PART No. EM12S – NA1 – 3

Operator's Manual

EX100-3
EX100M-3
Excavator

Serial No.
EX100-3 36487 and up
EX100M-3 03614 and up

HITACHI

INTRODUCTION

Read this manual carefully to learn how to operate and service your machine correctly. Failure to do so could result in personal injury or machine damage.

This manual should be considered a permanent part of your machine and should remain with the machine when you sell it.

This machine is of metric design. Measurements in this manual are metric. Use only metric hardware and tools as specified.

Right-hand and left-hand sides are determined by facing in the direction of forward travel.

Write product identification numbers in the Machine Numbers section. Accurately record all the numbers to help in tracing the machine should it be stolen. Your dealer also needs these numbers when you order parts. If this manual is kept on the machine, also file the identification numbers in a secure place off the machine.

Warranty is provided as part of Hitachi's support program for customers who operate and maintain their equipment as described in this manual. The warranty is explained on the warranty certificate which you should have received from your dealer.

This warranty provides you the assurance that Hitachi will back its products where defects 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. **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.

Only qualified, experienced operators officially licensed (according to local law) should be allowed to operate the machine. Moreover, only officially licensed personnel should be allowed to inspect / service the machine.

All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

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SAFETY

RECOGNIZE SAFETY INFORMATION

This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow all recommended precautions and safe operating practices.

SA-001

UNDERSTAND SIGNAL WORDS

SA-100

On machine safety signs, signal words designating the degree or level of hazard – DANGER, WARNING, or CAUTION – are used with the safety-alert symbol.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

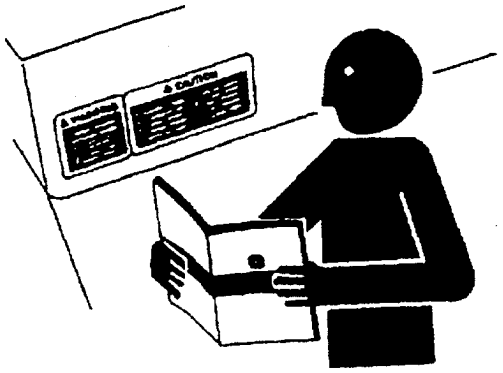
WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

DANGER or WARNING safety signs are located near specific hazards.
General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

To avoid confusing machine protection with the personal safety messages, a signal word IMPORTANT indicates a situation which, if not avoided, could result in damage to the machine.

FOLLOW SAFETY INSTRUCTIONS



SA-101

Carefully read and follow all safety signs on the machine and all safety messages in this manual.

Safety signs should be installed, maintained and replaced when necessary.
If a safety sign or this manual is damaged or missing, order a replacement from your Hitachi dealer in the same way you order other replacement parts (be sure to state machine model and serial number when ordering).

Learn how to operate the machine and its controls correctly and safety.
Allow only trained, qualified, authorized personnel to operate the machine.

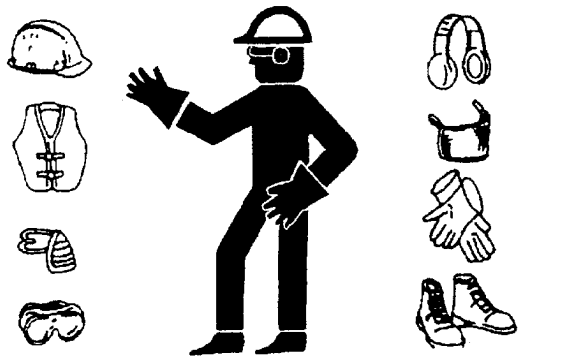
Keep your machine in proper working condition.
Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

The safety messages in this SAFETY chapter are intended to illustrate basic safety procedures of hydraulic excavators. However it is impossible for these safety messages to cover every hazardous situation you may encounter. If you have any questions, you should first consult your supervisor before operating and servicing the machine.

WEAR PROTECTIVE CLOTHING

Avoid wearing loose clothing, jewelry, or other items that can catch on control levers or other parts of the machine.
Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

Wear close fitting clothing and safety equipment appropriate for the job.



SA-023

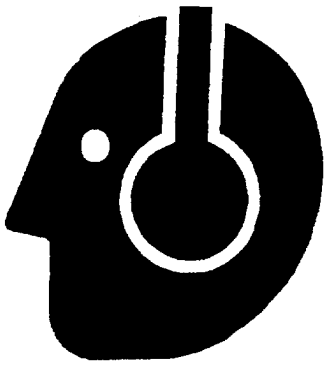
Standard safety equipment includes:
- A hard hat
- Safety shoes
- Safety glasses, goggles, or face shield
- Heavy gloves
- Hearing protection
- Reflective clothing
- Wet weather clothing
- Respirator or filter mask.(See SA-023)

Do not take chances. Wear whatever is needed for the job at hand.

PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against constant or uncomfortably loud noises.



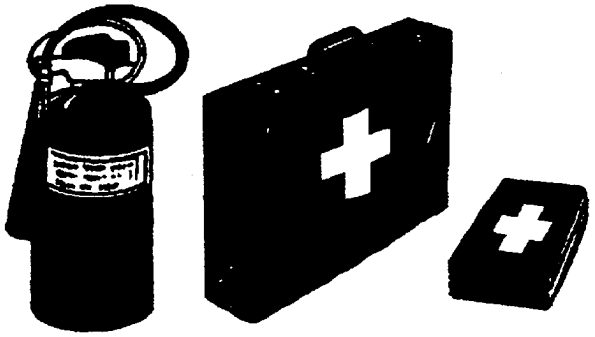
SA-024

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



SA-020

INSPECT MACHINE

To avoid personal injury, inspect your machine carefully at the beginning of each day or shift by walking around it before you start it. While performing your walk-around inspection, refer to the chapter "Pre-start Inspection" in this manual.

SA-005

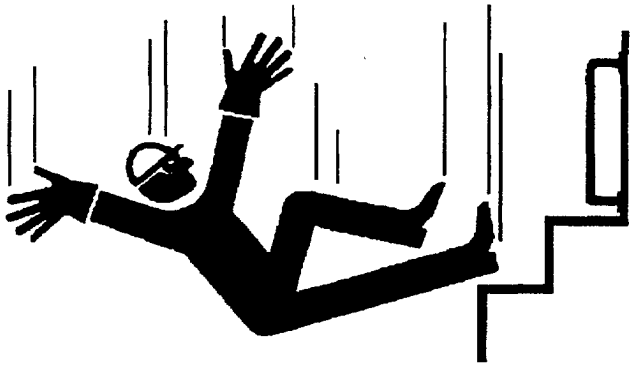
USE HANDHOLDS AND STEPS

Falling is one of the major causes of personal injury.

When you get on and off the machine, always maintain a three-point contact with the steps and handrails and face the machine. Do not use any controls as handholds.

Never jump on or off the machine. Never mount or dismount a moving machine.

Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.



SA-006

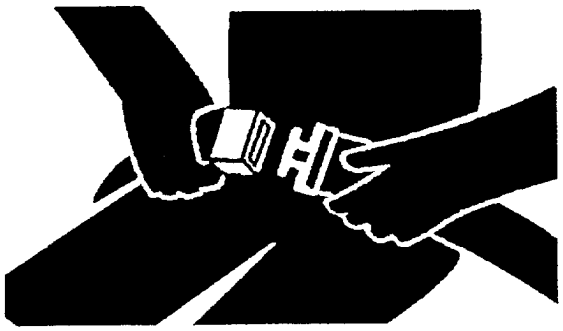
ADJUST THE SEAT

Adjust the seat whenever changing operators. Be sure that the operator can fully depress the pedals with his back against the seat back.
If not, move the seat forward and check again.

