# Operation & Maintenance Manual

EEAM024501

# WA600-6

## WHEEL LOADER

SERIAL NUMBER
**WA600-6 - 60001 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 inside the cab for reference and periodically reviewed by all personnel who will come into contact with the machine.**

KOMATSU

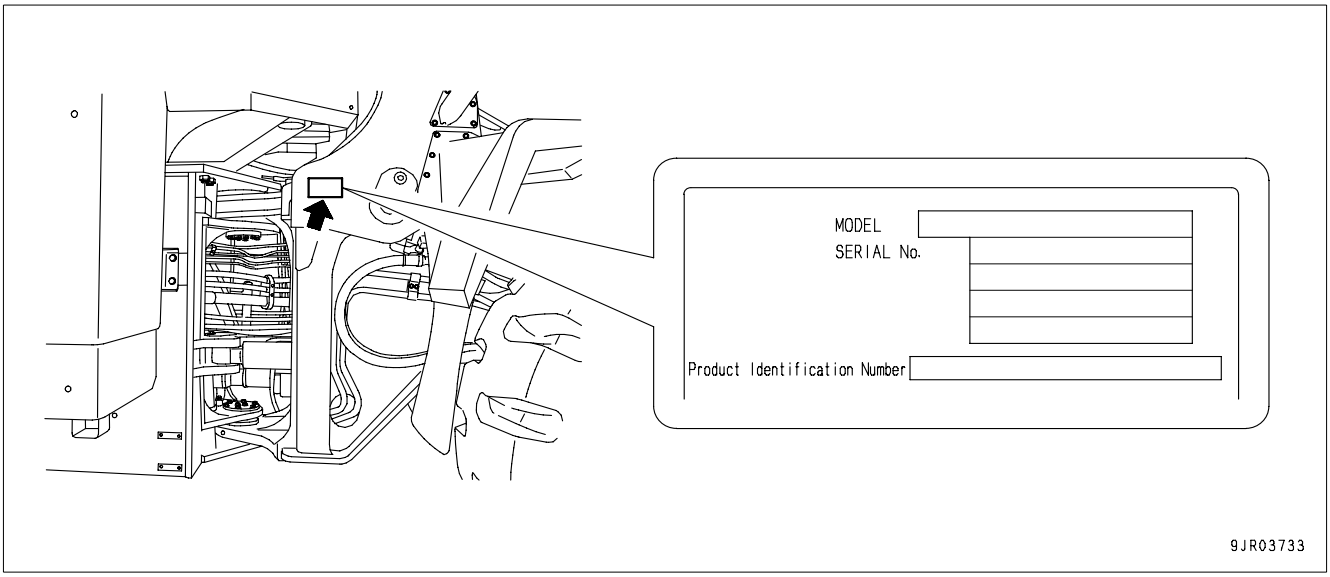
# NECESSARY INFORMATION

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

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

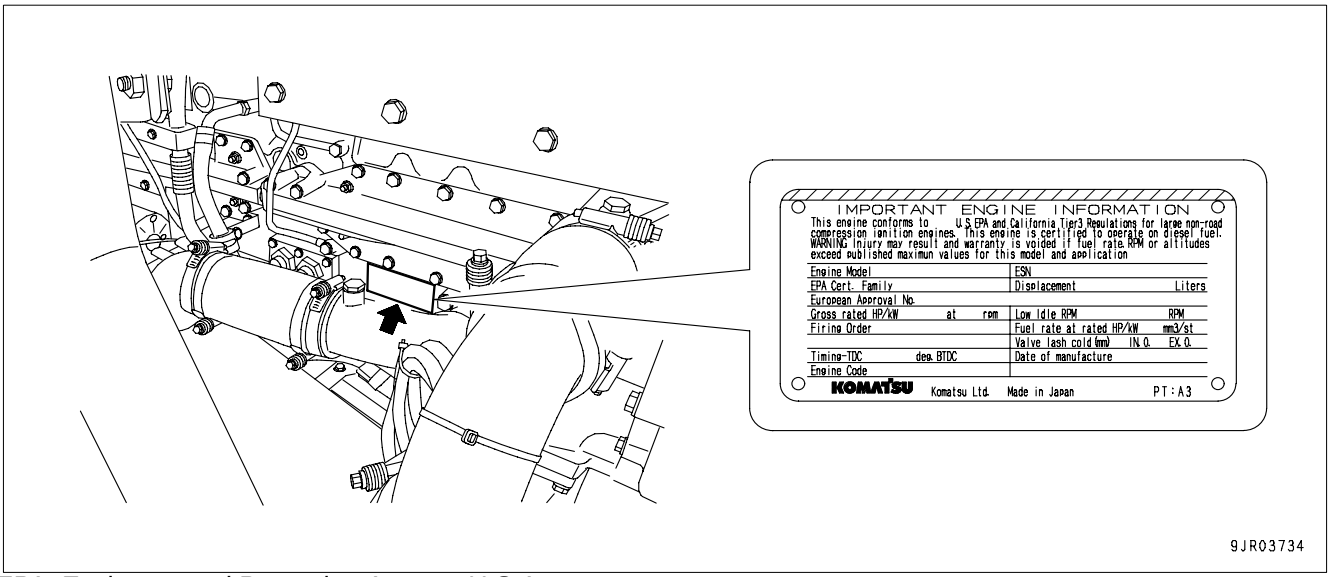
On the center right of the front frame.

The design of the nameplate differs according to the territory.




## EPA REGULATIONS, ENGINE NUMBER PLATE

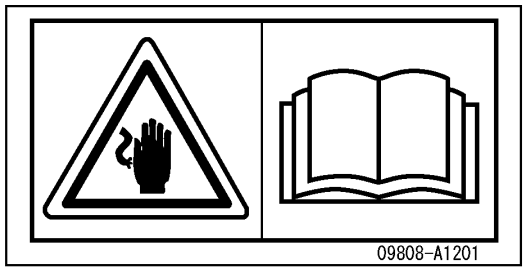
This name plate is affixed on the oil cooler at the side of engine cylinder block on the left side of machine.




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

(10) Caution when handling battery cable (09808-A1201)

- Sign indicates an electric hazard from handling the cable.
- Read manual for safe and proper handling.




(11) Caution to prohibit going up on the hood (09805-A0881)

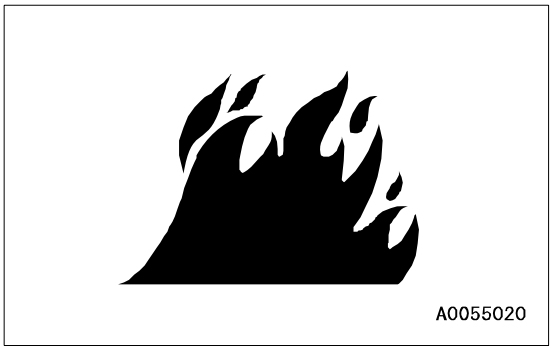
- There is the hazard of falling down.
- Do not go close to the edge of the machine by mistake.

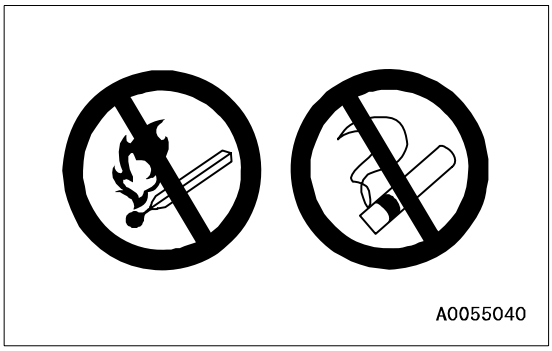

(12) “Do not go under work equipment“ sign (09807-C1683)

- Sign indicates a crush hazard from falling off of working device.
- Keep away when the working device is raised.

## 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.

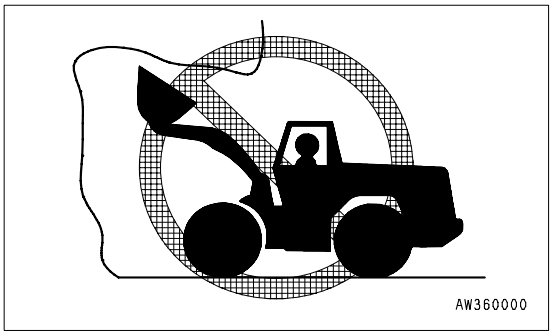
- **Fire coming from hydraulic line**

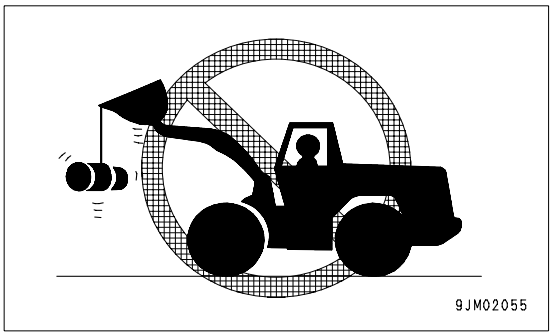
Check that all the hose and tube clamps, guards, and cushions are securely fixed in position.

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.

**PROHIBITED OPERATIONS**

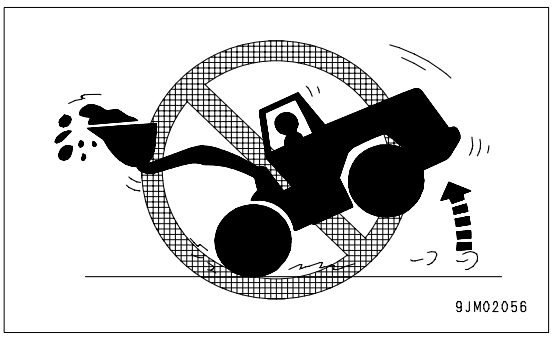
- It is dangerous to excavate the bottom of a rock face. Never do this.
- When digging, never thrust the bucket into a load at an angle. This will bring an excessive load to bear on the machine and will reduce the service life of the machine.
- It is dangerous to apply drive force when excavating a rock face. In addition, an excessive load will be brought to bear on the machine and this will cause damage to the machine.
- Never carry out digging operations on a downhill slope. An excessive load will be brought to bear on the machine and this will cause damage to the machine.
- 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**

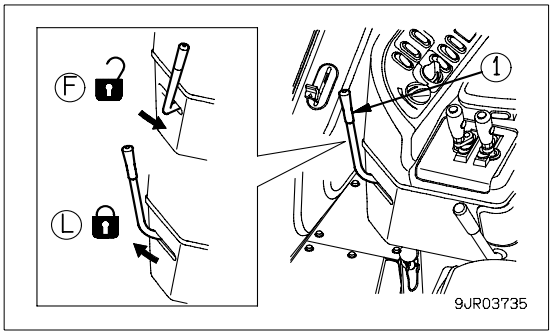
- When using the machine, to prevent the machine from overturning due to overloading and to avoid damage to the work equipment, do not exceed the maximum permitted load or performance of the machine.
- If the engine cannot be started again after it has stopped, immediately operate the work equipment 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.

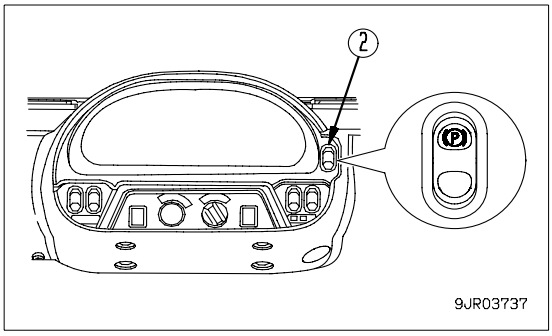


- Set work equipment lock lever (1) to the LOCK position (L) to prevent the work equipment from moving.

  In addition, set parking brake switch (2) to the ON position to prevent the machine from moving.

- 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.



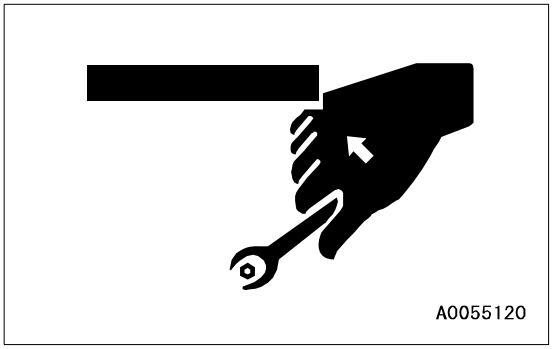




**INSPECTION AND MAINTENANCE AFTER TURNING E.C.S.S. SWITCH OFF**

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.

