

**OPERATION MANUAL**

# **EX100W**

# **EX100WD**

**Wheel type Hydraulic Excavator**



SERIAL No. EX100W 0103~  
EX100WD 0103~

EM11A-1-1

<b>MACHINE Mfg. No.</b>	
<b>ENGINE TYPE</b>	
<b>ENGINE Mfg. No.</b>	
<b>REMARKS</b>	



## TO THE READER

**This manual is designed to serve as a reference for HITACHI customers and distributors who wish to gain basic product knowledge on Hitachi EX100W/EX100WD Hydraulic Excavator. To maintain it in optimum condition and retain maximum performance over a long period of time, CORRECT OPERATION and PROPER MAINTENANCE are essential.**

PART ONE describes the operation procedures, PART TWO details the inspection and maintenance, and PART THREE covers handling optional attachments. Please read through this manual, and utilize it to attain the maximum performance. The descriptions in this manual may be subject to changes without prior notice.





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## TO THE OPERATOR and dealer's service personnel

Read this manual carefully to learn how to operate and service your excavator correctly.

### WARRANTY


The warranty on this excavator appears on your copy of the purchase order which you should have received from your dealer when making your purchase. This warranty provides you the assurance that HITACHI will back its products where defects caused by faulty workmanship appear within the warranty period. In some circumstances, HITACHI also provides field improvements, often without charge to the customer, even if the product is out of warranty.

Warranty and field improvements are a part of HITACHI's product support program for customers who operate and maintain their equipment as described in this manual. Should the equipment be abused, or modified to change its performance beyond the original factory specifications, the warranty will become void and field improvements may be denied. Setting fuel delivery above specifications or otherwise overpowering machines will result in such action.

### DIRECTIONS

Left, right, front, and rear in this manual are seen from the operator's seat facing forward, propel motors at the rear.

### SAFETY

 This safety symbol is used for important safety messages. When you see this symbol, follow the safety message to avoid personal injury.

Read all of the safety rules in this manual before you operate or service the excavator.

### MEASUREMENTS

SI units equivalent and conventional metric system in parenthesis are used in this manual.

### MACHINE NUMBERS

Write your machine serial number and engine number shown below as well as machine model and engine type. Your dealer needs this information when you order parts and/or whenever you contact them.

Machine model

EX100W/EX100WD

Serial No.

Engine type

ISUZU 6BBI

Engine Serial No.





## UNDERSTAND MACHINE OPERATION

Only qualified people should operate the machine.  
Learn the location and purpose of all controls, instruments, indicator lights, and labels.

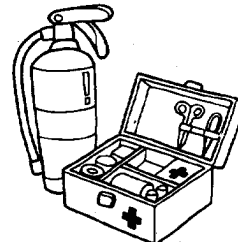
## WEAR PROTECTIVE CLOTHING

Wear fairly tight clothing . . . and safety equipment.



## USE SAFETY EQUIPMENT

Fasten a first-aid kit and a fire extinguisher to the machine.  
Keep the extinguisher fully charged.  
Learn to use it correctly.



## INSPECT EXCAVATOR

Inspect your excavator carefully each day before you start it. Use the check list on page 33.

Do not start or operate the excavator unless you are in the operator's seat.

When you operate the excavator, do not let another person on the machine.

When you get on or off the excavator, use hand rails and steps

Start the engine only in well-ventilated area.

Before you move the boom or arm, be sure all persons are away from the excavator.



**Safety**

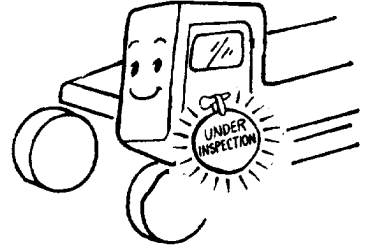
### **PRECAUTIONS FOR INSPECTION AND MAINTENANCE**

Be sure to stop the engine.

Place a notice board "under inspection and maintenance" on the cab door or control lever.

Never get under the machine while it is jacked up by the boom and arm:

When inspecting or servicing the machine with raised boom and arm, always use safety blocks, safety supports, etc.



### **MOVE EXCAVATOR SAFELY**

Before you move the excavator, find out which way to move propel pedals for the direction you want to go. If propel motors (A) are in front of the cab, push down the rear of the propel pedals (B) to move forward.

Do not travel without a signal person for a guide.

Do not travel near the edge of a ditch, gully, or excavation.

Travel carefully where room is limited, over rough ground, and on slopes.

### **PARK SAFELY**

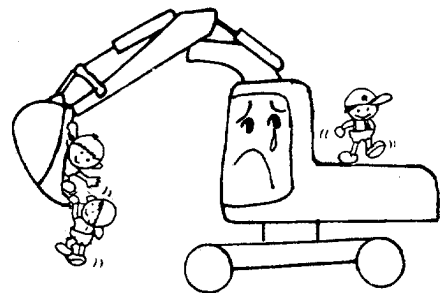
Before you leave the cab:

- Lower bucket to ground.
- Put the parking and speed change lever in the "P" (parking) position.
- Stop engine.
- Put control lever in neutral position.

If you park the excavator on a slope, put blocks against tracks.

Do not park excavator with tracks pointed downhill.

Take the engine key and cab door key with you.



## CONTROLS AND INSTRUMENTS

### GETTING ON/OFF THE MACHINE

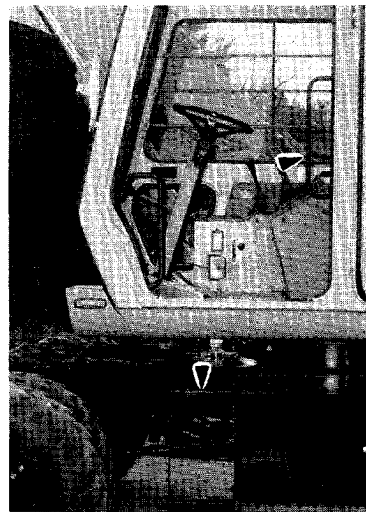
Steps and handrails are provided at necessary places.

They should be used to assure the safety in getting on/off the machine, as well as the inspection and maintenance works.

Never jump on/off the machine.

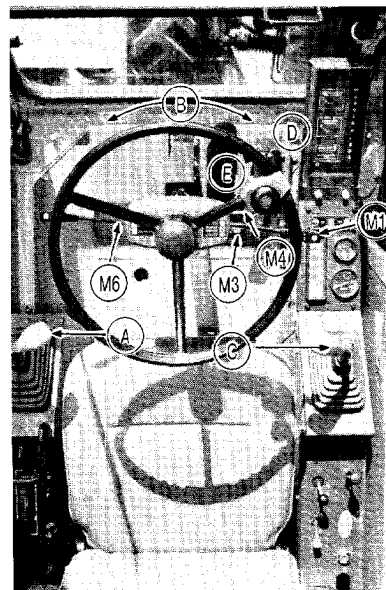


Do not wire these steps and handrails to lift the cab or the machine body, or to stabilize the machine for transport on a truck or trailer.



## CONTROL LEVERS AND PEDALS

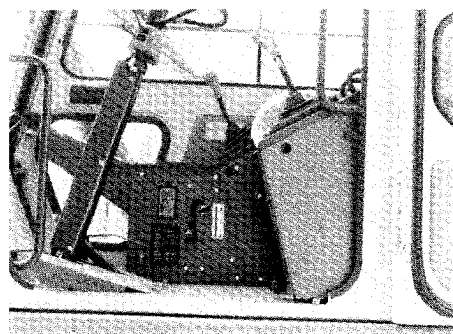
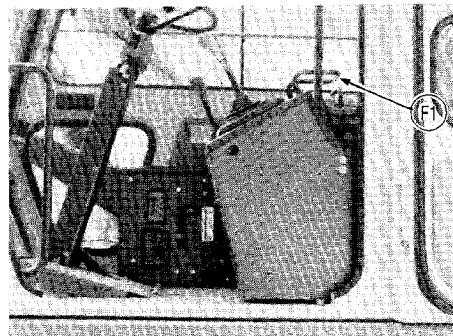
- Ⓐ Swing-arm control lever
- Ⓑ Steering wheel
- Ⓒ Boom and bucket control lever
- Ⓓ Travel pedal
- Ⓔ Brake pedal



- Ⓕ Left console slide lever  
By operating this lever, the left console can be moved back and forth to facilitate getting on/off the machine.  
It should be set at "FRONT" for excavation, and "REAR" for getting on/off the machine and travelling.  
(Lever at "FRONT" for excavation)

**⚠ Never get on/off the operator's seat in this condition !!**  
**When the lever is set at "Front," getting off the machine by pushing aside the swing-arm lever may activate the arm and cause an accident.**

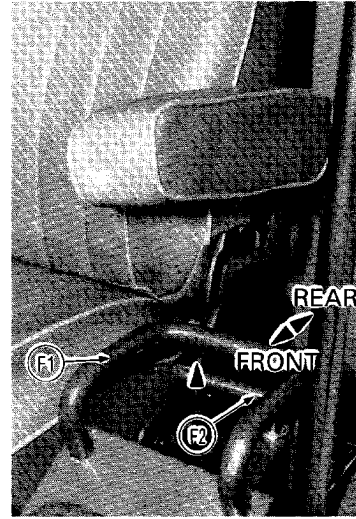
(Lever at "REAR" for getting on/off and travel)  
All actuators are locked, and never activated by operating any control lever. Only the travel operation is possible.



## Controls and Instruments

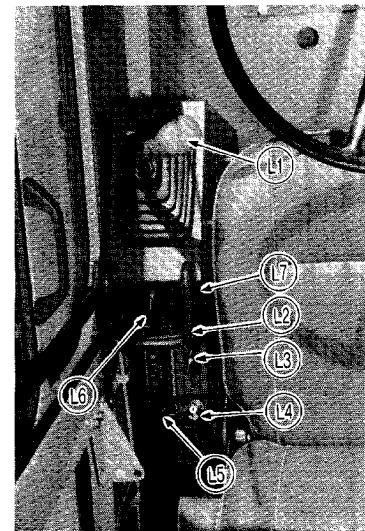
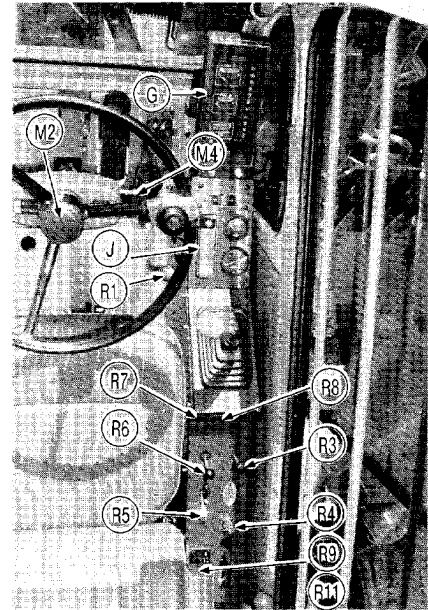
- F2** Left console lock lever  
This lever locks the left console at either  
“FRONT” or “REAR.”

**⚠** Confirm that the left console is locked correctly with a click sound to start the work, or get on/off or travel the machine.



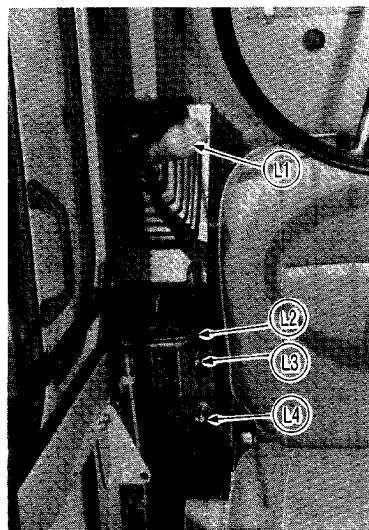
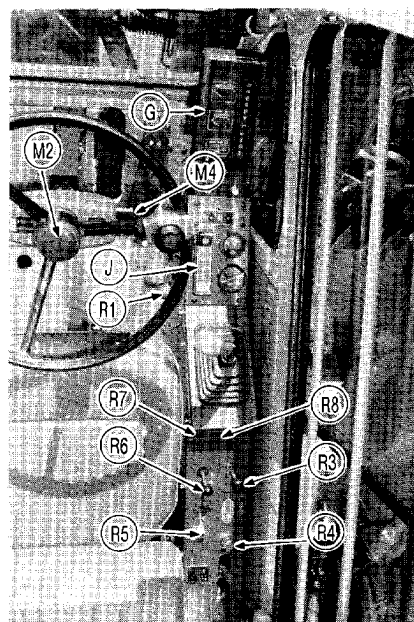
**INSTRUMENT PANEL (SDX)**

- G Monitor panel
- H Turn signal indicator lamp
- I Air pressure gauge
- J Working brake indicator lamp
- K Engine speed indicator
- L1 Horn switch
- L2 Working light switch
- L3 Parking lamp switch
- L4 Cigar lighter
- L5 Car radio
- L6 Mode switch
- L7 Auto idle switch
- M1 Dimmer switch  
Turn signal switch (See P. 6)
- M2 Horn switch
- M3 Lighting switch (See P. 6)
- M4 Hazard lamp switch
- M5 Wiper washer switch
- M6 Travel mode switch
- R1 Swing lock lever
- R2 Fuel lever
- R3 Forward-reverse lever
- R4 Starter switch
- R5 Transmission change lever
- R6 Working brake lever
- R7 Ram lock switch
- R8 Outrigger-blade switch (O.P.T)
- R9 Heater switch
- R11 Water cock



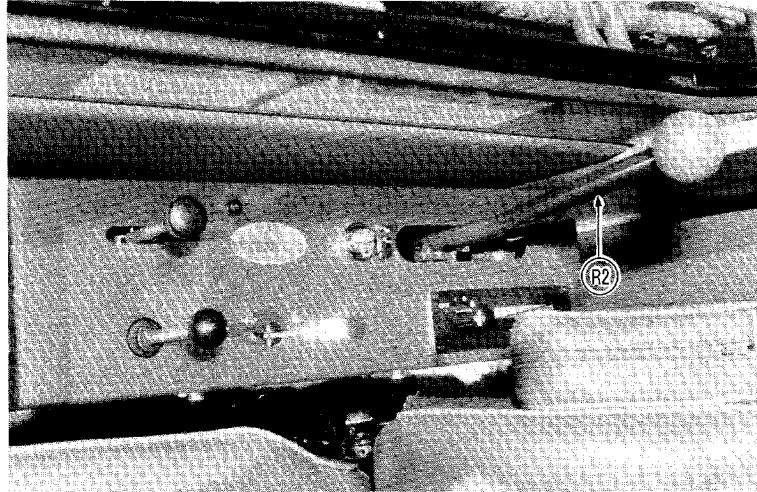
**INSTRUMENT PANEL (DX)**

- G Monitor panel
- H Turn signal indicator lamp
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- R6 Working brake lever
- R7 Ram lock switch
- R8 Outrigger-blade switch (O.P.T)

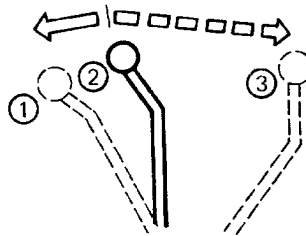




## FUEL LEVER (SDX)

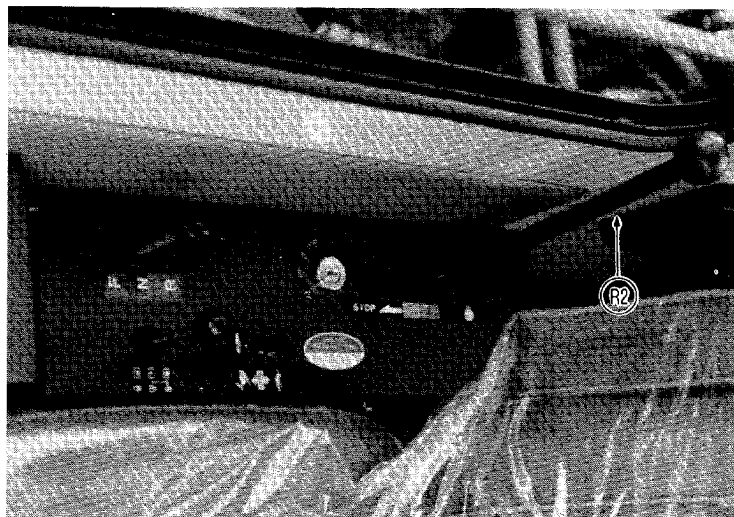


It adjusts the engine speed (output) and also serves as a stop engine.



- ① Engine stop: The lever is fully pushed forward.  
(Caution) Do not take your hand off until the engine has stopped completely. If you take off your hand, the lever will reset close to the low idling position automatically.
- ② Low idling: Pull the lever a little backward, and push it again forward to a point where the lever control becomes heavy.
- ③ High idling: Pull the lever fully backward from the low idling position.

**FUEL LEVER (DX)**



To ensure an optimal engine rpm for particular work and to reduce fuel consumption, a panel with Economy Range is provided for the accelerator lever.

Each range indicates as follows.

H: Full Range (Red range)

E: Economy Range (Orange range)

Economy Range's engine rpm is 70 to 85% of the Full range's rpm.

L: Low Speed Range (Yellow range)

STOP: Engine Stop Range

Choose one of these ranges for each particular work. Especially, when the Economy Range is used, although it depends on the work condition, the fuel consumption is reduced approx. 20 to 35%. Choose suitable range for each work.

By choosing a suitable range for the work, setting the engine rpm for the work thereafter is made easy.

The working speed is reduced accordingly to the range chosen compared to the Full Range.

## Controls and Instruments

### STARTER SWITCH R4



Switch OFF  
(Stop the engine)



Preheat



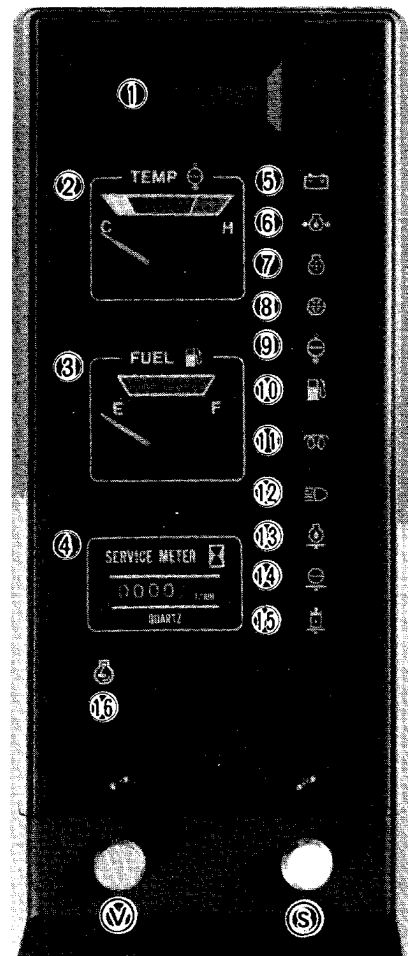
Start the engine



Switch ON  
(During operation)

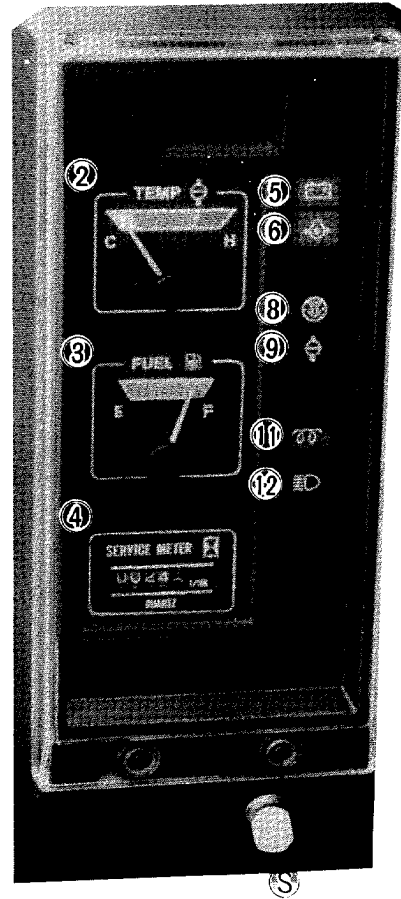
### GAUGES AND INDICATORS ON THE MONITOR PANEL (SDX)

- ① Clock
- ② Engine coolant temperature gauge
- ③ Fuel gauge
- ④ Service meter
- ⑤ Charge lamp
- ⑥ Engine oil pressure warning lamp
- ⑦ Engine oil filter clog warning lamp
- ⑧ Air cleaner filter clog warning lamp
- ⑨ Overheat warning lamp
- ⑩ Fuel level warning lamp
- ⑪ Preheat timer pilot lamp
- ⑫ Working pilot lamp
- ⑬ Engine oil lever OK lamp
- ⑭ Cooling water level OK lamp
- ⑮ Hydraulic oil lever OK lamp
- ⑯ Auto idle pilot lamp
- Ⓥ Preoperation check switch
- Ⓢ Stop buzzer switch



**GAUGES AND INDICATORS (DX)**  
**in the Monitor Panel ①**

- ② Engine Coolant Temperature Gauge
- ③ Fuel Gauge
- ④ Service Meter
- ⑤ Charge Lamp
- ⑥ Engine Oil Pressure Warning Lamp
- ⑧ Air Cleaner Filter Clog Warning Lamp
- ⑨ Overheat Warning Lamp
- ⑪ Preheat Timer Pilot Lamp
- ⑫ Head Light Pilot Lamp
- Ⓢ Buzzer Stop Switch

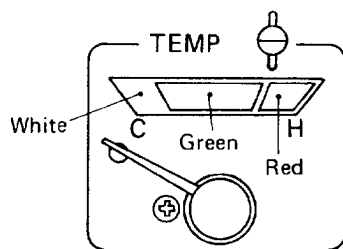


## Controls and Instruments

The monitor panel consists of the following three areas:

- (1) Gauges and meters : Indicate measurements.
- (2) Warning lamps : Turn ON to indicate abnormality.
- (3) Pilot lamps : Indicate the operation of devices.

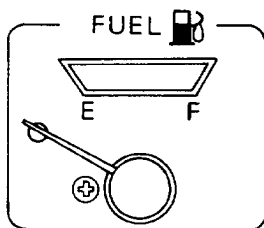
### FUNCTION OF EACH GAUGE AND INDICATOR



Engine coolant temperature gauge

- Green zone indicates the normal running temperature range.
- After you start the engine, keep idling the machine at low speed until the needle comes into the green zone.

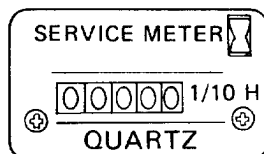
Fuel Gauge



Fuel gauge

- "E" indicates the fuel tank being empty. Supply fuel immediately.

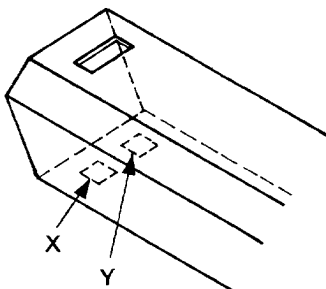
Service Meter



Service meter

- The first digit (right end) denotes 1/10 hour (6 minutes).

To set the hour and minutes of the switch.

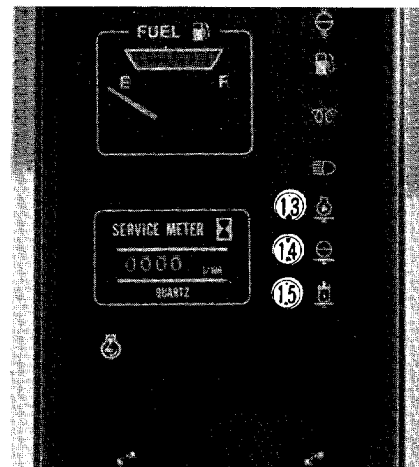


- Push the X , Y switch to set hour and minutes.  
X switch sets hour (look down at left switch)  
Y switch sets minutes (look down at right switch)

## Controls and Instruments

**(SDX)**

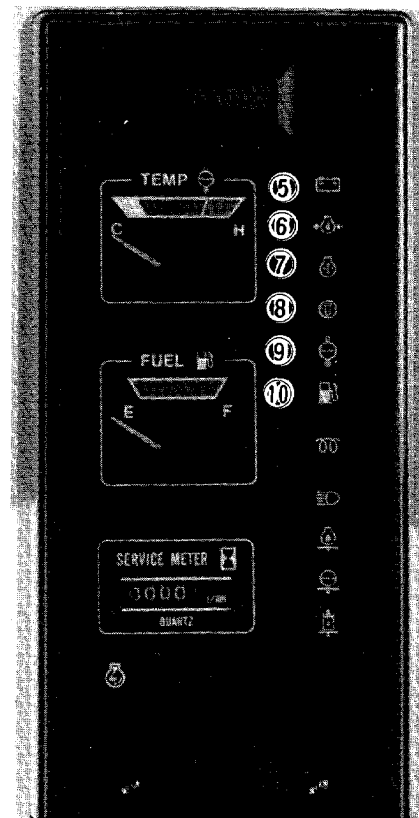
By pressing the preoperation check switch **(V)** before starting the machine, the green lamps **(13)** , **(14)** and **(15)** turn ON if the respective liquid levels are normal.



In case of abnormality, the respective red warning lamps **(5)** , **(6)** , **(7)** , **(8)** , **(9)** and/or **(10)** turn ON. **(6)** and **(9)** turn ON with a buzzer sound.

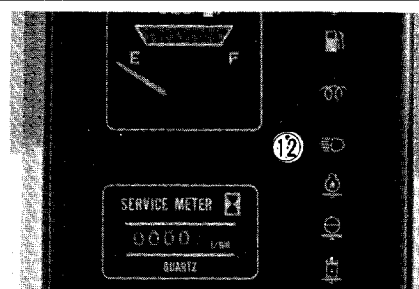
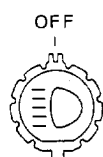
The buzzer sound for the warning lamp **(9)** can be stopped by pressing the stop buzzer switch **(S)**. The buzzer function is reset by taking off your hand, making the buzzer sound in case of another abnormality.

If the red fuel level warning lamp **(10)** turned ON on a level ground, it indicates the remaining fuel of about 30 liters. In this case, supply fuel as soon as possible.



**Working light switch L2**

By turning ON this switch, the work light attached to the boom turns on.

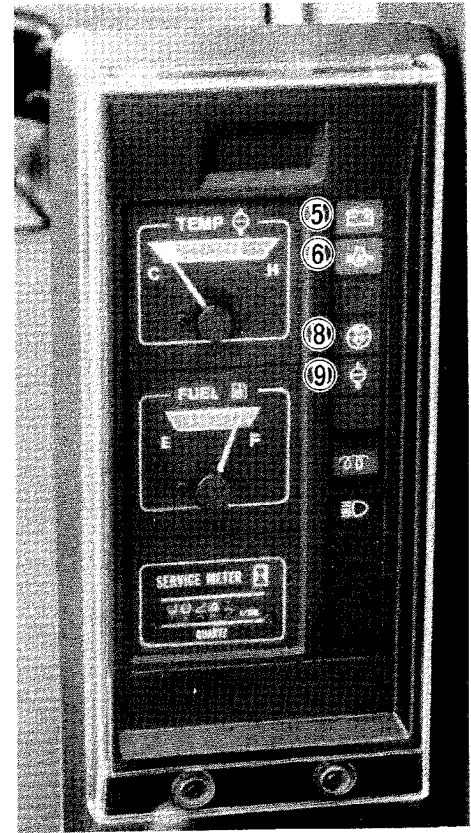


## Controls and Instruments

(DX)

In case of abnormality, the respective red warning lamps ⑤, ⑥, ⑧, and/or ⑨ turn ON. When ⑥ and ⑨ are abnormal, the buzzer sounds at the same time.

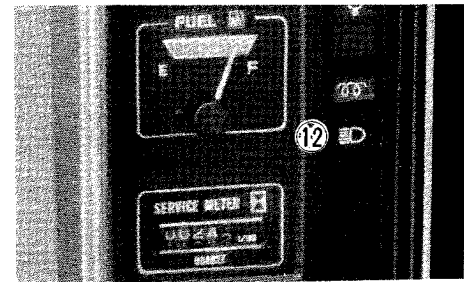
If ⑨ is abnormal, the buzzer sound is stopped by pressing the buzzer switch ⑤. By taking off your hand from the switch, the buzzer function will be automatically recovered, making the buzzer sound in case of another abnormality.



### HEAD LIGHT

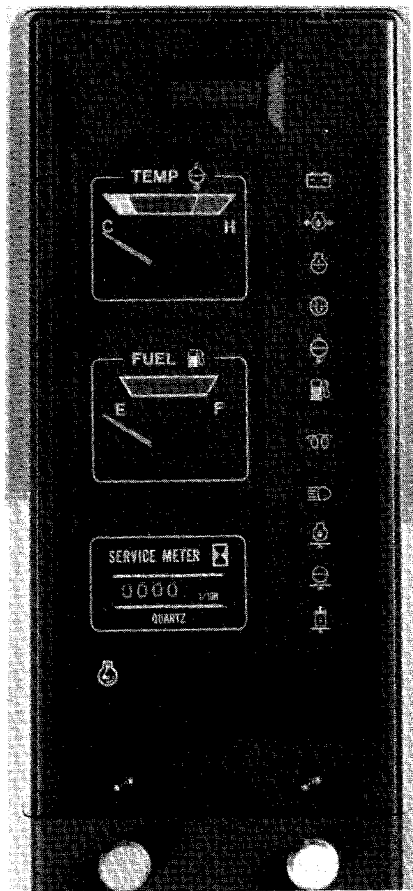
When you switch on the Lighting Switch ⑩, the Green Lamp ⑫ and monitor interior lamp will be lit.

- First Stage: Right hand head lamp only.
- Second Stage: Boom head lamp also.



### LAMP BULB CHECK

By turning ON the starter switch, the OK lamps (13), (14) and (15) (SDX only) and the warning lamps turn on for about 2 seconds. Any lamp that fails to turn on needs replacement of its bulb. These lamps also turn on for about 2 seconds by turning the starter switch to PREHEAT or START, which is not abnormal.



(SDX)



(DX)

#### CAUTION:

- (1) This monitor system is only to give you an indication of safe operation. To ensure safe operation, regular visual checks and maintenance of fluid levels etc. should be performed.
- (2) The front cover of the indicators (parts name: panel gauge), made of formed resin, should be cleaned with a wet cloth. A dry cloth must not be used as it may damage the cover.

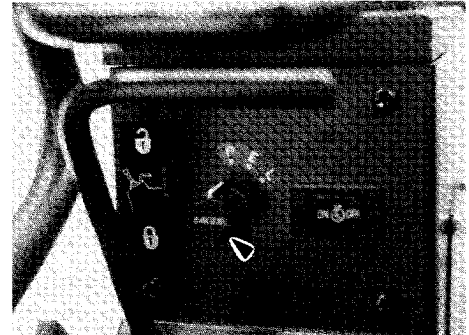


### MODE SELECTION (SDX only)

Any of three operation modes can be selected by operating the mode selection switch located on the left console.

In each operation mode, a microcomputer selects the best combination of the engine speed and the pump flow to meet the current working conditions and purpose.

The following table helps the user select the mode appropriately for efficient operation:



- |                  |   |  |
|------------------|---|--|
| P (Power) Mode   | : | For high speeds and large work volumes.  |
| E (Economy) Mode | : | The work volume will be slightly lowered from P Mode, but it improves fuel efficiency greatly and reduces noise level.   |
| L (Light) Mode   | : | For low speeds to obtain high precision.<br>The engine speed is further lowered, allowing more improved fuel consumption and noise level. The digging power is the same as in P and E Modes. |

## Controls and Instruments

### Mode Selection Criteria (SDX only)

Mode	Main purpose		Suitable works
P	Workload	<ul style="list-style-type: none"> <li>① Complete many works in a short time.</li> <li>② Use many dump trucks waiting for loading.</li> </ul>	<ul style="list-style-type: none"> <li>① Digging and dumping.</li> <li>② Digging and loading earth and sand.</li> <li>③ Heavy duty digging.</li> </ul>
E	Efficiency	<ul style="list-style-type: none"> <li>① General works.</li> <li>② Improve working efficiency and fuel consumption.</li> <li>③ Reduce noise.</li> </ul>	<ul style="list-style-type: none"> <li>① Digging and loading earth and sand.</li> <li>② Preparing agricultural land.</li> <li>③ Levelling ground.</li> </ul>
L	Precision	<ul style="list-style-type: none"> <li>① Work at low speed to improve precision.</li> <li>② Further reduce noise.</li> <li>③ Increase fuel efficiency rather than working speed.</li> </ul>	<ul style="list-style-type: none"> <li>① High precision works such as slope finishing and levelling.</li> <li>② Works in limited spaces.</li> <li>③ Lifting works using soil supports.</li> <li>④ Night works in urban areas.</li> <li>⑤ Carrying unhardened concrete.</li> </ul>

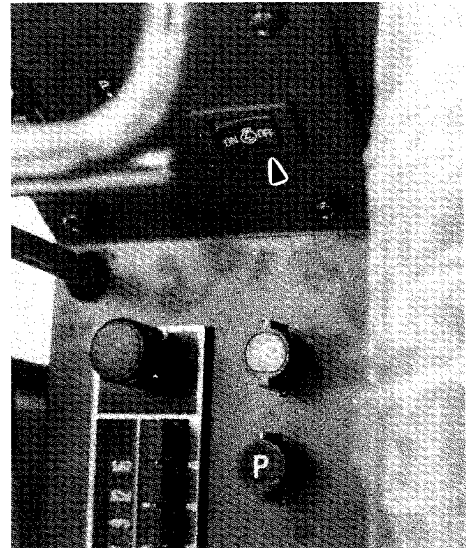
### AUTO IDLE DEVICE (SDX only)

This machine is equipped with an auto idle device that automatically lowers the engine speed when the control levers are at NEUTRAL.