SA-233

FASTEN YOUR SEAT BELT

Always check the condition of the seat belt, and mounting hardware before starting the machine.
A weak or damaged seat belt and mounting hardware can result in serious injury if it fails in the event of an accident.
Be sure to use the seat belt when operating the machine.

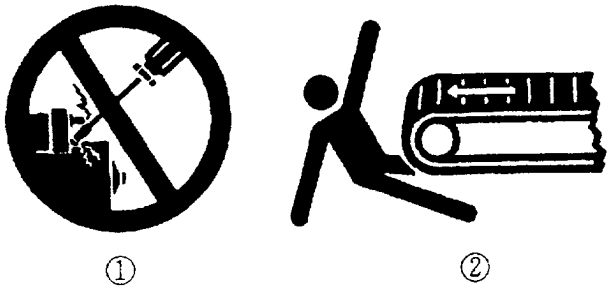


SA-237

OPERATE ONLY FROM OPERATOR'S SEAT

Avoid possible injury or machine damage. Do not start the engine by shorting across starter terminals. (See ①)

NEVER start the engine while standing on ground. Start the engine only from operator's seat. (See ②)



① ②

SA-008

KEEP RIDERS OFF MACHINE

Only allow the operator on the machine. Keep riders off.

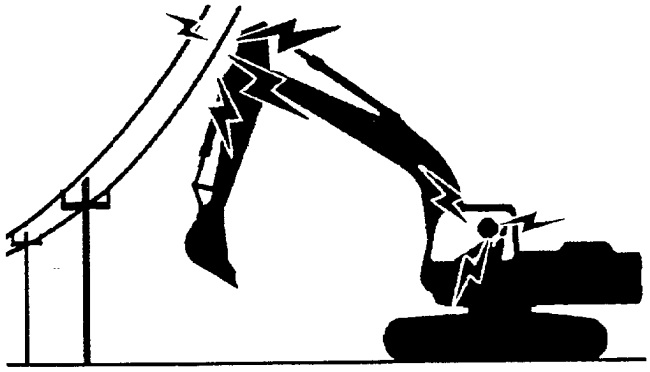
Riders on machine are vulnerable to injury such as being struck by foreign objects or being thrown off the machine. (See SA-017)
Riders also obstruct the operator's view, resulting in unsafe operation.

SA-017

AVOID POWER LINES

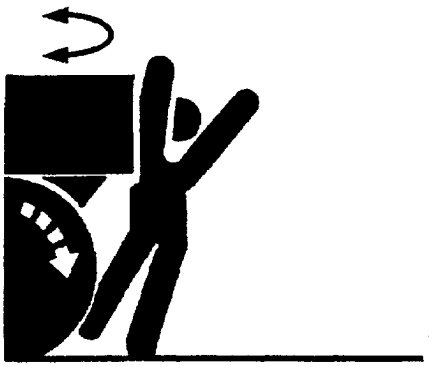
Serious injury or death can result from contact with electric lines. (See SA-013)

Never move any part of the machine or load closer to any electric line than 3 m (10 ft) plus twice the line insulator length.



SA-013

AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS (See SA-004)



SA-004

To avoid back-over and swing accidents:

Always look around before you back up and swing the machine. Be sure that everyone is in the clear.

Keep bystanders away from pivot area of an articulated machine.

Keep travel alarm in working condition.
Always be alert for bystanders moving into the work area. Use horn or other signal to warn bystanders before moving machine.

Use a signal person when backing up if your view is obstructed. Always keep signal person in view.
Use hand signals when work conditions require signal person.
No excavator or backhoe motions shall be made unless signals are clearly understood by both signalman and operator.

Learn the meaning of all flags, signs, and markings used on the job and confirm who has the responsibility for signaling.

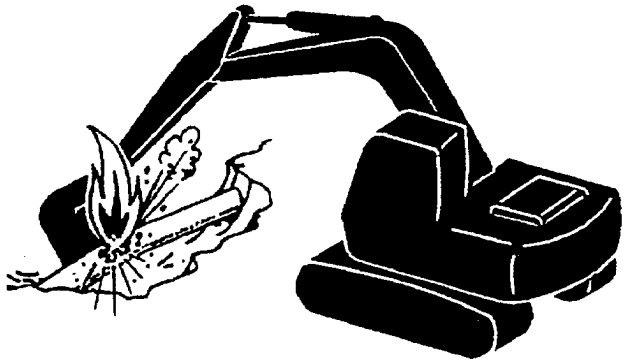
Keep windows, mirrors, and lights clean and in good condition.

Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.

Read and understand all operating instructions in this operator's manual.

DIG WITH CAUTION

Before digging, check the location of cables, gas lines, and water lines.



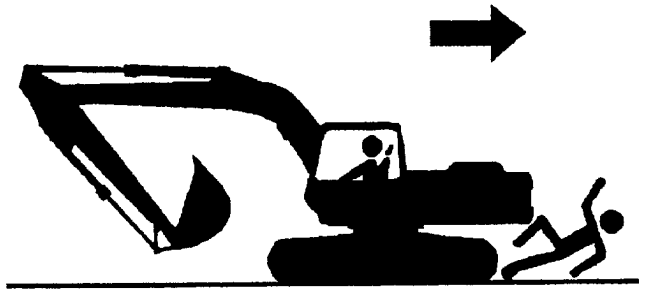
SA-010

MOVE AND OPERATE MACHINE SAFELY

Bystanders are in danger of being run over. (See SA-007) Confirm the location of bystanders before moving, swinging, or operating the machine.

Always keep the travel alarm in good working condition. It warns people when the machine starts to move.

Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the machine.



SA-007

OPERATE MACHINE SAFELY

Clear all persons from area of operation and machine movement.

Make sure worksite footing has sufficient strength to firmly support the machine. (See SA-009)
When working close to an excavation, operate the machine with the tracks positioned perpendicular to the cliff face with travel motors at the rear, so that the machine can more easily evacuate if the cliff face collapses.

SA-009

When digging deeply, avoid hitting bottom of boom or bucket cylinder hoses against the ground.

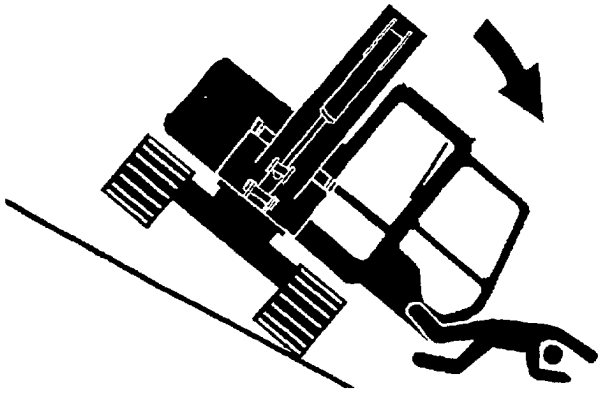
Use the bucket only for digging. To avoid accidents, do not use it as a jack hammer or wrecking ball.