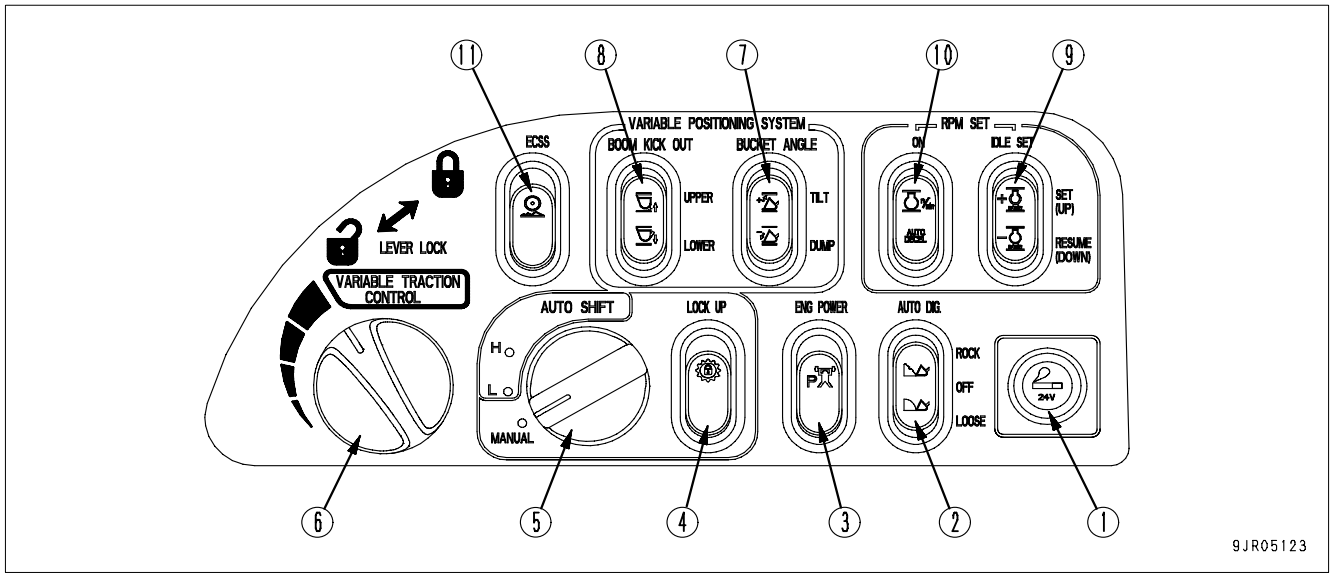



**ACCUMULATOR**

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.

RIGHT SWITCH PANEL




(1) Cigarette lighter
(2) Semi auto digging selector switch (if equipped)
(3) Engine power mode selector switch
(4) Torque converter lock-up switch
(5) Transmission auto shift/manual shift selector switch
(6) Driving force control dial
(7) Remote positioner bucket angle set switch
(8) Remote positioner raise/lower set switch
(9) RPM set idling up-down selector switch (if equipped)
(10) RPM set ON-OFF switch (if equipped)
(11) E.C.S.S. switch (*) (if equipped)

(*) E.C.S.S.: Electrically Controlled Suspension System

Hydraulic tank breather element
“REPLACE HYDRAULIC TANK BREATHER ELEMENT (4-72)“

Hydraulic filter
“CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT (4-69)“

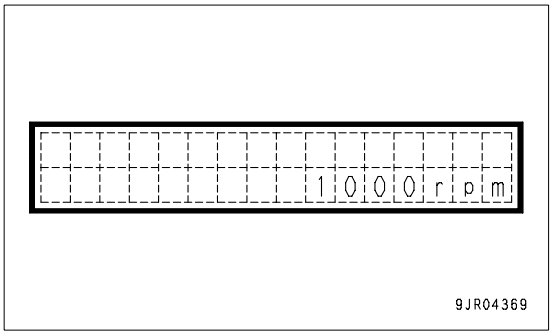
Hydraulic oil
“CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT (4-69)“

Axle oil
“CHANGE AXLE OIL (4-72)“

**ENGINE SPEED (OR TRAVEL SPEED) DISPLAY**

When the machine monitor meter displays the travel speed, this display (6) shows the engine speed. When the machine monitor meter displays the engine speed, this display (6) shows the travel speed.

For details, see “METHOD OF SWITCHING TRAVEL SPEED/ ENGINE SPEED DISPLAY/NON-DISPLAY (3-43)“.

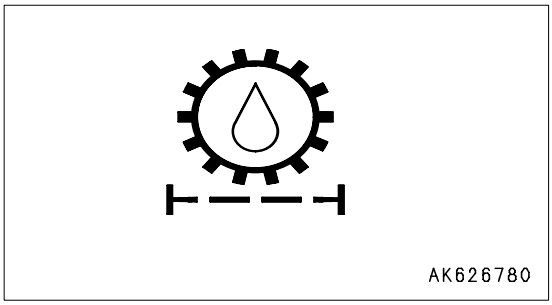


**TRANSMISSION OIL FILTER CLOGGING CAUTION LAMP**

This lamp (7) lights up when the transmission oil filter is clogged.

When the transmission oil filter is clogged, the transmission clogging caution lamp lights up.

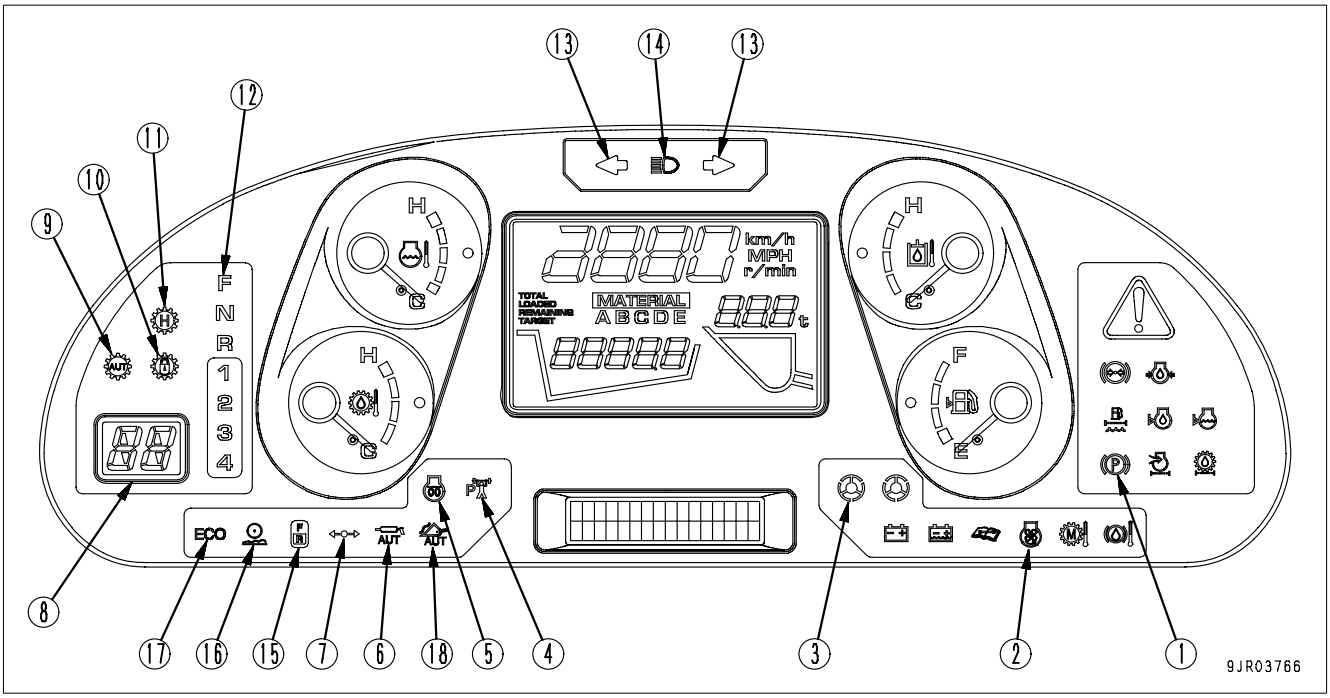
At the same time, “E01 TRANSM FILTER“ is displayed, so stop the engine, and replace the element.




**REMARK**
If the engine is stopped or the torque converter oil temperature is low, the transmission oil filter clogging caution lamp does not light up.

## PILOT DISPLAY PORTION

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

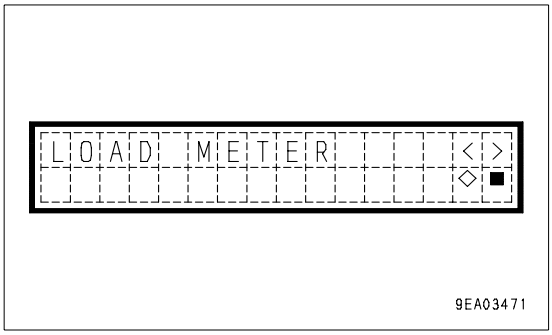



(1) Parking brake pilot lamp
(2) Cooling fan reverse rotation pilot lamp
(3) Emergency steering pilot lamp (if equipped)
(4) Output mode pilot lamp (power mode)
(5) Preheating pilot lamp
(6) Auto-greasing pilot lamp (if equipped)
(7) AJSS actuation pilot lamp (*1)
(8) Shift indicator
(9) Auto shift pilot lamp
(10) Lock-up pilot lamp
(11) Shift hold pilot lamp
(12) Shift position pilot lamp
(13) Turn signal pilot lamp
(14) Head lamp high beam pilot lamp
(15) Directional selector pilot lamp
(16) E.C.S.S. pilot lamp (*2) (if equipped)
(17) Economy operation display lamp
(18) Semi auto digging pilot lamp (if equipped)

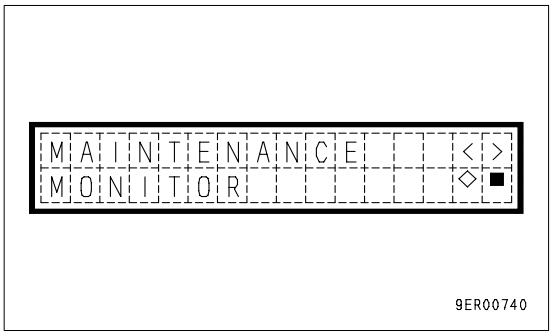
(*1) AJSS: Advanced Joystick Steering System

(*2) E.C.S.S.: Electrically Controlled Suspension System

**REMARK**
If a load meter is installed, when the (◇) portion of the machine monitor mode selector switch 1 is pressed, the screen displays “LOAD METER“.
If the (>) or (<) portion of the machine monitor mode selector switch 2 is then pressed, the display changes to “ODO“ (odometer).




2. Press the (>) or (<) portion of the machine monitor mode selector switch 2 to display “MAINTENANCE MONITOR“.

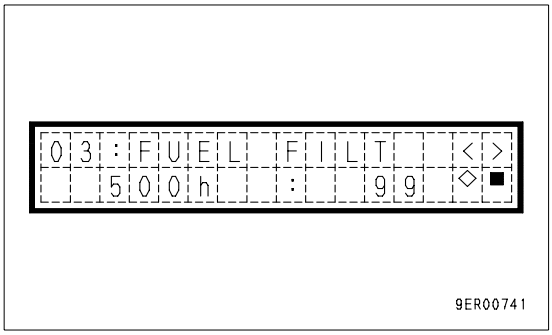



3. Press the (◇) portion of the machine monitor mode selector switch 1. The screen switches to the display shown on the right.

   The replacement interval is shown on the bottom line at the left and the number of times of replacement is shown on the right.

4. Press the (>) or (<) portion of the machine monitor mode selector switch 2 to display the filter or oil item that has been replaced.

   For details of the items to reset, see “FILTER, OIL REPLACEMENT TIME DISPLAY (3-13)“.