The auto idle device can be turned ON/OFF by simply operating the auto idle switch L7.

(1) Turn ON auto idle switch

By operating a control lever, the engine speed rises automatically to a lever set by the fuel lever R2. By turning the control lever to NEUTRAL, the timer is activated, and the engine speed decreases to a set auto-idling speed after 4 seconds.



(2) Turn OFF auto idle switch

The engine speed can be controlled by the fuel lever.

Cautions:

- 1) The auto idle device does not function if the engine speed set by the fuel lever is lower than a set auto idling speed.
- 2) The auto idle device does not work when the forward-reverse lever is at F or R.

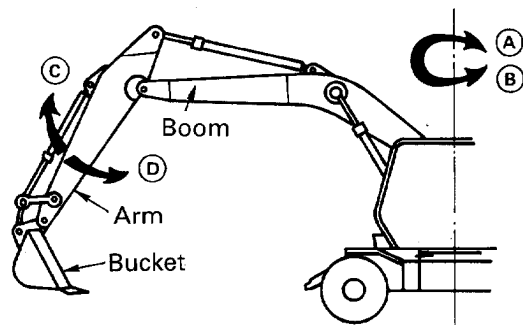
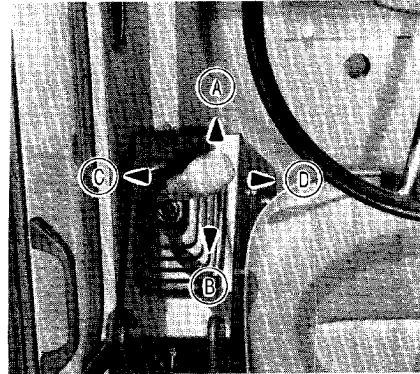
**BEFORE OPERATION**

- (1) Always check if the auto idle switch is turned ON or OFF before operating a control lever.
- (2) When the auto idle switch is turned ON, the engine speed decreases to a set auto idling speed (1,300 ~ 1,500 rpm) lower than a value set by the fuel lever if the control levers are at NEUTRAL. In this case, operating a control lever will cause a sudden increase of the engine speed.
- (3) When the auto idle switch is turned ON, the fuel lever operation is heavier than when it is turned OFF.

### SWING-ARM CONTROL LEVER

By taking off your hand from the lever, it returns to NEUTRAL, keeping the current positions of the swing unit and the arm.

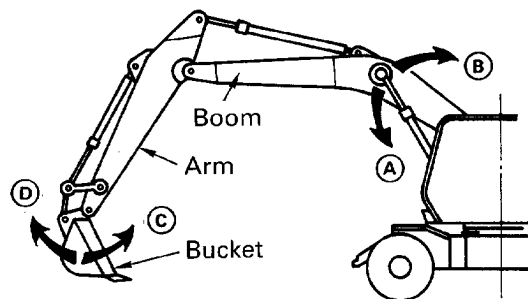
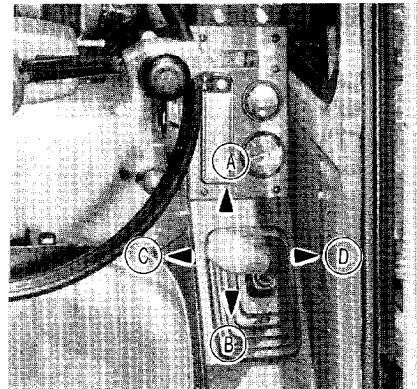
- (A) — Swing right
- (B) — Swing left
- (C) — Roll out arm
- (D) — Roll in arm



### BOOM AND BUCKET CONTROL LEVER

By taking off your hand from the lever, it returns to NEUTRAL, keeping the current positions of the boom and the bucket.

- (A) — Lower boom
- (B) — Raise boom
- (C) — Roll in bucket
- (D) — Roll out bucket



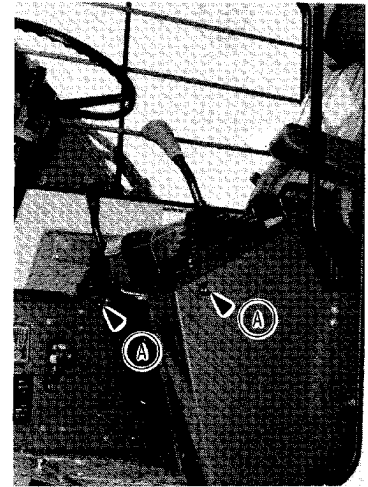
For the actual control, confirm the operation as instructed on the name plate provided in the operator's cab.

## ADJUSTING CONTROL LEVERS

The swing-arm lever and the boom-bucket lever can be adjusted (tilted) forward and backward. For the adjustment, insert a hexagonal wrench (100 mm width across flats) into the adjustment hole A, loosen the internal socket bolt, and pull the grip to either direction (back or forth). The adjustable range is 70 mm forward and 30 mm backward.

Tightening torque : 9 kgf.m

**!** Before adjusting the control levers, always land the bucket and stop the engine.



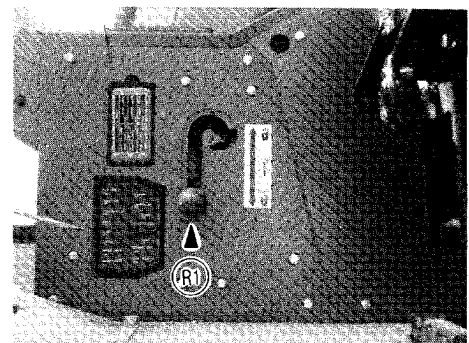
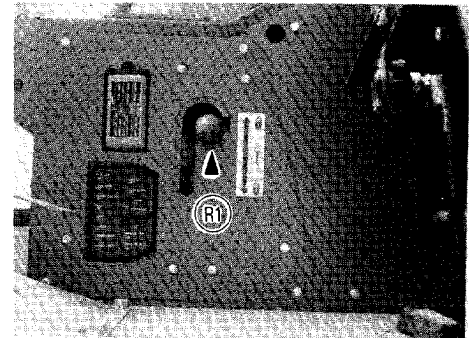
## SWING LOCK LEVER

This lever (R1) is used to lock the swing unit by mechanically connecting the superstructure and the travel unit.

The figure shows the swing lock lever (R1) at "RELEASE".

In normal digging and travelling, the swing lock lever (R1) should be pushed up to the RELEASE position.

This figure shows the lever (R1) turned to "LOCK." The superstructure is locked with the travel mechanism on the front side. Therefore, align the two units correctly before you pull down the lever (R1) to "LOCK."



## THE LEVER MUST BE AT "LOCK" IN THE FOLLOWING CASES:

- Travelling on a road
- When the swing operation is unnecessary.
- Stopping or parking, or moving on trailer on a slope.
- Ascending or descending.

**!** Avoid locking the swing unit in operation, as it will damage the frame.

## STEERING WHEEL

The steering wheel (B) has a knob to facilitate the one-hand operation and quick turns.



1. **When the travel unit is facing backward, steering wheel (B) should be operated opposite to the normal direction.** When travelling at a high speed or on an unlevelled ground, it should be operated with both hands.
2. If the engine stops in travelling, the steering unit will not function normally and its operation becomes very heavy. In this case, restart the engine immediately.

## TRAVEL PEDAL

The travel pedal (D) allows smooth control of travel speed.



- (1) The travel pedal (D) cannot control the engine speed.
- (2) If the pedal is released suddenly, the hydraulic brake noise increases. This is not abnormal, but is dangerous because the brake is activated suddenly. The pedal should be released slowly except for emergency.

## BRAKE PEDAL

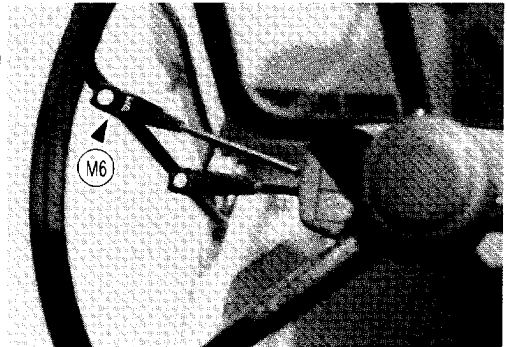
The machine adopts an air-over hydraulic brake that provides a large braking force by light pedalling. Therefore, do not apply it suddenly except for emergency.



- (1) Don't take off your foot from the brake pedal (E) completely, as it will drain all compressive air in the air booster and cause a drift.
- (2) **Never stamp on the pedal (E) more than necessary. It will discharge a large amount of compressive air at one time, reducing the air pressure and the braking efficiency.**
- (3) To stop the machine smoothly, operate the pedal as follows:
  - (i) Release the accelerator pedal slowly 25 ~ 35 m before the objective stop point.
  - (ii) Press down the brake pedal lightly 5 ~ 6 m before the stop point.
  - (iii) Immediately before the stop point, release the brake pedal only slightly, and press it down again to stop the car completely.
- (4) If the brake does not work effectively, take off your foot from the accelerator pedal to activate the hydraulic brake, and apply the parking brake. However, this method should be used only for emergency purposes, and requires subsequent checking of the parking brake for any abnormality.

### TRAVEL MODE SWITCH (SDX only)

Located on the upper left side of the steering wheel, the travel mode switch (M6) allows the selection of:

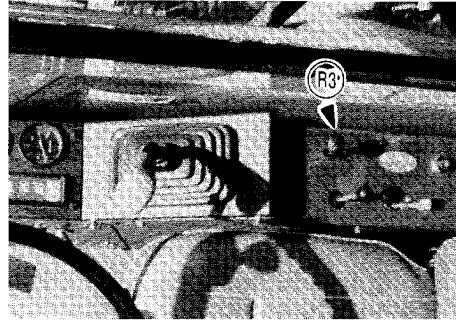


- P (Power) mode : • For ascending and high-speed travelling.
- E (Economy) mode : • For travelling in urban areas and working site.  
The maximum speed is the same as in P mode,  
but the fuel consumption and noise are reduced.

## FORWARD-REVERSE LEVER

This lever is used to change the travel direction.

- F : Forward
- N : Neutral
- R : Rearward



- (1) The forward-reverse lever (R3) should be at NEUTRAL (N) during excavation, and when the car is stopped/parked.
- (2) While travelling, do not move the lever to NEUTRAL (N), or turn it to an opposite direction suddenly.  
When the brake dose to work effectively, the car can be stopped by turning the forward-reverse lever (R3) to an opposite direction.
- (3) The engine can be started only when this lever (R3) is at NEUTRAL (N).
- (4) **When the travel unit is facing backward, the lever should be operated in the opposite direction**

## TRANSMISSION CHANGE LEVER

Either high speed or low speed can be obtained by turning the lever (R5) to the front (Rabbit) side or the rear (Turtle) side. For travelling, it should be turned to the rabbit side.

It should be turned to the turtle side to obtain a driving force, get the machine out of mud or travel it at a low speed.



- Before changing the transmission, fully press down the brake pedal, and confirm that the car is stopped completely.
- Never change the transmission while the car is running, nor operate the forward-reverse lever (R5) many times after a restart. operations may damage the equipment.


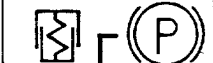
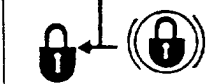


## Controls and Instruments

### WORKING BRAKE LEVER

The working brake lever (R6) can be operated in three positions for travelling, parking and working.

By applying the parking brake lever (R6), the ram cylinder locks automatically.

		Working brake	Parking brake	Ram lock
	Travel	: Release	Release	Release
	Park	: Release	(Function)	(Function)
	Work	: (Function)	(Function)	(Function)



- (1) Use the working brake during works.
- (2) Do not use the working brake to stop the machine for a long time.

### RAM LOCK SWITCH

The ram lock switch (R7) is provided to stop the movement of the front axle. Normally, the switch is not used independently as it is activated by applying the working (R6) brake.

It should be turned on to lock only the ram cylinder. ON

Normally, keep the switch turned OFF.

(Lock the ram cylinder)

OFF

(Release the ram cylinder)



The ram cylinder is not released by turning off the ram lock switch when the brake is applied or the engine is stopped.

### PARKING LAMP SWITCH

It is used when parking the machine on a road at night. By turning ON this switch (L3), the parking lamps turn on.

## Controls and Instruments

### TURN SIGNAL SWITCH DIMMER SWITCH

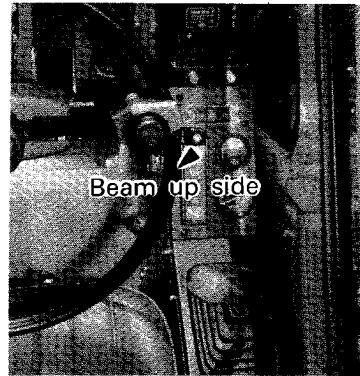
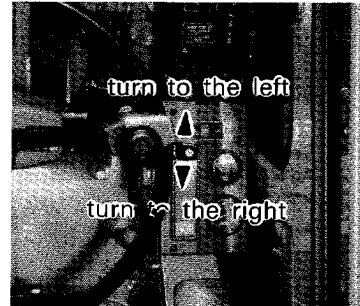
The turn signal switch (M1) is used to inform others to which direction the machine is turning. It resets to NEUTRAL automatically by returning the steering wheel.

The horn sounds by pressing this switch (R2) provided at the center of the steering wheel.

**!** If the switch turned to NEUTRAL while the car is making a turn, set it again to the left or right turn position.

The dimmer switch allows the operator to change the direction of the headlights.

**!** Turn the headlights down when there is another car in front of you in the same or opposite direction.

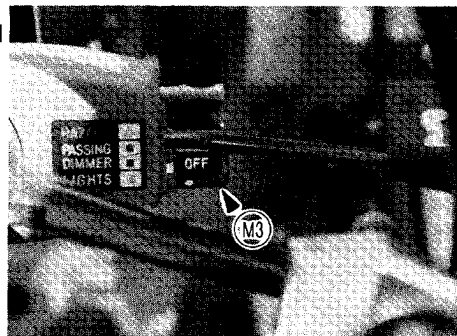


### HORN SWITCH (TO BE USED DURING TRAVELLING)

The horn sounds by pressing this switch (M2) provided at the center of the steering wheel.

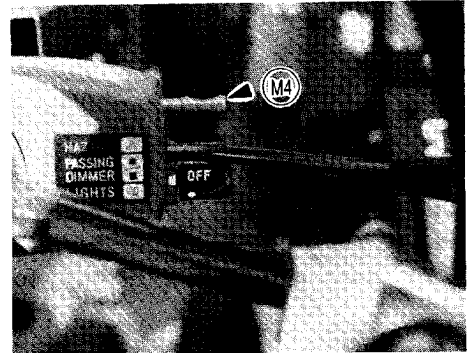
### LIGHTING SWITCH


	Headlights	Clearance (Side) lamps	Tail lamps	License plate lamp	Monitor panel lamps and engine tachometer light
2nd step	☀	☀	☀	☀	☀
1st step	✕	☀	☀	☀	☀
OFF	✕	✕	✕	✕	✕



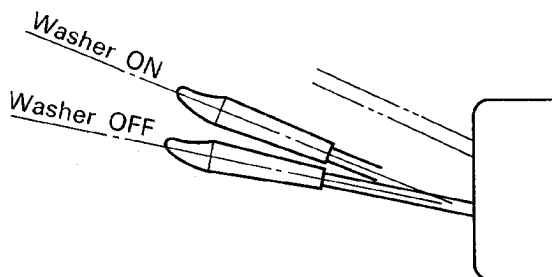
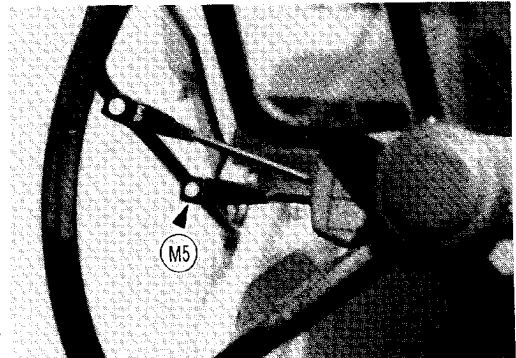
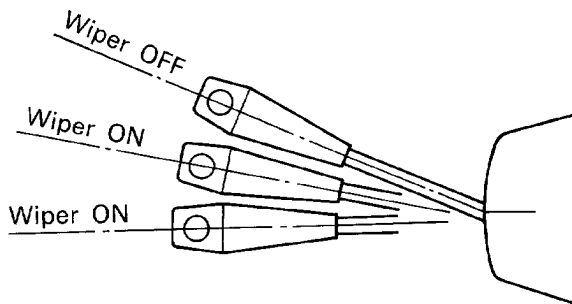
### HAZARD LAMP SWITCH

This switch (M4) is used to inform others of emergency because of failure or faulty operation. By pushing up this switch, both the left and right turn signal lamps turn on.



 If the hazard lamp switch (M4) is left turned ON after the engine is stopped, the battery capacity decreases.

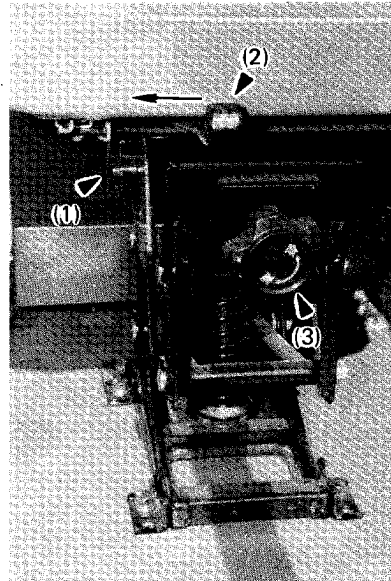
### WIPER WASHER SWITCH



## ADJUSTING THE OPERATOR'S SEAT

### (1) Adjustment of height

The operator's seat can be raised or lowered by turning the height adjustment handle.



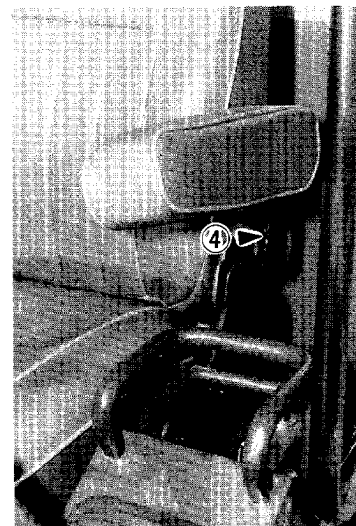
### (2) Forward and Backward Sliding of the seat

The seat can be slid by operating the slide adjustment lever shown in the above photo. It can be slid by 25 mm to 5 positions (total 125 mm).

The seat can be slid for additional 40 mm or 80 mm by removing the four screws fixing the seat stand.

After shifting the stand, adjust the seat position again by the adjustment lever.

The arm rest can be turned 180° backward by hand.



### (3) Adjustment of the damper

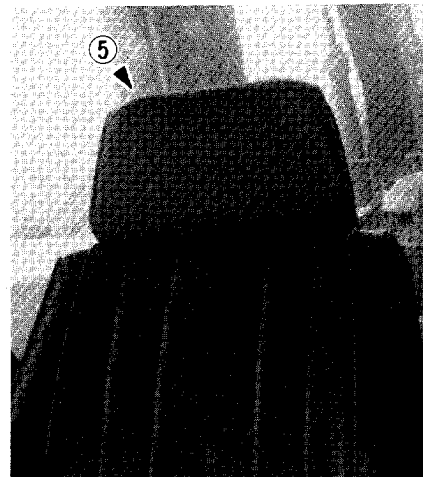
Damper function of the whole seat can be adjusted by turning the knob for adjusting damper.

Clockwise.....Becomes hard  
Anticlockwise...Becomes soft

### (4) Reclining of the seat

To recline the seat, pull the reclining lever located on the left side at the back of the seat.

The reclining angle can be changed in 5 steps forward and 12 steps backward at 3.5° intervals. Also, free reclining is possible in the forward direction for up to 43°.



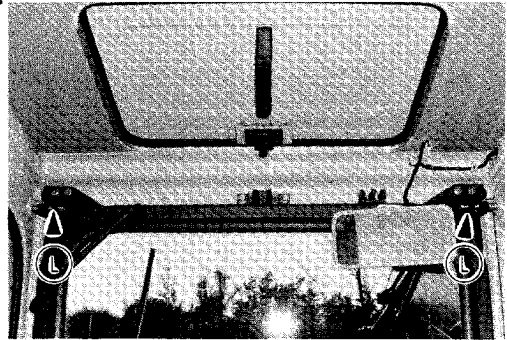
### (5) Head rest

Its height can be shifted between two positions. Either height should be selected as appropriate.

## OPENING/CLOSING AND STORING FRONT WINDOW

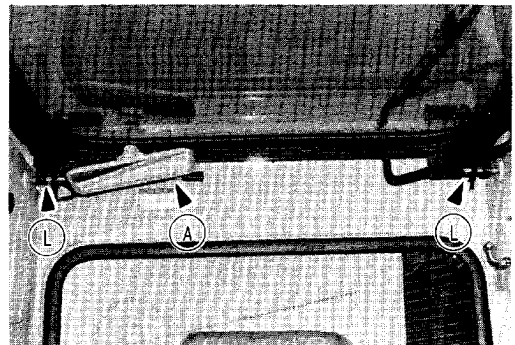
(1) Fully closed position

Press the window pane forward, and fix it firmly with the right and left lock pins (L) .



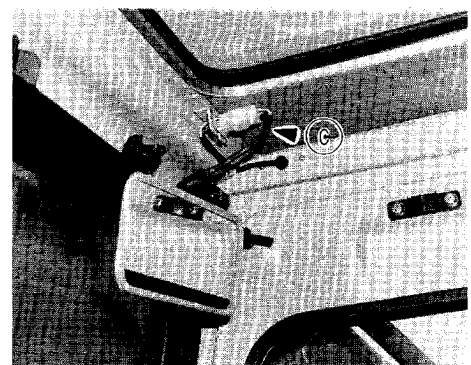
(2) Fully opened (stored) position

After raising the front glass, confirm the autolock (A) is effective, and fix the window with the right and left lock pins (L) .



(Caution)

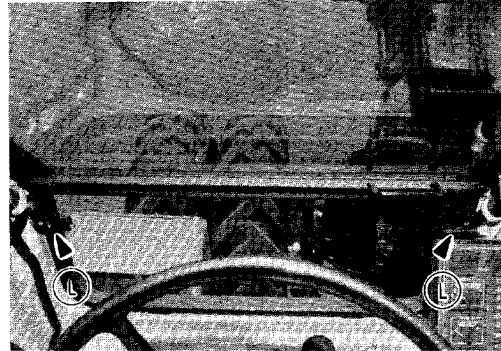
Before opening or closing the front glass, be sure to disconnect the connector (C) for the wiper.



## OPENING/CLOSING AND STORING LOWER FRONT WINDOW

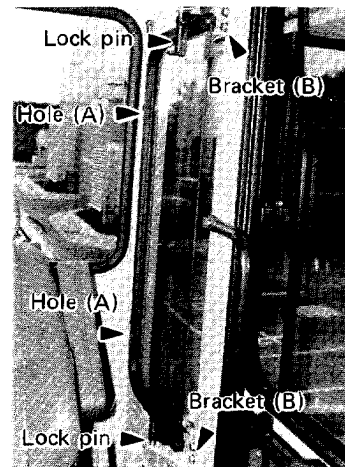
- (1) Fully closed position

Fix it firmly with the left and right lock pins (L)



- (2) Fully opened (stored) position

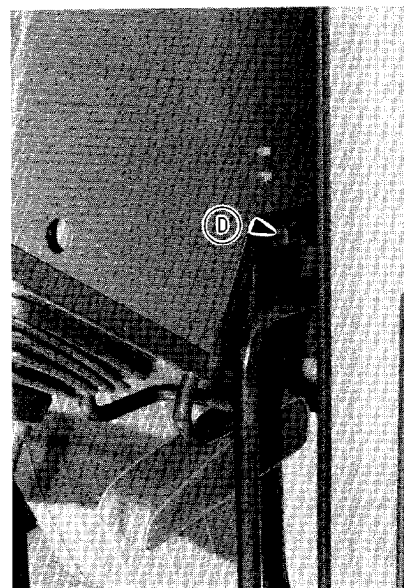
Insert the pins located at the bottom of window pane into the bracket holes (A), and attach the window to the bracket (B) firmly by using the left and right lock pins (L).



## DOOR LOCK

- (1) Releasing the lock to open the door.

Push down the door lock lever (D).



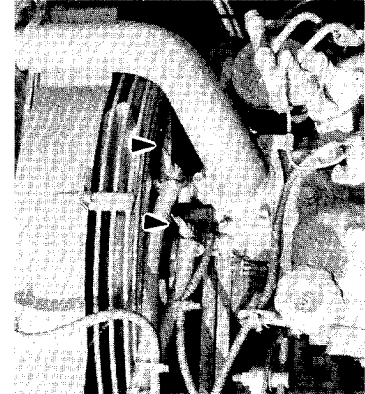
## Controls and Instruments

### CAB HEATER (SDX only)

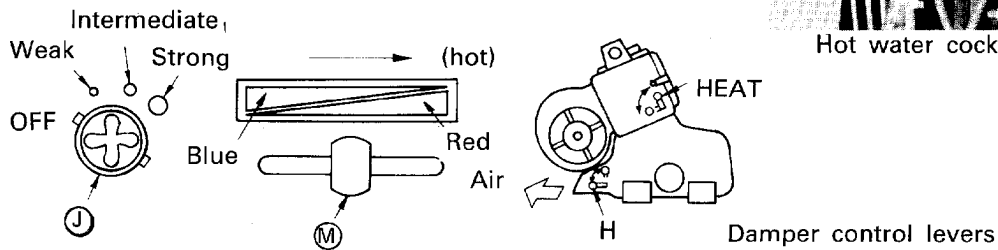
To use the heater, first open the hot water cocks, and turn the damper control levers to H and HEAT, respectively.

Adjust the temperature in the cab by using the heater switch J and the heater cock M.

When the heater is not used, the heater cocks should be closed to prevent hot water entering the heater.



Hot water cocks



A cooler is available as an option. For an order, please contact the nearest service shop.

### BREAK-IN OF NEW MACHINE

All new machines are provided with complete inspection and adjustment at factory. However, they need a break-in operation as follows:

Hours (by hourmeter)	Load
Initial 50 hours	80 % of full load
After 50 hours	Full load

**⚠ Applying the full load without break-in operation will cause a seizure of the machine and scoring, which largely affect the service life and safe operation.**

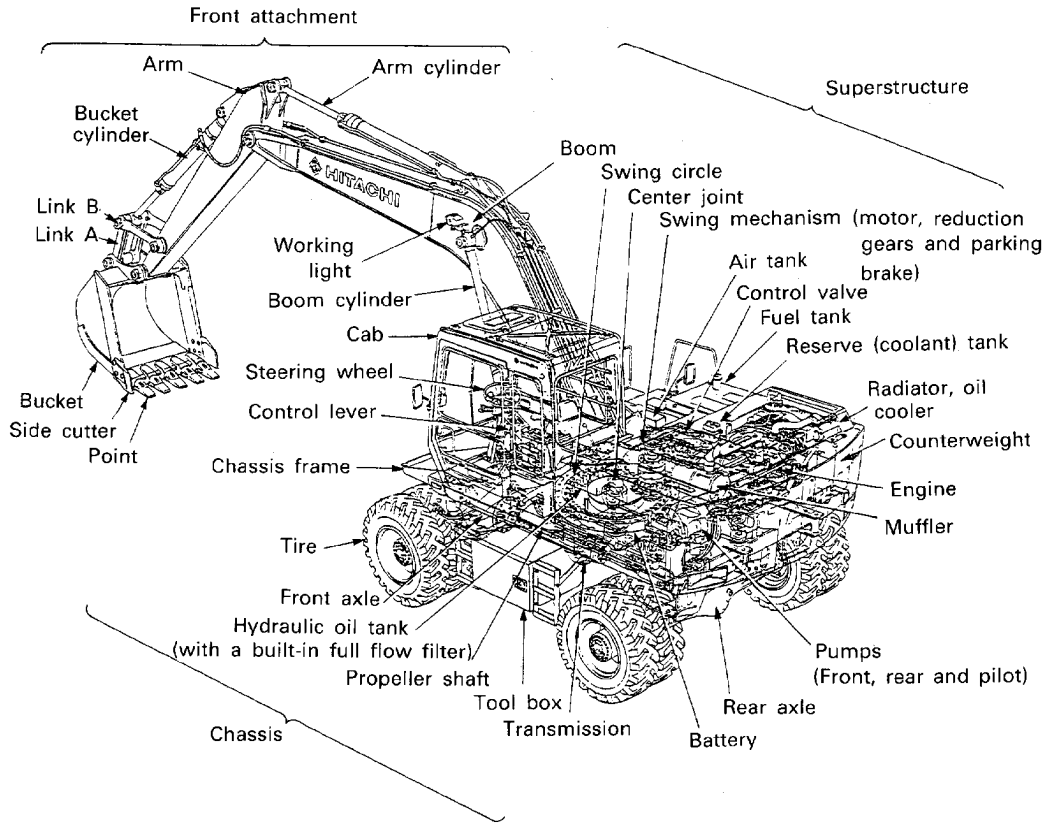
### CORRECT BREAK-IN OPERATION

Cautions for the initial 50 hours:

- (1) Every day, check the levels and any leakage of coolant, engine oil and hydraulic oil. Supply specified oils and coolant as necessary.
- (2) Check the lubrication regularly, and lubricate if necessary.
- (3) Retighten the bolts regularly.
- (4) From time to time, check the gauges and meters in operation.
- (5) Warm up the machine sufficiently. After the warming up, the machine should be operated at 80 % of the full load.
- (6) Check if the machine is operating normally.

# PRESTART INSPECTION

## PREOPERATION CHECK (DAILY)



	Items to be Checked.		Items to be Checked.
(1) Brakes.	<ol style="list-style-type: none"> <li>1. Effective state of brake and volume of brake oil.</li> <li>2. Presence of air leakage.</li> <li>3. Effective state of parking brake.</li> </ol>	(5) Chassis.	<ol style="list-style-type: none"> <li>1. Oil leakage from drive unit.</li> <li>2. Slackness and drop of fitting bolts and nuts.</li> <li>3. Collapse and oil leakage of brake piping.</li> </ol>
(2) Tires.	<ol style="list-style-type: none"> <li>1. Presence of puncture with any of tires.</li> </ol>	(6) Operation units.	<ol style="list-style-type: none"> <li>1. Oil leakage from and damage with cylinder, piping and hoses.</li> <li>2. Abrasion and damage with bucket.</li> <li>3. Looseness, wearout and fracture of bucket pawls.</li> <li>4. Supply situation in the periphery of front.</li> <li>5. Damage with pin Loose locking pin and stopper link.</li> <li>6. Slackness and drop of fitting bolts and nuts.</li> </ol>
(3) Engine.	<ol style="list-style-type: none"> <li>1. Volume and dirtiness of oil and cooling water.</li> <li>2. Slackness of and damage with v-belt.</li> <li>3. Start property, exhaust gas colour and abnormal noise.</li> <li>4. Oil and water leakage from every section, and damage with hoses and piping.</li> <li>5. Damage with radiator and oil cooler, clogging of core.</li> <li>6. Looseness and drop of fitting bolts and nuts.</li> </ol>		
(4) Revolving super-structure.	<ol style="list-style-type: none"> <li>1. Oil volume of and leakage from fuel tank, mixture of foreign materials into it, and water drain.</li> <li>2. Oil volume of and leakage from oil tank.</li> <li>3. Actuation, play and control force of respective control levers.</li> <li>4. actuation of each hydraulic equipment, oil leakage from and damage with piping and hoses.</li> <li>5. Deformation, damage with and abnormal noise from respective sections.</li> </ol>	(7) Others.	<ol style="list-style-type: none"> <li>1. Working state of every metering instrument and switch horn.</li> <li>2. Functions of swing lock and console lock.</li> <li>3. Damage and deformation with head guard.</li> <li>4. Foreign substance stuck to the appearance of machine.</li> </ol>



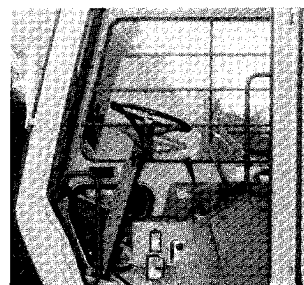


## OPERATION

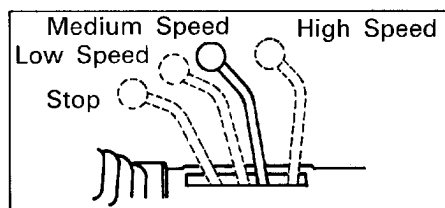
Before operation, always check the machine as described in Chapter 3 Inspection and Maintenance.