AVOID TIPPING

When operating on a slope, keep bucket low to ground and close to machine. Point tracks uphill to avoid tipping. (See SA-012)

Reduce swing speed, to avoid tipping the machine when swinging heavy loads.

Be cautious of tipping when working on frozen ground. Temperature increases will cause ground to become soft and make ground travel unstable.

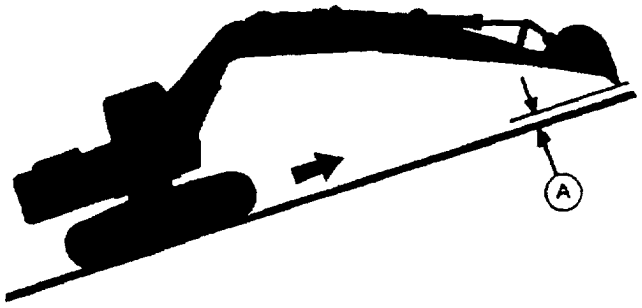


SA-012

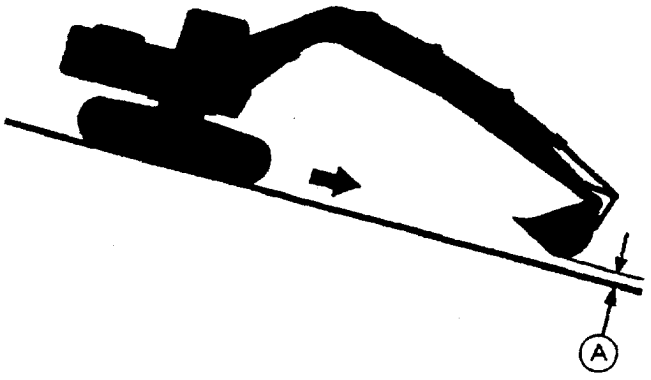
DRIVE MACHINE SAFELY

Before moving machine, find out which way to move travel pedals/levers for the direction you want to go. Pushing down on the front of the travel pedals or pushing the levers moves the machine towards the idlers.

Keep the bucket point in direction of travel, approximately 200 to 300 mm (8 to 12 in) Ⓐ above ground, when traveling up or down a slope. (See SA-015 and SA-284) If machine starts to slip or become unstable, lower the bucket immediately.



SA-015

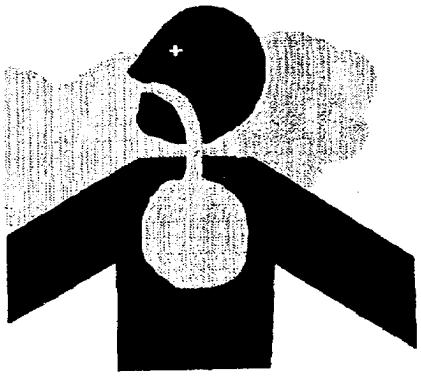


SA-284

BEWARE OF EXHAUST FUMES

Engine exhaust fumes can cause sickness or death.

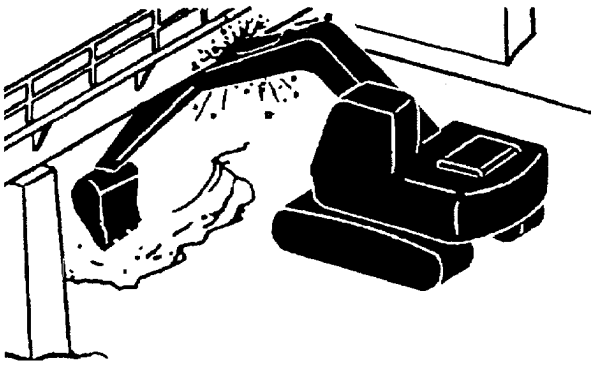
If you must operate in a building, be sure there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.



SA-016

OPERATE WITH CAUTION

Avoid contact of boom or arm and overhead obstacles when you operate the machine.



SA-011

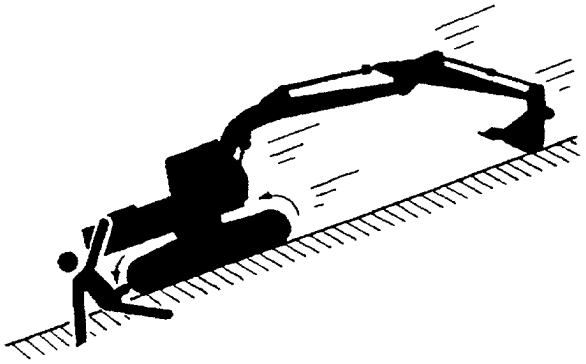
AVOID INJURY FROM RUNAWAY ACCIDENTS

Death or serious injury may result if you attempt to mount or stop a moving machine. (See SA-230)

To avoid runaways:

Select level ground when possible to park machine.

Lower bucket to the ground.
Turn auto-idle switch off.



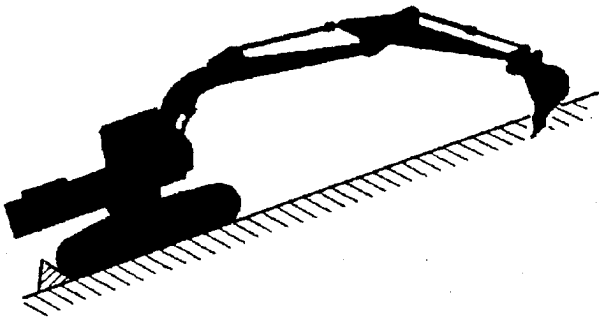
SA-230

Run engine at slow idle speed without load for 3 minutes to cool it.

Stop the engine and remove the key from the key switch.

Pull pilot control shut-off lever to LOCK position.

Block both tracks and lower bucket to the ground, thrusting the bucket teeth into the ground if you must park on a slope. (See SA-234)
Position machine to prevent running.



SA-234

Park a reasonable distance from other machines.

PARK MACHINE SAFELY

Before working on the machine:

- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto-idle switch off.
- Run engine at slow idle speed without load for 3 minutes.
- Turn key switch to OFF to stop engine. Remove key from switch.
- Pull pilot control shut-off lever to LOCK position.
- Allow engine to cool.

HANDLE FLUIDS SAFELY – AVOID FIRES

Handle fuel with care; it is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks. (See SA-018) Always stop engine before refueling machine. Fill fuel tank outdoors.

All fuels, most lubricants, and some coolants are flammable. (See SA-019) Store flammable fluids away from fire hazards.
Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.

SA-018

SA-019

PRACTICE SAFE MAINTENANCE

Understand service procedures before doing work. Keep work area clean and dry. (See SA-028)

Never lubricate or service the machine while it is moving.
Keep hands, feet and clothing from power-driven parts.

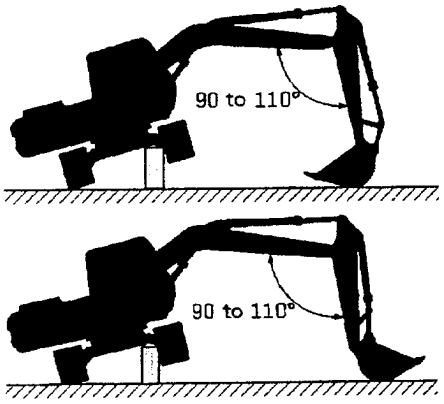
Before servicing the machine:

- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto-idle switch off.
- Run engine at slow idle speed without load for 3 minutes.
- Turn key switch to OFF to stop engine. Remove key from switch.
- Attach a "Do Not Operate" tag on the right control lever.
- Pull the pilot control shut-off lever to LOCK position.
- Allow engine to cool.