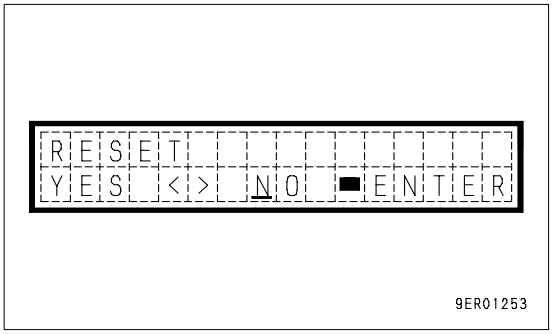



5. Press the (◇) portion of the machine monitor mode selector switch 1. The screen switches to the display shown on the right.

   “RESET“ and “ITEM TO RESET“ are displayed on the top line in turn.

6. When resetting the replacement interval, press the (>) or (<) portion of the machine monitor mode selector switch 2, set the cursor on “YES“, then press the (■) portion of the machine monitor mode selector switch 1. The time is reset and the screen returns to the previous screen.

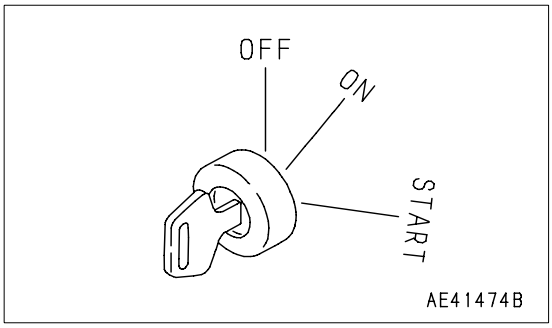
   To abort the operation, set the cursor on “NO“, then press the (■) portion of the machine monitor mode selector switch 1.




7. When resetting the replacement interval for another item, repeat the procedure from Step 4. After completing the resetting operation, press the (■) portion of the machine monitor mode selector switch 1 twice or turn the starting switch OFF.

**STARTING SWITCH**

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




OFF position

The key can be inserted and removed at this position. When the key is turned to this position, all electrical circuits 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.

If the engine water temperature is below -5°C when the engine is started, the preheating pilot lamp will light up automatically and preheating will start.

The preheating time differs according to the temperature of the water when the engine is started.

If the preheating pilot lamp lights up, wait for it to go out, then turn the key to the START position.

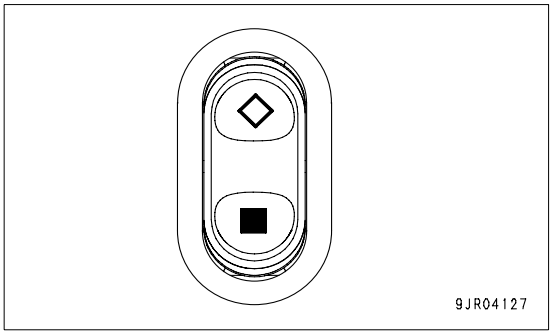
START position

This is the engine-start position. Keep the key at this position during cranking. Immediately after starting the engine, release the key. It will automatically return to the ON position.

**MACHINE MONITOR MODE SELECTOR SWITCH 1**

This switch (2) 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

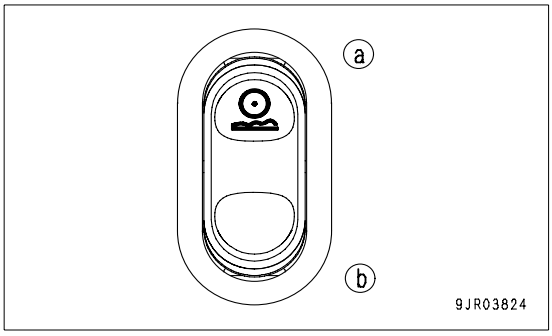
This switch (6) is used to turn the E.C.S.S. ON and OFF.

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.



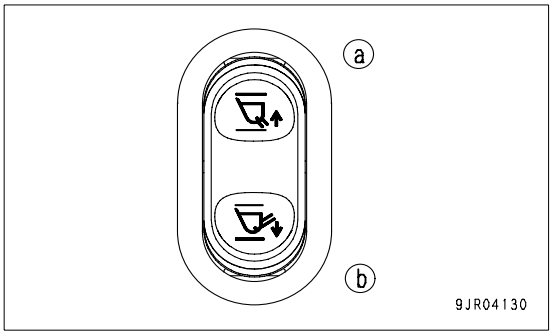

**REMARK**
The E.C.S.S. is a device that uses the hydraulic spring effect of an accumulator to absorb the vibration of the chassis during travel and allows the machine to travel smoothly and at high speed.
When traveling in 1st, the E.C.S.S. is not actuated.
When the speed range is 2nd to 4th, and the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

**REMOTE POSITIONER RAISE/LOWER SET SWITCH**

Use this switch (7) to set the kick-out position for the lift arm.

Position (a): When the lift arm is above the horizontal position, raise the lift arm to the position to set the kick-out. Press the top (a) of this switch to set the kick-out for the RAISE operation at that position.

Position (b): When the lift arm is below the horizontal position, lower the lift arm to the position to set the kick-out. Press the bottom (b) of this switch to set the kick-out for the LOWER operation at that position.




If the setting has been made without problem, the buzzer emits short sounds.

If it was not possible to make the setting, the buzzer does not sound.

If the switch is kept pressed for more than 1 second, the buzzer emits a long sound and the kick-out position setting is cancelled.

For details, see “OPERATING REMOTE BOOM POSITIONER (3-136)“.

**REMOTE POSITIONER BUCKET ANGLE SET SWITCH**

When setting the angle of the bucket, set the bucket control lever to the HOLD position and stop the machine. If the bucket control lever is not at HOLD and the machine is not stopped, the setting cannot be carried out.

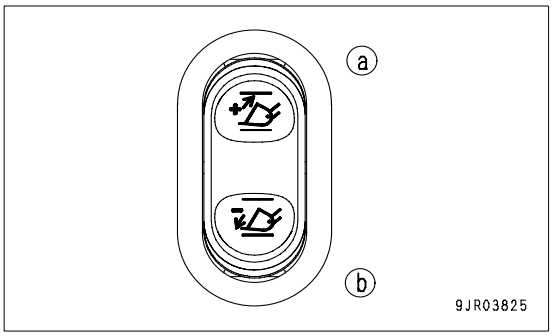
When this switch (8) is pressed, the bucket lower is actuated and the angle of the cutting edge is set to the desired angle when the tilt operation is stopped on the ground.

Each time (a) is pressed, the stop position when the leveler is actuated is set to face up one stage.

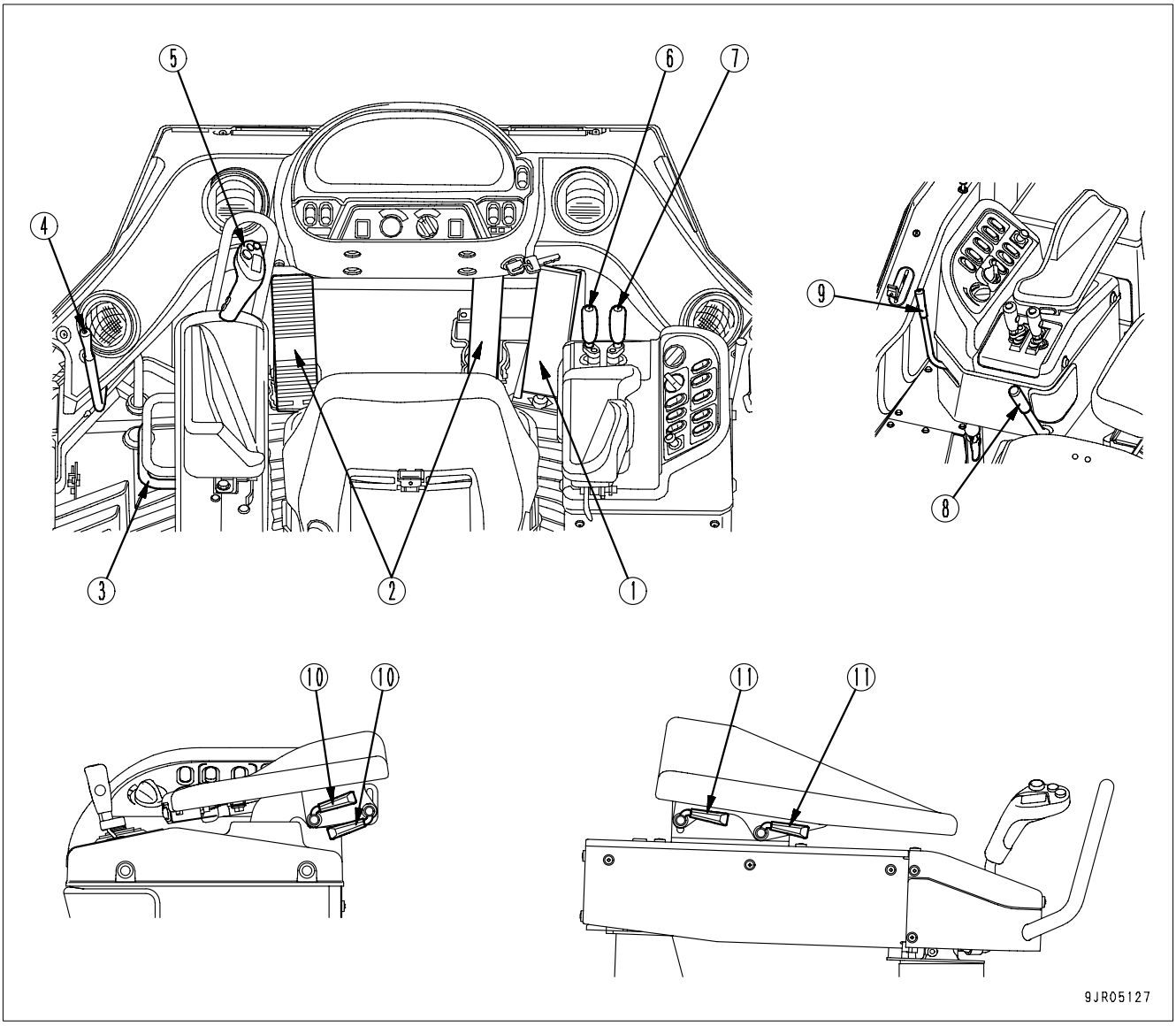
Each time (b) is pressed, the stop position when the leveler is actuated is set to face down one stage.

When setting the bucket facing up or down, it is possible to set up or down five stages (± 5) from the horizontal. The angle changes approx. 1° for each stage.

The angle of the bucket doesn't change when the remote positioner bucket angle set switch is pushed. The bucket stops at the set angle by operating the bucket leveller after the angle is set.



## CONTROL LEVERS, PEDALS



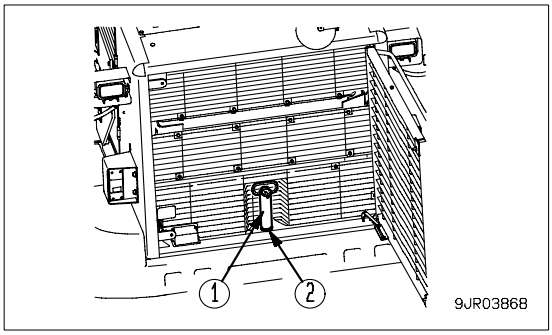

(1) Accelerator pedal
(2) Brake pedal
(3) AJSS lever front-rear adjustment knob
(4) Steering lock lever
(5) AJSS lever
(6) Bucket control lever
(7) Lift arm control lever
(8) Work equipment control lever directional adjustment lever
(9) Work equipment lock lever
(10) Right armrest adjustment lever
(11) Left armrest adjustment lever

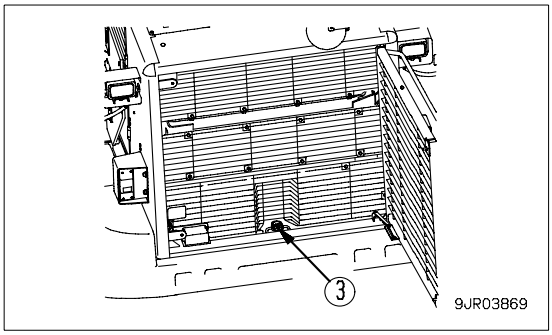
## TOWING PIN

Towing pin (1) is installed to the counterweight (2) and is used when towing the machine.