### STARTING THE ENGINE

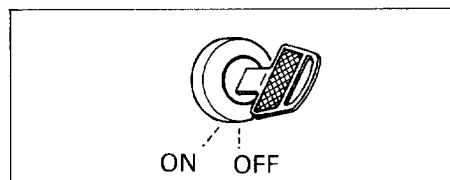
(1) Confirm that all control levers are at NEUTRAL.



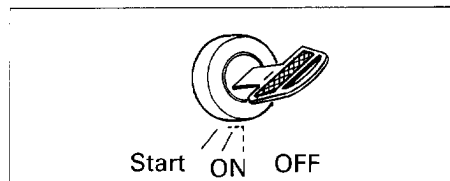
(2) Turn the fuel lever to MEDIUM SPEED



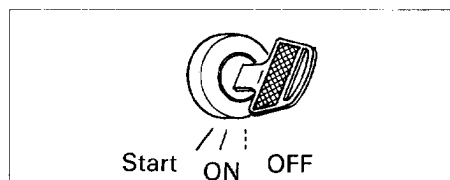
(3) Turn "ON" the starter switch.



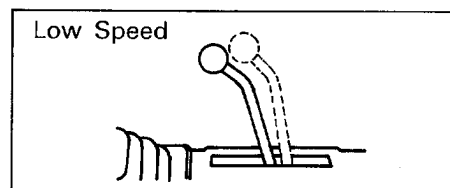
(4) Turn the starter switch to START.



(5) When the engine is started, take off your hand from the starter switch immediately.



(6) Return the fuel lever to "LOW SPEED."



#### (Cautions)

- (1) Before starting the engine, sound the horn to alert others.
- (2) If the engine is not started by turning the switch to "START," do not keep turning it on for more than 15 seconds. Wait for about 2 minutes and try again.
- (3) Be sure to observe (5) above. If not, the starter will not function normally.
- (4) During operation, the starter switch must be turned "ON." Turning it OFF will cause failure of the electrical system.
- (5) When you start the engine or keep it idling at low speed, the vibration of the machine may increase. In this case, raise the engine speed until the vibration stops.

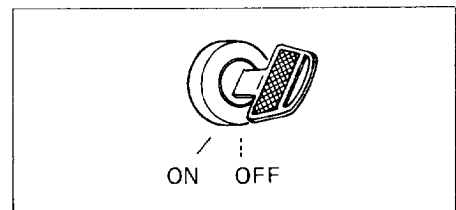
## Operation

- (6) When the pressure in the air tank is low, turning ON the starter switch will cause the buzzer to sound continuously. This is to warn the operator that the brake will not be activated by operating the brake pedal. After a while, the buzzer sound will stop and the air pressure warning lamp will turn off.
- (7) The engine will never start unless the forward-reverse lever is at NEUTRAL.

### STARTING THE ENGINE IN COLD WEATHER

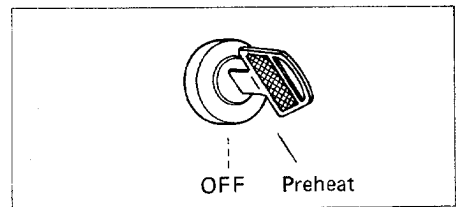
- (1) Keep the fuel lever at "LOW SPEED," and turn "ON" the starter switch.

In this condition, keep running the engine for several seconds to feed oil to the pump and make an oil film on the internal surface to prevent scoring.



- (2) Preheating

1. Turn the starter switch to PREHEAT, and check if the preheat lamp turns ON. After 20 seconds, the preheat lamp turns OFF, indicating the completion of preheating.
2. When the lamp turned OFF, start the engine as instructed in the previous section "Starting the engine."

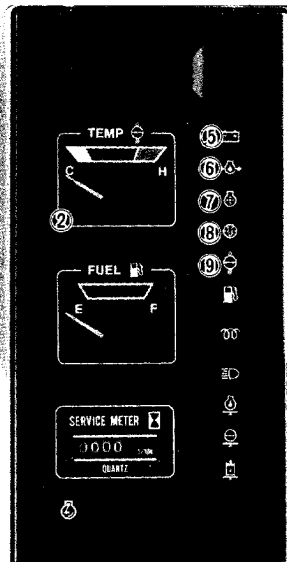


## CHECK INSTRUMENTS AFTER STARTING

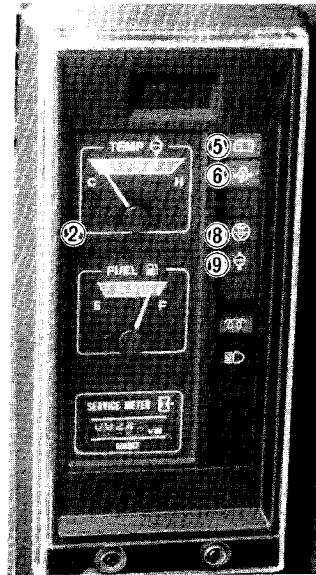
**IMPORTANT:** If a gauge does not operate as shown below, IMMEDIATELY STOP THE ENGINE. Find and correct the cause.

Check indication of gauges.

- (1) Engine coolant temperature gauge ② is in the green range.
- (2) Are the warning lamps ⑤, ⑥, ⑦ (SDX only), ⑧ and ⑨ OFF?
- (3) The engine noise and exhaust gas are normal.



(SDX)



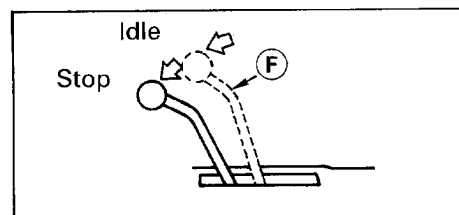
(DX)

## STOPPING THE ENGINE

- (1) Idle the engine for 5 minutes by operating the fuel lever.
- (2) Stop the engine by fully pushing the fuel lever.
- (3) Turn OFF the starter switch.



In case of emergency, the engine can be stopped immediately by fully pushing the fuel lever forward.



(Cautions)

1. These procedures must be followed in this order. If (2) and (3) are reversed, it will cause a failure of the electrical system.
2. If you find any discrepancy between the above description and the "Operation Manual for Isuzu Diesel Engine 6BB1", follow this operation manual.

## WARMING UP

The machine functions correctly when the hydraulic oil temperature is between 50 and 80°C. If the oil temperature is lower than 20°C, sudden operation will damage the hydraulic equipment.

When the engine is started, warm up the machine as follows to raise the hydraulic oil temperature above 20°C:

### Warming up method

- (1) Idle the engine for 5 minutes
- (2) Pull the fuel lever to MEDIUM SPEED, and run the machine for 5 minutes with the bucket lever at "ROLL-IN." (At this time, do not operate any other levers.)
- (3) Turn the fuel lever to HIGH SPEED, and run the machine for 5 - 10 minutes with the bucket-arm lever at "ROLL-OUT" or "ROLL-IN". (Do not operate any other levers.)

## WARMING UP IN COLD WEATHER



**(Caution)** When the oil temperature is low, warm up the machine until the front attachment can function at normal speed.

- (1) Run the engine at medium speed for 5 minutes.
- (2) Do not run it at low or high speed.
- (3) Extend the bucket cylinder fully to the stroke end.
- (4) At this time, don't keep operating the bucket lever for more than 30 seconds.
- (5) Retract the bucket cylinder fully to the stroke end.
- (6) Here again, don't operate the bucket lever for more than 30 seconds.
- (7) Repeat (3) to (6) above until the bucket operates in a normal cycle.
- (8) **In winter or cold weather, water in the brake air circuit may freeze. Drain the water during the preoperation check.**

**Also, check if air is discharged from the drain hose of the air drier when the compressor shifts from LOAD to UNLOAD after the engine is started.**

- (9) In winter or cold weather, even the correct warming up operation may not be effective to achieve a proper travelling speed. This is due to the cold lubricants in the axle and transmission units, and not due to a failure of the machine.

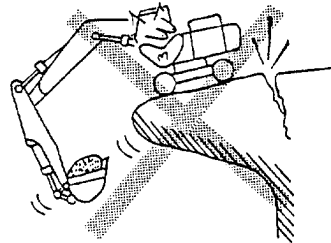


## BASIC MACHINE OPERATION



### AVOID POWER LINES

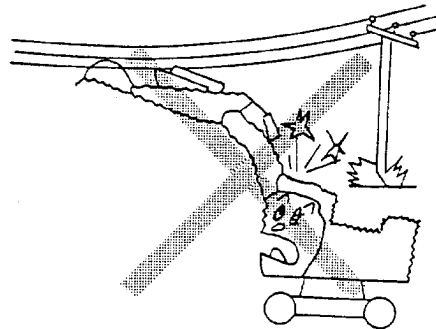
The ground strength must be secured in the work on ground shoulder.



### CHECK WORK SITE

Any contact with these cables may lead to death accident or serious disaster.

Before starting the work in the vicinity of these cables, never fail to discuss the safety measure previously with the concerned power company.



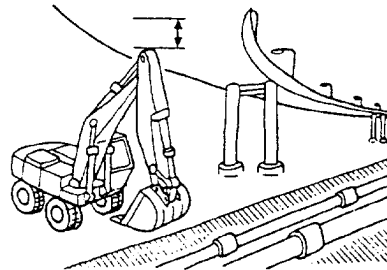
### OPERATE WITH CAUTION

When you operate, move or haul the excavator, avoid contact between boom or arm and overhead obstacles.

Before you dig, check the location of cables, gas lines, and water mains.

Do not dig under the machine.

If engine stops during operation on a hillside, lower the bucket to ground. Start engine immediately.





## Basic Machine Operation

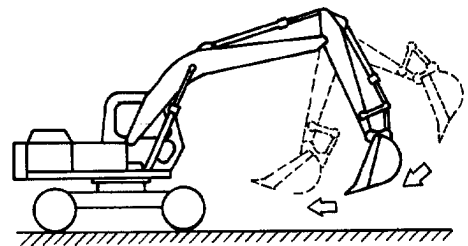


### CAUTIONS FOR OPERATING IN WATER OR ON SOFT GROUND

- (1) Never let the front and rear axles, transmission, parking brake, and front and rear propeller shafts into the water or mud.
- (2) If the river has a flat bottom and slow currents, the machine can travel in water as deep as 300 mm. This standard should be revised appropriately for uneven river beds and strong currents.
- (3) Even if the chassis is not sinking under mud, check the inside of the frame, and remove any earth or sand.
- (4) If the axles, transmission, and/or parking brake are plunged into water or mud, inform the nearest service shop for inspection and maintenance. Continued use of such parts may cause a failure of the parking brake or unusual wear of the internal gears, or damage other equipment.

### WORKING PROCEDURES

- (1) For excavation, direct the swing unit backward (rear axle on the front side).
- (2) Use mainly the arm for excavation.
- (3) If the earth in the bucket is not dumped well, move the arm and bucket several times by operating the respective levers.
- (4) Lower the boom slowly. A sudden stop will cause a great shock to the machine.
- (5) The bucket teeth should be pointed to the excavating direction, and dig the ground to a moderate depth by using the full stroke of the arm.
- (6) For an excavation work, align the truck body with the ditch, and travel the machine as it continues excavation.
- (7) Provide some tolerance at the stroke ends of the cylinders.
- (8) Avoid digging diagonally to the chassis frame, as the teeth may hit the tire.
- (9) For deep digging, be careful not to hit the side of the boom or the bucket cylinder hose against the ground surface.
- (10) Following are normal phenomena unique to hydraulic shovels:
  - ① When the arm lever is operated, the arm cylinder may stop for a moment before it starts working. This is because the pump delivery cannot sustain the arm falling by its self weight.
  - ② When the machine is in swing or travel motion, or when it is started or stopped, a noise may occur from the brake valve due to pressure relief.



 **Basic Machine Operation**

 **DON'T HIT BUCKET TEETH FORCIBLY INTO GROUND**

Use the hydraulic force to excavate a hard soil. Don't shove the bucket teeth forcibly into such soil, as it shortens the service life of the front attachment (especially the bucket). Also wrong is jacking up the front side of the machine body to possibly increase the digging power of the bucket teeth. This will apply an excessive force to the chassis frame and damage it. Jacking up the machine will never increase the digging force but simply damage the equipment. To improve the efficiency, dig the ground little by little by using the boom, arm and bucket.

 **AVOID FORCIBLE DIGGING**

Never travel the machine with the bucket biting into ground or dig it by using the machine's weight. Such operation will apply an extra force to the machine and affect safe operation.

 **DON'T USE THE BUCKET AS A HAMMER**

Never use the bucket for hammer or piling works. Using it for such purpose will damage the bucket and front attachment.

 **AVOID WRONG USE OF SWING FORCE**

Do not shift rocks or attempt to break walls by using swing motion. Such operation will damage the front attachment and shortens the life of the swing mechanism.

 **AVOID WRONG USE OF TRAVEL FORCE**

Never travel the machine with the bucket thrusting into the ground.

 **USE THE MACHINE AS SPECIFIED**

Do not use the machine as a crane.  
The machine has the performance specified by the manufacturer, and should never be used outside the specifications.





## Basic Machine Operation

### USAGE OF THE LONG ARM

- (1) Intended only for loading loam and handling sludge, the long arm should not be used for heavy duty works such as digging gravel.  
If used for the specified purposes, avoid an extreme usage that may damage the boom or arm.  
To excavate with the long arm, it should be operated carefully so as to scrape the surface of the ground.
- (2) **When the long arm is attached, the capacity of the hoe bucket should be limited to 0.45 m<sup>3</sup> to assure proper stability and strength.**

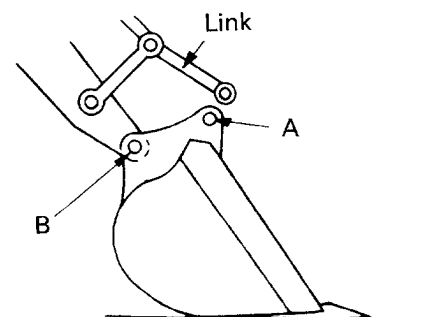
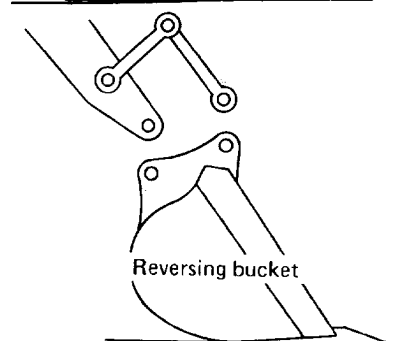
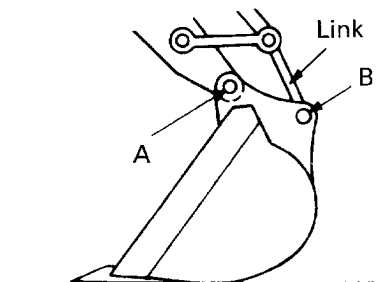
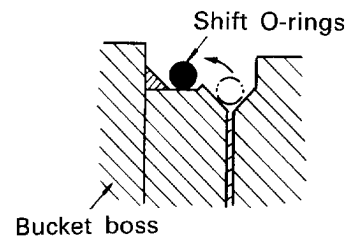
### FACE SHOVEL OPERATION (WITH REVERSED HOE BUCKET)

By turning over the hoe bucket, the machine can be used as a face shovel. Select a stable ground and confirm the safety of others for the operation.

Avoid abrupt motion in operating the front attachment.  
For a joint work, establish a complete signal system to prevent accidents.


To reverse the bucket

- (1) Rest the bucket stably on a firm ground.
- (2) Shift the O-rings set around the pins (A and B) to the bucket boss side.
- (3) Remove the pins A and B. Save them in a clean condition.
- (4) Reverse the bucket, and make it stabilized.
- (5) To reinstall the bucket, fix the arm and the link at the holes B and A, respectively, by using the pins (Provide grease around the holes before inserting the pins).
- (6) Fix the pins A and B with stoppers.
- (7) Reset the O-rings at their original positions.
- (8) Grease the pins A and B.
- (9) After the reassembly, move the bucket at low engine speed between stroke ends, and check if it works smoothly without harmful contacts.

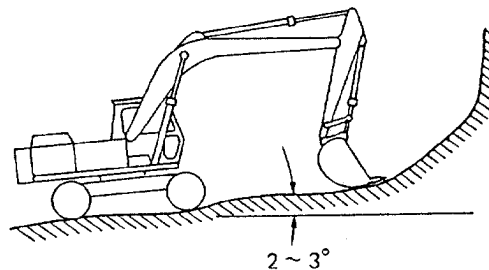


## FACE SHOVEL OPERATION

- (1) For the shovel operation, use mainly the arm cylinder to dig the ground in a scraping motion.
- (2) Where underground water is expected, make a slope of  $2^{\circ}$  to  $3^{\circ}$  to facilitate the drainage.

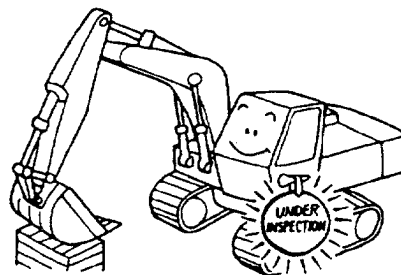
-  (3) Operate carefully so as not to hit the reversed bucket against the cab.

- (4) In the shovel operation, the digging power is reduced as compared to the backhoe operation.



## AFTER THE WORK

- (1) Park the machine with the bucket landed on a level ground where there is no danger of falling rocks, landslide, or flood.
- (2) Fill up the fuel tank.
- (3) Clean the machine.
- (4) If no antifreeze is used in winter, be sure to drain water from the radiator and the engine water jacket. When the water is drained, indicate "NO WATER" at a clearly visible place.
- (5) Release the working brake.
- (6) Apply the parking brake.





## TRAVEL OPERATION

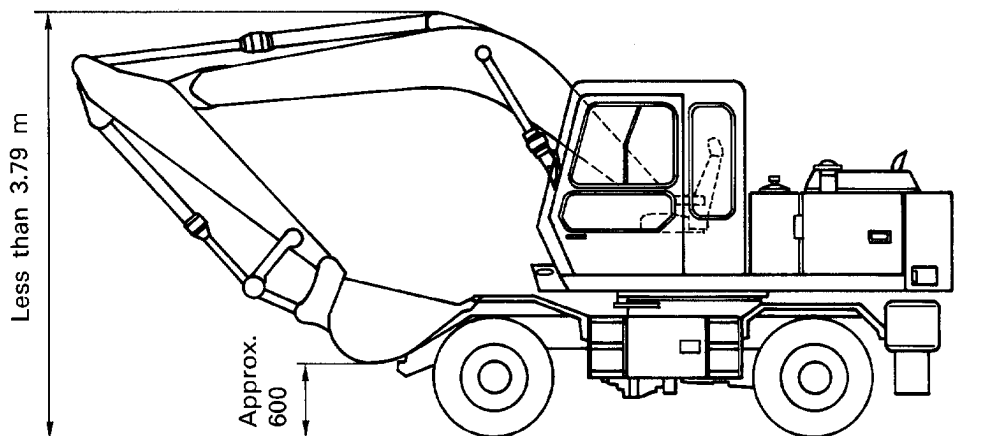
### TRAVEL OPERATION (ON GENERAL ROADS)

Long service life and fuel efficiency are supported by correct travel operation. Observe the following cautions for safe and economical operation:



#### Before start

- ① Check the tires to confirm correct pressure and no defect. At the same time, make sure no danger or obstacle around the machine.
- ② Lift the rear outrigger or blade sufficiently.
- ③ Confirm the front attachment is on the front side of the machine, and lock the swing unit by operating the lever.
- ④ Make the front attachment in the travelling posture (see the figure below), slide the left console BACKWARD, and lock it.



Travelling posture

\* Retain the bucket in the air or slightly in contact with the chassis frame.



#### To start travelling

- ① Confirm the air pressure gauge is indicating the green zone.
- ② After confirming the safety in all directions, release the parking brake. Turn the forward-reverse lever to either F or R, and start the machine.
- ③ Step on the accelerator pedal to increase the speed.
- ④ For high speed travelling, check if the brake works normally in a safe place.

## TEMPORARY STOP AND RESTART



For a stop and restart before a traffic signal, the machine should be operated as follows:

- ① To stop the machine, release the accelerator pedal slowly, and step on the brake pedal.
- ② For a restart, step on the accelerator pedal slowly.
- ③ If the machine should be stopped longer than temporarily, turn the forward-reverse lever to NEUTRAL and apply the parking brake for safety.
- ④ In the course of travelling, the posture of the machine may be affected by leakage of hydraulic oil. When the machine is stopped for a while as in 3. above, make necessary adjustments to keep the machine in the correct travelling posture.



## DURING TRAVEL OPERATION

Observe the following cautions as well as general driving rules to assure safe travel operation:

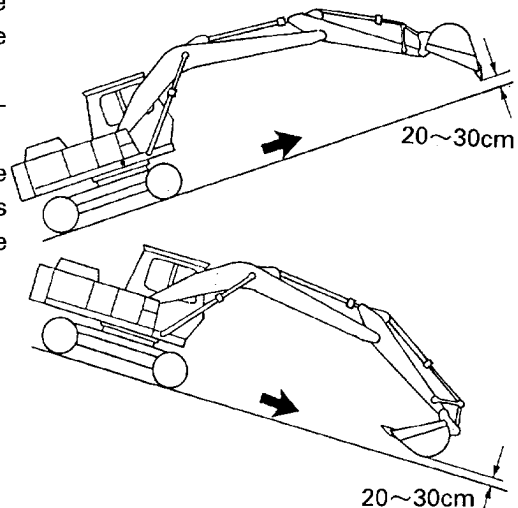
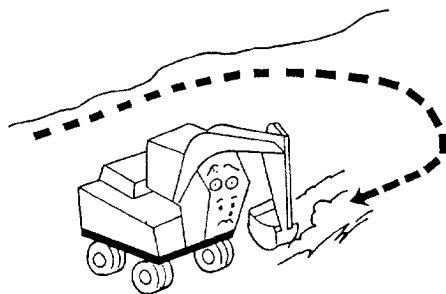
- (1) **Stop travelling immediately when abnormality is alarmed by warning buzzer or air pressure warning lamp.**
- (2) Do not crank the engine more than necessary even after the specified break-in operation.
- (3) If there is an unusual noise or smell, stop travelling immediately. Also, stop the engine for inspection.
- (4) Avoid abrupt steering and braking; it is dangerous not only for you but also for others.
- (5) As the machine does not travel as fast as general cars, keep to the left (or right in some countries) on the road, and give way to other cars as appropriate.
- (6) To make a turn, slow down in advance, and drive carefully.
- (7) **In case of a puncture, stop the car slowly while holding the steering wheel firmly. Never step on the brake pedal too strongly, as it causes wrong steering that may lead to a serious accident.**
- (8) Check the gauges and indicators (especially the air pressure warning lamp and air pressure gauge) constantly. In case of any abnormality, stop the car immediately for checking
- (9) **Do not jump on or off the car in travelling. Don't let anyone except the driver on the machine for travelling.**
- (10) When travelling on a shoulder of road or narrow street, the machine should be guided by someone else.

### CAUTIONS FOR TRAVELLING ON A SLOPE

- (1) If the engine stopped on a road, step on the brake pedal, and restart the engine with the forward-reverse lever at NEUTRAL. **Never drive down a slope with the forward-reverse lever at NEUTRAL, as it causes failure of the motor.**
- (2) **To drive down a slope, use mainly the hydraulic brake, with the help of the brake pedal as necessary. Do not use the brake pedal too much, as it causes an overheat of the brake drum and affect the brake performance. If the brake drum is overheated, stop the car immediately in a safe place, and wait until it cools down for a restart.**
- (3) Before driving down a slope, make sure that the brake works normally.
- (4) If the hydraulic oil and lubricants are not warm enough, the machine cannot climb a slope effectively. Assure enough warming up before ascending a steep slope.

### TRAVELLING IN A WORKING SITE


- (1) Avoid obstacles, and never drive over them.
- (2) Keep away from edges, shoulders, etc.
- (3) On a slope, drive in parallel to its direction. Driving diagonally or sideways will cause a turnover or a side slip.
- (4) Avoid changing the direction on a slope.
- (5) On a slope, hold the bucket 20-30 cm above the ground, and drive slowly. This will allow the operator to stop the machine by landing the bucket in case of emergency.
- (6) Never travel on a steep slope over 20° lengthwise and 5° sideways.
- (7) If the engine stopped on a slope, step on the brake pedal, land the bucket, and turn all levers to NEUTRAL. In this condition, restart the engine.

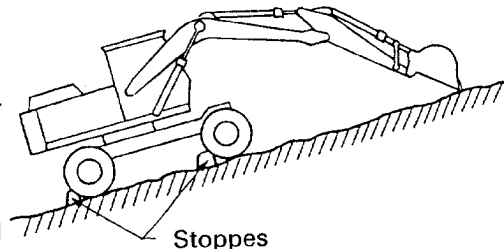



## Travel Operation

### **PARKING**

The machine should be parked as follows:

1. Release your foot from the accelerator pedal slowly.
2. Step on the brake pedal to stop the machine.
3. Turn the front-reverse lever to NEUTRAL (N).
4. Apply the parking brake by operating the lever, and release your foot from the brake pedal.
5.  **Land the bucket.**
6. Stop the engine, turn OFF the starter switch, and pull out the key.
7. Lock the swing lever.
8. Lock the cab door.



 **To park the machine on a slope, even for a short time, always land the bucket, apply the parking brake, and fix the tires with stoppers.**

### **IN CASE OF FAILURE**

- (1) Keep calm, and signal the following cars. Slow down little by little, stop the car as close as possible to the shoulder of the road, and apply the parking brake. In a short tunnel, stop the car outside the tunnel.
- (2) Put a sign that the car is in trouble. Otherwise, the car may be struck by following cars. Be sure to put a sign by using any of the following methods:
  - 1) Parking indicator
  - 2) Hazard lamp
  - 3) Emergency sign (lamp)
  - 4) Red flag or lamp
  - 5) Handkerchief tied at the door or clearly visible place on the rear side.
- (3) Check the cause of failure. If possible, repair the defective part, but watch out other cars for safety.
- (4) If the hydraulic oil is leaking, drain the air from the tank immediately. For the draining procedures, see P. 83. **If the oil leaks so much as to possibly cause a slip, take an immediate action to alarm the following cars.**
- (5) If the machine is unrepairable, contact the nearest service shop.
- (6) Never stop in a tunnel to repair the machine, even for a small repair.

## TRANSPORTING

### TRANSPORTATION

Capable of self travelling as fast as 34.5 km/h, the excavator requires no trailing equipment for short transportation.

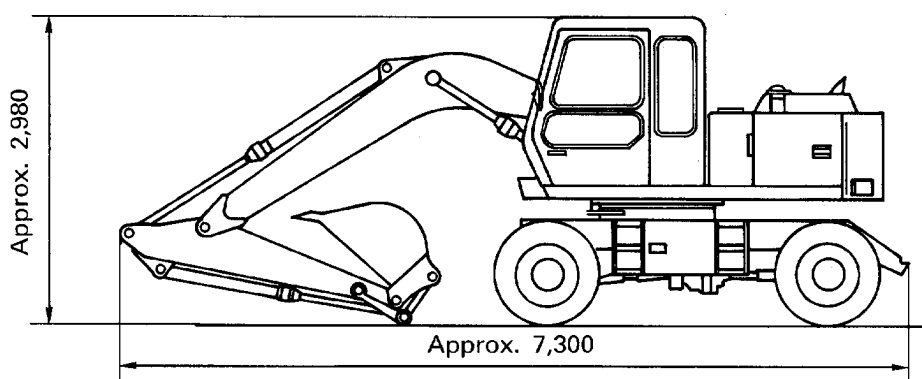
For a long distance, however, it should be transported on a trailer.

### SELF TRAVELLING (FOR SHORT TRANSPORTATION)

- (1) Observe the rules specified in "Basic Operations" (Travelling).
- (2) If there is a bridge on the way, check if the bridge allows the passage of a vehicle as heavy as 12 tons. If not, avoid the bridge or make necessary reinforcement to enable the passage.

### TRANSPORTING ON TRAILER

The excavator has overall dimensions of 2,930 mm (height) and 2,490 mm (width).



Transporting dimensions

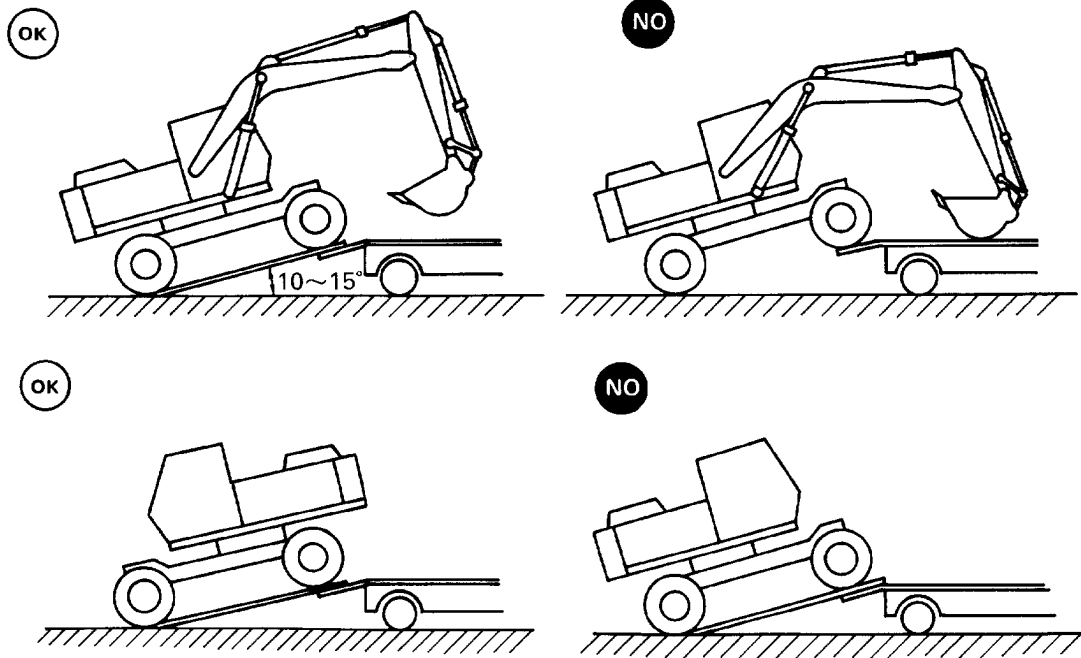
### LOADING/LOADING EXCAVATOR

- (1) Select a level ground for loading and unloading the machine.
- (2) Clean the trailer floor in advance.
- (3) Fix the tracks and tires with blocks.
- (4) Use a trailer deck or ramp for loading/unloading.



## Transporting

- (5) The ramp should have a gradient of  $10^{\circ}$  to  $15^{\circ}$  and enough strength. Fix it firmly with the trailer.
- (6) Align the center of the excavator with that of the trailer floor, and travel the machine straight onto the trailer without steering. At this time, the transmission change lever should be at LOW SPEED (TURTLE).
- (7) The gravity center of the machine shifts suddenly as it moves from the ramp to the trailer. At this time, support the machine temporarily with the bucket.
- (8) If the machine has the front attachment, it should be loaded from the front side.
- (9) If not, it should be loaded from the rear side.