SA-028

If maintenance procedure must be performed with engine running, do not leave machine unattended.

If the machine must be raised, keep a 90 to 110° between boom and arm. Securely support any machine elements that must be raised for service work.
Never work under a machine raised by the boom.



SA-270

Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of this manual.

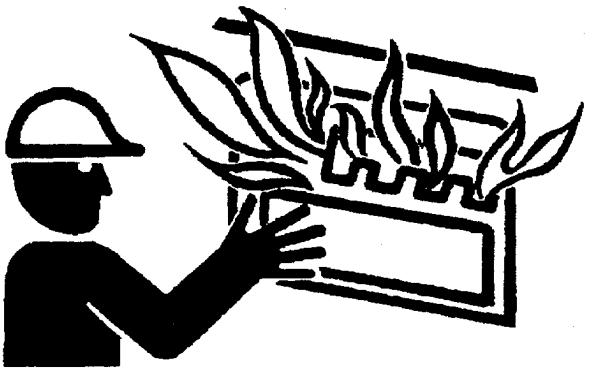
Keep all parts in good condition and properly installed.
Fix any damage immediately. Replace worn or broken parts.
Remove any buildup of grease, oil, or debris.
Disconnect battery ground cable (−) before servicing electrical systems or welding on the machine.

CLEAN TRASH FROM MACHINE

Keep engine compartment, radiator, batteries, hydraulic lines, fuel tank, and operator's station clean.

Temperature in engine compartment may go up immediately after engine is stopped. (See SA-021)
BE ON GUARD FOR FIRES DURING THIS PERIOD.

Open access door (s) to cool the engine faster, and clean engine compartment.

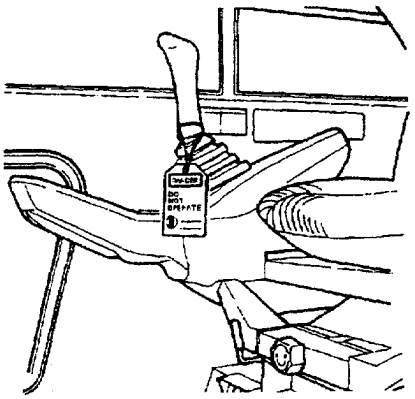


SA-021

WARN OTHERS OF SERVICE WORK

Unexpected machine movement can cause serious injury.

Before performing any work on the machine, attach a "Do Not Operate" tag on the right control lever. (See SA-109)
This tag is available from your authorized dealer.

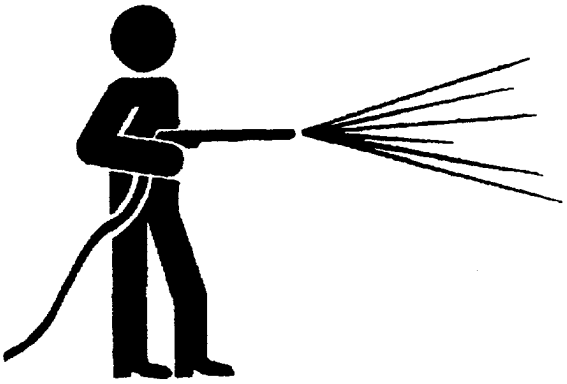


SA-109

CLEAN THE MACHINE REGULARLY

Remove any grease, oil or debris build-up to avoid possible injury or machine damage. (See SA-033)

Do not spray water or steam inside the cab.



SA-033

STORE ATTACHMENTS SAFELY

Stored attachments such as buckets, hydraulic hammers, and blades can fall and cause serious injury or death.

Securely store attachments and implements to prevent them from falling. Keep playing children and bystanders away from storage area.

SA-034

PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and flame away from the top of battery. Battery gas can explode. (See SA-032)

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16 °C (60 °F).

SA-032

AVOID HARMFUL ASBESTOS DUST

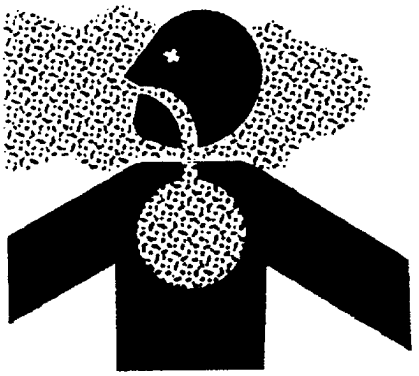
Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

Some gaskets may contain asbestos fibers. The asbestos used in these components is usually found in a resin or is sealed in some way. Normal handling is not hazardous as long as airborne asbestos-containing dust is not generated.

Avoid creating dust. Never use compressed air for cleaning. Avoid brushing or grinding asbestos containing materials. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, wet the asbestos-containing materials with a mist of oil or water.

Comply with all applicable workplace rules and regulations, and follow all environmental rules and regulations for the disposal of asbestos.

Keep bystanders away from the area.

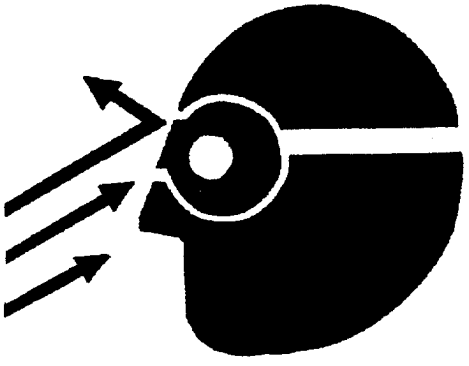


SA-029

PROTECT AGAINST FLYING DEBRIS

Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.

Keep bystanders away from the working area before striking any object, to avoid personal injury.



SA-022

PREVENT PARTS FROM FLYING

Grease in track adjuster is under high pressure.
DO NOT REMOVE GREASE FITTING OR VALVE ASSEMBLY.

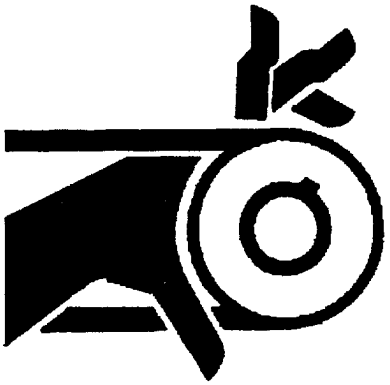
As pieces may fly off, be sure to keep body and face away from valve.

Travel reduction gears are under pressure.
AS PIECES MAY FLY OFF, BE SURE TO KEEP BODY AND FACE AWAY FROM AIR RELEASE PLUG TO AVOID INJURY. GEAR OIL IS HOT. WAIT FOR GEAR OIL TO COOL, THEN GRADUALLY LOOSEN AIR RELEASE PLUG TO RELEASE PRESSURE.

STAY CLEAR OF MOVING PARTS

Entanglements in moving parts can cause serious injury.

To prevent accidents, care should be taken to ensure that hands, feet, clothing, jewelry and hair do not become entangled when working around rotating parts.