When using towing pin (1), open the rear grill.

Insert linchpin (3) into the towing pin and counterweight so that the towing pin does not come out.

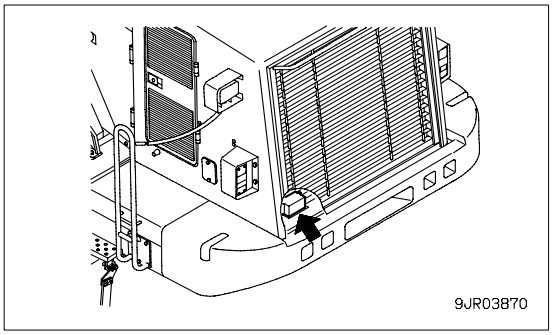



## BACKUP ALARM

When the machine travels in reverse, the alarm sounds to warn people in the area that the machine is traveling in reverse.

When the directional selector switch on the head of the AJSS lever is set to the R position, the alarm sounds.

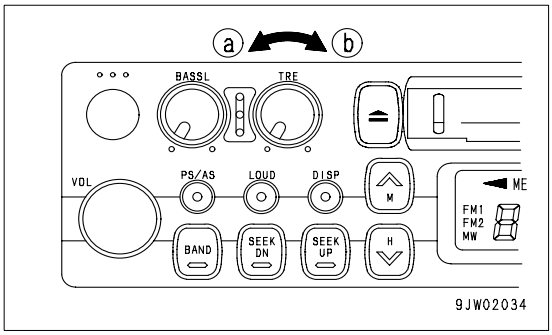


**TREBLE CONTROL KNOB**

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

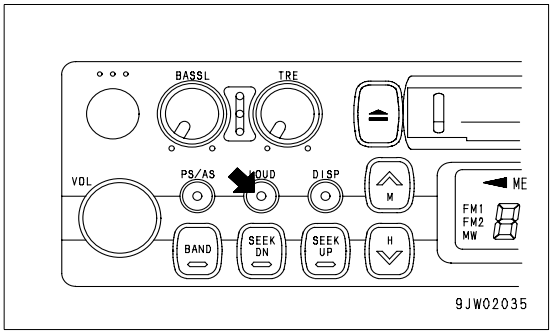



**LOUDNESS BUTTON**

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.

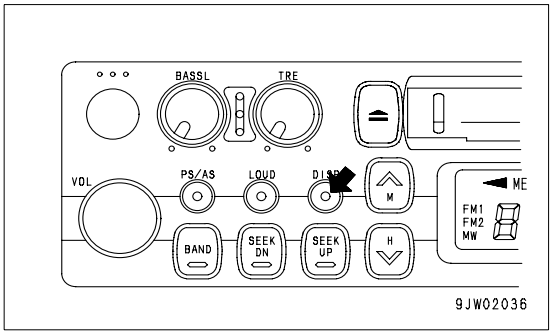
Push button: Actuated (ON)

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

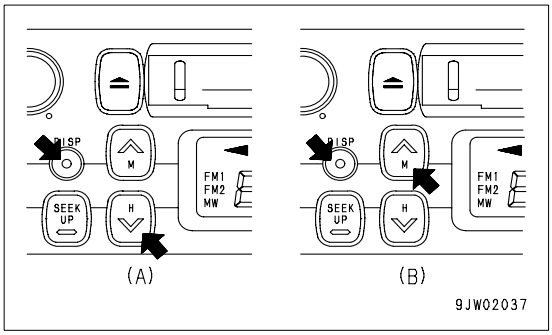
  Press the button to set the time display.

  (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.



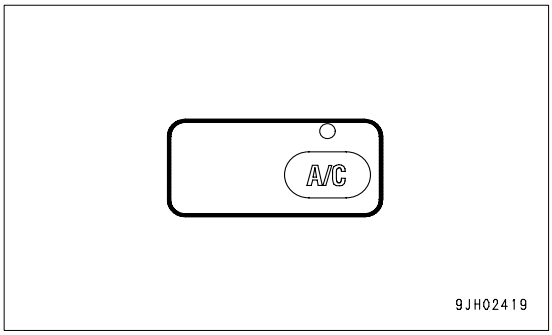
### AIR CONDITIONER SWITCH

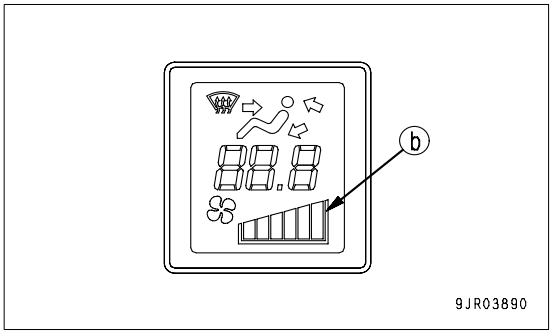
Use this switch (8) to operate or stop the air conditioner (cooling, dehumidifying warming).

- When the fan is actuated (display (b) is shown) and air conditioner switch (8) is pressed, the air conditioner is switched ON, lamp above the air conditioner switch lights up, and the air conditioner starts.

  When switch (8) is pressed again, the air conditioner is switched OFF, lamp above the air conditioner switch goes out, and the air conditioner stops.

- Air conditioner cannot be operated while the fan is off.




## METHOD OF OPERATION

For this air conditioner, there are two methods of operation: automatic and manual.

With automatic operation, the air flow, vents, and air intake source are automatically selected according to the set temperature.

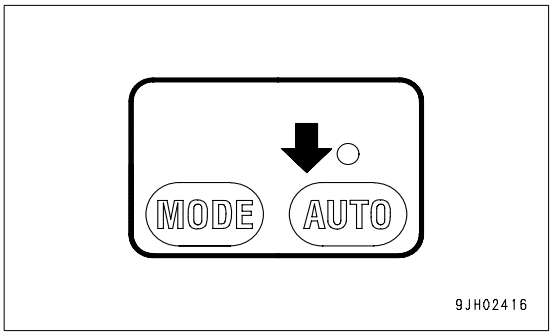
With manual operation, the air flow, vents, and air intake source are switched manually.

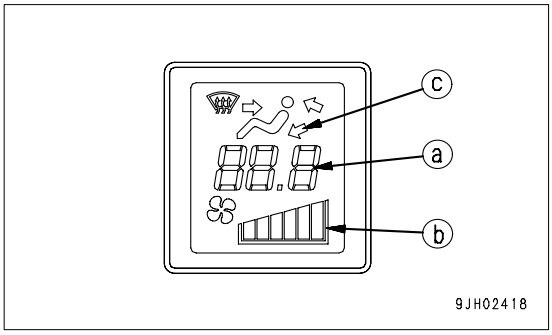
Please select the method of operation as desired.

### AUTOMATIC OPERATION

1. Turn the auto switch (5) ON.

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



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.

**NOTICE**

- **Before starting operations, clean all dirt from the surface of the lamps. If the lamps are used with mud stuck to the surface, the lamp may overheat and suffer damage.**
- **If the lamp is cleaned when it is overheated, the sudden change in temperature may cause the lens to crack. Turn the lamp off and wait for the temperature to go down before cleaning the lamp.**

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.

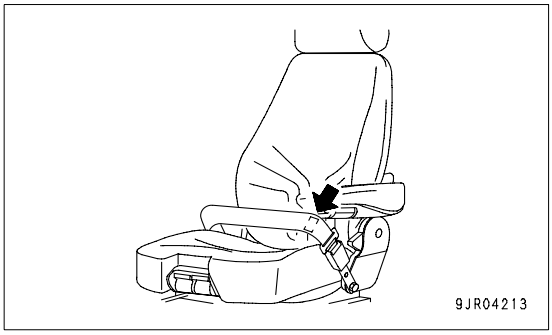
11. Check for damage to the seat belt and mounting clamps.

## ⚠ WARNING

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

**REMARK**

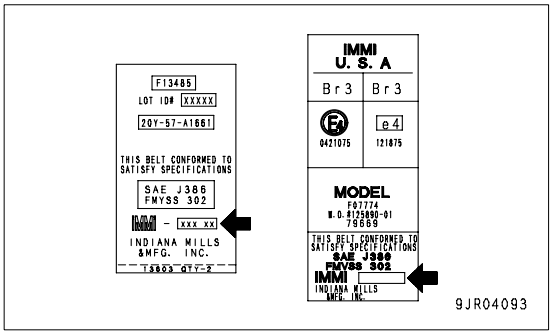
The date of manufacture of the seat belt is marked on the belt at the place indicated by the arrow in the diagram on the right.




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 ± 4.9 Nm (2.5 ± 0.5 kgm)

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.



**REMARK**
If lever (3) is pulled up further from the maximum height, the air compressor may make a sound of actuation but the seat may not rise. This does not indicate any abnormality.
If this happens, the air compressor will stop automatically after approx. 8 seconds. It will also stop if lever (3) is pushed down.

(D) Setting seat for weight

Pull lever (3) up fully (pull it until a click can be felt). When the lever is released, the weight adjustment is carried out automatically. To ensure that the weight adjustment is carried out correctly, the operator should sit in the normal operating position when operating the lever. If the operator raises his body from the seat or changes the amount of weight applied to the seat during adjustment, the air in the suspension may be discharged.

When operators change shifts, the new operator should pull lever (3) up fully (pull it until a click it is felt). When the lever is released, the weight adjustment is carried out automatically.

If lever (3) is pulled lightly, the weight adjustment starts, but always pull the lever up fully (pull it until a click is felt) before releasing it.

**REMARK**
When making initial adjustment or when adjusting the weight settings when operators change shifts, set the damping force of the suspension damper to the soft setting (for details, see “Adjusting hardness of suspension damper“), then adjust it to match the operator's weight. If the damping force of the suspension damper is left set to the hard setting and the height of the seat is adjusted, even if the height is raised, the seat may go down. If the seat goes down, set the damping force of the suspension damper to the soft setting, lower the seat, then adjust the weight again. After completing adjustment of the weight and height, set the damping force of the suspension damper to the desired strength.
To protect the operator, the suspension must be adjusted to match the operator's weight. Adjust the weight before starting operations.
When adjusting, do not remove your weight from the seat or change the load in any other way. If this is done, the air may be released from the suspension's seat.

(E) Fore-and-aft adjustment of seat cushion

Operate lever (4) up, set the seat cushion to the desired position, then release the lever.

Fore-and-aft adjustment: 60 mm

(F) Adjusting reclining angle

Operate lever (5) up and move the back cushion to the front or rear.

But your back firmly against the seat back when carrying out this adjustment. If you move your back away from the seat back, the seat back may suddenly spring forward.

Amount of adjustment

Forward tilt: 20 degrees (over 20 degrees is free)

Rear tilt: 60 degrees

**NOTICE**
**If the seat back is reclined too far, the seat back may hit the rear glass, so use it in a position where it does not contact the glass.**

(G) Adjusting headrest angle

Rotate the backrest to the front or rear and set to the desired angle.