During loading and unloading, do not operate any control devices other than the travel pedal.

### AFTER LOADING

- (1) Be sure to lock the swing unit.
- (2) Apply the parking brake, and fix the front and rear wheels with stoppers.
- (3) Check if the excavator is at the center of the trailer floor and the boom is lowered.
- (4) Stop the engine, and pull out the key.  
**Fix the excavator firmly with the trailer by using wires.**

## TO THE MECHANIC and dealer's service personnel

Read this manual carefully to learn how to service your excavator correctly.

As to more detailed information on the Isuzu Engine than that mentioned in this manual, please refer to the Isuzu Engine manual.

### WARRANTY

The warranty on this excavator appears on your copy of the purchase order which you should have received from your dealer when making your purchase. This warranty provides you the assurance that HITACHI will back its products where defects caused by faulty workmanship appear within the warranty period. In some circumstances, HITACHI also provides field improvements, often without charge to the customer, even if the product is out of warranty. Warranty and field improvements are a part of HITACHI's product support program for customers who operate and maintain their equipment as described in this manual. Should the equipment be abused, or modified to change its performance beyond the original factory specifications, the warranty will become void and field improvements may be denied. Setting fuel delivery above specifications or otherwise overpowering machines will result in such action.

### DIRECTIONS

Left, right, front and rear in this manual are seen from the operator's seat facing forward, propel motors at the rear.

### SAFETY



This symbol is used for important safety messages. When you see this symbol, follow the safety message to avoid personal injury.

Read all of the safety rules in this manual before you service or operate the excavator.

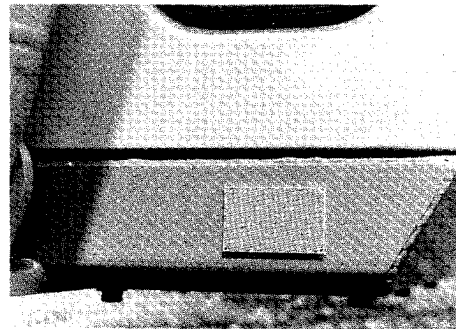
### MEASUREMENTS

SI units equivalent and conventional metric system in parenthesis are used in this manual.

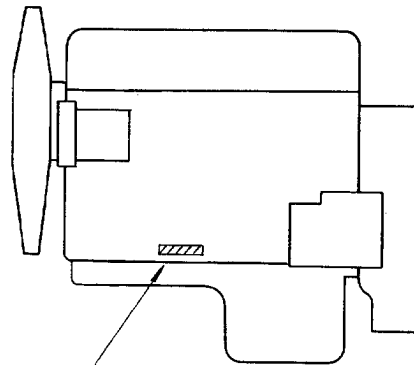
### MACHINE NUMBERS

Write your machine serial number and engine serial number as well as machine model and engine type. Your dealer needs this information when you order parts and/or whenever you contact them.

Machine model and serial number are punched on the front-end side main frame as shown.



Engine type and serial number are stamped on the left side of the engine body.



Location of engine number

6BB1

Engine model-Engine serial number



### UNDERSTAND CORRECT SERVICE

Be sure you understand a service before you work on the excavator.

Do not run the engine while you service the excavator unless the procedure is approved.

Do not start or operate the excavator unless you are in the operator's seat.

Do not lubricate or work on the excavator while it is moving.

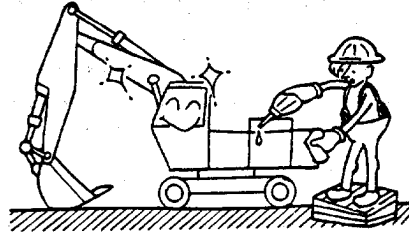


### BE SURE TO STOP THE ENGINE

Place the machine on level ground. Lower the bucket to the ground.

Effect the parking brake.

Stop the engine.

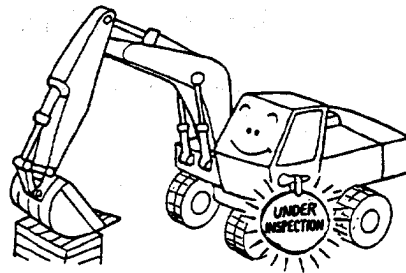


### CAUTIONS FOR INSPECTION AND MAINTENANCE

Place a notice board "under inspection and maintenance" on the cab door or control lever.

Never get under the machine while it is jacked up by the boom and arm:

When inspecting or servicing the machine with raised boom and arm, always use safety blocks, safety supports, etc.



Be careful not to touch hot surfaces or high temperature oil.





Safety

## SERVICE HYDRAULIC SYSTEM SAFELY

The oil tank is always pressurized.

Before you work on the hydraulic system:

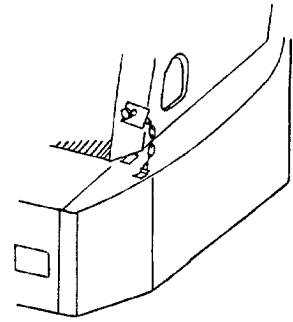
Take off the air brezer cap, and drain the air in the tank.

Before you use the hydraulic system, be sure all connections are tight.

## LOCK THE ENGINE HOOD

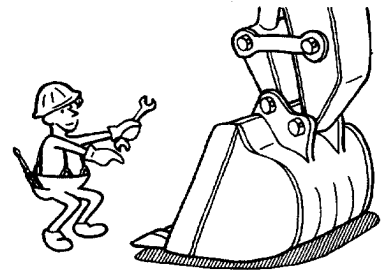
Lock the engine hood after opening.

Don't leave the hood open on slopes or in strong winds.



## SUPPORT RAISED EQUIPMENT

Do not work under a raised bucket. Lower the bucket to ground or onto blocks.

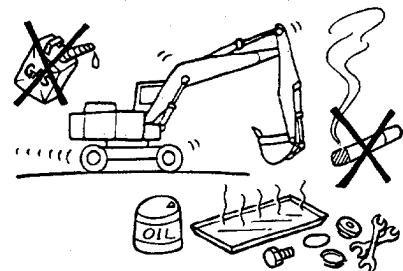


## HANDLE FUEL SAFELY

Be careful when you work with any kind of fuel.

Do not fill the fuel tank when the engine is hot or running.

Do not smoke while you fill the fuel tank or service the fuel system.



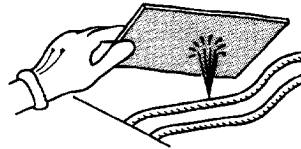


Safety

## AVOID HIGH PRESSURE FLUIDS

Escaping fluid under pressure can have sufficient force to penetrate the skin, causing serious injury. Before disconnecting lines, be sure to release pressure. Before applying pressure, be sure connections are tight and lines, pipes and hoses are not damaged. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.

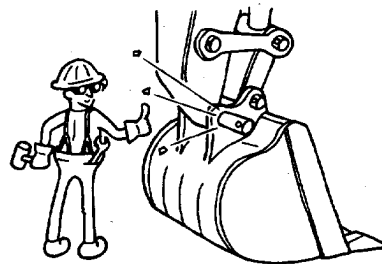
If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.



## MAKE REPAIRS SAFELY

When you drive connecting pins in or out, guard against injury from flying pieces of metal.

Wear goggles or safety glasses, hard hat, and gloves.



## AVOID DANGEROUS WORK

Never attempt to get on or off the machine while it is operating.

When getting on or off the machine, use the handrail and steps.

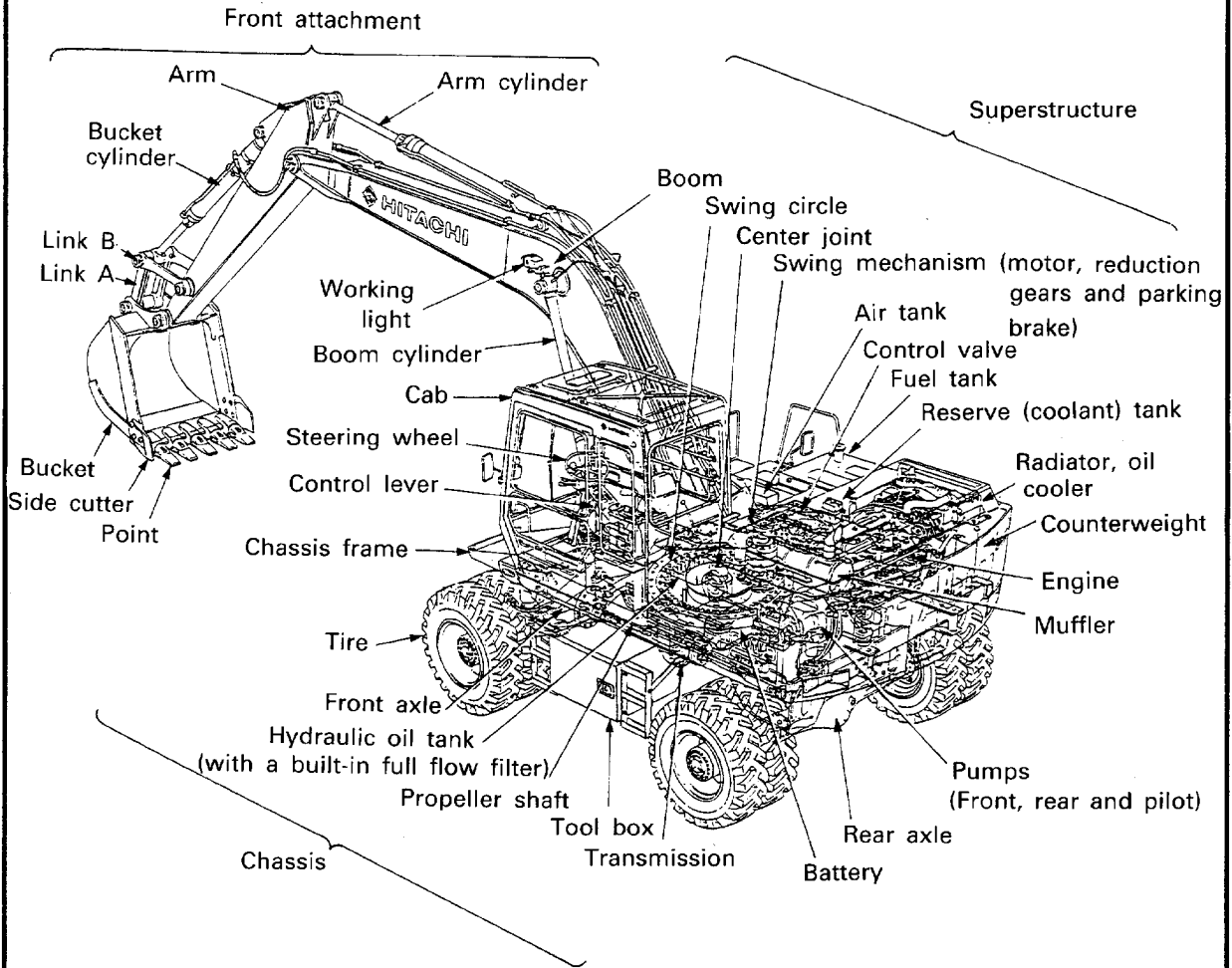




# COMPONENTS LOCATIONS AND CIRCUITS

## GENERAL

consists of three main components as follows:

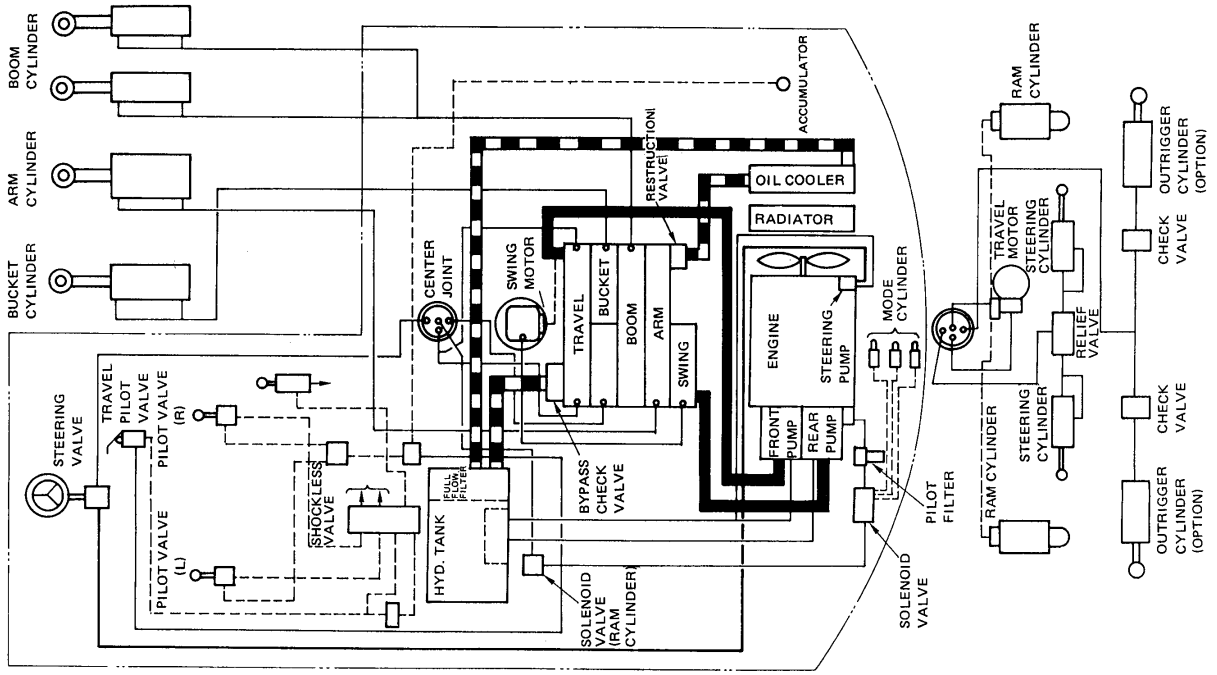




**HYDRAULIC SYSTEM (SDX)**

- (1) This machine has adopted an "optimum hydraulic system (OHS)", a new hydraulic system developed by Hitachi Construction which facilitates the speeding up of the actuator, swing operation and a variety of combined operations required of a hydraulic shovel.
- (2) The control valve has an attachment port, which is a spare port used for the attachments (e.g. breaker).
- (3) A large-capacity safety valve is provided at the control valve, with many additional safety valves equipped on each hydraulic circuit to prevent overpressure and clogging of filters that may damage the hydraulic unit.
- (4) The swing parking brake is interlocked with the swing, boom, arm and bucket levers, and is put ON and OFF automatically. It is released by operating the swing, boom arm or bucket lever, and is applied automatically after putting back the lever.
- (5) This machine is equipped with an accumulator, which allows to move the front-end attachment for some time after the engine has stopped. As it contains high pressure gas, never detach it from the machine body, dismantle it or throw it into flames.
- (6) The all hydraulic components, including the hydraulic pump, control valve have been adjusted at the time of factory delivery.

Do not dismantle these components nor touch the adjustment screws; once demounted, they are no longer readjustable. In case of any abnormality, always inform the nearest service shop.

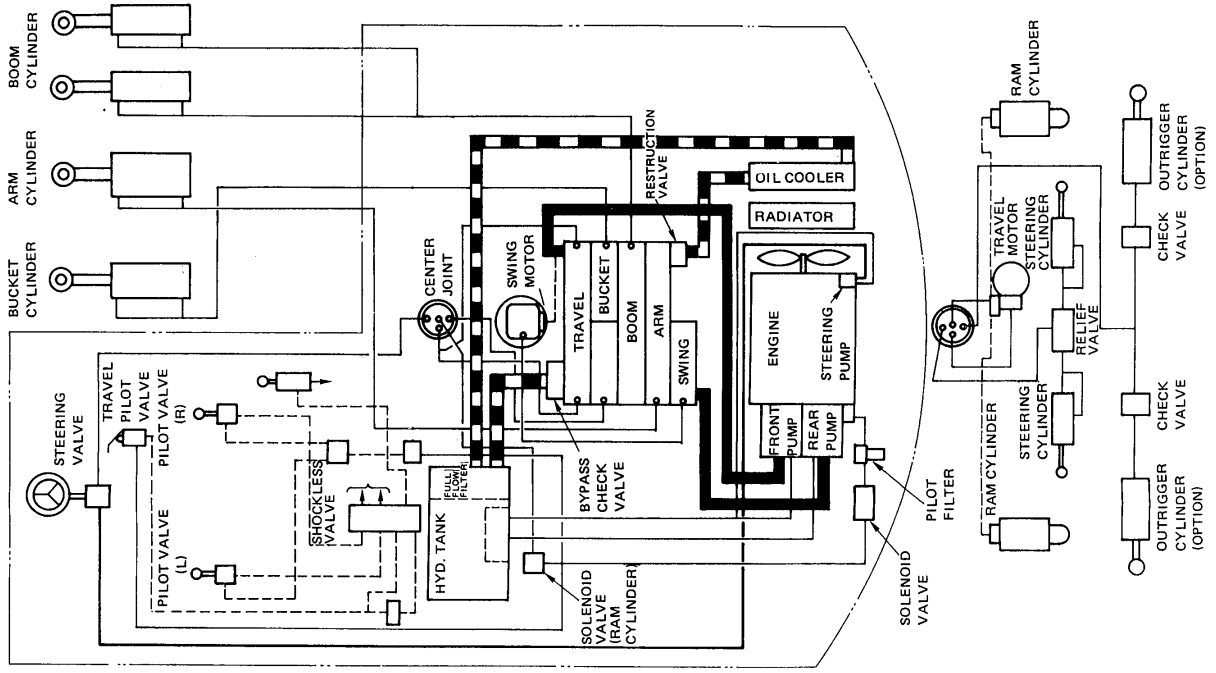


- Supply line from pumps
- ▨ Return line
- Actuator line
- - - Drain and pilot line



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- (5) The all hydraulic components, including the hydraulic pump, control valve have been adjusted at the time of factory delivery. Do not dismantle these components nor touch the adjustment screws; once dismantled, they are no longer readjustable. In case of any abnormality, always inform the nearest service shop.



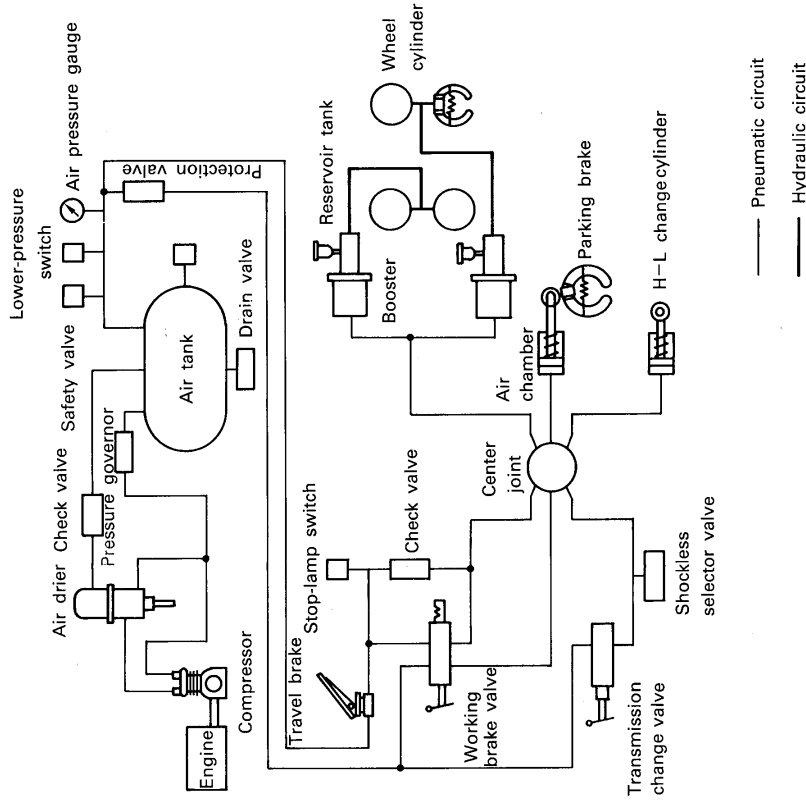
- Supply line from pumps
- - -** Return line
- Actuator line
- - -** Drain and pilot line



**PNEUMATIC SYSTEM**

The excavator uses compressed air to drive the brakes and other devices such as the H-L selector. Compressed air is produced by the compressor and stored into the air tank. It drives the equipment as controlled by the operator.

- (1) Storage of air  
When the engine is started, the compressor compresses open air and feed it to the air drier. The dried compressed air is stored into the air tank.
- (2) Travel (Working) brake  
By stepping on the travel brake pedal (f), compressed air is fed to the booster through the center joint, in an amount corresponding to the stepping strength. The pneumatic pressure is then converted into hydraulic pressure to operate the wheel cylinder and brake the wheels.
- (3) Parking brake at working position  
By turning the parking brake lever to the working position, compressed air is fed from the air tank to brake the wheels in the same way as it drives the travel brake.
- (4) Parking brake  
By turning the parking brake lever to the parking position, the compressed air in the air chamber is released through the center joint and the parking brake valve. This extends the spring being compressed inside the chamber to pull the parking brake lever to apply the parking brake.
- (5) Transmission shift  
By turning the transmission lever to TURTLE, compressed air in the air tank (c) is fed to the H-L selector cylinder through the center joint. It compresses the spring and move the shifter to select the low speed.  
At the same time, it controls the shockless selector valve to select 2 pilot systems for the hydraulic travel valves.  
By turning the lever to RABBIT, the compressed air is released. The shifter is reset to the original position by the spring, to turn the transmission to high speed. Also, the shockless selector valve is controlled to select 1 pilot system for the hydraulic travel valves.
- (6) Internal pressure of hydraulic tank  
Compressed air is constantly fed from the air tank (c) to the hydraulic oil tank, keeping the internal pressure at a specified level reduced by the reducing valve.



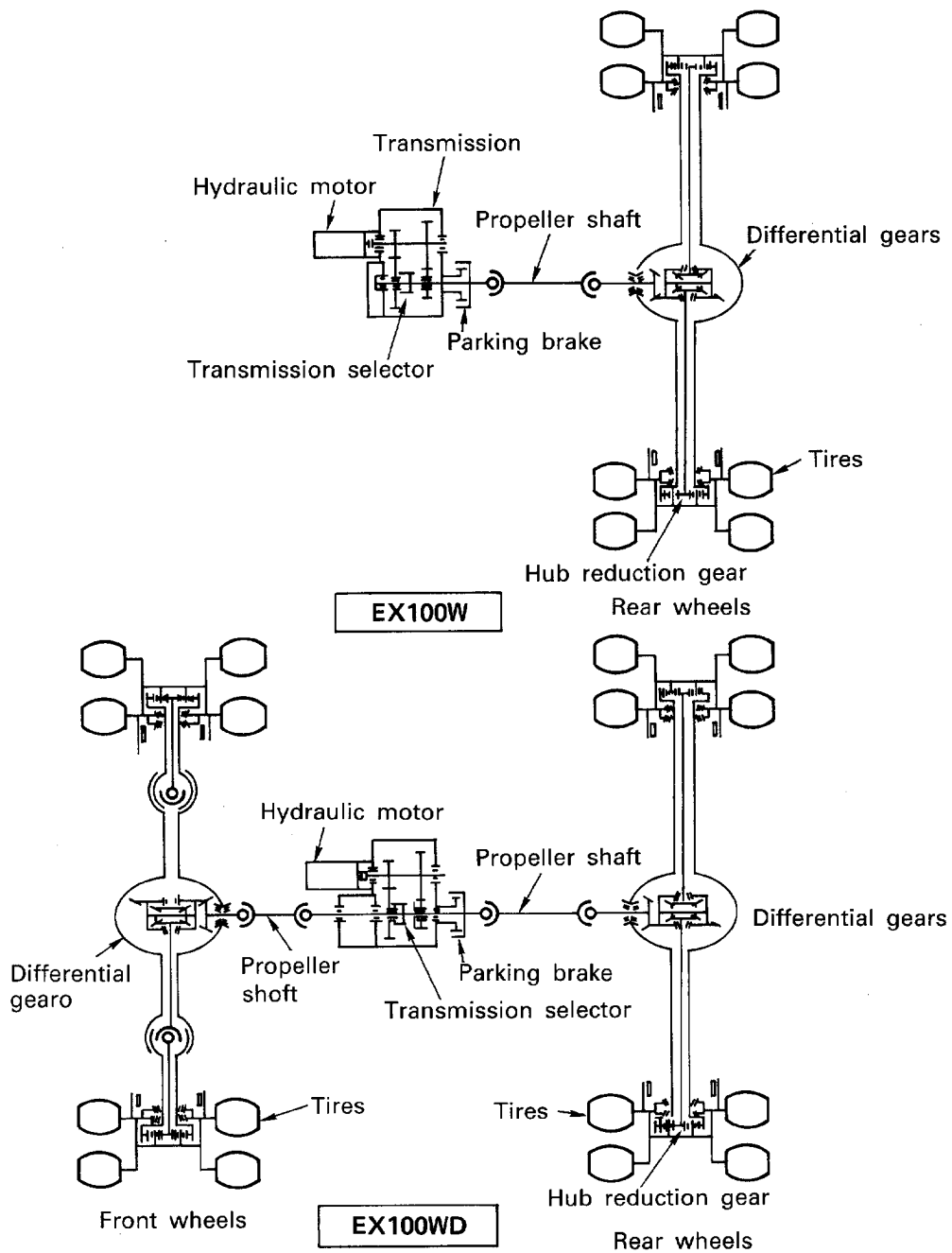
The safety valve, pressure governor and air pressure switch have been adjusted at the time of delivery. Do not dismantle these parts or touch the adjustment screws. Once dismantled, they can never be readjusted. Failure of these parts will cause a serious accident. In case of abnormality, always contact the nearest service shop.



**TRAVEL DRIVE SYSTEM**

The travel operation is effected by the hydraulic motor that drives the wheels.

- (1) The drive force of the motor is transmitted to the axles via the transmission and propeller shaft. Its speed is reduced by the differential gears and hub reduction gears, and transmitted to the wheels with large torque.
- (2) By turning the transmission lever to HIGH SPEED, the propeller shaft is engaged with the high speed gear. By turning it to LOW SPEED, the shaft is engaged with the low speed gear.



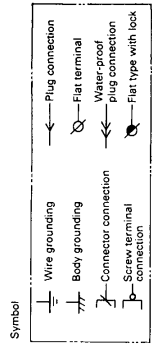
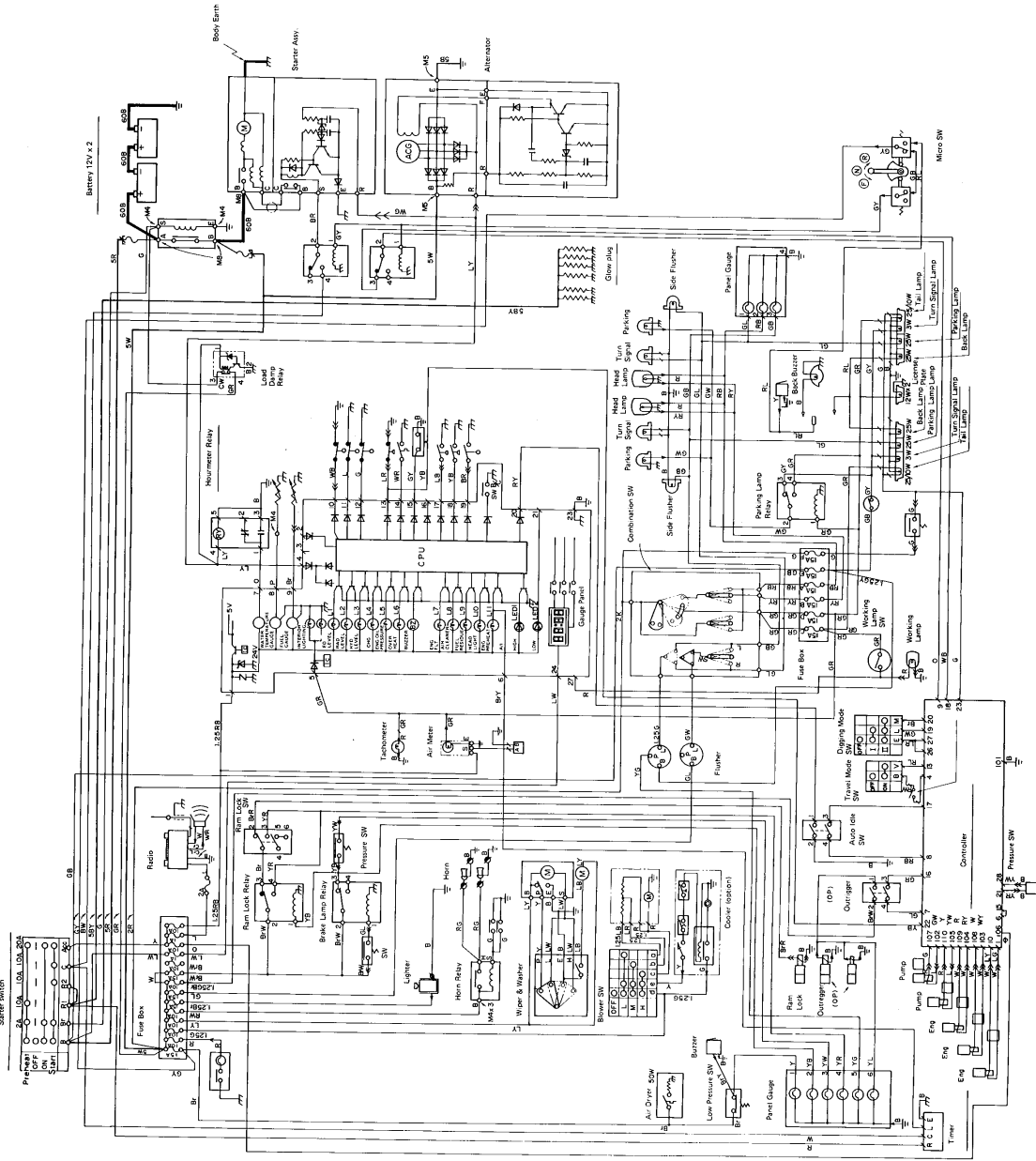
**ELECTRICAL CIRCUIT (SDX)**

This machine uses a 24 volt, negative earth type system. For additional details, refer to the ISUZU 6881 engine operation manual.

**NOTES:** Colour distinction of electrical wires.

- B : Black
- BR : Black/Red
- Br : Brown
- BW : Black/White
- G : Green
- BY : Black/Yellow
- GW : Green/White
- Gr : Gray
- GY : Green/Yellow
- L : Blue
- LB : Blue/Black
- OR : Orange
- LR : Blue/Red
- OW : Orange/White
- W : White
- LY : Blue/Yellow
- RY : Red/Yellow
- LBW : Blue/Black/White
- LYW : Blue/Yellow/White
- RYW : Red/Yellow/White
- WLG : White/Green
- WLY : White/Yellow/Black
- WR : White/Red
- YB : Yellow/Black
- YR : Yellow/Red

(Notes) The wires consisting of 2 colors, the first color indicates the base color of wire, and the second color is the color of marking.  
Ex.) BW: Black base and white marking.