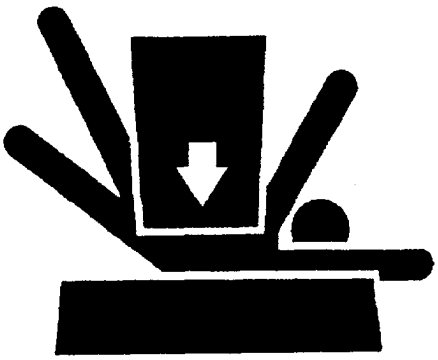


SA-026

SUPPORT MACHINE PROPERLY

Always lower the attachment or implement to the ground before you work on the machine. If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow the procedures in this manual.

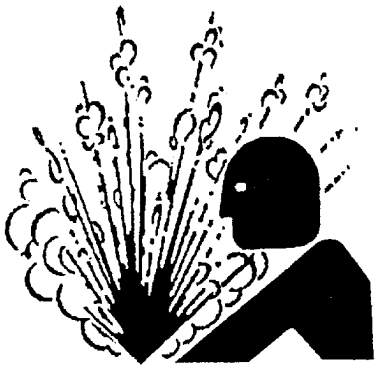


SA-027

PREVENT BURNS

Hot spraying fluids

- After operation, the engine coolant is hot and is under pressure. Hot water or steam are contained in the engine, radiator and heater lines.
  Prevent possible injury from hot spraying water. DO NOT remove the radiator cap until the engine is cool.
  When opening, turn the cap slowly to the stop. Allow all pressure to release before removing the cap.
- The hydraulic oil tank is pressurized. Again, be sure to release all pressure before removing the cap. (See SA-039)



SA-039

Hot fluids and surfaces

- Skin contact with escaping hot water or steam can cause severe burns.
  Be sure to stop the engine, and let engine and radiator cool.
  Slowly loosen the cap to release pressure after the system has cooled, then remove it.
- Engine oil, gear oil and hydraulic oil also become hot during operation.
  The engine, hoses, lines and other parts become hot as well.
  Wait for the oil and components to cool before starting any maintenance or inspection work. (See SA-225)

Hot Surface

SA-225

REMOVE PAINT BEFORE WELDING OR HEATING

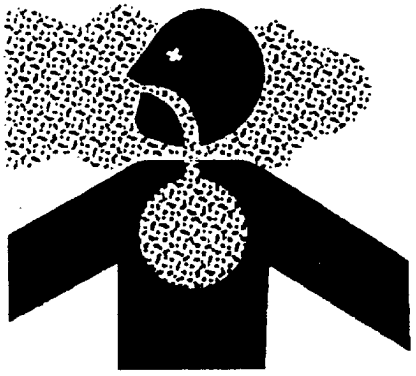
Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all such work outside or in a well-ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



SA-029

AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by applying heat near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.

Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install temporary fire resistant guards to protect hoses or other materials when engaging in welding, soldering, etc.

SA-030

AVOID APPLYING HEAT TO LINES CONTAINING FLAMMABLE FLUIDS

Do not weld or flame cut pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting them.

AVOID HIGH-PRESSURE FLUIDS

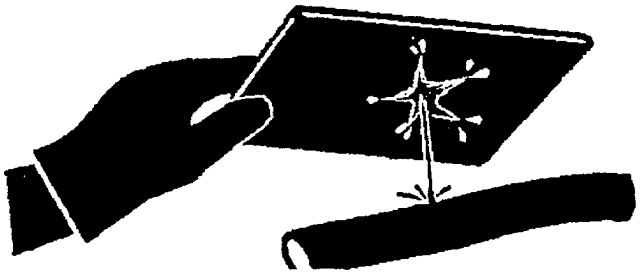
Escaping fluid under pressure can penetrate the skin causing serious injury. (See SA-031)

Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.
Relieve the pressure by moving the control levers several times.
Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard; take care to protect hands and body from high-pressure fluids. (See SA-044)

If an accident occurs, see a doctor familiar with this type of injury immediately.
Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

SA-031



SA-044

PREVENT FIRES

1. Check for Oil Leaks:

- Fuel, hydraulic oil and lubricant leaks can lead to fires that may result in serious injury.

- Check for missing or loose clamps, kinked hoses, lines or hoses that rub against each other,damaged oil-cooler, and loose oil-cooler flange bolts, for oil leaks.

- Search for leaks with a piece of cardboard.
  Escaping fluid under pressure can penetrate the skin causing serious injury.
  Do not use your bare hand to check for oil leaks.

- Tighten, repair or replace any missing, loose or damaged clamps, lines, hoses, oil-cooler and oil-cooler flange bolts.
  Do not bend or strike high-pressure lines.
  Never install bent or damaged lines, pipes or hoses.

2. Check for Shorts:

- Short circuits can cause fires that may result in serious injury.

- Clean and tighten all electrical connections.
  Check before each shift or after eight (8) hours of operation for loose, kinked, hardened or frayed electrical cables and wires.
  Check before each shift or after eight (8) hours of operation for missing or damaged terminal caps.

- DO NOT OPERATE MACHINE if cable or wires are loose, kinked, etc..
  Tighten, repair or replace any loose or damaged electrical cables, wires, and terminal caps before operating the machine.

3. Clean Flammables:

Spilled fuel and oils, and accumulated coal dust and other flammables may cause fires and serious personal injury.
Prevent fires by keeping machine clean every day.

4. Repair Switches:

Always check key switch function before operating the machine every day. If any abnormalities are found, be sure to repair them immediately.
If fire breaks out, failure to stop the engine will escalate fire, hindering fire fighting and possibly resulting in serious injury.

HANDLE CHEMICAL PRODUCTS SAFELY

SA-309

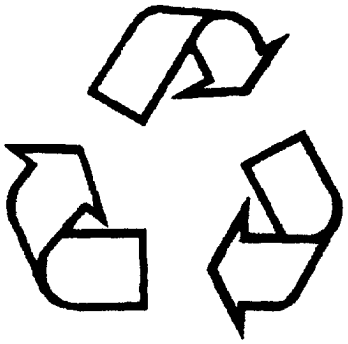
Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with your machine include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and use recommended equipment.

See your authorized dealer for the MSDS's (available only in English) on chemical products used with your machine.

DISPOSE OF WASTE PROPERLY



SA-226

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste from HITACHI equipment includes such items as oil, fuel, coolant, brake fluid, filters, and batteries.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

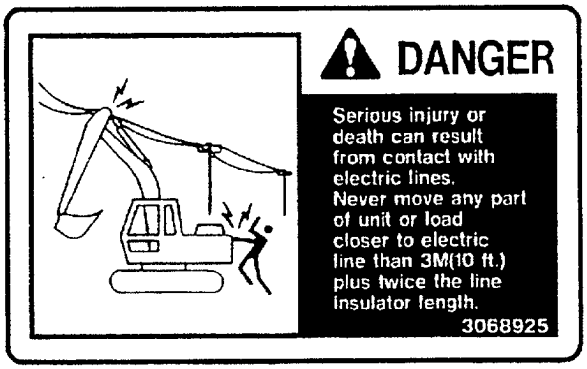
Obtain information on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your authorized dealer.

