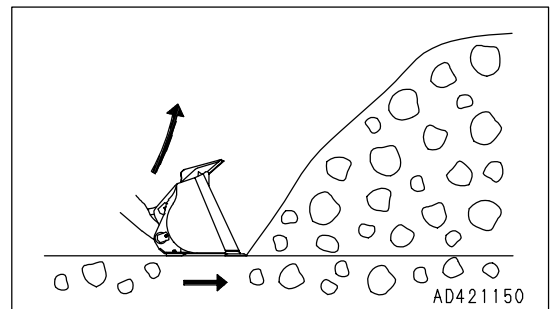
- Stock pile



- Blasted rock



4. At the same time as thrusting the bucket into the material, raise the lift arm to prevent the bucket from going in too far. By raising the lift arm, ample traction will be produced by the front tires.



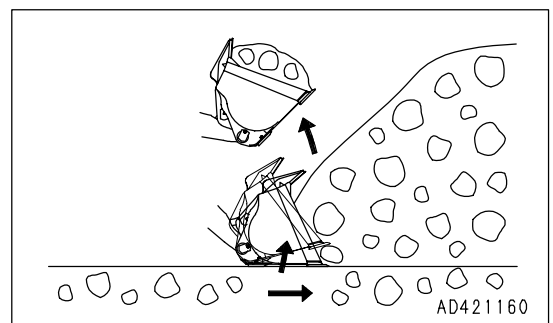
**REMARK**

If the bucket is thrust too much and the lift arm stops rising or the machine stops moving forward, release the accelerator pedal a little. Proper operation of the accelerator pedal for each type of the soil is effective for saving of fuel and prevention of wear of the tires.

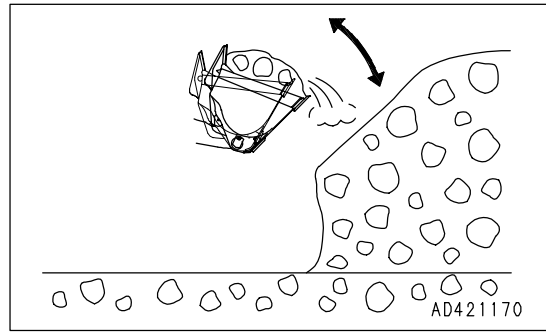
5. Check that there is enough material loaded into the bucket, then operate the bucket control lever to tilt the bucket and load the bucket fully.

**REMARK**

If the bucket edge is moved up and down while pushing in the bucket and digging, the front tires will come off the ground and this will cause the tires to slip.



6. If there is too much material loaded in the bucket, dump and tilt the bucket quickly to remove the excessive load. This prevents spillage of the load during hauling.



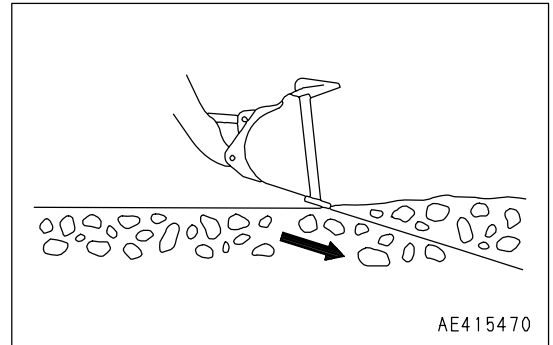
**DIGGING AND LOADING ON LEVEL GROUND**

- When digging and loading on level ground, set the bucket edge facing down slightly as follows and drive the machine forward. Always be careful not to load the bucket on one side and cause an unbalanced load. This operation should be carried out in 1st gear.

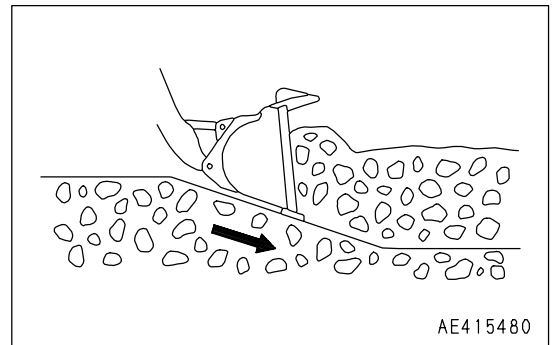
**CAUTION**

Do not set the bucket facing down more than 20 degrees.

- Set the edge of the bucket facing slightly down.

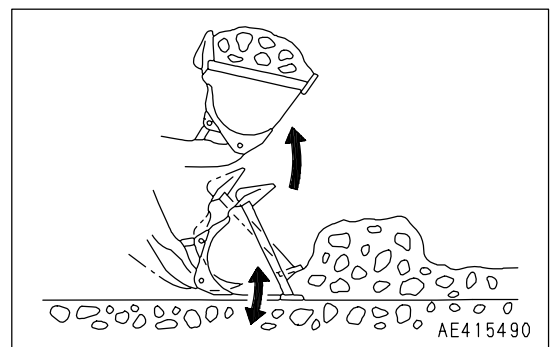


- Drive the machine forward and operate the lift arm control lever forward to cut a thin layer of the surface each time when excavating the soil.



- Operate the lift arm control lever slightly up and down to reduce the resistance when driving the machine forward.

When digging with the bucket, avoid imposing the digging force on one side of the bucket.



## LEVELING OPERATIONS

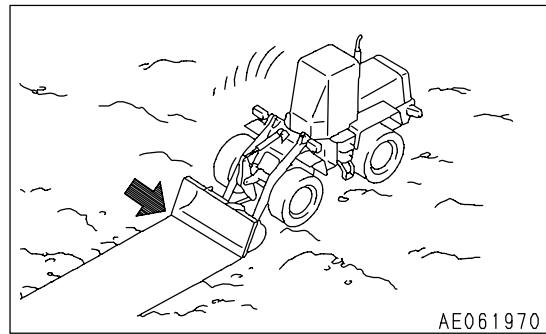
### NOTICE

- Always operate the machine in reverse when carrying out leveling operations.

If it is necessary to carry out leveling operations when traveling forward, do not set the bucket dumping angle to more than 20 degrees.

- Turn the E.C.S.S. OFF when carrying out leveling operations.

1. Scoop soil into the bucket. Move the machine backward while spreading soil from the bucket little by little.
2. Go over the spread soil with the bucket teeth touching the ground and level the ground by back-dragging.
3. Scoop some more soil into the bucket, put the lift arm control lever in FLOAT position, level the bucket at ground level, and smooth the ground by moving backward.



## PUSHING OPERATION



### CAUTION

Never set the bucket to the DUMP position when carrying out pushing operation.

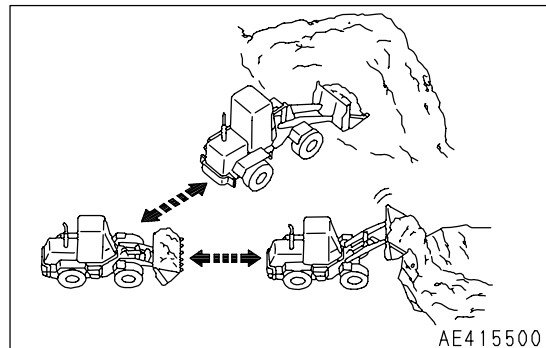
When carrying out pushing operations, set the bottom of the bucket parallel to the ground surface.

## LOAD AND CARRY OPERATIONS



### WARNING

- When carrying a load, lower the bucket to lower the center of gravity when traveling.
- When the machine is traveling or the work equipment is raised, the moment that the E.C.S.S. switch is turned ON, the work equipment will move.
- If operations are carried out with the E.C.S.S. switch left at the ON position, the moment that the travel damper is actuated, the work equipment will move.



The load and carry method for wheel loaders consists of a cycle of scooping -> hauling -> loading (into a hopper, truck, etc.).

Always keep the travel path properly maintained.

When using the load and carry method, see "PRECAUTIONS FOR USING LOAD AND CARRY METHOD (PAGE 3-145)".

## LOADING OPERATIONS

Select the method of operation which will give the minimum amount of turning and travel in order to provide the most efficient method for the jobsite.



### WARNING

- Always keep the jobsite flat, and do not operate the steering wheel suddenly or apply the brakes suddenly when the lift arm is raised with a loaded bucket. This is dangerous.
- Never thrust the bucket in when traveling at high speed (when loading soil or crushed rock). This is dangerous.
- When the machine is traveling or the work equipment is raised, the moment that the E.C.S.S. switch is turned ON, the work equipment will move.
- If operations are carried out with the E.C.S.S. switch left at the ON position, the moment that the travel damper is actuated, the work equipment will move.

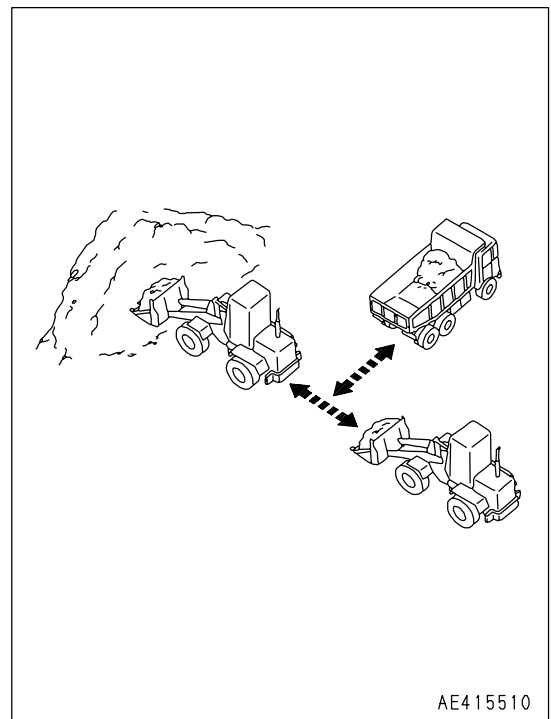
### NOTICE

- If the tires slip, the tire life will be reduced, so do not allow the tires to slip during operation.
- Avoid excessive bucket shaking.

### CROSS DRIVE LOADING

Always set the wheel loader facing at a right angle to the stockpile. After digging in and scooping up the load, drive the machine straight back in reverse, then bring the dump truck in between the stock pile and the wheel loader.

This method requires the least time for loading, and is extremely effective in reducing the cycle time.

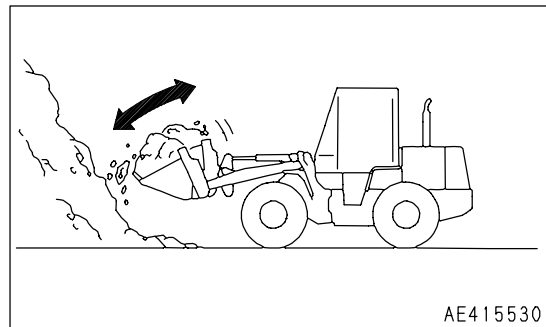
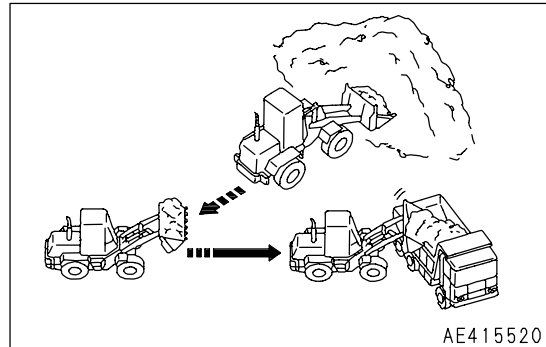


### V-SHAPE LOADING

Position the dump truck so that the direction of approach of the wheel loader is approx. 60 degrees from the direction of approach to the stockpile. After loading the bucket, drive the wheel loader in reverse, then turn it to face the dump truck and travel forward to load the dump truck.

The smaller the turning angle of the wheel loader is, the more efficient the operation becomes.

When loading a full bucket and raising it to the maximum height, first shake the bucket to stabilize the load before raising the bucket. This will prevent the load from spilling to the rear.



### PRECAUTIONS WHEN PILING UP LOADS

When forming products into a pile, be careful not to let the rear counterweight come into contact with the ground. Do not set the bucket to the DUMP position when piling-up loads.

### REMARK

- When carrying out scooping-up work, avoid using the transmission cut-off function as far as possible. It will prevent the machine from moving back.
- When using the transmission cut-off function, lower the cut-off position so that cut-off function is actuated, when the brake pedal is deeply depressed, while ensuring ample braking force.

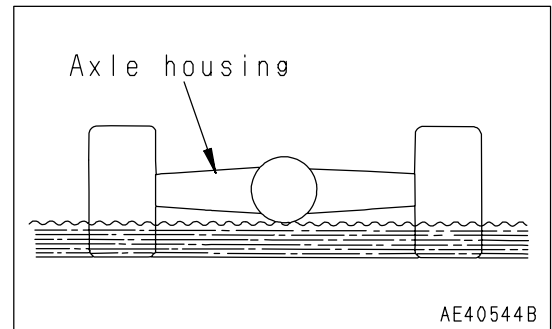


## PRECAUTIONS FOR OPERATION

### PERMISSIBLE WATER DEPTH

When working in water or on swampy ground, do not let the water come above the bottom of the axle housing.

After finishing the operation, wash and check the lubricating points.



### IF WHEEL BRAKE DOES NOT WORK

If the machine is not stopped by depressing the brake pedal, use the parking brake to stop the machine.

#### NOTICE

If the parking brake has been used as an emergency brake, contact your Komatsu distributor to have the parking brake checked for any abnormality.

## PRECAUTIONS WHEN DRIVING UP OR DOWN SLOPES

### LOWER THE CENTER OF GRAVITY WHEN TURNING

When turning on slopes, lower the work equipment to lower the center of gravity before turning. It is dangerous to turn the machine suddenly on slopes.

### BREAKING ON DOWNHILL SLOPE

If the footbrake is used frequently when traveling downhill, the brake will overheat and may be damaged. Place the gearshift lever at a low speed range and use the braking force of the engine when traveling downhill.

Use the right brake pedal for braking.

If the brakes are used excessively, the axle oil temperature caution lamp may light up and the alarm buzzer may sound intermittently. For details of the necessary action to take, see "AXLE OIL TEMPERATURE CAUTION LAMP (PAGE 3-17)" in EXPLANATION OF COMPONENTS.

If the speed range selected by the gearshift lever is not correct, the torque converter oil may overheat. If this happens, shift down one gear range and reduce the oil temperature.

If the oil temperature does not return to the white range even when the gearshift lever is at 1st, stop the machine, return the directional lever to the N position, and run the engine at a mid-range speed until the gauge returns to the white range.

### IF ENGINE STOPS

If the engine stops on a slope, apply the parking brake immediately, and lower the work equipment to the ground and stop the machine. Then put the directional lever in neutral position, and start the engine again.

### PRECAUTIONS WHEN DRIVING MACHINE

When the machine travels at high speed for a long distance, the tires become extremely hot. This causes early wear of the tires and should be avoided as much as possible. If the machine must be driven for a long distance, take the following precautions.

- Follow the regulations related to this machine, and drive carefully.
- Before driving the machine, carry out the checks before starting.
- The most suitable tire pressure, travel speed, or tire type differ according to the condition of the travel surface. Contact your Komatsu distributor or tire dealer for information.
- The following is a guide to suitable tire pressures and speeds when traveling on a paved surface with standard tires. (23.5-25-20PR)

Tire pressure

Front wheel: 0.39 MPa (4.0 kgf/cm<sup>2</sup>, 56.8 PSI)

Rear wheel: 0.31 MPa (3.2 kgf/cm<sup>2</sup>, 45.4 PSI)

Speed: 14 km/h (8.7 MPH)

- Check the tire pressure before starting, when the tire is cool.
- After traveling for 1 hour, stop for 30 minutes. Check the tires and other parts for damage; also check the oil and coolant levels.
- Always travel with the bucket empty.
- Never put "calcium chloride" or "dry ballast" in the tires when traveling.

### PRECAUTIONS REGARDING BRAKE FUNCTION

When traveling long distances continuously downhill, the frequency of using the brake may increase. As a result, depending on the weight of the machine and the grade of the slope, the machine's braking capacity may be exceeded and the brakes may overheat.

The table below shows a guideline of the values for this machine.

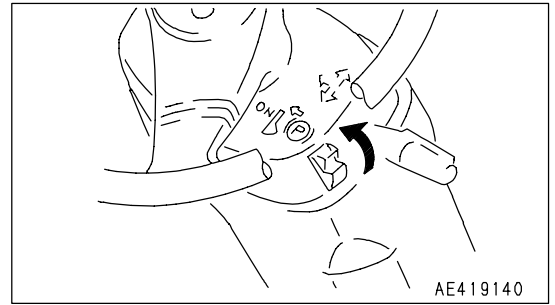
Machine weight (t)	Slope grade (%)	Braking capacity limit	
		Average travel speed limit (km/h (MPH))	Downhill distance limit (continuous) (km)
22 - 24 (unloaded)	10	40 (24.9)	2
	20	17 (10.6)	1.2
28.5 - 30.5 (loaded)	10	30 (18.6)	1.8
	20	12 (7.5)	0.6

If the braking capacity limit is exceeded, a forced cooling system for the brakes is needed, so please consult your Komatsu distributor.

## ADJUSTING WORK EQUIPMENT POSTURE

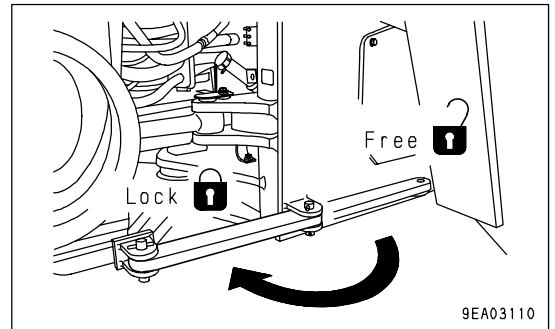
### WARNING

- Stop the machine on flat ground and put blocks in front and behind the wheels.
- Apply the parking brake.
- Secure the front and rear frames with the frame lock bar.
- Always attach the warning tag to the work equipment control lever.
- Do not go under the work equipment when the arm is raised.



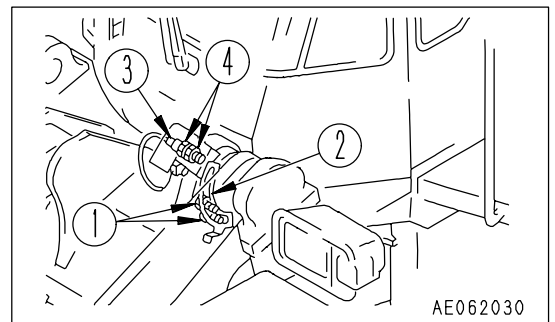
The boom kickout makes it possible to set the bucket so that it automatically stops at the desired lifting height (lift arm higher than horizontal) and the bucket positioner makes it possible to set the bucket so that it automatically stops at the desired digging angle. The setting can be adjusted to match the working conditions.

For machines equipped with an EPC work equipment lever (if equipped), refer to the section of "METHOD OF REMOTE POSITIONER (PAGE 6-49)" in the chapter, ATTACHMENT AND OPTION, in this manual.



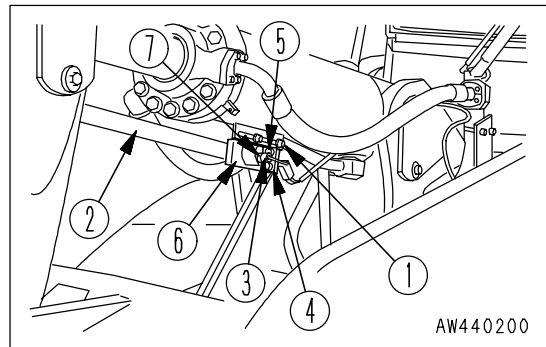
## ADJUSTING BOOM KICKOUT

1. Raise the bucket to the desired position, return the lift arm control lever to the HOLD position, set the work equipment lock lever to the LOCK position, then stop the engine.
2. Loosen two bolts (1), and adjust plate (2) so that the bottom edge is in line with the center of the sensing surface of proximity switch (3). Then tighten the bolts to hold the plate in position.
3. Loosen two nuts (4) to make a clearance of 3 to 5 mm (0.118 to 0.197 in) between plate (2) and the sensing surface of proximity switch (3). Then tighten the nuts to hold in position. Tightening torque:  $17.2 \pm 2.5$  N·m ( $1.75 \pm 0.25$  kgf·m,  $12.7 \pm 1.8$  lbf)
4. After adjusting, start the engine and operate the lift arm control lever. Check that the lever is automatically returned to HOLD when the bucket reaches the desired height.



## ADJUSTING BUCKET POSITIONER

1. Lower the bucket to the ground, set it to the desired digging angle, return the bucket control lever to the HOLD position, set the work equipment lock lever to the LOCK position, then stop the engine.
2. Loosen 2 bolts (1), adjust the position of mounting bracket (4) of the proximity switch so that the rear tip of bar (2) is in line with the center of the sensing surface of proximity switch (3), then tighten bolts to hold the bracket in position.
3. Loosen 2 bolts (5), adjust so that the clearance between bar (2) and support (6) is 0.5 to 2 mm (0.020 to 0.079 in), then tighten bolts (5) to hold in position.
4. Loosen 2 nuts (7), adjust so that the clearance between bar (2) and the sensing surface of proximity switch (3) is 3 to 5 mm (0.118 to 0.197 in), then tighten the nuts to hold in position.  
Tightening torque:  $17.2 \pm 2.5$  N·m ( $1.75 \pm 0.25$  kgf·m,  $12.7 \pm 1.8$  lbft)
5. After adjusting, start the engine and raise the lift arm. Operate the bucket control lever to the DUMP position, then operate it to the TILT BACK position and check that the lever is automatically returned to the HOLD position when the bucket reaches the desired digging angle.

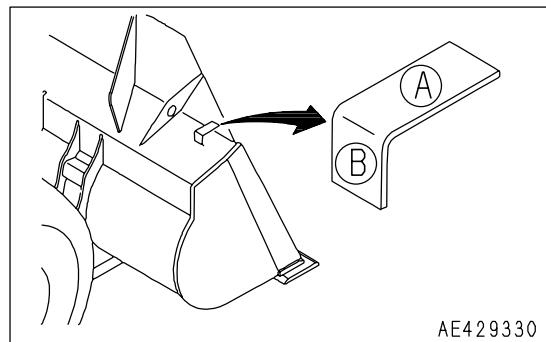


## BUCKET LEVEL INDICATOR

(A) and (B) at the top rear of the bucket are the level indicators. They check the bucket angle during operations.

(A): Parallel with cutting edge

(B): 90 degrees to cutting edge



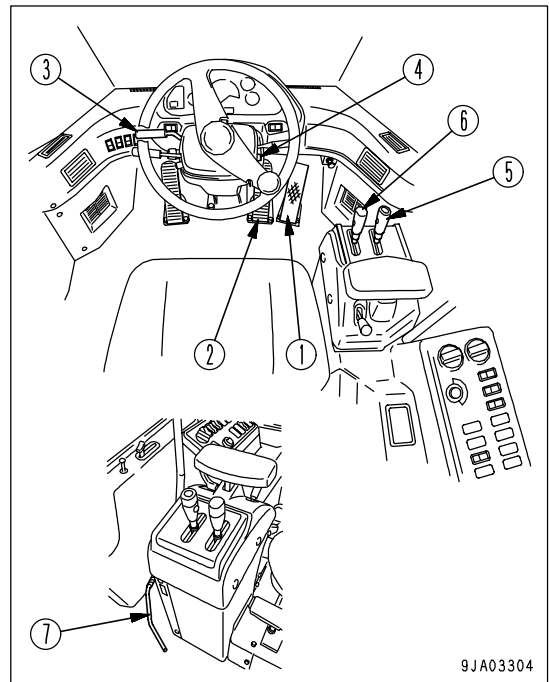
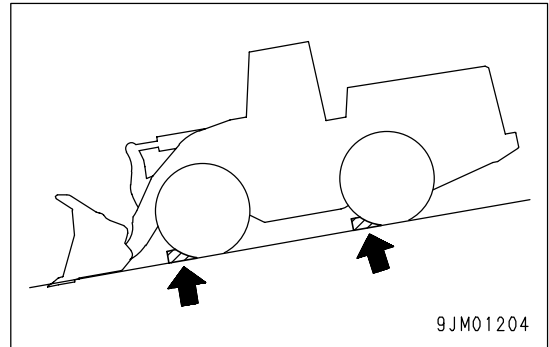
PARKING MACHINE

**WARNING**

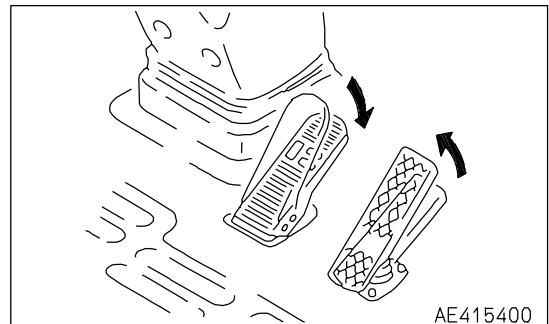
- Avoid stopping suddenly. Give yourself ample room when stopping.
- Do not park the machine on slopes.  
If the machine has to be parked on a slope, set it facing directly down the slope, then dig the bucket into the ground and put blocks under the tires to prevent the machine from moving.
- If the control lever is touched by accident, the work equipment or the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always set the work equipment lock lever securely to the LOCK position.
- Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.

NOTICE

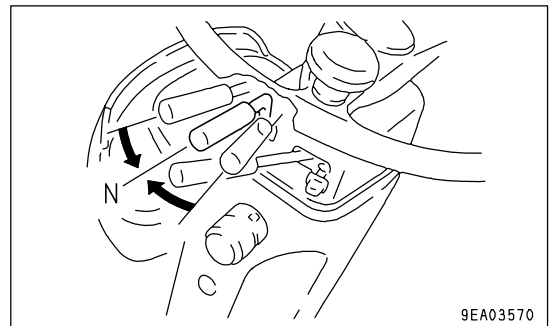
Never use the parking brake switch to brake the machine when traveling except in an emergency. Apply the parking brake only after the machine has stopped.



1. Release accelerator pedal (1), then depress brake pedal (2) to stop the machine.



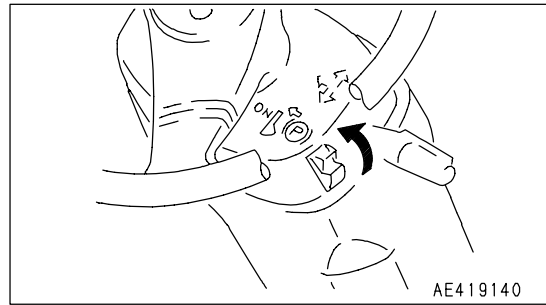
2. Place directional lever (3) in N (neutral) position.



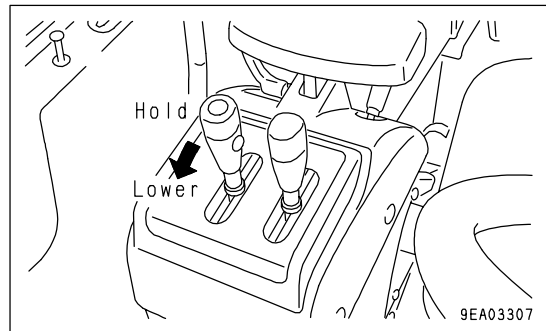
- Turn parking brake switch (4) to ON to apply the parking brake.

**NOTICE**

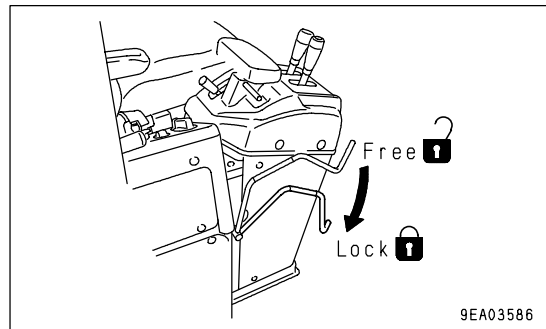
When the parking brake is applied, the transmission is automatically returned to neutral.



- Operate lift arm control lever (5) to lower the bucket to the ground.



- Check that the lift arm control lever (5) and bucket control lever (6) is at the HOLD position, then set the work equipment lock lever (7) to the LOCK position.



## CHECKS AFTER COMPLETION OF OPERATION

### BEFORE STOPPING ENGINE

Check the engine water temperature, engine oil pressure, torque converter oil temperature, and fuel level with the machine monitor.

If the engine has overheated, do not stop it suddenly. Run the engine at a midrange speed to allow the engine to cool down before stopping it.

### AFTER STOPPING ENGINE

1. Walk around the machine and check the work equipment, bodywork, and undercarriage, and check also for oil and water leakage.
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.

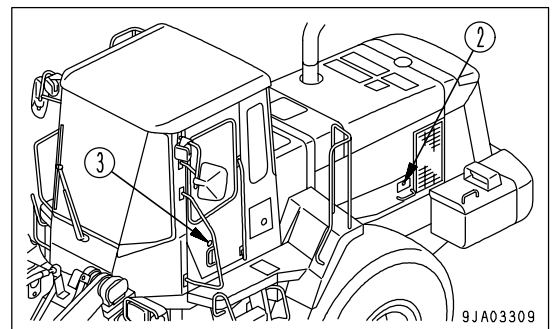
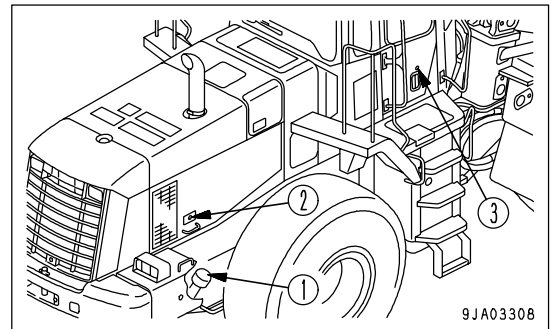
### LOCKING

Always lock the following parts.

- (1) Fuel tank filler cap
- (2) Engine side panel (2 points)
- (3) Cab door (2 points)

### REMARK

The starting switch key is used also for locks (1), (2), and (3).



## HANDLING THE TIRES

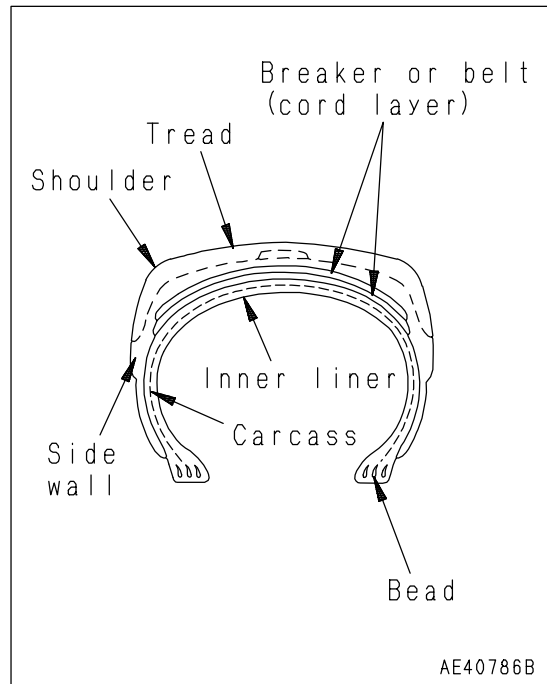
### PRECAUTIONS WHEN HANDLING TIRES



#### CAUTION

If a tire has reached any of the following service limits, there is danger that the tire may burst or cause an accident, so to ensure safety, replace it with a new tire.

- Service limits for wear
  - When the remaining depth of the grooves on construction equipment tires (at a point approx. 1/4 of the tread width) is 15% of the groove depth on a new tire.
  - When the tire shows marked uneven wear, stepped wear or other abnormal wear, or when the cord layer is exposed.
- Service limits for damage
  - When there is external damage extending to the cord or when the cord is broken
  - When the cord is cut or there is dragging
  - When the tire is peeling (there is separation)
  - When the bead is damaged
  - For tubeless tires, when there is air leakage or improper repair



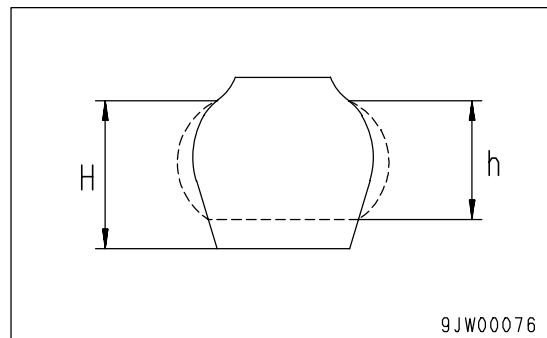
Please contact your Komatsu distributor when replacing the tires. It is dangerous to jack up the machine without taking due care.

### TIRE PRESSURE

Measure the tire pressure before starting operations, when the tires are cool.

If the tire inflation pressure is too low, there will be overload; if it is too high, it will cause tire cuts and shock burst. To prevent these problems, adjust the tire inflation pressure according to the table on the next page.

$$\text{Deflection ratio} = \frac{H - h}{H} \times 100$$



As a guideline that can be checked visibly, the deflection ratio of the front tire (deflection/free height) is as follows.

When carrying normal load (lift arm horizontal): Approx. 15 to 25 %

When digging (rear wheels off ground): Approx. 25 to 35 %



When checking the tire inflation pressure, check also for small scratches or peeling of the tire, for nails or pieces of metal which may cause punctures, and for any abnormal wear.

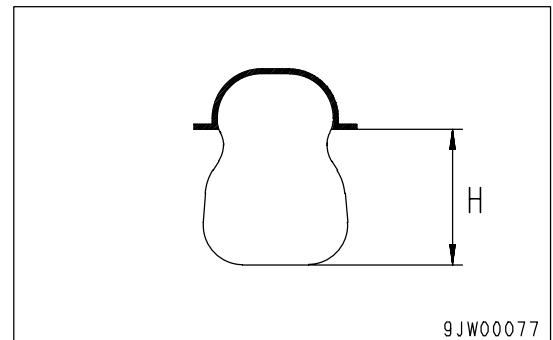
Clearing fallen stones and rocks from the operating area and maintaining the surface will extend the tire life and give improved economy.

- For operations on normal road surfaces, rock digging operations: High end of range in air pressure chart
- Stockpile operations on soft ground: Average pressure in air pressure chart
- Operations on sand (operations not using much digging force): Low end of range in air pressure chart

If the deflection of the tire is excessive, raise the inflation pressure within the limits given in the table to give a suitable deflection (see deflection ratio).

Tire size (Pattern)	H Free height (mm)	Inflation pressure [MPa (kgf/cm <sup>2</sup> , PSI)]			When shipped from factory
		Soft ground (sandy ground)	Normal road		
			Stockpile	Stockpile	
23.5-25-20PR (L3: Rock) (Standard)	424 (BS) 423 (TOYO)	0.24 - 0.35 (2.4 - 3.6, 34.1 - 51.1)	0.26 - 0.35 (2.6 - 3.6, 36.9 - 51.1)	0.26 - 0.35 (2.6 - 3.6, 36.9 - 51.1)	Front tire: 0.39 (4.0, 56.8) Rear tire: 0.31 (3.2, 45.4)
26.5-25-16PR (L3: Rock) (if equipped)	492 (BS)	Front tire: 0.34 (3.5, 49.7)	Front tire: 0.34 (3.5, 49.7)	Front tire: 0.34 (3.5, 49.7)	Front tire: 0.34 (3.5, 49.7)
26.5-25-20PR (L3: Rock) (if equipped)		Rear tire: 0.29 (3.0, 42.6)	Rear tire: 0.29 (3.0, 42.6)	Rear tire: 0.29 (3.0, 42.6)	Rear tire: 0.29 (3.0, 42.6)

Stockpile operations mean the loading of sand and other loose materials.



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**PRECAUTIONS FOR USING LOAD AND CARRY METHOD**

When traveling continuously with load and carry operations, choose the correct tires to match the operating conditions, or choose the operating conditions to match the tires. If this is not done, the tires will be damaged, so contact your Komatsu distributor or tire dealer when selecting tires.

## TRANSPORTATION

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

### TRANSPORTATION PROCEDURE

As a basic rule, always transport the machine on a trailer.

When selecting the trailer, see the weights and dimensions given in Section "SPECIFICATIONS (PAGE 5-2)".

Note that the specifications for the weights and dimensions for transportation differ according to the type of tires and type of bucket.

### LOADING, UNLOADING WORK WITH TRAILERS

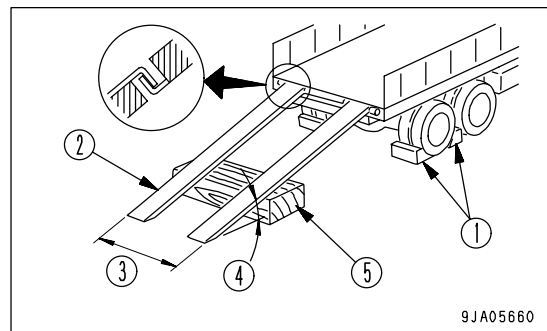
#### WARNING

- When loading or unloading the machine, run the engine at low speed, travel at low speed, and operate slowly.
- When loading or unloading the machine, stop the trailer on firm level ground.  
In addition, keep well away from the road shoulder.
- Use ramps of ample width, length, thickness, and strength, and install them securely at an angle of less than 15°. When using an embankment, compact the fill soil thoroughly and make sure that the slope face does not collapse.
- Remove the mud stuck to the undercarriage to prevent the machine from slipping to the side on the ramps.  
In addition, remove any water, snow, ice, grease, or oil from the ramps.
- Never change direction on the ramps. There is danger that the machine may tip over.  
If it is necessary to change direction, return to the ground surface or the trailer platform, correct the direction, and start again.
- The position of the center of gravity of the machine will change suddenly at the connection of the ramp and trailer, and there is danger of the machine losing its balance. Always drive slowly over this point.

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

### LOADING

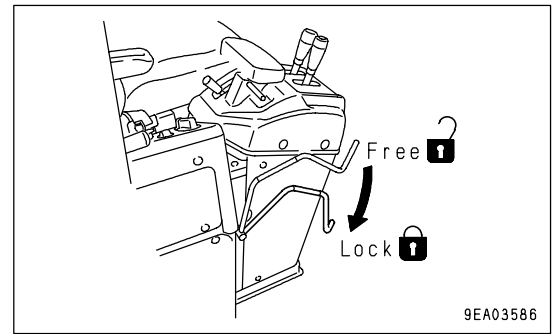
1. Load and unload on firm level ground only.  
Maintain a safe distance from the edge of a road.
2. Apply the brakes on the trailer securely and insert locks (1) under the tires to hold the trailer in position.  
Set the distance (3) between ramps (2) to match the distance between the left and right tires, and make angle (4) of the ramps a maximum of 15°.  
If ramps (2) sag appreciably under the weight of the machine, put wooden blocks (5) under the ramps to support them.
3. Determine the direction of the ramp, then slowly load the machine.
4. Load the machine correctly in the specified position on the trailer.



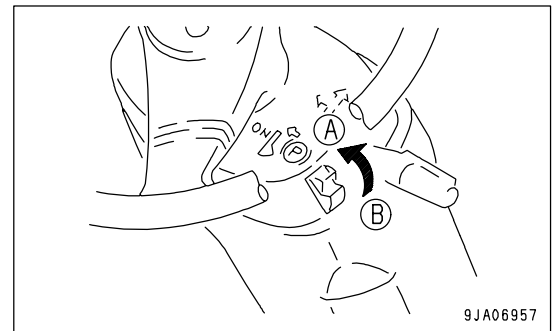
## SECURING MACHINE

Load the machine onto a trailer as follows:

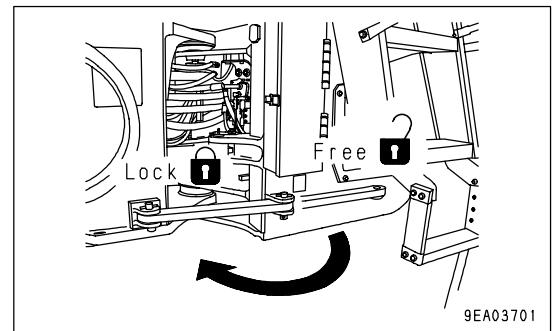
1. Lower the work equipment slowly.
2. Check that the work equipment control lever is at the HOLD position, then set the work equipment lock lever to the LOCK position.



3. Set the parking brake switch to ON position (A) to apply the parking brake securely.
4. Turn the starting switch to the OFF position and stop the engine.  
Remove the key from the starting switch.



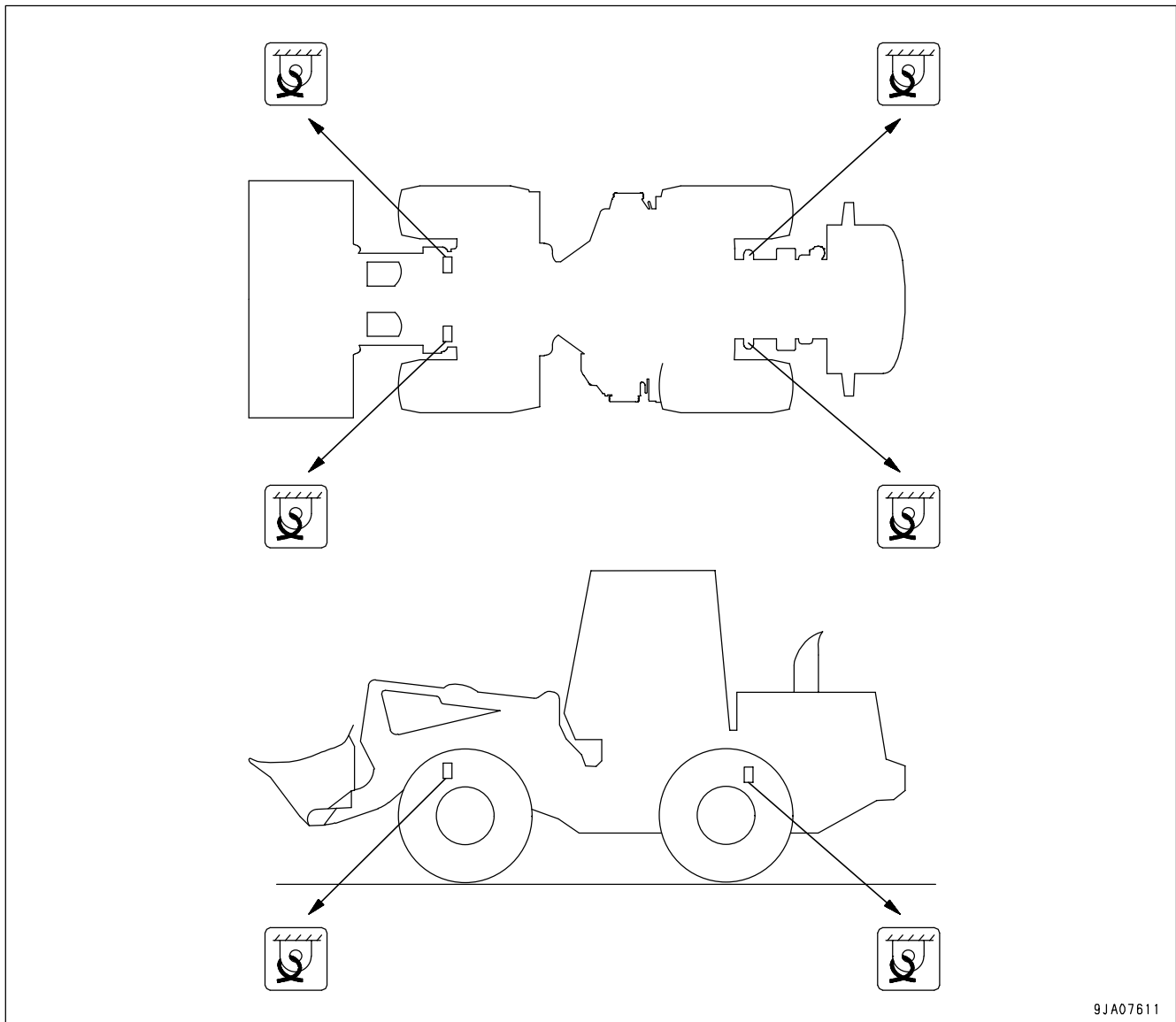
5. Lock the front and rear frame with the frame lock bar.



6. Put blocks in front and behind the wheels, and secure the machine with chains or wire rope to prevent the machine from moving during transportation.

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

Fastening positions



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7. Stow the antenna away.

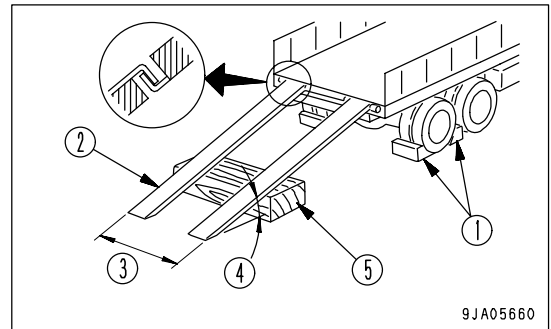
## UNLOADING

1. Load and unload on firm level ground only. Maintain a safe distance from the edge of a road.

2. Apply the brakes on the trailer securely and insert locks (1) under the tires to hold the trailer in position.

Set the distance (3) between ramps (2) to match the distance between the left and right tires, and make angle (4) of the ramps a maximum of 15°.

If ramps (2) sag appreciably under the weight of the machine, put wooden blocks (5) under the ramps to support them.

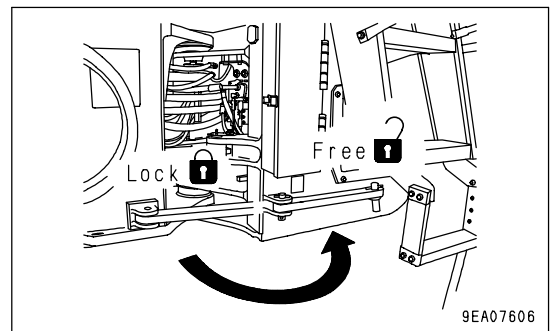


3. Remove the chains and wire ropes fastening the machine.

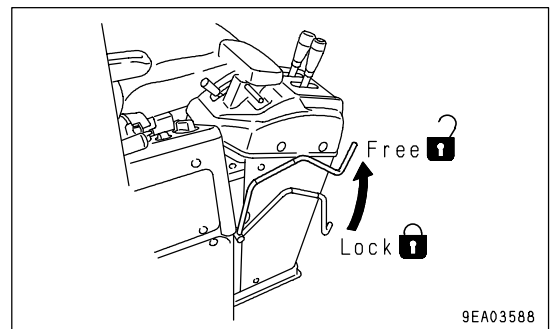
4. Set the frame lock bar to the FREE position.

5. Start the engine.

Warm the engine up fully.

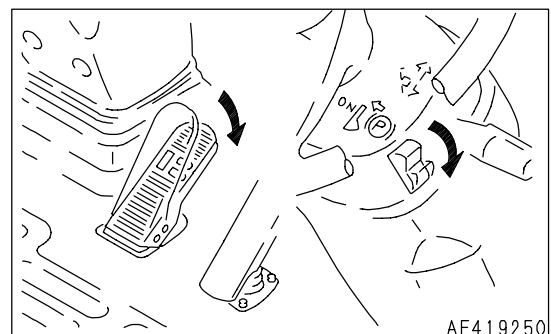


6. Check that the work equipment control lever is at the HOLD position, then set the work equipment lock lever to the FREE position.



7. Depress the right brake pedal, then turn the parking brake switch OFF (release) to release the parking brake. Keep the right brake pedal depressed.

8. Determine the direction of the ramps, then drive the machine slowly down the ramps to unload the machine.



## LIFTING MACHINE

### WARNING

- The person using the crane to carry out lifting operations must be a qualified crane operator.
- Never carry out lifting operations if any person is on the machine being lifted.
- Always use a wire rope that has ample strength for the weight of the machine being lifted.
- Keep the machine horizontal when lifting it.
- When carrying out lifting operations, do as follows to prevent the machine from moving unexpectedly.
  - Set the parking brake switch to the ON position.
  - Set the work equipment lock lever to the LOCK position.
  - Set the frame lock bar to the LOCK position.
- Never enter the area under or around a raised machine.
- There is danger of the machine losing its balance.
  - Use the procedure below to set the machine in the proper posture and use the lifting equipment when lifting the machine.