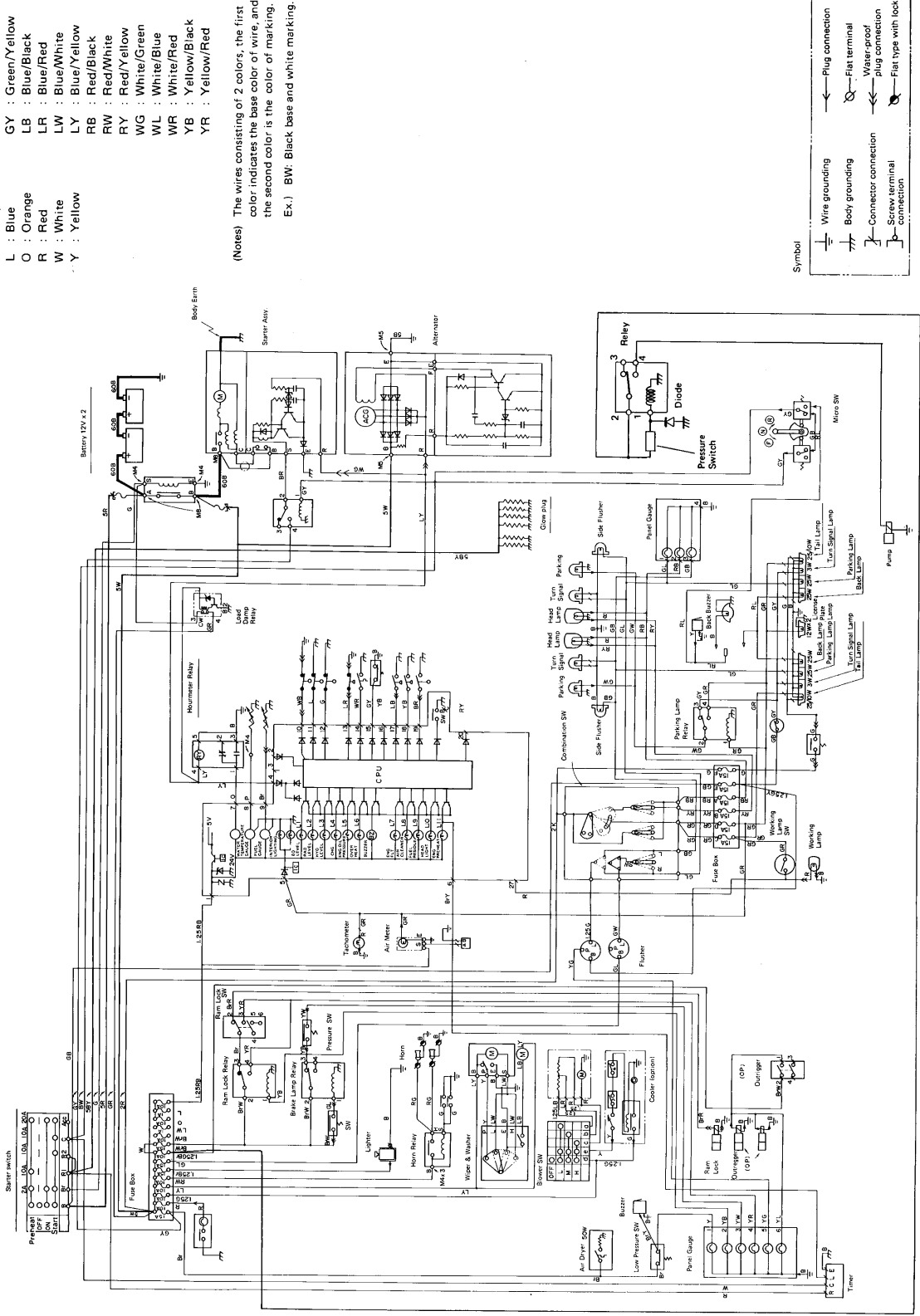


**ELECTRICAL CIRCUIT (DX)**

This machine uses a 24 volt, negative earth type system. For additional details, refer to the ISUZU 6BB1 engine operation manual.

- NOTES:** Colour distinction of electrical wires.
- B : Black
  - BR : Black/Red
  - Br : Brown
  - BW : Black/White
  - G : Green
  - BY : Black/Yellow
  - Gr : Gray
  - GW : Green/White
  - L : Blue
  - GY : Green/Yellow
  - LB : Blue/Black
  - O : Orange
  - LR : Blue/Red
  - OR : Red
  - LW : Blue/White
  - W : White
  - LY : Blue/Yellow
  - WB : White/Black
  - RY : Red/White
  - RY : Red/Yellow
  - WG : White/Green
  - WL : White/Blue
  - WR : White/Red
  - YB : Yellow/Black
  - YR : Yellow/Red

(Notes) The wires consisting of 2 colors, the first color indicates the base color of wire, and the second color is the color of marking.  
Ex.) BW: Black base and white marking.





## MAINTENANCE

The correct inspection and maintenance demonstrate the thorough performance of the vehicle. Especially, operate the excavator with cares given in the following all the time.

- Is the brake system normal?
- Are the drive and steering system normal?
- Are the operating systems and measuring instruments normal?
- Check the water, fuel oil and operation oil for leakage, level and dirt.
- Check the appearance, sound and overheat for any failure.
- Check every part for damage, wear and missing.

If any failure is found during inspection or operation, immediately determine the cause and repair it. If the cause is uncertain, ask our nearest service shop for hydraulic system. . . . .

Precautions for inspection and maintenance are:

- Always use the specified fuel and lubrication oils and grease.
- Always use the genuine parts.
- Never adjust the engine governor and safety valves.;



Use of fuel and lubrication oils and grease other than the specified ones shall be out of the "warranty."

### REGULAR VOLUNTARY INSPECTION

(1) Always conduct the complete maintenance and adjustments, as this results in an extension of lifetime, as well as the sufficient demonstration of functions in each shovel part.

This section describes the standards for regular voluntary inspection. Prepare the maintenance Plan meeting the operating conditions and environment, and execute the effective inspection and maintenance.

(2) Classification of regular voluntary inspection

A. Routine inspection	To be conducted daily before operation.
B. Monthly inspection	To be conducted monthly.
C. Quarterly inspection	To be conducted quarterly.
D. Annual inspection	To be conducted annually.
E. Replacement of oil, grease and element	To be conducted during routing the specified replacement time via the hour meter.

## Maintenance

● : Items specified by safety

○ : Item specified by use

### A. Routine Inspection (Before Drive and Operation)

Where to check	What to check		Procedure Reference page
1. Brake system	1. Appropriate stepping size of brake pedal; sufficient effect of brake; and no one-side braking effect	●	43
	2. Sufficient brake oil quantity	●	89
	3. Good air pressure rise	●	
	4. Normal exhaust sound from the brake valve upon stepping on and off the brake pedal	●	
	5. Sufficient effect of parking brake	●	91
2. Tire	1. Appropriate air pressure of tires	●	43
	2. Neither tear nor damage	●	
	3. No abnormal wear	●	
	4. No foreign matter, such as metal piece, stone and any other	●	
3. Lighting system and direction indicators	Good lighting on and off, and neither stain nor damage	●	27
4. Back mirrors and reflection mirrors	Good image reflection	●	
5. Reflectors, license number plate and vehicle number	Neither stain nor damage	●	
6. Air tank	1. No condensate in the air tank	●	
	2. Appropriate air pressure	●	
7. Wherever a failure is found in the previous day operation	No failure in the said part	●	
8. Engine	1. Quantity and stain of oil and cooling water	○	83 105
	2. V-belt looseness and damage	○	106
	3. Startability, exhaust smoke color and foreign sound	○	
	4. Oil and water leakages from every part, and damage of hoses and pipes	○	
	5. Damage of radiator and oil cooler, and core clogging	○	107
	6. Looseness and missing of set nuts and bolts	○	
	7. Water drain from the fuel filter	○	
9. Superstructure	1. Oil level in, oil leakage from, foreign matter entrance into, and water drain from the fuel oil tank	○	101
	2. Oil level in and oil leakage from the oil tank	○	93
	3. Operation, play and operability of each operating lever	○	
	4. Hydraulic equipment operation, piping, oil leakage from hoses, and damage	○	
	5. Deformation, damage and foreign sound at every part	○	
	6. Looseness and missing of set nuts and bolts	○	115 116
10. Undercarriage	1. Oil leakage from the drive system	○	
	2. Looseness and missing of set nuts and bolts	○	118

## Maintenance

Where to check	What to check		Procedure Reference page
11. Operating equipment	1. Oil leakage from and damage of cylinders, pipes and hoses	○	112  114
	2. Bucket wear and damage	○	
	3. Looseness, wear, missing and breakage of bucket forks	○	
	4. Lubricating condition around the front	○	
	5. Damage of pin stopper rings	○	
	6. Looseness and missing of set nuts and bolts	○	
12. Others	1. Operating condition of each measuring instrument, switch, lamp and horn	○	12~17, 26~28    104
	2. Function of turning lock and arm lever lock	○	
	3. Wear and deformation of head guard	○	
	4. Any failure of machine appearance	○	
	5. Drain of air tank	○	

## Maintenance

### B. Montly Inspection

Where to check		What to check		Procedure Reference page
Steering system	Power steering system (steering valve)	Oil leakage and quantity	●	
	Brake pedal	1. Play and clearance from the floor upon 2. Braking effectiveness	● ●	
Brake system	Parking brake	Braking effectiveness	●	43
	Hose and pipe	Leakage, damage and connection	●	
	Reservoir	Liquid level	●	89
	Brake drums and shoes	Clearance between drum and lining	●	89
Driving system	Wheels, frame, etc.	1. Air pressure of tires	●	120
		2. Tire tear and damage	●	
		3. Tire groove depth and abnormal wear	●	119
		4. Metal piece, stone and any other foreign matters of tires	●	
		5. Looseness of wheel nuts and pins	●	
		6. Damage of rims, side rings and wheel discs	●	
		7. Deformation and damage of chassis frame, etc.	○	118 ~ 119
		8. Oil quantity, stain and foreign sound of drive system	○	
		9. Looseness and missing of set nuts and bolts	○	
		10. Driving condition	○	
Power trans- mission system	Mission selector switch	Operation	●	
	Transmission	Oil leakage and quantity	●	87
	Differential gears	Oil leakage and quantity	●	87, 88
	Propeller shaft	Bending and deformation	●	
Power equipment	Battery	Liquid quantity	●	109
	Electric wiring	Loose connection and damage	●	
Engine	Main body	1. Startability and foreign sound	●	34, 36
		2. Low speed and acceleration condition	●	
		3. Exhausting condition	●	103
		4. Air cleaner element condition	●	
		5. Oil stain and quantity of air cleaner	●	115
		6. Looseness and missing of set nuts and bolts	○	
Engine	Lubrication system	1. Oil leakage	●	83
		2. Oil stain and quantity	●	
	Fuel system	1. Fuel oil leakage	●	84
		2. Fuel oil filter stain and clogging	○	
Cooling system	1. Water level	●	106	
	2. Looseness and damage of fan belt	●		
	3. Stain, clogging and damage of radiator and oil cooler	○	107	
Lighting system and direction indicators		Operation	●	
Exhaust pipe and muffler		1. Stain of air cleaner 2. Looseness and damage of exhause pipe and muffler	○ ○	

## Maintenance

Where to check	What to check		Procedure Reference page
Air drier	<ol style="list-style-type: none"> <li>1. Condensate in the air tank</li> <li>2. Make-up function of air dryer</li> </ol>	<ul style="list-style-type: none"> <li>●</li> <li>●</li> </ul>	104
Superstructure	<ol style="list-style-type: none"> <li>1. Oil level, leakage, stain and foreign matter mix in each oil tank</li> <li>2. Stain and clogging of each operating oil filter</li> <li>3. Operation, operability and play of each operating lever</li> <li>4. Oil leakage and damage of pipes and hoses</li> <li>5. Lubricating condition at every part</li> <li>6. Deformation, damage and foreign sound at every part</li> <li>7. Looseness, short circuit and damage of every wiring connection</li> <li>8. Operating condition and oil leakage of each valve</li> <li>9. Operating condition of hydraulic pumps</li> <li>10. Looseness and missing of set nuts and bolts</li> <li>11. Looseness and missing of swing ring set nuts and bolts</li> </ol>	<ul style="list-style-type: none"> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> </ul>	96            77
Operating equipment	<ol style="list-style-type: none"> <li>1. Oil leakage and damage of cylinder pipes and hoses</li> <li>2. Deformation and damage of boom, arm, ring, etc.</li> <li>3. Bucket wear and damage</li> <li>4. Looseness, wear, missing and breakage of bucket forks</li> <li>5. Bucket clearance adjustment</li> <li>6. Lubricating condition around the front</li> <li>7. Looseness and missing of pins and bushes</li> <li>8. Hydraulic cylinder damage, rod damage and deformation</li> <li>9. Looseness and missing of set bolts and nuts</li> </ol>	<ul style="list-style-type: none"> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> </ul>	112 114 77 114
Others	<ol style="list-style-type: none"> <li>1. Lubricating condition at every part of chassis</li> <li>2. Operating condition of each measuring instrument, switch, etc.</li> <li>3. Operating condition of horn and lighting system</li> <li>4. Function of arm lever lock and turning lock</li> <li>5. Damage and deformation of head guard</li> </ol>	<ul style="list-style-type: none"> <li>●</li> <li>○</li> <li>○</li> <li>○</li> <li>○</li> </ul>	77



## Maintenance

### C. Quarterly Inspection (Following Inspection in Addition to the Monthly Inspection)

Where to check		What to check		Procedure Reference page
Steering system	Steering wheel	1. Play, looseness and rattling 2. Operating condition	● ●	
	Rods and arms	1. Looseness, rattling and damage 2. Tear and damage of ball joint dust boots	● ●	
	Knuckle	Rattling connection	●	
	Power steering system (steering valve)	Loose setting	●	
Brake system	Brake drum and lining	Wear of shoes sliding part and lining	●	89
	Parking brake drum and lining	1. Loose drum setting 2. Clearance between drum and lining	● ●	91
Drive system Power trans- mission system	Wheel	Hub bearing rattling	●	
	Proppeller and drive shafts	1. Loose connection 2. Breakage and damage of flexible joints	● ●	118
Electric equipment	Battery	1. Specific gravity of liquid 2. Terminal connecting condition	● ●	109
Engine	Lubricaiton system	Oil filter clogging	●	84
	Fuel system	1. Injection pump condition 2. Throttle valve condition 3. Fuel filter clogging 4. Jet pressure and condition of jet nozzle	● ● ● ●	
	Cooling system	1. Water leakage 2. Radiator cap function	● ●	
Horn, wiper wash, defroster and turning lock		Operation	●	
Meter		Operation	●	
Exhaust pipe and muffler		Loose connection and damage	●	
Chassis frame and unit		1. Door lock function 2. Looseness and damage	● ●	

**Maintenance**

**D. Annual Inspection (Following Inspection in Addition to the Quarterly Inspection)**

Where to check		What to check		Procedure Reference page
Steering system	Rod and arm	1. Connection wear condition 2.	● ●	
	Knuckle	Clearance between knuckle and front axle	●	
	Steering wheels	1. Wheel alignment 2. Right and left turning angles	● ●	
Brake system	Master cylinder wheel	Function, wear and damage	●	
	Brake valve	Function	●	
	Brake drum and shoe	Drum wear and damage	●	89
	Parking drum and lining	1. Wear of lining 2. Drum wear and damage	● ●	91
Drive system	Front axle housing	Damage and deformation	●	
	Rear axle housing	Damage and deformation	●	
	Wheel	Hub bearing rattling	●	
Power transmission system	Transmission	Rattling of operating mechanism	●	
	Propeller and drive shafts	1. Rattling of spline section 2. Rattling of flexible joints 3. Swing of propeller shaft 4. Rattling of center bearing 5. Twist and breakage axle shaft	● ● ● ● ●	
Engine	Main body	1. Tightening condition of each part of cylinder head and manifold 2. Compressed pressure 3. Valve clearance	● ● ●	
	Fuel system	1. Jet timing and quantity 2. Function of supply pump	● ●	
Exhaust pipe and muffler		Muffler function	●	
Air compressor		Functions of compressor, pressure regulator and unloader valve	●	

## MAINTENANCE GUIDE

### A. Lubrication

Parts to be lubricated	Q'ty	Interval (hr)							Page
		8	50	100	250	500	1000	2000	
1. Front joint pins	19	★							78
2. Swing bearings	3								79
3. Swing gear	1								79
4. Front axles.	10								80
5. Steering cylinders	4								80
6. Propeller shafts (front and rear)	6								80
7. Outriggers (Option)	12								81
8. Equalizer pin	1								81

For underwater excavation, only the pins submerged in water should be lubricated before and after operation.

### B. Engine oil

Checking point		Q'ty	Interval (hours)							Page
			8	50	100	250	500	1000	2000	
1. Engine oil	Check level	-								83
	Replace	(20ℓ)								83
2. Engine oil filter	Replace	1								84

### C. Gear oil

Checking point		Q'ty	Interval (hours)							Page
			8	50	100	250	500	1000	2000	
1. Swing mechanism	Check level	-								86
	Replace	(3.2ℓ)								86
2. Transmission	Check level	-								87
	Replace	5ℓ								87
3. Front axle case ★	Check level	-								87
	Replace	6ℓ								87
4. Front/rear hub reduction gears ★	Check level	-								87
	Replace	3ℓ								87
5. Rear axle case	Check level	-								88
	Replace	8.5ℓ								88

★ EX100WD only

## Maintenance

### D. Brake system

Checking Point	Q'ty	Interval (hours)							Page
		8	50	100	250	500	1000	2000	
1. Brake reservoir Check oil level and refill	-								89

### E. Hydraulic system

Checking Point	Q'ty	Interval (hr)							Page
		8	50	100	250	500	1000	2000	
1. Check hydraulic oil level	-								93
2. Drain hydraulic oil tank	1								93
3. Replace hydraulic oil (133ℓ)	(133ℓ)								94
4. Clean suction filter	1	When hydraulic oil is replaced							95
5. Replace full-flow filter element	1								96
6. Replace pilot filter element	1								97

### F. Fuel system

Tank capacity: 250 ℓ

Checking Point	Q'ty	Interval (hr)							Page
		8	50	100	250	500	1000	2000	
1. Drain water in fuel tank	1								101
2. Check water sedimenter	1								101
3. Replace fuel filter element	1								101
4. Clean feed pump strainer	1								102

### G. Pneumatic system

Checking point	Q'ty	Interval (hours)							Page
		8	50	100	250	500	1000	2000	
1. Air cleaner element	Clean	1					* or when warning lamp lit		103
	Replace	1	After cleaning 6 times or 1 year						
2. Air drier	Check	1							104
	Replace	1							104

## Maintenance

### H. Cooling system

Checking Point	Q'ty	Interval (hours)						Page	
		8	50	100	250	500	1000		2000
1. Check coolant level	1								106
2. Check fan belt tension	1		★★						106
3. Replace coolant	(20 ℓ)	Twice a year in spring and autumn						107	
4. Clean radiator core	Outside	1							107
	Inside	1	Once a year						
5. Clean oil cooler front net	1								107

### I. Electric system

### J. Others

Checking point	Q'ty	Interval (hours)						Page	
		8	50	100	250	500	1000		2000
1. Check bucket teeth loose and wear	-								112
2. Adjust clearance of bucket set pins	1	When necessary						114	
3. Check bolt loosening	-		★★						115

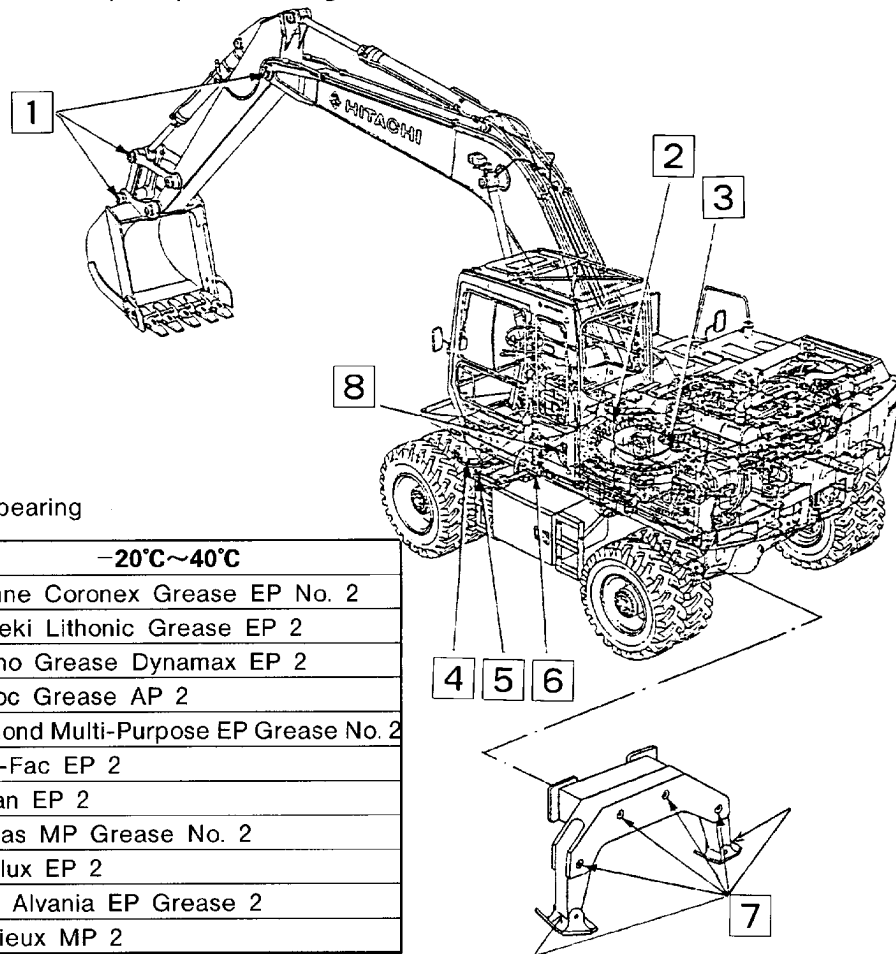
Only for initial checking

★★ Only for initial checking

**A. Lubrication**

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		8	50	100	250	500	1000	2000	
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6. Propeller shafts (front and rear)	6								80
7. Outriggers (Option)	12								81
8. Equalizer pin	1								81

For underwater excavation, only the pins submerged in water should be lubricated before and after operation.



Grease for gear and bearing

Manufacturer	-20°C~40°C
Idemitsu Kosan	Daphne Coronex Grease EP No. 2
Kyodo Oil	Kyoseki Lithonic Grease EP 2
Cosmo Oil	Cosmo Grease Dynamax EP 2
Nippon Oil	Epinoc Grease AP 2
Mitsubishi Oil	Diamond Multi-Purpose EP Grease No. 2
Caltex Oil	Multi-Fac EP 2
Esso Standard	Lithtan EP 2
Kygnas Oil	Kygnas MP Grease No. 2
Mobil Oil	Mobilux EP 2
Showa Shell	Shell Alvania EP Grease 2
General Oil	Gemieux MP 2

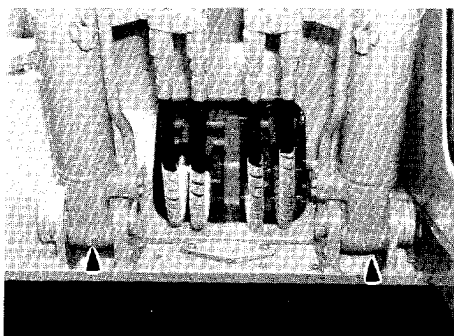
\* The 100-hour greasing interval for the front pins is intended for general excavation. For underwater excavation, only the pins submerged in water should be lubricated also before and after operation.

## Maintenance

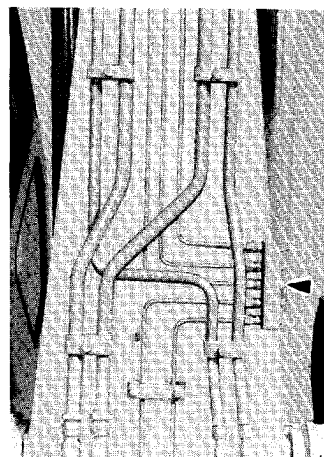
### **1** Front joint pins - Every 100 hours (for general excavation)

Lubricate the all fittings shown below.

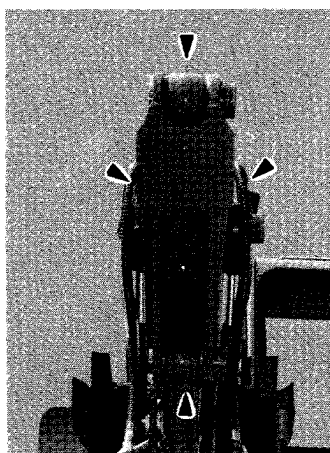
A central lubricating system is provided to assure safety in greasing high places.



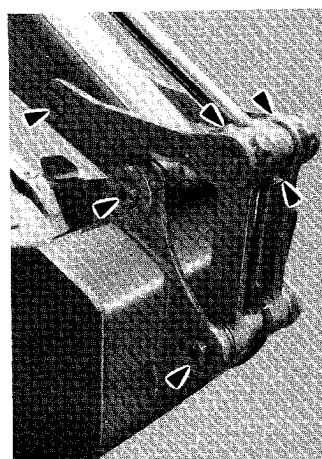
Bottom of boom cylinders



Central lubricating system



Boom-arm joint pins on arm cylinder rod and at bottom of bucket cylinder



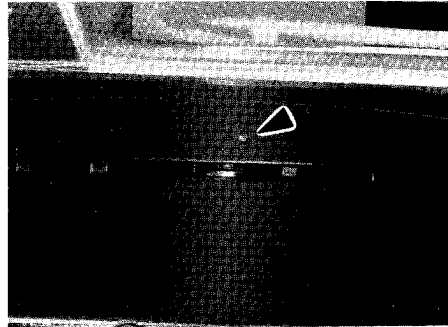
Bucket and link pins

## Maintenance

### **2** Swing bearings - Every 500 hours

Lubricate them one by one by repeating the following 2 steps alternately :

- (1) Stop the swing unit and lubricate.
- (2) Stop lubricating, and swing the unit a little.

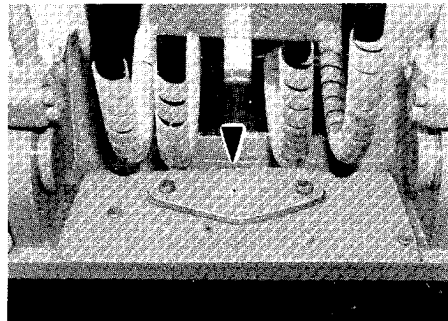
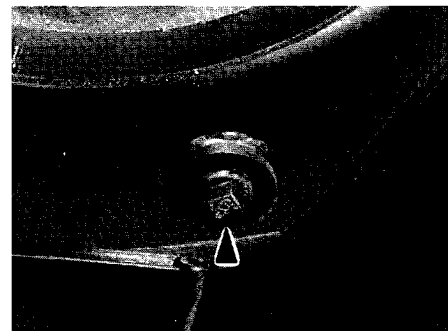


### **3** Swing gears - Every 500 hours

- (1) Remove the plug provided on the travel unit side, and scrape off old grease attached to the swing gear.

- (2) Take off the cover on the swing unit side. Grease all teeth through the hole with a spatula by repeating the swing and stop cycle.

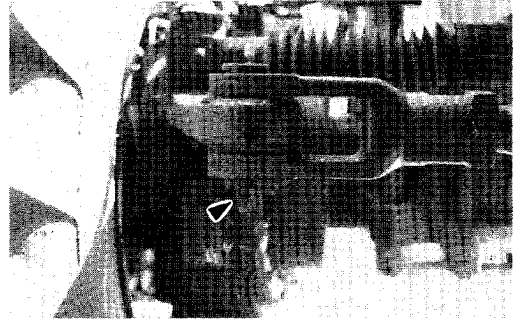
Repeat the above operations (1) and (2) alternately.



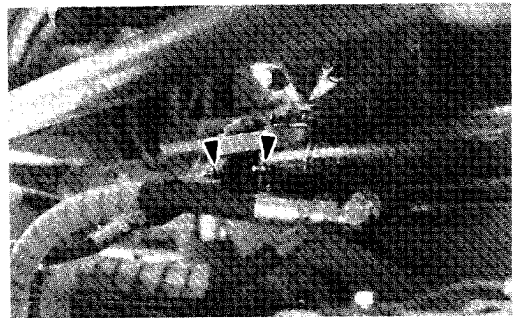
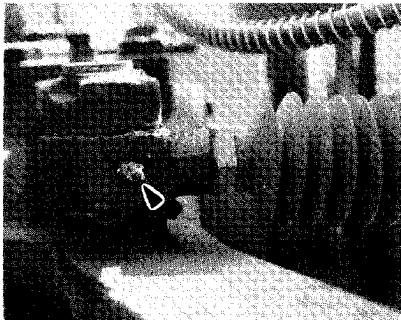


## Maintenance

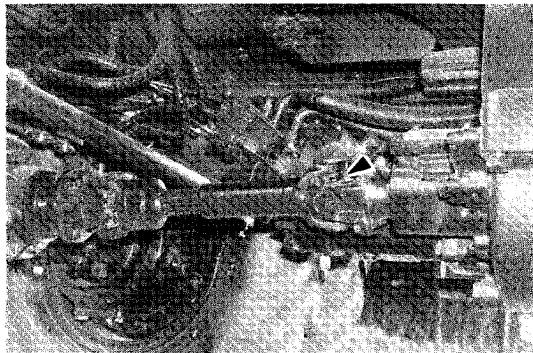
- 4** **Front axles - Every 500 hours**  
Lubricate the all fittings shown below.



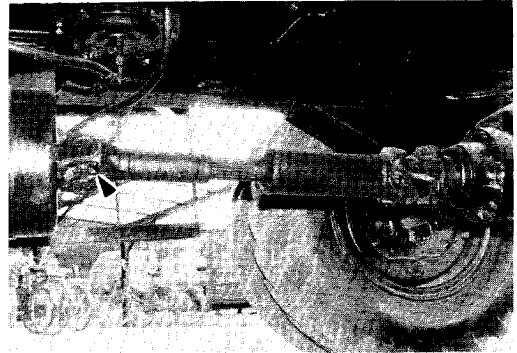
- 5** **Steering cylinders - Every 500 hours**  
Lubricate the fittings shown below.



- 6** **Propeller shafts (front and rear) - Every 500 hours**  
Lubricate the fittings shown below.



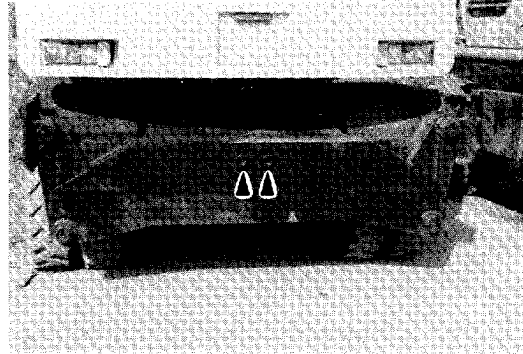
Front propeller shaft



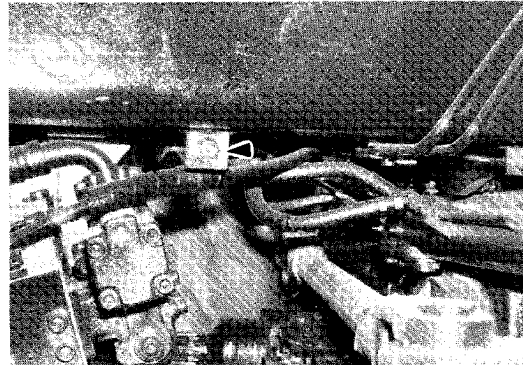
Rear propeller shaft

## Maintenance

- 7** **Outriggers - Every 500 hours**  
Lubricate the fittings shown below.



- 8** **Equalizer pin - Every 100 hours**  
Lubricate the fittings shown below.



## Maintenance

### B. Engine oil

Checking point		Q'ty	Interval (hours)						Page	
			8	50	100	250	500	1000		2000
1. Engine oil	Check level	-								83
	Replace	(20ℓ)								83
2. Engine oil filter	Replace	1								84

Specified lubricant

Class CD specified by American Petroleum Institute (API)

Engine oil

Determined by ambient temperature as follows:

Normal temperature (incl. summer and winter): SAE 30

Extremely hot : SAE 40

Extremely cold : SAE 10W

Manufacturer	Application→	Engine crank case, fuel jet pump, governor		
	Ambient temperature→	-20°C~0°C	-10°C~35°C	25°C~40°C
Idemitsu Kosan	Apolloil Diesel Motive	S-310	S-330	S-340
	Apolloil Custom Wide 15W-40	(-15°C~40°C)		
	Apolloil Super-Wide 15W-40			
Kyodo Oil	Kyoseki Delstar	D-10W	D30	D40
Showa Shell	Rymia Z	10W	30	40
	White Pilot Super			
Cosmo Oil	Cosmo Diesel CD	10W	30	40
Nippon Oil	Hidiesel S-3 Save	-20~35°C		-10~40°C
		10W -30	15W -40	
Mitsubishi Oil	Diamond HDS-3	SAE 10W	SAE 30	SAE 40
Caltex Oil	RPM DELO 300 Oil	SAE 10W	SAE 30	SAE 40
Esso Standard	Essolube	10W	30	40
Kygnas Oil	Kygnas Mighty Oil S-3	10W	30	40
Mobil Oil	Mobil Delpack	1310	1330	
General Oil	General Gemico Super	S-310	S20W-30	S-340
Remarks	Class API CD	Normal temperature (incl. summer and winter)		SAE 30 or equivalent
		Extremely hot		SAE 40 or equivalent
		Extremely cold		SAE 10W or equivalent

## Maintenance

### 1 Check engine oil level - Before starting engine (Every day)

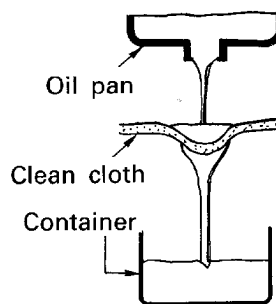
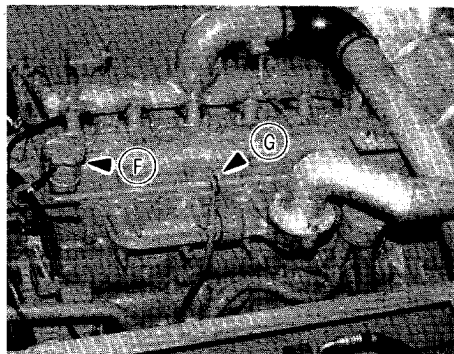
Before starting the engine, check the oil level. It should be within the scale range on the oil level gauge (G). When the oil is short, supply the specified engine oil in the oil filler (B). Check the oil level again.