⚠ CAUTION

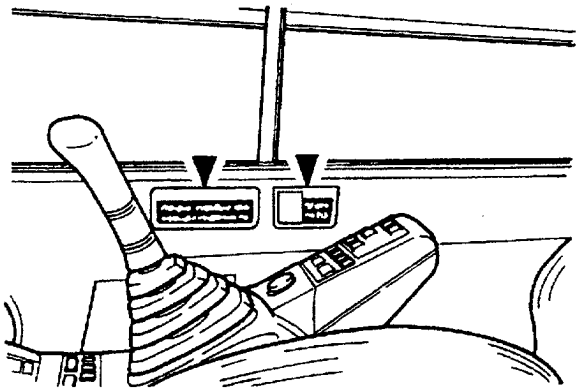
- AVOID DEATH OR SERIOUS INJURY - READ AND UNDERSTAND THE OPERATOR'S MANUAL AND SAFETY MANUAL PRIOR TO OPERATING THIS MACHINE.
- Controls may be changed for attachment or operator preference. Try control pattern before operating.
- Always lower working tools to the ground and engage hydraulic control lockout lever before leaving operator's seat.
- Keep riders off machine..
- Avoid contact between boom/attachments and overhead obstacles whenever operating, traveling or transporting machine.
- Keep bystanders clear of machine; especially before moving boom, swinging upperstructure or traveling.
- Upperstructure position affects travel direction. Try pedals or levers to determine travel direction before moving machine.
- Avoid tipping - Do not lift or move objects that exceed machine stability.
- Avoid parking machine on an incline.

3070586

SS-439



SS-410



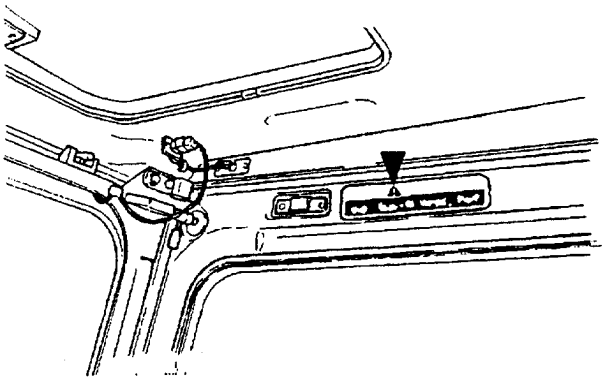
SS-438

⚠ WARNING

- AVOID SERIOUS CRUSHING INJURY FROM BOOM
- NEVER place any part of body beyond window bars or frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged.
- DO NOT remove window bars. If window is missing or broken, replace immediately.

3068922

SS-414

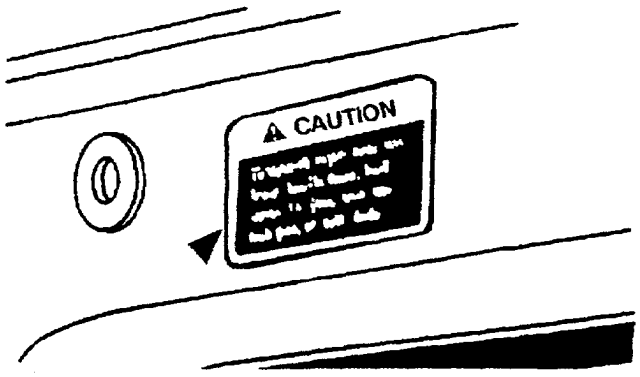


SS-417

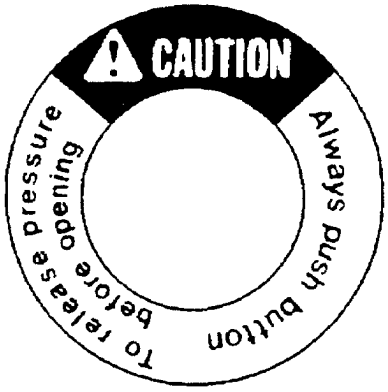
⚠ CAUTION

To prevent injury from the front window falling, lock window in place with the lock pins on both sides. 4334037

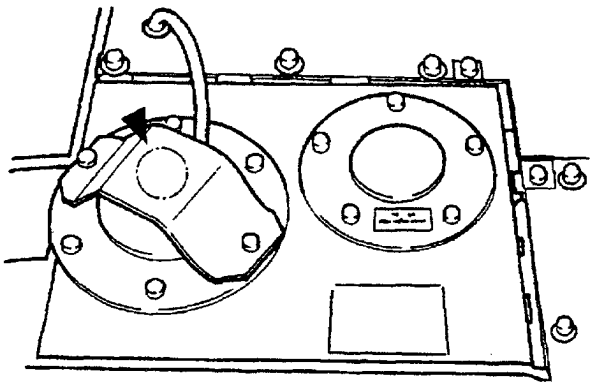
SS-412



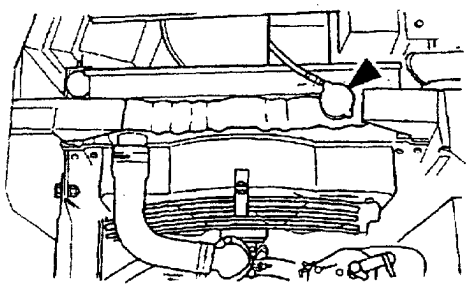
SS-418



SS-008



SS-009



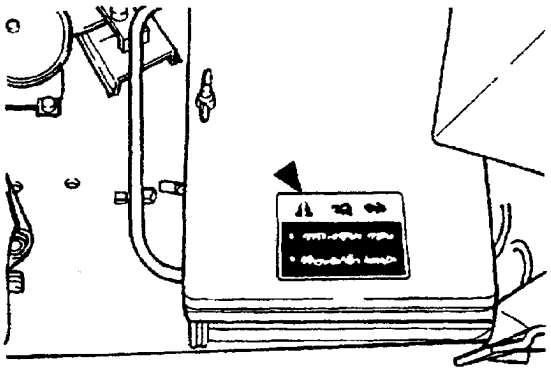
SS-057

⚠ DANGER

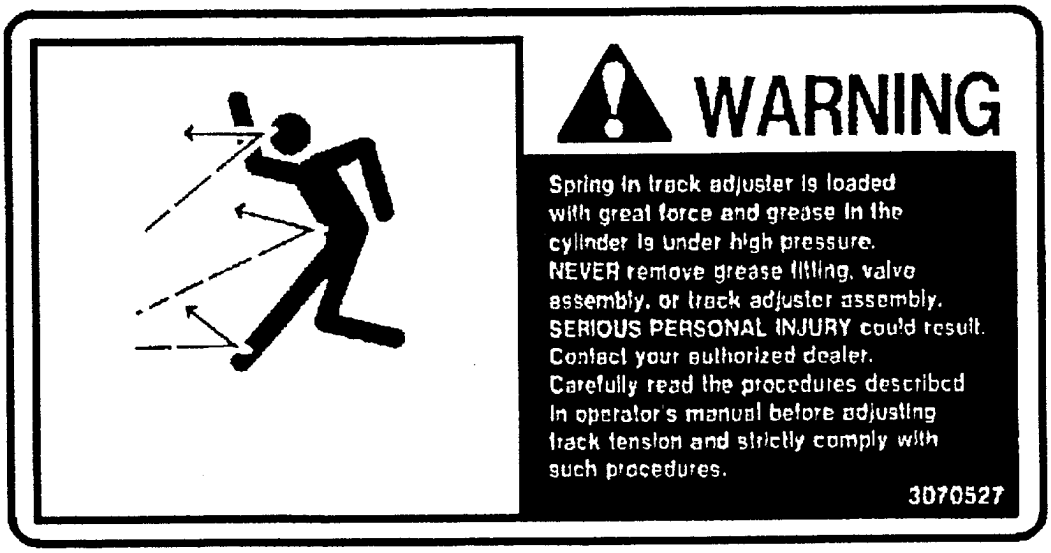
- Battery fumes can explode. Keep sparks and flames away from batteries.
- Always avoid storing metals like tools or inflammable materials around or on the batteries. Explosion or fire can be caused by shortcircuiting batteries.
- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes. If you spill acid on yourself :
  1. Flush your skin with water.
  2. Apply baking soda or lime to help neutralize the acid.
  3. Flush your eyes with water for 10-15 minutes. Get medical attention immediately.