Amount of adjustment: 38 degrees

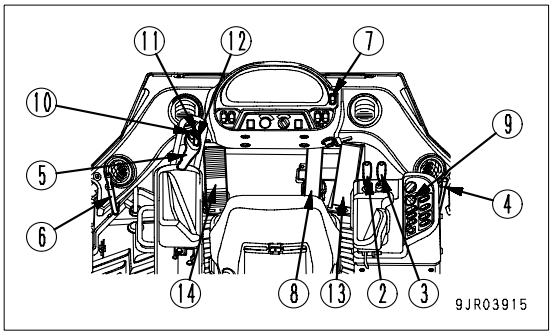
# MOVING THE MACHINE (DIRECTIONAL, SPEED), STOPPING THE MACHINE

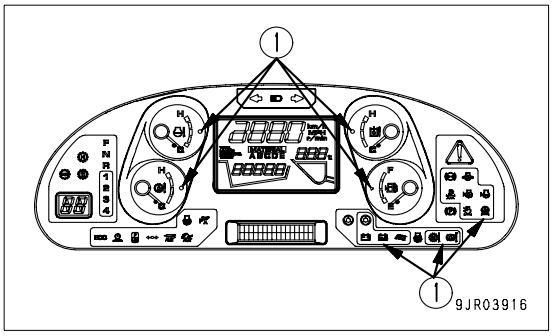
## ⚠ WARNING

- **Always remove the frame lock bar before traveling. If it is not removed, the steering will not work and this may lead to serious personal injury.**
- **When moving the machine off, check that the surrounding area is safe, then sound the horn and start the machine.**
- **Do not let any person enter the area around the machine.**
- **Remove any obstacles from the travel path.**
- **The rear of the machine is a blind spot, so when traveling in reverse, be particularly careful to check that it is safe.**
- **When starting the machine off on a slope, depress the left brake pedal, then depress the accelerator pedal and slowly let the left brake pedal back to allow the machine to move off. This will prevent the machine from running back down the slope.**

## PREPARATIONS FOR MOVING MACHINE

1. Check that warning pilot lamp (1) is not lighted up.



### BUCKET CONTROL LEVER

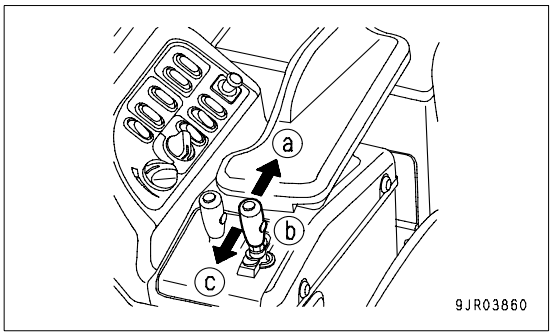
Set the work equipment lock lever to the FREE position before operating the control lever.

Position (a): TILT

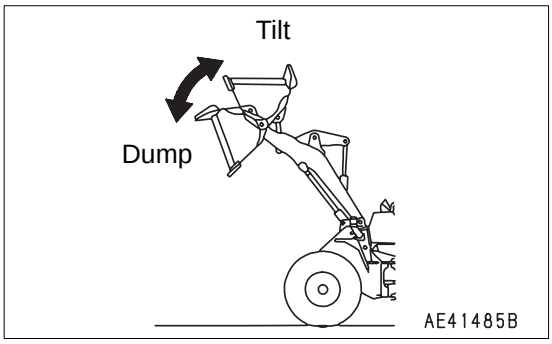
Position (b): HOLD

The bucket is stopped and held in position.

Position (c): DUMP




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.




## SEMI AUTO DIGGING OPERATIONS

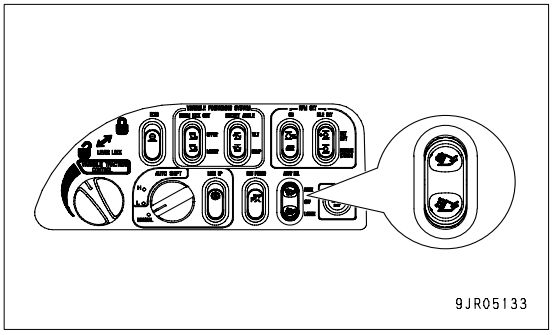
### SEMI AUTO DIGGING FUNCTION

With semi auto digging, the bucket tilt operation is automatically controlled. The purpose of this is to make bucket operations easier and relieve the load on the operator. For details of the work that can be carried out with a wheel loader, see “DIGGING OPERATIONS (3-139)“.

### ACTUATION OF SEMI AUTO DIGGING

Set the semi auto digging selector switch to “ROCK mode“ or “LOOSE mode“ to match the material being handled.

1. Drive the machine forward and lower the bucket to a position approx. 300 mm above the ground.
2. Press the kickdown switch to shift down to F1.
3. Depress the accelerator pedal and dig the cutting edge of the bucket into the stockpile.
4. Operate the lift arm in the RAISE direction, then return it to HOLD, or set the lift arm control lever to the detent position. This is taken as the starting signal, and semi auto digging will start after approx. 1 second.




During semi auto digging operations, the tilt is operated automatically and the lift arm rises at the same time, even when the lift arm control lever is at the HOLD position.

**REMARK**
When carrying out digging operations with the speed range in 1st, if the kickdown switch is pressed, the mode will enter the semi auto digging mode.

## PRECAUTIONS WHEN HANDLING BLASTED ROCK

If the target load is blasted rock, pay careful attention to the following items when carrying out the operation in order to extend the service life of the machine.

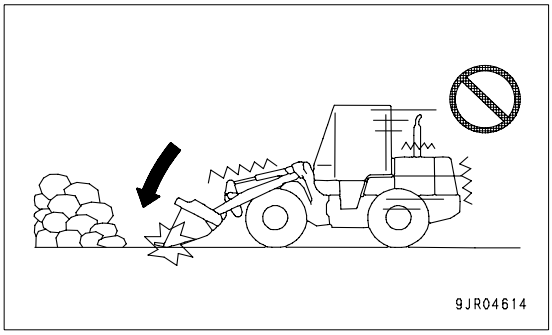
### OPERATING PROCEDURE TO PREVENT DAMAGE TO MACHINE

#### HANDLING BUCKET

When approaching the facing and lowering the bucket to the ground, do not drop the bucket suddenly into contact with the ground. If the bucket is dropped suddenly, the bucket, work equipment, area around the pins, and the machine frame will be subjected to excessive shock, and this will lead to damage or deformation of various parts of the machine.

In addition, the front wheels were come off the ground, so this will cause the machine to slip.

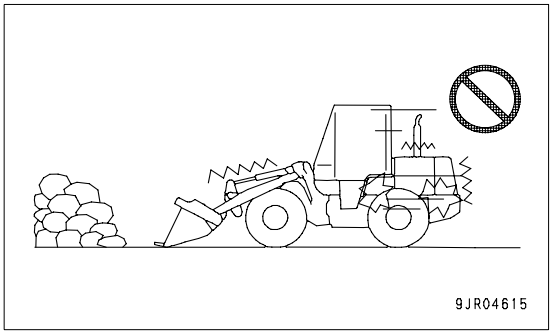
When lowering the bucket to the ground, reduce the lowering speed of the bucket when it is close to the ground and bring it slowly into contact with the ground.




#### SHIFTING TRANSMISSION WHEN THRUSTING BUCKET IN

When thrusting the bucket into the facing to carry out excavation, do not shift down with the accelerator pedal depressed (with the engine speed raised). If the transmission shifts down when the engine speed is high, there will be an excessive load on the engine, torque converter, transmission, axles, final drive, and the whole power train.

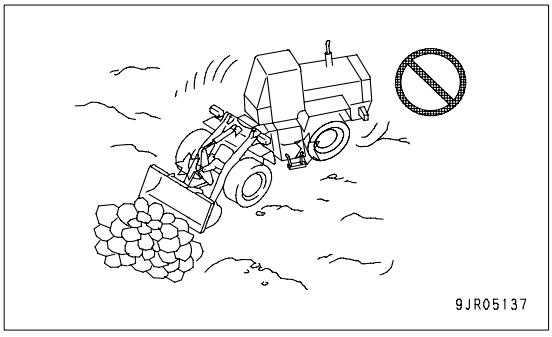
When shifting down to 1st and thrusting the bucket into the facing, release the accelerator pedal to reduce the engine speed before shifting down. Then gradually depress the accelerator pedal. If the accelerator is operated suddenly after shifting down, there will be excessive load brought to bear on the engine and power train.




#### ARTICULATING MACHINE DURING DIGGING OPERATIONS

Do not carry out operations with the machine articulated. If the machine is articulated, the direction of force will be different for the front wheels and rear wheels. As a result, the power when traveling will not be transmitted fully to the front wheels, so this will reduce the digging force and bring an excessive load to bear on the center hinge pin. In addition, even with the front wheels, the power will not be transmitted uniformly to the left and right wheels. The load will be brought to bear on one wheel, so this will reduce the service life of the tire on one side.

If digging work is carried out with the machine articulated, the overall stability of the machine will be poor and there is danger of the machine tipping over.

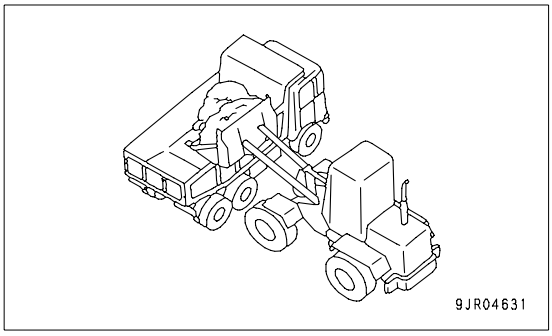


### LOADING DUMP TRUCK

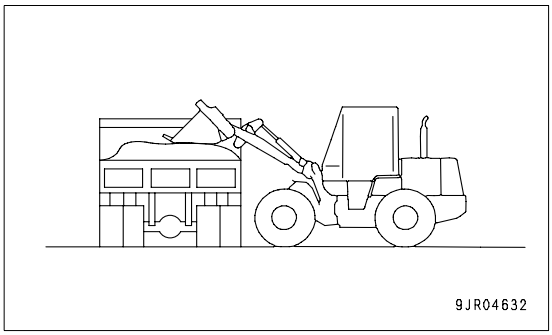
**NOTICE**

- **Do not load the dump truck suddenly from a high position. If the dump truck is loaded like this, the dump truck will suffer impact load and there is danger that this may damage the body.**
- **Do not operate the dump or stop operations when the engine is running at high speed. There is danger of impact pressure being generated in the hydraulic equipment and causing damage to the hydraulic equipment.**
- **Do not shake the bucket violently to dump the load inside the bucket. The machine will sway greatly and there is danger of damage to the machine. In addition, there is danger of impact pressure being generated in the hydraulic equipment and causing damage to the hydraulic equipment.**
- **When loading the dump truck, do not pushed forcibly with the bucket. This machine and the dump truck will suffer impact shock, and this will cause damage. When pushing the load with the bucket to prevent rocks from falling, carry out the operation softly.**
- **When loading large rocks, first load with sand or soil to act as a cushion. Then load the large rocks on top. If large rocks are loaded directly, they will cause deformation or damage to the dump body.**

1. When loading the dump truck, load at a low point that does not hit with the dump truck or dilution.




2. After completing the loading, if there is danger of rocks falling off, push the load softly with the bucket.



## CHECKS AFTER COMPLETION OF OPERATION

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.

Check that there are no loose bodywork mounting bolts.

Check that there are no cracks in the work equipment or bucket.

## LOCKING

Always lock the following parts.

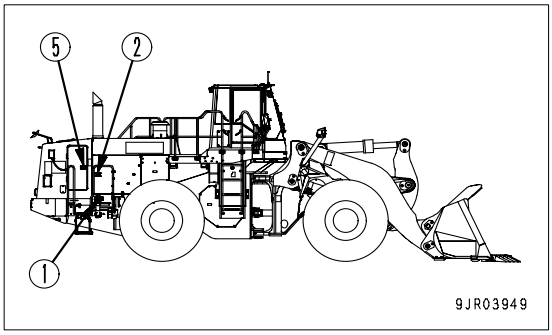
(1) Fuel tank filler cap (1 place)

(2) Engine side panel (2 places)

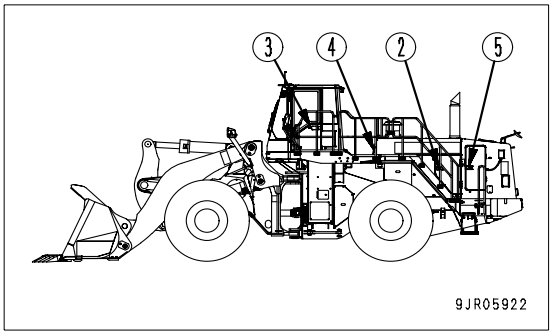
(3) Cab door (1 places)

(4) Engine hood (1 place) (Bulkhead cover)

(5) Radiator guard (2 places)




**REMARK**
The starting switch key is used for locking places (1), (2), (3), (4) and (5).



# 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 (4-10)“.

### 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 (AF-NAC) 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.**
- **When using Komatsu Supercoolant (AF-NAC), there is no need to use a corrosion resistor. For details, see “CLEAN INSIDE OF COOLING SYSTEM (4-24)“.**

For details of the antifreeze mixture when changing the coolant, see “CLEAN INSIDE OF COOLING SYSTEM (4-24)“.