### NOTICE

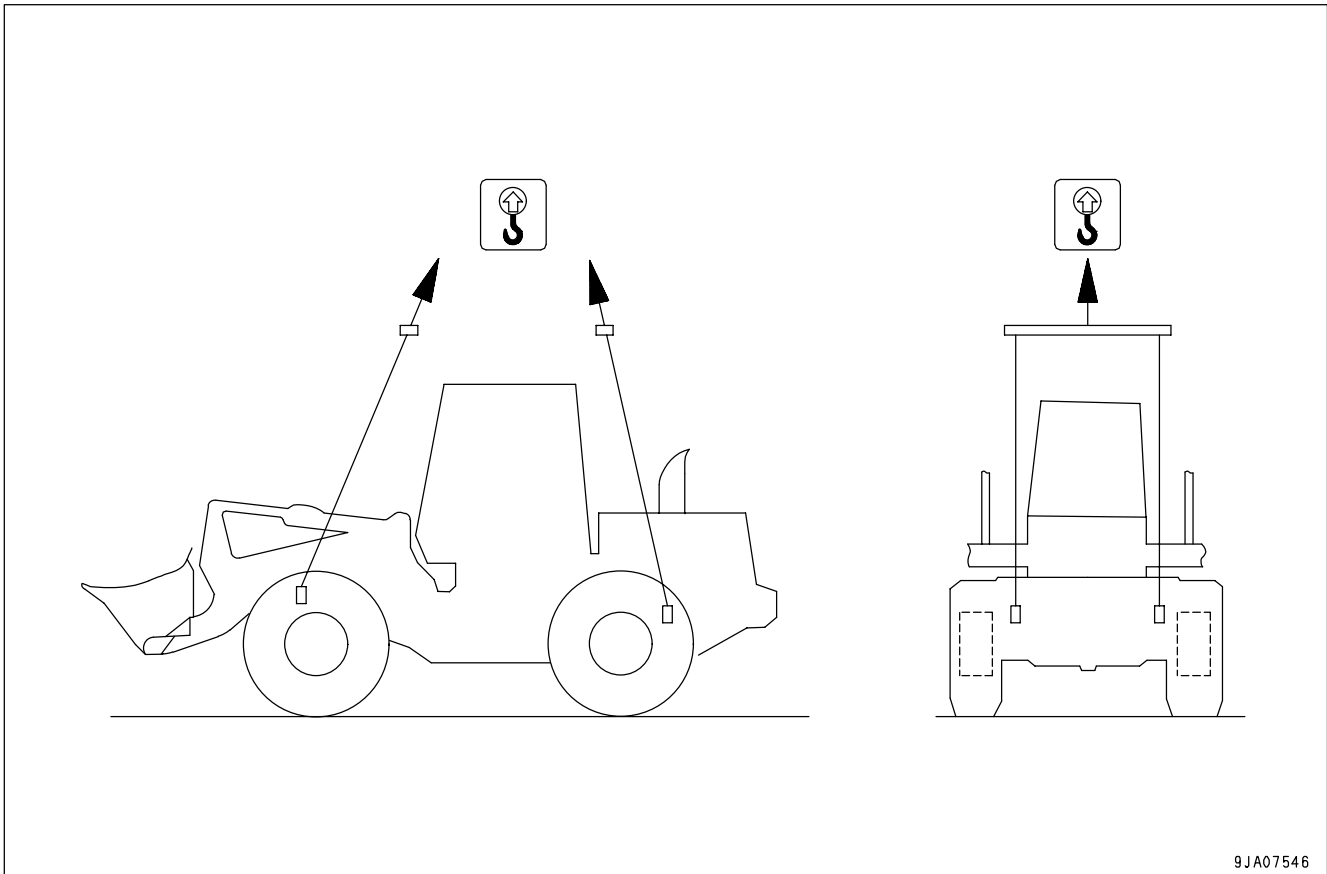
The lifting procedure applies to machines with standard specifications.

The method of lifting differs according to attachments and options actually installed on the machine. For the proper lifting procedures, contact your Komatsu distributor.

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

## LIFTING PROCEDURE

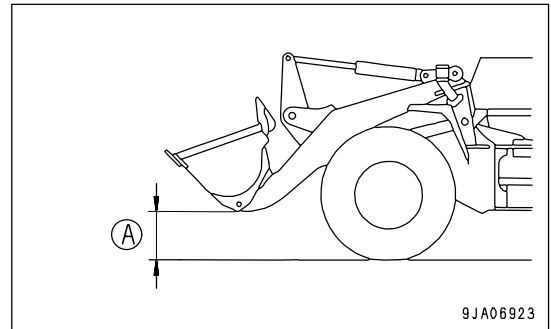
Lifting position



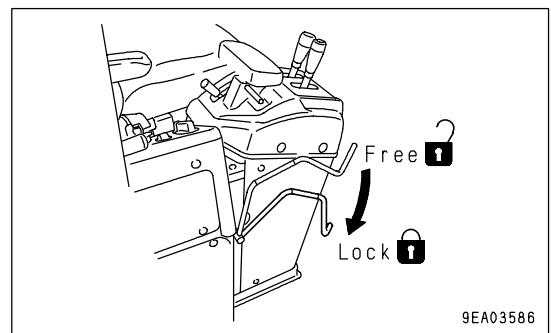
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Lifting work can be carried out only for machines with lifting marks. Before starting the lifting operation, stop the machine in a horizontal place and do as follows.

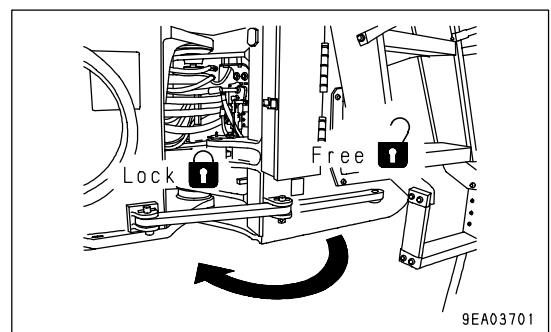
1. Start the engine, make sure that the machine is horizontal, then set the work equipment to the travel posture.  
For details, see "MOVING THE MACHINE (PAGE 3-115)".  
(A): 40 - 50 cm (16 - 20 in)



2. Check that the work equipment control lever is at the HOLD position, then set the work equipment lock lever to the LOCK position (L).



3. Stop the engine, check that the area around the operator's compartment is safe, then lock with the frame lock bar so that the front frame and rear frame do not articulate.



4. Use wire ropes and slings that match the weight of the machine, and wind the wire rope and fix it to the lifting points as shown in the figure.

#### NOTICE

- Use protectors, etc. so that the wire ropes will not be broken at sharp edges or narrow places.
- Use spreaders and bars having sufficient width so that they will not touch the machine.
- For machines equipped with a rear full fender, remove the rear full fender before carrying out the operation.

5. 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 fuel and oil with low viscosity for all components.

For details of the specified viscosity, see "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-9)".

### 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 of the antifreeze mixture when changing the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-22)".



## 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.

Charging Rate (%)	Electrolyte Temperature (°C)	20	0	-10	-20
	100		1.28	1.29	1.30
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.

**PRECAUTIONS 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.

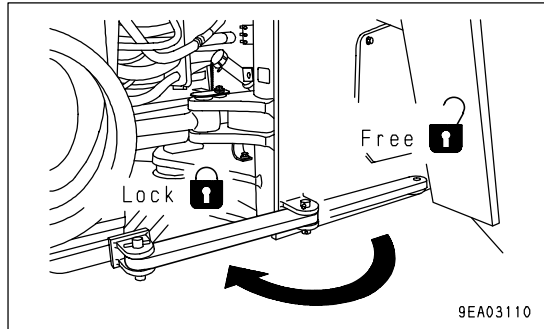
- Replace all fuel and oil with fuel and oil of the specified viscosity. For details, see "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-9)".

### WARMING-UP OPERATION FOR STEERING HYDRAULIC CIRCUIT IN COLD WEATHER

**WARNING**

If the steering wheel is operated and stopped while the oil temperature is low, there may be a time lag before the machine stops turning. In this case, use the frame lock bar to ensure safety, and perform the warm-up operation in a wide place.

Do not relieve the hydraulic oil in the circuit continuously for more than 5 seconds.



When the temperature is low, do not start the operation of the machine immediately after starting the engine.

**Warming up steering hydraulic circuit**

Slowly operate the steering wheel to the left and right to warm up the oil in the steering valve. (Repeat this operation for about 10 minutes to warm up the oil.)

**NOTICE**

Turn the steering wheel a little and stop in that position. Confirm that the machine turns by an angle equivalent to the amount that the steering wheel is turned.

**RECOMMENDED OIL**

Select the oil from the table below according to the ambient temperature.

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE									
		-22	-4	14	32	50	68	86	104	122°F	
		-30	-20	-10	0	10	20	30	40	50°C	
Hydraulic system	Engine oil	TO10									
		SAE 5W-20CD									

If SAE5W-20CD is used in the cold season, replace it with TO10 oil when the cold season finishes.

## 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.
- Coat the exposed portion of the hydraulic cylinder piston rod with grease.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- Set the work equipment lock lever to the LOCK position to prevent the machine from moving.
- 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.
- When operating the work equipment, wipe off all the grease from the hydraulic cylinder rods.
- If the machine is equipped with an air conditioner, operate the air conditioner for 3 to 5 minutes once a month to lubricate all parts of the air conditioner compressor. Always run the engine at low idle when doing this. In addition, check the refrigerant level twice a year.

### 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

### WHEN MACHINE RUNS OUT OF FUEL

When starting the engine again after running out of fuel, fill with fuel, then bleed the air from the fuel system before starting the engine.

Always watch the fuel level and be careful not to run out of fuel.

If the engine has stopped because of lack of fuel, it is necessary to use the priming pump to bleed the air completely from the fuel circuit.

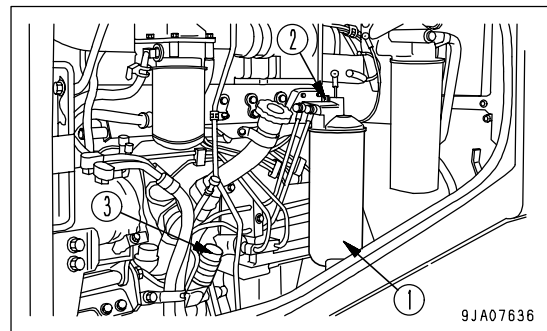
### PROCEDURE FOR BLEEDING AIR



### CAUTION

- This engine consists of higher precision parts than on the conventional fuel injection pump and nozzle, so if dirt gets in, it will cause problems. If there is any dirt stuck to the fuel line, use fuel to wash it off completely.
- Be careful when opening the air bleed plug at the fuel filter head and the air bleeder of the supply pump. The system is still under pressure and fuel may spurt out.

1. Loosen air bleed plug (A), (B) at the fuel filter head (1).



2. Loosen the knob of priming pump (2), then pump the knob until no more bubbles come out of air bleed plug (A).

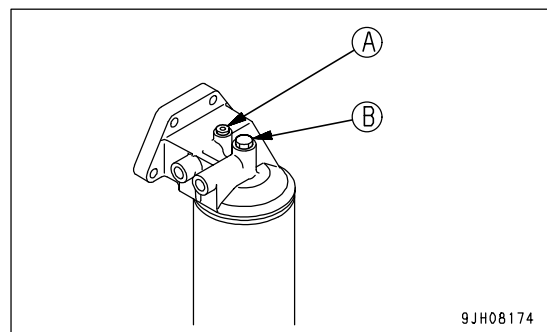
3. Wrap sealing tape around air bleed plug (A) before tightening it.

Tightening torque: 2.0 to 3.9 N·m (0.2 to 0.4 kgf·m, 1.4 to 2.9 lbf·ft)

4. Operate the priming pump again and check that no more bubbles come out with the fuel from air bleed plug (B).

5. Tighten air bleed plug (B).

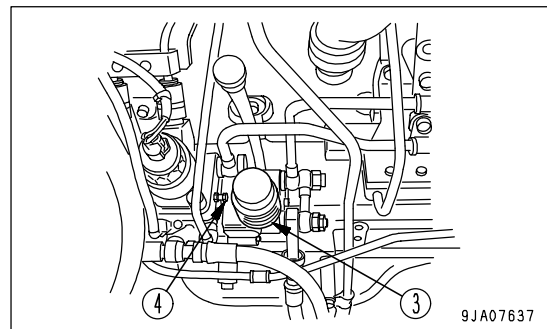
Tightening torque: 4.9 to 6.9 N·m (0.5 to 0.7 kgf·m, 3.6 to 5.1 lbf·ft)



6. Loosen air bleeder (4) of the supply pump.

7. Pump priming pump (3) (approx. 90 to 100 times) until no more bubbles come out with the fuel from air bleeder (4), then tighten air bleeder (4).

Tightening torque: 4.9 to 6.9 N·m (0.5 to 0.7 kgf·m, 3.6 to 5.1 lbf·ft)



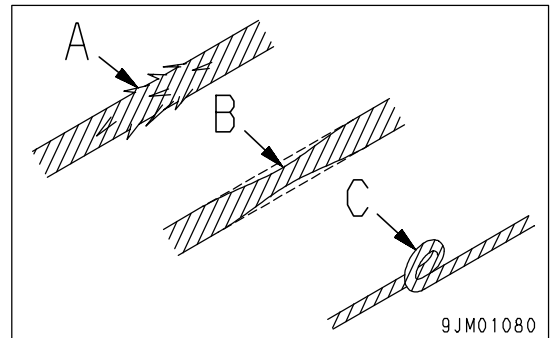
8. Continue pumping (approx. 50 times) until the priming pump (3) becomes stiff and the overflow valve release sound becomes continuous.
9. Push the knob of priming pump (3) in and tighten it.
10. Turn the key in the starting switch to the START position and start the engine.  
When doing this, do not crank the starting motor continuously for more than 20 seconds. If the engine does not start, wait for at least 2 minutes, then try again. Perform this operation a maximum of 4 times.
11. If the engine does not start, repeat the operation from Step 1.

## METHOD OF TOWING MACHINE

### WARNING

Serious injury or death could result if there is any mistake in the selection of wire rope or method of towing a disabled machine.

- Always be sure to check carefully that the capacity of the wire rope used for towing is ample for the weight of the towed machine.
- 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.
- Always wear leather gloves when handling wire rope.
- Never tow a machine on a slope.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Move the machine slowly and be sure not to apply any sudden load on the wire rope.
- If there is a failure in the brake line, the brakes cannot be used, so be extremely careful when towing.



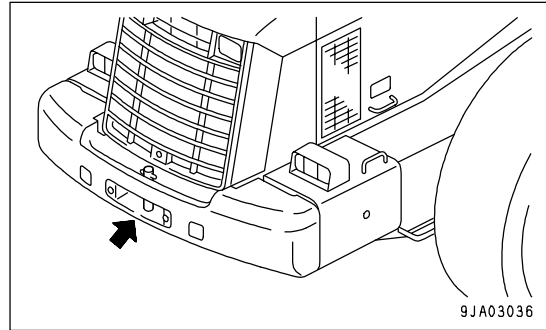
### NOTICE

- Only tow the machine for a short distances, such as to a place for inspection or maintenance.  
The machine must not be towed for long distances.
- For details of the permissible towing load for this machine, see Section "SPECIFICATIONS (PAGE 5-2)".
- For details of the procedure for towing a machine when it has broken down, please contact your Komatsu distributor.

This machine must not be towed except in emergencies. When towing the machine, take the following precautions.

- Before releasing the brakes, put blocks under the wheels to prevent the machine from moving. If the wheels are not blocked, the machine may suddenly move.
- When towing a machine, tow it at a low speed of less than 2 km/h (1.2 MPH), and for a distance of a few meters to a place where repairs can be carried out. The machine should be towed only in emergencies. If the machine must be moved long distances, use a transporter.
- If it is impossible to operate the steering and brakes of the machine being towed, do not let anyone ride on the machine.
- Keep the angle of the towrope as small as possible. Keep the angle between the centerlines of the two machines to within 30 degrees.
- The towing machine should normally be of the same class as the machine being towed. Check that the towing machine and towed machine both have ample braking power and that the towing machine has ample rimpull to control both machines on the slopes or on the tow road.
- When towing a machine downhill, it may be necessary to connect another machine to the rear of the machine being towed in order to provide ample rimpull and braking power. This makes it possible to prevent the machine from losing control.

- Towing may be carried out under various differing conditions, so it is impossible to determine beforehand the requirements for towing. Towing on flat horizontal roads will require the minimum rimpull, while towing on slopes or on uneven road surfaces will require the maximum rim pull.
- Connect a wire rope to the part indicated with the arrow in the diagram at right.



### WHEN ENGINE CAN BE USED

- If the transmission and steering wheel can be operated, and the engine is running, it is possible to tow the machine out of mud or to move it for a short distance to the edge of the road.
- The operator should sit on the machine being towed and operate the steering in the direction that the machine is towed.

### WHEN ENGINE CANNOT BE USED

When towing a machine with the engine stopped, use the following procedure.

1. The transmission oil does not lubricate the system, so remove the front and rear drive shafts. If necessary, block the tires to prevent the machine from moving.
2. The steering cannot be operated, so remove the steering cylinder.  
Even if the brakes are in good condition, the brakes can only be used a limited number of times. There is no change in the operating force for the brake pedal, but the braking force is reduced each time the pedal is depressed.
3. Connect the towing equipment securely. When carrying out towing operations, use two machines of at least the same class as the machine being towed. Connect one machine each to the front and rear of the machine being towed, then remove the blocks from the tires and tow the machine.
4. Parking brake  
The parking brake cannot be turned OFF. To release the parking brake, do as follows.

## RELEASING PARKING BRAKE



### WARNING

- When releasing the parking brake, stop the machine on level ground and check that the surrounding area is safe. If it is necessary to release the brake on a slope in an emergency, block the tires before starting the operation.
- If the parking brake is released, the brake cannot be used, so check the safety carefully when moving the machine.

If the engine will not run for some reason, use the following methods to release the parking brake and tow the machine.

## METHOD OF RELEASING BRAKE BY USING EMERGENCY PARKING BRAKE CANCEL SWITCH



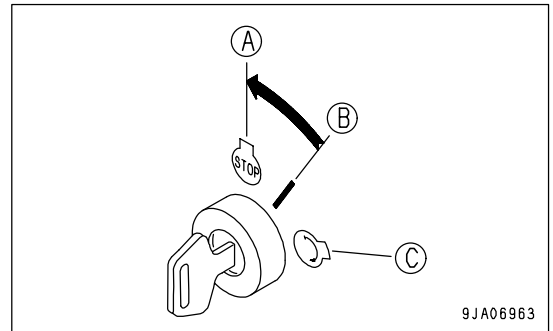
### CAUTION

When the parking brake switch is at the OFF position and the emergency parking brake release valve is opened, the parking brake is released immediately.

In this condition, even if you feel danger and try to stop the machine, the parking brake will not be applied immediately even if you close the emergency parking brake release valve.

If the pressure in the brake accumulator is high, do as follows.

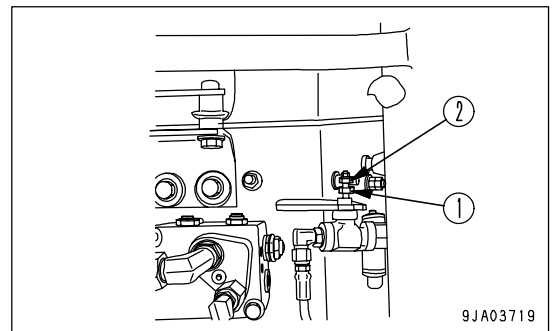
1. Turn the starting switch to the OFF position (A).



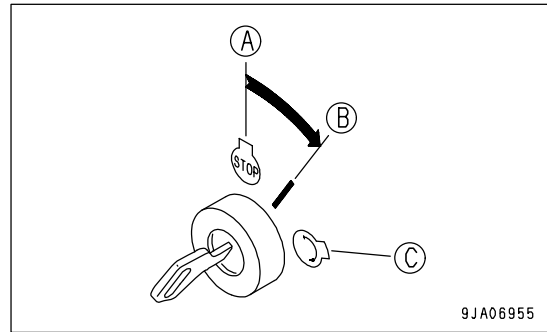
2. Loosen relief valve lock nut (1) by turning it counterclockwise, and turn grip (2) likewise to relieve the valve.

### REMARK

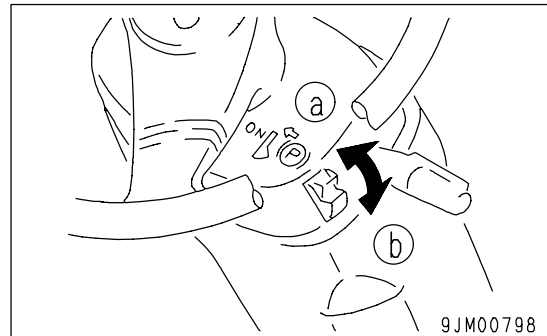
The relief valve is located on the left front portion inside the rear frame and secured to the accumulator mounting bracket.



3. Turn starting switch to the ON position (B).



4. Move the parking brake switch to the ON (a) position (actuated), then move it to the OFF (b) position (released). The parking brake is released.



5. To restore the function of the parking brake, turn grip (2) of the release valve clockwise to close the release valve, then turn locknut (1) clockwise to lock it.

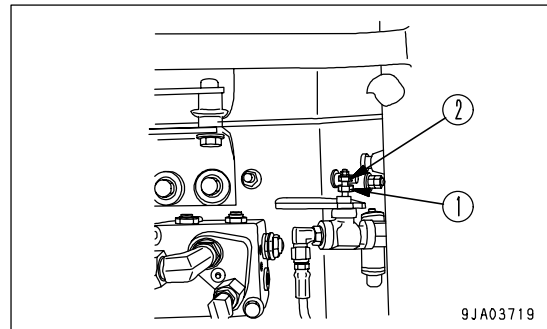
Tightening torque

Grip (2):  $25 \pm 5 \text{ N}\cdot\text{m}$  ( $2.5 \pm 0.5 \text{ kgf}\cdot\text{m}$ ,  $18.1 \pm 3.6 \text{ lbft}$ )

Locknut (1):  $20 \pm 5 \text{ N}\cdot\text{m}$  ( $2.0 \pm 0.5 \text{ kgf}\cdot\text{m}$ ,  $14.5 \pm 3.6 \text{ lbft}$ )

6. Move the parking brake switch to the ON (a) position. The parking brake is applied.

To release the parking brake again, repeat the procedure in Steps 1 to 4.



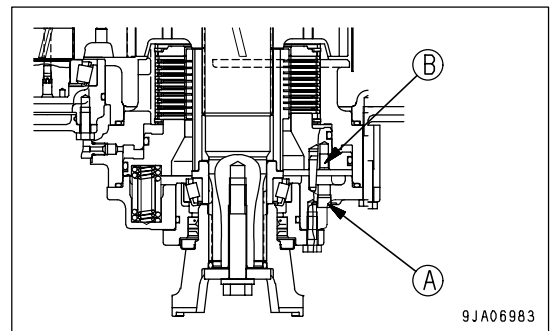
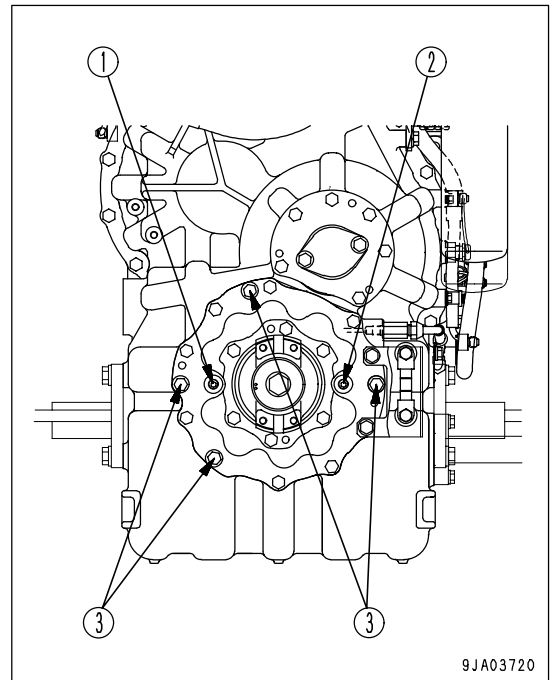
#### REMARK

If the brake accumulator pressure is low, the parking brake warning lamp may not go out, or the alarm buzzer may sound continuously. If this happens, go to the following section "METHOD OF RELEASING MECHANICALLY (PAGE 3-161)" and release the brake.



**METHOD OF RELEASING MECHANICALLY**

1. Remove plugs (1) and (2) at the front of the transmission case.
2. Of the bolts installing the parking brake chamber, 4 bolts (3) have a high (3 mm (0.118 in)) mounting seat. Remove 2 of bolts (3).
3. Screw bolts (3) into the holes from which plugs (1) and (2) were removed and tighten uniformly until they stop.
4. This releases the parking brake.



- (A) Plug mounting hole  
(Taper mounting hole)
- (B) Thread hole M12 for releasing

**EMERGENCY TRAVEL OPERATION**

The normal gear shifting operation is carried out by electric signals. If there should be a failure in the electrical system and the machine does not move, please contact your Komatsu distributor to have the machine moved.

**NOTICE**

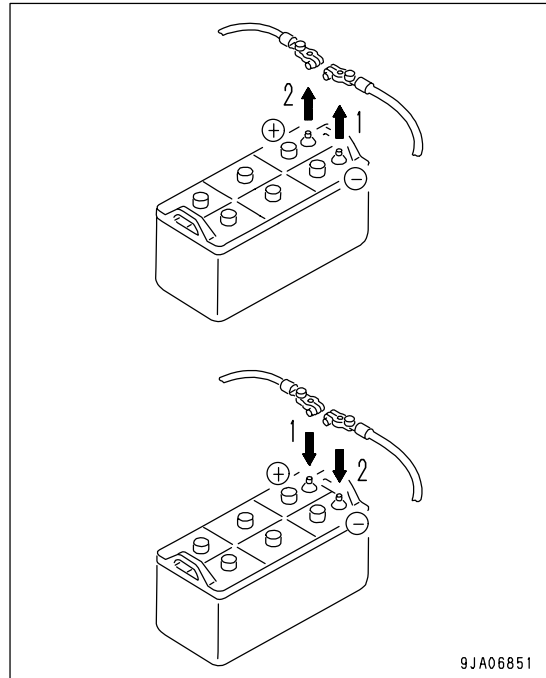
Always request your Komatsu distributor to carry out the emergency travel operation.

## 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 protective goggles 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.



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## REMOVAL AND INSTALLATION OF BATTERY

1. 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.  
Tightening torque: 2 to 2.9 N·m  
(0.2 to 0.3 kgf·m, 1.4 to 2.2 lbft)
2. After installing the battery, fix it with the battery hold down.  
Tightening torque: 5.9 to 9.8 N·m  
(0.6 to 1.0 kgf·m, 4.3 to 7.2 lbft)

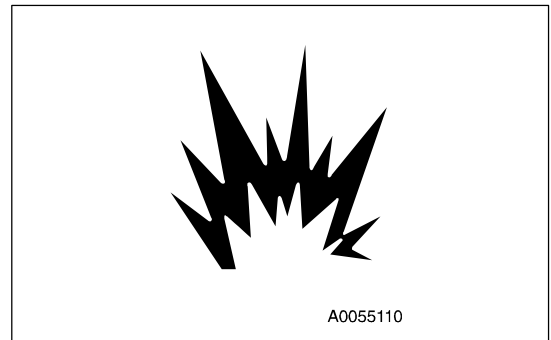
### REMARK

The batteries are on both sides at the rear of the machine. The battery used for the ground is on the left side of the machine.

## PRECAUTIONS FOR CHARGING BATTERY

When charging the battery, if the battery is not handled correctly, there is danger that the battery may explode. Always follow the instructions in "BATTERY (PAGE 3-153)" and the instruction manual accompanying the charger, and do as follows.

- 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.
- 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.



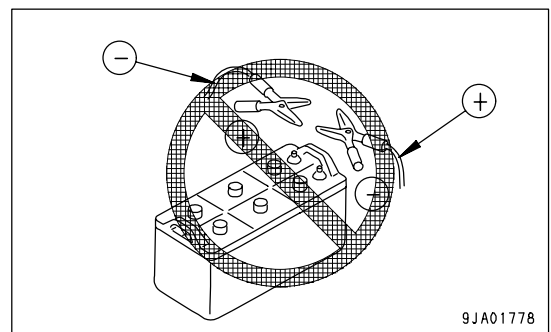
## STARTING ENGINE WITH BOOSTER CABLE

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.



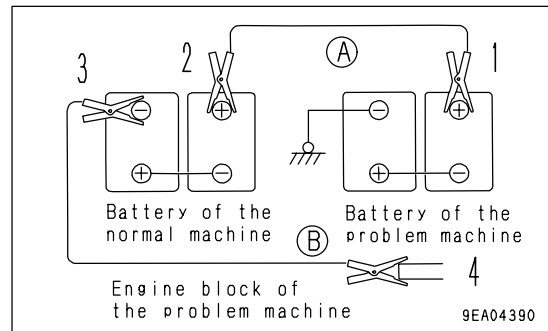
### NOTICE

- Use a booster cable and clip of a thickness to match the size of the battery.
- The battery on the normal machine must be the same capacity as the battery on the failed machine.
- Check that there is no breakage or corrosion of the cable or clip.
- Connect the clip securely.
- Check that the work equipment lock levers on both the machines are at the LOCK position and that the parking brake is applied.
- Check that all levers are at 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

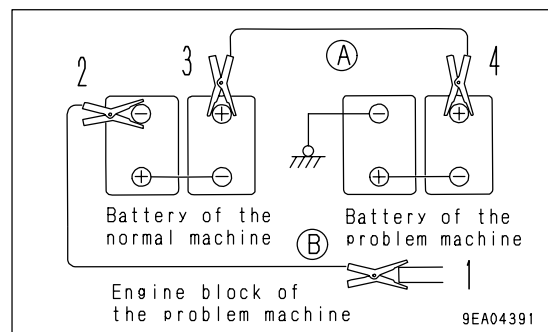
Always check that the work equipment lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are in the HOLD or NEUTRAL position.

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, wait for at least 2 minutes before trying again.

### DISCONNECTING THE BOOSTER CABLE

After the engine has started, disconnect booster cables in the reverse 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 causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed Lamp flickers while engine is running	<ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Defective adjustment of belt tension</li> </ul>	( <ul style="list-style-type: none"> <li>• Check, repair loose terminals, disconnections</li> <li>• Adjust alternator belt tension For details, see EVERY 250 HOURS</li> </ul>
Even when the engine is rotating, the battery charge circuit caution lamp does not go out	<ul style="list-style-type: none"> <li>• Defective alternator</li> <li>• Defective wiring</li> <li>• Defective adjustment of alternator belt tension</li> </ul>	( <ul style="list-style-type: none"> <li>• Replace</li> <li>• Check, repair</li> <li>• Adjust alternator belt tension For details, see EVERY 250 HOURS</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> </ul>	( <ul style="list-style-type: none"> <li>• Check, repair</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> </ul>	<ul style="list-style-type: none"> <li>• Charge</li> </ul>
Starting motor disengages before engine starts	<ul style="list-style-type: none"> <li>• Defective wiring</li> </ul>	( <ul style="list-style-type: none"> <li>• Check, repair</li> </ul>
Preheating pilot lamp does not light up	<ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Defective glow relay, glow controller, water temperature sensor</li> </ul>	( <ul style="list-style-type: none"> <li>• Check, repair</li> <li>• Replace</li> </ul>
Even when engine is stopped, battery charge circuit caution lamp does not light up (starting switch at ON position)	<ul style="list-style-type: none"> <li>• Defective wiring</li> <li>• Defective monitor</li> </ul>	( <ul style="list-style-type: none"> <li>• Check, repair</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
Transmission		
Engine is running but machine does not move	<ul style="list-style-type: none"> <li>• Parking brake is applied</li> <li>• Directional lever is not shifted properly</li> <li>• Lack of oil in transmission case</li> </ul>	<ul style="list-style-type: none"> <li>• Release parking brake</li> <li>• Shift lever properly</li> <li>• Add oil to specified level. See</li> </ul>
Even when engine is run at full throttle, machine only move slowly and lacks power	<ul style="list-style-type: none"> <li>• Lack of oil in transmission case</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level. See WHEN REQUIRED</li> </ul>
Oil overheats	<ul style="list-style-type: none"> <li>• Too much oil or too little oil in transmission case</li> <li>• Machine is not traveling in correct speed range</li> <li>• Torque converter is stalled for long periods</li> </ul>	<ul style="list-style-type: none"> <li>• Add or drain oil to specified level. See WHEN REQUIRED</li> <li>• Place in correct speed range</li> <li>• Reduce stall time</li> </ul>
Noise generated	<ul style="list-style-type: none"> <li>• Lack of oil in transmission case</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level. See</li> </ul>
Axle		
Noise generated	<ul style="list-style-type: none"> <li>• Lack of oil</li> <li>• Improper oil used (for machines</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level. See WHEN REQUIRED</li> <li>• Change to specified oil</li> </ul>
Brake		
Brake is not applied when pedal is depressed	<ul style="list-style-type: none"> <li>• Disc has reached wear limit</li> <li>• Lack of oil in hydraulic tank</li> </ul>	<ul style="list-style-type: none"> <li>• Replace disc</li> <li>• Add oil to specified level. See EVERY 100 HOURS</li> </ul>
Brake drags or remains applied	<ul style="list-style-type: none"> <li>• Vent hole of brake valve is</li> </ul>	<ul style="list-style-type: none"> <li>• Clean</li> </ul>
Brakes squeal	<ul style="list-style-type: none"> <li>• Disc is worn</li> <li>• Large amount of water in axle oil</li> <li>• Deteriorated axle oil due to</li> </ul>	<ul style="list-style-type: none"> <li>• Replace disc</li> <li>• Change axle oil</li> <li>• Change axle oil</li> </ul>

Problem	Main causes	Remedy
<b>Steering</b>		
Steering wheel is heavy	<ul style="list-style-type: none"> <li>Lack of oil in hydraulic tank</li> </ul>	<ul style="list-style-type: none"> <li>Add oil to specified level. See</li> </ul>
Steering wheel is loose	<ul style="list-style-type: none"> <li>Play in steering cylinder pin</li> <li>Lack of oil in hydraulic tank</li> </ul>	<ul style="list-style-type: none"> <li>Grease bearing or replace pin and bushing where there is play</li> <li>Add oil to specified level. See</li> </ul>
<b>Parking brake</b>		
Braking effect is poor		
Brake drags or remains applied	<ul style="list-style-type: none"> <li>Lack of oil in transmission case</li> <li>Screen is clogged</li> </ul>	<ul style="list-style-type: none"> <li>Add oil to specified level. See WHEN REQUIRED</li> </ul>
<b>Hydraulic system</b>		
Lack of lifting power for bucket	<ul style="list-style-type: none"> <li>Lack of oil in hydraulic tank</li> </ul>	<ul style="list-style-type: none"> <li>Add oil to specified level. See EVERY 100 HOURS SERVICE</li> </ul>
Bucket takes time to rise	<ul style="list-style-type: none"> <li>Clogged hydraulic tank filter</li> </ul>	<ul style="list-style-type: none"> <li>Replace filter. See EVERY 2000</li> </ul>
Excessive bubbles in oil	<ul style="list-style-type: none"> <li>Low quality oil being used</li> <li>Lack of oil in hydraulic tank</li> <li>Air in oil line</li> </ul>	<ul style="list-style-type: none"> <li>Replace with good quality oil</li> <li>Add oil to specified level. See EVERY 100 HOURS SERVICE</li> <li>Bleed air. See EVERY 2000</li> </ul>
Hydraulic pressure is low	<ul style="list-style-type: none"> <li>Lack of oil in hydraulic tank causes pump to suck in air</li> </ul>	<ul style="list-style-type: none"> <li>Add oil to specified level. See EVERY 100 HOURS SERVICE Then bleed air. See EVERY</li> </ul>
Movement of cylinder is irregular	<ul style="list-style-type: none"> <li>Lack of oil in hydraulic tank</li> </ul>	<ul style="list-style-type: none"> <li>Add oil to specified level. See</li> </ul>

**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 lights up	<ul style="list-style-type: none"> <li>• Low engine oil pan oil level (sucking in air)</li> <li>• Clogged oil filter cartridge</li> <li>• Defective tightening of oil pipe joint, oil leakage from damaged part</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> </ul>
Steam is emitted from top part of radiator (pressure valve)  Engine water temperature gauge is in red range Engine cooling water temperature caution lamp lights up	<ul style="list-style-type: none"> <li>• Low cooling water level, water leakage</li> <li>• Defective fan pump or motor</li> <li>• Dirt or scale accumulated in cooling system</li> <li>• Clogged radiator fin or damaged fin</li> <li>• Defective thermostat</li> <li>• Defective thermostat seal</li> </ul>	<ul style="list-style-type: none"> <li>• Check, add cooling water, repair, see WHEN REQUIRED</li> <li>( • Check, repair)</li> <li>• Change cooling water, clean inside of cooling system, see WHEN REQUIRED</li> <li>• Clean or repair, see WHEN REQUIRED</li> <li>( • Replace thermostat)</li> <li>( • Replace thermostat seal)</li> </ul>
Engine water temperature gauge is in white range	<ul style="list-style-type: none"> <li>• Defective thermostat</li> </ul>	<ul style="list-style-type: none"> <li>( • Replace thermostat)</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>• No fuel in fuel filter</li> <li>• Defective supply pump or injector</li> <li>• Starting motor cranks engine too slowly</li> <li>• Starting motor does not turn</li> <li>• Preheating pilot lamp does not</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>• Fuel filter with fuel. See EVERY 500 HOURS SERVICE</li> <li>( • Replace pump or injector)</li> <li>• See ELECTRICAL SYSTEM</li> <li>• See ELECTRICAL SYSTEM</li> <li>• See ELECTRICAL SYSTEM</li> </ul>
Exhaust gas is white or blue	<ul style="list-style-type: none"> <li>• Too much oil in oil pan</li> </ul>	<ul style="list-style-type: none"> <li>• Add oil to specified level, see CHECK BEFORE STARTING</li> </ul>
Exhaust gas occasionally turns black	<ul style="list-style-type: none"> <li>• Clogged air cleaner element</li> <li>• Defective injector</li> <li>• Defective compression</li> </ul>	<ul style="list-style-type: none"> <li>• Clean or replace, see WHEN REQUIRED</li> <li>( • Replace injector)</li> <li>( • See defective compression above)</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 generated (combustion or mechanical)	<ul style="list-style-type: none"><li>• Low grade fuel being used</li><li>• Overheating</li><li>• Damage inside muffler</li></ul>	<ul style="list-style-type: none"><li>• Change to specified fuel</li><li>• Refer to "Water temperature gauge is in red range" as above</li><li>( • Replace muffler)</li></ul>

# MAINTENANCE

## **WARNING**

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

---

## GUIDES 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:**

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

### **ALWAYS USE CLEAN WASHER FLUID:**

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

### **ALWAYS USE 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 FOR FOREIGN MATERIALS IN DRAINED OIL AND ON FILTERS:**

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:

- 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 OIL:**

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.

**LOCKING INSPECTION COVERS:**

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.

**BLEEDING AIR FROM HYDRAULIC CIRCUIT:**

If the hydraulic oil equipments have been repaired or replaced and if the hydraulic hoses, pipes, etc. have been disconnected, it is necessary to bleed air from the circuit. See "CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT (PAGE 4-61)".

**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 or bend them into loops with a small radius.  
This will cause damage to the hose and drastically reduce its service life.

**CHECKS AFTER INSPECTION AND MAINTENANCE:**

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?
- Check when the engine is running
  - See "TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (PAGE 2-34)" in the section on safety for checking when the engine is running. Pay attention to safety.
  - Check if the inspected and maintenance area is operating normally.
  - Increase the engine speed to check for fuel and oil leakage.

## OUTLINES 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)
Transmission case	Power train oil TO10 (Komatsu genuine parts)
Hydraulic oil system	Power train oil TO10 (Komatsu genuine parts)
Axle	Axle oil AXO80 (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.

## NOTICE

**Always use diesel fuel. Never use any other fuel.**

**The engine on this machine uses electronic control and high-pressure fuel injection equipment to enable it to provide good fuel consumption and good exhaust gas characteristics. For this reason, high-precision parts and lubricating ability are demanded. Using low-viscosity fuel with poor lubricating ability will cause a marked reduction in the durability of the engine.**

## 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 4-22)".  
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 for overhaul, so they do not need grease.  
If any part becomes stiff after being used for long time, add grease.
- 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.

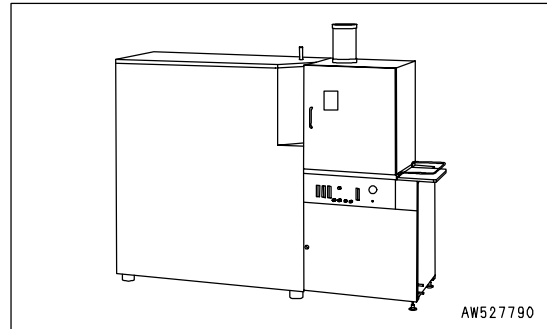
## CARRYING OUT KOWA (Komatsu Oil Wear Analysis)

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.

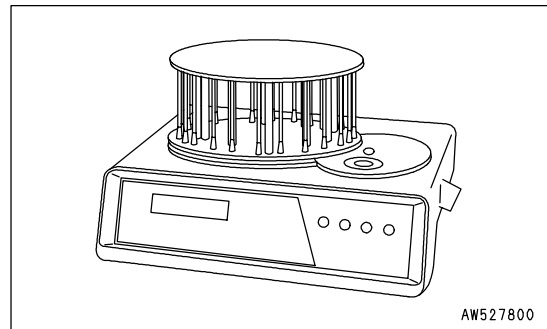
We strongly recommend you to use this service. The oil analysis is carried out at actual cost, so the cost is low, and the results of the analysis are reported together with recommendations which will reduce repair costs and machine downtime.

### 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 particle quantifier index measurement machine to measure the quantity of iron particles of 5 $\mu$  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.

## OUTLINE OF 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.
- When working at the seashore, carefully clean the electric system to prevent corrosion.
- The optional power source must never be connected to the fuse, starting switch, or battery relay.



## WEAR PARTS

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	Q'ty	Replacement frequency
Engine oil filter		600-211-1340	Cartridge	1	EVERY 500 HOURS
Fuel filter		600-311-3520	Cartridge	1	EVERY 500 HOURS
Additional fuel filter		600-319-3440	Cartridge	1	EVERY 500 HOURS
Transmission oil filter		714-07-28711	Cartridge	1	EVERY 1000 HOURS
Transmission strainer		07000-15085	O-ring	1	EVERY 1000 HOURS
Corrosion resistor		600-411-1151	Cartridge	1	EVERY 1000 HOURS
Hydraulic filter		07063-01383 (07000-15210)	Element (O-ring)	1 (1)	EVERY 2000 HOURS
Hydraulic tank breather		421-60-35170	Element	1	EVERY 2000 HOURS
Air cleaner		600-185-5100	Element ass'y	1	-
Air conditioner filter	Fresh	427-07-22120	Element	1	EVERY 2000 HOURS
	Recirc	20Y-979-6261	Element	2	EVERY 2000 HOURS
PPC accumulator		20Y-60-11430 (07002-12034)	Accumulator (O-ring)	1 (1)	EVERY 4000 HOURS
Bolt on cutting edge	Standard type	421-815-2110	Center edge	1	-
		421-815-1121	Side edge	2	
		(02090-11485)	(Bolt)	(16)	
	(02290-11422)	(Nut)	(16)		
	(01643-32260)	(Washer)	(16)		
	Long life type	421-T79-2150	Center edge	2	
		421-T79-2160	Side edge	2	
		(02090-11485)	(Bolt)	(16)	
		(02290-11422)	(Nut)	(16)	
(01643-32260)	(Washer)	(16)			
Segment type	421-838-1110	Center edge	6		
	421-838-1120	Side edge	2		
	(02091-11600)	(Bolt)	(16)		
	(02290-11625)	(Nut)	(16)		
(01643-22460)	(Washer)	(16)			

## 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									Recommended Komatsu Fluids
		-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	122 °F 50 °C	
Engine Oil Pan	Engine oil	SAE10W30									Komatsu EO10W30-DH API CH-4 API CI-4
		SAE15W40									Komatsu EO15W40-DH API CH-4 API CI-4
		SAE30DH									Komatsu EO30-DH
Transmission case	Power train oil (Note.1)	T010									T010
Hydraulic System	Power train oil	T010									T010
	Hydraulic oil	HO46-HM									HO46-HM
	Engine oil	SAE10W-30DH									Komatsu EO10W30-DH
		SAE15W40DH									Komatsu EO15W40-DH
Axle	Axle oil (Note.2)	AXO80									AXO80
	Engine oil	(Note.3)									EO50-CD
Pin / Bushing Grease fitting (Note.4)	Hyper grease (Note.5)	G2-T, G2-TE									G2-T, G2-TE
	Lithium EP grease	G2-LI									G2-LI
Cooling system	Supercoolant AF-NAC	AF-NAC (Note.6)									AF-NAC
Fuel tank	Diesel fuel	No.2-D									ASTM No.2-D
		No.1-D									ASTM No.1-D

Reservoir		Engine oil pan	Transmission case	Hydraulic system	Axle (front and rear) (each)	Cooling system	Fuel tank
Capacity	Liters	47	65	280	52	50	390
	US gal	12.42	17.17	73.98	13.74	13.21	103.04
Specified	Liters	38	54	190	52	-	-
	US gal	10.04	14.27	50.20	13.74	-	-

**NOTICE**

Use only diesel fuel.

The engine mounted on this machine employs electronic control and a high-pressure fuel injection device to obtain good fuel consumption and good exhaust gas characteristics. For this reason, it requires high precision for the parts and good lubrication. If kerosene or other fuel with low lubricating ability is used, there will be a big drop in durability.

Note .1: Power train of oil has different properties from engine oil. Be sure to use the recommended oil.

Note .2: Axle oil AXO80 has the function of preventing squealing from the brakes and LSD (Limited Slip Differential). If only AXO80 is recommended, use Komatsu genuine AXO80 or equivalent.

Note .3: When the ambient temperature is higher than 45°C (113°F) and the machine operation hour is longer than 12 hours/day, then the use of EO50-CD instead of AXO80 is recommended. Squealing of the brakes may occur with EO50-CD, but there is no problem with the brake performance or durability.

Note .4: If the machine is equipped with an automatic greasing system, see "HANDLING AUTO-GREASING SYSTEM (PAGE 6-31)".

Note .5: 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 .6: Supercoolant (AF-NAC)

- 1) 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.
- 2) For details of the ratio when diluting super coolant with water, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-22)".  
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

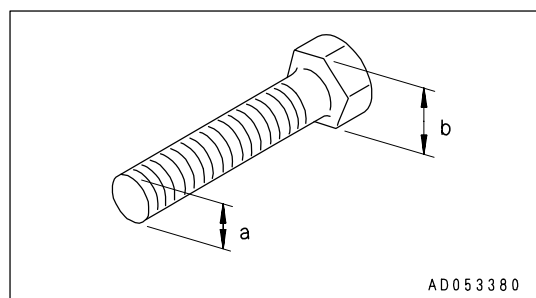


If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation.

Always pay careful attention when tightening parts.

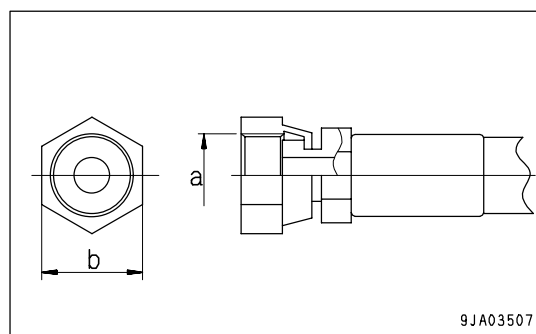
Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below. If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque					
		Target value			Service limit		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
6	10	13.2	1.35	9.8	11.8-14.7	1.2-1.5	8.7-10.8
8	13	31	3.2	23.1	27-34	2.8-3.5	20.3-25.3
10	17	66	6.7	48.5	59-74	6.0-7.5	43.4-54.2
12	19	113	11.5	83.2	98-123	10.0-12.5	72.3-90.4
14	22	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.

Nominal - No. of threads (a)	Width across flats (b) (mm)	Tightening torque					
		Target value			Permissible range		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
9/16 -18UNF	19	44	4.5	32.5	35 - 63	3.5 - 6.5	25.3 - 47.0
11/16 -16UN	22	74	7.5	54.2	54 - 93	5.5 - 9.5	39.8 - 68.7
13/16 -16UN	27	103	10.5	75.9	84 - 132	8.5 - 13.5	61.5 - 97.6
1 -14UNS	32	157	16.0	115.7	128 - 186	13.0 - 19.0	94.0 - 137.4
13/16 -12UN	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.

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank - fuel strainer)	1	Every 2 years or every 4000 hours
2	Fuel hose (fuel strainer - supply pump)	1	
3	Fuel return hose (supply pump - fuel tank)	1	
4	Fuel hose (supply pump - fuel filter)	1	
5	Fuel hose (fuel filter - supply pump)	1	
6	Fuel spill hose (unit injector - fuel tank)	1	
7	Steering hose (pump - steering valve)	1	
8	Steering hose (steering valve - steering cylinder)	4	
9	Steering hose (steering valve - hydraulic tank)	2	
10	Brake hose (pump - accumulator charge valve)	2	
11	Brake hose (accumulator charge valve - check valve)	1	
12	Brake hose (check valve - tandem valve)	2	
13	Brake hose (check valve - single valve)	1	
14	Brake hose (check valve - accumulator P.P port)	1	
15	Brake hose (tandem valve - front brake)	2	
16	Brake hose (tandem valve - rear brake)	2	
17	Brake hose (single valve - tandem valve)	1	
18	Brake hose (tandem valve - drain block)	1	
19	Brake hose (single valve - drain block)	1	
20	Brake hose (drain block - hydraulic tank)	1	
21	Brake hose (brake accumulator - reduction valve for emergency parking brake cancel)	1	
22	Brake hose (transmission valve - reduction valve for emergency parking brake cancel)	1	
23	Brake hose (charge valve drain - hydraulic tank)	1	
24	Accumulator (For PPC)	1	
25	Seat belt	1	Every 3 years

# MAINTENANCE SCHEDULE CHART

## MAINTENANCE SCHEDULE CHART

The maintenance interval for adjusting the injector differs according to the exhaust gas regulations for each area. When carrying out the adjustment, check the maintenance time. For details, see "ADJUST INJECTOR (PAGE 4-16)".