#### Replace engine oil - Every 500 hours

##### (1) Drain oil

Remove the drain plug (D) of the engine oil pan, and drain oil.

**(Note)** Provide a 20 liter container. Drain the oil through clean cloth into the container. Check the cloth for any foreign matter such as metal.



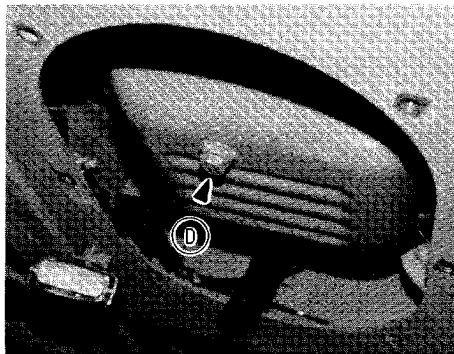
##### (2) Supply oil

Fasten the drain plug (D) tightly.

Remove the oil, filler cap (F), and supply 20 liters of engine oil.

##### (3) Check oil level

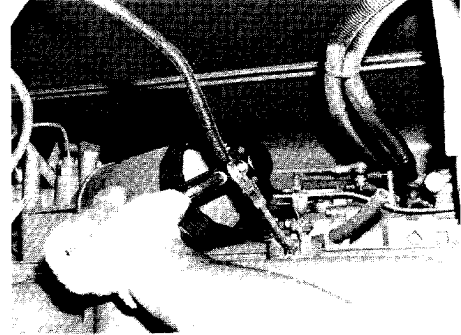
Read the oil level gauge (G). If the reading is in its scale range, start the engine. Idle the engine for a few minutes, and stop it. Check the oil level again.



**2** Replacement of engine oil filter element  
- Every 500 hours.

(1) How to replace

- ① Loosen the cartridge filter by using a tool, and take it out from the engine unit.
- ② Apply engine oil lightly on the gasket of a new cartridge.
- ③ To assemble the new cartridge, first tighten it by hand for a 1/2 turn after the gasket touched the seal surface. Then, tighten it for a 1/6 turn by using a tool. Be careful not to scratch the cartridge filter with the tool. Do not fasten it so tightly as to deform the filter.
- ④ After the assembly, run the engine, and check the seal surface for oil leakage.



(2) After replacement

Idle the engine for about 5 minutes. When the oil pressure increased, stop the engine. After 10 - 20 minutes, check the oil level, and refill if necessary.

(3) When the oil filter warning lamp lit on the monitor panel in operation, the filter element is clogged. In this case, replace the element immediately regardless of the replacement interval.

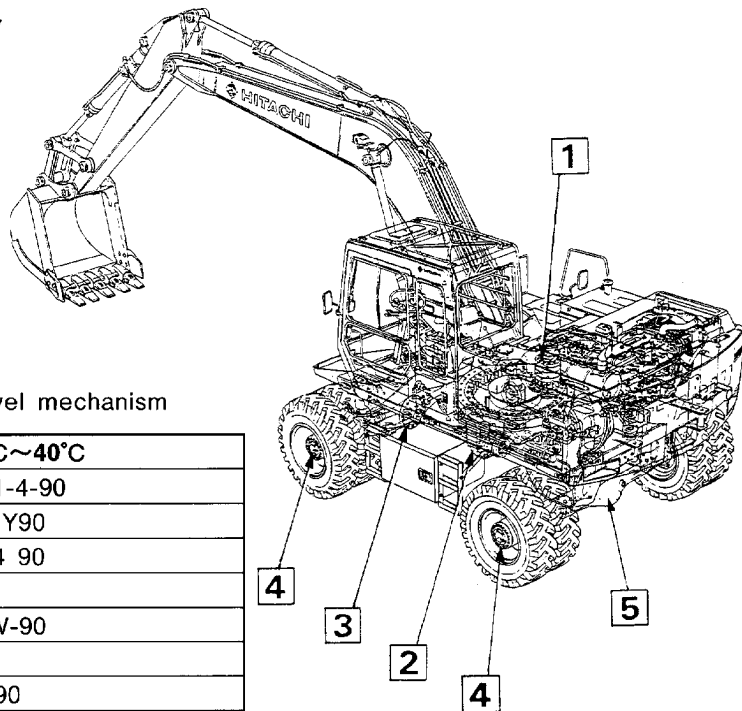
For details, refer to the "Operation Manual for Isuzu Diesel Engine 6BB1."

## Maintenance

### C. Gear oil

Checking point		Q'ty	Interval (hours)						Page	
			8	50	100	250	500	1000		2000
1. Swing mechanism	Check level	-								86
	Replace	(3.2 l)								86
2. Transmission	Check level	-								87
	Replace	5 l								87
3. Front axle case ★	Check level	-								87
	Replace	6 l								87
4. Front/rear hub reduction gears ★	Check level	-								87
	Replace	3 l								87
5. Rear axle case	Check level	-								88
	Replace	8.5 l								88

★ EX100WD only



Gear oil for Swing mechanism, travel mechanism

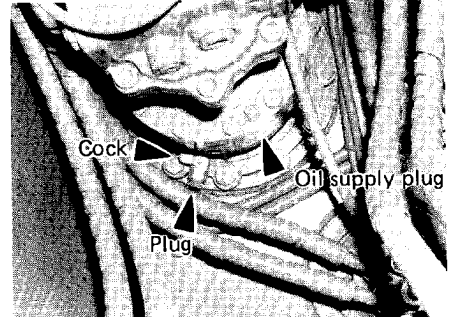
Manufacturer	-20°C~40°C
Idemitsu Kosan	Apolloil 21 Gear 1-4-90
Kyodo Oil	Kyoseki EP Gear Y90
Cosmo Oil	Cosmo Gear GL-4 90
Nippon Oil	Gear Lube SP90
	Gear Lube SP80W-90
Mitsubishi Oil	Diamond
	Hypoid Gear Oil 90
Caltex Oil	Universal Supan SAE90
Esso Standard	Standard Gear Oil 90
Kygnas Oil	Kygnas Gear Oil MP80W-90
Mobil Oil	Mobilube HD80W-90
Showa Shell	Shell Spilux EP90
General Oil	General Gear MP90

## Maintenance

### 1 Swing reduction gears - Every 1,000 hours

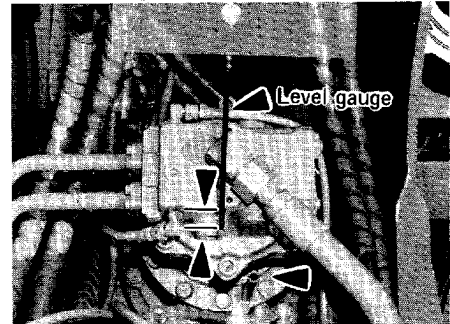
#### (1) Drain oil

Remove the drain plug (D) at the bottom of the swing reduction gears. Open the cock (P) and drain oil.



#### (2) Supply oil

Fasten the drain plug (D), and supply gear oil through the oil supply plug (S).



#### (3) Inspection and refilling - Every 250 hours

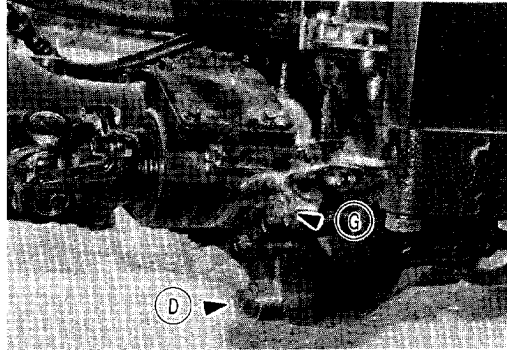
The oil level should be between the scale of the oil level gauge (G).

## Maintenance

### 2 Transmission - Every 2,000 hours (Inspect and refill every 250 hours)

Oil inlet (also used for the air breather) is provided at the back on the upper surface.

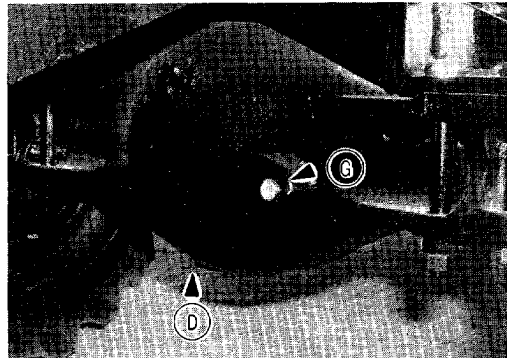
- Ⓓ : Oil drain plug
- Ⓔ : Oil level plug



### 3 Front axle case

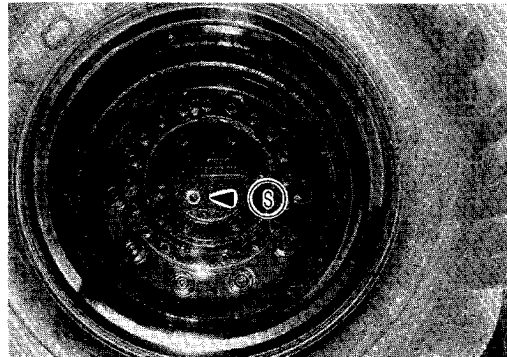
Replace every 2,000 hours (Inspect and refill every 250 hours)

- Ⓓ : Oil drain plug
- Ⓔ : Oil level plug (Also used for oil supply plug)



### 4 Front and rear hub reduction gears

- Ⓔ : Oil supply plug

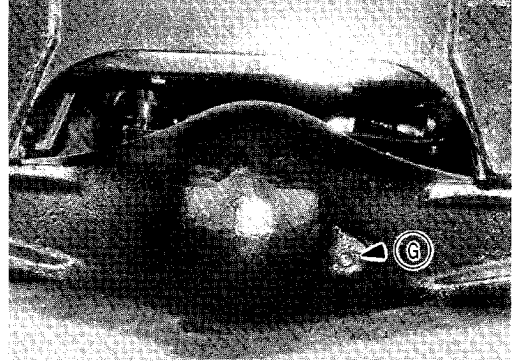




## Maintenance

### **5** Rear axle case - Replace every 2,000 hours (Inspect and refill every 250 hours)

Ⓒ : Oil level gauge. (Also used for oil supply plug)



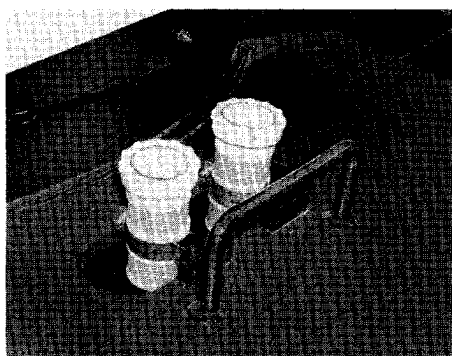
## D. Brake system

Checking Point	Q'ty	Interval (hours)							Page
		8	50	100	250	500	1000	2000	
1. Brake reservoir Check oil level and refill	-								89

Specified brake oil

Use brake oil equivalent to JIS K2233.

Manufacturer	Oil
Idemitsu Kosan	Idemitsu Apollo Brake Fluid



### 1 Brake reservoir tank - Daily

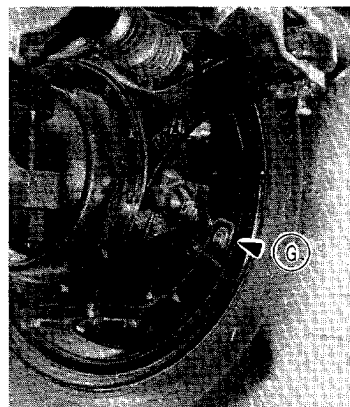
2 reservoir tanks are provided in front of the upper swing wheels on the chassis frame. Check them every day for the oil level and leakage.

**⚠** If either reservoir tank becomes empty, drain air.

### 2 Brake adjustment - As necessary

Adjust the clearance between the brake drum and the lining for all wheels.

1. Jack up the machine body until the tires can be turned freely.
2. Turn the tire, and check if the hub bearing moves smoothly without backlash (If not, stop the work, and contact the nearest service shop).
3. To expand the brake shoe, turn the cam spindle in the arrowed direction. Insert a 0.3 mm thickness gauge into the inspection window **G** on the drum. Adjust the clearance so that the gauge can be moved only tightly.
4. Step on the brake pedal several times, and check the clearance again. Adjust it if necessary.



- ⚠**
- (1) The drum cover can be separated into 2 parts, The 8 bolts may be removed to facilitate checking the clearance and wear of the lining.
  - (2) The standard clearance between the brake drum and the lining is 0.2 ~ 0.4 mm.
  - (3) If the brake lining is stained with grease, replace it. Do not use the stained lining, as it causes failure of the brake.

**3** Checking wear of brake lining - Every 3 months

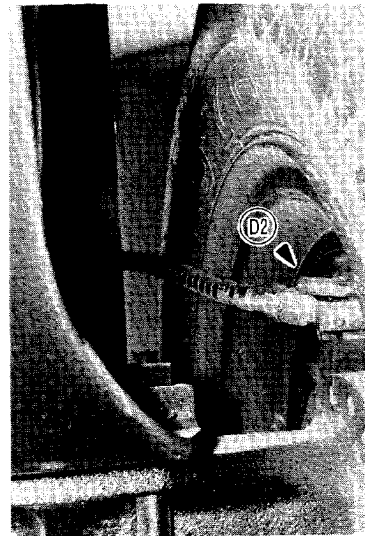
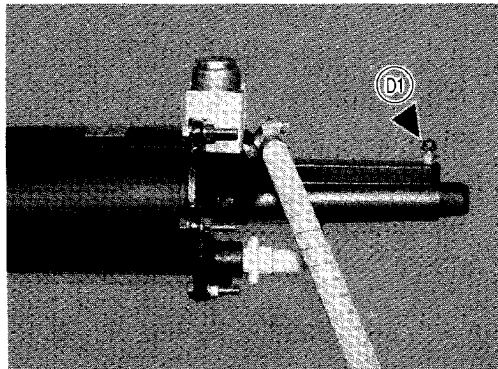
**!** When the stepped part is almost worn out, inform the nearest service shop for replacement of the brake shoe assembly.

**4** Draining air from brake system

**!** Air contained in the brake system greatly affects the performance of the brake pedal. It must be drained when the reservoir tanks get empty or when the brake pipings are dismantled.

Air should be drained by 2 persons from all wheel cylinders as follows:

Drain air from the air breather (D1) , (D2) of the 2 boosters and the 4 wheel cylinders (total 3 points).



(D1) : Booster air breather

(D2) : Wheel cylinder air breather

Drain air from the boosters, and then from the wheel cylinders.

- (a) Turn the forward-reverse lever to NEUTRAL, and apply the parking brake. Start the engine to increase the internal pressure of the air tank.
- (b) Supply brake oil into the reservoir tanks to the MAX level. Refill as necessary during the draining work, and do not make them empty.

## Maintenance

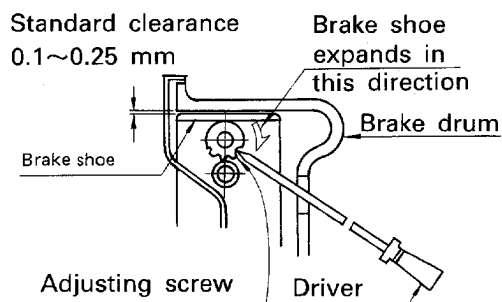
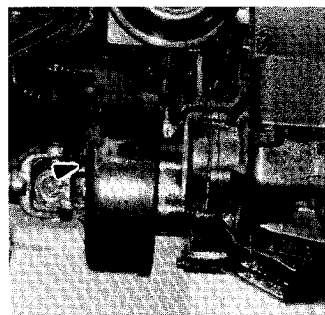
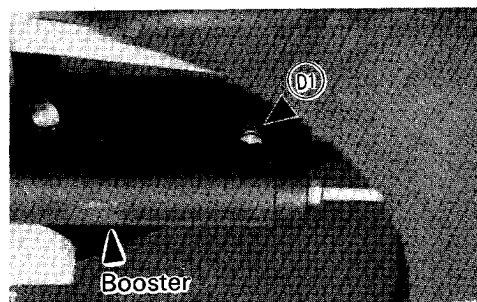
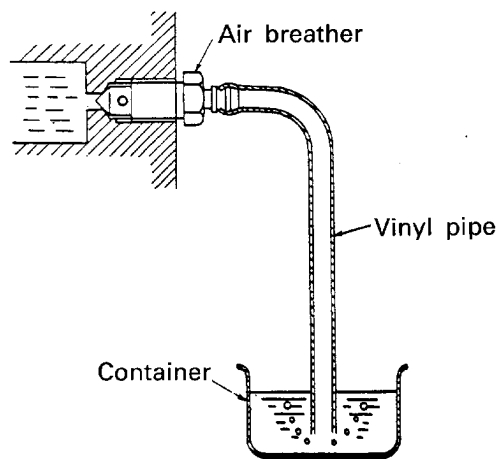
- (c) Remove the rubber cap of the booster air breather, and connect a vinyl pipe. Put the other end of the pipe into a transparent container containing brake oil.
- (d) One person steps on the brake pedal several times, and then keeps pressing the pedal.
- (e) The other person opens the air breather to drain brake oil containing air, and close the breather immediately.
- (f) Repeat this procedure until no air is contained in the brake oil being drained. Finally, close the air breather firmly, and reset the rubber cap.
- (g) Drain air from the front and rear wheel cylinders in the same procedure.
- (h) Repeat the entire operation again (Air should be drained twice each from all points).

**!** The booster air breather must be cleaned at the time of the legal inspection.

### 5 Parking brake adjustment

Adjust the clearance between the brake drum and the lining as follows:

1. Jack up the machine body until the tires can be turned freely.
2. Stop the engine, and turn the forward-reverse lever to NEUTRAL. Release the parking brake by turning OFF the lever.
3. Loosen the bolt and take off the cover of the adjustment hole.
4. Align the hole with the adjusting screw by turning the brake drum or tire.
5. Insert a driver into the hole, and turn the adjusting screw toward the center of the brake drum until it stops.
6. From this position, turn back the adjusting screw for about 11 pitches.



## E. Hydraulic System

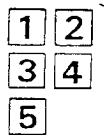
Checking Point	Q'ty	Interval (hr)							Page
		8	50	100	250	500	1000	2000	
1. Check hydraulic oil level	-								93
2. Drain hydraulic oil tank	1								93
3. Replace hydraulic oil	(133ℓ)								94
4. Clean suction filter	1	When hydraulic oil is replaced							95
5. Replace full-flow filter element	1								96
6. Replace pilot filter element	1								97

- Select hydraulic oil suitable to the ambient temperature.
- \* is the oil used in new machines.

### Specified Oils

Hydraulic oil for Hydraulic system (oil tank)

Manufacturer	-20°C~0°	-10°~40°C
Idemitsu Kosan	Daphne Super Hydro 46WR * Daphne Super Hydro LW46	
Kyodo Oil	Kyoseki Hydrolux 32	
Cosmo Oil	Cosmo Hydro AW32	
Nippon Oil	High Rand Wide 32	
Mitsubishi Oil	Diamond Hydro Fluid EP32	
Caltex Oil	Rand Oil HD32	
Esso Standard	Nuto H32	
Kygnas Oil	Unit Oil E32	
Mobil Oil		Mobil DTE24
Showa Shell	Shell Tellus Oil K32	
General Oil		Panel 32



### (Caution)

Strictly observe the following rules in the maintenance of the hydraulic system:

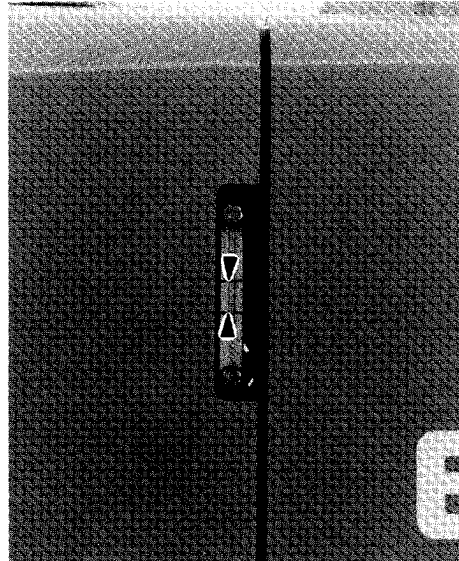
- (1) Place the machine on a flat surface.
- (2) Land the bucket, and stop the engine.
- (3) Release the air in the hydraulic tank and the hydraulic circuit.
- (4) Protect the system from dirt, water and other foreign matters.
- (5) Fill the same hydraulic oil, and never mix a different product. When using a different oil, replace the entire amount.
- (6) Do not use an oil not specified in the table.
- (7) Never start the engine after draining the hydraulic oil.

## Maintenance

### **1** Check oil level - Daily


Check and refill

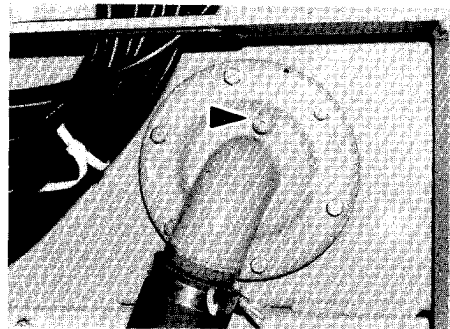
- (1) Place the machine on a solid and level ground. Extend the bucket cylinder, and retract the arm cylinder. Land the bucket, and stop the engine.
- (2) Check the oil level on the level gauge provided on the side of the oil tank. The oil level should be between the max and min . Refill the oil necessary.



### **2** Hydraulic Oil Tank Draining every 250hrs.

After leaving the body in static state for a long time, extract air from tank and then loosen slowly the drain plug (D) on the bottom of tank to discharge remaining water and deposit.

-  Should this work is done just after operation, high temperature hydraulic oil may to cause burn.




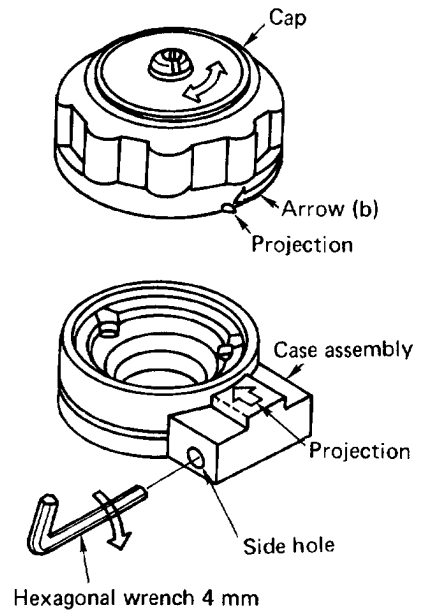
**3** Replace hydraulic oil - Every 2,000 hours

- (1) Place the front attachment as indicated in the figure.
- (2) Remove the air breather cap, and drain air in the tank.

(How to detach/attach the air breather cap)

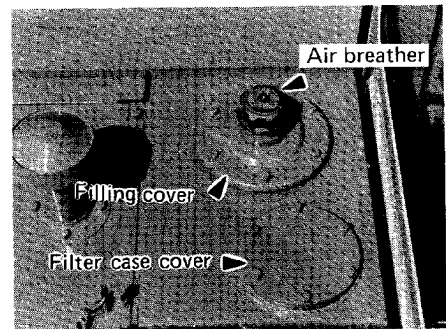
- ① Insert a hexagonal head wrench (4 mm) into the side hole of the side block.
- ② Turn the wrench clockwise, and turn the cap anticlockwise for about 30°. In this condition, drain air. Then, turn the cap until it stops, and take it off.
- ③ To attach the cap, insert it after aligning the projections of the cap and the case. Then, turn it clockwise until it locks.

 To detach the cap, be sure to unlock the cap by using a hexagonal wrench.



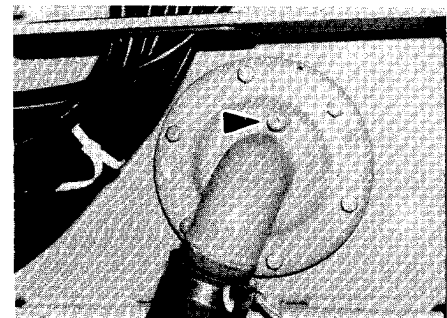
(3) Drain oil

- ① Remove the oil inlet cover (B), and drain the oil into a 150 liter - container by using an oil pump.



- ② Release the drain plug (D) at the bottom of the oil tank, and discharge any remaining oil.

- (A) : Air breather cap
- (B) : Oil inlet cover
- (C) : Filter cpse cover

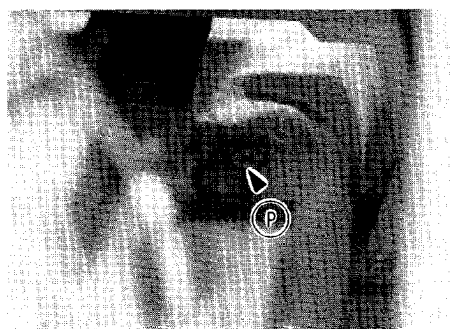


## Maintenance

### (4) Supply oil

- ① Remove the oil inlet cover (O) of the hydraulic oil tank, and feed oil. While feeding, check the oil level on the level gauge.
- ② Remove the air drain plug (P) at the top of the pump, and drain air from the pump. Then, feed hydraulic oil (Use an 8 mm bar wrench).
- ③ When the pump is filled, fasten the plug.

**⚠ Be sure to supply oil after draining the pump. If not, the pump will be broken when the engine is started.**



### (5) Drain air in hydraulic circuit

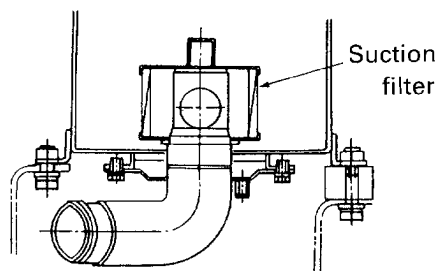
After feeding oil, drain air in the hydraulic circuit by evenly operating the cylinders and the swing motor for 10 to 15 minutes.

An air drainer is provided for the pilot circuit, so the air can be drained in 5 minutes by the above operation.

## 4 Clean suction filter - when replacing hydraulic oil

The suction filter is provided at the bottom of the tank. It should be cleaned each time the hydraulic oil is replaced.

After draining the oil, remove the suction filter together with the cover attached to the bottom of the tank. Clean the inside of the tank and the suction filter. To reset the filter, first fix it with the cover, and attach them to the tank as a single unit.





**5** Replace full-flow filter element  
- Every 500 hours

**How to replace**

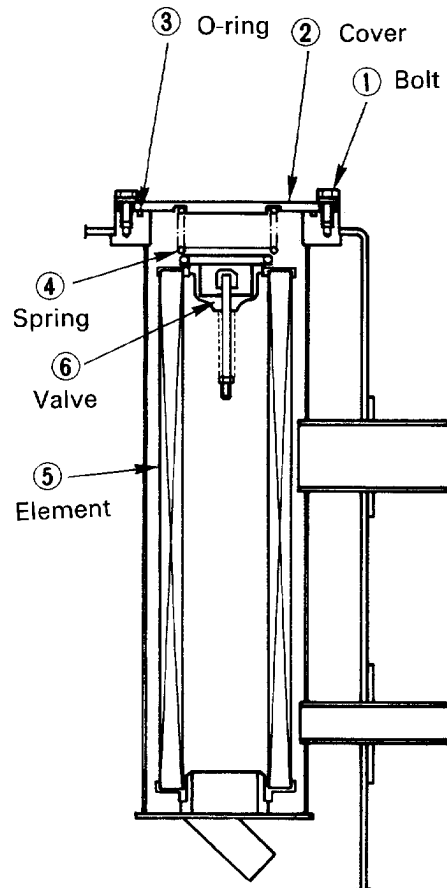
- (1) Remove the air breather cap of the hydraulic tank, and drain air. Regarding how to detach/attach the cap, refer to the previous section on the replacement of hydraulic oil.
- (2) Loosen the 6 bolts (1), and remove the cover (3) and the O-ring (3).



**(Caution)** Be sure to remove the parts in the above order. Otherwise, the oil may pour out. Remove the cover (2) carefully. Otherwise the spring (4) may jump out.

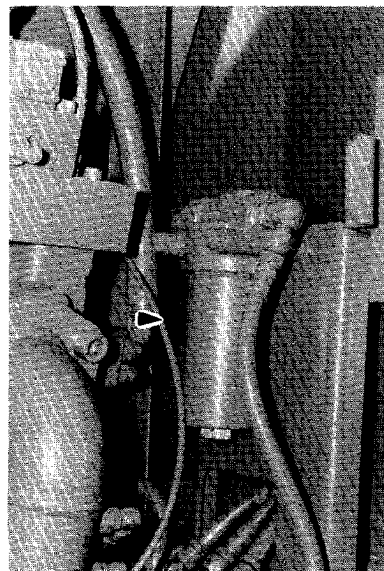
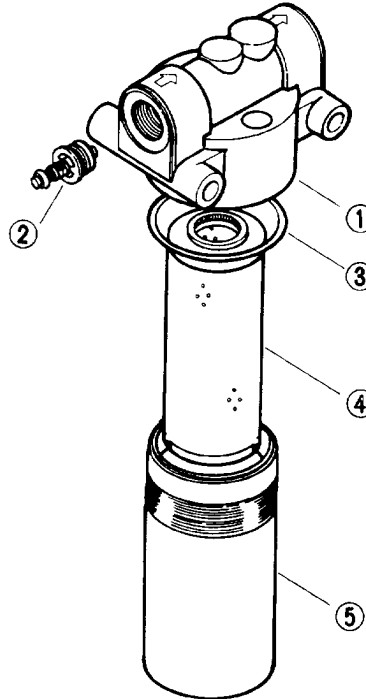
- (3) Take out the spring (4), valve (6) and element (5).
- (4) Replace the element together with the O-ring (3).
- (5) Fasten the bolts (1) firmly (fastening torque: 5 kgf.m).

- (i) Before replacing the element, be sure to drain air from the tank by removing the air breather cap.
- (ii) Never put water or any foreign matter into the filter case.
- (iii) Be careful not to hurt the element or the O-ring. Never use a broken element.
- (iv) After the replacement, check the oil level and drain air. If any air is contained in the circuit, it will cause a failure of the pump.
- (v) Keep the hydraulic oil clean. To extend the life of the equipment, replace and clean the element on a regular basis.



**6** Replace pilot filter element  
- Every 1,000 hours

- (1) Disassemble the filter and replace the element as follows:
- (2) To disassemble the filter, loosen the case (5), and pull it down to detach it. Turn the element (4) and remove it.
- (3) Before reassembly, replace the O-ring (3) with a new one.  
To reassemble the filter,
  - (i) Insert the O-ring (3) into the O-ring groove on the head cover (1).
  - (ii) Set the element (4) with the head cover (1) and turn it until it locks.
  - (iii) Set the case (5), and fasten it tightly (fastening torque: 2~3 kgf.m).