**NOTICE**

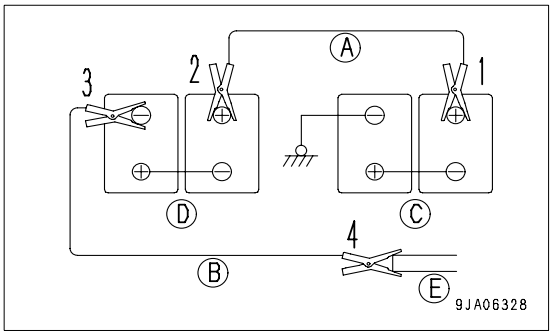
- **The starting system on this machine is 24V. For the normal machine, use a machine that is also 24V.**
- **Always use a booster cable or clip of a thickness that is suitable for the size of the battery.**
- **For the battery on the normal machine, use a battery with the same capacity as the problem machine.**
- **Check that the cable and clips are not damaged or corroded.**
- **Connect the clips securely.**
- **Check that the lock levers (work equipment, steering) and parking brakes of both machines are at the LOCK position.**
- **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 (C).
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 (D).
4. Connect the other clip of booster cable (B) to the engine block (E) of the problem machine.



**DUSTY WORKSITES:**

When working at dusty worksites, do as follows:

- Check the air cleaner clogging caution lamp more frequently to check the degree of clogging of the air cleaner.

  Clean the air cleaner element more frequently.
- 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:**

After repairing or replacing the parts of hydraulic circuit, or removing the piping of hydraulic circuit, it is necessary to bleed the air from inside of the circuit. See “BLEEDING AIR FROM HYDRAULIC TANK (4-41)“ for bleeding the air.

**PRECAUTIONS WHEN INSTALLING HYDRAULIC HOSES:**

- When removing parts at locations where there are O-rings or gasket seals, clean the mounting surface, and replace with new parts.

  When doing this, be careful not to forget to assemble the O-rings and gaskets.
- When installing the hoses, do not twist them or bend them sharply. If they are installed so, their service life will be shortened extremely and they may be damaged.

**CHECKS AFTER INSPECTION AND MAINTENANCE:**

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 (2-38)“ 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.

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 (4-24)“.

Supercoolant AF-NAC may be supplied in premix. In this case, always top off with premix solution. (never dilute with water)

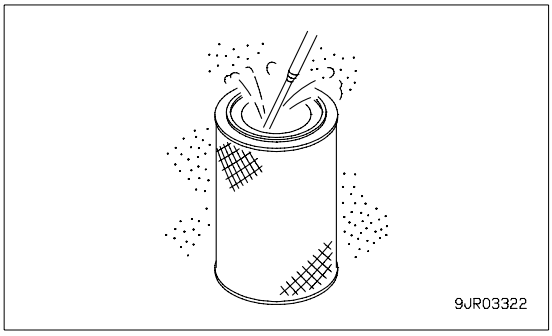
3) To maintain the anticorrosion properties of Supercoolant AF-NAC, always keep the density of Supercoolant between 30% and 68%.

## RECOMMENDED BRANDS, RECOMMENDED QUALITY FOR PRODUCTS OTHER THAN KOMATSU GENUINE OIL

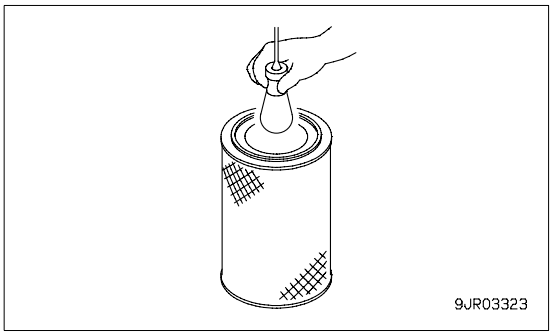
When using commercially available oils other than Komatsu genuine oil, consult your Komatsu distributor.

5. Direct dry compressed air (Max. 0.69 MPa (7 kg/cm$^2$) from the inside of the outer element along its folds. Then direct the compressed air from the outside along the folds, and again from the inside.

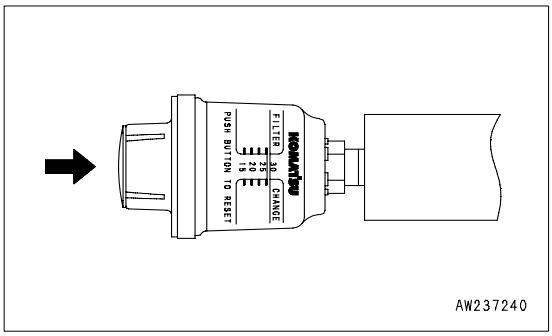
   1) If the air cleaner clogging warning lamp flashes immediately after the outer element has been cleaned, replace both the inner and outer elements.




**NOTICE**
**After cleaning and drying the element, check it by shining a light through it. If any small holes or thin cracks are found, replace the element.**
**When cleaning the element, do not hit it or beat it against anything.**
**Do not use an element that has damaged folds, gaskets, or seals.**




6. After cleaning the element, install it, then install cover (4).
7. After cleaning and replacing the element, push the dust indicator button to return the red display to its original position.




**REMARK**
After cleaning the element, press the button of the dust indicator. If the dust indicator shows the 5th stage even when the button is pressed, replace the element.
After the element is cleaned or replaced with a new element, the dust indicator may show the 3rd stage.

**REPLACING INNER ELEMENT**

1. First remove the outer element, and then remove the inner element.
2. Cover the air connector side (outlet side) with a clean cloth or tape.
3. Clean the inside of the air cleaner body, then remove the cover installed in Step 2.
4. Install a new inner element to the connector.

**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. Install the outer element and the cover.
6. After replacing the element, return the red display of the dust indicator to its original position.

## CLEAN RADIATOR FINS

**⚠ WARNING**

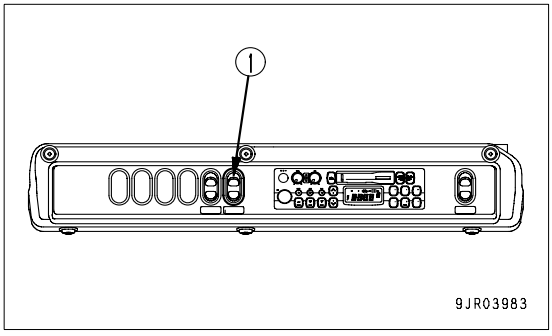
- **If compressed air, high-pressure water, or steam hits your body directly or dirt is sent flying by the compressed air, high-pressure water, or steam, there is danger of personal injyury. Always wear protective glasses, dust mask, and other protective equipment.**
- **Before carrying out cleaning and inspection, always stop the engine and check that the fan does not rotate. When rotating the fan, always install the fan net and close the radiator to prevent anyone from touching the fan.**

Clean the radiator fins if any mud or dirt is stuck to the radiator.

### 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 it is easy for dirt to stick to the radiator or cooler, turn cooling fan reverse rotation switch (1) ON to rotate the fan in reverse. This will blow off the dirt and dust stuck to the radiator or cooler, and can extend the cleaning interval.




### METHOD OF ROTATING FAN IN REVERSE

**NOTICE**
- **When the engine is running, even if the cooling fan reverse rotation switch is operated, the fan will not rotate in reverse, but the cooling fan reverse rotation pilot lamp on the main monitor will flash. Operate this switch only when the engine is stopped.**
- **When the fan is rotating in reverse, the pilot lamp on the main monitor lights up. Do not carry out operations while the lamp is lighted up. If the fan is run in the reverse direction during operations, the machine will be unable to display its performance fully and the engine will tend to overheat. During normal operations, always run the fan in the normal direction.**
- **When stopping the engine with the fan rotating in reverse, first run the engine at low idling before stopping it.**
- **When cleaning the fins by the rotating the cooling fan in reverse, clean after finishing operations or after warming-up the hydraulic oil. If the temperature of the hydraulic oil is low, the fan is held at low speed to protect the hydraulic circuit, so it will be unable to display its cleaning performance properly.**

1. Stop the machine on horizontal ground and turn the parking brake switch ON.
2. Stop the engine.
3. Turn the starting switch to the ON position.

## BLEEDING AIR FROM FUEL CIRCUIT

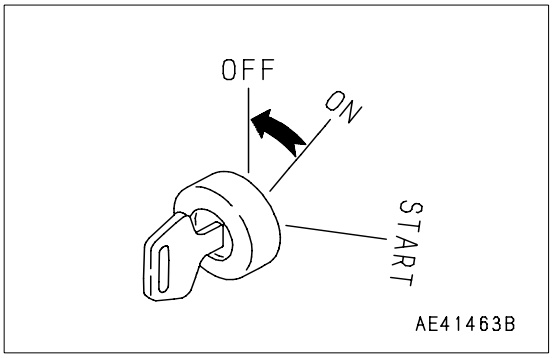
This machine is equipped with an electric priming pump to bleed the air from the fuel circuit. In the following cases, use the procedure below to bleed the air.

- When fuel filter has been replaced
- When engine has run out of fuel
- When starting the engine for the first time after replacing the supply pump or modifying the piping or any other parts

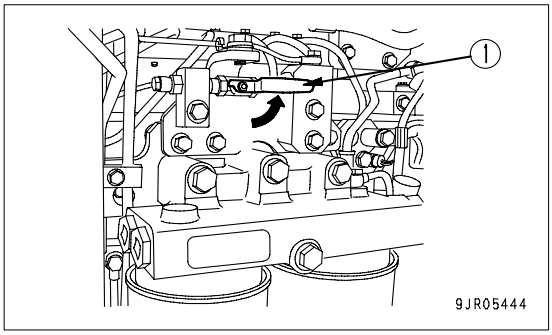
### PROCEDURE FOR BLEEDING AIR

**⚠ WARNING**

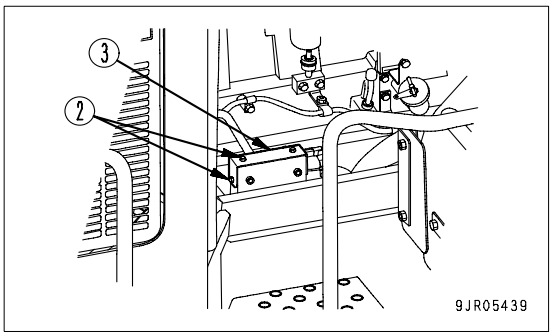
**When using the electric priming pump, do not loosen the air bleed plug for the fuel circuit. When the electric priming pump is operated, pressure is applied to the fuel circuit, so if the air bleed plug is loosened, fuel will spurt out and create a dangerous situation.**




1. Turn the key in the starting switch to the OFF position and stop the engine.
2. Open air bleed valve (1).




3. Loosen 4 screws (2), then remove cover (3) from the electric priming pump switch.

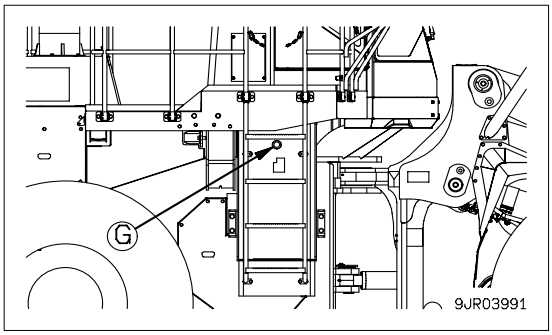


## CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

**⚠ WARNING**

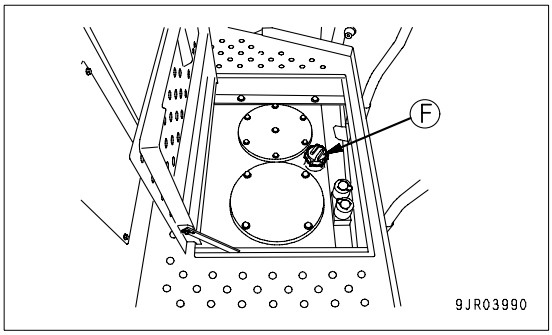
- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

1. Lower the bucket to the ground, stop the engine, and wait for approx. 5 minutes.
2. Check the oil level with sight gauge (G) of the hydraulic tank. The oil level should be near the top of sight gauge (G).