3068914

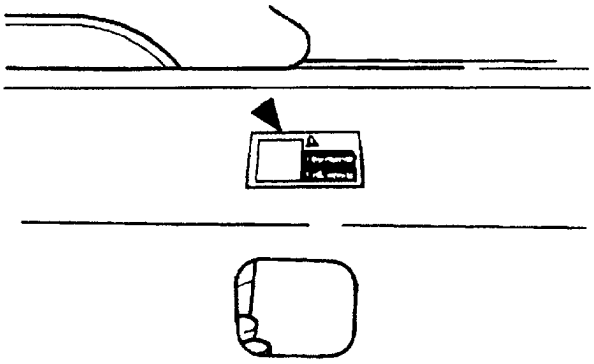
SS-411



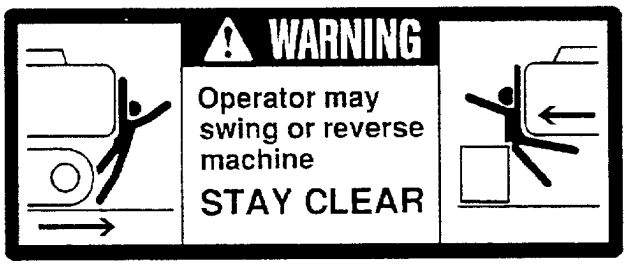
SS-423



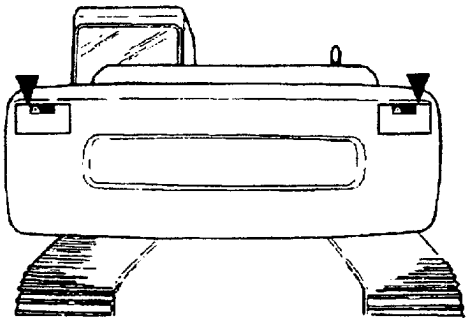
SS-408



SS-425



SS-024

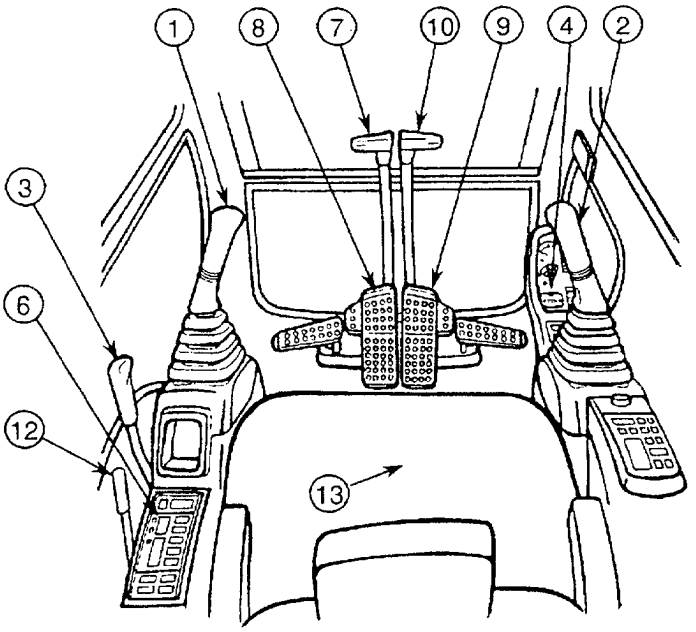


SS-013

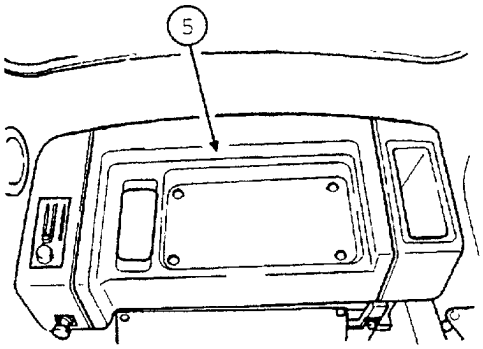
SAFETY SIGNS

CAB FEATURES

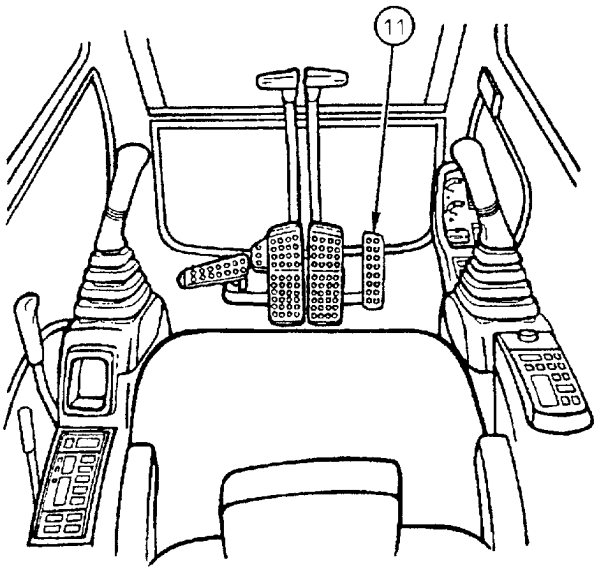
1 – Left Control Lever / Horn Switch (On Top of Lever)
2 – Right Control Lever
3 – Pilot Control Shut-Off Lever
4 – Monitor Panel and Switch Panels
5 – Rear Console
6 – Left Console
7 – Left Travel Lever
8 – Left Travel Pedal
9 – Right Travel Pedal
10 – Right Travel Lever
11 – Attachment Pedal - If equipped
12 – Cab Door Release Lever
13 – Operator's Seat