### INITIAL 250 HOURS SERVICE (ONLY AFTER THE FIRST 250 HOURS)

CHANGE TRANSMISSION OIL FILTER CARTRIDGE .....	4- 56
REPLACE HYDRAULIC TANK FILTER ELEMENT .....	4- 61

### WHEN REQUIRED

CHECK, CLEAN, OR REPLACE AIR CLEANER ELEMENT .....	4- 18
CLEAN INSIDE OF COOLING SYSTEM .....	4- 22
CHECK WATER SEPARATOR, DRAIN WATER .....	4- 25
CHECK TRANSMISSION OIL LEVEL, ADD OIL .....	4- 26
CHECK AXLE OIL LEVEL, ADD OIL .....	4- 27
CHECK AXLE CASE BREATHER .....	4- 28
CLEAN CONDENSER OF AIR CONDENSER .....	4- 29
CHECK WINDOW WASHING FLUID LEVEL, ADD FLUID .....	4- 29
CLEAN RADIATOR FINS AND COOLER FINS .....	4- 30
CHECK ELECTRICAL INTAKE AIR HEATER .....	4- 33
TURN, REPLACE BOLT ON CUTTING EDGE .....	4- 34
REPLACE BUCKET TEETH .....	4- 35
CHECK AIR CONDITIONER .....	4- 37
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\*: The interval of 2000 hours for changing the axle oil is for standard operations. If the brake is used frequently or the brakes make a sound, change the oil after a shorter interval.

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## ADJUST INJECTOR

This machine uses an engine that conforms with all exhaust gas regulations.

The exhaust gas regulations differ according to the applicable area. To ensure that the engine conforms with the regulations in the area of use and can fully display its performance, keep to the following periodic maintenance intervals when adjusting the injector.

If the periodic maintenance intervals are not observed correctly, the engine may not be able to display its performance fully, and it may also not conform with the regulations.

### NOTICE

**When transporting a machine from an A regulation area to a B regulation area, always replace all the injector assemblies before transporting the machine to the new area.**

**Check with your Komatsu distributor to confirm if your area of operation is an A regulation area or a B regulation area.**

## A REGULATION AREA

EPA regulation areas and areas with the regulations equivalent to EPA regulations

### EVERY 2000 HOURS SERVICE

#### Check injector

Check the exhaust gas color visually. If there is any abnormality in the exhaust gas color, please ask your Komatsu distributor to carry out inspection or replacement. For details of the procedure if any abnormality is found, see Section "ENGINE (PAGE 3-168)".

### EVERY 4000 HOURS SERVICE

#### Replace injector assembly

Ask your Komatsu distributor to carry out this work.

## B REGULATION AREA

Areas not applying EPA regulations or areas not applying regulations equivalent to EPA regulations

### EVERY 4000 HOURS SERVICE

#### Check injector

Check the exhaust gas color visually. If there is any abnormality in the exhaust gas color, please ask your Komatsu distributor to carry out inspection or replacement. For details of the procedure if any abnormality is found, see Section "ENGINE (PAGE 3-168)".

### EVERY 8000 HOURS SERVICE

#### Replace injector nozzle tip

Ask your Komatsu distributor to carry out this work.

## SERVICE PROCEDURE

### INITIAL 250 HOURS SERVICE

Perform the following maintenance only after the first 250 hours.

- CHANGE TRANSMISSION OIL FILTER CARTRIDGE
- Replace hydraulic tank filter element

For details of the method of replacing or maintaining, see the section on EVERY 1000 HOURS and 2000 HOURS SERVICE.

## WHEN REQUIRED

### CHECK, CLEAN, OR 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

If air cleaner clogging caution lamp (1) on the machine monitor lights up, clean the air cleaner element.

#### NOTICE

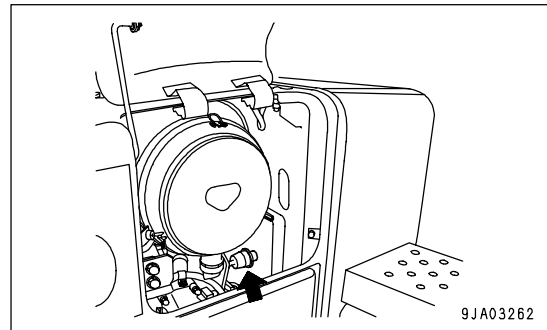
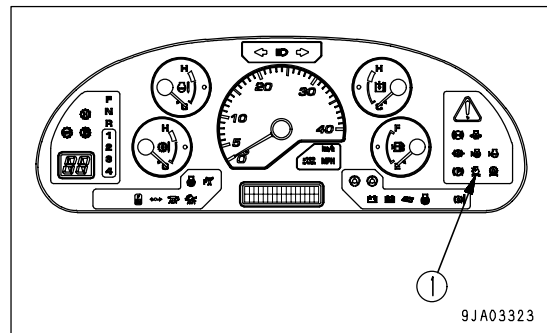
Do not clean the element until the air cleaner clogging caution lamp lights up.

If the element is cleaned frequently before the air cleaner clogging caution lamp lights up, the air cleaner will not be able to display its performance fully and the cleaning efficiency will drop.

In addition, the frequency of dirt stuck to the element falling inside the inner element will increase.

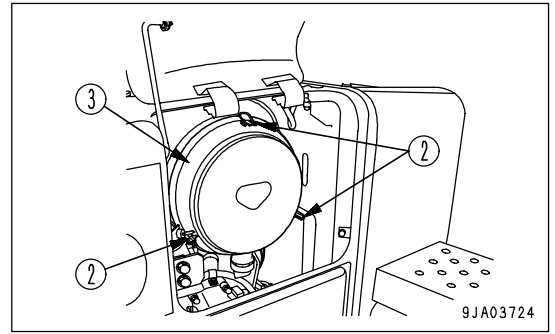
It is also possible to check the condition of the air cleaner by using the dust indicator installed to the air cleaner.

If the yellow piston in the dust indicator display portion enters the red (7.5 kPa (0.0765 kgf/cm<sup>2</sup>, 1.1 PSI)) position, clean the element.



**CLEANING OUTER ELEMENT**

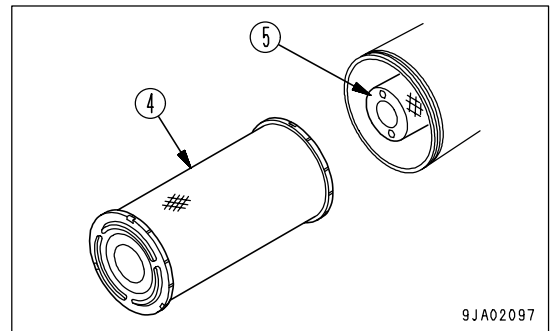
1. Open the top cover at the front of the engine side cover on the right side of the machine.
2. Remove three clips (2), then remove cover (3).



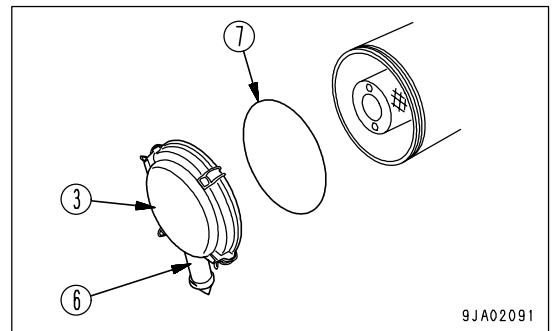
**NOTICE**

Never remove inner element (5). If it is removed, dust will enter and cause engine trouble.

3. Remove outer element (4).



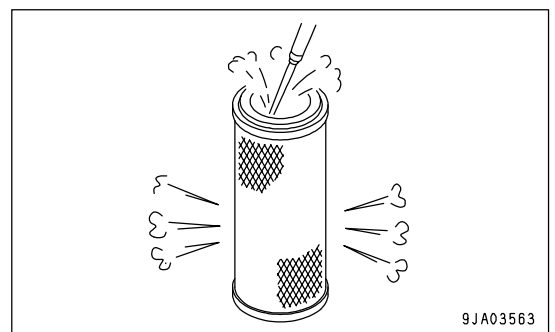
4. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6).



**NOTICE**

The inner element must not be used again even after cleaning. When replacing the outer element, replace the inner element at the same time.

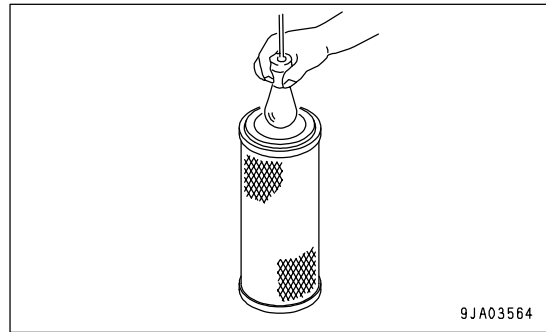
5. Direct dry compressed air (Max. 0.69 MPa (7 kgf/cm<sup>2</sup>, 99.4 PSI)) from the inside of the outer element along its folds. Then direct the compressed air from the outside along the folds, and again from the inside.



- 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.

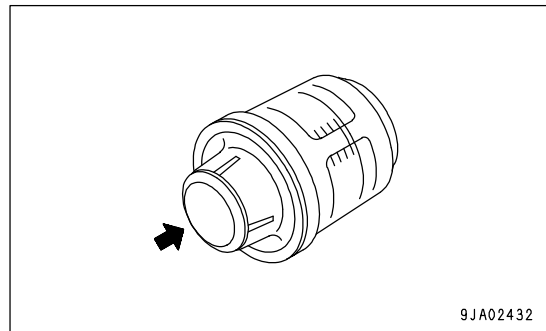
**NOTICE**

When cleaning the element, do not hit or beat it against anything.  
Do not use an element whose folds, gasket or seal are damaged.

**CAUTION**

When installing the cover (3), check O-ring (7) and replace it if there are any scratches or damage.

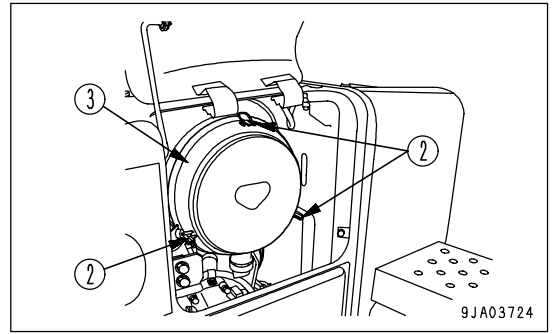
- Set the cleaned outer element in position, then secure cover (3) with mounting clips (2).
- Press the dust indicator button to return the yellow piston to its original position.



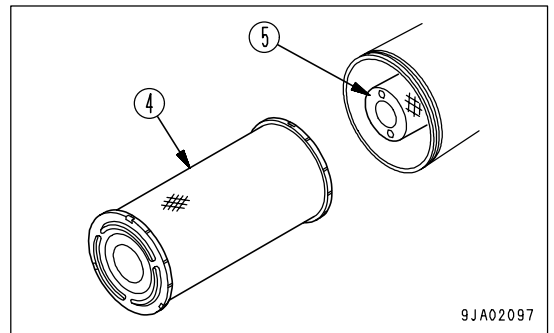
- Close the top cover at the front of the engine side cover on the right side of the machine.  
After cleaning, if the air cleaner clogging caution lamp lights up immediately or the yellow piston reaches the red line (7.5 kPa), replace the inner and outer elements.

**REPLACING ELEMENT**

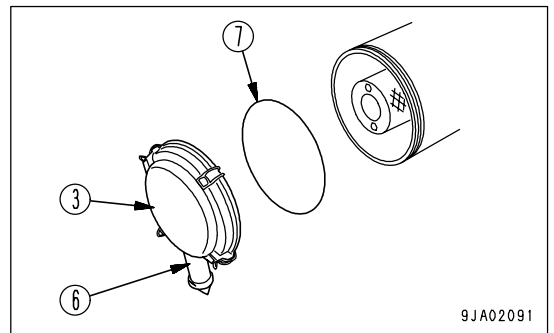
1. Open the top cover at the front of the engine side cover on the right side of the machine.
2. Remove three clips (2), then remove cover (3).



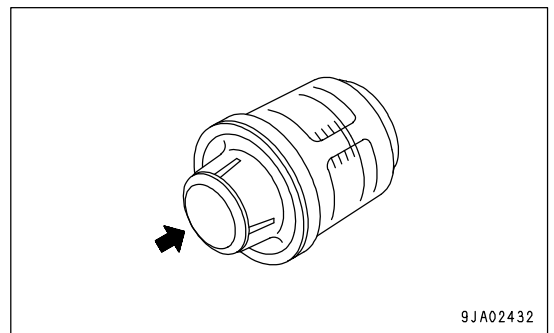
3. Remove outer element (4).  
Do not remove inner element (5) at this time, however.



4. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6).



5. Remove inner element (5), then install a new inner element immediately.
6. Fit new outer element (4), replace O-ring (7) with a new part, install cover (3), then secure with clips (2).
7. Press the dust indicator button to return the yellow piston to its original position.



8. Close the top cover at the front of the engine side cover on the right side of the machine.

**CLEAN INSIDE OF COOLING SYSTEM**



**WARNING**

- Immediately after the engine is stopped, the engine coolant is hot and the pressure inside the radiator is high. Removing the cap and draining the water under this condition could cause burns. Allow the engine to cool down, then turn the cap slowly to release the pressure.
- Start the engine and flush the system. Before standing up or leaving the operator's seat, set the work equipment lock lever to the LOCK position.
- For details of starting the engine, see "CHECK BEFORE STARTING ENGINE, ADJUST (PAGE 3-91)" and "STARTING ENGINE (PAGE 3-107)" in the OPERATION section of the Operation and Maintenance Manual.
- When the undercover is removed, there is danger of touching the fan.  
Never enter the rear of the machine when the engine is running.

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	15.0	17.5	20	22.5	25.0
	US gal	3.96	4.62	5.28	5.94	6.61

Amount of water	Liters	35.0	32.5	30.0	27.5	25.0
	US gal	9.25	8.59	7.93	7.27	6.61
Ratio	%	30	36	41	46	50

**! WARNING**

Antifreeze is flammable, so keep it away from flame.

Antifreeze is toxic. When removing the drain plug, be careful not to get water containing antifreeze on you. If it gets in your eyes, flush your eyes with large amount of fresh water and see a doctor at once.

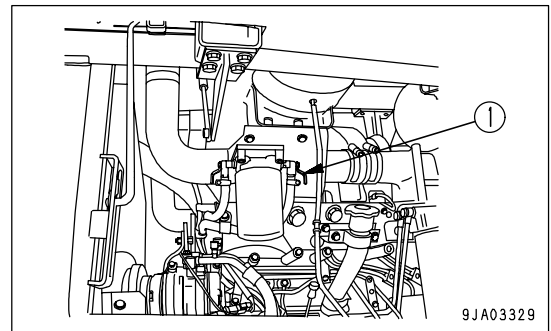
Use antifreeze and appropriate water for diluting (for details, see "COOLANT AND WATER FOR DILUTION (PAGE 4-5)")

We recommend use of an antifreeze density gauge to control the mixing proportions.

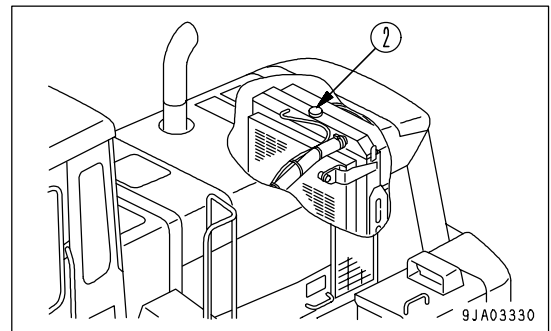
Prepare a container whose capacity is larger than the specified coolant volume to catch drained coolant.

Prepare a hose to supply antifreeze coolant and water.

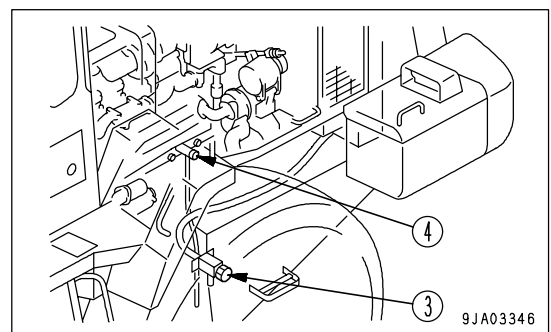
1. Stop the engine and tighten 2 valves (1) of the corrosion resistor.



2. Check that the cooling water temperature has gone down enough to make it possible to touch the radiator cap surface by hand, then turn radiator cap (2) slowly until it contacts the stopper to release the pressure.
3. Following this, push radiator cap (2), turn it until it contacts the stopper, then remove it.



4. Set a container in position to catch the drained antifreeze mixture, then open drain valve (3) under the left side of the fuel tank and drain plug (4) at the side face of the cylinder block, and drain the coolant.
5. After draining the coolant, close drain valve (3) and drain plug (4) and fill with city water.
6. When the radiator is full, start the engine, and run it at low idle. Keep the engine running at low idle for 10 minutes until the coolant temperature reaches more than 90°C (194°F).
7. Stop the engine, open drain valve (3) and drain plug (4), drain the water, then tighten them again.
8. After draining the water, clean the cooling system with cleaning agent. For the cleaning method, see the instructions for the cleaning agent.





9. Replace the corrosion resistor, then open 2 valves (1).

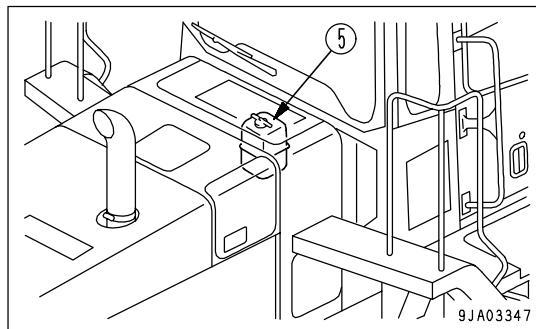
For details of the procedure for replacing the corrosion resistor, see "REPLACE CORROSION RESISTOR CARTRIDGE (PAGE 4-58)".

10. Add coolant mixed with antifreeze until it overflows from the water filler.

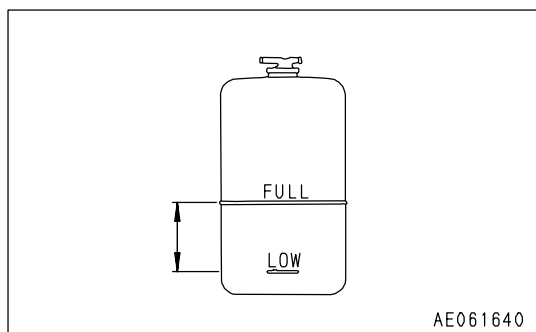
Decide the proportions of antifreeze and water according to the table for the mixing rate of water and antifreeze.

11. To bleed the air from the cooling system, run the engine at low idle for 5 minutes, and for a further 5 minutes at high idle. (When doing this, leave the radiator cap off.)

12. Drain the coolant from sub-tank (5), 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 WATER SEPARATOR, DRAIN WATER

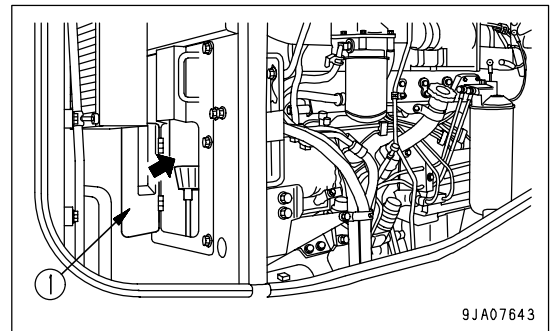


**WARNING**

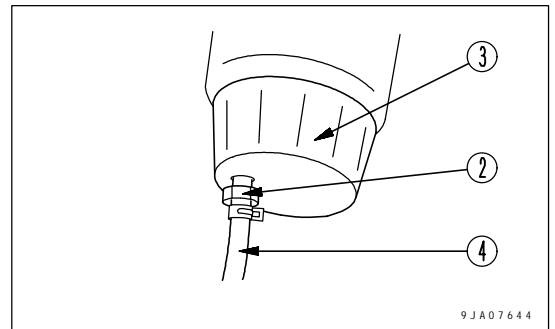
- Each part of the engine is still highly heated immediately after the engine is stopped. Do not attempt to drain cooling water or remove the filter element cup.
- High pressure is generated inside the engine fuel piping, while the engine is running. Wait for more than 30 seconds after the engine stop for the engine to sufficiently cool down. Then start with draining cooling water or removing the filter element cup.
- Do not bring fire close.
- This engine consists of higher precision parts than on the conventional fuel injection pump and nozzle, so if dirt gets in, it will cause problems. If there is any dirt stuck to the fuel line, use fuel to wash it off completely.

The water separator separates the water from the fuel.

1. Open the engine side cover on the right side of the chassis.
2. Open cover (1).  
The water separator forms one unit with the additional fuel filter and is at the bottom.
3. Loosen plug (2) and drain the water.



4. It is possible to judge the condition of water and sediment through transparent cap (3). If water or sediment is accumulated, set a container under drain hose (4) to collect the discharged water.
5. Tighten plug (2) as soon as fuel starts to be discharged from drain hose (4).  
(Tightening torque: 0.2 - 0.45 Nm {0.02 - 0.046 kgm})



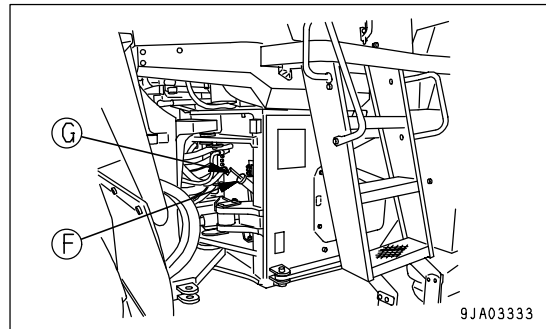
## CHECK TRANSMISSION OIL LEVEL, ADD OIL

**WARNING**

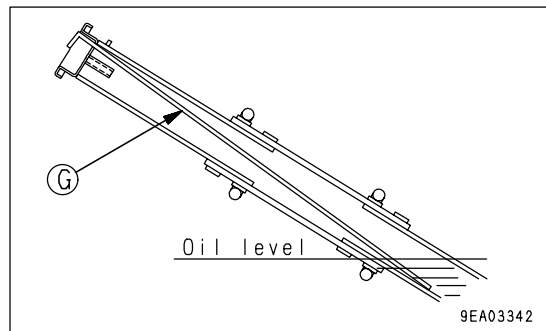
The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.

Carry out this procedure if there is any sign of oil on the transmission case, or if there is oil mixed with the cooling water.

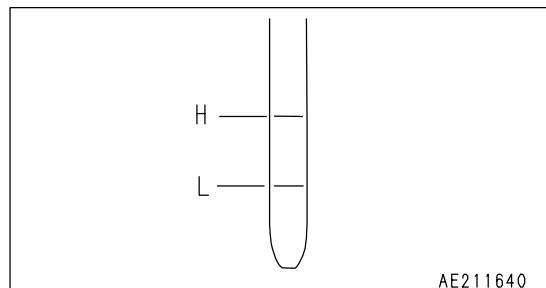
1. Start the engine and run it for at least 5 minutes.
2. Open the cap of oil filler port (F), remove dipstick (G), and wipe the oil off with a cloth.



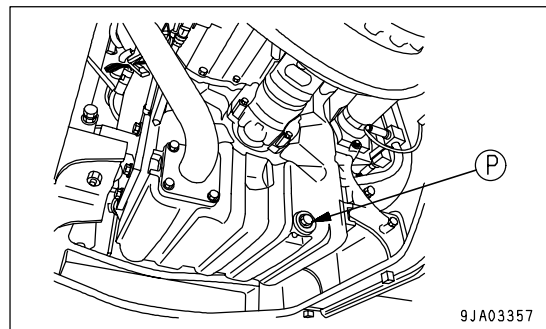
3. Insert dipstick (G) again from the top of the oil filler port diagonally as shown in the diagram, then pull it out again. When doing this, insert the dipstick so that the tip contacts the bottom of the dipstick guide.



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 (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) in the dipstick guide, then tighten the cap.



CHECK AXLE OIL LEVEL, ADD OIL

 **WARNING**

- When checking the oil level, apply the parking brake and secure the front and rear frames with the frame lock bar.
- After stopping the engine, the parts and oil are at a high temperature. Wait for the temperature to go down before starting the operation.

Perform this procedure if there is any sign of oil on the axle case.  
 Inspect the machine on a horizontal surface.

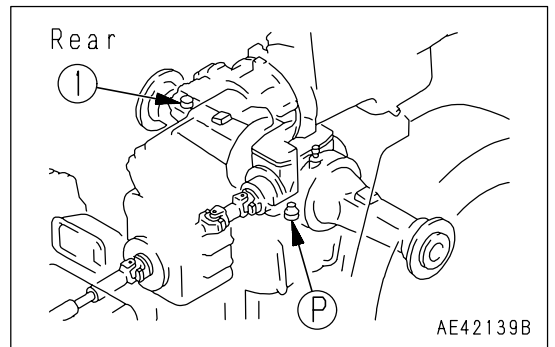
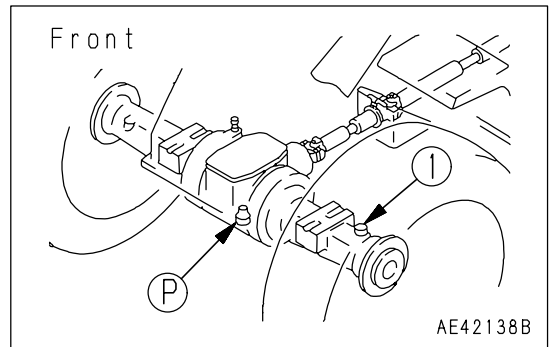
(If the road surface is at an angle, the oil level cannot be checked correctly.)

1. Stop the engine and remove oil level plug (1).

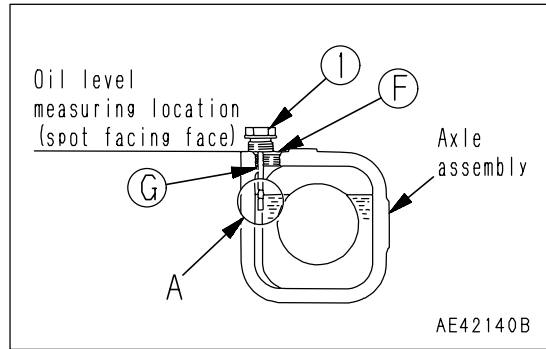
**REMARK**

Remove the mud and dirt from around plug (1), then remove the plug.

2. With cloth, wipe off any oil adhering to the oil level gauge attached to plug (1).



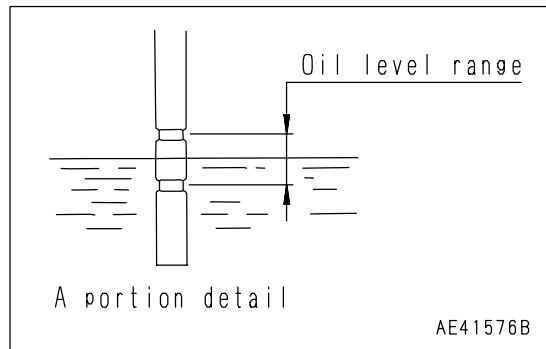
- 3. Set the oil level gauge (G) as shown in the right diagram.
- 4. The oil level is correct when it is between the two lines provided on the oil level gauge.  
If the oil level does not reach the lower line, add oil through filler port (F).



**REMARK**

For axles with ASD (Limited-Slip Differential), the brand of lubricating oil is different. Use the specified lubricating oil.

- 5. If the oil level is above the upper line, drain off the excess oil through drain plug (P) and check the oil level again.
- 6. If the oil level is correct, install plug (1).  
Tightening torque: 127 to 177 N·m (13 to 18 kgf·m, 94.0 to 130.2 lbft)

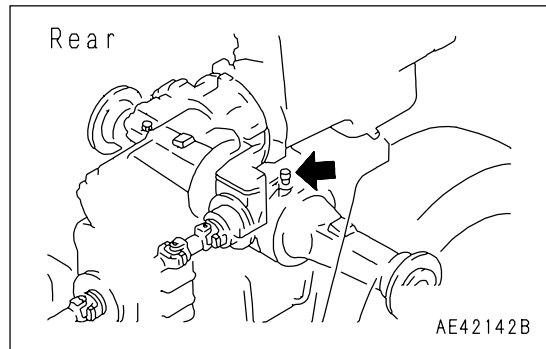
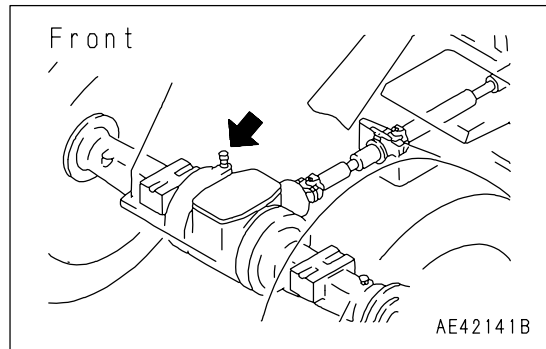


**CLEAN AXLE CASE BREATHER**

**WARNING**

When cleaning the axle breather, apply the parking brake and secure the front and rear frames with the frame lock bar.

Remove all mud and dirt from around the breather with a brush.  
 After removing the mud or dirt from around the breather, remove the breather, immerse it in cleaning fluid and clean it.  
 When cleaning the breather, clean the breathers at two places (front and rear).  
 After removing the breather, take steps to prevent dirt or dust from entering the mount.



### CLEAN AIR CONDITIONER CONDENSER

(Machine equipped with cab) (If equipped)

**! WARNING**

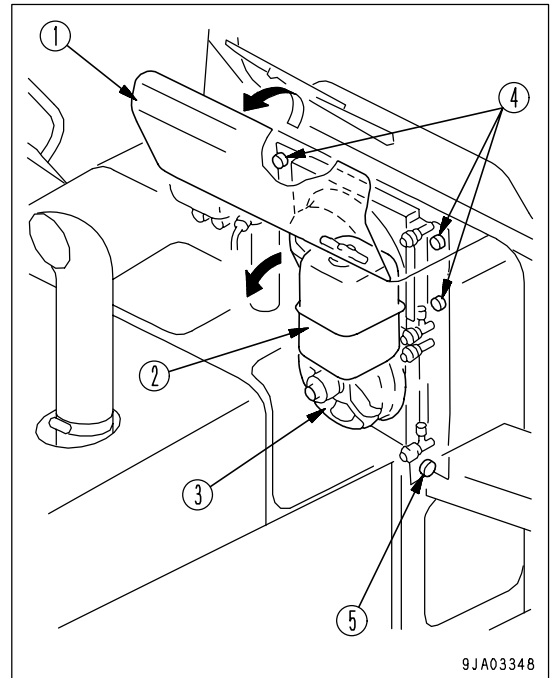
- Do not wash the condenser with a steam cleaner. There is danger that the condenser could overheat.
- If high-pressure water hits your body directly or dirt is sent flying, there is danger of personal injury. Always wear protective glasses, dust mask, and other protective equipment.

If there is mud or dust on the air conditioner condenser, clean it with water.

If the water pressure is too high, the fins may get deformed. When washing with a high pressure washing machine, apply the water from a reasonable distance.

#### WASHING METHOD

1. Open top cover (1) at the front of the engine hood.
2. Move radiator sub tank (2) to make space so that air conditioner condenser (3) can swing to the rear.
3. Remove 4 bolts (4) at the top of the condenser.
4. Using pin (5) at the bottom of the condenser as the fulcrum, push over to the rear.
5. Wash with water from the top.
6. Install bolts (4), then install sub tank (2) to its original position.



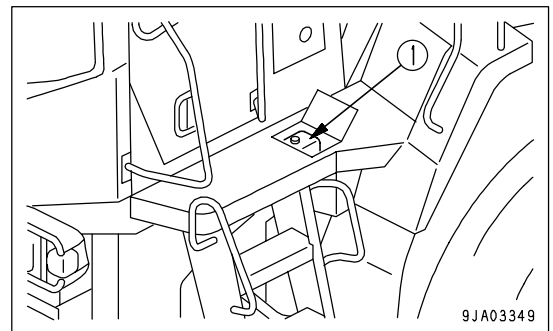
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### CHECK WINDOW WASHING FLUID LEVEL, ADD FLUID

(Machines equipped with cab)

Check the washing fluid levels in washer tank (1). When the fluid has run low, add automotive window washing fluid.

Be careful not to let dust get into the fluid.



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### CLEAN RADIATOR FINS AND COOLER FINS

#### WARNING

- Never open the engine side cover when the engine is running. Stop the engine completely before starting the cleaning operation.
- If compressed air, pressurized water, or steam hits your body directly, or causes dirt to fly, it may lead to personal injury. Always wear safety glasses, dust mask, or other protective equipment.

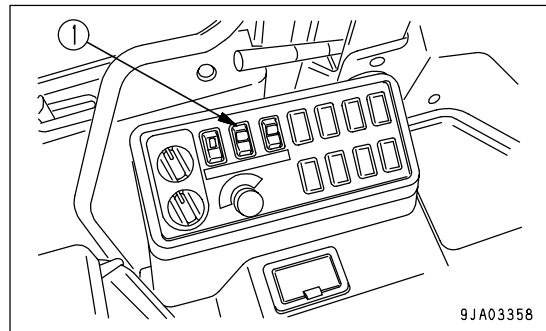
Clean the radiator or cleaner if mud or dirt is stuck to it.

### CLEAN FINS BY ROTATING COOLING FAN IN REVERSE

#### NOTICE

When rotating the fan in reverse, be careful of flying dust and take steps to prevent cloth or other objects from getting caught in the fan.

On jobsites where the dust accumulates on to the radiator or cooler, turn cooling fan reverse rotation switch (1) ON to rotate the fan in the reverse direction and blow out the dust stuck to the radiator or cooler. This can be used to extend the cleaning interval.



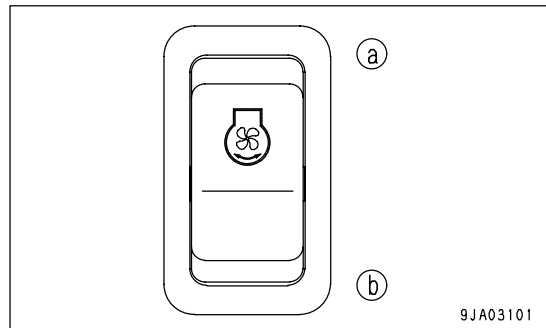
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### METHOD OF ROTATING FAN IN REVERSE

#### NOTICE

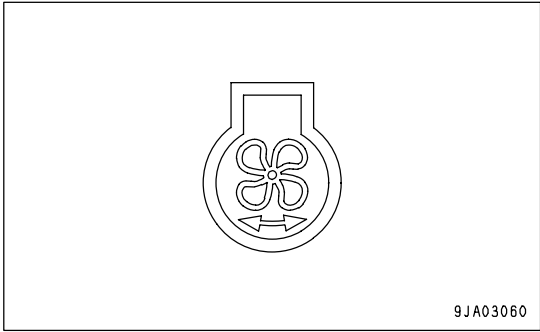
- When the engine is running, even if the switch is pressed, the direction of rotation of the fan does not change, but the cooling fan reverse rotation pilot lamp on the machine monitor flashes. Stop the engine, then operate the switch.
- When the fan is rotating in reverse, the pilot lamp on the machine monitor lights up. Do not carry out operations while the pilot lamp is lighted up. The machine will be unable to display its performance fully and it may lead to overheating. For normal operations, always use the fan rotating in the normal direction.
- If the engine has to be stopped when the fan is rotating in reverse, run the engine at low idle, then stop it.

1. Turn the starting switch to the OFF position and stop the engine.
2. Turn the starting switch to the ON position.
3. Set cooling fan reverse rotation switch (1) to position (a) (ON).



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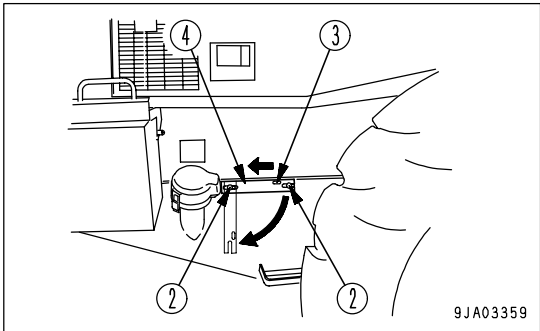
4. Check that the pilot lamp inside the switch and the cooling fan reverse rotation pilot lamp on the machine monitor are lighted up. At the same time, "COOLING FAN REVERSE" is displayed on the character display, and the fan is set to reverse rotation.
5. Turn the key in the starting switch to the START position and start the engine.  
The cooling fan will rotate in reverse.



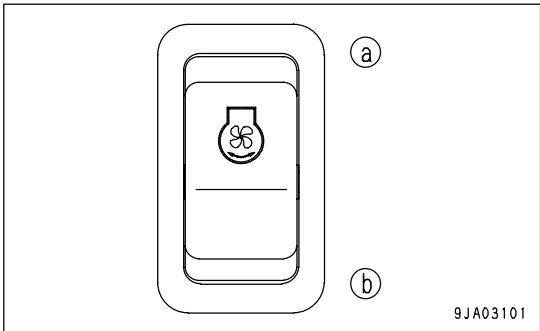
6. Run the engine at high idle.  
Select the time for running the engine at high idle as follows according to the condition of clogging.  
Normal clogging: 1 to 2 minutes  
Excessive clogging: 2 to 3 minutes
7. After completing the cleaning, run the engine at low idle for approx. 10 seconds.
8. Turn the starting switch to the OFF position and stop the engine.
9. When the fan rotation stops, loosen wing bolts (2), use hook (3) to slide cleaning covers (4), and open the left and right covers.
10. Insert the air nozzle and blow the dirt out to the front of the machine.

**REMARK**

Steam or water can be used instead of compressed air.



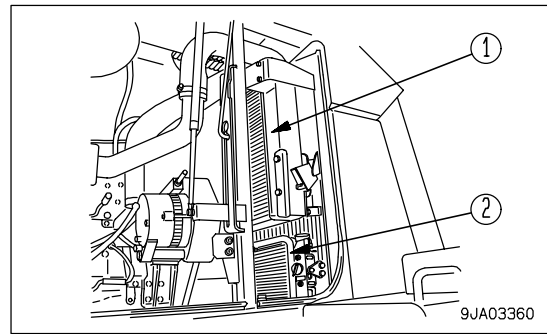
11. After blowing out the dirt, install left and right cleaning covers (4).
12. Run the engine at low idle.
13. Turn the key in the starting switch to the OFF position and stop the engine.
14. Turn starting switch key to the ON position.
15. Set cooling fan reverse rotation switch (1) to position (b) (OFF) to cancel the reverse rotation.
16. Check the rubber hose. Replace with a new one if the hose is found to have cracks or to be hardened by aging.  
Also, check hose clamps for looseness.





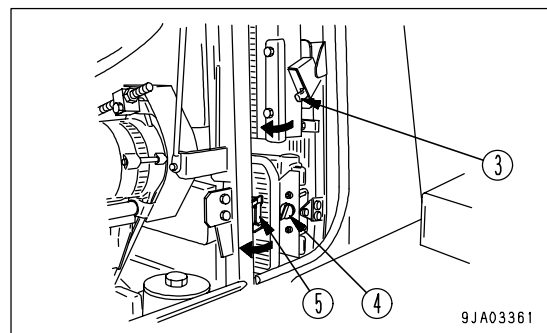
**CLEAN FINS WITH COMPRESSED AIR**

Tilt aftercooler (1) at the top front face of the radiator, swing oil cooler (2) at the bottom, then insert the steam jet nozzle through the gap and clean the fins.



**METHOD OF TILTING AND SWINGING COOLER**

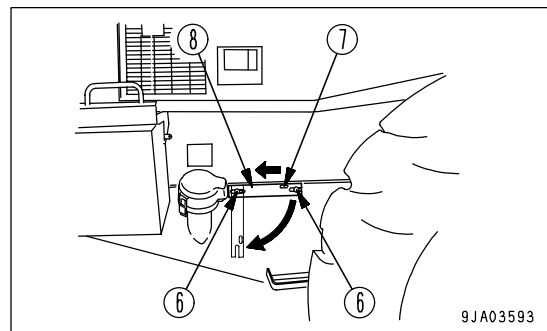
1. Turn the starting switch to the OFF position and stop the engine.
2. Pull lever (3) down to release the lock, then tilt aftercooler (1).  
Turn the knob (4) counterclockwise to release the lock, then swing oil cooler (2).  
If necessary, band (5) can be fitted to oil cooler (2) to hold it in position after swinging it.
3. Use the steam jet nozzle to blow out the mud, dirt, or leaves clogging the radiator fins or cooler fins.



**NOTICE**

If the steam jet nozzle is brought too close to the radiator fins, it may damage the fins, so keep the nozzle a suitable distance away from the fins when cleaning.

4. Check the rubber hose. Replace with a new one if the hose is found to have cracks or to be hardened by aging.  
Also, check hose clamps for looseness.
5. Do as follows to blow out the mud or dirt that has fallen to the bottom.
6. Loosen wing bolts (6), use hook (7) to slide cleaning covers (8), and open the left and right covers.
7. Insert the air nozzle and blow the dirt out to the front of the machine.



**REMARK**

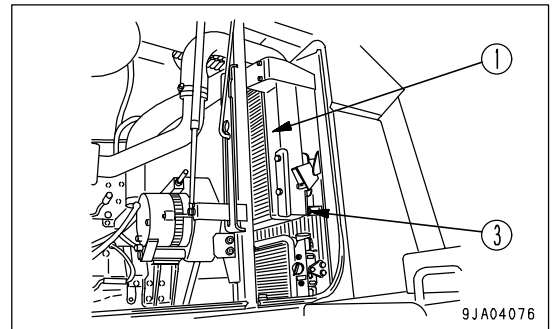
Steam or water can be used instead of compressed air.

8. After blowing out the dirt, install left and right cleaning covers (8).
9. After completing the cleaning, push the bottom of aftercooler (1) to lock it, then push the front of oil cooler (2) to lock it.  
Check that they are both securely locked in position.

**ADJUSTING RUBBER STOPPER FOR AFTERCOOLER**

If aftercooler (1) moves even when it is locked, adjust rubber stopper (2) as follows.

1. Push the bottom of aftercooler (1) to lock it securely.

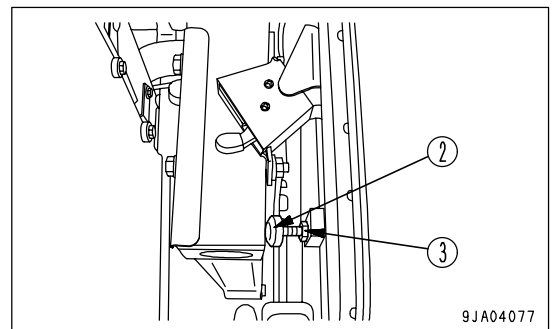


2. Loosen locknut (3) of rubber stopper (2).
3. Adjust the height of rubber stopper (2) so that aftercooler (1) does not move.

**REMARK**

Push rubber stopper (2) to adjust so that it contacts aftercooler (1).

4. Tighten locknut (3).



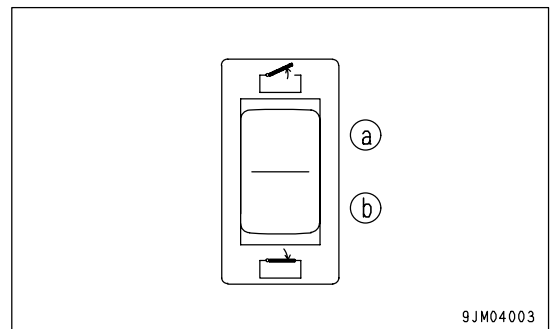
5. There is one rubber stopper (2) each on the left and right, so repeat Steps 1 - 4 to adjust the rubber stopper on the opposite side.
6. After adjusting the rubber stopper on the left and right, push the bottom of aftercooler (1) and check that it does not move.

**AFTERCOOLER TILT SWITCH**

(If equipped)

For machines with the optional equipment, Step 2 of the method for tilting and swinging the cooler can be used to tilt the aftercooler electrically.

Press aftercooler switch on the left side of the engine room to tilt the aftercooler electrically approx. 17 degrees; press (b) to return the aftercooler to its original position.



**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 checked for dirt or disconnections.

## TURN, REPLACE BOLT-ON CUTTING EDGE

**WARNING**

It is dangerous if the work equipment moves by mistake during the turning or replacement operation.

Set the work equipment in a stable condition, stop the engine, then set the work equipment lock lever securely to the LOCK position.

Turn or replace the cutting edge before the wear reaches the edge of the bucket.

1. Raise the bucket to a suitable height, then put blocks (A) under the bucket to prevent the bucket from coming down.

Raise the bucket so that the bottom surface of the bucket is horizontal.

2. Remove nuts and bolts (1), then remove cutting edge (2).
3. Clean the mounting surface of cutting edge (2).
4. Turn cutting edge (2) and install it to the bucket. When turning the edge, install it to the opposite side (left edge to right side, right edge to left side).

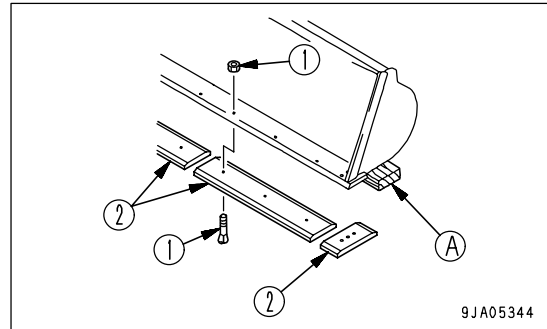
If both sides of the cutting edge are worn, replace with a new part.

If the wear extends to the mounting surface, repair the mounting surface before installing the cutting edge.

5. Tighten nuts and bolts (1) uniformly so that there is no gap between the bucket and cutting edge.

Tightening torque for mounting bolt:  $745 \pm 108$  N·m ( $76 \pm 11$  kgf·m,  $549.7 \pm 79.6$  lbf·ft)

6. Tighten the mounting bolts again after operating for several hours.



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## REPLACE BUCKET TEETH

(If equipped)

### ONE-PIECE TOOTH

When the bucket teeth are worn, replace them as follows.

1. Raise the bucket to a suitable height, then put blocks (A) under the bucket to prevent the bucket from coming down.  
Raise the bucket so that the bottom surface of the bucket is horizontal.

2. Remove the bolt and nuts (1) and (2), then remove bucket tooth (3).

3. Clean the installation surface of bucket tooth (3).

4. Install new teeth to the bucket.

When doing this, insert shims so that there is no clearance between the teeth and the top surface of the bucket.

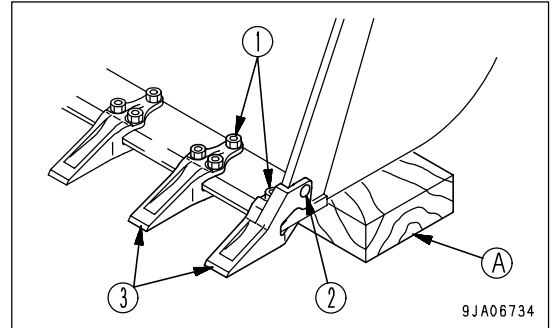
Continue to add shims until it becomes impossible to add a 0.5 mm (0.02 in) shim.

If the mounting surface is worn, correct the mounting surface before installing the teeth.

5. To prevent any gap from forming between the teeth and tip of the bucket, tighten bolts and nuts (1) and (2) temporarily, then hit the tip of the teeth with a hammer.

Tightening torque of mounting bolt (1):  $863 \pm 941$  N·m ( $88 \pm 96$  kgf·m,  $636.5 \pm 694.4$  lbft)  
(2):  $588 \pm 647$  N·m ( $60 \pm 66$  kgf·m,  $434 \pm 477.4$  lbft)

6. After operating the machine for a few hours, tighten the mounting bolts again.



## BUCKET WITH TIP TOOTH

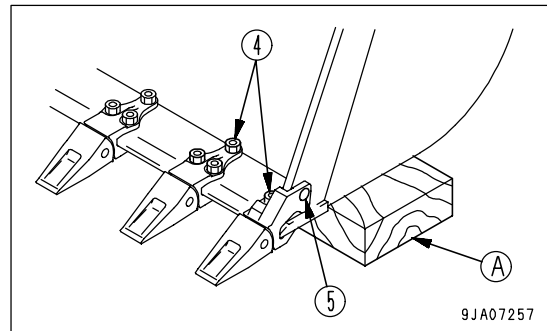
**WARNING**

- If the pin is hit out with strong force, there is danger that the pin may fly out. Check that there is no one in the surrounding area.
- There is danger of pieces flying during the replacement operation, so always wear protective clothing, such as safety glasses and gloves.