**NOTICE**
**If the oil level is above the top of sight gauge (G), stop the engine, wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug. Using the machine with excess oil in the circuit will cause damage to the hydraulic circuit or cause the oil to spurt out.**

3. If the oil is not up to the top of the sight gauge, open the inspection cover above the step and add oil through oil filler port (F).



## REPLACE BRAKE OIL FILTER CARTRIDGE

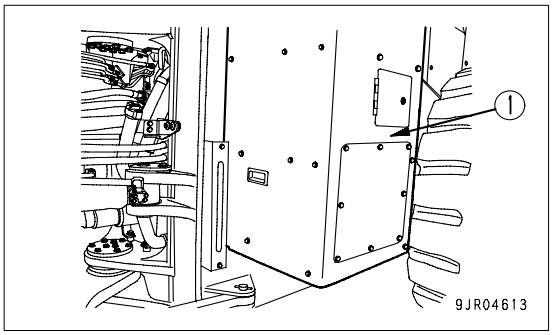
(If equipped)

**⚠ WARNING**

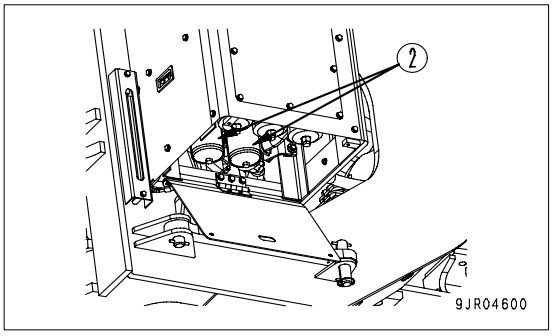
**Parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the oil temperature to go down before performing this operation.**

- Prepare a container to catch drain fuel.
- Prepare a filter wrench

1. Loosen 2 bolts at the bottom face of accumulator mount (1) on the left side of the rear frame, then remove the cover.

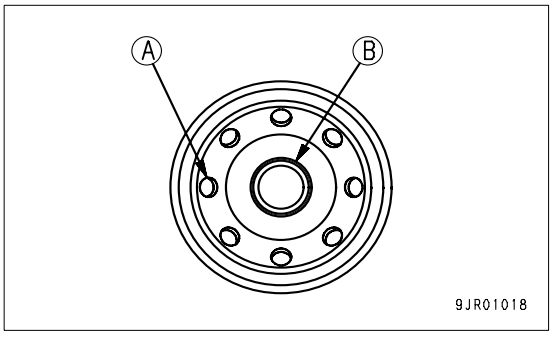



2. Set the container to catch the fuel under the filter cartridge (2).
3. Using a filter wrench, turn filter cartridge (2) counterclockwise to remove it.
4. Clean the filter holder.




5. Check that a new filter cartridge is installed to cap (B), then fill with fresh oil.

**NOTICE**
**When filling with oil, always use fresh oil and be careful not to let any dirt or dust get in. Fill with oil through 8 small holes (A) (dirty side). Cap (B) is to prevent oil containing dirt from getting into the clean side. Always add the oil with cap (B) installed.**

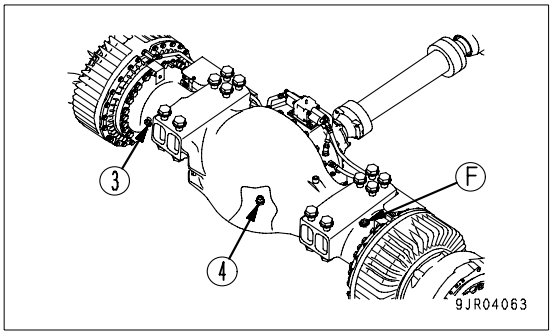


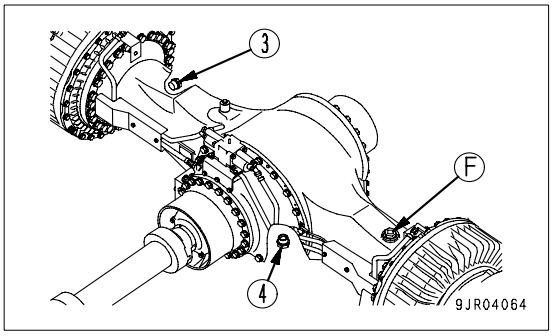

6. Coat the packing surface of the filter cartridge with oil.
7. Remove filter cartridge cap (B), then install to the filter holder.

   Tightening torque for filter cartridge: 35 - 41 Nm {3.6 - 4.2 kgm}

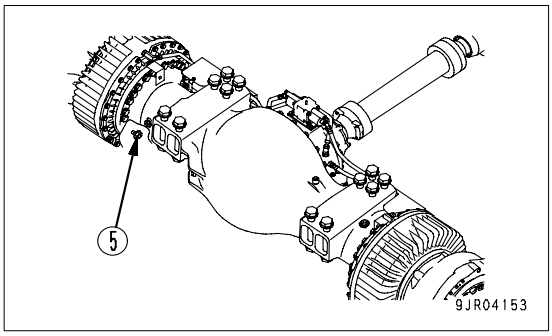
8. Run the engine at low idling for a short time, then check that the oil is at the specified level. For details, see “CHECK AXLE OIL LEVEL, ADD OIL (4-30)“.

2. Remove front and rear oil filler plugs (F), then remove level plug (3) and drain plug (4) to drain the oil.




3. Remove drain plug (5) and attach the tool (nipple and hose) to drain the oil.
4. After draining the oil, clean drain plugs (1), (4) and (5), then install them.
5. Add oil to the specified level through the oil filler ports (F) and (2) of the axle housing and left and right final drives.
6. After adding oil, check at level plug (3) that the oil is at the specified level. For details, see CHECK AXLE OIL LEVEL, ADD OIL (4-30).




**REMARK**
For operations where the brake is used frequently, change the axle oil at shorter intervals.

## REPLACE ELEMENT IN AIR CONDITIONER RECIRCULATION AIR FILTER, FRESH AIR FILTER

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 (4-57)“.

For details of cleaning the fresh air filter, see “CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER (4-54)“.

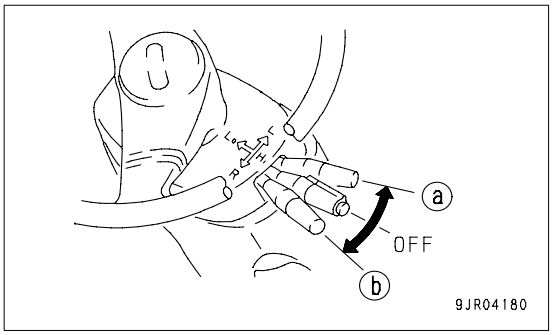
# SPECIFICATIONS

**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.

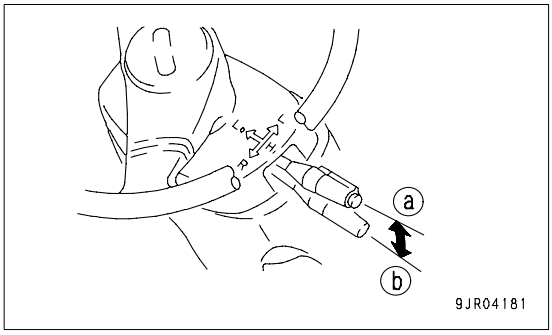
**DIMMER SWITCH**

Use this switch (6) to switch the head lamps between high beam and low beam.

When the head lamps are at high beam, the high beam pilot lamp lights up.

Position (a): High beam

Position (b): Low beam



## TURNING

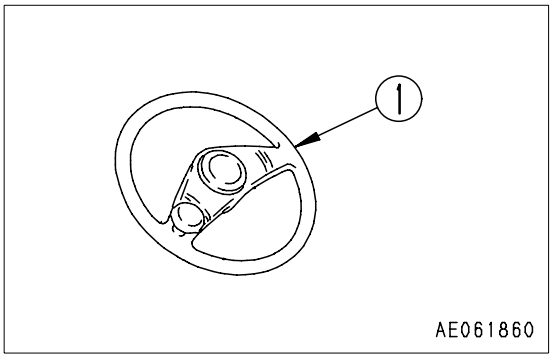
**⚠ WARNING**

- **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.**

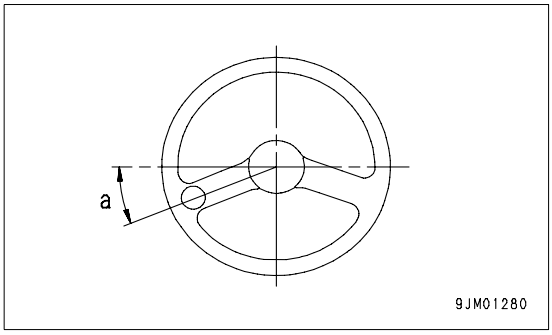
When traveling,use steering wheel (1) to turn the machine.

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**
**Do not attempt to turn the steering wheel any further in an effort to make a sharp turn, when it reaches its stroke end. Check that steering wheel play (a) is somewhere between 50 to 100 mm and that steering normally functions. If any abnormality is noticed, call your Komatsu distributor for inspection and repair.**



## ESTABLISHING POWER SUPPLY

When using this preheater, it is necessary to set up the external power supply facility shown in Diagram 1 in PROCEDURE FOR SETTING UP EXTERNAL POWER SOURCE FOR EXTERNAL POWER SOURCE TYPE ELECTRIC HEATER (6-22). This power source facility is to supply to the preheater the AC voltage electricity sent from a generator or substation. It must have a structure that enables the external power source input cable to be connected easily to it.

The shape, size, and method of setting up the facility can be decided locally, but the specifications should be as follows.

Power source facility specifications

(1) Output electricity type: Single phase AC

(2) Output voltage: 230V

(3) Power supply procedure: 6.3 kilovolt-ampere (kVA)

(4) Main switch: Yes

(5) Electrical leakage breaker: Yes

(6) Ground circuit: Yes

Note: When setting up the power supply, follow all related laws and regulations in that country and use an authorized contractor.

This completes the operations for setting up the external power supply.

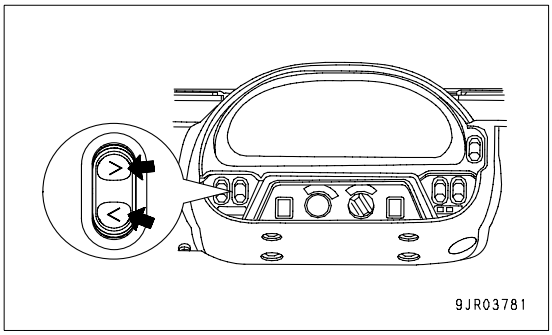
## CHECK ACTUATION AFTER COMPLETION OF ASSEMBLY

1. Check that there is no leakage of oil or water.
2. Check that there is no interference with the wiring harnesses.
3. Connect to the external power supply and use a tester to check that 230V is flowing to each heater connector.

## CLEARING TOTAL LOAD

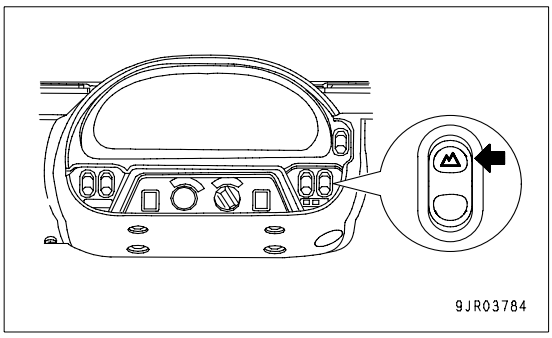
The calculated total load can be cleared as follows.

1. Press the (>) or (<) portion of the machine monitor mode selector switch 2 to select the category of load displayed for “MATERIAL“.



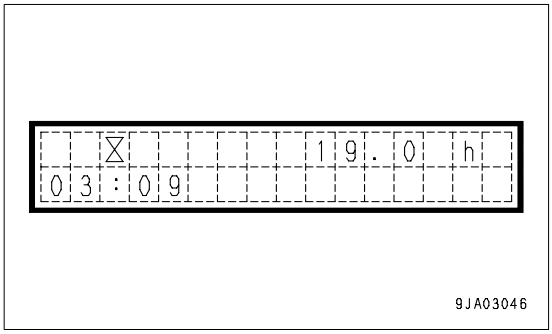

2. With the total load displayed, keep the top of the load meter display selector switch pressed for at least 4 seconds. The data for the total load for the selected material will be cleared.