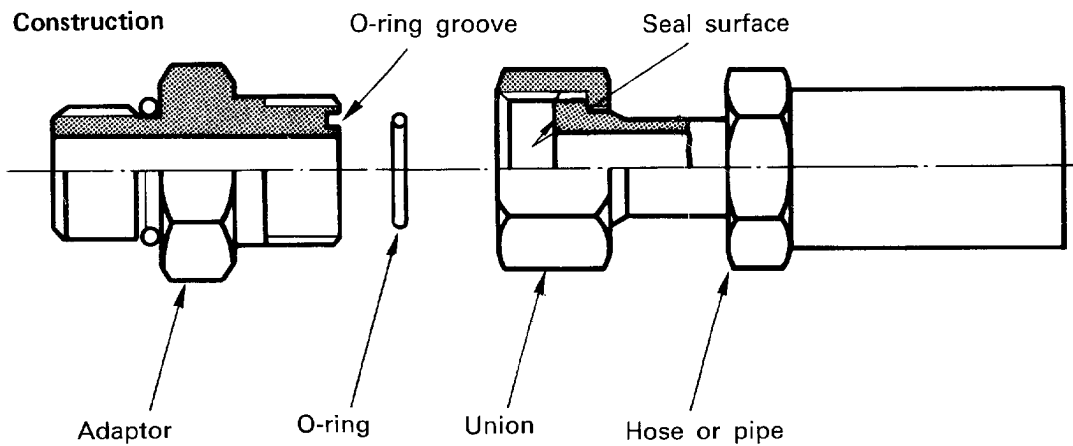
## Maintenance

**Pay thorough attention to protect the hydraulic equipment from scratches and foreign matters, especially the joints.**

- (1) Clean the entire part of the pipes, hoses, and oil tanks. Before reassembly, wipe out the detergent completely.
- (2) Use flawless O-rings. Avoid careless action such as filing their set surface.
- (3) For connecting a high pressure hose, be careful not to twist it. If it is set twisted, it can never support the normal service life.
- (4) A low-pressure hose should be clamped with a torque of 0.6~0.7 kgf.m.
- (5) The following two types of joints are used for hoses and pipes:

① O-ring seal joint

It has an O-ring on the end surface of the adaptor to prevent oil leakage from the joint.  
Construction



## F. Fuel system

Tank capacity: 250 ℓ

Checking Point	Q'ty	Interval (hr)							Page
		8	50	100	250	500	1000	2000	
1. Drain water in fuel tank	1								101
2. Check water sedimenter	1								101
3. Replace fuel filter element	1								101
4. Clean feed pump strainer	1								102

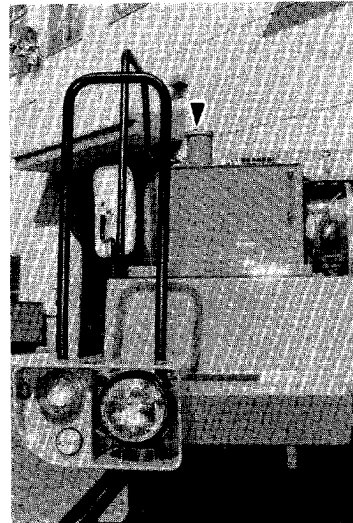
### Specified fuel

Use the following light oils (equivalent to JIS K-2204, ASTM 2D) according to the ambient temperature:

At more than  $-5^{\circ}\text{C}$  : JIS No. 2 light oil

$-15^{\circ}\text{C}$  to  $+20^{\circ}\text{C}$  : JIS No. 2 light oil

$-30^{\circ}\text{C}$  to  $+20^{\circ}\text{C}$  : No. 3 special light oil



### Refilling

Refill the tank after the day's operation. The fuel tank capacity is 250 liters.

Remove the cap at the top, and fill the tank by using a wing pump or electric pump.

### (Caution)

When supplying fuel, make sure it is free of dust and water.

(Note) Regarding the engine, refer to the "Operation Manual for Isuzu Diesel Engine 6BB1."

## Maintenance

### Cautions

- (i) For reassembly, always replace the O-ring with a new one.
- (ii) Before fastening the union, confirm that the O-ring is properly set in the O-ring groove. If the O-ring is off the groove, fastening the union will damage the O-ring, and cause an oil leak.
- (iii) Reassemble the joint so as not to hurt the surface of the O-ring groove on the adaptor and the seal surface of the hose. A scratch on these surfaces may hurt the O-ring and cause an oil leak.
- (iv) If oil is leaking from a loose union, first check if the O-ring is set correctly in the groove before you retighten the joint. Here again, replace the O-ring with a new one.
- (v) Fastening torque

Following is a table of torques to be used for fastening the joint:

Width between flats (mm)	27	32	36	41,46
Fastening torque (kgf.m)	9.5	14	18	21±10%

- ② Metal seal joint (Union nut; Width across flats: 19.22)

It seals the pressure oil by the adaptor and the metal part of the hose. It is used for joints with a relatively small diameter. For disassembly and reassembly, be careful not to hurt the seal surface.

Width between flats (mm)	19	22
Fastening torque (kgf.m)	3	4

**1** Drain water in fuel tank - Daily

Drain water the deposits in the fuel tank by releasing the drain valve at the bottom. Do not touch the protecting plug provided at the drain cock.

**2** Check water sedimenter - Every 50 hours

The **water sedimenter** serves to separate the water mixed in the fuel. It is a case containing a "float," which comes up when water is accumulated in the case.

When the **float** has reached the "DRAIN WATER" level indicated on the outside of the case, **drain the water**.

**HOW TO DRAIN WATER**

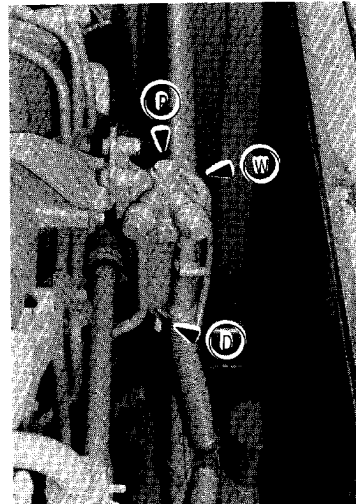
Loosen the **plug** (P) at the top of the water sedimenter, as well as the **drain plug** (D) at the bottom to drain internal water.

After draining water, be sure to fasten the both plugs.

**(Cautions)**

- (1) After draining water from the fuel, also **drain mixed air** (See "Drain air from fuel system").
- (2) If the fuel contains much water, drain it immediately.

- (P) : Plug
- (W) : Water Sedimenter
- (D) : Drain plug



**3** Replace fuel filter element  
- Every 500 hours

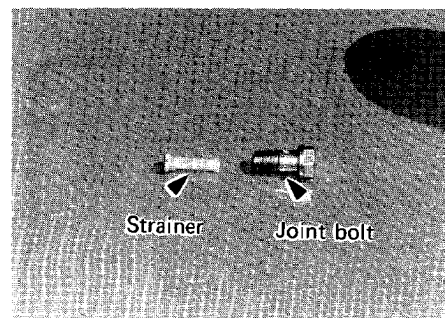
- (1) Detach the cartridge filter from the engine by using a tool.
- (2) Apply the fuel lightly on the gasket surface of a new cartridge filter.
- (3) To set the new filter, first fasten it by hand for a 1/2 turn after the gasket touched the seal surface. Then, tighten it with a tool for a 1/6 turn. At this time be careful not to hurt the filter with the tool. Also, do not tighten it so strongly as to deform the filter.
- (4) Drain air from fuel  
After replacing the fuel filter element, drain air from the fuel system.
- (5) When the new filter is reassembled, start the engine, and check the seal surface for oil leakage.

**4** Clean feed pump strainer  
- Every 1,000 hours

Take off and clean the strainer attached to the joint bolt on the inlet side of the water sedimenter.

**Drain air from fuel system**

If air entered the fuel system, it prevents the start of the engine and its normal operation. **Drain air** from the system when the fuel tank gets **empty**, and after draining water from the water sedimenter and replacing the filter element.



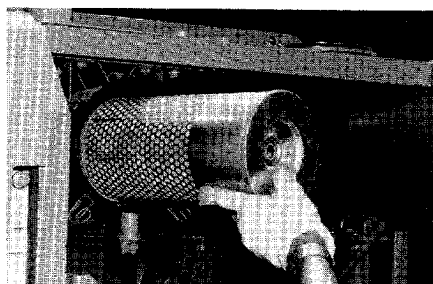
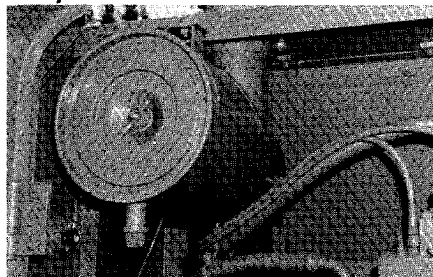
- (1) Loosen the **"air bleeding plug"** of the fuel pump.
- (2) Turn the upper part of the feed pump handle to the left, and the handle is pushed up by the internal spring.
- (3) By pressing down this handle, drain the fuel containing air from the **"air bleeding plug."**
- (4) Repeat this pumping operation until the fuel being drained from **air bleeding plug** contains no bubble. Fasten the **"air bleeding plug,"** and push down the feed pump handle to reset at its original position.
- (5) Start the engine, and check the fuel system for any leak.

### G. Pneumatic system

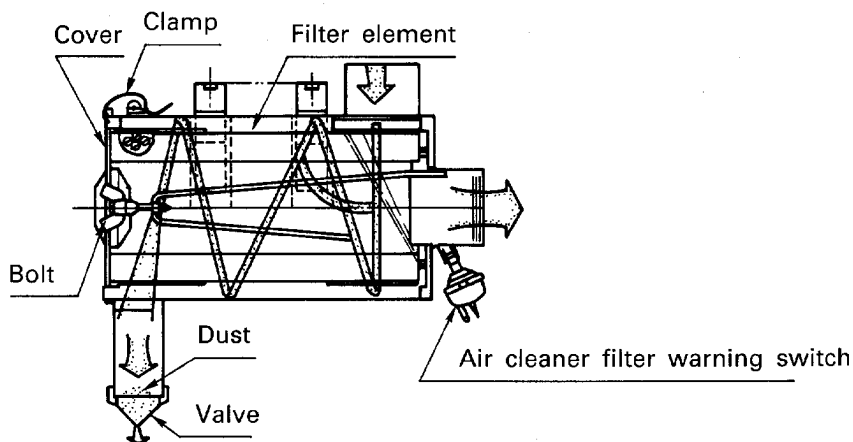
Checking point	Q'ty	Interval (hours)							Page
		8	50	100	250	500	1000	2000	
1. Air cleaner element	Clean	1				*	* or when warning lamp lit		103
	Replace	1	After cleaning 6 times or 1 year						
2. Air drier	Check	1							104
	Replace	1							104

**1** Air cleaner element - Clean Every 250 hours or when warning lamp lit  
 Replace After cleaning 6 times or 1 year

The element should be cleaned by injecting compressed air from inside. It can be removed easily by releasing the bolt on the end face.



Clogging of the air cleaner filter element is indicated by the air cleaner filter warning lamp on the monitor panel. When the lamp turned on, clean or replace the element as soon as possible.



**(Cautions)**

- (1) Be sure to stop the engine before the maintenance work.
- (2) Check the hoses and pipes for loosening and other defect at monthly inspection.

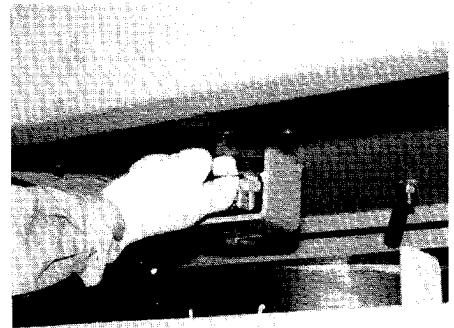
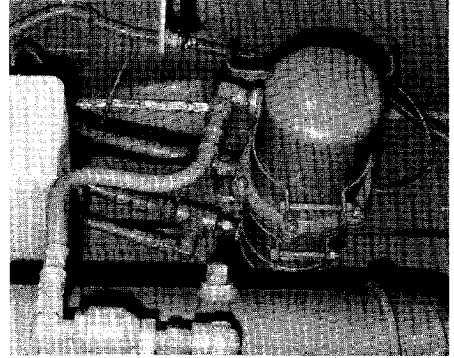


**2** Air drier - Check : Daily  
Replace parts : Every 2,000 hours

**Checking**

Being used to eliminate moisture in the compressed air, the air drier has the dehumidifying and recycling functions.

- 1) Pull out the drain valve at the bottom of the air tank, and check if there is any water inside (check the dehumidifying function).  
If there is water in the tank, it means that the drying agent is no longer serviceable. Replace it with a new one immediately.



- 2) Check if the compressor drains water with a "whistle" sound to turn from LOAD to UNLOAD mode (Check the reclaim function).



A fault of the air drier causes water in the brake circuit, and prevents the normal brake effect. **If the drier is found abnormal, inform the nearest service shop immediately.**



**The air drier is part of the safety system. When used for more than 2,000 hours, it must be replaced with a new one even if it functions normally. For the replacement, contact the nearest service shop.**

## H. Cooling system

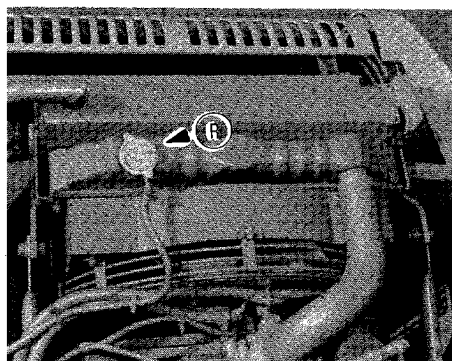
Checking Point	Q'ty	Interval (hours)							Page
		8	50	100	250	500	1000	2000	
1. Check coolant level	1								106
2. Check fan belt tension	1		★★						106
3. Replace coolant	(20ℓ)	Twice a year in spring and autumn							107
4. Clean radiator core	Outside	1							107
	Inside	1	Once a year						
5. Clean oil cooler front net	1								107

★★ only firsttime check.

### Coolant

As the coolant, use city water or soft water as pure as possible (that allows the bubbling of soap).  
Into the coolant, put 400 cc of anti-rust.

Ⓡ : Radiator cap



### Anti-freeze

At the outside temperature of under 0°C, also use an anti-freeze.  
Its concentration should be 30 % to 60%.

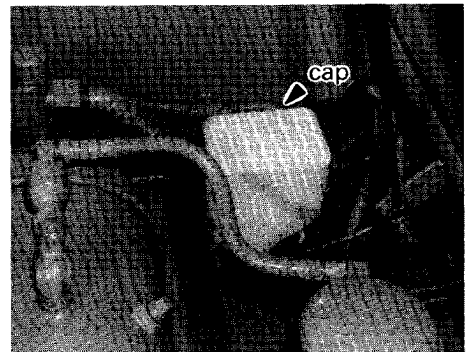
If the concentration is lower than 30%, the radiator is liable to corrosion. An excess of 60% will cause frequent overheating.

Outside temperature [°C]	Anit - freeze Mixing Ratio	Soft water [ℓ]
- 1	6.0	14.0
- 4	6.0	14.0
- 7	6.0	14.0
-11	6.0	14.0
-15	7.1	12.9
-20	8.0	12.0
-25	9.1	10.9
-33	10.4	9.6
-50	12.0	8.0

**1** Check coolant level - Daily

Check if the coolant level is between FULL and LOW indicated on the reserve tank. If it is below the LOW level, refill the coolant from the reserve tank. If the reserve tank is empty, the coolant should be supplied from the radiator cap.

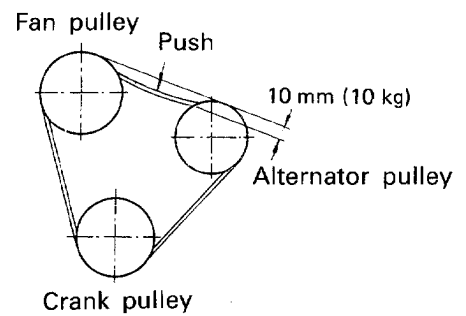
**⚠ (Caution)** When the engine is hot, do not open the radiator cap. Wait until it cools down to the ambient temperature.



**2** Adjust fan belt tension  
- Every 100 hours (and after initial 50 hours)

Check the belt tension if the fan belt can be depressed about 10 mm with the thumb (with a 10 kg force) in the middle (between the fan pulley and the alternator pulley).

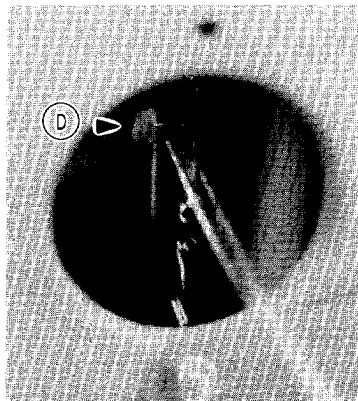
For adjustment, loosen the bolts of the adjusting plate and the alternator bracket. Also, check the belt surface for any defect. If any defect is found, replace the belt.



**3** Replace coolant  
- Twice a year in spring and autumn

Drain all coolant from the radiator and the water jacket by opening their drain cocks. Also, clean out any impurities such as water scales.

After the replacement, run the engine for several minutes. Check the coolant level again, and add if necessary.



**4** Clean radiator core

(1) Outside - Every 500 hours.

The radiator is aligned in parallel to the oil cooler. Clean the radiator core with flushing water or steam (Also, clean the oil cooler).

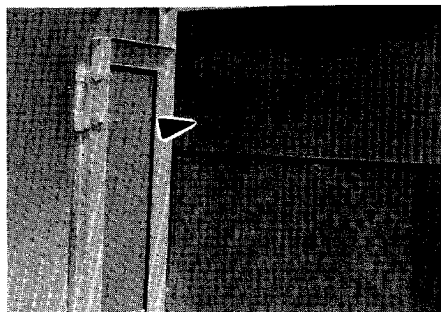
**!** Be careful about the delivery pressure of the cleaning water or steam. A too high pressure will damage the radiator fin. At more than 60 kgf/cm<sup>2</sup>, keep the nozzle at least 500 mm away from the core surface.

(2) Inside (flushing) - Once a year

Clean out all rust and scales in the cooling system by using a radiator cleaner.

**5** Clean oil cooler front net  
- Every 500 hours

**!** When the machine is used in a dusty environment, check the net every day if it is clogged with dirt. If clogged, remove the net and clean it.



## I. Electric system

- (1) For detailed information on the electric system, refer to the "Operation Manual for Isuzu Diesel Engine 6BB1."
- (2) Batteries



**As the batteries generate inflammable hydrogen gas, ignition of fire may provoke an explosion. Also note that the battery liquid contains sulfuric acid, which is so strong as to hurt the skin and clothes, and even metals.**

**Therefore, use the greatest care for handling the batteries.**

- ① **Avoid access of flames and sparks. Never strike a match or smoke near the batteries.**
- ② **If the battery liquid is attached to the skin or clothes, wash it away with water immediately, and further wash the stained part with soap. Should it enter into the eyes, wash them with clean water for at least 15 minutes, and receive a medical treatment.**
- ③ **Never touch the battery terminals immediately after the operation. Wait until the batteries cool down.**
- ④ **For the maintenance or inspection, stop the engine (turn off the engine key), and open the cock of the battery liquid outlet.**
- ⑤ **To disconnect the battery terminals, always start from the earth side (-terminal). For connection, this side must be connected last.**  
**If a lead wire is connected on the earth side, be sure to protect the +terminal and the battery body (frame) from the access of an object that may cause a spark. Especially, be careful about handling tools.**
- ⑥ **Fix the terminals firmly. A loose terminal may cause a spark.**
- ⑦ **For charging a battery, remove it from the machine, and open the cock, to minimize the danger of inflammable hydrogen gas.**

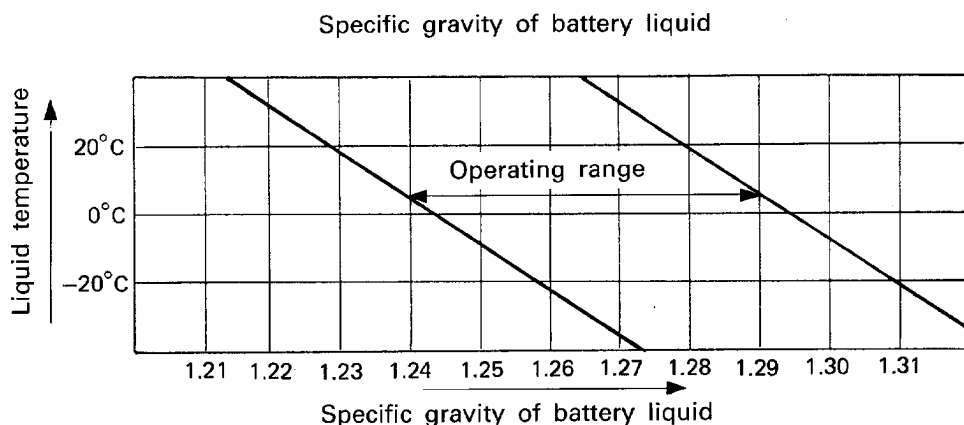
## Maintenance

### MF (Maintenance-Free) battery

The batteries also require proper maintenance, as their performance is a decisive factor of the ignition efficiency.

The MF battery is superior to general batteries in the liquid consumption and self-discharge. However, it still needs the following maintenance:

- ① The specific gravity of the battery liquid changes with its temperature, and must be within the operating range indicated below. If it decreases below the lower limit (the smallest operating gravity), the batteries need charging.



### (Caution)

Do not measure the specific gravity immediately after the operation, but wait until the battery liquid cools down to the ambient temperature.

- ② Check the terminals for loosening and rust. Apply grease or Vaseline to prevent corrosion.
- ③ Keep clean the upper surface of the batteries (especially around the terminals and liquid outlet), which helps minimize the discharge.
- ④ Do not use a new battery and an old battery together, as such usage may shorten the life of the new battery. When either battery gets old, replace the 2 batteries as a set.
- ⑤ Avoid using a general battery with an MF battery. If used together, the advantages of the MF battery become worthless.

**Start engine by using booster cables**

If the battery capacity is exhausted, the engine can be started by using booster cables as follows:

- ① Stop the engine of a normal machine.
- ② Connect one end of the red booster cable with the + terminal of the exhausted battery, and the other end with the + terminal of the normal machine's battery.
- ③ Connect one end of the black booster cable with the - terminal of the normal battery, and the other end with the superstructure frame of the machine in trouble. Note that the last connection always causes a spark. Therefore, keep the machine away from the battery as much as possible for connection.
- ④ Confirm the correct connection, and start the engine of the faulty machine.
- ⑤ When the engine is started, disconnect the booster cables by tracing back the above procedures.

Maintenance

**J. Others**

Checking point	Q'ty	Interval (hours)							Page
		8	50	100	250	500	1000	2000	
1. Check bucket teeth loose and wear	-								112
2. Adjust clearance of bucket set pins	1	When necessary							114
3. Check bolt loosening	-		★★						115

★★ Only for initial checking



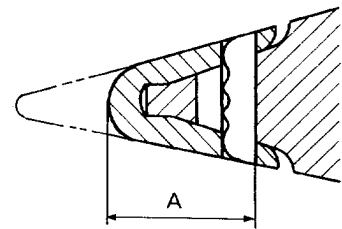
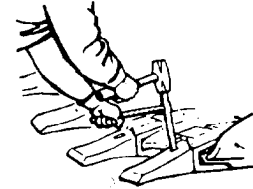
## Maintenance

### 1 Bucket teeth (points) - Daily

Check the bucket teeth for wear and loosening.

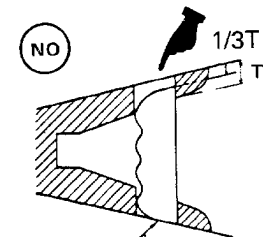
- (1) Replace any tooth worn out in excess of the service limit.

	New tooth	Recommended service limit	Service limit
Amm	166	100	85

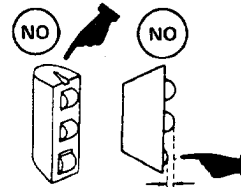


- (2) How to replace

- ① By using a hammer and a mallet, strike out the locking pin so as not to damage the rubber pin lock.
- ② Check the locking pin and the rubber pin lock as indicated in the figure. A too short locking pin and a defective rubber pin, must be replaced.



Align the surface. The locking pin is too short.



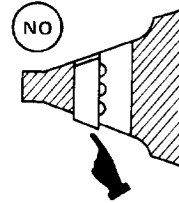
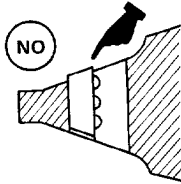
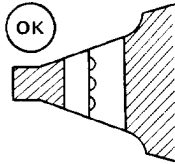
The steel ball may fall off due to the cut rubber.

The steel ball can be pressed into the rubber by hand.

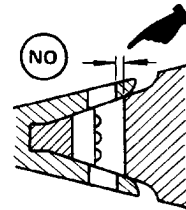
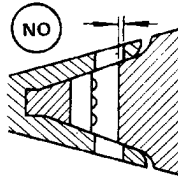
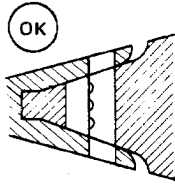
- ③ By using a putty knife, scrape off any soil attached to the nose surface.

Maintenance

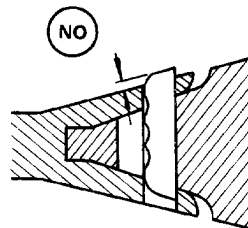
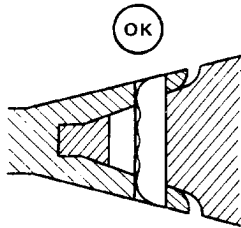
- ④ Push the rubber pin lock into the nose hole.



- ⑤ Set the point with the nose.



- ⑥ Strike the locking pin to align it with the point surface.

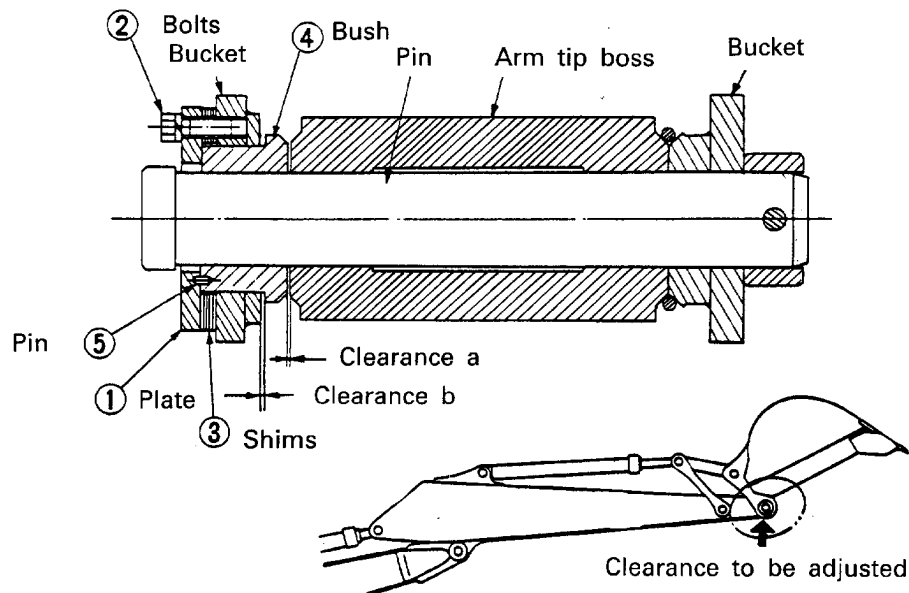


## 2 Adjust clearance of bucket set pins

This machine features a bucket clearance adjustment system developed by HCM. However, the following adjustment is required for the clearance at the top of the arm:

- (1) Remove the bolts (2) (three M16 bolts by using a 24 mm wrench), and take off the plate (1).
- (2) Adjust the clearance (a) by pulling out the shims (3) as necessary.
- (3) Position the plate (1) based on the pin (5), and fix it with the bolts (2) with a 21 kgf.m torque.
- (4) This makes the bush (4) shift to the right on the figure, which increases the clearance b and decreases the clearance a.

(Caution) The clearance (a) should be more than 0.5 mm, and must not be reduced by fastening the bolts.



## Maintenance

### 3 Bolts and nuts - Every 250 hours (and after initial 50 hours)

#### Tighten and retighten bolts and nuts

Tighten or retighten the bolts and nuts as based on the table below. Also, check them for loosening or omission before starting the operation, and retighten or supply as necessary.

**After the initial 50 hours and every 250 hours thereafter, check the fastening torque by using a torque wrench, and retighten if necessary.**

Symbol	Where to retighten	Bolt diameter	Q'ty	Wrench	Torque (kgf.m)
1.	Engine vibration isolating rubber set nut	14	4	22	14
	Engine vibration isolating rubber set bolt	16	2	24	21
		18	2	27	40
2.	Engine bracket set bolt	10	7	17	5
	Engine bracket set nut	10	1	17	5
3.	Hydraulic tank set bolt	16	4	24	21
4.	Fuel tank set bolt	16	4	24	21
5.	Hydraulic hose and piping union joint			19	3
				22	4
				27	9.5
				32	14
				36	18
		41	21		
6.	Pump set bolt	10	9	17	5
7.	Control valve set bolt	14	8	22	14
8.	Control valve bracket set bolt	12	4	19	9
9.	Swing mechanism set bolt	20	10	30	55
10.	Battery set bolt	8	4	13	1
11.	Cab set bolt	16	4	24	21
12.	Swing bearing set bolt (Superstructure)	18	28	27	40
	Swing bearing set bolt (Track)	16	36	24	27
13.	Transmission set bolt	M20	4	30	55
14.	Propelling shaft set bolt EX100W	M12	8	19	11
	Propelling shaft set nut EX100WD		16		
15.	Front axle EX100WD	M24	8	36	95
16.	Rear axle	M24	8	36	95
17.	Wheel pin nut Right .....	M22	20	32	45~55★
	Left .....				
18.	Cover set bolt	10		17	5
		12		19	9

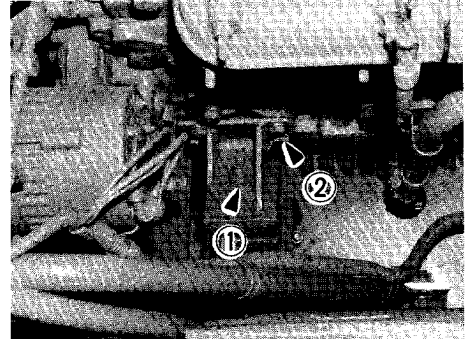
#### (Cautions)

- (1) For tightening, use a lubricant (e.g. white zinc B solved with spindle oil) to stabilize the friction coefficient.
- (2) Before tightening, remove rust, soil and dust.
- (3) When the counterweight set bolt is loosened, inform the nearest service shop.