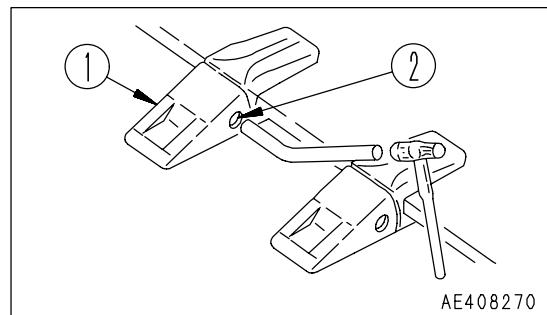
Replace the teeth before they wear down as far as the adapter.

1. Raise the bucket to a suitable height, then put blocks (A) under the bucket to prevent the bucket from coming down.

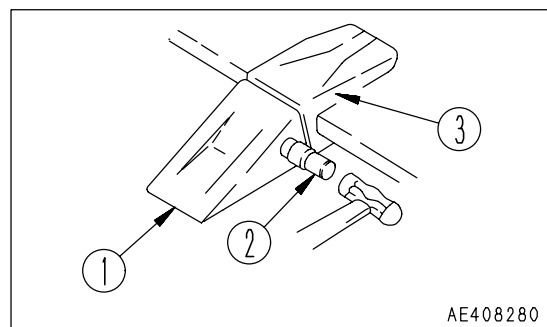
Raise the bucket so that the bottom surface of the bucket is horizontal.



2. Remove pin (2) installed to the bucket, then remove tooth (1). Put a rod (slightly narrower than the pin) in contact with the hatched portion (either left or right) and tap pin (2) out to the opposite side.



3. Fit new tooth (1) in adapter (3), push in pin (2) partially by hand, then knock it in with a hammer.
4. After operating the machine for a few hours, check that the pin does not come out.



5. If mounting bolts (4) or (5) of adapter (3) are loose, tighten them.

Tightening torque of mounting bolt (4):  $863 \pm 941$  N·m ( $88 \pm 96$  kgf·m,  $636.5 \pm 694.4$  lbf·ft)  
 (5):  $588 \pm 647$  N·m ( $60 \pm 66$  kgf·m,  $434 \pm 477.4$  lbf·ft)

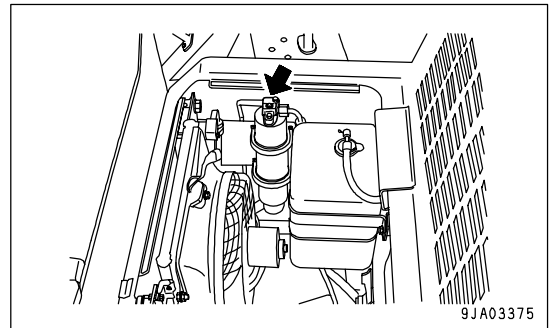
**CHECK AIR CONDITIONER**

(Machine equipped with cab) (If equipped)

**CHECK LEVEL OF REFRIGERANT (GAS)**

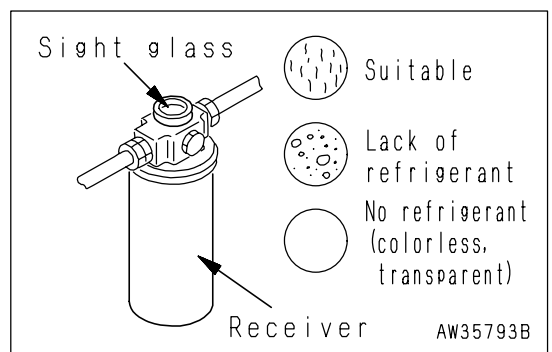
**WARNING**

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 there is a lack of refrigerant (gas), the cooling performance will be poor. When operating the air conditioner at high speed with the engine at full throttle, use the receiver sight glass (inspection window) to check the condition of the refrigerant gas (R134a) flowing in the refrigerant circuit.

- 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 Komatsu distributors to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.

**OPERATING THE AIR CONDITIONER OFF-SEASON**

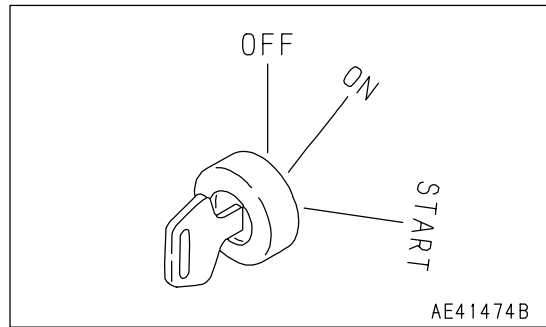
Even during the off-season, operate the air conditioner for 3 to 5 minutes once a month to maintain the oil film at all parts of the compressor.

## REPLACE SLOW BLOW FUSE

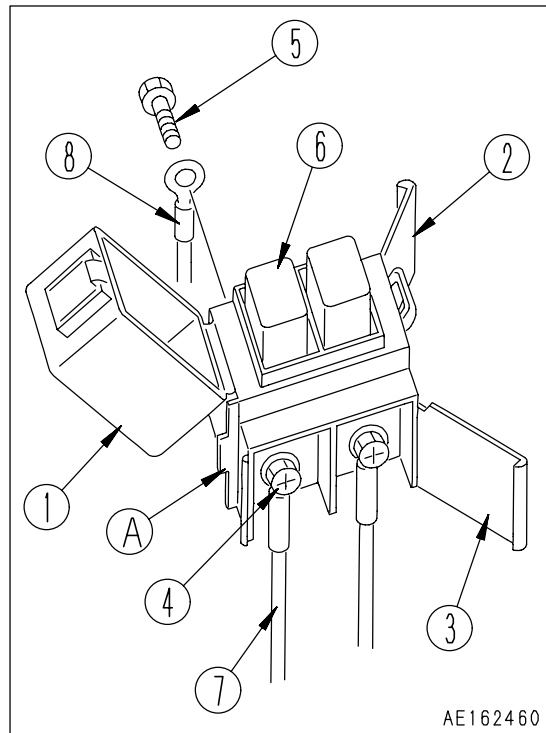
### NOTICE

- Always turn the power OFF when replacing the slow blow fuse (turn the starting switch to the OFF position).
- Always replace the slow blow fuse with a fuse of the same capacity.

1. Turn the starting switch to the OFF position.
2. Remove the slow blow fuse box from the chassis.



3. Open covers (1), (2), and (3) of the slow blow fuse box.  
Covers (2) and (3) can be removed easily by using protrusion (A) on the body as a fulcrum and levering the catch of the cover with a flat-headed screwdriver to release it.
4. Loosen screws (4) and (5), and remove.  
When screws (4) and (5) are removed, slow blow fuse (6) will also come off together with electric wiring (7) and (8).
5. Using screws (4) and (5), install a new slow blow fuse together with electric wiring (7) and (8) to the slow blow fuse box, then close covers (1), (2), and (3).
6. Install the slow blow fuse box to the chassis.



## CHECKING FUNCTION OF ACCUMULATOR

For details of handling the accumulator, see Section "ACCUMULATOR (PAGE 2-35)".

### ACCUMULATOR FOR TRAVEL DAMPER

When the travel damper switch is ON, the hydraulic spring effect of the accumulator absorbs the up-and-down motion of the machine during travel and reduces the swaying.

Drive the machine and compare the up-and-down movement of the machine during travel when the travel damper switch is ON and when it is OFF.

If there is no change in the up-and-down movement of the machine, the gas pressure in the accumulator has probably dropped.

Please contact your Komatsu distributor to have the accumulator inspected.

### REMARK

Carry out the inspection when the machine is traveling at a speed of at least 10 km/h (6.2 MPH). Even if the travel damper switch is ON, the travel damper is not actuated if the travel speed is less than 10 km/h (6.2 MPH).

### ACCUMULATOR FOR BRAKE DAMPER

When the brake pedal is depressed, the hydraulic spring effect of the accumulator actuates the brake smoothly.

If any change is felt in the smoothness of the brake operation during daily operations, the gas pressure in the accumulator has probably dropped.

Please contact your Komatsu distributor to have the accumulator inspected.

### REMARK

Even if there is any change in the smoothness, there is no drop in the braking force or brake performance.

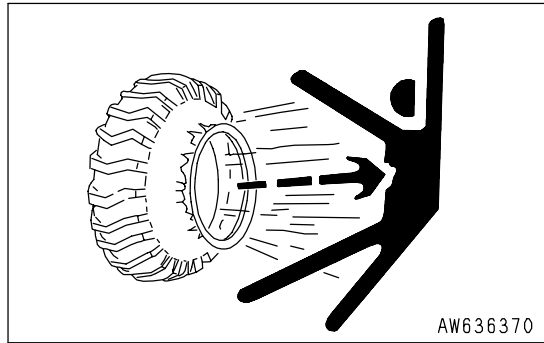


### SELECTION AND INSPECTION OF TIRES

#### **WARNING**

If a tire or a rim is handled improperly, the tire may burst or may be damaged and the rim may be broken and scattered, and that can cause serious injury or death.

- Since maintenance, disassembly, repair and assembly of the tires and rims require special equipment and skill, be sure to ask a tire repair shop to do the work.
- Do not heat or weld the rim to which the tire is installed. Do not make a fire near the tire.



### SELECTION OF TIRES

#### **WARNING**

Select the tires according to the conditions of use and the weight of the attachments on the machine. Use only specified tires and inflate them to the specified pressure.

Select the tires according to the conditions of use and the weight of the attachments of the machine. Use the following table.

Since the travel speed indicated on the speedometer varies with the tire size, consult your Komatsu distributor when using optional tires.

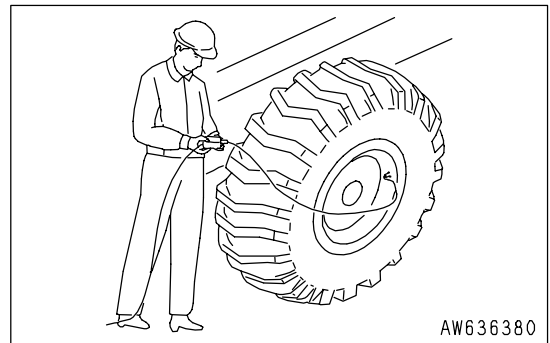
		Tire size	Maximum load [kg (lb)]
Standard	Front and Rear	23.5-25-20PR	10,760 (23,726)
Option	Front and Rear	26.5-25-16PR	11,140 (24,564)
	Front and Rear	26.5-25-20PR	12,690 (27,981)

CHECK INFLATION PRESSURE OF TIRES

**WARNING**

When inflating a tire, check that no one will enter the working area. Use an air chuck which has a clip and which can be fixed to the air valve.

- While inflating the tire, check the inflation pressure occasionally so that it will not rise too high.
- If the rim is not fitted normally, it may be broken and scattered while the tire is inflated. To ensure safety, place a guard around the tire and do not work in front of the rim but work on the tread side of the tire.
- Abnormal drop of inflation pressure and abnormal fitting of the rim indicate trouble in the tire or rim. In this case, be sure to ask a tire repair shop to carry out repairs.
- Be sure to observe the specified inflation pressure.
- Do not adjust the inflation pressure of the tires just after high-speed travel or heavy-duty work.



CHECK

Measure the inflation pressure with a tire pressure gauge, while the tires are cool, before starting work.

INFLATION OF TIRES

Adjust the inflation pressure properly.

When inflating a tire, use an air chuck which can be fixed to the air valve of the tire as shown in the figure. Do not work in front of the rim but work on the tread side of the tire.

The proper inflation pressure is shown below.

	Tire size	Inflation pressure
Standard	23.5-25-20PR	Front Tire: 0.39MPa (4.0kgf/cm <sup>2</sup> , 56.8 PSI)
		Rear Tire: 0.31MPa (3.2kgf/cm <sup>2</sup> , 45.4 PSI)
Option	26.5-25-16PR	Front Tire: 0.34MPa (3.5 kgf/cm <sup>2</sup> , 49.7 PSI)
	26.5-25-20PR	Rear Tire: 0.29MPa (3.0 kgf/cm <sup>2</sup> , 42.6 PSI)

NOTICE

The optimum inflation pressure differs according to the type of work. For details, see "HANDLING THE TIRES (PAGE 3-144)" .

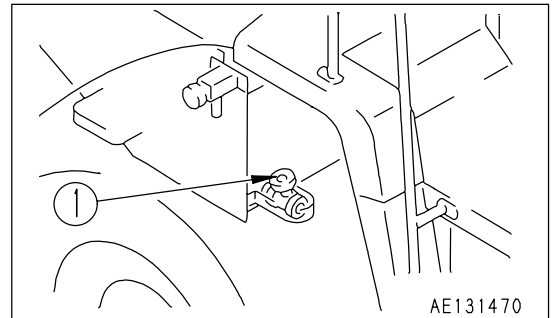
**CHECK BEFORE STARTING**

For the following items, see "CHECK BEFORE STARTING (PAGE 3-94)".

- Check monitor panel
- Check coolant level, add coolant
- Check oil level in engine oil pan, add oil
- Check fuel level, add fuel
- Check electric wiring
- Check parking brake
- Check brake pedal
- Check inflation pressure of tires

**EVERY 50 HOURS SERVICE****DRAIN WATER, SEDIMENT FROM FUEL TANK**

Loosen valve (1) on the right side of the tank so that the sediment and water will be drained together with fuel.



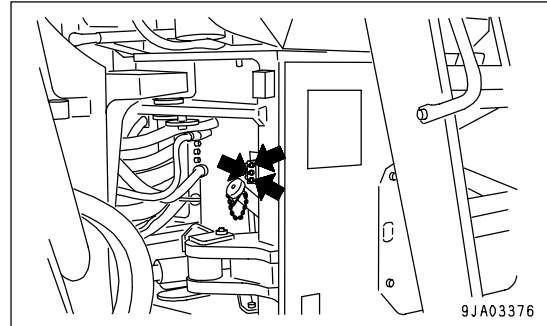
## EVERY 100 HOURS SERVICE

Maintenance for every 50 hours service should be carried out at the same time.

### LUBRICATE REAR AXLE PIVOT PIN

(3 places)

1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that was pushed out.



### CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL



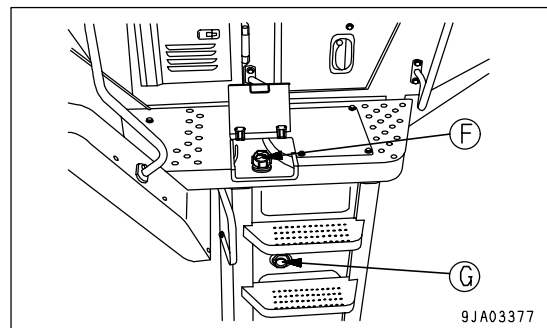
#### WARNING

- 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.

1. Lower the bucket horizontally to the ground and stop the engine. Wait for 5 minutes, then check sight gauge (G). The oil level should be between the H and L marks.

#### NOTICE

Do not add oil if the level is above the H line. If the oil has been added to above H level, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug. If the oil is above H level, it will damage the hydraulic circuit or cause the oil to spurt out.



2. If the oil is below the L level, open the inspection cover above the step and add oil through oil filler port (F).

### CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER

(Machine equipped with cab) (If equipped)



### WARNING

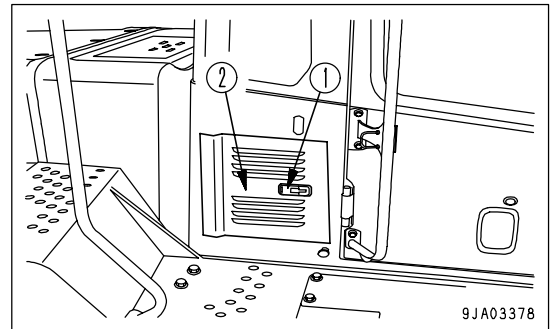
If compressed air is used, there is danger that dirt may fly and cause personal injury.

Always wear protective glasses, dust mask, and other protective equipment.

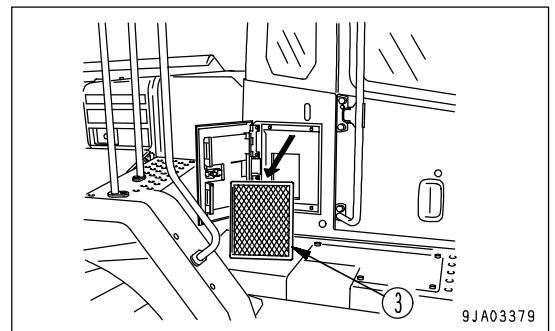
If the air conditioner has been used, the air filter should be cleaned.

Stop the air conditioner before cleaning the element.

1. Push handle (1) and open cover (2).



2. Remove element (3) and clean it.
3. Direct dry compressed air (less than 0.69 MPa (7 kgf/cm<sup>2</sup>, 99.4 PSI)) to the element from inside along its folds, then direct it from outside along its folds and again from inside.



## EVERY 250 HOURS SERVICE

Maintenance for every 50 and 100 hours service should be carried out at the same time.

### CHECK BATTERY ELECTROLYTE LEVEL

Perform this check 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

When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

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

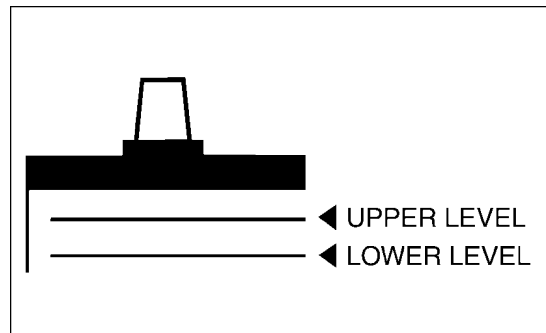
If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Open the cover of the battery box.

There are two battery boxes: One on each side at the rear of the machine.

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.

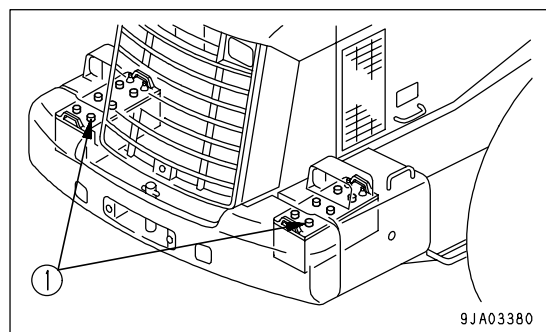


3. If the electrolyte level is below the midway point between the U.L. and L.L. lines, remove cap (1) and add distilled water to the U.L. line.

4. If distilled water has been added to any cell of cap (1), add distilled water also to the other cells.

5. Clean the vents of the battery caps, then close the caps securely.

Keep the top of the battery clean and wipe it with a wet cloth.



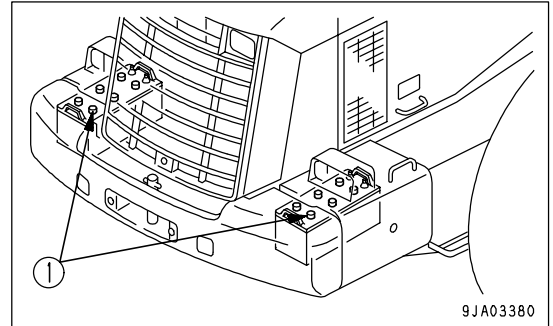
### REMARK

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.

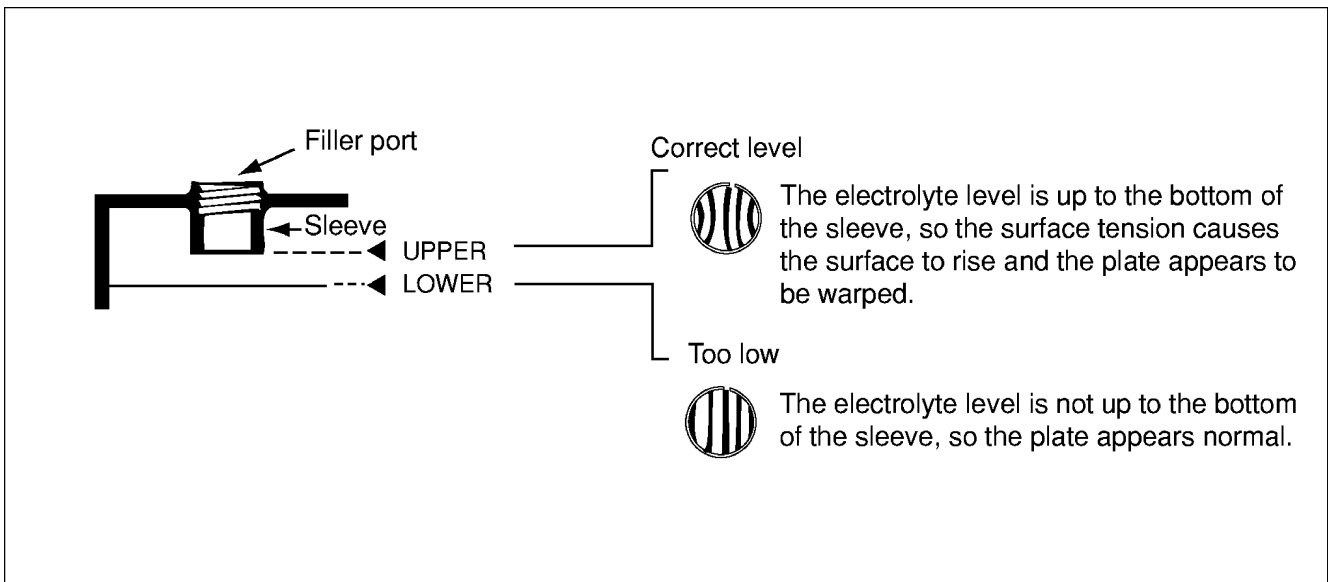
**WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY**

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 cover of the battery box.  
There are two battery boxes: One on each side at the rear of the machine.
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.
3. If distilled water has been added to any cell of cap (1), add distilled water also to the other cells.



Use the diagram below for reference, and check if the electrolyte reaches the bottom of the sleeve.



4. After adding distilled water, tighten cap (1) securely.

**REMARK**

If distilled water is added to above the bottom of the sleeve, use a syringe to lower the level to the bottom of the sleeve. 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.

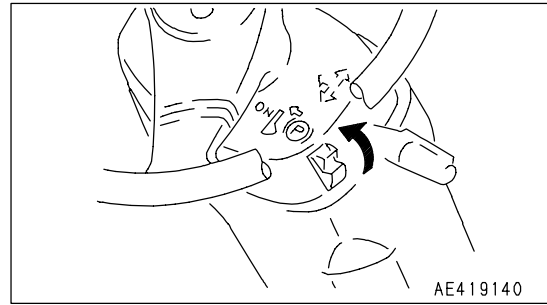
**WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL**

If it is possible to use an indicator to check the electrolyte level, follow the instructions given.



## CHECK PARKING BRAKE

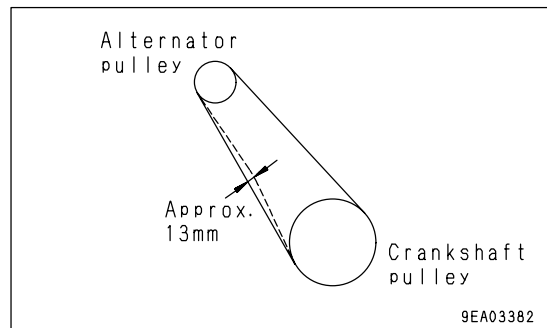
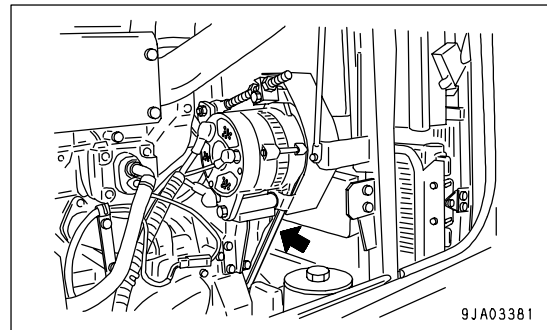
1. Set the machine on a dry downhill slope, press the parking brake switch to the ON position, and check if the parking brake hold the machine in position.
2. If any problem is found, please contact your Komatsu distributor.



## CHECK ALTERNATOR BELT TENSION, ADJUST

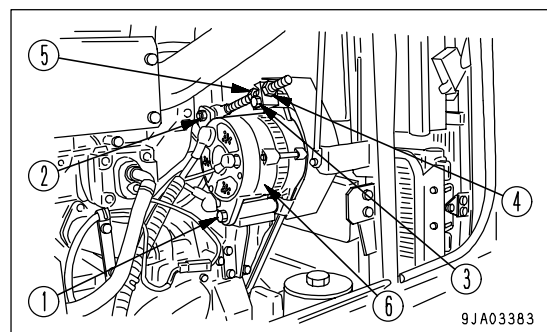
### CHECKING

The standard deflection between the alternator pulley and crank pulley when pressed with a thumb (approx. 59N (6 kg)) should be approx. 13 mm (0.5 in).



### ADJUSTING

1. Loosen bolts and nuts (1), (2), (3), and (4).
2. Turn nut (5) clockwise and move alternator (6) so that the deflection of the belt is approx. 13 mm (0.5 in)(approx. 59N (6 kg)).
3. Tighten bolts and nuts (1), (2), (3), and (4) to hold alternator (6) in position.



**NOTICE**

- Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
- In case any of the following occurs, ask the Komatsu distributor in your territory to replace the belts with new ones.
  - The fan belt has elongated, leaving little allowance for adjustment.
  - A cut or crack is found on the belt.
  - Slipping or creaking sound is heard coming from the belt.
- When the new V-belt is set, readjust it after one hour of operation.

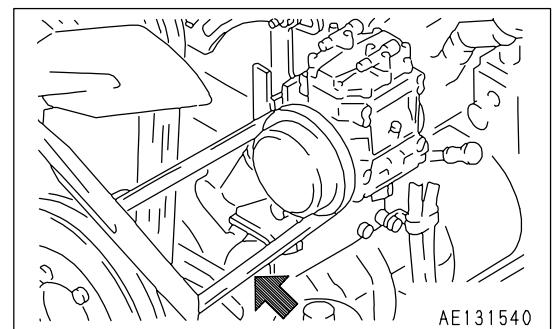
**CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST**

(Machine equipped with cab) (If equipped)

**CHECKING**

The standard deflection between the air conditioner compressor pulley and crank pulley when pressed with a thumb (approx. 98 N (10 kgf)) should be approx. 16 to 20 mm (0.6 to 0.8 in).

When a belt tension gauge is used, the standard tension is within a range of 353 to 530 N (36 to 54 kgf).



**CHECK WHEN CHANGING THE V-BELT**

The standard deflection between the air conditioner compressor pulley and fan pulley when pressed with a thumb (approx. 98 N (10 kgf)) should be approx. 12 to 17 mm (0.5 to 0.7 in).

When a belt tension gauge is used, the standard tension is within a range of 530 to 745 N (54 to 76 kgf).

**REMARK**

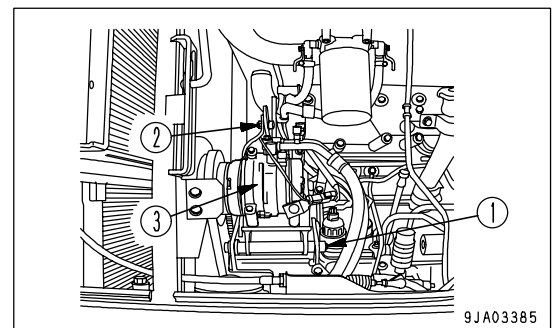
When the belt has been replaced with a new part, a high tension is necessary, so the initial tension is in the value given above.

**ADJUSTING**

1. Loosen nuts (1) and (2), and move compressor (3) to adjust.
2. Tighten nuts (1) and (2) to hold compressor (3) in position.

**NOTICE**

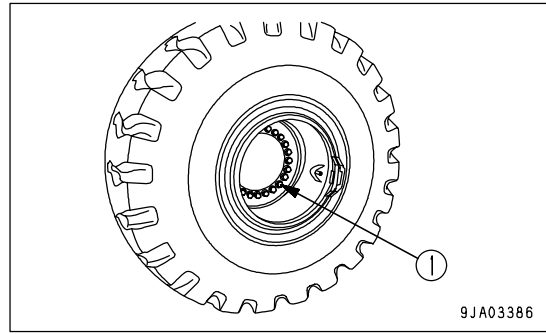
- Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
- In case any of the following occurs, ask the Komatsu distributor in your territory to replace the belts with new ones.
  - The fan belt has elongated, leaving little allowance for adjustment.
  - A cut or crack is found on the belt.
  - Slipping or creaking sound is heard coming from the belt.
- When the new V-belt is set, readjust it after one hour of operation.



### CHECK FOR LOOSE WHEEL HUB BOLTS, TIGHTEN

If wheel hub nuts (1) are loose, tire wear will be increased and may cause accidents.

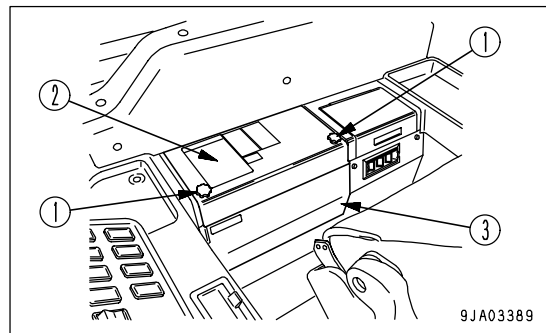
1. Check for loose nuts, and tighten if necessary.  
 When checking for loose nuts, always turn the nuts in the direction of tightening to check.  
 Tightening torque: 825 to 1030 N·m  
 (84 to 105 kgf·m, 607.6 to 759.9 lbft)
2. If any stud bolt is broken, replace all the stud bolts for that wheel.



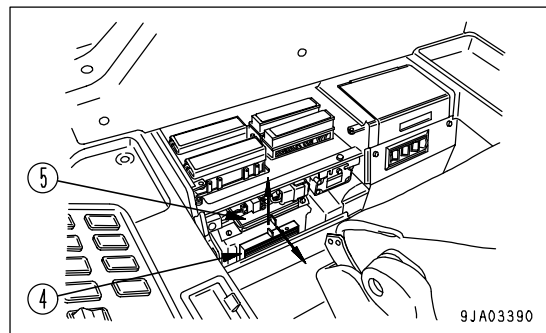
### CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER

(Machine equipped with cab) (If equipped)

1. Loosen knob (1), remove filter inspection cover (2), then open filter inspection cover (3).



2. Pull out filters (4) and (5) in the direction of the arrow.
3. Clean with compressed air in the same way as for the fresh air filter.  
 If the filter is extremely dirty, rinse it in water.  
 After rinsing the filter, dry it completely before installing it again.



### CHECKING FUNCTION OF ACCUMULATOR

For details of handling the accumulator, see Section "ACCUMULATOR (PAGE 2-35)".

#### BRAKE ACCUMULATOR

If the engine stops when the machine is traveling, the oil pressure in the accumulator can be used to apply the brake as an emergency measure.

1. Stop the machine on level ground and lower the work equipment completely to the ground.
2. Apply the parking brake.
3. Start the engine, run it at a mid-range speed for 1 minute, then stop the engine.
4. Turn the starting switch key to the ON position and depress the brake pedal repeatedly.
  - If the brake oil pressure caution lamp does not light up even when the brake is depressed 6 times, the gas pressure in the accumulator is normal.
  - If the brake oil pressure caution lamp lights up when the brake has been depressed 5 or less times, the gas pressure in the accumulator has probably dropped. Please contact your Komatsu distributor to have the accumulator inspected.

#### REMARK

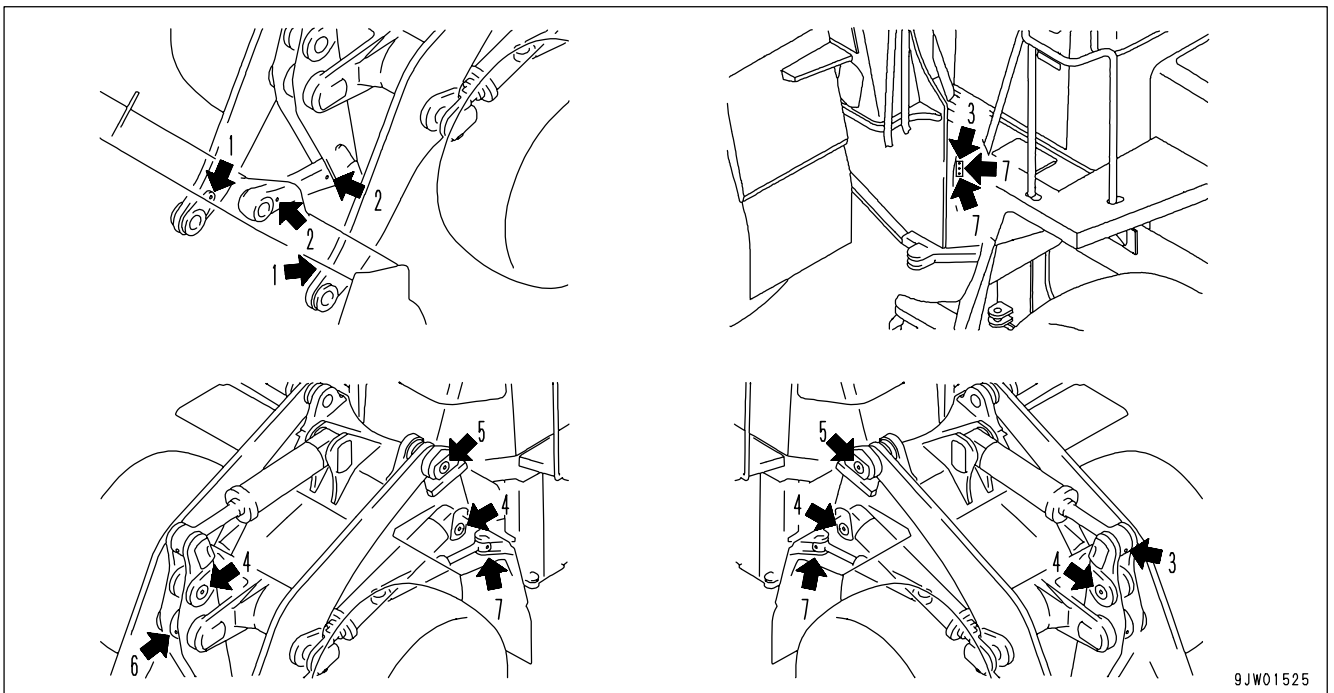
Carry out the check within 5 minutes after stopping the engine. If the machine is left with the engine stopped, the accumulator pressure will drop and it will be impossible to check the cause of the problem.

#### LUBRICATING

1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that was pushed out.

#### NOTICE

On jobsites where there is a lot of heavy-duty work, or on jobsites where operations are carried out continuously for more than eight hours, reduce the greasing interval and carry out greasing more frequently.



- (1) Bucket pin (2 places)
- (2) Bucket link pin (2 places)
- (3) Dump cylinder pin (2 places)
- (4) Lift cylinder pin (4 places)
- (5) Lift arm pivot pin (2 places)
- (6) Bellcrank pin (1 place)
- (7) Steering cylinder pin (4 places)

### EVERY 500 HOURS SERVICE

Maintenance for every 50, 100 and 250 hours service should be carried out at the same time.

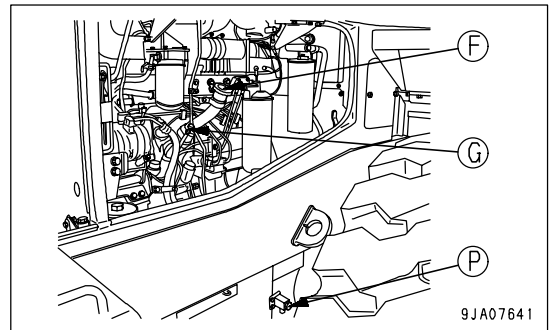
### CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

 **WARNING**

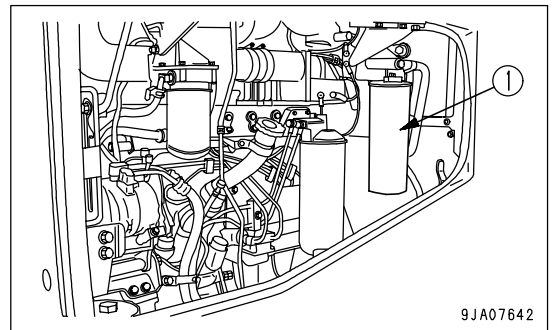
- The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

- Refill capacity: 38 liters (10.04 US gal)
- Filter wrench

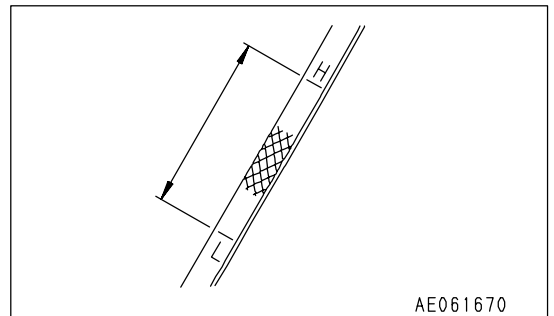
1. Open the engine side cover on the right side of the chassis.
2. Open oil filler (F).
3. Place a container to catch the oil under drain plug (P).
4. Loosen drain plug (P), and drain the oil.
5. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
6. Install drain plug (P).



7. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
8. Clean the filter holder, fill the new filter cartridge with oil, then coat the seal and thread of the filter cartridge with oil (or coat thinly with grease) and install.
9. When installing, bring the seal surface into contact with the filter holder, then tighten a further 3/4 to 1 turns.



10. 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).
11. Run the engine at idle for short time, then stop the engine, and check that the oil is between the H and L marks on the dipstick. For details, see "CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL (PAGE 3-96)".



## REPLACE ADDITIONAL FUEL FILTER CARTRIDGE

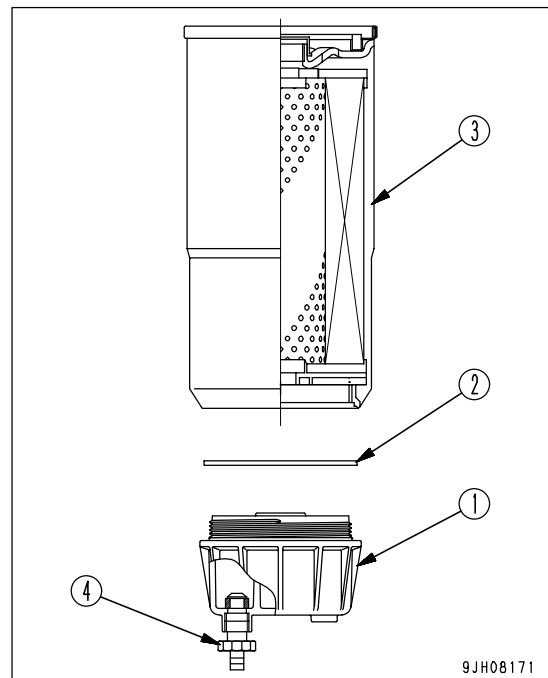
 **WARNING**

- After the engine has been operated, all parts are at high temperature, so do not replace the filter immediately. Wait for all parts to cool down before starting the operation.
- High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before replacing the filter.
- Do not bring any fire or flame close.
- Be careful when opening the air bleed plug in the fuel filter head. It is still under pressure, so fuel may spurt out.

## NOTICE

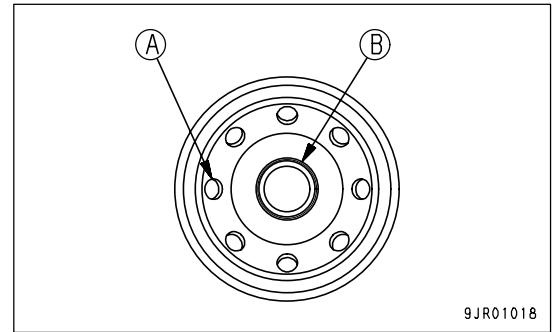
- Genuine Komatsu fuel filter cartridges use a special filter that has highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Komatsu part.
- The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection pump and nozzle. If any part other than a genuine Komatsu filter cartridge is used, dust or dirt may get in and cause problems with the injection system. Always avoid using substitute parts.
- When carrying out inspection or maintenance of the fuel system, pay more attention than normal to the entry of dirt. If dirt is stuck to any part, use fuel to wash it off completely.

- Container to catch the oil
  - Filter wrench
1. Close the fuel valve.
  2. Set the container to catch the fuel under the additional fuel filter cartridge.
  3. Using a filter wrench, turn filter cartridge counterclockwise to remove it.
  4. After removing the filter, remove transparent bowl (1) and inspect it. If there is any damage, replace it with a new part.
  5. Clean transparent bowl (1) and remove seal (2). Coat new seal (2) with clean fuel or oil, then install it.
  6. Install transparent bowl (1) to new filter cartridge (3).  
Tightening torque: 10 N·m (1 kgf·m, 7.2 lbf)



## NOTICE

- When adding fuel, do not remove cap (B). Always add fuel from the 8 small holes (A) on the dirty side.
- After adding fuel, remove cap (B) and install the fuel filter.
- Always fill with clean fuel. Be careful not to let any dirt or dust get into the fuel. In particular, center portion is the clean side, so do not remove cap (B) when adding fuel. Be careful not to let dirt or dust get into center portion on the clean side.



7. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it 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 the correct amount.
  - When tightening with a filter wrench, be extremely careful not to dent or damage the filter.
8. After completion of the replacement of fuel filter cartridge (1), bleed the air.  
Bleed the air as follows:
9. Add fuel to the fuel tank until full (to FULL mark on the fuel gauge).
10. After replacing filter cartridge (1), loosen air bleed plug (3) and add fuel until no more bubbles come out in the fuel from the air bleed plug.
11. After replacing the filter cartridge, start the engine and check for any leakage of fuel from the filter seal surface.



### EVERY 1000 HOURS SERVICE

Maintenance for every 50, 100, 250 and 500 hours service should be carried out at the same time.

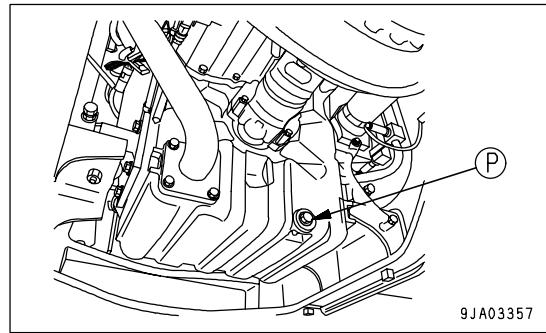
### CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER

**WARNING**

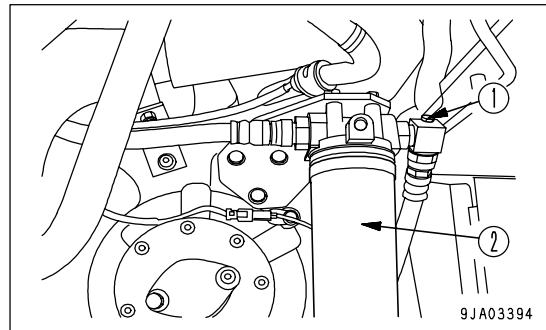
- The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

- Refill capacity: 54 liters (14.27 US gal)
- Filter wrench

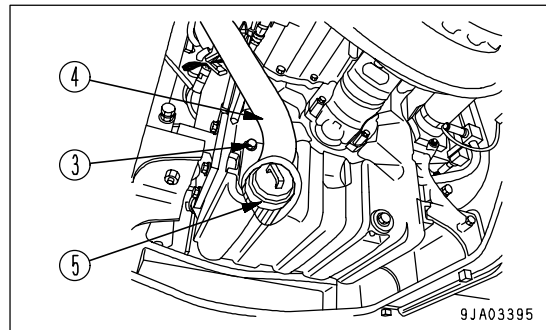
1. Set a container to catch the oil under drain plug (P), then remove drain plug (P) and drain the oil.  
To prevent the oil from pouring out suddenly, loosen drain plug (P) and remove it gradually.
2. After draining the oil, install drain plug (P).  
Tightening torque:  $68.6 \pm 9.8$  N·m ( $7.0 \pm 1.0$  kgf·m,  $50.6 \pm 7.2$  lbft)
3. Set a container to catch the oil under the transmission filter.



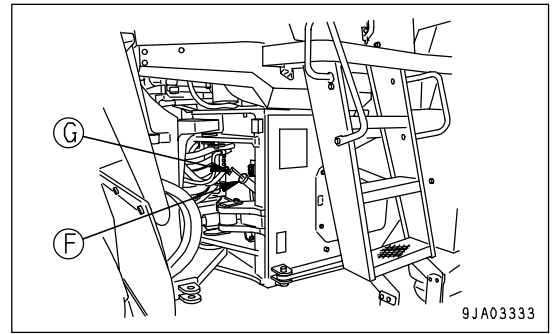
4. Remove drain plug (1) of the transmission filter, drain the oil, then tighten the plug again.
5. Using a filter wrench, turn filter cartridge (2) to the left to remove it.
6. Clean in the filter holder, coat the seal surface and thread of the new filter cartridge with engine oil, then install it.
7. When the seal surface comes into contact with the filter holder, tighten a further 2/5 turns with the filter wrench.



8. Remove 4 bolts (3), move tube (4), then remove strainer (5).
9. Remove any dirt stuck to strainer (5), then wash it in clean diesel fuel or flushing oil. If strainer (5) is damaged, replace it with a new part.
10. Install strainer (5) in the case.  
Replace the O-ring of tube (4) with a new part, then install tube (4).

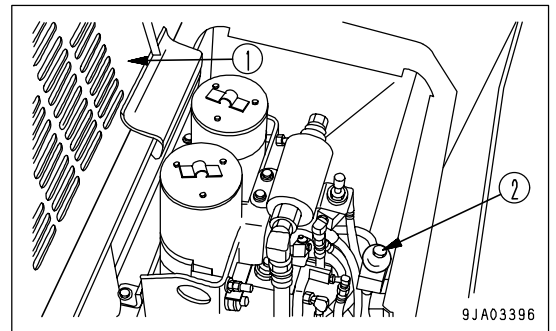


11. Refill the specified quantity of oil through oil filler (F).
12. After filling with oil, check that the oil is at the specified level.  
For details, see "CHECK TRANSMISSION OIL LEVEL, ADD OIL (PAGE 4-26)".
13. Check that there is no leakage of oil from the transmission case or oil filter.



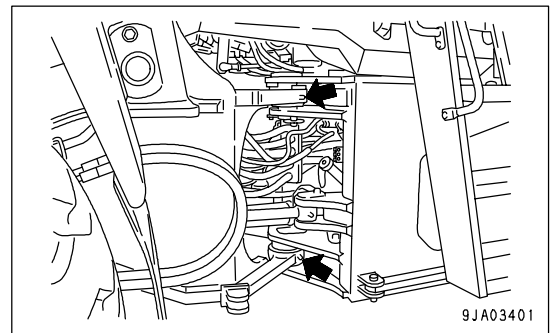
**CLEAN TRANSMISSION CASE BREATHER**

1. Open cover (1) on the cab side of the engine hood.
2. Remove the mud and dirt from around the breather, then remove breather (2), soak it in washing liquid and wash it.  
After removing the breather, take steps to prevent dirt or dust from entering the mount.

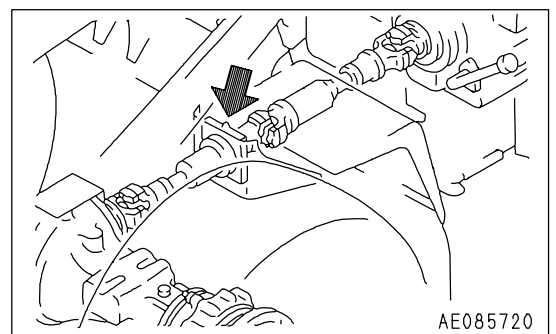


**LUBRICATING**

1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
  2. After greasing, wipe off any old grease that was pushed out.
- (1) Center hinge pin (2 places)



- (2) Drive shaft center support (1 place)



### CHECK TIGHTENING PARTS OF TURBOCHARGER

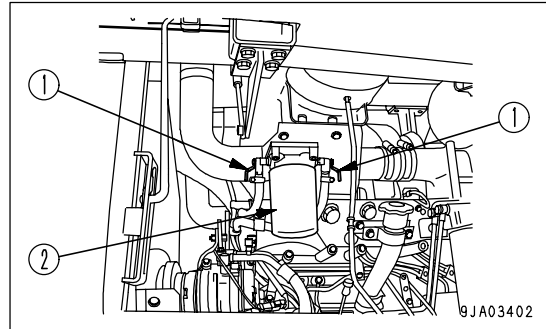
Contact your Komatsu distributor to have the tightening portions checked.