3. When it is cleared, the buzzer sounds and the character display returns to the normal service meter and clock display.




**REMARK**
If the display for the category of material on the load meter is A, B, C, D, E (all lamps light up), all the total load data are cleared. If top of the load meter display selector switch is pressed when the total load data are being displayed, the load meter returns to the normal service meter and clock display.

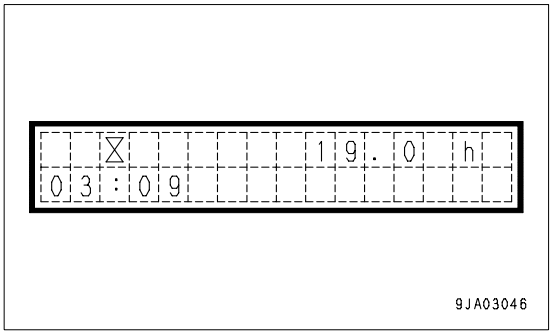
- If operations are started when the load meter is displaying the calculated data and measurements are made by the load meter, the load meter returns to the normal service meter and clock display.
- The display for the number of loads has a maximum of 500. Even if the actual number of loads has exceeded 500, the display remains at 500.



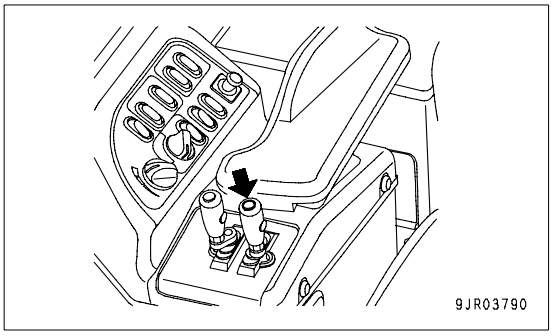

## STOPPING LOAD METER CALCULATION

When the load meter calculation is stopped and is not used, the load meter gives no display.

1. Check that the standard service meter and time is displayed on the character display.



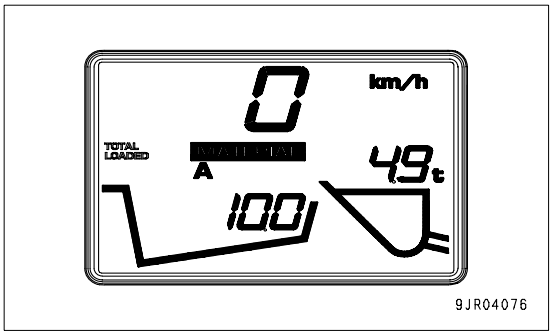
**REMARK**
When the bucket is tilted back fully and the lift arm is raised above the travel posture, the measurement of the load starts. If the first load is not discharged in Step 1, and the lift arm is lowered to the travel posture, then raised again to the horizontal position, the load will be measured as the second load, even though it has not been discharged. In this case, the bucket load display will show 5.1t, and the total load display will show 10.2. To cancel the mistaken second load data, press the load meter cancel switch. The measurement is cancelled and the total load display returns to 5.1.
It is possible to cancel the measurement 15 seconds after the load is displayed or before measuring the next load.



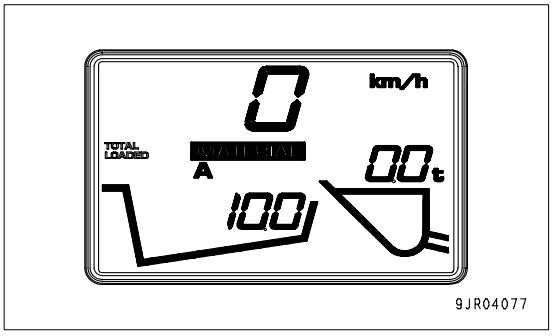

3. Fill the bucket with the second load, tilt the bucket back fully, raise the lift arm above the horizontal position, then load the dump truck.

   Let us take the load in this case as 4.9t.

   The display shows the bucket load as 4.9t, and the total load display shows 10.0.



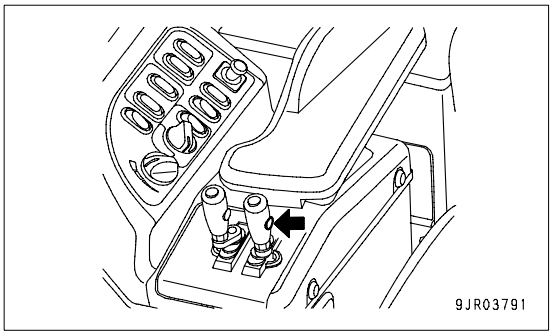

When 15 seconds have passed since the start of the measurement, the bucket load display goes out and returns to 0.0t. The total load display shows 10.0.



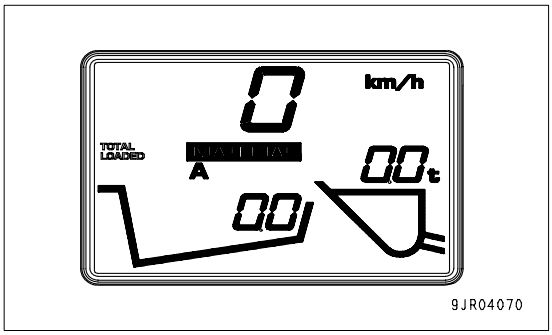

Repeat Step 3 for the third and following loads. The total load display shows the total amount that has been loaded.

4. When resetting the total load in order to carry out the next loading cycle, press the load meter sub-total switch.

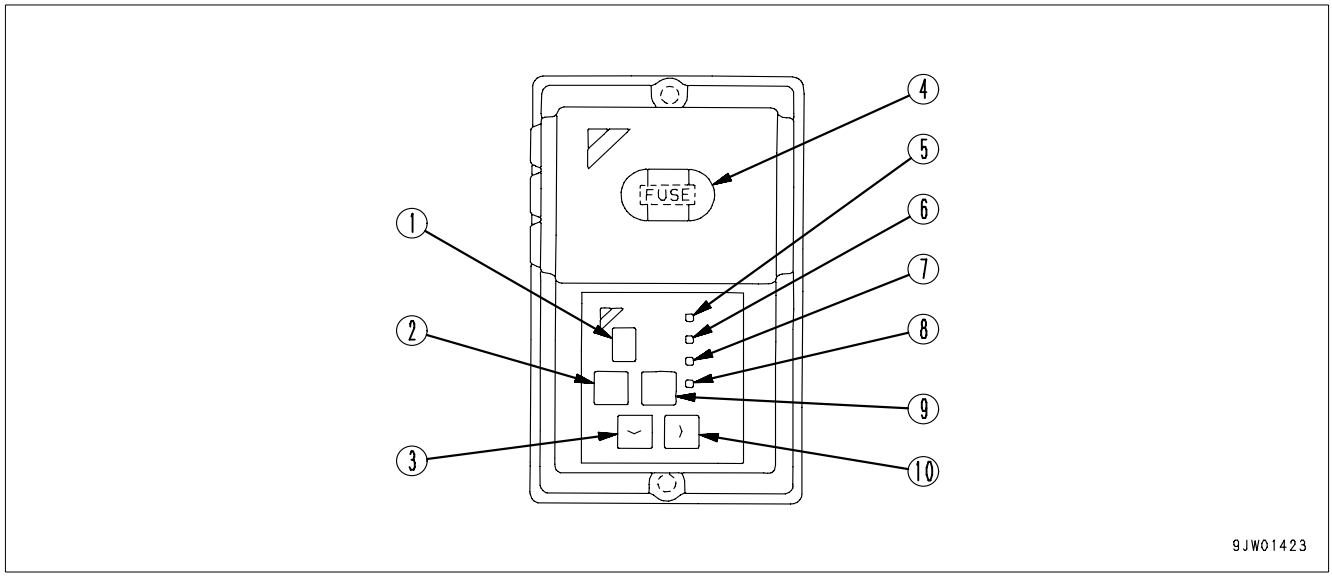
   The load meter display returns to the initial condition.




**REMARK**
To reset, keep the load meter sub-total switch pressed for at least 2 seconds.
When printer is connected
If the load meter sub-total switch is released after less than 2 seconds, the data are printed out but the data are not reset.
If the load meter sub-total switch is kept pressed for more than 2 seconds, the data are not printed out, but the data are reset.



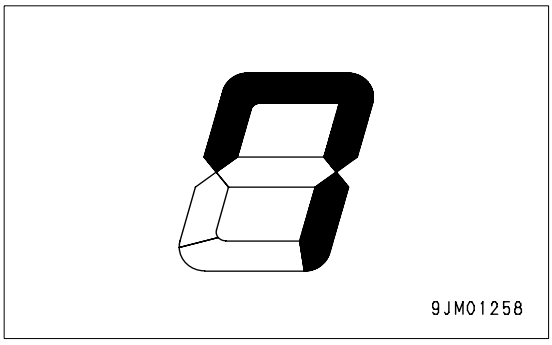
## LUBRICATION CONTROLLER DISPLAY TABLE




(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

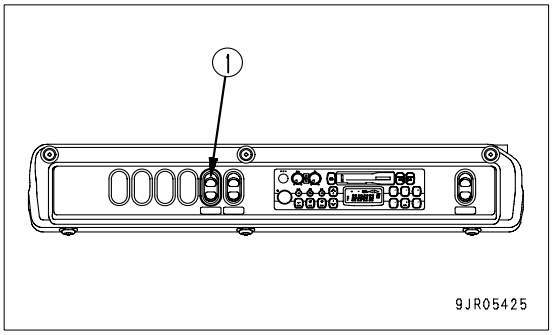
If the remaining number of times of greasing is less than 10, remaining number is displayed and it flashes. If the remaining number of times is 10 or more, only the flashing is shown without displaying the number.




## OPERATION AS DESIRED

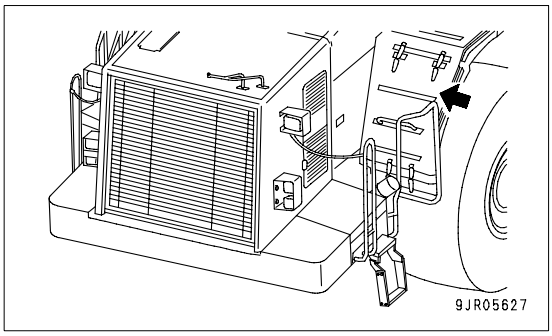
Press auto-greasing switch (1) at the left overhead portion or the start button of the lubrication controller inside the cover under the hydraulic tank on the right side of the machine to carry out one cycle of operation as desired, regardless of the total time.

The count for the greasing interval being calculated is canceled, and after the electric pump automatically stops, the count starts again.



# HANDLING REAR FENDER

The rear fender acts to prevent mud from being sprayed up on the machine and into the surrounding area.




## HANDLING

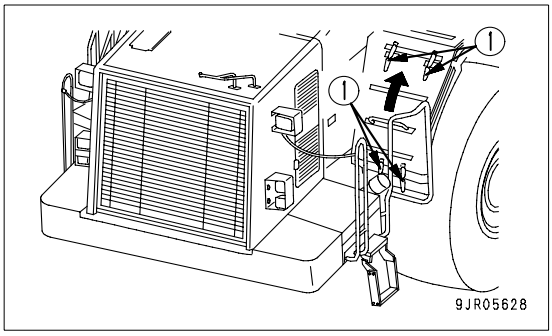
**⚠ WARNING**

**When traveling or carrying out operations, lower the rear fender and lock it securely. If the rear fender is raised when traveling or carrying out operations, it will block the view, and there is danger that this may lead to serious personal injury.**

**NOTICE**
**If the machine travels or operations are carried out with the rear fender raised, it will be impossible to prevent mud from spraying on the machine and into the surrounding area. In addition, it will cause damage to the rear fender.**

When carrying out maintenance and opening the engine side cover on the right side of the machine, raise the rear fender first.

1. Remove lock (1).




2. Hold grip (2) and raise the rear fender.