**Remarks:** The bolt tightening force is expressed in torque. For example, if you turn the end of a 1 m wrench with a 12 kgf force, it produces a torque of 1 m x 12 kgf = 12 kgf.m. To obtain the same torque by using a 25 cm wrench, the necessary force (f) can be calculated as follows: 0.25 x f kgf = 12 kgf.m. f=12/0.25 = 48 kgf

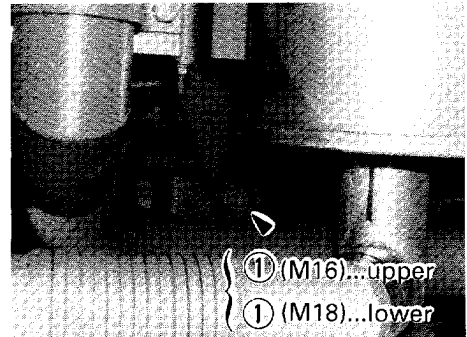
① **Engine vibration absorbing rubber set bolt and nut**

Tool : 22, 24, 27 mm  
Tightening torque : 14, 27, 40Kgf.m



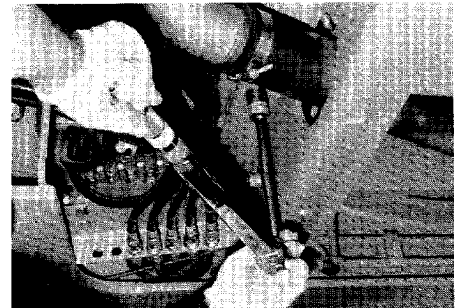
② **Engine bracket set bolt and nut**

Tool : 17 mm  
Tightening torque : 5 kgf.m



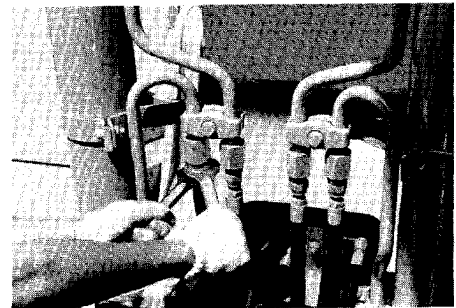
③ ④ **Hydraulic tank/fuel tank set bolt**

Tool : 24 mm  
Tightening torque : 21 kgf.m



⑤ **Hose and pipe union joint**

Tool : 19, 22, 27, 32, 36, 41 mm  
Tightening torque : 3, 4, 9.5, 14, 18, 21 kgf.m



⑥ **Pump set bolt**

Tool : 17 mm  
Tightening torque : 5 kgf.m

## Maintenance

### ⑦ Control valve set bolt

Tool : 22 mm  
Tightening torque : 14 kgf.m

### ⑧ Control valve set bolt

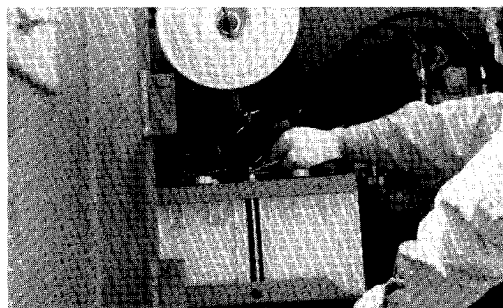
Tool : 19 mm  
Tightening torque : 9 kgf.m

### ⑨ Swing mechanism set bolt

Tool : 30 mm  
Tightening torque : 55 kgf.m

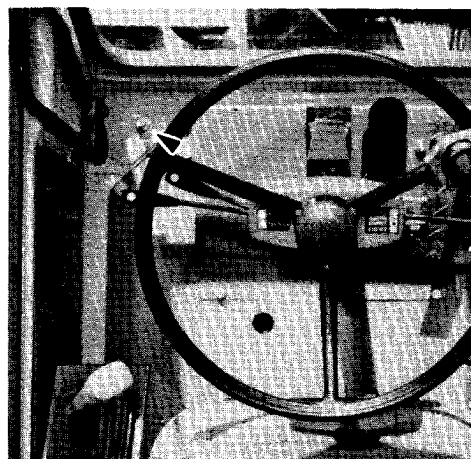
### ⑩ Battery set bolt

Tool : 13 mm  
Tightening torque : 1 kgf.m



### ⑪ Cab set bolt

Tool : 24 mm  
Tightening torque : 21 kgf.m

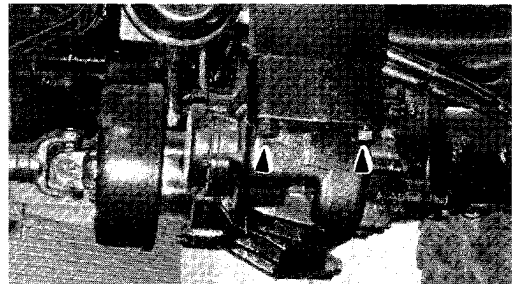


⑫ **Swing bearing set bolt**

	(Superstructure)	(Truck)
Tool	: 27 mm	24 mm
Tightening torque	: 40 kgf.m	27 kgf.m

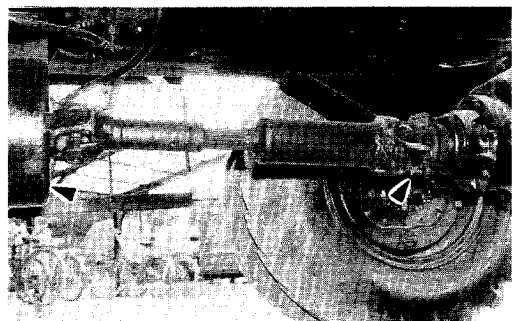
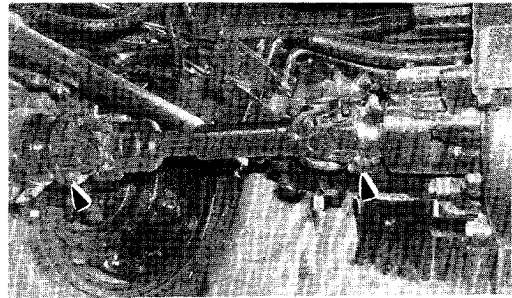
⑬ **Transmission set bolt**

Tool : 30 mm  
Tightening torque : 55 kgf.m



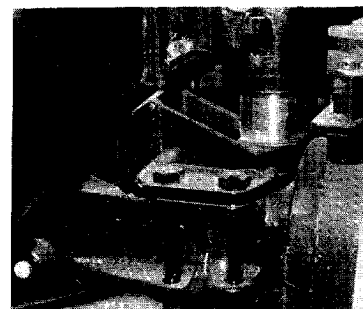
⑭ **Propeller shaft set bolt**

Tool : 19 mm  
Tightening torque : 11 Kgf.m



⑮ **Front axle**

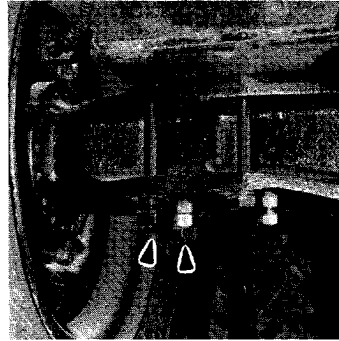
Tool : 36 mm  
Tightening torque : 95 kgf.m



## Maintenance

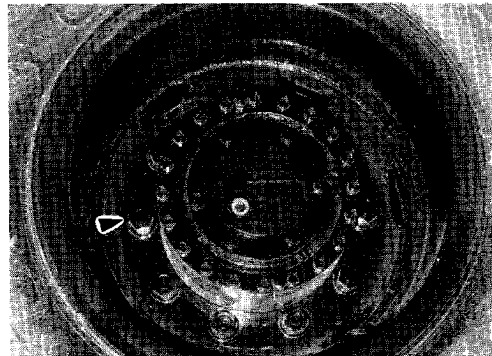
### ⑯ Rear axle

Tool : 36 mm  
Tightening torque : 95 kgf.m



### ⑰ Wheel pin nut

Tool : 32 mm  
Tightening torque : 45 ~ 55 kgf.m



### ⑱ Cover set bolt

Tool : 17, 19 mm  
Tightening torque : 5, 9 kgf.m



## Maintenance


### Tires

Item	Q'ty	Interval
1. Replace tires	8	When necessary

### Size of tires

Use tires sized as follows:

	Front wheel	Rear wheel	Front wheel	Rear wheel
Size	9.00-20-12PR (O.R)		9.00-20-14PR (O.R)	
Type	Class 3 tires for construction vehicle			
Air pressure	6~6.75 kgf/cm <sup>2</sup>		6~7.0 kgf/cm <sup>2</sup>	
Air pressure at delivery	6.75 kgf/cm <sup>2</sup>		7.0 kgf/cm <sup>2</sup>	
Delivery	Standard		Option	


 Use tires with the same tread groove (pattern) produced by the same manufacturer.

### Replacement of tires

The tires should be removed as follows for replacement and adjustment:

(a) Removal

- (i) Release the wheel nut with a wheel wrench.


 A right tire is set by a right-thread screw, and a left tire by a left-thread screw.

- (ii) Jack up the machine to float the tire, and remove it.


(b) Reassembly

- (i) Do not apply oil at the thread part of the wheel pin and nut.

- (c) Fasten the wheel nut temporarily. Then, lower the machine to contact the tire with the ground, and tighten it with the specified torque.

 Torque for tightening the wheel nut: 45 - 55 kg.m torque.

- (d) When assembling the tire, shift the air valves of the inner and outer rings so as to facilitate air feeding.

-  (a) Keep the specified air pressure.  
 (b) If any part of the tread pattern is missing, replace the tire with a new one.  
 (c) Before the day's operation, always check the tires for cracks, damages and foreign matters.  
 (d) Even for only one tire, be sure to observe the rule of the same tread pattern and the same manufacturer.

## Maintenance

### Maintenance services under various conditions

Condition	Maintenance
Mud, rain or snow	<p>Before work : Check plugs and cocks for tightness.</p> <p>After work : Clean the machine, and check it for cracks, damages, loosened or omitted bolts/nuts. Lubricate necessary parts. Use special care when travelling or starting the machine at a depth of more than 300 mm, as water starts to enter the brake system and prevents its function.</p>
Seaside	<p>Before work : Check plugs and cocks for tightness.</p> <p>After work : Wash the machine carefully to remove salt. Take special care for the electric system to prevent corrosion.</p>
Dusty	<p>Air cleaner : Clean the element frequently.</p> <p>Radiator : Clean the oil cooler front net to prevent clogging of the core.</p> <p>Fuel : Clean the element and filter frequently.</p> <p>Electrical system : Clean the starter and generator, especially the commutator surface.</p>
Rocky	<p>Carrier : Check the tires for cracks, and the bolts and nuts for loosening, crack, wear and damage.</p> <p>Front attachment : For a heavy-dusty work, option a suitable attachment or reinforce the standard one.</p>
Falling rocks	<p>Cab head guard : Attach a head guard</p>
Coldness	<p>Fuel and lubricant : Use high quality and low viscosity oils.</p> <p>Engine coolant : Always use an anti-freeze.</p> <p>Batteries : Charge them to full capacity more frequently than usual. If not, the electrolytic solution may be frozen.</p> <p>Carrier : Wipe out attached soil, and prevent freezing.</p> <p>Air tank : Drain water completely before operation.</p>



## STORAGE

### Cautions for long storage

If the machine is to be stored for at least one month, observe the following points to prevent deteriorated performance:

	Description of Work
Washing	Wash the machine completely, inspect the undercarriage, and grease all lubricating points.
Lubrication	Check the lubricating for the amount and contamination, and grease all lubrication points. Apply oil lightly to points liable to rust (such as cylinder rods).
Batteries	Remove them, and charge them to full capacity before storage, or disconnect the -terminal.
Coolant	Be sure to put an anti-rust. To prevent possible freezing, put an anti-freeze, or drain water completely. In this case, put a "NO WATER" sign.
Air tank	Drain air from the tank by applying and releasing the foot brake repeatedly.
Prevent dust and moisture	Store the machine in a less humid place, prevent moisture entering into the engine, and cover the seat.
Tools	Check and repair before storage.
Lubricating run	Perform this operation once a month. It prevents the lack of oil film and rust, and protect the machine from abnormal wear when it resumes the operation after storage.
(Run the machine at low speed and no load for several minutes)	Before the lubricating run, check the coolant level.



- (1) Lubricating run is the series of operations repeated a few times, including warm-up, travel, and swing.
- (2) Check the stored lubricants carefully, as they keep deteriorating during the storage.



# TROUBLESHOOTING

## Troubleshooting

If any abnormality is detected, it must be solved immediately. Find the cause and repair or adjust defective parts to prevent recurrence. Several causes may be detected for a single failure. Therefore, it must be analyzed logically and systematically without acting on instinct. Use the following chart for the analysis of problems and their solution.

When it is impossible to determine the cause, consult the nearest service shop.

Note that the user must not adjust the hydraulic system, or adjust, dismantle or repair the pneumatic system. If any of these equipment is found defective, contact the nearest service shop.

### 1. ENGINE

For the troubleshooting of the engine, refer to the "Operation Manual for Isuzu Diesel Engine 6BB1."

### 2. ENGINE ACCESSORIES

<b>Battery failure</b>	Battery does not charge	Diaphragm is damaged	Replace
		Regulator is faulty	Adjust or replace
		Grounding is incomplete	Repair
		Generator is faulty	Adjust or replace
	Battery charges but discharges immediately	Part of wire is short-circuited	Adjust or replace
		Diaphragm is short-circuited	Adjust or replace
	Much deposit in battery	Clean	
<b>Too high coolant temperature</b>	Coolant is short		Refill
	Fan belt tension is short		Adjust
	Rubber hose is damaged		Replace
	Radiator cap pressure is wrong		Replace
	Thermostat is faulty		Replace
	Dust and scale deposited in cooling system		Replace coolant or clean
	Water temperature gauge is faulty		Replace
Radiator fin or oil cooler front net is clogged		Clean	

## Troubleshooting

### 3. CONTROL LEVERS

<b>Fuel lever</b>	Operation is heavy	Jet pump is faulty	Check and repair or replace
		Bush, shaft, or rod pin is rusted	Grease or repair
	Too much play	Ball joint is worn out	Replace
		Adjusting spring is too tight	Adjust
<b>Control lever</b>	Heavy	Jet pump is faulty	Check and repair
		Lever unit is worn out	Repair or replace
	Stops midway	Joint is rusted	Grease or repair
		Pusher is worn out	Replace
	Doesn't return to NEUTRAL	Pusher is worn out	Repair or replace
		Pilot valve is faulty	Replace
Too much play, slanting at NEUTRAL	Pilot valve is faulty	Replace	
	Joint is worn out	Repair or replace	
<b>Travel pedal</b>	Heavy	Pilot valve is faulty	Replace
		Joint is rusted	Grease or repair
	Cannot be applied to full stroke	Pusher is worn out	Replace
		Pusher is worn out	Repair or replace
	Doesn't return to NEUTRAL	Pilot valve is faulty	Replace
		Pilot valve is faulty	Replace
Too much play at NEUTRAL	Joint is worn out	Repair or replace	
	Pilot valve is faulty	Replace	

## Troubleshooting

### 4. HYDRAULIC SYSTEM

When the machine is suspended for a long time, air in the oil may separate and accumulate at the upper part of cylinders, causing delayed or powerless operation.  
In such case, repeat all operations several times.

<b>Front attachment, swing unit and travel unit are inoperable (Hydraulic pump noise increases)</b>	Hydraulic pump is faulty	Repair or replace
	Hydraulic oil is short	Refill
	Suction pipe or hose is damaged	Repair or replace
<b>Front attachment, swing unit and travel unit are inoperable (Hydraulic pump noise is unchanged)</b>	Pilot pump is damaged	Replace
	Solenoid valve is damaged	Replace
	Left console is not in operating position	Correct
	Front-reverse lever is at NEUTRAL	Correct
<b>Total operating force is short</b>	Performance decreased because hydraulic pump is worn out	Replace
	Set pressure of main safety valve decreased	Adjust
	Hydraulic oil is short	Refill
	Foreign matter is attached to suction filter in oil tank	Clean
	Air entered suction side	Retighten
<b>Lever is operable on only one side or powerless</b>	Relief valve is faulty	Repair or replace
	Pipe or hose is damaged	Repair or replace
	Pipe joint is loosened	Retighten
	O-ring at joint is damaged	Replace
	Hydraulic pump is faulty	Repair or replace
	Pilot valve is faulty	Replace
<b>1 control level is inoperable</b>	Pilot pipes are faulty	Repair or replace
	Control valve spool is damaged	Replace
	Valve spool contains foreign matter	Repair or replace
	Pipe or hose is damaged	Repair or replace
	Pipe joint is loosened	Retighten
	O-ring at pipe joint is damaged	Replace
	Actuator is damaged	Repair or replace
Pilot valve is faulty	Replace	
Pilot pipe is faulty	Repair or replace	



## Troubleshooting

<b>1 cylinder is inoperable or powerless</b>	Oil seal in cylinder is damaged	Repair or replace
	Oil leaks from damaged cylinder or rod	Repair or replace
	Pilot valve is faulty	Replace
	Pilot pipe is faulty	Repair or replace
<b>Oil is hot</b>	Oil cooler is dirty	Clean
	Engine fan belt tension is short	Adjust
<b>Oil leaks from low pressure hose</b>	Clamp is loosened	Retighten
	Suction manifold is faulty	Repair or replace

## 5. PNEUMATIC SYSTEM

<b>Air pressure decreases</b>	Clamp is loosened	Retighten
	Pipe or hose is damaged	Replace
	Valve contains foreign matter	Repair or replace
	Valve is damaged	Replace
<b>Water accumulates or rust occurs in air circuit</b>	Air drier is faulty	Repair or replace
	Drying agent is out of service life	Replace
	Drain valve is faulty	Repair or replace
	Air is leaking	Replace

## Troubleshooting

### 6. TRAVEL

<b>Steering</b>	Steering is heavy	Steering pump is faulty	Repair or replace		
		Hydraulic steering is faulty	Repair or replace		
		Steering cylinder is faulty	Repair or replace defective parts		
		Pressure of relief valve decreased	Adjust		
		Tire pressure is short	Refill		
		Wheel alignment is faulty	Adjust		
	Steering is shaky	Hub bearing caused backlash	Repair or replace		
		Wheel alignment is faulty	Adjust		
		Left and right tires are imbalanced	Adjust or replace		
		King pin bush is worn out	Repair or replace		
	Steering is uncontrollable	Wheel alignment is faulty	Adjust		
		Brake works only one side or drags.	Adjust		
		Left and right tires are imbalanced	Adjust or replace		
<b>Brake</b>	Brake is ineffective	Oil is attached to brake lining	Replace		
		Mud or water is attached to brake lining	Clean		
		Brake lining is worn out	Replace		
		Brake lining is hardened (transformed)	Replace		
		Too much gap between lining and drum	Adjust		
		Oil leaks from wheel cylinder	Repair or replace		
		Booster is faulty	Repair or replace		
		Brake pipe leaks oil or contains air	Repair or drain air		
		Compressor is faulty	Repair or replace		
		Compressor hose is damaged	Repair or replace		
			Brake drags	Booster is faulty	Repair or replace
				Brake shoe or return spring is fatigued or damaged	Replace
				Little gap between lining and drum	Adjust
	Working brake or parking brake is applied	Release			

## Troubleshooting

<b>Brake</b>	Brake works only one side	Uneven gap between lining and drum	Adjust
		Lining contact is faulty or surface is hardened	Replace
		Oil, mud or water is attached to lining	Clean
		Wheel bearing causes backlash	Repair or replace
		Drum is worn out or deformed	Repair or replace
		Drum cover is deformed	Repair or replace
		Oil leaks from wheel cylinder	Repair or replace
	Brake squeaks	Lining is worn out or rivet is loosened	Repair or replace
		Lining surface is hardened	Replace
		Drum is unstable or worn out	Repair or replace
Brake drum contains foreign matter		Clean	
Brake oil decreases too much	Oil leaks from brake pipe or hose joint	Retighten or repair	
	Oil leaks from damaged seal in booster	Repair or replace	
	Oil leaks from damaged seal in wheel cylinder	Repair or replace	
<b>Transmission</b>	Noise	Gear oil is short or substandard	Refill or replace with new oil
		Internal parts are worn out	Repair or replace defective parts
		Gear or bearing is damaged	Repair or replace defective parts
	Gear engagement is difficult	Gear oil is short	Refill
		Shift operation is wrong	Do as specified
	Gears disengage	Gear or bearing is partially worn out	Repair or replace defective parts
		Air is leaking	Repair or replace defective parts

## Troubleshooting

<b>Propeller shaft</b>	Propeller shaft shakes	Propeller shaft is bent Parts are loosened or imbalanced	Repair or replace defective parts Retighten or adjust
	Propeller shaft causes noise	Spline wears too much Spider bearing is worn out or burnt Parts are loosened Greasing is short	Replace Replace Retighten Grease
<b>Front and rear axles</b>	Noise	Gears are worn out or damaged Gear oil is short or substandard  Bearings are worn out or cause backlash Shaft spline causes backlash	Replace Refill or replace with new oil Replace Repair or replace
	Do not transmit force	Shaft is damaged Gears are damaged	Replace Replace

## 7. SWING

<b>Machine doesn't swing</b>	Swing parking brake is faulty	Repair or replace
	Swing parking release valve is damaged	Repair or replace
	Swing motor is damaged	Repair or replace
	Pilot valve is faulty	Replace
	Pilot pipe is faulty	Repair or replace
<b>Machine doesn't swing smoothly</b>	Swing gear is worn out	Repair or replace
	Swing bearing or ball bearing is worn out	Repair or replace
	Grease is short	Refill

The machine may cause noise or may not swing smoothly after the replacement of the control valve, swing motor relief valve or swing motor. This is due to air contained in the hydraulic circuit of the swing mechanism. To solve this problem, run the machine at low speed for about 10 minutes. After the maintenance work, always check the amount of oil in the tank.

## Troubleshooting

### 8. MODE SELECTOR AND AUTO-IDLE DEVICE

(1) <b>Unchangeable between drill and travel</b>	Mode SW is damaged	Replace
	Connector contact is faulty	Repair or replace
	Wire harness is damaged	Repair
	Controller is damaged	Repair
	Solenoid valve is damaged	Repair or replace
	Mini-cylinder is damaged	Repair or replace
	Pump-regulating solenoid valve is damaged	Repair or replace
(2) <b>Auto-idle switch does not turn on or off</b>	Auto-idle SW is damaged	Replace
	Travel-drill sensor is damaged	Replace
	Connector contact is faulty	Repair or replace
	Wire harness is damaged	Repair
	Controller is damaged	Replace
	Solenoid valve is damaged	Repair or replace
	Mini Cylinder is damaged	Repair or replace

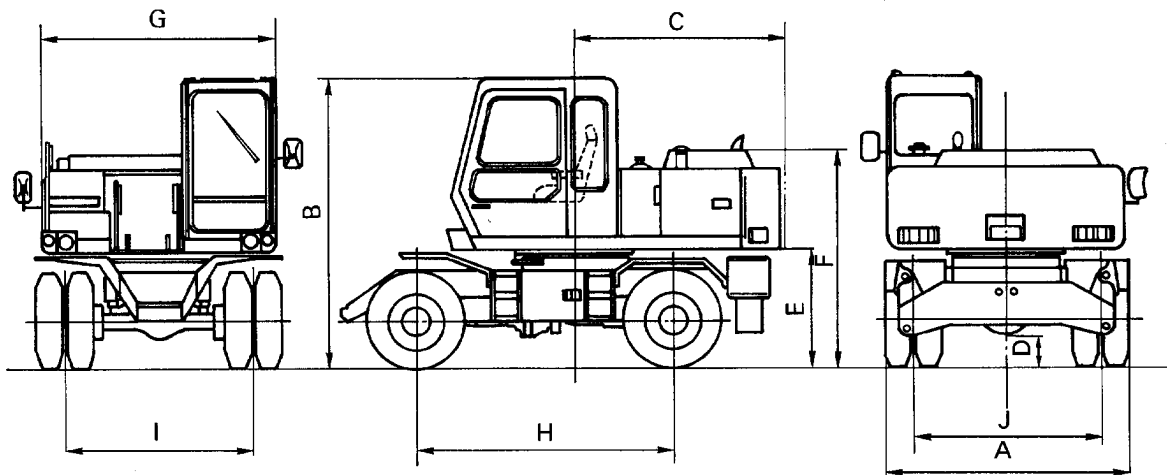
### 9. OTHER

A failure can be detected by abnormal noise, vibration or smell. Pay attention to these features during operation.

## SPECIFICATIONS

### Standard specifications

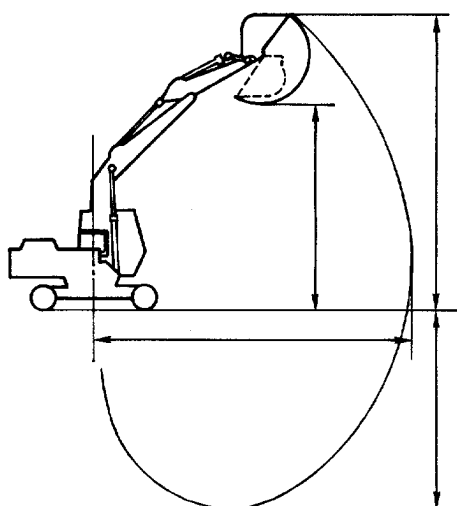
Type		EX100W and EX100WD		
Type of front attachment	–	Standard arm (1.95 m)		
Standard bucket capacity	m <sup>3</sup>	0.4		
Gross weight	t	10.4 (EX100W)	10.7 (EX100WD)	
Chassis (Main body) weight	t	8.6 (EX100W)	8.9 (EX100WD)	
Engine	–	6BB1, 110ps/2500rpm(SDX), 95ps/2100rpm (DX)		
A : Overall width	m	2470		
B : Cab height	m	2995		
C : Rear end radius	m	2100		
D : Minimum ground clearance	m	315		
E : Ground clearance of superstructure	m	1205		
F : Height of engine cover	m	2205		
G : Overall width of superstructure	m	2380		
H : wheel base	m	2600		
I : Front wheel tread	m	1895		
J : Rear wheel tread	m	1895		
Tire size	–	9.00-20-12PR		
Swing speed	rpm	12.5		
Travel speed	km/h	Forward and backward	Low speed	11.0
			High speed	34.5
Gradeability	%(degrees)	65 (33)		



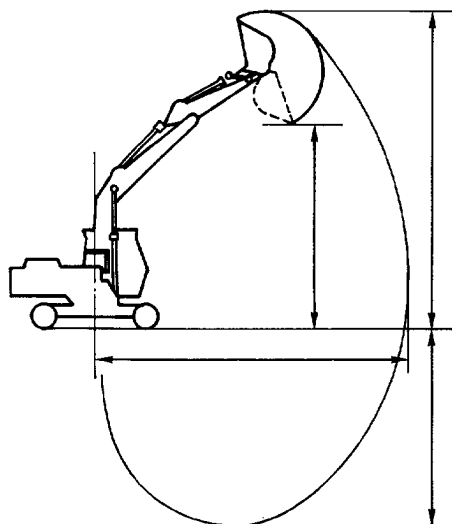
Dimensions of Main Body

## Specifications

### Working range



Backhoe operation  
(Standard hoe bucket)

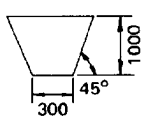


Face shovel operation  
(Reversed hoe bucket)

	Standard arm (1.95 m)		Long arm (2.25 m)	
	Backhoe operation	Face shovel operation (reversed hoe bucket)	Backhoe operation	Face shovel operation (reversed hoe bucket)
A: Max. digging radius (mm)	7410	7630	7680	7900
B: Max. digging depth (mm)	4410	4640	4710	4930
C: Max. cutting height (mm)	7950	8280	8100	8430
D: Max. dumping height (mm)	5600	5370	5740	5520

## Specifications

### Types and applications of buckets

Name	Bucket capacity (m <sup>2</sup> )		Bucket width (mm)		Applicable front attachment	
	Heaped	Struck	With side cutter	Without side cutter	Standard arm	Long arm
Hoe bucket	0.17	0.15	550	450	⊙	⊙
	0.25	0.22	700	580	⊙	⊙
	0.33	0.28	800	680	⊙	⊙
	0.40	0.34	970	850	⊙	⊙
	0.45	0.39	1010	890	○	○
	0.50	0.43	1070	950	□	—
V-type bucket	0.35	—			⊙	⊙
Clamshell bucket	0.3		Bucket width	570	⊙	⊙
			Opening width	1840		
Slope-finishing blade	—		1600		◇	◇

(Notes) (1) The symbols used in the above table have the following meanings:

- ⊙ : General excavation
- : Light duty excavation
- : Loading
- ◇ : Slope-finishing

(2) Applications of hoe bucket

- General excavation : Digging and loading sand, gravel, clay, general earth, etc.
- Light duty excavation : Digging and loading dry and loose earth and sand, mud, etc. with a specific gravity of less than 1,600 kgf/m<sup>3</sup>
- Loading : Loading dry and loose earth and sand with specified gravity of less than 1,100 kgf/m<sup>3</sup>





## HANDLING OPTIONAL ATTACHMENTS

### 1. Hydraulic breakers

- Selection and attachment

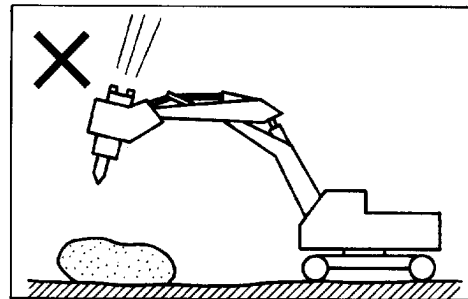
In order to use a breaker with the wheel type hydraulic excavator, it is necessary to check its stability, as well as the oil pressure and capacity to obtain the best combination. For the selection of a hydraulic breaker, contact the nearest sales office or service shop.

- Caution for use

For using a hydraulic breaker, read through the related operation manual for proper maintenance and maximum performance.

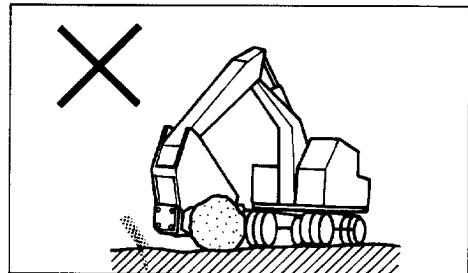
- Use the outriggers

A hydraulic breaker is heavy than the bucket. To stabilize the machine, be sure to use the outriggers, and extend them on the front side for operation.



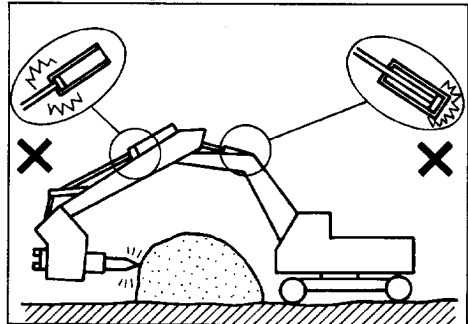
- Avoid sudden operation

Operate it slowly. Abrupt operation may damage the front attachment and the swing unit.



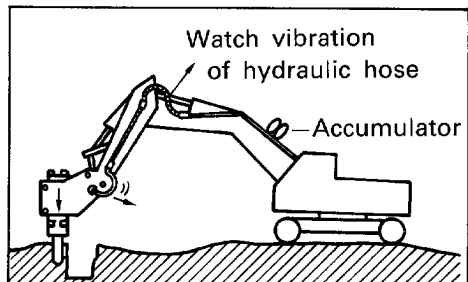
- Never use it to shift an object

Do not move an object with a hydraulic breaker. Such operation will cause damage to the front attachment, and apply an excessive force to the swing unit. The breaker itself may be damaged by the shock.



- Do not operate a breaker at the cylinder stroke end

For the breaker operation, do not extend or retract the front attachment to the stroke end. Keep a tolerance of at least 100 mm from the stroke end of each hydraulic cylinder. Otherwise, the cylinders or the front attachment may be damaged.

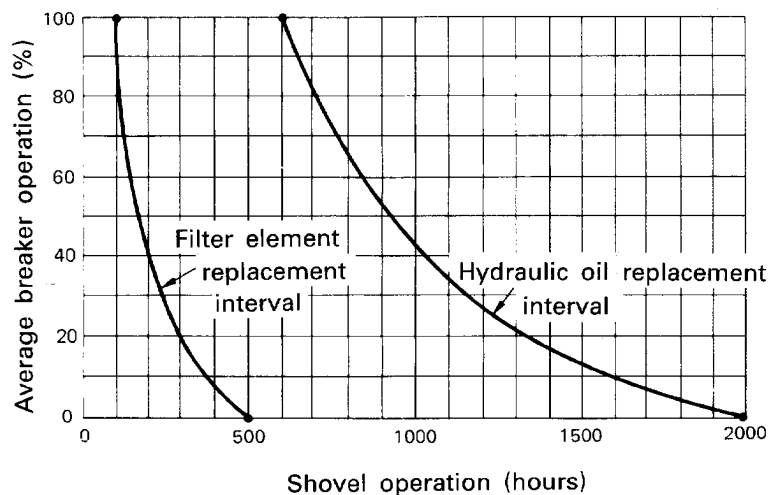


## Handling Optional Attachments

- Keep alert to the vibration of the hydraulic hose.**  
 If the hydraulic hose caused abnormal vibration, stop the operation immediately, and check the accumulator for the air pressure and damage. Otherwise, the impact of the vibration will increase, which loosens bolts and causes adverse effect to the machine.
- Replace hydraulic oil and filter element**  
 Generally, a hydraulic breaker is attached to the machine for a work under severe conditions. As a result, the hydraulic oil wears and gets dirty more quickly than usual. Check it frequently and keep it in a good condition. Neglecting its maintenance results in a failure of the hydraulic equipment and the breaker. To extend the life of the hydraulic pump, replace the hydraulic oil and the full flow filter element in the following interval:

Hydraulic oil and filter element replacement interval (hours)

Attachment	Operation rate	Hydraulic oil	Filter element
Bucket	100%	2000	500
Breaker	100%	600	100



- Replace the hydraulic oil as based on the diagram and the frequency of breaker operation, and keep it at the NAS Class 10 level.
- If the breaker is used repeatedly in a short time, replace the element each time the hour meter counts 100 hours.

## Handling Optional Attachments

### 2. Crusher

- The crusher is also heavier than the bucket. Observe the following cautions to prevent a turnover and other accident:
- For the operation, extend the outriggers on the front side (Do not swing the equipment in the lateral direction of the tires).
- Keep the machine body flat, and stabilize the footing for the operation (be careful especially when riding on rubbles and working on a slope).
- Avoid using the crusher at the cylinder stroke end, as it may damage the front attachment.

**Hitachi Construction Machinery Co., Ltd.**