### CHECK PLAY OF TURBOCHARGER ROTOR

Contact your Komatsu distributor to have the rotor play checked.

### REPLACE CORROSION RESISTOR CARTRIDGE

1. Set 2 levers (1) at the top of the corrosion resistor to the side to the CLOSED position.
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. Bring the packing surface into contact with the seal surface of the filter holder, then tighten it further approx. 2/3 turn.
5. Set 2 levers (1) vertically to the OPEN position.



REPLACE FUEL FILTER CARTRIDGE

**WARNING**

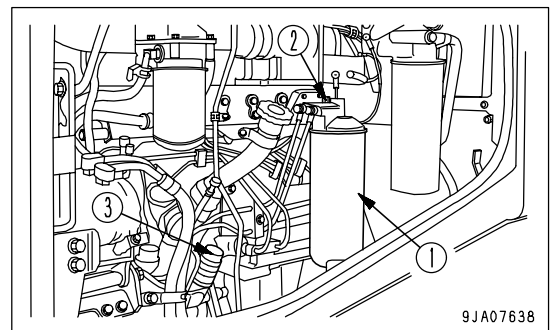
- After the engine has been operated, all parts are at high temperature, so do not replace the filter immediately. Wait for all parts to cool down before starting the operation.
- High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before replacing the filter.
- Do not bring any fire or flame close.

NOTICE

- Genuine Komatsu fuel filter cartridges use a special filter that has highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Komatsu part.
- The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection pump and nozzle. If any part other than a genuine Komatsu filter cartridge is used, dust or dirt may get in and cause problems with the injection system. Always avoid using substitute parts.
- When carrying out inspection or maintenance of the fuel system, pay more attention than normal to the entry of dirt. If dirt is stuck to any part, use fuel to wash it off completely.

Prepare a filter wrench and a container to catch the fuel.

1. Set the container to catch the fuel under the filter cartridge.
2. Using a filter wrench, turn filter cartridge (1) counterclockwise on remove it.
3. Clean the filter holder.



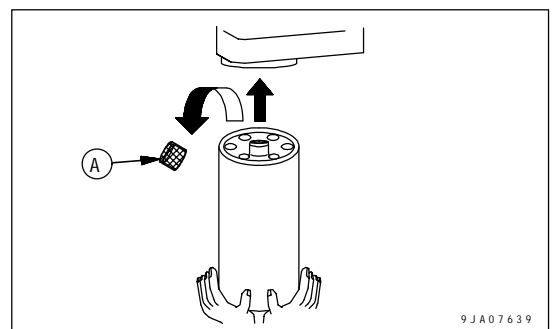
9JA07638

NOTICE

Do not fill the filter cartridge with fuel.

Cap (A) is installed to prevent dirt from entering the inside of the filter cartridge.

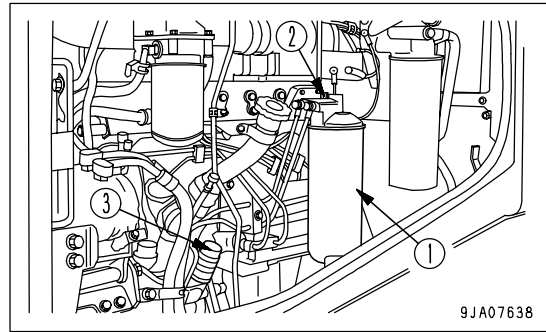
4. Coat the packing surface of the filter cartridge with oil.



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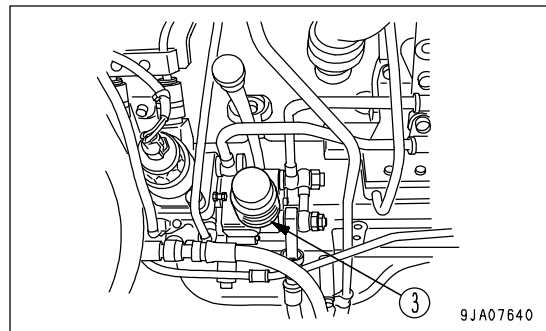
5. Remove filter cartridge cap (A) and install to the filter holder.
6. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it 3/4 of a turn. If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten the correct amount.

7. After replacing filter cartridge (1), loosen air bleed plug (2).
8. Loosen the knob of priming pump (3), then pump the knob until no more bubbles come out of air bleed plug (2).
9. Tighten air bleed plug (2).  
Tightening torque: 7.8 to 9.8 N·m (0.8 to 1 kgf·m, 5.8 to 7.2 lbft)



9JA07638

10. Push the knob of priming pump (3) in and tighten it.



9JA07640

11. After replacing the filter cartridge, start the engine and check for leakage of fuel from the filter seal surface. If any fuel is leaking, check the tightening condition of the filter cartridge. If there is still leakage of fuel, repeat Steps 1 and 2 to remove the filter cartridge, and check the packing surface for damage or embedded foreign material. If the packing is damaged or there is embedded foreign material, replace the cartridge with a new part and repeat Steps 3 - 11 to install.

### EVERY 2000 HOURS SERVICE

Maintenance for every 50, 100, 250, 500 and 1000 hours service should be carried out at the same time.

### CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT

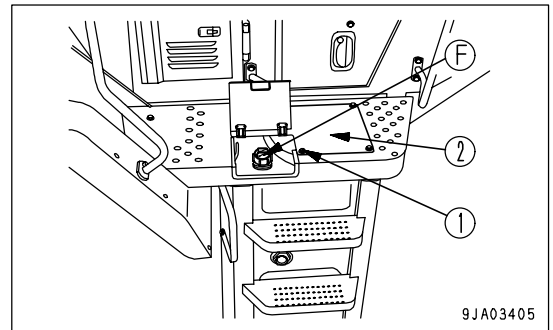


#### WARNING

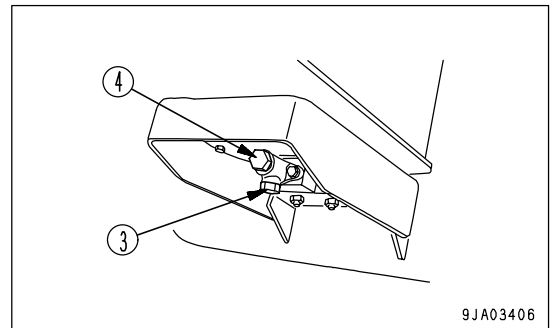
- The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

- Refill capacity: 190 liters (50.2 US gal)

1. Lower the bucket horizontally to the ground and apply the parking brake, then stop the engine.
2. Remove bolts (1), then remove cover (2).
3. Remove oil filler cap (F).



4. Set a container to catch the oil under drain plug (3).
5. Remove drain plug (3).
6. Open drain valve (4) gradually and drain the oil.
7. After draining the oil, close drain valve (4), then tighten drain plug (3).

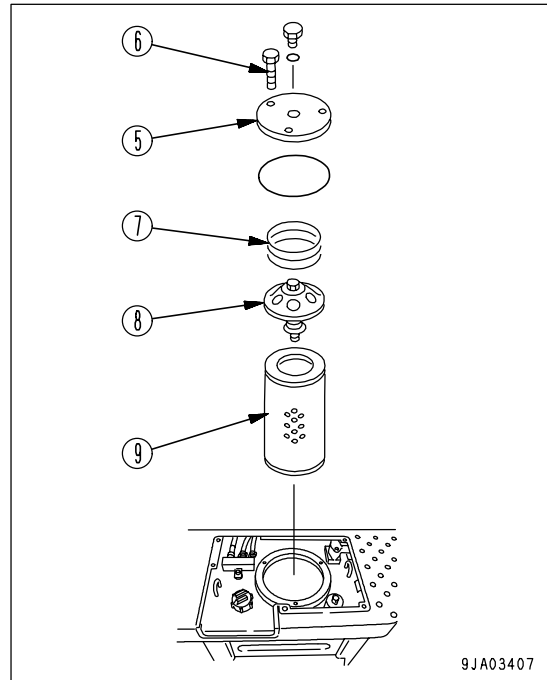


Tightening torque

Drain plug (3):  $68.6 \pm 9.8 \text{ N}\cdot\text{m}$  ( $7.0 \pm 1.0 \text{ kgf}\cdot\text{m}$ ,  $50.6 \pm 7.2 \text{ lbft}$ )

Drain valve (4):  $63.7 \pm 14.7 \text{ N}\cdot\text{m}$  ( $6.5 \pm 1.5 \text{ kgf}\cdot\text{m}$ ,  $47.0 \pm 10.8 \text{ lbft}$ )

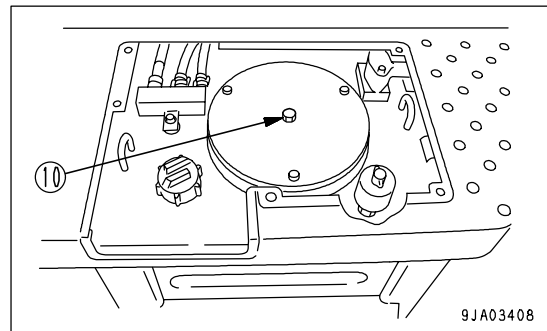
8. Remove mounting bolts (6) of filter cover (5) at the top of the tank, then remove the cover.  
When the cover is removed, the force of spring (7) may make the cover fly off, so keep the cover pushed down when removing the bolts.
9. Remove spring (7) and bypass valve (8), then remove element (9).
10. Check that there is no foreign material inside the tank, then clean it.
11. Install new element (9), then set bypass valve (8), spring (7), and cover (5) to the tank.  
If the O-ring of the cover is damaged or deteriorated, replace it.
12. When installing the cover bolts, push down the cover and tighten the bolts evenly.
13. Add the refill amount of engine oil through oil filler port (F), then install the cap.
14. Check that the hydraulic oil is at the specified level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-44)".
15. Run the engine at low idle, and extend and retract the steering, bucket, and lift arm cylinders 4 to 5 times. Be careful not to operate the cylinder to the end of its stroke (stop approx. 100 mm (3.9 in) before the end of stroke).



**NOTICE**

**If the engine is run immediately at high speed or the cylinder is operated to the end of its stroke, the air inside the cylinder will cause damage to the piston packing.**

16. Next, operate the steering, bucket, and lift arm cylinders to the end of their stroke 3 to 4 times, then stop the engine and loosen bleed plug (10) to bleed the air from the hydraulic tank. After bleeding the air, tighten plug (10) again.  
Run the engine at low idle when bleeding the air.
17. Check that the hydraulic oil is at the standard level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-44)".



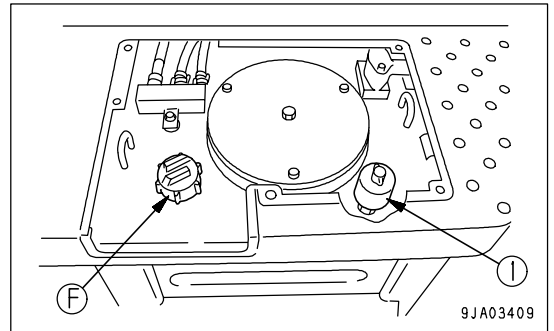
18. Next, increase the engine speed and repeat the procedure in Step 16 to bleed the air. Continue this operation until no more air comes out from plug (10).
19. After completing the air bleed operation, tighten plug (10).  
Tightening torque: 11.3 ± 1.5 N·m (1.15 ± 0.15 kgf·m, 8.3 ± 1.1 lbf)
20. Check that the hydraulic oil level and add oil to the specified level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-44)".
21. Check that there is no leakage of oil from the filter cover mount.

REPLACE HYDRAULIC TANK BREATHER ELEMENT

**! WARNING**

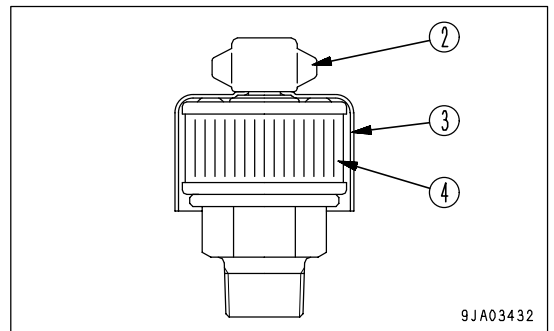
- The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

1. Before removing the breather, wipe off all the dirt from around the breather.
2. Remove the cap of oil filler (F).
3. Remove nut (2) of breather (1), then remove cover (3).
4. Replace filter element (4) with a new part, then install cover (3) and nut (2).
5. Tighten the cap of oil filler (F).



**REMARK**

It is possible to replace the element with the breather installed in the tank. However, if the breather is removed, do not wrap the taper thread of the breather with seal tape when assembling again, and be careful not to tighten too much.





## CHANGE AXLE OIL

 **WARNING**

- When changing the oil, apply the parking brake and secure the front and rear frames with the frame lock bar.
- After the engine is stopped, the parts and oil are at high temperature, and may cause burns. Wait for the temperature to go down before starting the operation.
- When the plug is removed, oil may spurt out, so turn it slowly to release the internal pressure, then remove it carefully.

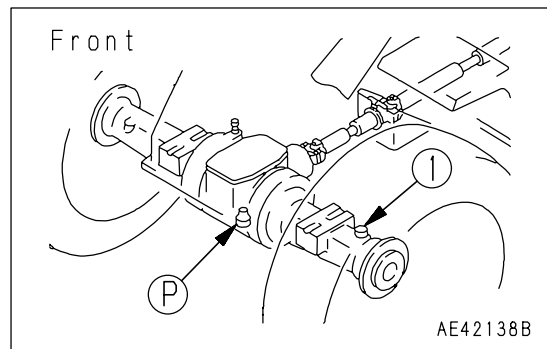
- Refill capacity (front and rear, each): 52 liters (13.74 US gal)

1. Set a container to catch the oil under drain plug (P).
2. Remove front and rear oil filler plugs (1), then remove drain plug (P) to drain the oil.

**REMARK**

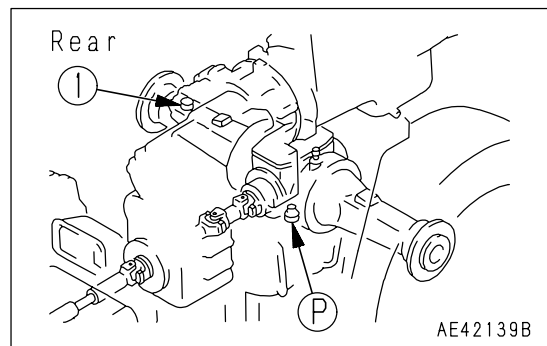
Remove the mud and dirt from around plug (1), then remove the plug.

3. After draining the oil, clean drain plug (P) and install it again.
4. Add oil through plug hole (1) at the refill level.

**REMARK**

For axles with ASD (Limited-Slip Differential), the brand of lubricating oil is different. Use the specified lubricating oil.

5. After adding oil, check at level plug (1) that the oil is at the specified level. For details, see "CHECK AXLE OIL LEVEL, ADD OIL (PAGE 4-27)".

**REMARK**

For operations where the brake is used frequently, change the oil at shorter intervals.

**REPLACE ELEMENT IN AIR CONDITIONER RECIRCULATION AIR FILTER, FRESH AIR FILTER**

(Machine equipped with cab) (If equipped)

Remove both the recirculation air filter and fresh air filter in the same way as when cleaning, and replace them with new parts.

For details of cleaning the recirculation air filter, see "CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER (PAGE 4-50)".

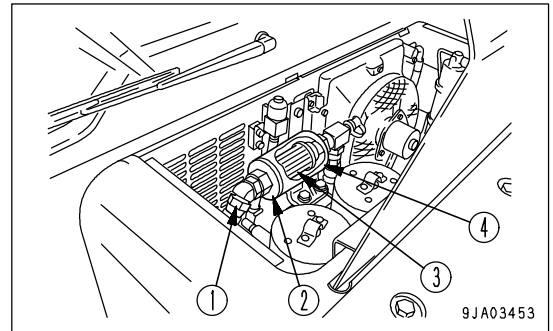
For details of cleaning the fresh air filter, see "CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER (PAGE 4-45)".

**CLEAN PPC CIRCUIT STRAINER**

**! WARNING**

- After the engine is stopped, the parts and oil are at high temperature, and may cause burns. Wait for the temperature to go down before starting the operation.
- When the rubber hose is removed, oil may spurt out, so turn it slowly to release the internal pressure, then remove it carefully.

1. When rubber hose (1) and flange (2) are removed, oil will spill out, so set a container (capacity: approx. 300 cc) in position to catch the oil.
2. Remove rubber hose (1) and flange (2).
3. Remove strainer (3) and wash it in clean diesel oil.
4. Install strainer (3) in strainer case (4) from the concave side, then install with flange (2).



**REMARK**

Assemble with the protruding side (O-ring side) of the strainer at the front

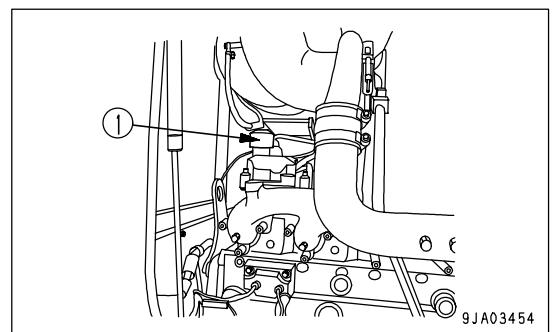
5. Install rubber hose (1).

**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. Loosen the clamp and remove the hose. Remove breather (1).
3. Clean the breather body with light oil or cleaning oil.
4. Replace O-ring with new one. Coat a new O-ring with engine oil, set it, then install breather (1).
5. Check the breather hose and pipe. If caked oil (sludge) adhere to insides, replace the hose and pipe with new parts.



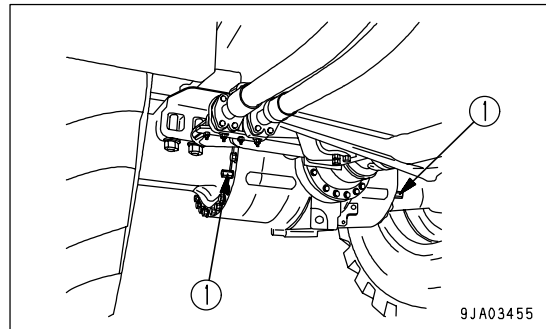
CHECK BRAKE DISC WEAR

**WARNING**

- When checking the brake disc wear, apply the parking brake and secure the front and rear frames with the frame lock bar.
- Make sure that the brake oil temperature is less than 60°C (140°F) before checking the brake wear.
- If the disc is near the wear limit, carry out inspection at shorter intervals, regardless of the specified inspection interval.

When checking the brake disc for wear, there are 4 places (front axle and rear axle, left and right), so use the same procedure to check all 4 places.

1. Remove cap nut (1).



2. Depress the brake pedal, keep it depressed, and push in the rod (2) of the gauge until contacts the piston.
3. The wear is the amount that the end face of rod (2) is protruding from the end face of guide (3). Measure the amount of protrusion.

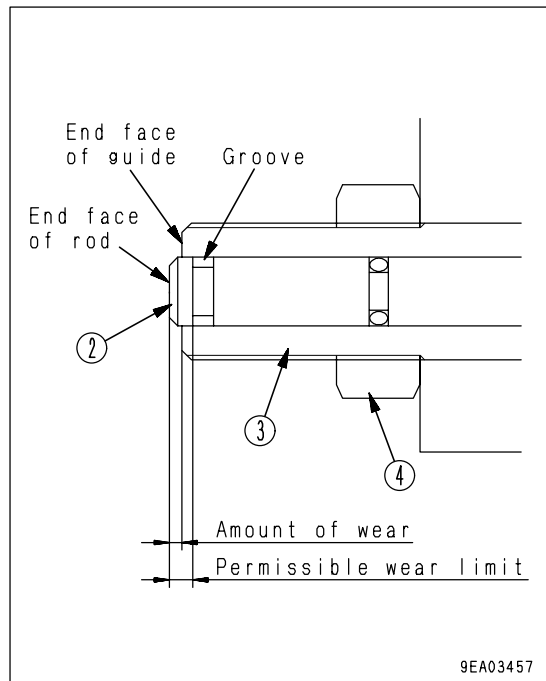
The point where the rod groove is level with the end face of the guide is the permissible limit for the disc wear.

If the wear has reached this point, please ask your Komatsu distributor for inspection and replacement parts.

- If the disc is near the wear limit, carry out inspection at shorter intervals, regardless of the specified inspection interval.

4. Install cap nut (1).

Tightening torque: 29.4 to 39.2 N·m (3.0 to 4.0 kgf·m, 21.7 to 28.9 lbf)



**REMARK**

- On new machines, the position of the guide is adjusted so that the end face of rod (2) comes to the end face of guide (3). For this reason, do not loosen locknut (4) except when replacing the disc.
- Carry out the operation with two workers: one worker depresses the brake pedal and the other worker pushes in rod (2).

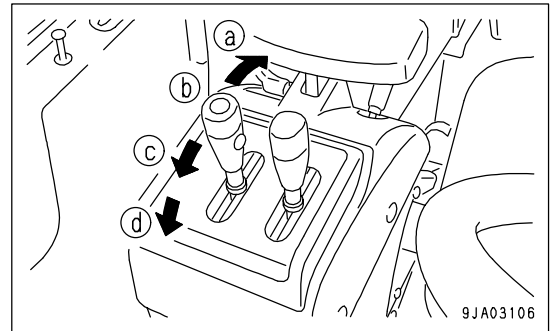
## CHECKING FUNCTION OF ACCUMULATOR

For details of handling the accumulator, see Section "ACCUMULATOR (PAGE 2-35)".

### PPC ACCUMULATOR

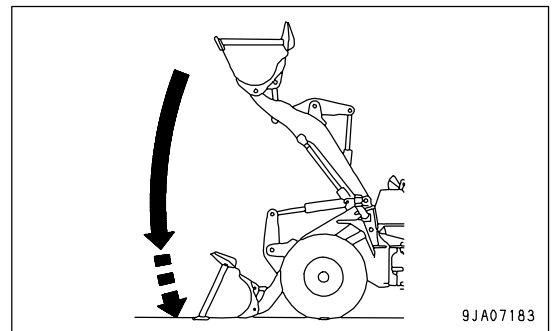
If the engine stops with the work equipment raised, and it is impossible to start the engine again, it is possible as an emergency measure to actuate the valve with the oil pressure stored in the accumulator and lower the work equipment to the ground.

1. Apply the parking brake.
2. Raise the work equipment to the maximum height, then operate the lift arm control lever to HOLD position (b).
3. Stop the engine.
4. Leave the work equipment lock lever in the FREE position.
5. Check that the area around the machine is safe, then operate the lift arm control lever to FLOAT position (d) and lower the work equipment to a point 1m above the ground.
6. When the lift arm comes to the 1m position, return the lift arm control lever to LOWER position (c), and lower the work equipment slowly to the ground.



### REMARK

Carry out the check within 2 minutes after stopping the engine. If the machine is left with the engine stopped, the accumulator pressure will drop and it will be impossible to check the cause of the problem.



If the work equipment stops while it is moving, the gas pressure in the accumulator has probably dropped. Please contact your Komatsu distributor to have the accumulator inspected. Replace the accumulator every 4000 hours or every 2 years.

## CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn or have no grease on the bearing, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, carry out inspection every 1000 hours.

## CHECK ENGINE VALVE CLEARANCE, ADJUST

As special tool is required for removing and adjusting the parts, request your Komatsu distributor for service.

## CLEAN AND CHECK TURBOCHARGER

If there is carbon or oil sludge stuck to the blower impeller, it will lower the performance of the turbocharger or cause it to break, so ask your Komatsu distributor to carry out the cleaning.

## CHECK INJECTOR

See Section "A REGULATION AREA (PAGE 4-16)".

## 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.

### EVERY 4000 HOURS SERVICE

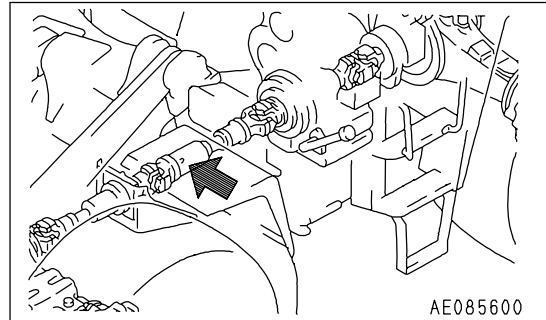
Maintenance for every 50, 100, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

### LUBRICATING

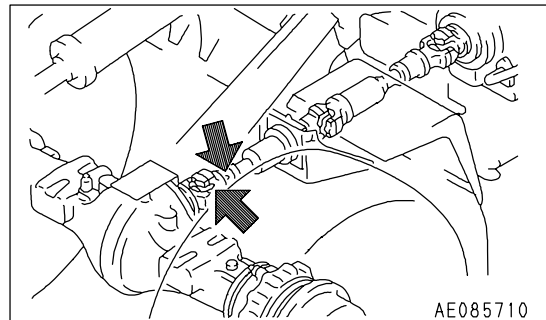
Carry out the greasing once every two years, regardless of whether the 4000 hour interval has passed.

1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that was pushed out.

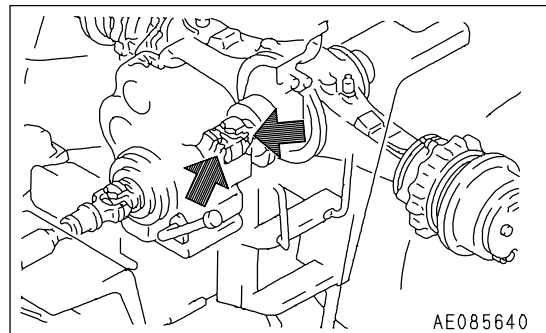
(1) Center drive shaft spline (1 place)



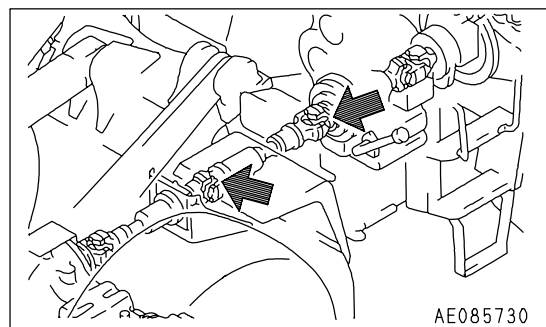
(2) Front drive shaft (2 places)



(3) Rear drive shaft (2 places)



(4) Center drive shaft (2 places)



**CHECK WATER PUMP**

Check that there is no play in the pulley or any grease leakage, water leakage, or clogging of the drain hole. If any problem is found, contact your Komatsu distributor for disassembly and repair or replacement.

**CHECK AIR CONDITIONER COMPRESSOR, ADJUST**

(Machine equipped with cab) (If equipped)

As special tool is required for checking and adjusting the parts, request Komatsu distributor for service.

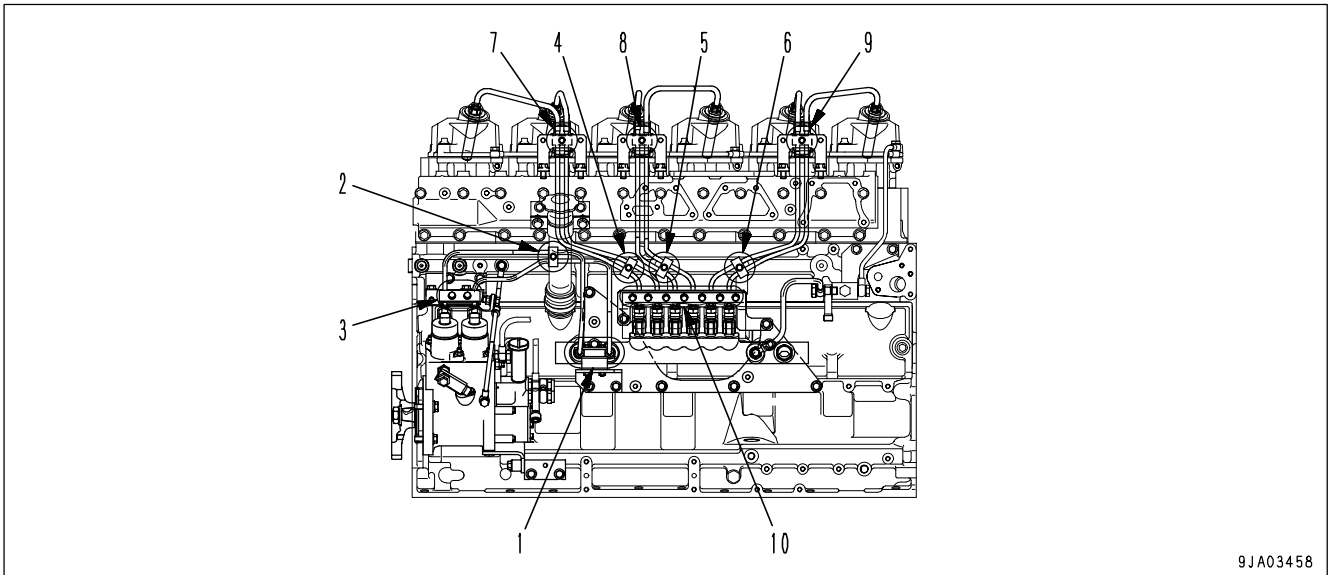
**CHECK INJECTOR**

See Section "B REGULATION AREA (PAGE 4-16)".

**REPLACE INJECTOR ASSEMBLY**

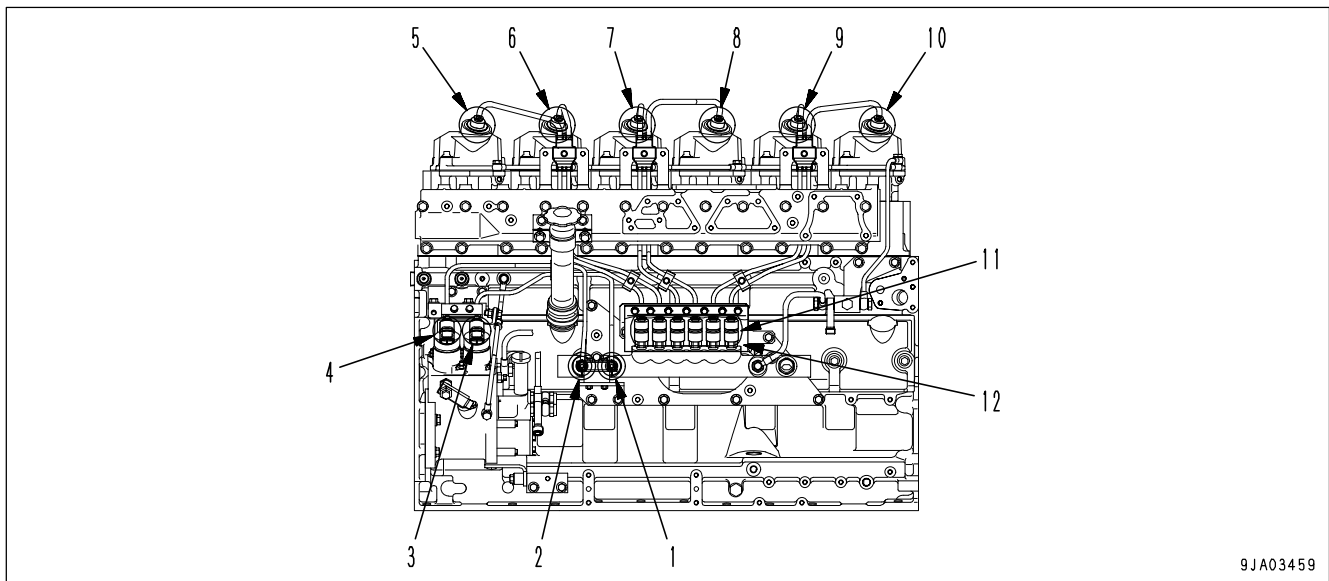
See Section "A REGULATION AREA (PAGE 4-16)".

**CHECKING FOR LOOSENESS OF HIGH-PRESSURE CLAMP, HARDENING OF RUBBER**



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Check visually and touch with your fingers to check that there are no loose bolts or hardening of rubber parts at clamps (1) to (10). If there is any looseness or hardened rubber, contact your Komatsu distributor for replacement.

**CHECKING FOR MISSING FUEL SPRAY PREVENTION CAP, HARDENING OF RUBBER**

Check for any missing fuel spray prevention caps (1) to (11) or fuel spray prevention cover (12), and check also for any hardened rubber portions. If there are any missing caps or cover or the rubber is hardened, please contact your Komatsu distributor for repairs.

**EVERY 8000 HOURS SERVICE**

Maintenance for every 50, 250, 500, 1000, 2000 and 4000 hours service should be carried out at the same time.

**REPLACE INJECTOR NOZZLE TIP**

See Section "B REGULATION AREA (PAGE 4-16)".

**REPLACE HIGH-PRESSURE PIPING CLAMP**

Ask your Komatsu distributor to carry out this work.

**REPLACE FUEL SPRAY PREVENTION CAP**

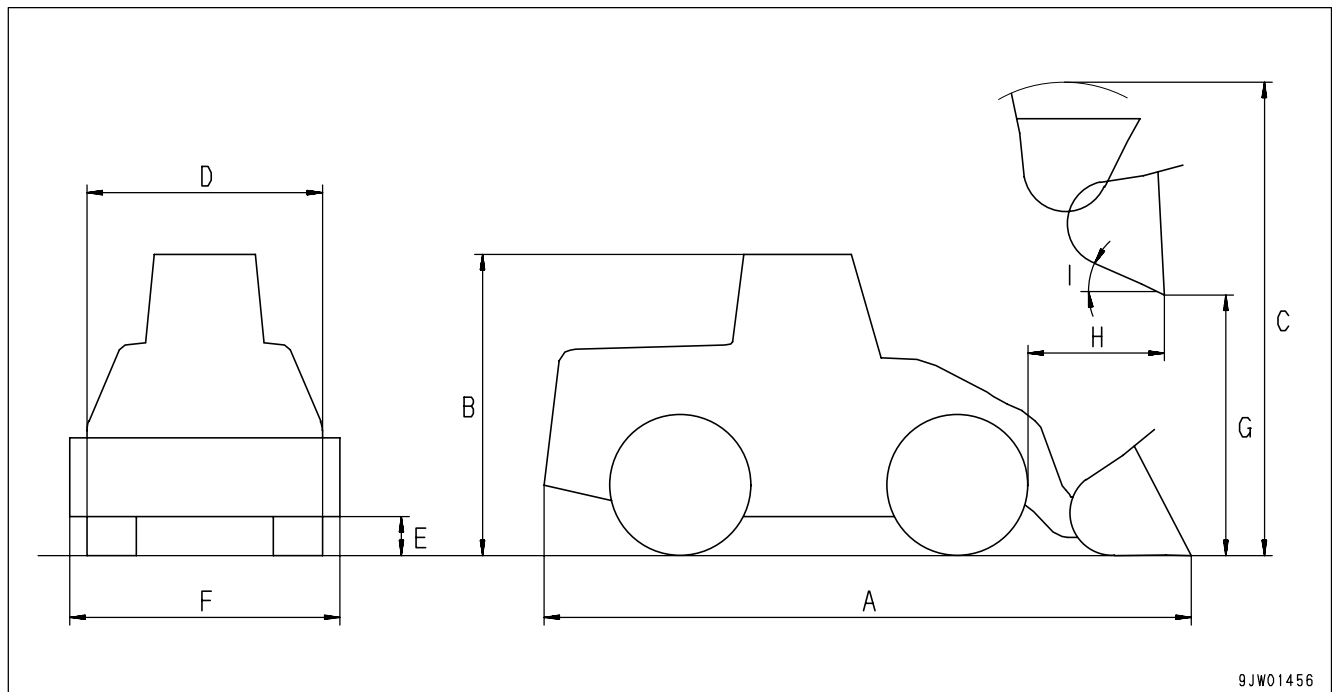
Ask your Komatsu distributor to carry out this work.



# **SPECIFICATIONS**

# SPECIFICATIONS

Item		Unit	WA470-5 standard specification machine (when using POWER mode)	
Operating weight (including 1 operator: 80 kg (176 lb.)(With bolt on cutting edge) j		kg (lb)	21,600 (47628)	
Normal load		kg (lb)	6,720 (14817)	
Bucket capacity	Heaped	m <sup>3</sup> (cu.yd)	4.2 (5.5)	
Engine model		-	Komatsu SAA6D125E-3 diesel engine	
Flywheel horsepower		kW{HP}/rpm	195{261}/2,000	
A	Overall length	mm (ft in)	8,765 (28' 9")	
B	Overall height	mm (ft in)	3,460 (11' 4")	
C	Max. dimension when shaking bucket	mm (ft in)	5,895 (19' 4")	
D	Overall width	mm (ft in)	3,010 (9' 11")	
E	Min. ground clearance	mm (ft in)	525 (1' 9")	
F	Bucket width	mm (ft in)	3,170 (10' 5")	
G	Clearance	Cutting edge [BOC tip]	mm (ft in)	3,205 (10' 6") [3,120 (10' 3")]
H	Reach	Cutting edge [BOC tip]	mm (ft in)	1,190(3' 11") [1,235(4' 1")]
I	Dump angle	degrees	45	
Min. turning radius	Out of chassis	mm (ft in)	6,940 (22' 9")	
	Center of outside tire	mm (ft in)	5,900 (19' 4")	
Permissible towing load		kg(N)	16,250 (159,360)	
Travel speed	Forward	1st	km/h (MPH)	6.3 (3.9)
		2nd	km/h (MPH)	12.1 (7.5)
		3rd	km/h (MPH)	21.7 (13.5)
		4th	km/h (MPH)	34.9 (21.7)
	Reverse	1st	km/h (MPH)	6.7 (4.2)
		2nd	km/h (MPH)	12.8 (8.0)
		3rd	km/h (MPH)	23.0 (14.3)
		4th	km/h (MPH)	36.0 (22.4)



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# ATTACHMENTS, OPTIONS

 **WARNING**

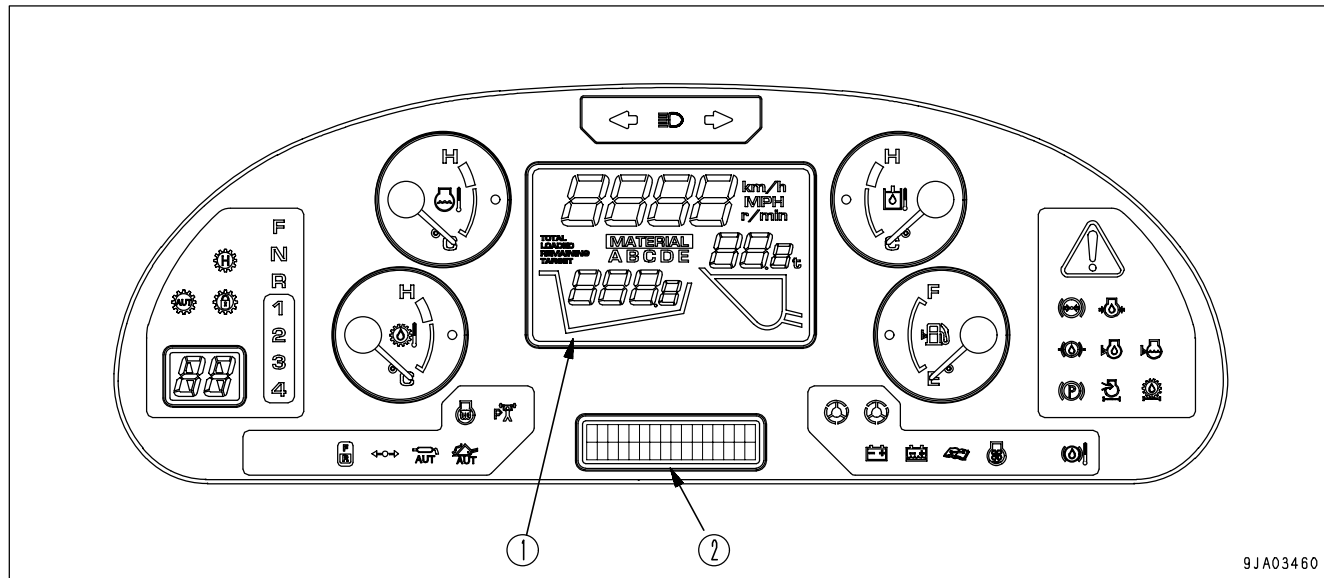
Please read and make sure that you understand the SAFETY section before reading this section.

---

# HANDLING LOAD METER

## GENERAL LOCATIONS

### MACHINE MONITOR WITH LOAD METER



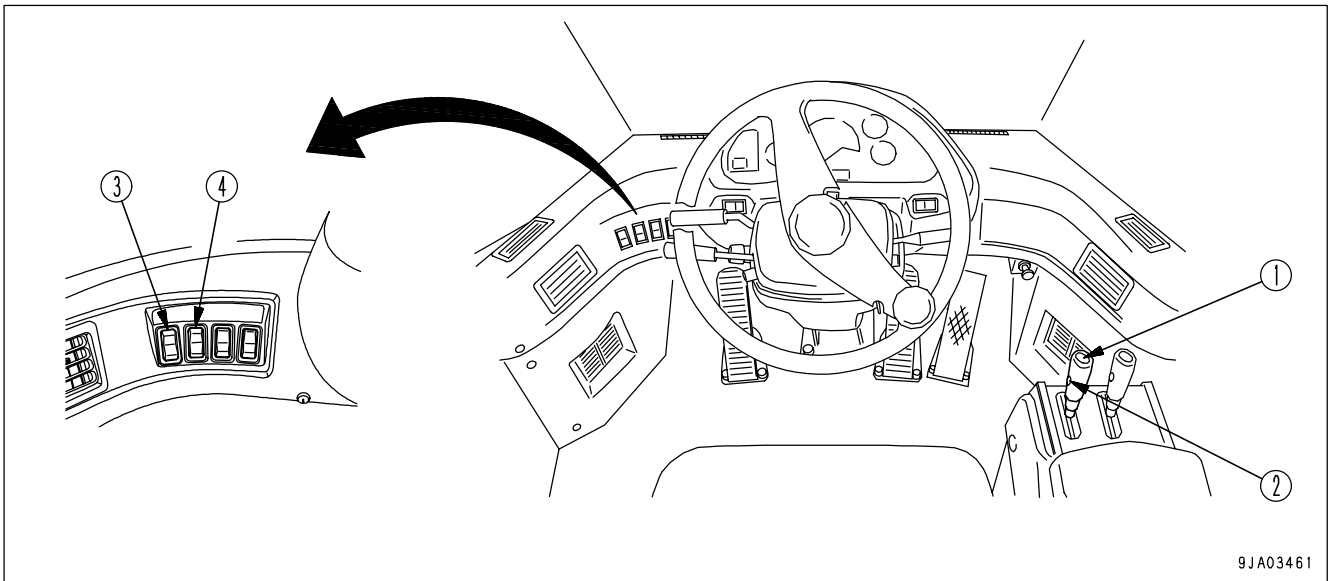
(1) Load meter display

(2) Character display

The only difference from the machine monitor described in EXPLANATION OF COMPONENTS in the OPERATION section is that the load meter panel is installed in place of the speedometer and meter display pilot lamp.

For details of items not given here, see "MACHINE MONITOR (PAGE 3-6)" in the OPERATION section.

**SWITCHES**



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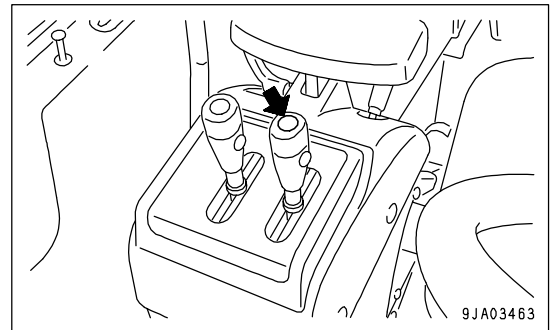
- (1) Load meter cancel switch
- (2) Load meter sub total switch
- (3) Monitor panel mode selector switch 1
- (4) Monitor panel mode selector switch 2

For details of switches (3) and (4), see "MONITOR PANEL MODE SELECTOR SWITCH 1 (PAGE 3-43)" and "MONITOR PANEL MODE SELECTOR SWITCH 2 (PAGE 3-43)".

**LOAD METER CANCEL SWITCH**

If it is not necessary to keep the measurement data, press switch (1) at the top of the bucket control lever.

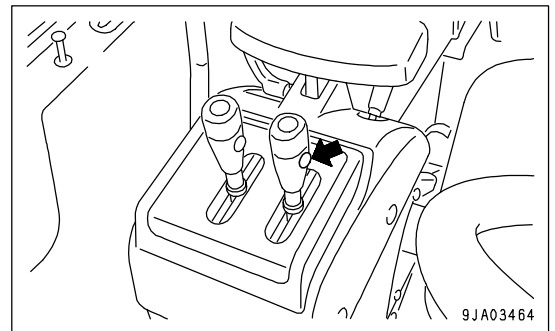
The data that has just been added is canceled and the display returns to the value before measurement.



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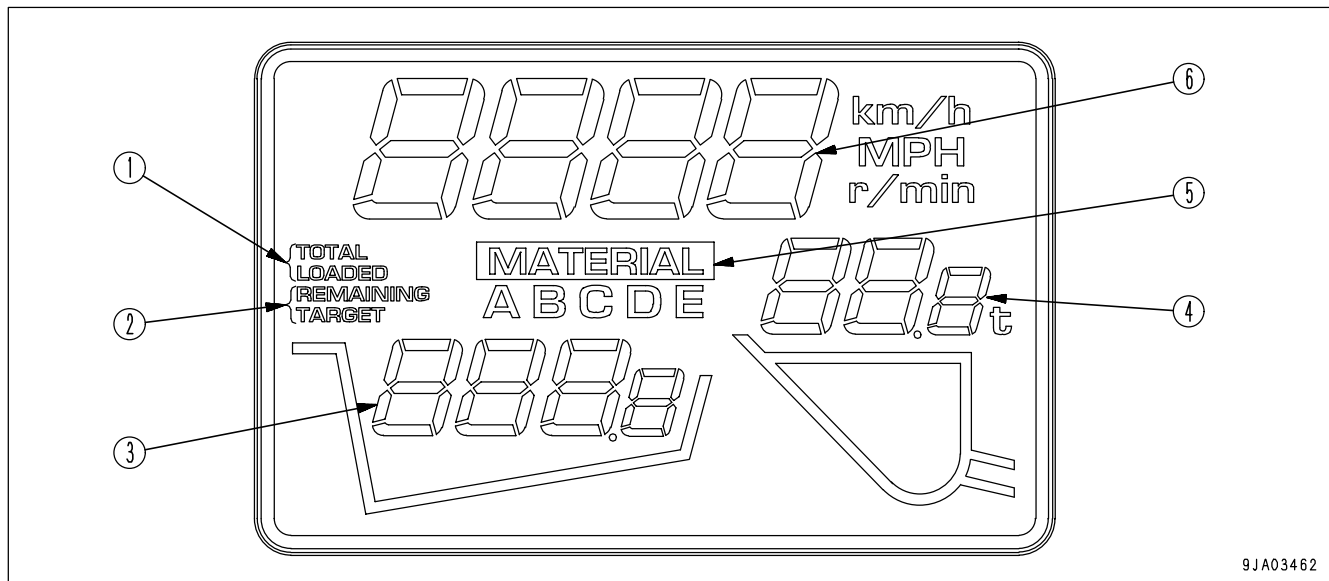
**LOAD METER SUB TOTAL SWITCH**

To return the aggregate load display (in addition mode) or the remaining load display (in subtraction mode) to 0, press switch (2) at the side of the bucket control lever.



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## LOAD METER FUNCTIONS



- |   |   |
|---|---|
| (1) Addition mode display   | (4) Bucket load display                   |
| (2) Remain mode display   | (5) Material type display                 |
| (3) TOTAL LOADED display (addition mode) or<br>REMAINING TARGET display (remain mode) | (6) Speed display or engine speed display |

Operation of the various functions of the load meter is carried out by using monitor panel mode selector switch 1 and monitor panel mode selector switch 2 together with the load meter cancel switch and load meter subtotal switch on the bucket control lever.

There are the following two types of measurement methods in the load meter mode.

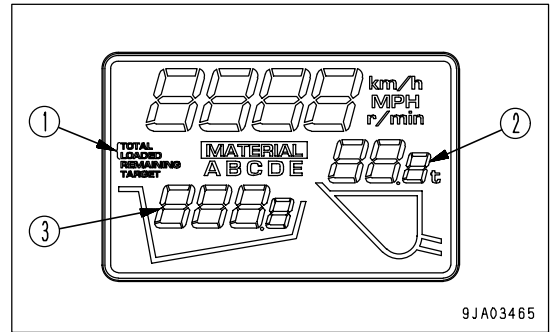
- Addition mode (measuring total amount loaded)  
This method is useful for measuring the production, such as the amount loaded into the dump truck, the amount loaded into the hopper, or the total work for half a day. The data can be displayed up to a maximum of 9999 tons for each type of work.
- Remain method (measuring amount remaining)  
Use this method for work requiring a determined amount (prevention of overloading, mixing of different types of material, etc.)

**REMARK**

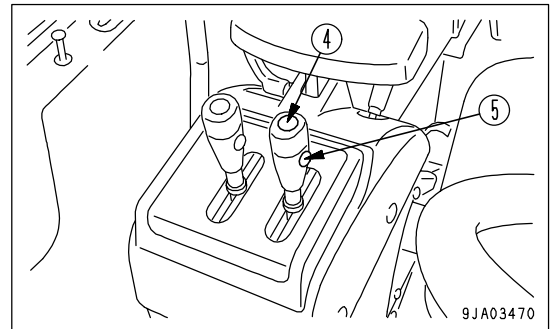
The total load display or remaining load display (3) can be displayed up to a maximum of 999.9 tons when displaying one place of decimal (units of 100 kg). If the value exceeds 1000 tons, the decimal point display goes out and the value is displayed in units of 1 ton.

**LOAD METER ADDITION MODE**

- For details of the method of switching to the addition mode, see "SETTING ADDITION MODE (PAGE 6-7)".
- "TOTAL LOADED" lights up on load meter display (1).
- The bucket load is displayed on load meter display (2), and the total load is displayed on display (3).



- If the measured data is not needed, press load meter cancel switch (4).  
The data for the last calculation is canceled and display (3) returns to the display for the previous measurement.
- To return total load display (3) to 0, press load meter sub total switch (5).

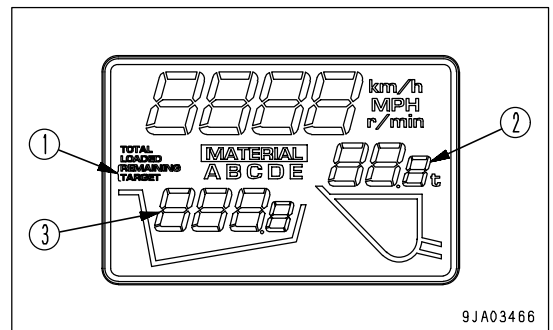


**REMARK**

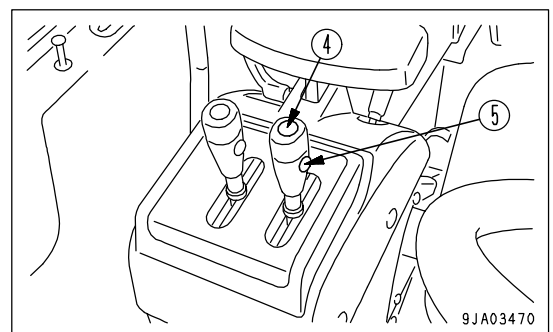
All operations using the load meter can be carried out simply by using the addition mode.  
If the target value is set and it is desired to display the remaining load, use the subtraction mode.

**LOAD METER REMAIN MODE**

- For details of the method of switching to the remain mode, see "SETTING REMAIN MODE (PAGE 6-9)".
- "REMAINING TARGET" lights up on load meter display (1).
- The bucket load is displayed on load meter display (2), and the amount remaining to the target is displayed on display (3).

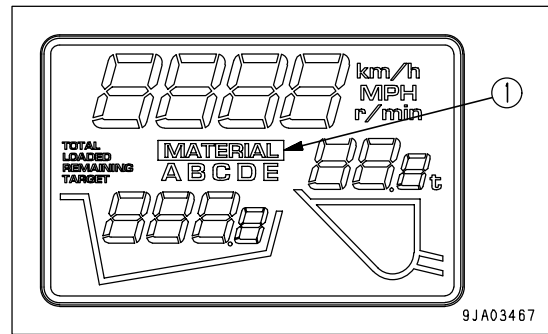


- If the measured data is not needed, press load meter cancel switch (4).  
The data for the last calculation is canceled and display (3) returns to the display for the previous measurement.
- To return total load display (3) to 0, press load meter sub total switch (5).



**SELECTION OF DISPLAY FOR TYPE OF LOAD**

- For details of the method of selecting the type of load, see "SETTING ADDITION MODE (PAGE 6-7)" and "SETTING REMAIN MODE (PAGE 6-9)".
- It is possible to make categories for a maximum of five types of material for TOTAL LOADED or REMAINING TARGET. If the settings for types A to E are changed for each type of material when operations are carried out, it is possible to store in memory the data for TOTAL LOADED or REMAINING TARGET for each type of material.
- One of the selected types of material A to E is displayed on load meter display (1).



### METHOD OF CALIBRATION (ADJUSTING 0 POINT)

- For details of the method of carrying out calibration, see "CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN EMPTY (PAGE 6-15)".

### DELETING LOAD METER DISPLAY

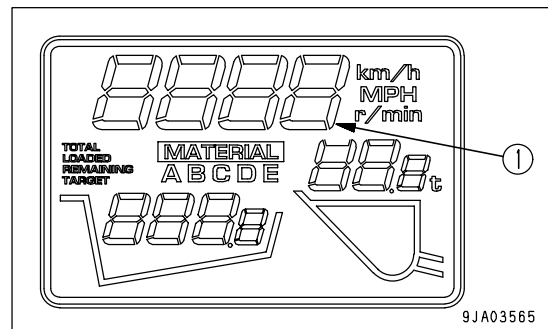
- It is possible to set so that there is no load meter display. If there is no display, only the speed is displayed.
- To switch the load meter between display and no display, see "STOPPING CALCULATION (PAGE 6-14)".

### SPEED DISPLAY

- The travel speed of the machine is displayed on load meter display (1).

It is also possible to switch this display (1) so that it displays the engine speed.

If you wish to switch the speed display to the engine speed display, please ask your Komatsu distributor to carry out the operation.



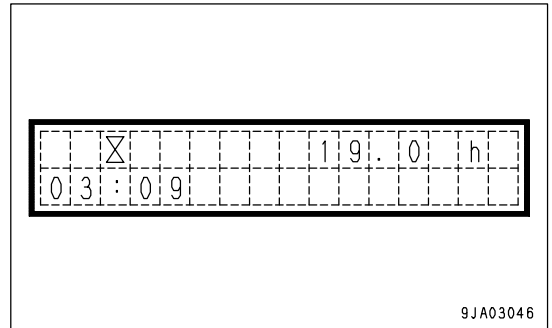


## HANDLING LOAD METER DISPLAY

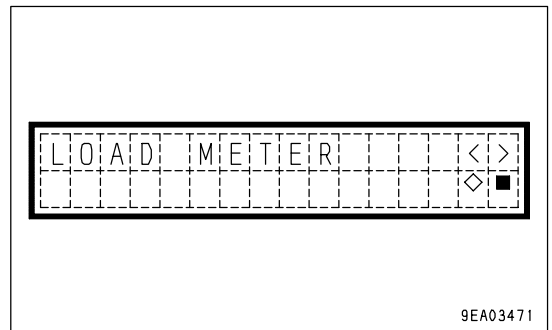
### SETTING ADDITION MODE

When carrying out loading in the addition mode, see Section "ADDITION FUNCTION (PAGE 6-18)" after setting the addition mode.

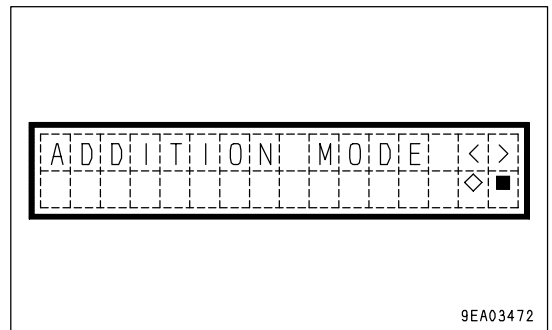
1. Check that the normal service meter and time are displayed on the character display.



2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".

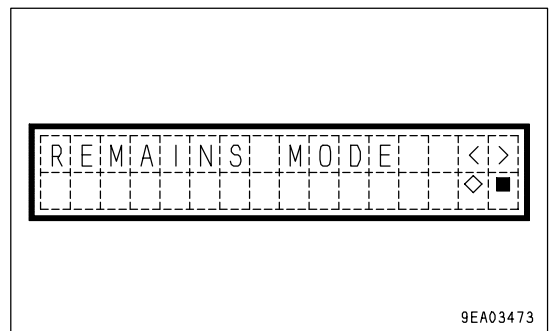


3. Press the (◇) of monitor panel selector switch 1 and display "ADDITION MODE".

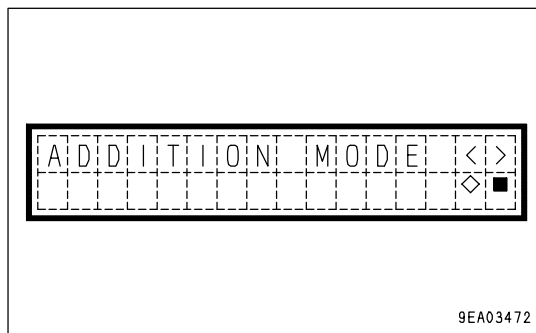


#### REMARK

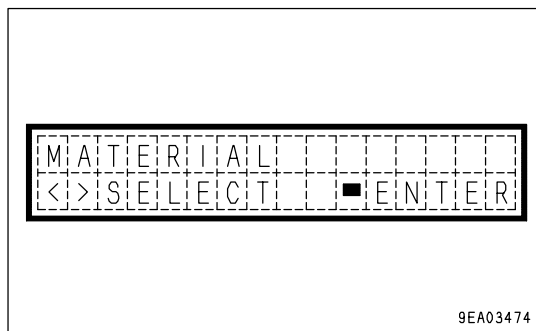
If the previous setting was the addition mode, "ADDITION MODE" is displayed; if the previous setting was the remain mode, "REMAINS MODE" is displayed.



- If the display is "REMAINS MODE", press the (>) or (<) of monitor panel mode selector switch 2 to display "ADDITION MODE".



- Press the (<>) of monitor panel selector switch 1 and display "MATERIAL < > SELECT".



- Check the display for the selected material on load meter display (1).

The present selection display is A.

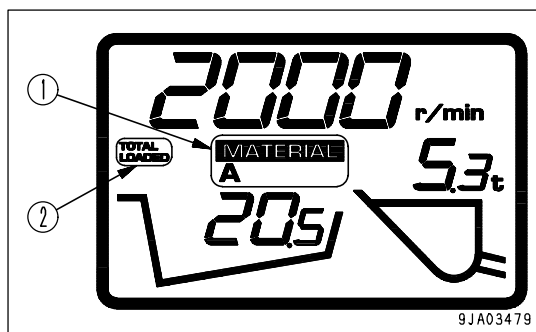
In the case of the addition mode, "TOTAL LOADED" is displayed on display (2).

- If A is to remain selected, press the (■) of monitor panel mode selector switch 1. A is then selected.

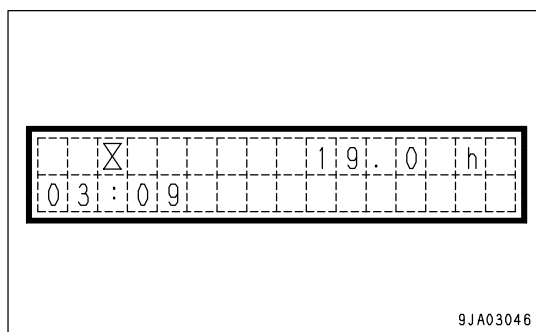
If A is to be changed to B to E, press the (>) or (<) of monitor panel mode selector switch 2 to select the type of material, then press the (■) of monitor panel mode selector switch 1.

- This completes the setting of the addition mode.

The character display returns to the normal service meter and time display.



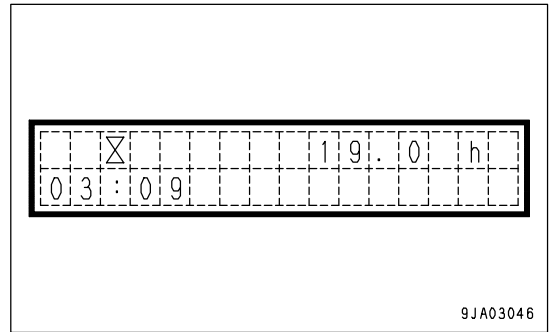
Once the setting has been made, even if the starting switch is turned OFF and operations are stopped, the setting is retained. When operations are started again, there is no need to carry out the setting again. All further loads will be added to the total load recorded before operations were stopped.



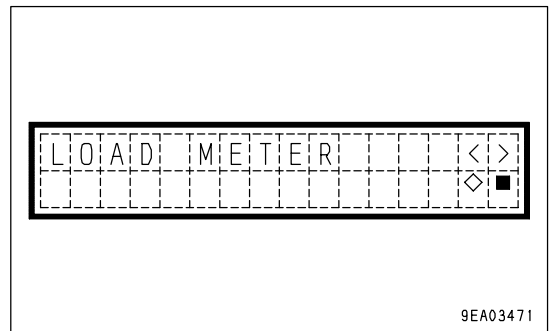
**SETTING REMAIN MODE**

When carrying out operations in the remain mode, set to the remain mode. For details of the remain mode functions, see "SUBTRACTION FUNCTION (PAGE 6-20)".

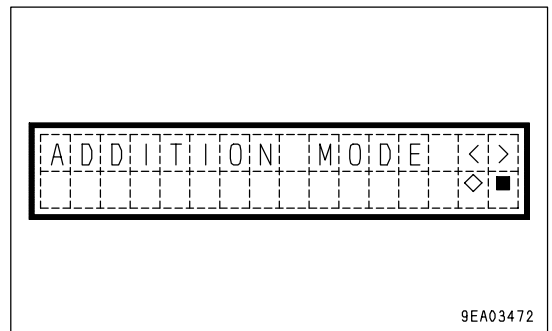
1. Check that the normal service meter and time are displayed on the character display.



2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".

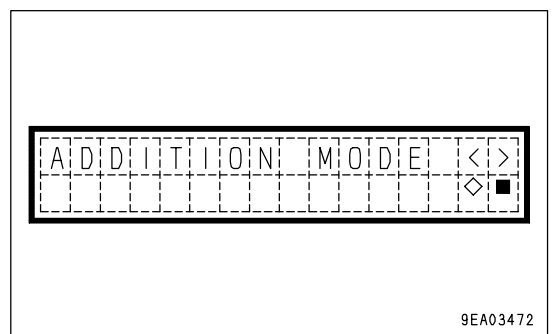


3. Press the (◇) of monitor panel selector switch 1 and display "ADDITION MODE".

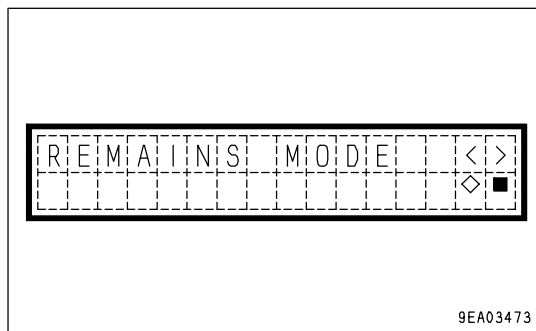


**REMARK**

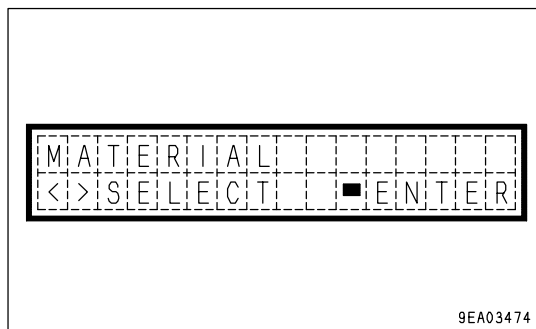
If the previous setting was the addition mode, "ADDITION MODE" is displayed; if the previous setting was the remain mode, "REMAINS MODE" is displayed.



4. If the display is "ADDITION MODE", press the (>) or (<) of monitor panel mode selector switch 2 to display "REMAIN MODE".



5. Press the (<>) of monitor panel selector switch 1 and display "MATERIAL < > SELECT".



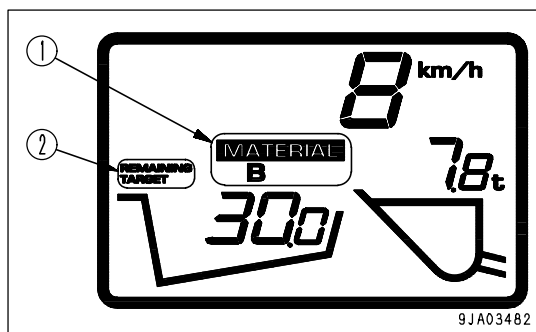
6. Check the display for the selected material on load meter display (1).

The present selection display is B.

In the remain mode, "REMAINING TARGET" is displayed on display (2).

7. If B is to remain selected, press the (■) of monitor panel mode selector switch 1. B is then selected.

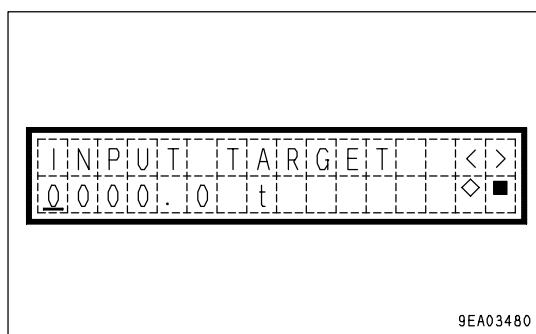
If B is to be changed to A, C, D or E, press the (>) or (<) of monitor panel mode selector switch 2 to select the type of material, then press the (■) of monitor panel mode selector switch 1.



8. Press the (<>) of monitor panel selector switch 1 and display "INPUT TARGET".

9. Input the target load.

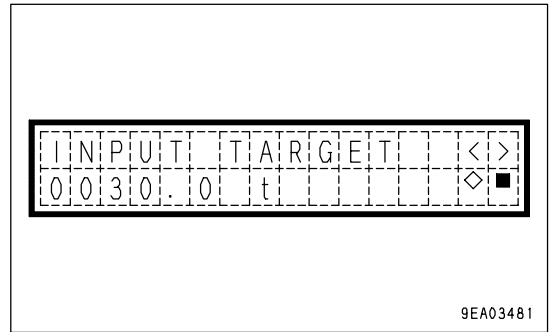
Before the target is input, "0000.0 t" is displayed on the target line and the cursor is at the 1000 ton position.



The following explanation explains the procedure when inputting 30 tons as the target.

10. "0" is marked by the cursor at the 1000 ton position, so leave it at "0" and press the (<>) of monitor panel selector switch 1.  
 "0" is selected and the cursor moves to the 100 ton position.
11. "0" is marked by the cursor at the 100 ton position, so leave it at "0" and press the (<>) of monitor panel selector switch 1.  
 "0" is selected and the cursor moves to the 10 ton position.

12. The "0" at the 10 ton position must be changed to "3", so press the (>) or (<) of monitor panel mode selector switch 2 to change to "3", then press the (◇) of monitor panel selector switch 1. "3" is selected and the cursor moves to the 1 ton position.
13. "0" is already displayed at both the 1 ton and 0.1 ton positions, so press the (◇) of monitor panel selector switch 1 twice. "0.0" is selected and 30 tons is set as the target load.

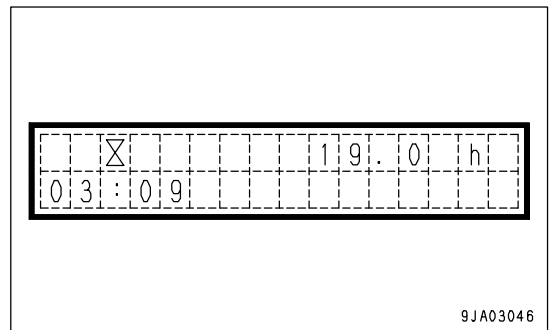


**REMARK**

If 0 tons is input as the target load, it is not accepted. The buzzer gives a long sound and the mode changes to give the addition mode display.

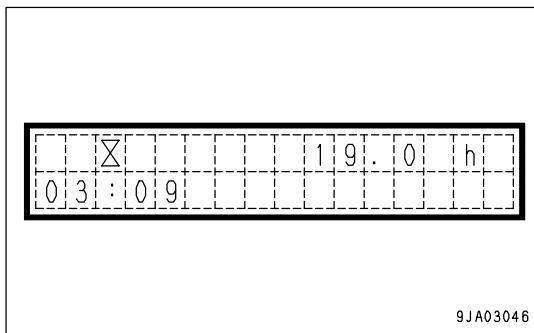
14. This completes the setting of the remain mode. The character display returns to the normal service meter and time display.

Once the setting has been made, even if the starting switch is turned OFF and operations are stopped, the setting is retained. When operations are started again, there is no need to carry out the setting again. All further loads will be subtracted from the total load recorded before operations were stopped.

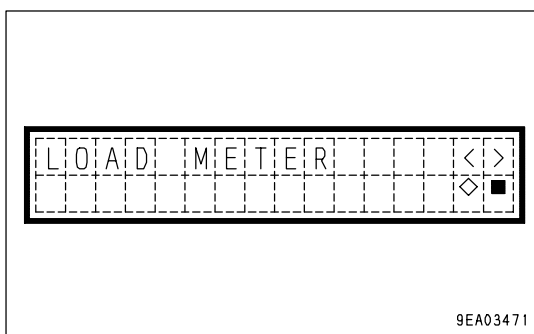


**TOTAL LOAD DATA DISPLAY**

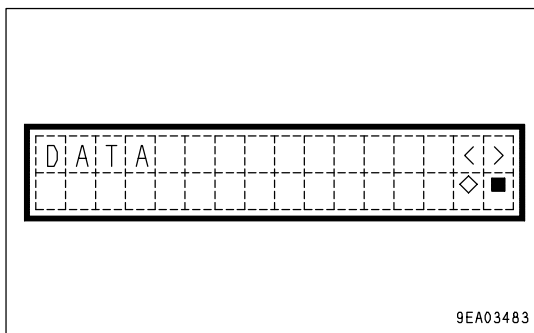
1. Check that the normal service meter and time are displayed on the character display.



2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



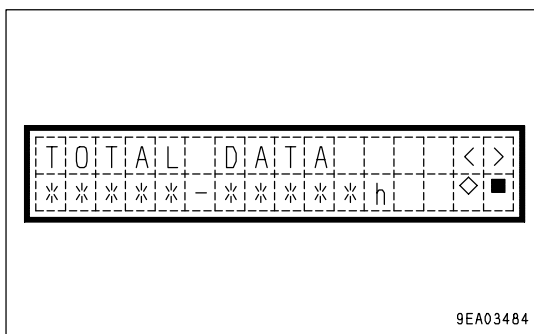
3. Press the (◇) of monitor panel selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 to display "DATA".



4. Press the (◇) of monitor panel selector switch 1 to display "TOTAL DATA".

The time when the load on the bottom line was calculated is displayed as the hour meter standard.

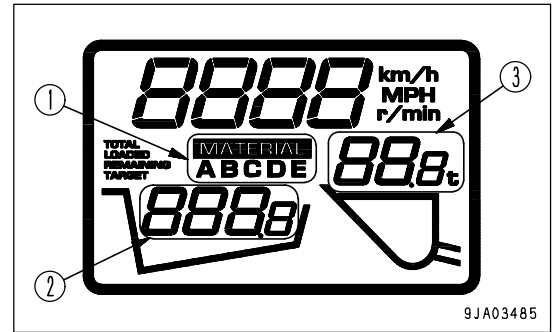
5. Press the (>) or (<) of monitor panel mode selector switch 2 to select the data for each of A to E or the all lighted-up display.



The total load data for each of A to E and for all data is displayed on the load meter display.

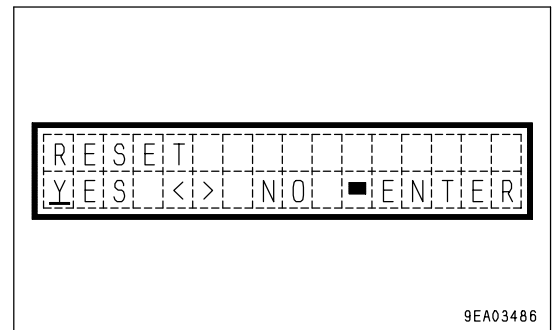
Check the material selection display on load meter display (1). In the example on the right, all of A to E for all data selected light up. On display (2) the total load data for all data or individual total load data for A to E is displayed.

On display (3) the individual number of loads for A to E is displayed.

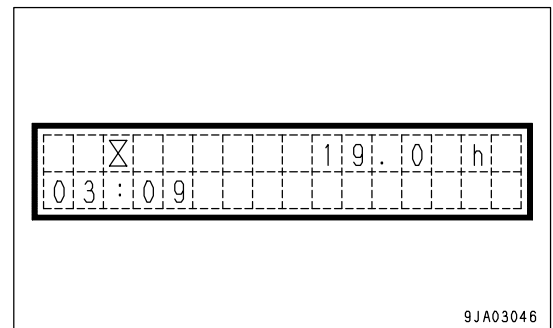


The total value can be cleared as follows.

- 1) Press the (>) or (<) of monitor panel mode selector switch 2, and select the individual items to be cleared from A to E or select the all lighted-up display.
- 2) Press the (<>) of monitor panel selector switch 1 to display "RESET".
- 3) "YES < > NO" is displayed, and the cursor is at the NO position, so press the(<) of monitor panel mode selector switch 2 to move the cursor to the "Y" of YES.

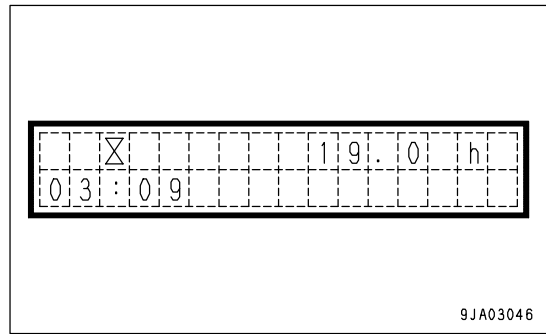


- 4) Press the (■) of monitor panel mode selector switch 1. The selected individual item from A to E or all the data is cleared. If the monitor accepts the clear command, the buzzer gives short sounds and the display returns to the normal service meter and time display.

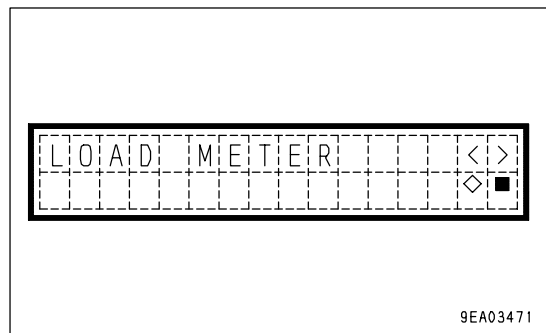


**STOPPING CALCULATION**

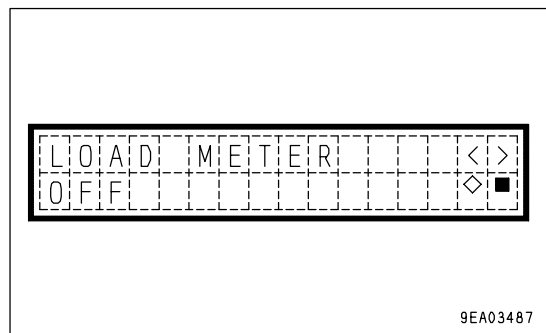
1. Check that the normal service meter and time are displayed on the character display.



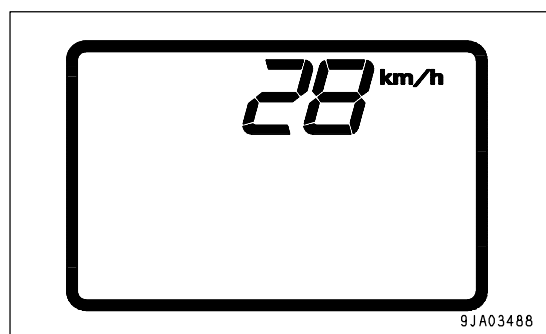
2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



3. Press the (◇) of monitor panel selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 and select "OFF" on the bottom line.



4. Press the (◇) of monitor panel selector switch 1. The load meter display goes out and the screen switches to the speed display. In addition, the character display returns to the normal service meter and time display.
5. When starting the calculation again, set to the addition mode or remain mode. For details, see "SETTING ADDITION MODE (PAGE 6-7)" or "SETTING REMAIN MODE (PAGE 6-9)".





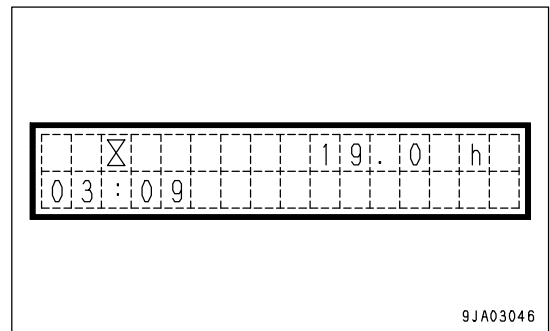
### CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN EMPTY

**REMARK**

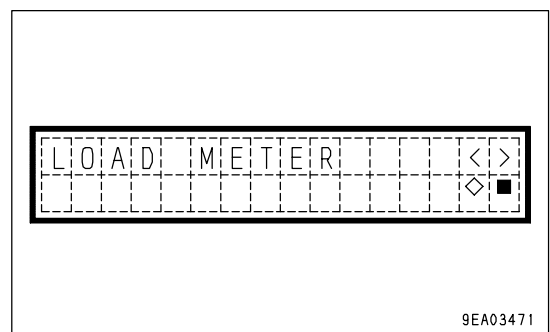
When carrying out calibration with the machine unloaded, the accuracy is improved by doing as follows.

- Hydraulic oil temperature: Carry out the calibration with the hydraulic oil temperature in the normal operating range (approx. 60 to 85°C (140 to 185°F), near the center of the white range on the hydraulic oil temperature gauge).  
(Compensate for the error caused by the temperature of the pressure sensor. This makes it possible to carry out calibration that matches the machine.)
- Engine speed: When carrying out calibration, keep the engine speed constant at the speed used for normal operations (near the rated speed).  
(The effect of compensation for the engine speed shows the maximum effect. When carrying out the actual measurement, even if the engine speed varies, accurate measurement can be made.)
- Bucket posture: Carry out calibration with the bucket at full tilt.  
Carry out the measurement for the weight also at the full tilt. If the bucket is not at full tilt, the position of the center of gravity of the load changes and the load cannot be measured accurately.
- Work equipment speed: When carrying out calibration, operate the work equipment slowly. (Take approx. 10 seconds to raise from the travel posture to the maximum height of the lift arm.)  
(This is done in order to increase the measurement data when carrying out calibration.)

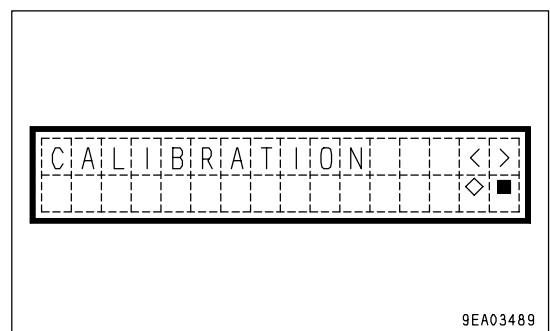
1. Check that the normal service meter and time are displayed on the character display.



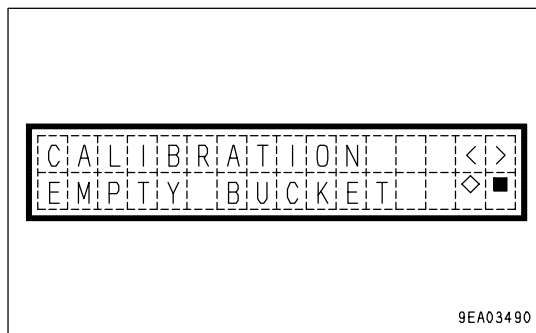
2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



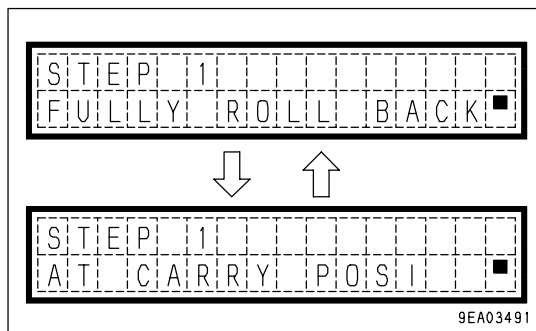
3. Press the (◇) of monitor panel selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 and select "CALIBRATION".



- Press the (◇) of monitor panel selector switch 1. "EMPTY BUCKET" is displayed on the bottom line.

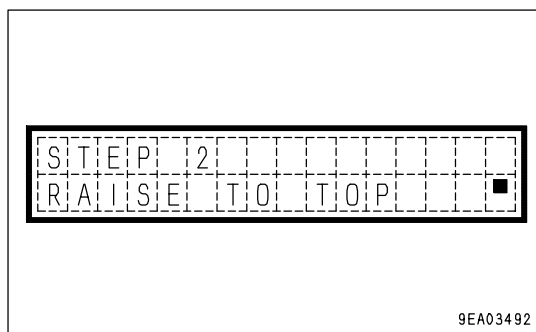


- Press the (◇) of monitor panel selector switch 1. The display changes to "STEP 1" on the top line, and "FULLY ROLL BACK" and "AT CARRY POSI" are displayed in turn for 3 seconds each on the bottom line.



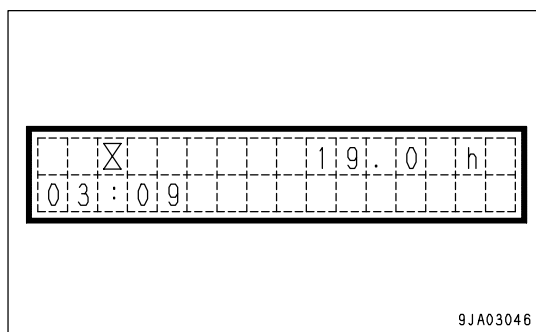
- Follow the instructions on the screen, tilt the empty bucket back fully, then lower the lift arm to set to the travel posture.

- When the lift arm is lowered, the display changes to "STEP 2" and "RAISE TO TOP". This completes preparation for setting the calibration when empty.



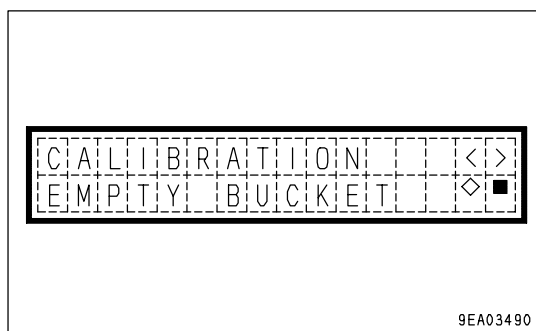
- Follow the instructions on the screen and raise the lift arm fully. When raising the lift arm, carry out the operation as close to actual operation as possible.

- When the setting of the empty calibration is completed correctly, the buzzer gives short sounds, and the character display returns to the normal service meter and time display.



- If the setting of the empty calibration is not completed correctly, the buzzer gives a long sound, and the display returns to "CALIBRATION" on the top line and "EMPTY BUCKET" on the bottom line.

- Repeat the procedure again from Step 5.



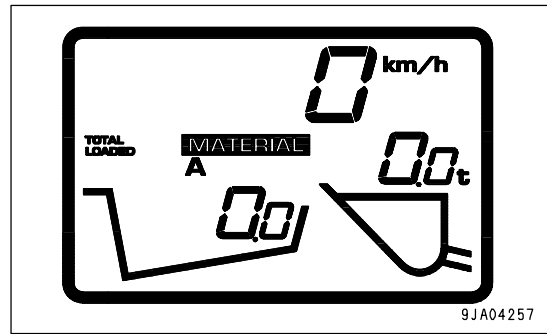
**CARRYING OUT CALIBRATION WHEN LOADED**

Normally there is no need to carry out calibration with load. But in the following cases, installation of a bucket except standard and replacement of main monitor, the pressure sensor of load meter or replacement of boom angle sensor, accurate value can not be showed. In this case there is need to carry out calibration with load.

Please contact KOMATSU distributor to carry out the calibration.

## ADDITION FUNCTION

After setting the addition mode, if the material being handled is "A" as shown in the diagram on the right, the procedure is as follows.



### 1. Measure the 1st load

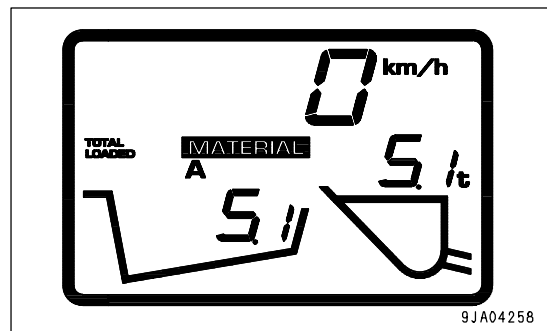
The result of weighing the bucket load is 5.1 ton.

The bucket load display shows 5.1 ton

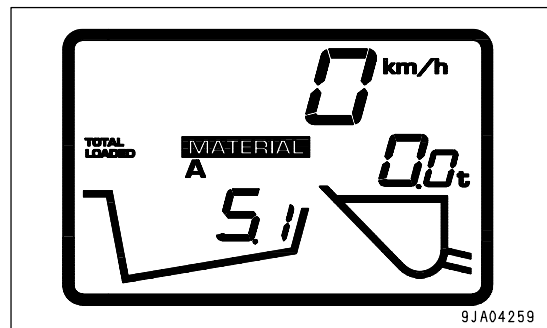
The total load display shows 5.1 ton

#### Precautions when weighing load

- The suitable precision for the weight of the bucket load can be obtained if the engine speed is slightly above low idling.
- Set the bucket to the full tilt position.
- When starting the measurement, set the height of the lift arm within a range from the travel posture to  $-10^\circ$  from the horizontal position of the lift arm.



### 2. When 15 seconds have passed from the time of measurement, the bucket load is canceled and the display returns to 0.0.



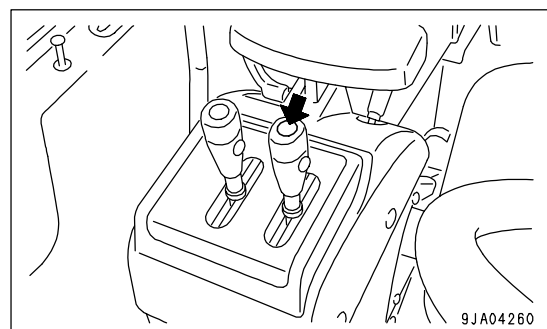
## REMARK

In the condition in Step 1 or Step 2, if the lift arm is lowered to near the travel posture, then raised again to measure the bucket load again, the load meter will recognize that work was carried out for the second loading operation.

The bucket load display will show 5.1 ton

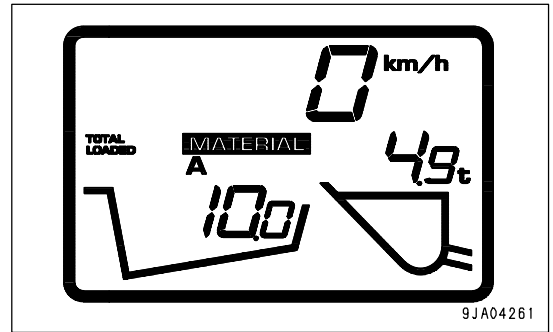
The total load display will show 10.2 ton (= 5.1 + 5.1)

In this condition, press the load meter cancel switch to return to Step 2.

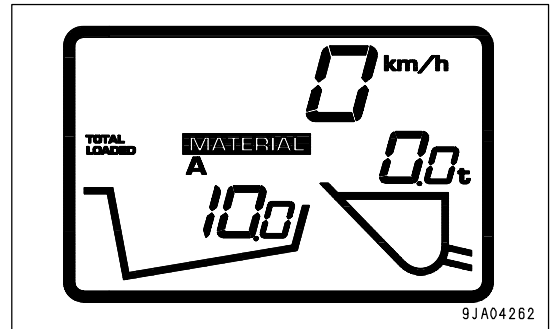


3. Measure the 2nd load

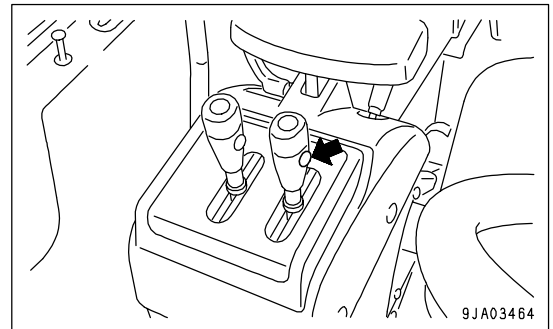
The result of weighing the 2nd bucket load is 4.9 ton.  
 The bucket load display shows 4.9 ton  
 The total load display shows 10.0 ton (= 5.1 + 4.9 ton)



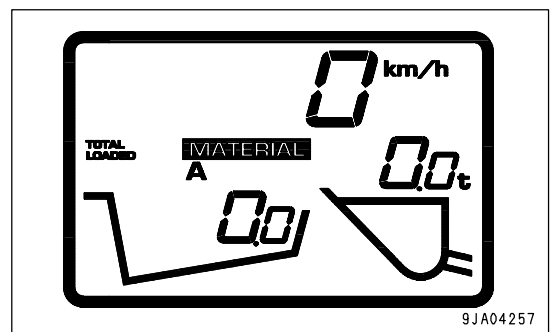
4. When 15 seconds have passed from the time of measurement, the bucket load is canceled and the display returns to 0.0.



- 5. Repeat Steps 3 and 4 to weigh the 3rd and following loads.
- 6. To start the next loading operation, press the load meter subtotal switch to complete the 1st loading operation.

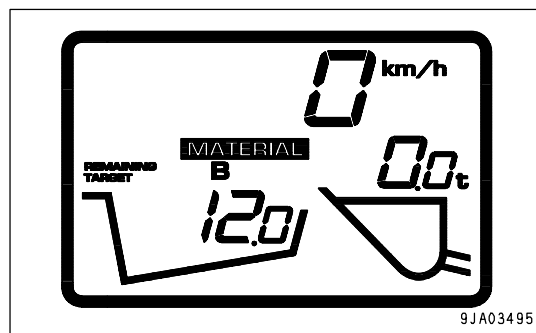


7. The screen will return to the initial display.



## SUBTRACTION FUNCTION

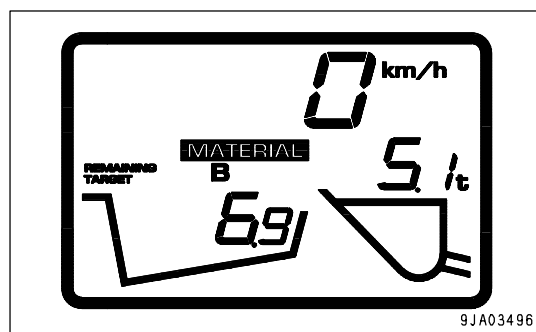
The following explanation assumes that after setting the remain mode, the target load is 12 tons as shown in the diagram on the right and that B is selected as the type of material.



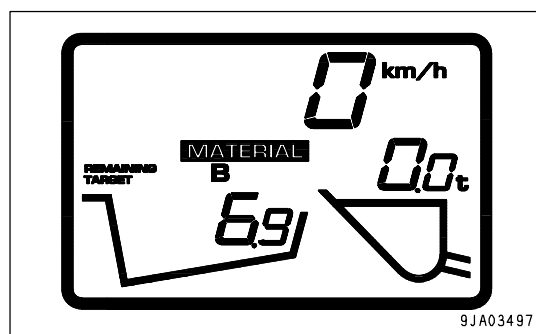
1. This is the first load.

The result of measuring the load in the bucket is 5.1 tons.

$12.0 - 5.1 = 6.9$ , so the next target load is displayed as 6.9 tons.



2. When 15 seconds pass after measuring, the bucket load is deleted and the load is displayed as 0.0 tons.



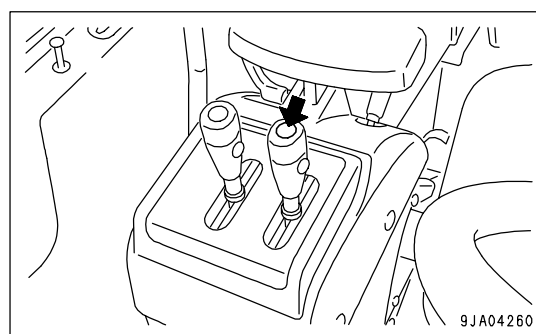
## REMARK

In the condition in Step 1 or Step 2, if the lift arm is lowered to near the travel posture, then raised again to measure the bucket load again, the load meter will think that work was carried out for the second loading operation.

The bucket load display will show 5.1 ton

The remaining load display will show 1.8ton (=  $6.9 - 5.1$ )

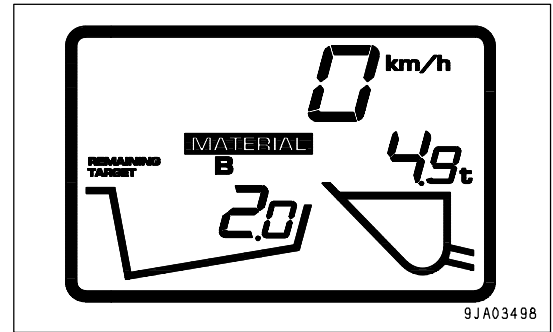
In this condition, press the load meter cancel switch to return to Step 2.



3. This is the second load.

The load in the bucket is 4.9 tons.

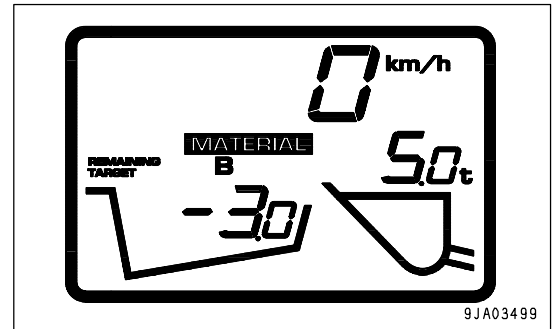
$6.9 - 4.9 = 2.0$  tons, so the next target load is displayed as 2.0 tons.



4. This is the third load.

The result of measuring the load in the bucket is 5.0 tons.

This is 3.0 tons over the target amount, so -3.0 tons is displayed.



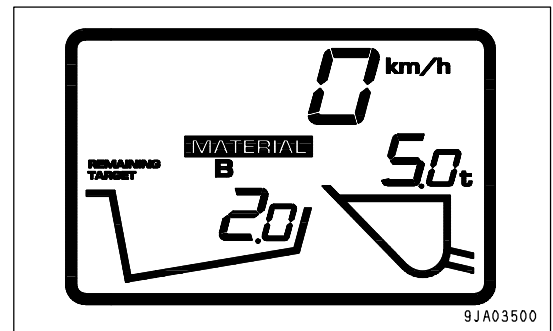
5. The target load is displayed as -3.0 tons, and after 3 seconds, the display changes to the display shown on the right.

The target value of 2.0 tons is the target load after completing the loading of the second bucket.

6. Load the target of 2.0 tons from the 5.0 tons loaded in the bucket.

When this is done, "2.0" flashes for the target load.

7. After loading, lower the lift arm and then raise it again in order to weigh the amount remaining in the bucket. The amount remaining in the bucket is weighed and displayed.



The amount remaining in the bucket is 3.5 tons.

The target load is  $2.0 - (5.0 - 3.5) = 0.5$  tons

The next target load of 0.5 tons is displayed.

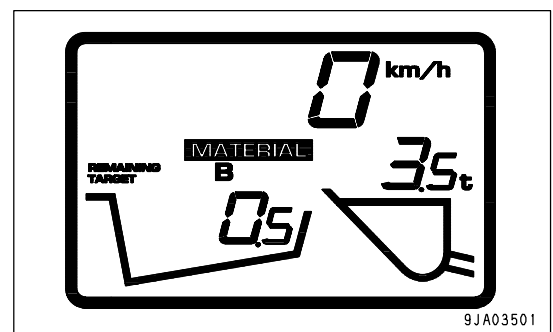
**REMARK**

If 2.2 tons is loaded when the target load is 2.0 tons, and the amount remaining in the bucket is displayed as 2.8 tons ( $5.0 - 2.2$ ), the target load has been exceeded, so the alarm buzzer sounds.

At the same time, "TARGET OVER" is displayed on the character display.

Push the load meter cancel switch to stop the alarm buzzer.

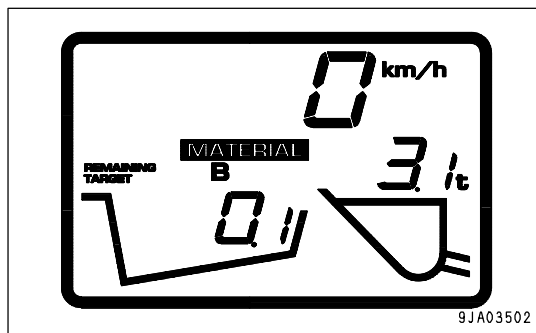
Note that the alarm buzzer does not stop when the starting switch is turned to the OFF position.



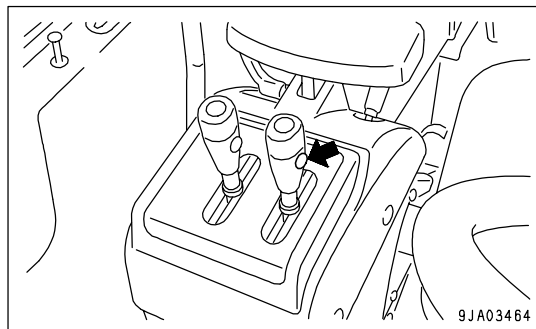
8. Load the target of 0.5 tons from the 3.5 tons loaded in the bucket.

9. After loading, lower the lift arm and then raise it again in order to weigh the amount remaining in the bucket. The amount remaining in the bucket is weighed and displayed.

10. The amount remaining in the bucket is 3.1 tons.  
 The target load is  $0.5 - (3.5 - 3.1) = 0.1$  tons

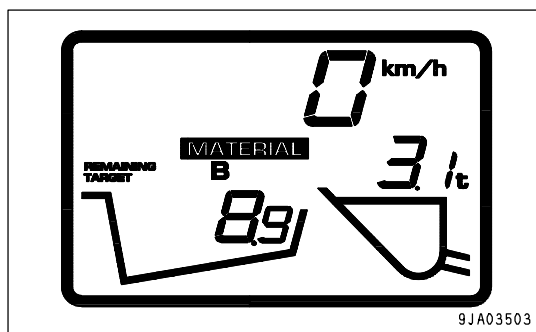


11. To start the next loading operation, press the load meter subtotal switch to complete the 1st loading operation.

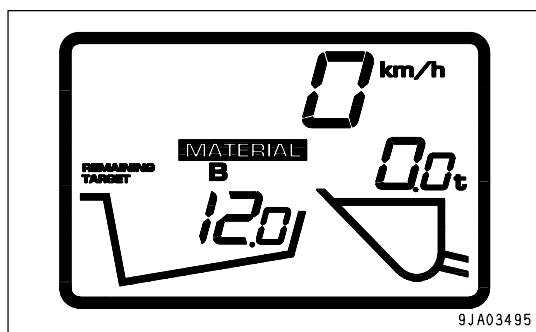


12. At this point, the amount remaining in the bucket (3.1 tons) is subtracted from the target load for the next loading operation, and the result (8.9 tons) is displayed as the target load.

The amount remaining in the bucket is 3.1 tons.  
 $12.0 - 3.1 = 8.9$  tons, so 8.9 tons is displayed as the next target load.



13. If the second loading operation is to be carried out without using the load remaining in the bucket, press the load meter cancel switch. The target load will return to the initial setting (12 tons).  
 The target load is displayed as 12.0 tons.

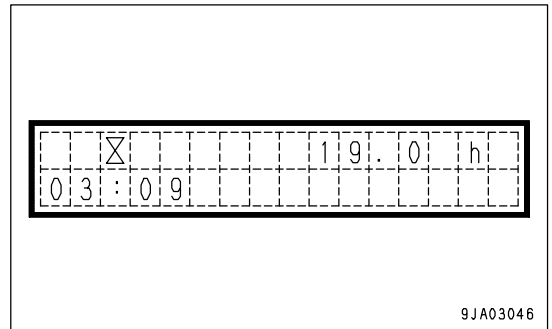




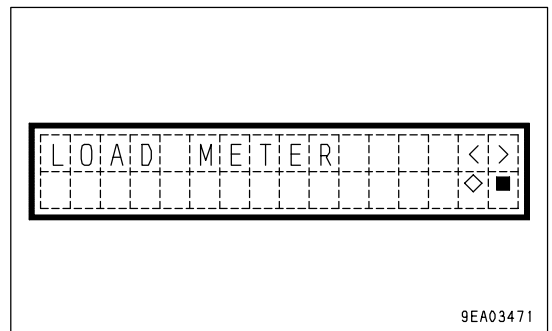
**METHOD OF SETTING TIME ON CLOCK**

(The time display is only available on machines equipped with the load meter)

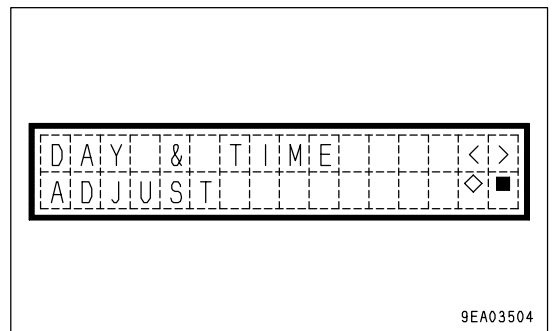
1. Check that the normal service meter and time are displayed on the character display.



2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



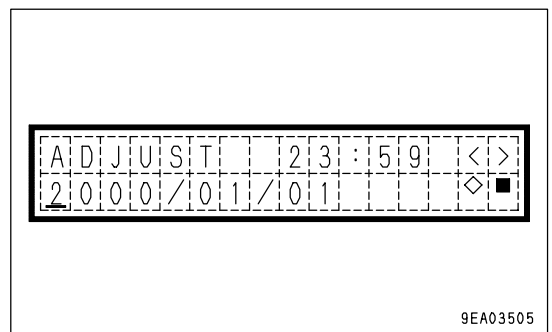
3. Press the (◇) of monitor panel mode selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 to select "DAY & TIME ADJUST".



4. Press the (◇) of monitor panel mode selector switch 1.
  - The top line displays "ADJUST 23: 59".
  - The bottom line displays "2000/01/01".

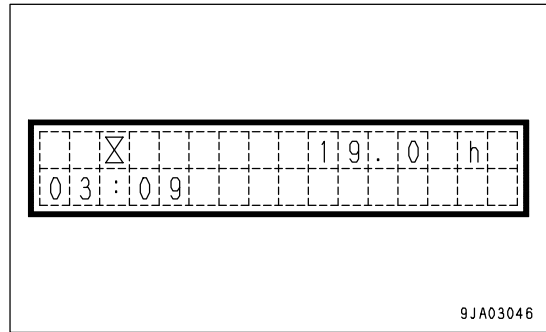
**REMARK**

Once the time is input, the clock will show the correct time from that time on.



5. Input the day and time.
  - The cursor is displayed at each input item in the following order: Year, Month, Day, Hour, Minute.
  - Use the (>) or (<) of monitor panel mode selector switch 2 to move the numbers up or down and input numbers between 0 and 9 at the cursor position.
6. After inputting the number, press the (◇) of monitor panel mode selector switch 1 to select and move the cursor to the next input position.
  - Repeat Steps 5 and 6 to input and select the numbers from the year to the minute.

7. When the (◇) of monitor panel mode selector switch 1 is pressed to select the last digit of the minutes, the character display will return to the normal service meter and time display.
8. To stop the input operation midway, or if the input is mistaken, press the (■) of monitor panel mode selector switch 1 to go back to the previous display.



**PRINTER OUTPUT**

**PRINTOUT MODE**

(This functions only when the optional printer is installed.)

Three types of output mode (A, B, C) can be selected for the load meter printout. For details, see "METHOD OF SELECTING PRINTOUT MODE (PAGE 6-26)".

A mode: Printout of totals

The number of loads and total amount loaded for each type of material are printed out.

B mode: Printout of subtotals

The total for each load, number of loads, and total amount loaded for each type of material are printed out.

C mode: Printout of operating record

In addition to the items printed out in A mode, the maintenance items and time remaining until maintenance are also printed out.

The printouts shown below are examples of the load meter printouts for the WA470.

Ex:

Output with mode A

WA470-5 #70001		
25/OCT/2001 17:30		
Material	Times	Total Load
A	1	2.62t
B	2	6.04t
C	3	7.11t
D	4	9.04t
E	5	14.82t
<b>Total</b>	<b>16</b>	<b>42.25t</b>

Output with mode B

WA470-5 #70001		
25/OCT/2001 17:30		
Material A		
1:	2.62t	
<b>Total:</b>	1 times	2.62t
Material B		
1:	2:	3.42t
<b>Total:</b>	2 times	6.04t
Material C		
1:	2:	2.25t
3:	1.43t	
<b>Total:</b>	3 times	7.11t
Material D		
1:	2:	2.27t
3:	4:	3.38t
<b>Total:</b>	4 times	9.04t
Material E		
1:	2:	2.94t
3:	4:	1.97t
5:	2.79t	
<b>Total:</b>	5 times	14.82t

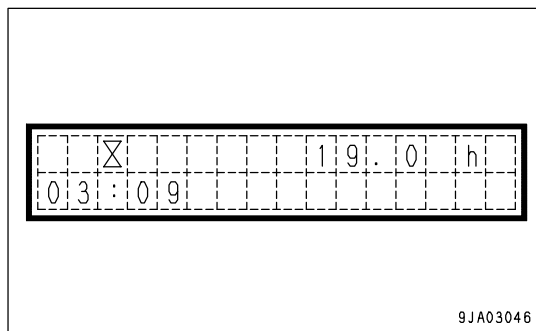
Output with mode C

WA470-5 #70001		
Start time		
25/OCT/2001	9:15	
Service meter	00043.0h	
End time		
25/OCT/2001	17:30	
Service meter	00051.2h	
Material	Times	Total Load
A	1	2.62t
B	2	6.04t
C	3	7.11t
D	4	9.04t
E	5	14.82t
<b>Total</b>	<b>16</b>	<b>42.25t</b>
Maintenance		
Engine oil	250h	
Transmission oil	1000h	
Hydraulic oil	2000h	
Axle oil	2000h	
Engine oil filter	250h	
Transmission oil filter	500h	
Hydraulic oil filter	1000h	
Axle pivot pin	50h	
Boom pin	100h	
Steering cylinder pin	250h	
Center hinge pin	1000h	

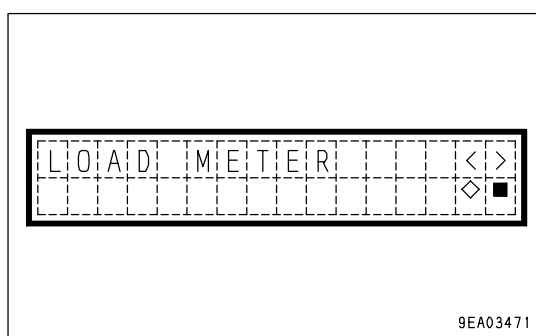
## METHOD OF SELECTING PRINTOUT MODE

(This functions only when the optional printer is installed.)

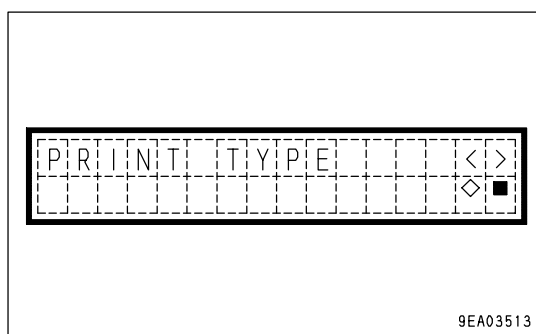
1. Check that the normal service meter and time are displayed on the character display.



2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



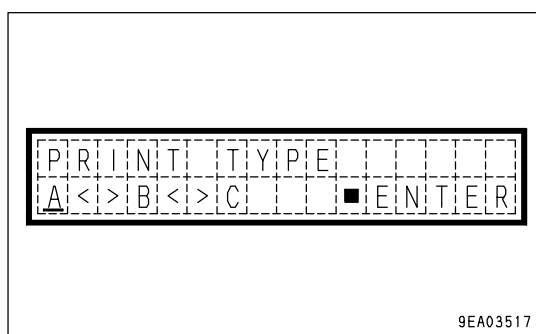
3. Press the (◇) of monitor panel mode selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 to select "PRINT TYPE".



4. Press the (◇) of monitor panel mode selector switch 1.  
The bottom line will change to display the printout mode "A < > B < > C".
5. Press the (>) or (<) of monitor panel mode selector switch 2 to set to the desired printout mode.

Three types of output mode (A, B, C) can be selected for the load meter printout.

For details, see "PRINTOUT MODE (PAGE 6-25)".

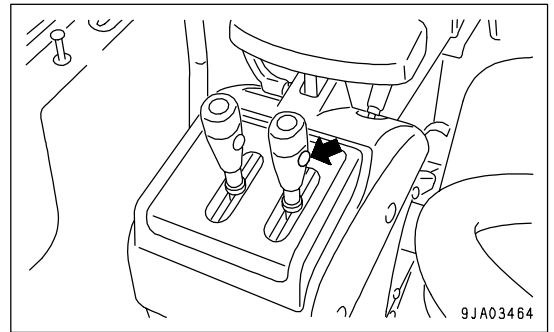


6. After setting the printout mode, press the (■) of monitor panel mode selector switch 1.  
If the monitor accepts it, the buzzer will give short sounds and the screen will return to the load meter display.

7. To print out in A or B mode, keep the load meter sub total switch pressed for at least 2 seconds and the data will be printed out.

When printing out in C mode, the data will be printed out immediately when C mode is selected in Step 5.

When the C mode printout is finished, the printout mode setting will return to A or B.



8. To stop the input operation midway, or if the input is mistaken, press the (■) of monitor panel mode selector switch 1 to go back to the previous display.

## HANDLING TORQUE CONVERTER LOCK-UP

### WARNING

When traveling down slopes of a grade of more than 6°, never depress the accelerator pedal fully, regardless of whether the torque converter lock-up switch is ON or OFF. It is extremely dangerous to drive too fast.

#### NOTICE

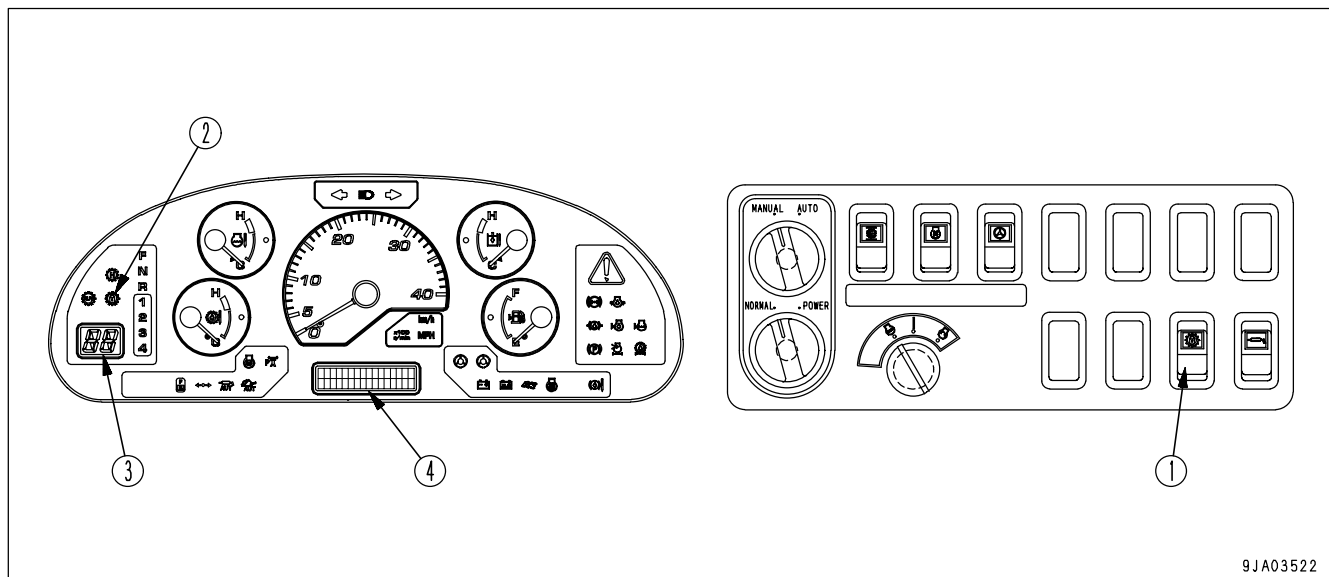
To prevent overrunning when traveling at high speed in the following cases, do not shift down gear.

- When traveling in F3 at a speed of more than 25 km/h (15.5 MPH), do not shift down to F2.
- When traveling in F4 at a speed of more than 36 km/h (22.4 MPH), do not shift down to F3.

When the actual speed range is 3rd or 4th in either FORWARD or REVERSE, the torque converter lock-up function is actuated according to the travel speed and sets to direct drive.

To prevent overrun, the lock-up is automatically canceled to prevent the travel speed from going above 40 km/h (24.9 MPH).

### GENERAL LOCATIONS



- |   |   |
|---|---|
| (1) Torque converter lock-up switch     | (3) Shift indicator (displays actual speed range) |
| (2) Torque converter lock-up pilot lamp | (4) Character display                             |

### TORQUE CONVERTER LOCK-UP SWITCH

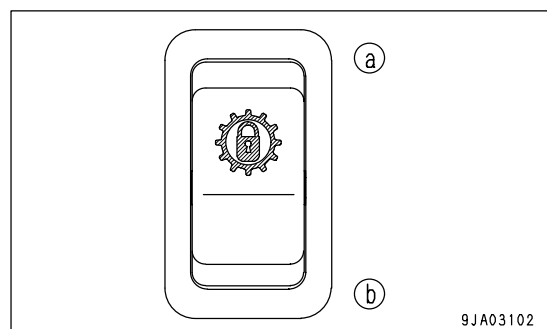
This switch (1) is the control switch for the torque converter lock-up function.

Position (a): ON

The pilot lamp inside the switch lights up and the lock-up is actuated according to the travel speed. While the lock-up is engaged, the lock-up pilot lamp on the machine monitor lights up.

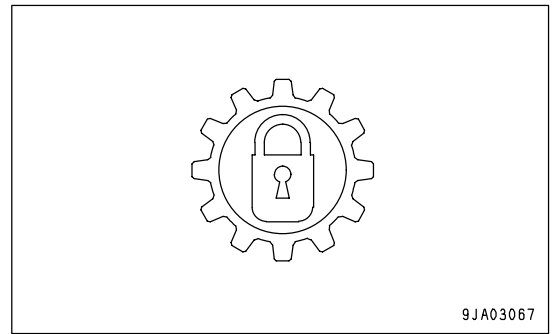
Position (b): OFF

The lock-up does not function.



**TORQUE CONVERTER LOCK-UP PILOT LAMP**

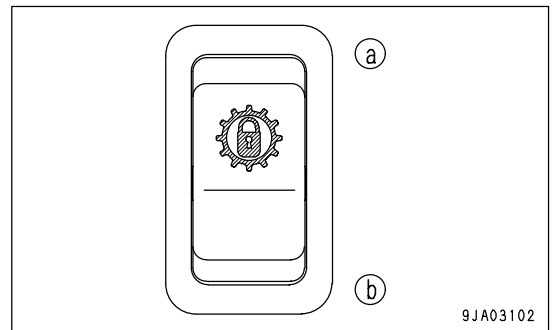
This monitor (2) lights up when the torque converter lock-up is engaged and the transmission actually enters direct drive.



For details of (3) and (4), see "SHIFT INDICATOR (PAGE 3-27)" and "ACTION CODE DISPLAY (PAGE 3-9)" in the section on the machine monitor in the OPERATION section.

**METHOD OF OPERATION**

1. Press the top (a) of the torque converter lock-up switch to turn it ON.  
The pilot lamp inside the switch lights up.
2. When the actual speed range is 3rd or 4th in either FORWARD or REVERSE, the torque converter lock-up function is actuated according to the travel speed and sets to direct drive.

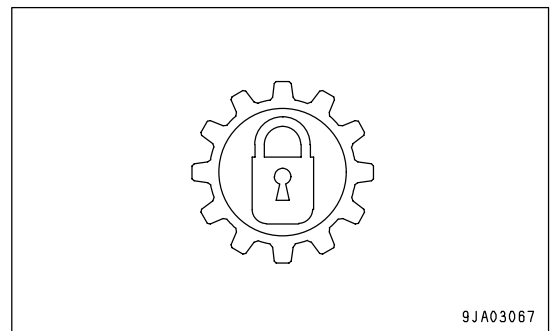


**REMARK**

When the gearshift lever is at 4th in auto-shift mode, the lock-up is not actuated if the actual speed range is 3rd. The lock-up is actuated only when the actual speed range is 4th.

When the lock-up is actually actuated, the lock-up pilot lamp on the machine monitor lights up.

3. To cancel the lock-up, press the bottom (b) of the torque converter lock-up switch to turn it OFF.  
The lock-up is canceled.



The travel speed for actuation and cancellation of the lock-up is as shown below.

Lock-up / Speed range	FORWARD travel speed (km/h (MPH))		REVERSE travel speed (km/h (MPH))	
	Actuated	Canceled	Actuated	Canceled
3rd	11 to 14 (6.8 to 8.7)	10 to 12 (6.2 to 7.5)	16 (9.9)	13 (8.1)
4th	21 to 24 (13.0 to 14.9)	19 (11.8)	22 to 25 (13.7 to 15.5)	20 (12.4)

**WARNING/LIMIT FUNCTIONS FOR TRAVEL SPEED****TRAVEL SPEED WARNING FUNCTION**

(This functions even when the torque converter lock-up switch is OFF.)

When the travel speed goes above 38.0 km/h (23.6 MPH), the central warning lamp lights up and the alarm buzzer sounds.

At the same time, "E00 OVERRUN PROTECT" is displayed on the character display.

If the alarm buzzer sounds, depress the brake immediately to slow the machine down.

When the travel speed goes below 36.0 km/h (22.4 MPH), the alarm buzzer stops.

**TRAVEL SPEED LIMIT FUNCTION**

(This functions only when the torque converter lock-up switch is ON.)

To prevent the travel speed from going above 40.0 km/h (24.9 MPH), the lock-up is automatically canceled.

The lock-up cancel continues until the travel speed goes below 38.0 km/h (23.6 MPH).



## HANDLING AUTO-GREASING SYSTEM

With this system, the grease is automatically supplied through the computer controls.

If any abnormality occurs in the lubrication controller, please inform your Komatsu distributor of the symptoms and ask for repairs to be carried out.

### METHOD OF OPERATING AUTO-GREASING SYSTEM

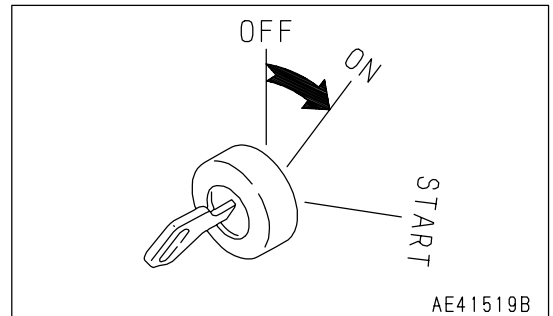
1. Turn the starting switch ON.

**REMARK**

Immediately after the power is turned on, all the display lamps on the lubrication controller inside the box under the step on the left side of the machine light up for several seconds. This is a self check for the lamps, and does not indicate any abnormality.

The display portion for starting the calculation of the greasing interval will flash, but all other displays will go out after a few seconds.

However, even if the greasing interval has not been reached, if the switch is turned ON/OFF repeatedly, greasing will automatically start due to the function of the supplemental circuit, immediately after the starting switch is turned ON. After display of the 7-segment LED and greasing-in-progress LED, as shown in the "LUBRICATION CONTROLLER DISPLAY TABLE", the above condition will be returned.

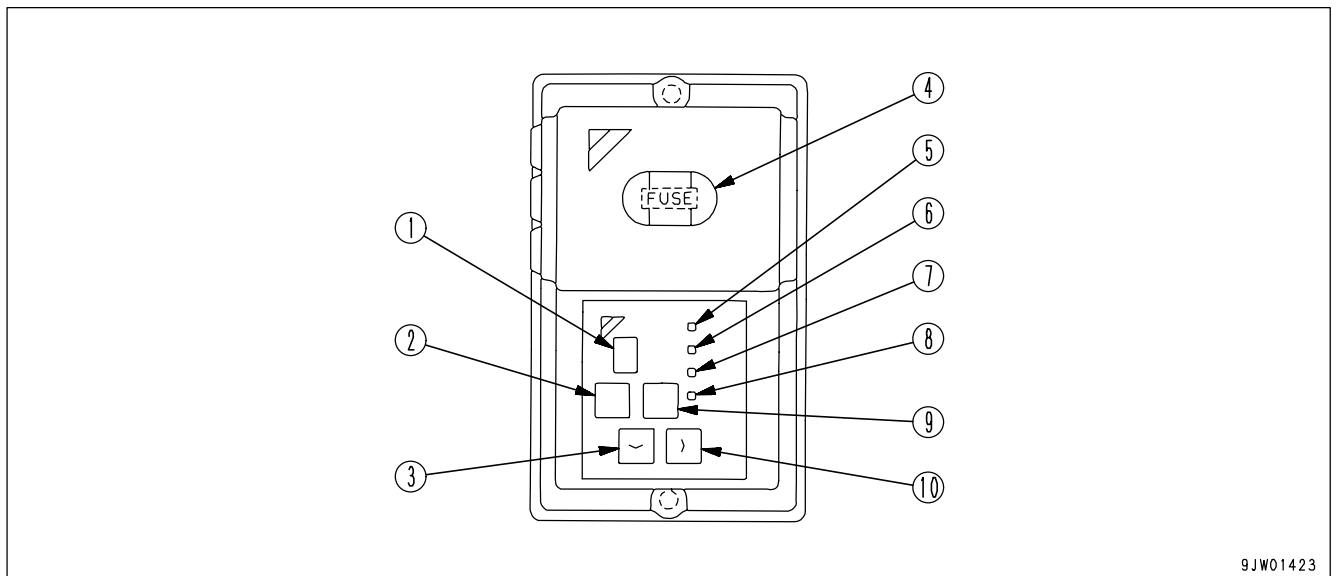


2. Centralized greasing is carried out in accordance with the set time and frequency limit for greasing.

**REMARK**

If the starting switch is turned ON/OFF frequently before the greasing interval is reached, the warning for the remaining time is displayed earlier, but this does not indicate any abnormality.

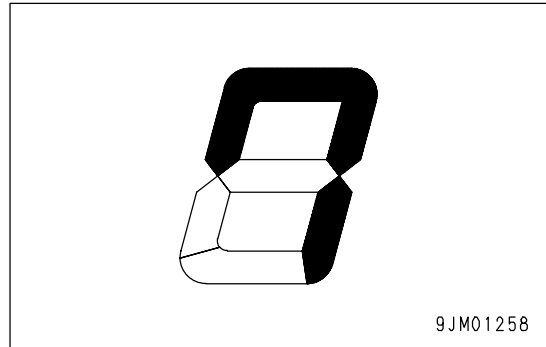
### LUBRICATION CONTROLLER DISPLAY TABLE



- (1) 7-segment LED
- (2) Cancel key
- (3) Level selector key
- (4) Blade-type fuse
- (5) Power source LED
- (6) Greasing LED
- (7) Warning LED
- (8) Setting LED
- (9) Starting key
- (10) Item selector key

**Remaining number of times of greasing**

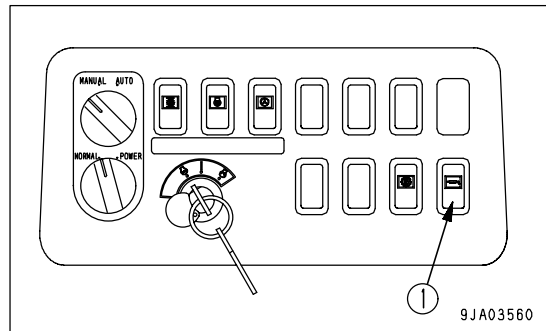
If the remaining number of times of greasing is less than 10, remaining number is displayed and it flashes. If the remaining number of times is 10 or more, only the flashing is shown without displaying the number.



**OPERATION AS DESIRED**

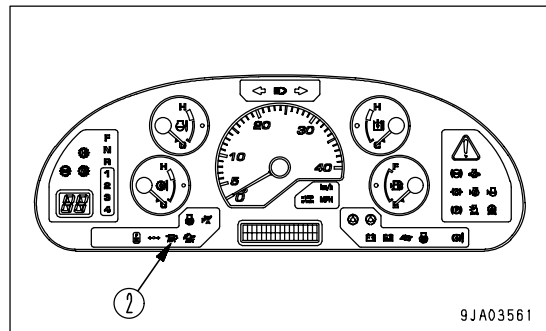
If auto-greasing switch (1) on the right switch panel or the start button of the lubrication controller inside the box under the step on the left side of the machine are pressed, one cycle of greasing will be carried out regardless of the hours of operation.

The time count for the greasing interval will be canceled, and when the electric pump automatically stops, the count will start again.



**PILOT LAMP DISPLAY ON MACHINE MONITOR**

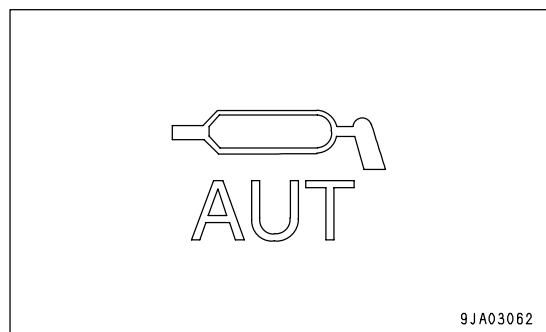
The display of pilot lamp (2) on the machine monitor lights up or flashes according to the following conditions.



Lighted up: Normal operation

1 flash per sec: Grease cartridge empty

1 flash per 0.5 sec: Defective decompression, pump pressurized, pressure detected, fuse blown



**SETTING GREASING TIME**

The set time and greasing frequency limit differs according to the operating condition and greasing plan for the machine, so set the following items to carry out suitable centralized greasing.

- Greasing interval (Hr): Greasing interval for automatic operation
- Greasing time (min): Length of time pump is operated for each greasing operation
- Greasing frequency limit (times): No. of times for operating pump before the 1000 cc grease cartridge becomes empty

The settings when shipping from the factory are as follows.

Greasing interval: 3 hours

Greasing time: 7 minutes

Greasing frequency limit: 100 times

The grease level alarm is set to sound after 300 hours on the hourmeter (when normal operation).

**NOTICE**

Be careful since the life of grease cartridge will be shortened if the greasing interval becomes shorter. Also, if the greasing interval becomes shorter, the amount of grease dripping from the tip of the working machine increases. It may make the machine and surrounding area dirty.

**SETTING GREASING TIME IN COLD AREAS**

In cold temperatures, the viscosity of the grease rises, so it is necessary to increase the greasing time.

For example, if the machine is used at temperatures below -20°C (-4°F), set the greasing time to 20 minutes (code No. 7). In addition, use lithium-based grease No. 0.

When changing the set value, please consult your Komatsu distributor.

**METHOD OF SETTING**

When setting the various items, the value is not input directly. Select the code number from the set code table below, and set as follows.

**SETTING CODE TABLE**

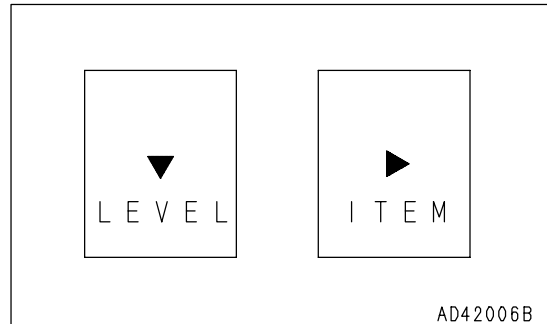
Code no.	0	1	2	3	4	5	6	7	8	9
Greasing interval (a)	/	1	1.5	2	3	4	5	6	8	/
Greasing time (min) (b)	/	2	3	5	7	10	15	20	25	/
Greasing frequency limit (c)	/	25	50	75	100	150	200	250	/	/

**NOTICE**

When using the machine at ambient temperatures of below -20°C (-4°F), set to greasing time (b) at code No. 7.

**PROCEDURE FOR SETTING**

1. Stop the working machine on the flat and hard ground, and stop the engine.
2. Set the work equipment lock lever at LOCK position and set the starting switch at ON position.
3. Turn the starting switch to START and start the engine.
4. Press the LEVEL and ITEM keys at the same time to set to the setting mode.
5. Press the ITEM key one or more times to select the item to be set.

**REMARK**

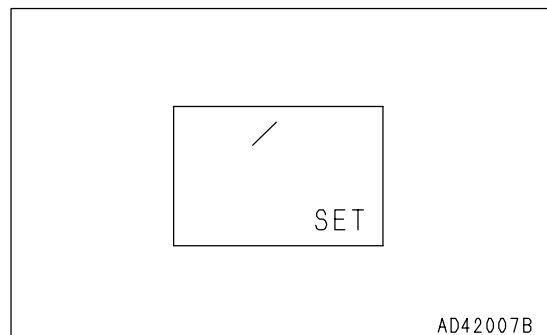
Each time the ITEM key is pressed, the setting item is changed: a → b → c → a.

6. When the item to be set flashes, press the LEVEL key.  
The set item and numeral are displayed alternately (a →→ 0 →→ a →→ 0).
7. Refer to the setting code table and press the ITEM key one or more times to select the code number to be set.

**REMARK**

Each time the ITEM key is pressed, the code number (numeric portion) goes up by 1.

8. When the code number that is to be set flashes, press the SET key to carry out the setting.

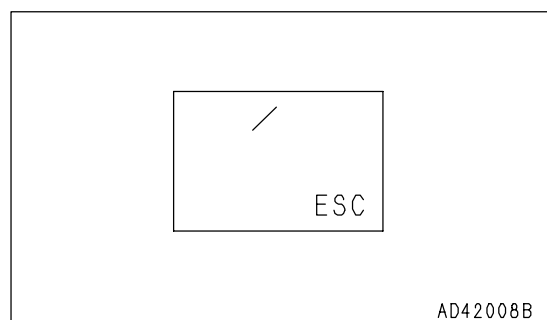


9. Repeat Steps 6 to 8 to set all of the items a, b, and c. After completing the setting, press the ESC key to leave the setting mode.

**REMARK**

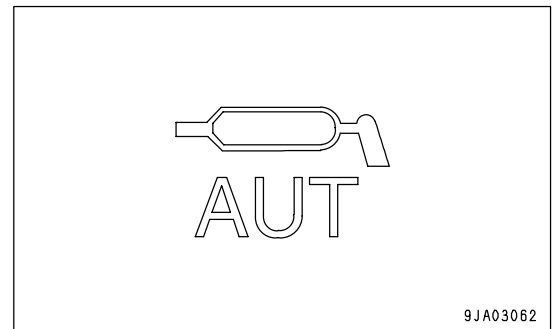
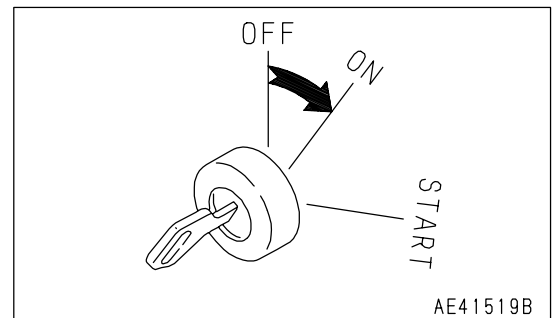
Even if it is desired to change only one item, always carry out the setting according to Steps 4 to 8. After completing the setting, always press the ESC key to leave the setting mode.

If the power is then turned ON, the count for the greasing interval will start immediately after the ESC key is pressed. Part of the display segment flashes to indicate that the system is counting. After setting, the set value is retained in memory even if the power is turned OFF.



**CHECK AMOUNT OF GREASE**

1. Turn the starting switch ON.
2. Check the display of the pilot lamp on the machine monitor.  
If the pilot lamp is flashing at 1-second intervals, it means that the grease cartridge is empty.  
Replace the grease cartridge with a new cartridge.

**REPLACEMENT OF GREASE CARTRIDGE****WARNING**

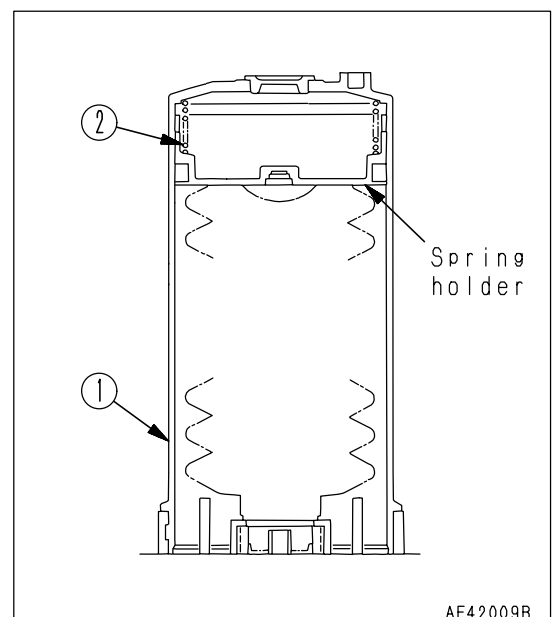
- Air bleeding of pump involves danger because of high pressure. Ask your Komatsu distributor for air bleeding.
- Be careful of the force applied by spring (2) installed inside the cover.

**NOTICE**

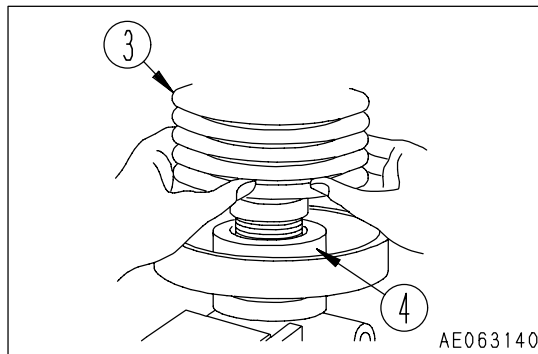
After replacing cartridge, make sure to reset number counter on controller. (Refer to "TROUBLESHOOTING (PAGE 6-37)".)

Replace grease cartridge according to procedure described below.

1. Remove cover by turning cartridge cover (1) approx. 60 degrees to the left.



2. Remove grease cartridge (3) by turning it to the left. Do not detach seal cap (4) at this time.

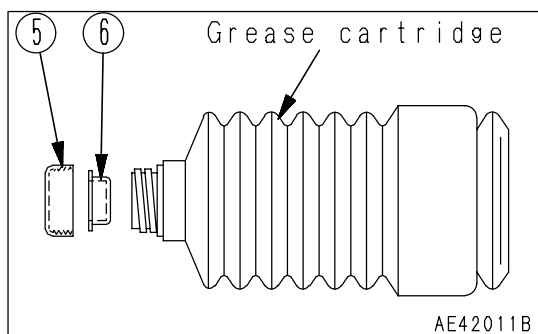


3. Detach cap (5) and middle plug (6) from new grease cartridge and tightly screw it in.

Screw in tightly to ensure that no air enters.

4. When fixing, if grease cartridge is pressed slightly and grease comes out and deposits in a heaped shape, and if grease cartridge is screwed into suction port connector under above conditions, no air will enter. (Max. No. of turns is approx. 5)

5. Turn the cover to right and tighten it until securely fixed. If not tightened well, there is a possibility that it will work loose due to machine vibration.



Use the grease cartridge shown below.

Part No.	Part name	Q'ty	Capacity
421-S95-3340	Cartridge	1	1000cc

## PRECAUTIONS WHEN HANDLING AUTO-GREASING SYSTEM

- Basically, the power source input to the lubrication controller should be DC24V, but use a maximum limit of 30V.
- The grease nipple installed to the service port used for initial charging of the divider valve has a ball check structure, so it may leak if dirt gets stuck in it.  
Check it from time to time, and replace the grease nipple immediately if any grease is leaking.
- When carrying out initial operation or when the grease tank is empty, air may get into the piston portion of the pump. If the pressure does not rise within the specified time when running the pump, and an error is displayed for the controller, bleed the air.
- If the divider valve or grease piping are removed when replacing the attachment on the machine, handle carefully to prevent any damage. When storing or installing again, be extremely careful to prevent the entry of air, and particularly dirt. If there is any air in the system, bleed the air immediately.

## TROUBLESHOOTING

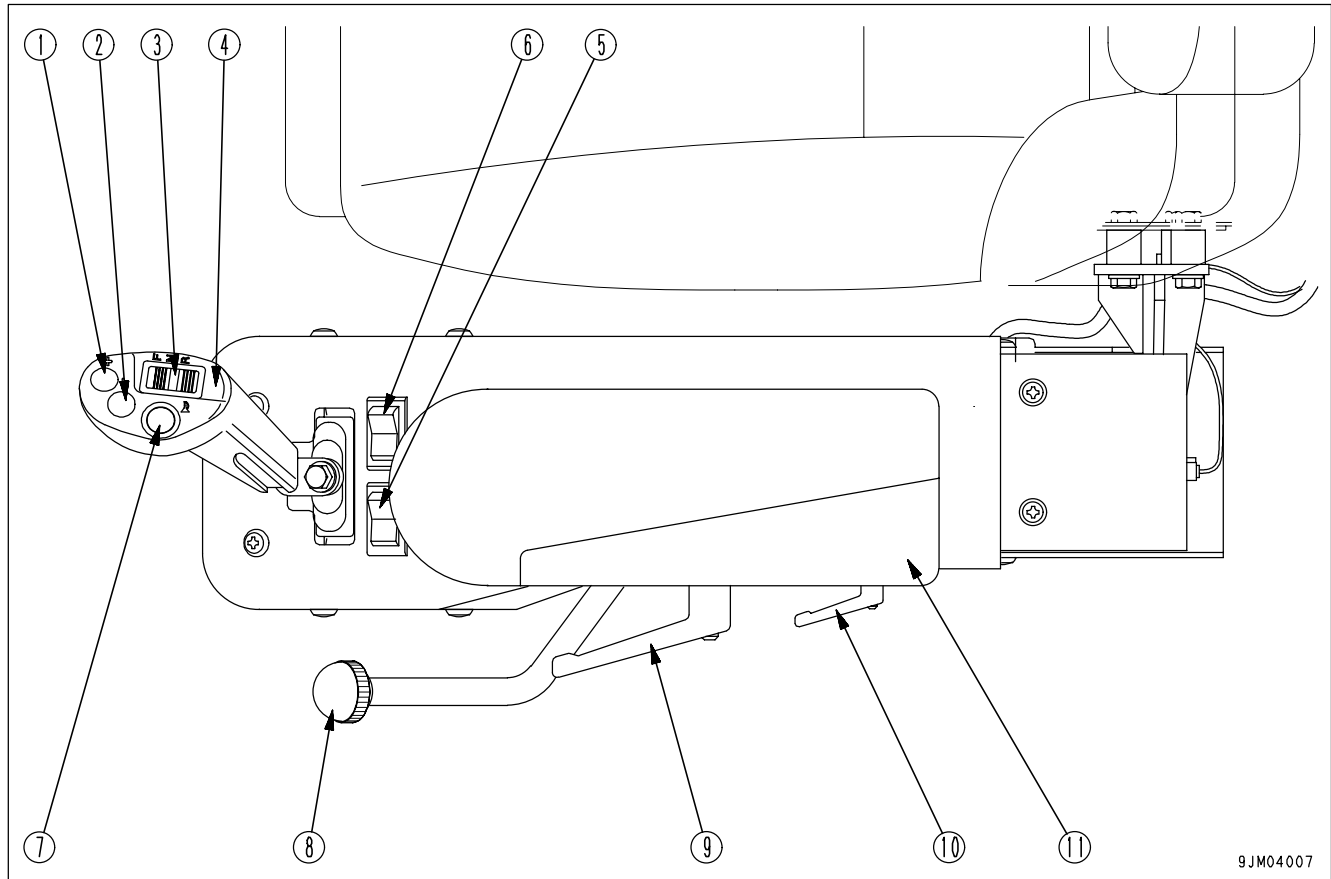
If any abnormality occurs in the greasing system, the error codes will flash alternately to display the type of abnormality.

Error code	Item	Cause	Remedy
E → a	Defective pressurizing of pump	<ul style="list-style-type: none"> <li>• Air in main piping</li> <li>• Air inside pump</li> <li>• Grease tank is empty</li> </ul>	<ul style="list-style-type: none"> <li>• Run pump as necessary and release grease from end of piping to bleed air</li> <li>• Release grease from air bleed in pump to bleed air</li> <li>• Add grease</li> </ul>
E → b	Abnormality in release of pressure	<ul style="list-style-type: none"> <li>• Abnormality in pressure-releasing structure built into pump</li> <li>• Abnormality in pressure-detection</li> </ul>	<ul style="list-style-type: none"> <li>• Disassemble pressure-releasing portion carefully, then check and clean</li> <li>• Check limit switch at pressure-detection portion</li> </ul>
E → c	Abnormality in pressure detection	<ul style="list-style-type: none"> <li>• Abnormality in pressure-detection equipment built into pump</li> <li>• Abnormality in pressure-releasing</li> </ul>	<ul style="list-style-type: none"> <li>• Check limit switch at pressure- detection portion</li> <li>• Disassemble pressure-releasing portion carefully, then check and clean</li> </ul>
E → 0	Empty tank	<ul style="list-style-type: none"> <li>• Greasing frequency limit has been reached</li> <li>• Grease added during frequency count</li> </ul>	<ul style="list-style-type: none"> <li>• Add grease Reset frequency counter to zero.</li> <li>• Confirm that 0 flashes three times on 7-segment LED by pressing reset</li> </ul>

# HANDLING JOYSTICK STEERING SYSTEM

To enable you to use the joystick steering safely and efficiently, please read the following before using it.

## EXPLANATION OF COMPONENTS



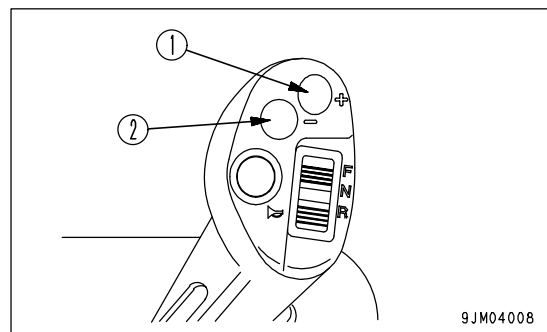
- |                             |  |
|-----------------------------|--|
| (1) Shift up switch         | (7) Horn switch                            |
| (2) Shift down switch       | (8) Console lock lever                     |
| (3) FNR switch              | (9) Height adjustment lock lever           |
| (4) Joystick steering lever | (10) Angle, fore/aft adjustment lock lever |
| (5) Joystick ON/OFF switch  | (11) Console                               |
| (6) HI/LOW selector switch  |  |

## SHIFT UP, SHIFT DOWN SWITCHES

These switches (1) and (2) are used when shifting up or down, regardless of whether the transmission is in the manual shift mode or auto shift mode.

Press (1): Shift up

Press (2): Shift down



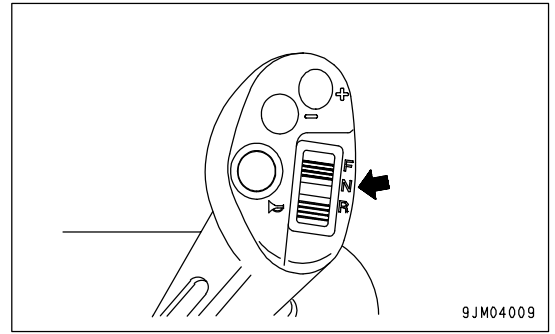


**FNR SWITCH**

The F/N/R switch (3) at the top of the joystick steering lever is used to switch the transmission between FORWARD and REVERSE.

- (F) position: FORWARD
- (N) position: NEUTRAL
- (R) position: REVERSE

Use the shift up and shift down switches at the top of the joystick to change the speed range.

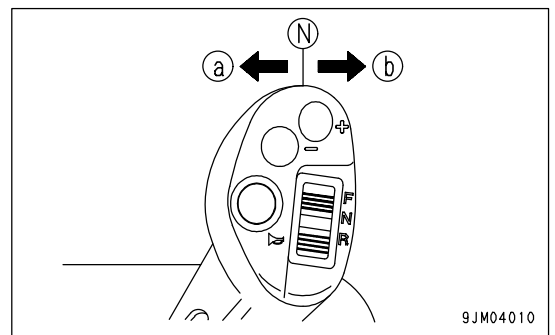


9JM04009

**JOYSTICK STEERING LEVER**

Use this lever (4) to steer the machine to the left or right. When traveling, operate this lever in the direction to turn the machine.

- (a): Left turn
- (b): Right turn
- (N): Neutral

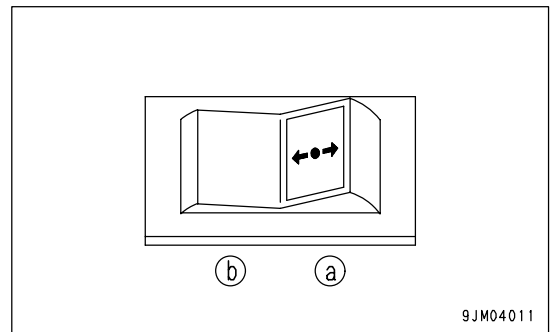


9JM04010

**JOYSTICK ON/OFF SWITCH**

When this switch (5) is turned ON, the joystick steering is switched ON.

- Position (a): ON (possible to steer with joystick)
- Position (b): OFF (impossible to steer with joystick)



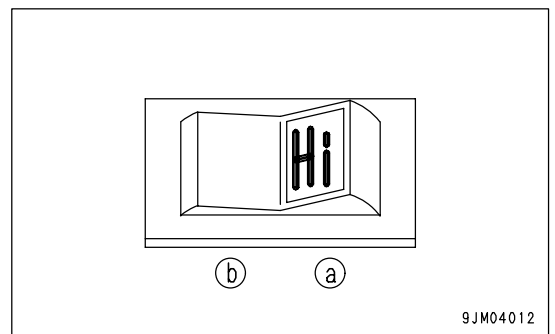
9JM04011

**HI/LOW SELECTOR SWITCH**

This switch (6) is used to switch the steering speed between HIGH and LOW.

Position (a): HI  
 The articulating speed of the machine is high in relationship to the operation of the joystick, so this setting is suitable for comparatively fast cycle times.

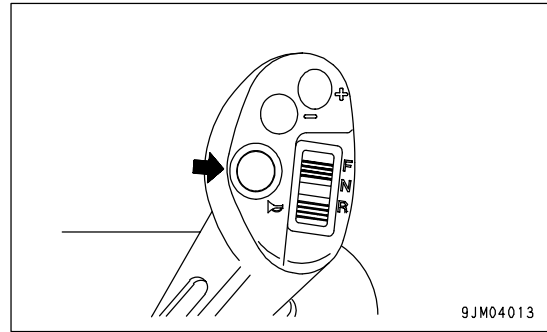
Position (b): LOW  
 The articulating speed of the machine is low in relationship to the operation of the joystick, so this setting is suitable for operations loading loose materials and materials that easily spill.



9JM04012

## HORN SWITCH

Press this switch (7) at the top of the joystick to sound the horn.  
By using this switch, it is possible to sound the horn without taking your hand off the joystick.



9JM04013

## CONSOLE LOCK LEVER

For details of this lever (8), see "GETTING IN OR OUT OF OPERATOR'S CAB (PAGE 6-42)".

## HEIGHT ADJUSTMENT LOCK LEVER

For details of this lever (9), see "ADJUSTMENT OF JOYSTICK CONSOLE (PAGE 6-42)".

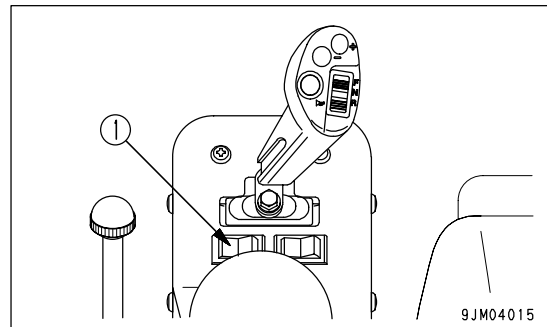
## ANGLE, FORE/AFT ADJUSTMENT LOCK LEVER

For details of this lever (10), see "ADJUSTMENT OF JOYSTICK CONSOLE (PAGE 6-42)".

## STRUCTURE AND FUNCTION OF JOYSTICK STEERING

- The joystick steering system is a system used to steer wheel loaders with a lever instead of a steering wheel.  
The joystick enables steering with small, light movements, and helps to reduce operator fatigue.

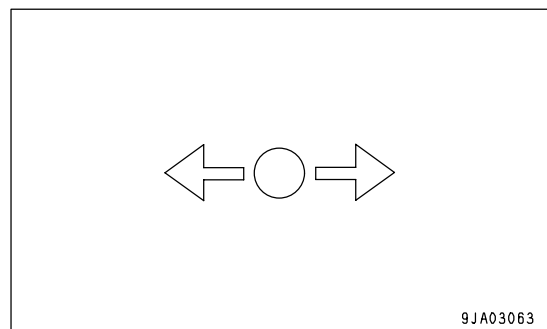
When joystick ON/OFF switch (1) is turned ON, it becomes possible to operate the steering with the joystick.



9JM04015

When the joystick steering is in use, the joystick pilot lamp on the machine monitor lights up.

- On machines equipped with the joystick steering system, it is possible to use joystick ON/OFF switch (1) to select the steering and transmission operation method as shown in the table below. In addition, on machines equipped with joystick steering, the transmission auto shift function is also included. The differences between operation using the joystick and operation using the steering wheel are as follows.



9JA03063

Selection		Operation using joystick		Operation using steering wheel	
Joystick ON/OFF switch		ON		OFF	
Steering		Steering using joystick (steering with steering wheel is also possible)		Steering using steering wheel	
Transmission	F/N/R	Operation using FNR switch at top of joystick		Operation using transmission directional lever	
	Transmission type	Auto		Auto	
	Shift mode selector switch	Manual	Auto (L, M, H)	Manual	Auto (L, M, H)
	Selection of speed range	Speed range selection using shift up, shift down switches at top of joystick*	Automatic gearshifting according to travel speed	Operation using gearshift lever	Automatic gearshifting according to travel speed

\*: Does not shift up above speed range of gearshift lever.

**OPERATION USING JOYSTICK LEVER AND OPERATION USING STEERING WHEEL**



- If the directional lever and joystick FNR switch are not at the neutral position, the neutral interlock circuit makes it impossible to switch the transmission directional control (when the joystick ON/OFF switch is ON, it is switched from the directional lever to the joystick FNR switch; when the joystick ON/OFF switch is OFF, it is switched from the joystick FNR switch to the directional lever).
- Do not use the joystick when traveling on public roads.

Select joystick operation or steering wheel operation according to the work.

- Steering using joystick
 

This is suited for continuous loading operations on jobsites with ample space where the loading operation can be carried out with a comparatively relaxed cycle time.

Because operations can be carried out with a small movements and light operating effort, this is also suitable for reducing operator fatigue when operating continuously.
- Steering using steering wheel
 

This provides excellent fine control and ability to travel straight, so it is suitable for travel between jobsites and for load and carry operations. In addition, it is also suitable for short cycle loading operations because the upper part of the operator's body is supported by the steering wheel when frequently switching between FORWARD and REVERSE.

## GETTING IN OR OUT OF OPERATOR'S CAB

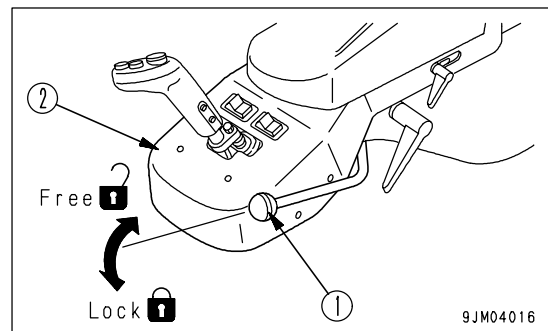
### WARNING

Always spring the joystick console up before getting in or out of the operator's cab.

If the console is sprung up, the safety switch is turned OFF and the joystick is automatically stopped from operating.

The joystick console is a spring-up type to make it easier for the operator to get in and out of the operator's cab. If the joystick is moved accidentally when the engine is running, the machine may articulate unexpectedly. To prevent this danger, always spring the joystick console up when not using the joystick for operations and when getting in or out of the operator's cab.

1. Set lock lever (1) to the FREE position.
2. Spring joystick console (2) up.  
Turn it at least 90 degrees.  
The safety switch is turned OFF and the joystick cannot be operated.
3. When operating, lower joystick console (2) and push lock lever (1) down to the LOCK position. The safety switch is turned ON and the joystick can be operated.



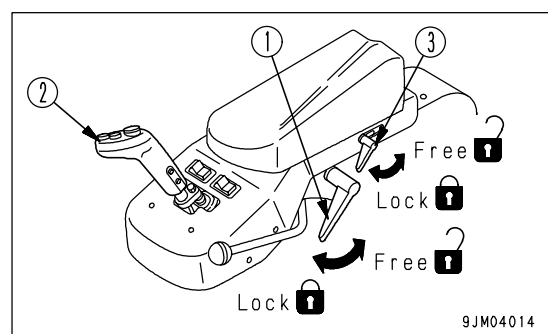
## ADJUSTMENT OF JOYSTICK CONSOLE

### WARNING

- Stop the machine on level ground in a safe place when carrying out the adjustment.
- Carry out the adjustment before starting operations or when changing operator shifts.
- Put your back against the backrest of the operator's seat and adjust the seat so that it is possible to depress the brake fully, then adjust the console.

### Adjusting height

1. Operate lever (1) in the cancel direction and loosen the lock.
2. Adjust the height of the console and set joystick (2) to the desired position.  
Amount of adjustment: 30 mm (1.2 in)
3. After setting, operate lever (1) to the LOCK position to lock the console securely in position.



### Adjusting angle, fore/aft position

1. Operate lever (3) in the cancel direction and loosen the lock.
2. Adjust the console and set joystick (2) to the desired position.  
Amount of fore/aft adjustment: 45 mm (1.8 in)
3. After setting, operate lever (3) to the LOCK position to lock the console securely in position.

## OPERATION METHOD OF JOYSTICK STEERING SYSTEM

**WARNING**

- It is dangerous to turn the machine suddenly at high speed, or to turn on steep hills. Do not operate the steering in such conditions.
- When turning, the articulation stops at the position where the steering wheel is turned to, but if the joystick is held in the tilted position, the body will articulate fully.
- The feeling when operating the steering with the joystick is different from when operating with the steering wheel, so be extremely careful until you have become used to operating the joystick.
- When the joystick ON/OFF switch is at the ON position, if the directional lever is operated to F or R, the machine will travel in forward or reverse according to the operation of the directional lever, regardless of the position of the FNR switch on the head of the joystick lever. Priority is given to the operation of the directional lever, so be careful when operating.
- When this is done, the central warning lamp lights up and the alarm buzzer sounds.
- Set the directional lever and FNR switch on the head of the joystick to the N position.

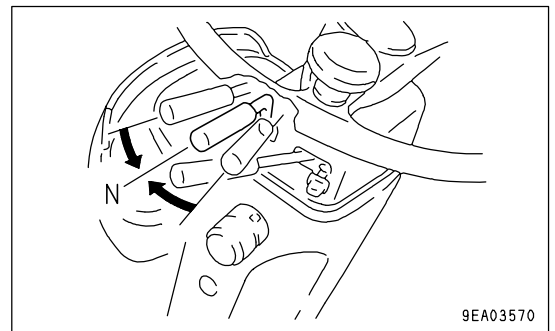
Check the adjustment and operation before starting the engine. For details, see "CHECK BEFORE STARTING ENGINE, ADJUST (PAGE 3-91)".

1. Before starting the engine, check the operation of the joystick lever steering, check that the transmission directional lever is at N, and that the surrounding area is safe.

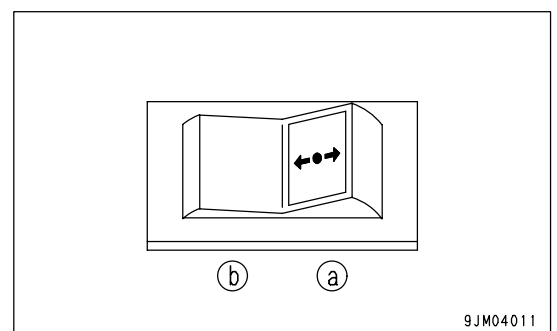
**REMARK**

Under the following conditions, a warning may be given when the engine is started.

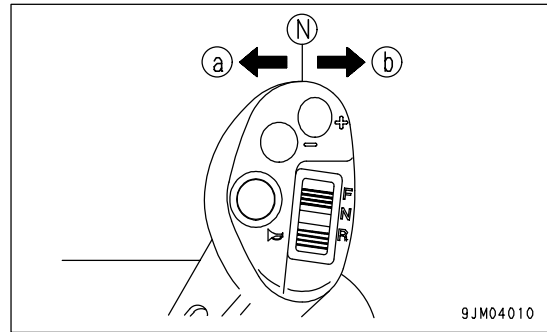
- If the FNR switch on the joystick is at F or R, the joystick pilot lamp flashes, the central warning lamp lights up, and the alarm buzzer sounds.  
In this condition, the engine will not start, so set the FNR switch to N.
- If the joystick is not at the N position, the joystick pilot lamp flashes, the central warning lamp lights up, and the alarm buzzer sounds.  
In this condition, the engine will not start, so set the joystick to the N position.



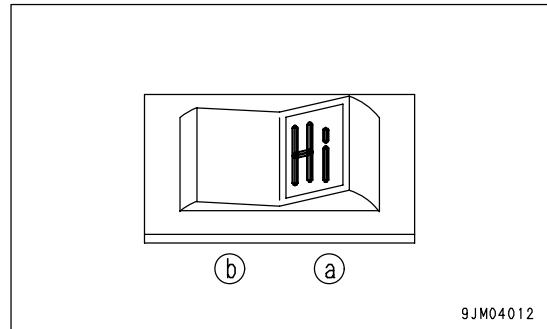
2. Press the (a) part of the joystick ON/OFF switch to turn it ON.



3. Operate the joystick in direction (b) to turn the machine to the right; operate it in direction (a) to turn the machine to the left. The greater the angle of operation, the faster the articulating speed becomes.



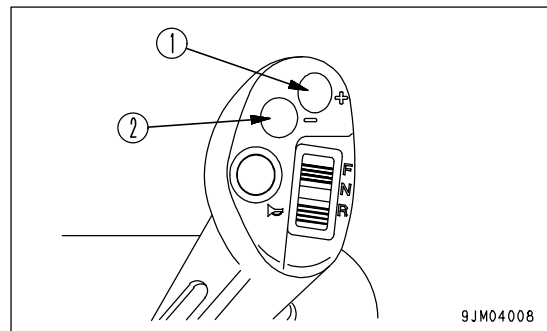
4. It is possible to switch the articulating speed with the HI/LOW selector switch. Select the speed to match the operation.
5. When the machine has articulated to the desired angle, return the joystick to the N position. The joystick will return automatically to the N position.
6. To return the direction of travel of the machine so that it travels in a straight line, operate the joystick in the opposite direction from the N position (for example, when the machine is articulated to the right, operate the joystick to the left).
7. Use the FNR switch at the top of the joystick lever to set the transmission to the direction of travel.



N position: NEUTRAL  
 F position: FORWARD  
 R position: REVERSE

If the position of the directional lever and the FNR switch are different, the joystick pilot lamp flashes, the warning lamp lights up, and the alarm buzzer sounds.

In this condition, the machine will travel in the direction set by the directional lever, so set the directional lever to N.



8. To change the speed range, use shift up switch (1) or shift down switch (2) on the joystick.

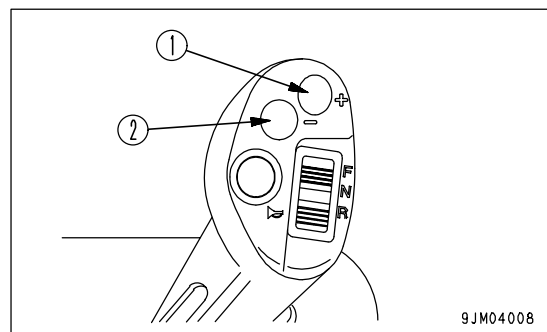
#### REMARK

The joystick steering is unstable and dangerous to operate at high speeds, so it is set so that the machine cannot travel in 4th.

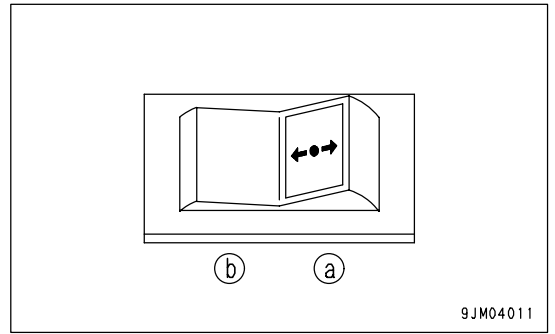
When joystick operation is selected, if the gearshift lever is moved to 4th, or the joystick ON/OFF switch is turned ON when the gearshift lever is at 4th, the central warning lamp lights up and the alarm buzzer sounds.

Set the gearshift lever within the range from 1st to 3rd.

In addition, when joystick operation is selected, for machines equipped with a torque converter lock up (option), the system is designed so that the machine does not travel at high speed even if the torque converter lock up switch is turned ON.



- 9. Press part (b) of the joystick ON/OFF switch to turn it OFF.  
The joystick operation is then canceled.



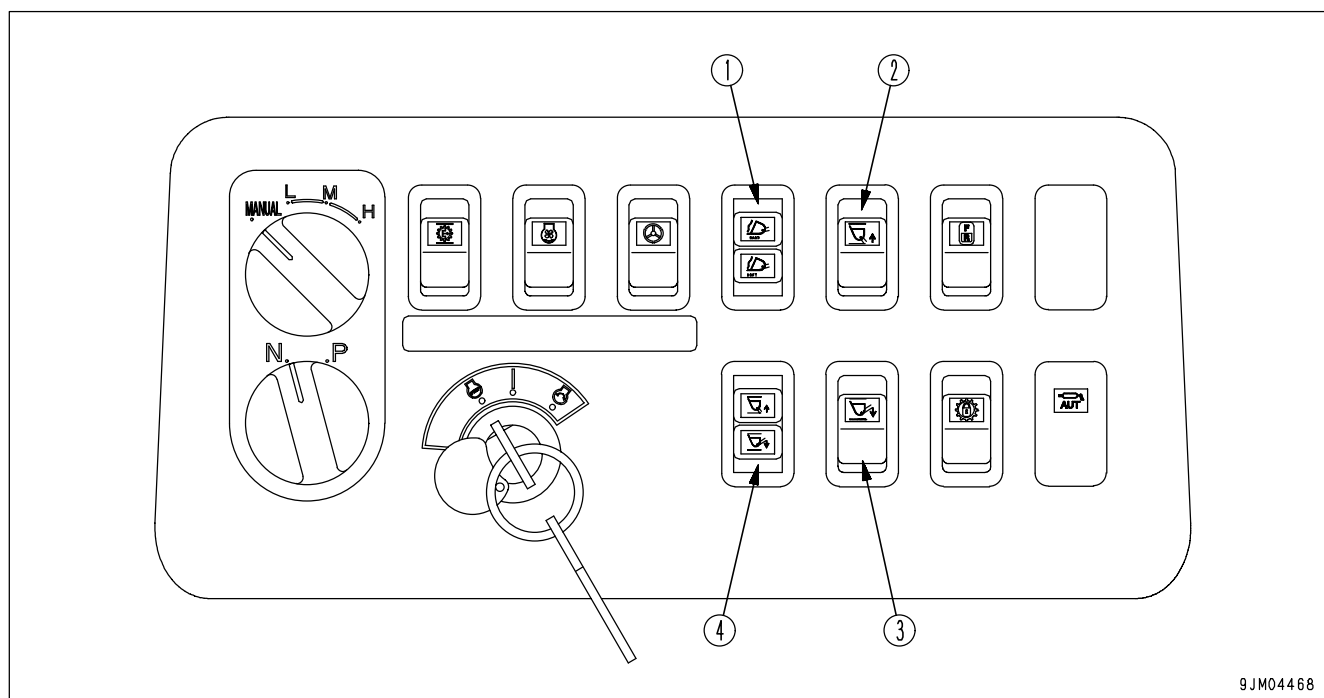
# HANDLING EPC WORK EQUIPMENT LEVER

## OPERATIONAL FEATURES

EPC (Electronic Pilot Control) work equipment levers are offered as an option. To improve the operating efficiency, the following three functions are provided.

- Modulation function to prevent shock when stopping the bucket
- Function to set the bucket stop position at two places - Top and Bottom (remote positioner)
  - It is possible to set the stop position from the operator's seat.
- Semiautomatic digging bucket - control function
  - Bucket tilt operation can be automatically done when digging.
  - Semiautomatic digging offers two selectable modes - Soft and Hard.

## SWITCHES



9JM04468

- |   |  |
|---|--|
| (1) Semi auto digging switch            | (3) Remote positioner lower mode switch      |
| (2) Remote positioner raise mode switch | (4) Remote positioner raise/lower set switch |



## WORK EQUIPMENT LOCK LEVER



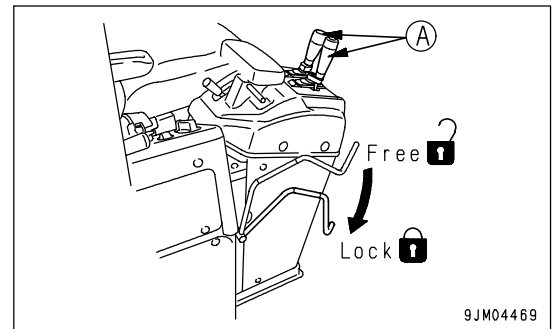
### WARNING

- Before standing up from the operator's seat, set the work equipment lock lever securely to the LOCK position. If the work equipment lock lever is not at the LOCK position, and work equipment control lever (A) is touched by mistake, it may lead to a serious accident.
- If the work equipment lock lever is not placed securely at the LOCK position, the work equipment may move, and this may lead to a serious accident or personal injury. Check that the lever is in the position shown in the diagram.
- When pulling up or pushing down the work equipment lock lever, be careful not to touch work equipment control lever (A).

This lever is a lock device for the work equipment control lever.  
Push the work equipment lock lever down to lock it.

#### REMARK

This lever electrically locks the hydraulic circuit for the work equipment, so if it is at the LOCK position, the work equipment will not move even when work equipment control lever (A) is operated. If the work equipment control lever is operated when this lever is at the LOCK position, the central warning lamp lights up and the alarm buzzer sounds. At the same time, "E00 WORK LEVER POSI" is displayed on the character display.



## SEMI AUTO DIGGING OPERATIONS

### SEMI AUTO DIGGING OPERATIONS

Semi auto digging controls the bucket tilt operation automatically in order to make bucket operations easier for the operator and reduce operator fatigue.

When doing the semi auto diggig operations, refer to the section of "DIGGING OPERATIONS (PAGE 3-130)" in the chapter, "WORK POSSIBLE USING WHEEL LOADER (PAGE 3-130)".

### SEMI AUTO DIGGING SWITCH

This switch turns the semi auto digging ON or OFF.

Position (a): HARD mode

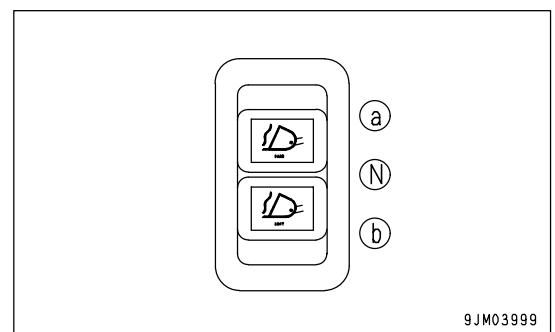
The bucket tilt actuation is controlled intermittently.  
Use this mode when handling heavy load materials.

Position (b): SOFT mode

The bucket tilt actuation is controlled continuously.  
Use this mode when handling crushed rock or other light load materials.

N position: Semi auto digging is switched OFF

In positions (a) and (b), the pilot lamp inside the switch lights up.



## METHOD OF OPERATION

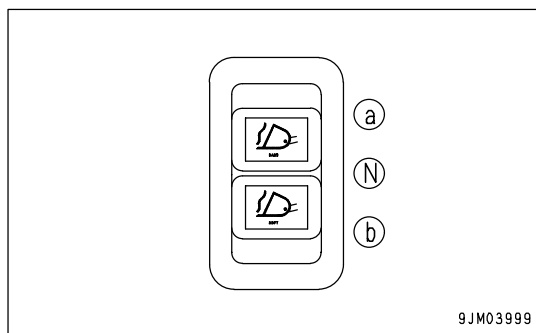
1. Turn the semi auto digging switch on the right switch panel ON (select SOFT or HARD).

When the switch is turned ON, the pilot lamp inside the switch lights up.

Position (a): HARD mode

Position (b): SOFT mode

N position: OFF



### REMARK

For details of the selection of SOFT or HARD, see "SELECTING DIGGING PATTERN (PAGE 6-48)".

2. Lower the bucket to the ground as in the normal digging work and travel the machine forward. When the bucket teeth dig into the ground, press the kick-down switch.
3. If the bucket tip is dug into the ground at boom RAISE, the bucket will automatically start tilting back. Besides, when the boom hydraulically stalls in the digging work where the boom lever is pulled back and held in the detent, the machine automatically starts the bucket to tilt back and maintains the optimum boom raise speed thereafter. The semi-auto digging pilot lamp on the main monitor lights up during automatic digging work.

## SELECTING DIGGING PATTERN

The following 2 modes can be selected for operating the bucket tilt.

- The semi auto digging switch on the right switch panel is used to select the mode.

### (1) SOFT mode

This mode is effective when handling crushed rock or other light load materials.

The bucket tilt actuation is controlled continuously.

### (2) HARD mode

This mode is effective when handling heavy load materials.

The bucket tilt actuation is controlled intermittently.

## MANUAL OPERATION DURING AUTOMATIC CONTROL

It is possible to operate the bucket control lever to the TILT or DUMP position during automatic operation of the bucket tilt.

As the bucket speed is proportional to the amount of lever operation, the bucket motion is the addition of the lever operation and bucket speed programmed by the automatic control system.

## END OF CONTROL

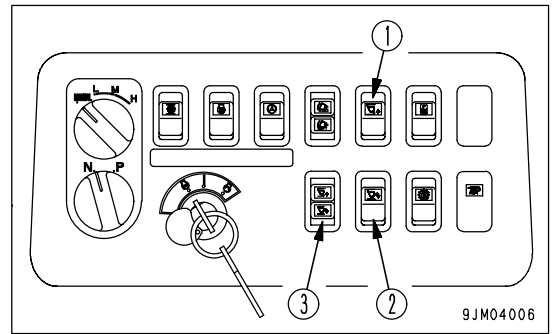
When the bucket reaches the end of the tilt, the control ends.

**METHOD OF REMOTE POSITIONER**

It is possible to set the lift arm stop position by operating remote positioner RAISE mode switch (1), remote positioner LOWER mode switch (2), and remote positioner RAISE/LOWER set switch (3) on the right switch panel.

**REMARK**

The RAISE mode is used when setting the lift arm position at a point where the lift arm is above the horizontal position; the LOWER mode is used when setting the stop position at a point where the lift arm is below the horizontal position.

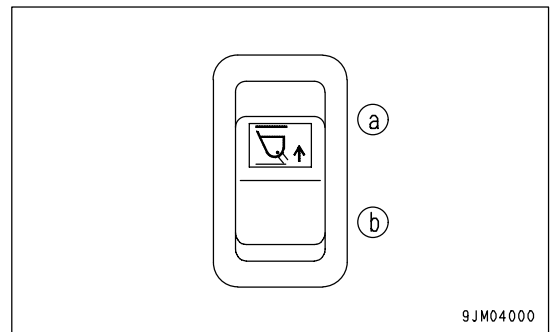


**REMOTE POSITIONER RAISE MODE SWITCH**

Use this switch (1) to turn on the remote positioner RAISE mode (operating the lift arm at above the horizontal position).

Position (a): RAISE mode ON

Position (b): OFF

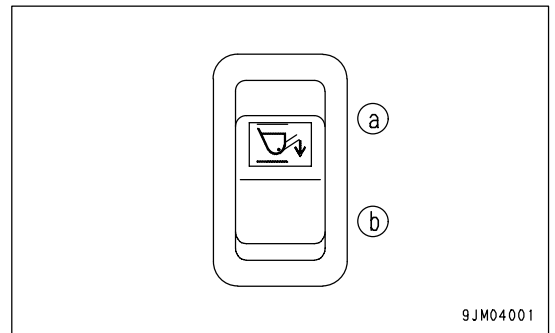


**REMOTE POSITIONER LOWER MODE SWITCH**

Use this switch (2) to turn on the remote positioner LOWER mode (operating the lift arm at below the horizontal position).

Position (a): LOWER mode ON

Position (b): OFF



## REMOTE POSITIONER RAISE/LOWER SET SWITCH

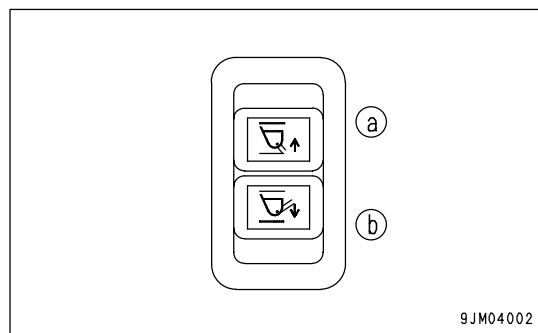
Use this switch (3) to set the stopping position of the lift arm for the remote positioner.

Position (a): After turning the remote positioner RAISE mode switch ON, raise the lift arm to the desired position above horizontal, then press the bottom (a) of this switch to set the top lift arm stop position at that point.

Position (b): After turning the remote positioner LOWER mode switch ON, lower the lift arm to the desired position below horizontal, then press the bottom (b) of this switch to set the bottom lift arm stop position at that point.

If the setting is carried out properly, the buzzer will give short sounds.

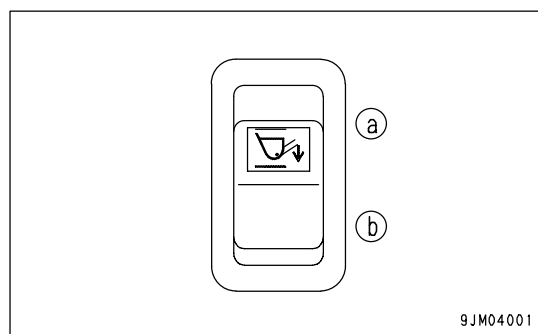
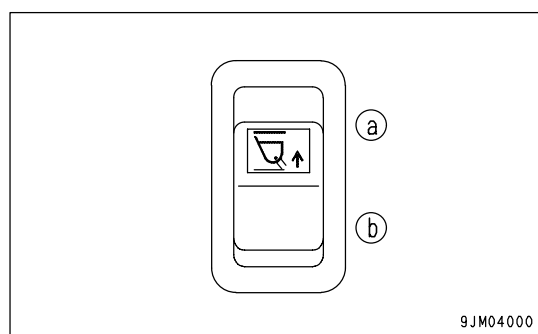
If the setting cannot be carried out, the buzzer gives a long sound.



## METHOD OF OPERATION

- Setting with RAISE (or LOWER) mode

1. Press the top (a) of remote positioner RAISE (or LOWER) mode switch (1) (or (2)) to turn the mode ON.
2. Raise (or lower) the bucket to the desired position.

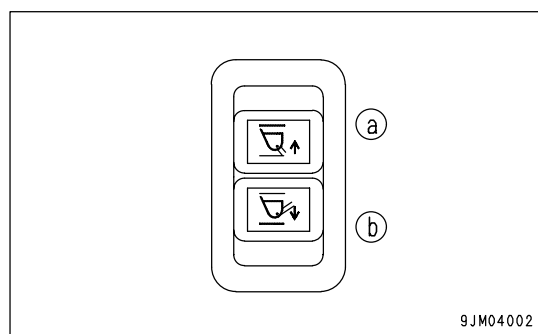


3. In the case of the RAISE mode, press the top (a) (or the bottom (b) for the LOWER mode) of remote positioner RAISE/LOWER set switch (3).

The lift arm stop position is set.

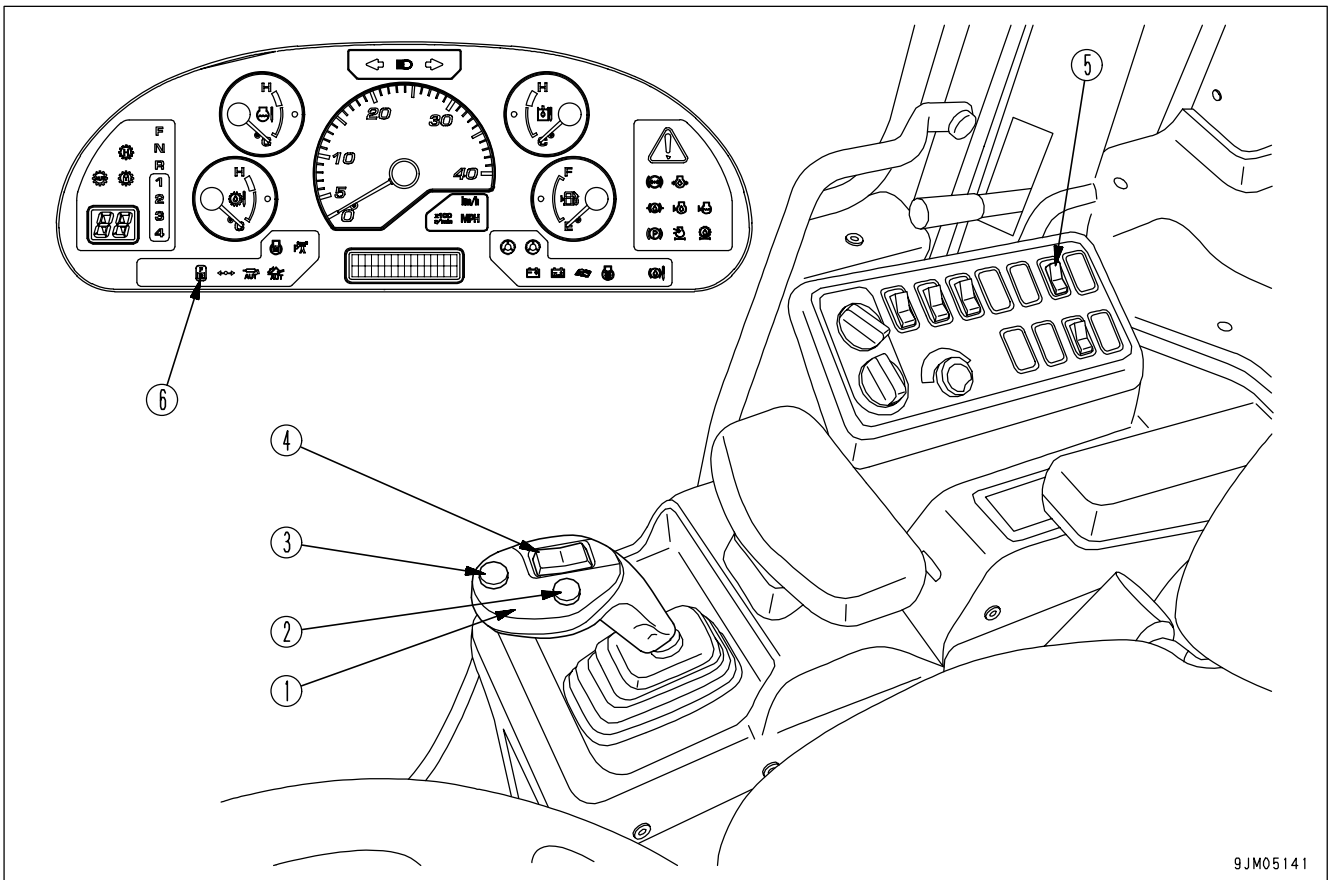
If the setting is carried out properly, the buzzer will give short sounds.

If the setting cannot be carried out, the buzzer gives a long sound, so repeat the procedure from Step 1.



# HANDLING MULTI-FUNCTION LEVER

## EXPLANATION OF COMPONENTS

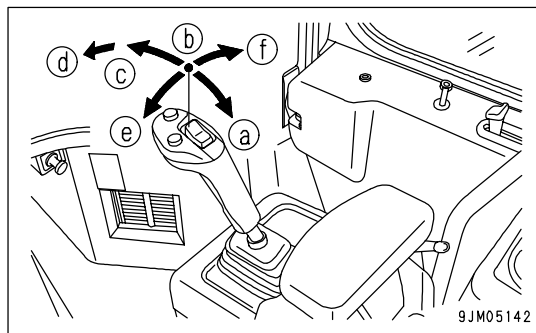


9JM05141

- |                          |  |
|--------------------------|--|
| (1) Work equipment lever | (4) FNR switch                                   |
| (2) Kickdown switch      | (5) Directional selector switch actuation switch |
| (3) Hold switch          | (6) Directional selector pilot lamp              |

## WORK EQUIPMENT LEVER

This lever (1) is used to control the lift arm and bucket.



### LIFT ARM OPERATION

#### NOTICE

Do not use the FLOAT position when lowering the bucket. Use the FLOAT position when leveling, see "LEVELING OPERATIONS (PAGE 3-134)".

Position (a): RAISE

When the work equipment control lever is pulled further beyond the RAISE position, the lever is stopped in this position until the lift arm reaches the preset position of the kickout, and the lever is returned to the HOLD position.

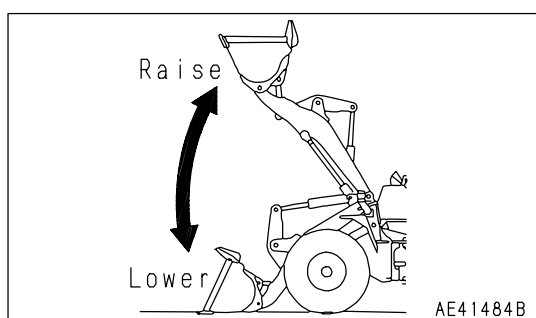
Position (b): HOLD

The lift arm is kept in the same position.

Position (c): LOWER

Position (d): FLOAT

The lift arm moves freely under external force.



### BUCKET OPERATION

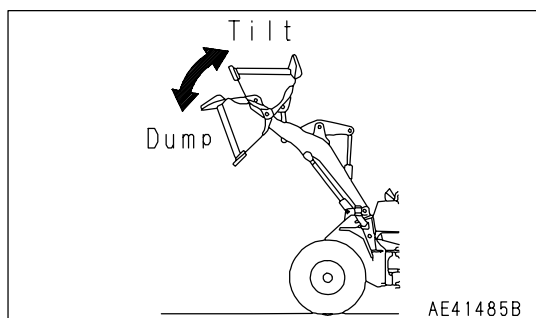
Position (e): TILT

When the work equipment control lever is pulled further beyond the TILT position, the lever is stopped in this position until the bucket reaches the preset position of the positioner, and the lever is returned to the HOLD position.

Position (b): HOLD

The bucket is kept in the same position.

Position (f): DUMP



#### NOTICE

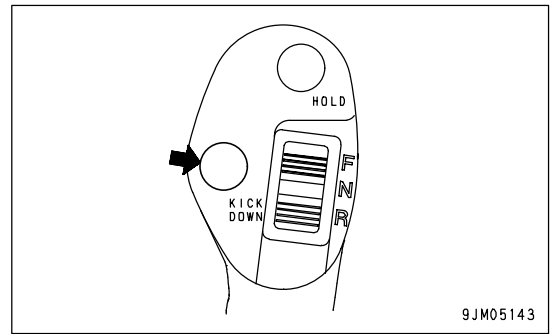
Do not use the FLOAT position when lowering the bucket. Use the FLOAT position when leveling, see "LEVELING OPERATIONS (PAGE 3-134)".

**KICKDOWN SWITCH**

When the gearshift lever is in 2nd, if switch (2) is pressed, the transmission will shift down to 1st.

Use this when you need to increase the drawbar pull in digging operations.

If the transmission is in auto-shift, and the travel speed is below 12.5 km/h (7.8 MPH) in any speed range when traveling in either forward or in reverse, the kick-down switch is actuated and it is possible to shift down to 1st.



This makes it easy to carry out load and carry operations.

Even if the travel speed is more than 12.5 km/h (7.8MPH), this switch can be used to shift the transmission down. Each time the kick-down switch is pressed, the speed range will shift down one range at a time (F4 -> F3 -> F2). When the torque converter is in the lock-up condition (if equipped), the lock-up is canceled.

**REMARK**

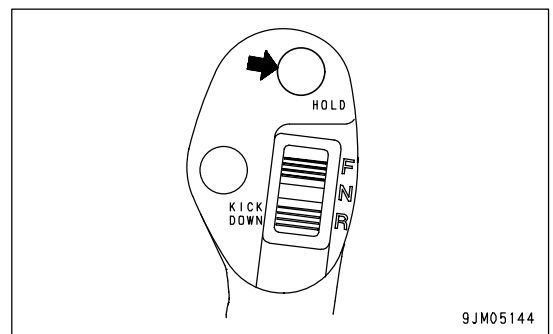
- When canceling the kick-down, operate the directional lever or the FNR switch. In manual shift, it can be canceled by operating the speed lever to any position other than 2nd. It is also possible to cancel the kick-down by turning the starting switch OFF.
- In auto-shift, if the travel speed becomes high after the kick-down, the gear will be shifted up by the auto-shift.
- In auto-shift, when traveling at more than 25 km/h (15.5 MPH) in 3rd or at more than 35 km/h (21.7 MPH) in 4th, even if the kick-down switch is pressed, the transmission will not shift down. This is to prevent overrun of the engine.

**HOLD SWITCH**

To fix the speed range when traveling in automatic transmission, press this switch (3). The transmission will be fixed in the speed range displayed on shift indicator (A) on the machine monitor and shift hold pilot lamp (B) will light up.

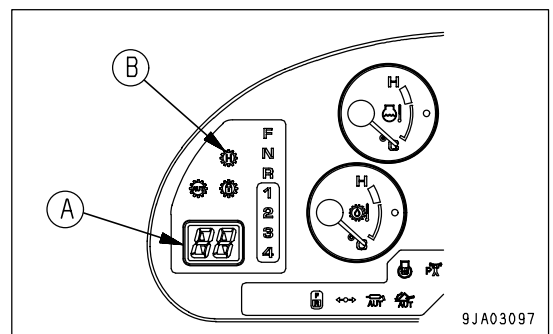
When the switch is pressed again, the display goes out.

Use this function to select the desired speed range when traveling up or down hills or when carrying out operations such as grading.



**REMARK**

- When the torque converter is in the lock-up condition (if equipped), the transmission cannot be fixed.
- When canceling the shift hold, operate the directional lever or the FNR switch. It can also be canceled by operating the speed lever and by switching the shift/manual selector switch to MANUAL. Is also possible to cancel the shift hold by turning the starting switch OFF.



## FNR SWITCH

This switch (4) is used to change the direction of travel of the machine.

Position (F): FORWARD

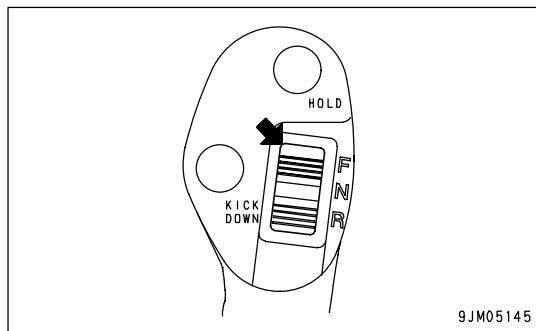
Position (N): Neutral

Position (R): REVERSE

Before operating this switch, check that the condition is as follows.

- Directional lever is at N
- Directional selector switch actuation switch is at ON

If the condition is not as above, the switch will not work.



9JM05145

## DIRECTIONAL SELECTOR SWITCH ACTUATION SWITCH

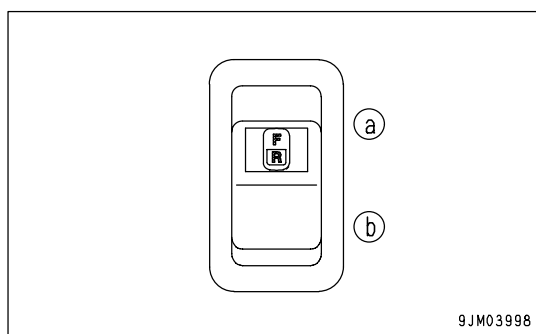
When this switch (5) is pressed, the FNR switch on the head of the multi-function lever is activated.

Position (a): ON

The pilot lamp inside the switch and the directional selection pilot lamp on the machine monitor light up, and the FNR switch is activated.

Position (b): OFF

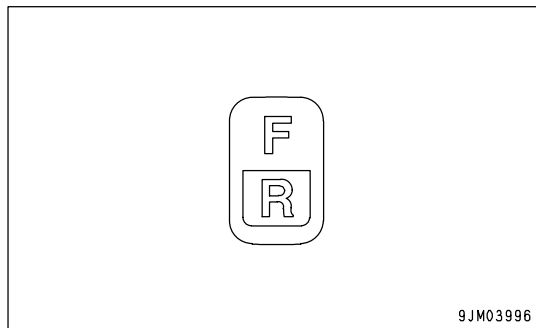
The FNR switch is not activated.



9JM03998

## DIRECTIONAL SELECTOR PILOT LAMP

This monitor (6) lights up when the directional selector switch actuation switch on the right switch panel is turned ON. It indicates that it is possible to operate the travel direction of the machine with the FNR switch on the head of the multi-function lever.



9JM03996



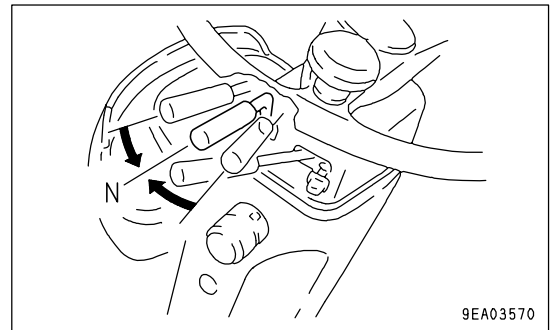
## USING FNR SWITCH TO CHANGE BETWEEN FORWARD AND REVERSE



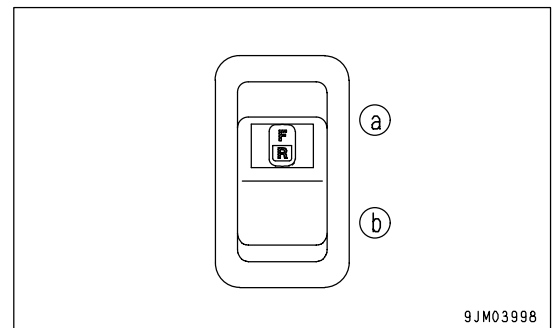
### WARNING

- When changing direction between FORWARD and REVERSE, check that the new direction of travel is safe. There is a blind spot behind the machine, so be particularly careful when changing direction to travel in reverse.
- When the directional selector switch actuation switch is at the ON position, if the directional lever is operated to F or R, the machine will travel in forward or reverse according to the operation of the directional lever, regardless of the position of the FNR switch on the head of the multi-function lever.  
Priority is given to the operation of the directional lever, so be careful when operating.
- Do not switch between FORWARD and REVERSE when traveling at high speed.  
When switching between FORWARD and REVERSE, depress the brake to reduce the travel speed sufficiently, then change the direction of travel. (Max.speed for changing direction: 12 km/h (7.5 MPH))

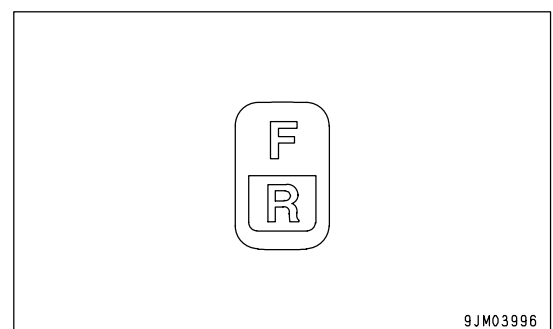
1. Place the directional lever at the N position.



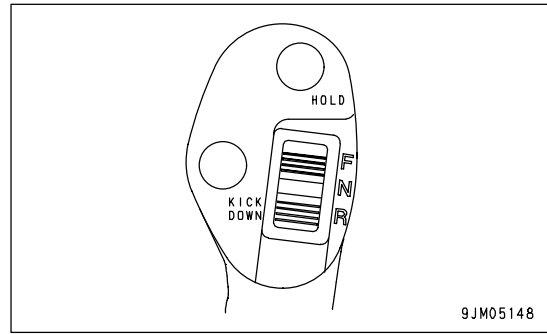
2. Turn on directional selector switch on the right side of switching panel that enables directional selection.  
Position (a): ON  
Position (b): OFF



The pilot lamp inside the switch and the directional selection pilot lamp on the machine monitor light up, and the FNR switch is activated.



3. Push the FNR switch on the head of the multi-function lever to the desired position.



If the directional selector pilot lamp on the machine monitor flashes, the switch or the lever is in one of the following conditions.

- When the directional selector switch actuation switch is at the OFF position, if the FNR switch is operated to F (or R):  
The pilot lamp flashes, and at the same time, the central warning lamp lights up and the alarm buzzer sounds. At the same time, "E00 SHIFTLEVER NEUT" is displayed on the character display.  
Set the FNR switch to the N position.
- When the engine is started, if the directional selector switch is at the ON position and the directional lever is at N, and the FNR switch is operated to F (or R):  
The pilot lamp flashes, and at the same time, the central warning lamp lights up and the alarm buzzer sounds.
- If the directional selector switch is at the ON position and the FNR switch is operated to F (or R):  
The pilot lamp flashes, and at the same time, the central warning lamp lights up and the alarm buzzer sounds. At the same time, "E00 SHIFTLEVER NEUT" is displayed on the character display.  
In this condition, the machine will travel in forward or reverse according to the operation of the directional lever. Set the directional lever and the FNR switch on the head of the multi-function lever to the N position.

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WA470-5 GALEO WHEEL LOADER

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