M104-01-001



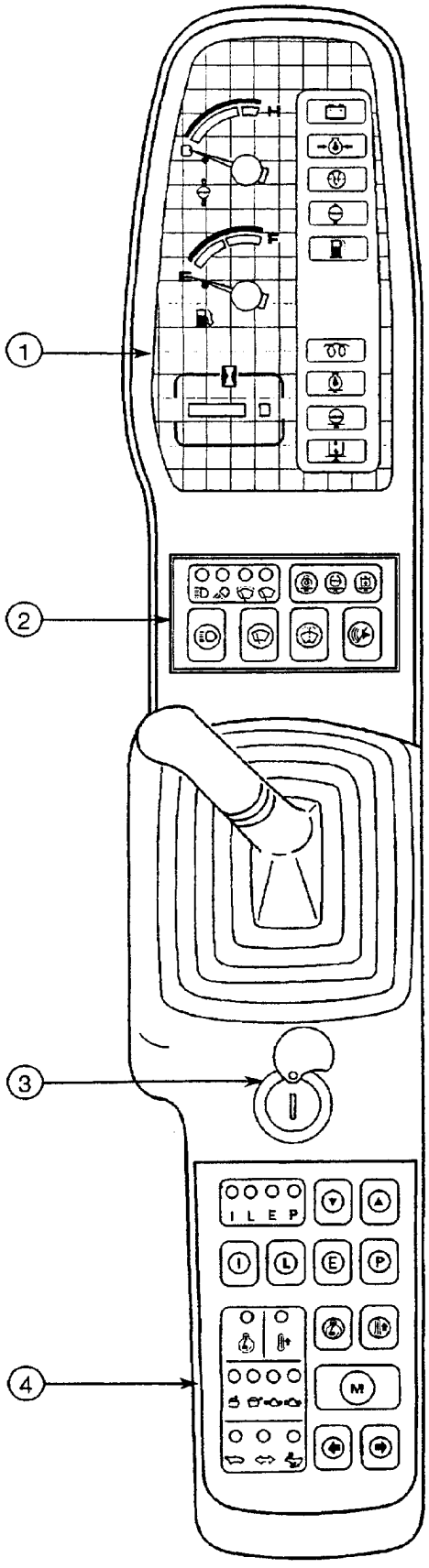
M104-01-043



M107-01-062

MONITOR PANEL AND SWITCH PANELS

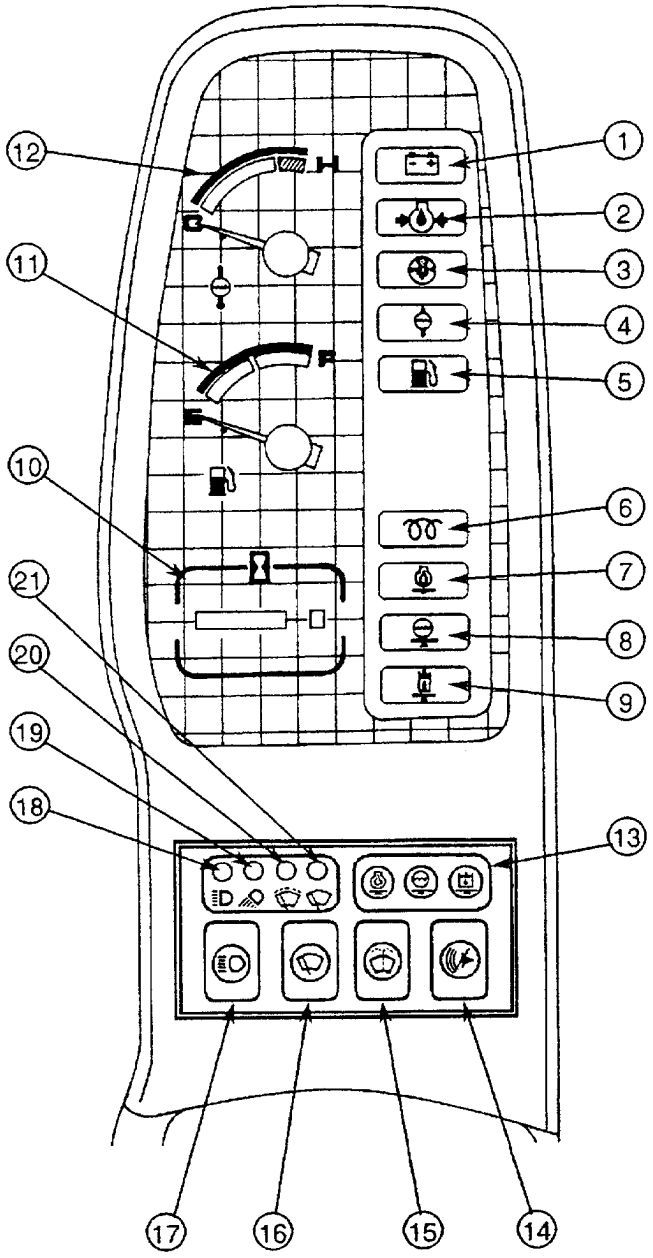
1 — Monitor Panel
2 — Switch Panel 1
3 — Key Switch
4 — Switch Panel 2



M104-01-002

MONITOR PANEL AND SWITCH PANEL 1

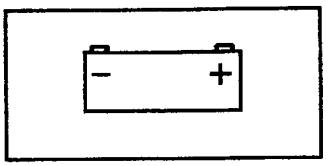
1 — Alternator Indicator
2 — Engine Oil Pressure Indicator
3 — Air Filter Restriction Indicator
4 — Overheat Indicator
5 — Fuel Level Indicator
6 — Preheat Indicator
7 — Engine Oil Level Indicator
8 — Coolant Level Indicator
9 — Hydraulic Oil Level Indicator
10 — Hour Meter
11 — Fuel Gauge
12 — Coolant Temperature Gauge
13 — Lever Check Switch
14 — Buzzer Stop Switch
15 — Washer Switch
16 — Wiper Switch
17 — Light Switch
18 — Head Light Indicator
19 — Work Light Indicator
20 — Intermittent Wiper Indicator
21 — Wiper Indicator



M104-01-017

ALTERNATOR INDICATOR

Red indicator will light with low alternator output.
Check electrical system.



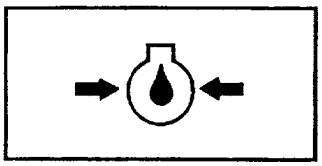
M104-01-004

ENGINE OIL PRESSURE INDICATOR

IMPORTANT: Prevent possible engine damage. If engine oil pressure indicator comes on while operating, the engine will stop automatically.

Red indicator will light and buzzer will sound when engine oil pressure is low. The engine will stop automatically.

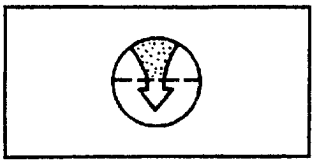
NOTE: Cold oil, low oil level, or operating on a steep slope may cause indicator to light.



M104-01-005

AIR FILTER RESTRICTION INDICATOR

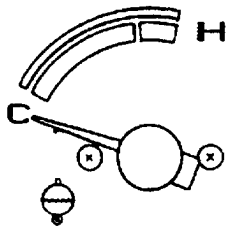
Red indicator will light when the air filter elements are clogged. Clean or replace outer element.



M104-01-006

COOLANT TEMPERATURE GAUGE AND OVERHEAT INDICATOR

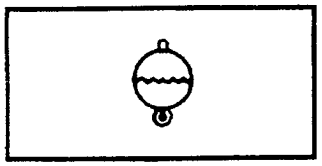
IMPORTANT: Prevent possible engine damage. Do not stop engine when needle enters red zone, as temperature will rise further. Instead, reduce load and run engine at slow idle. If overheat indicator continues to stay ON, shut engine OFF.



M104-01-007

If needle enters red zone, reduce load immediately and run engine at slow idle. If problem continues, inspect for plugged radiator or coolant leakage.

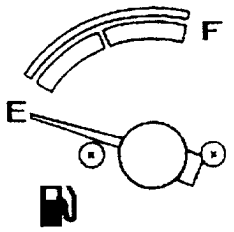
Red indicator will light and buzzer will sound when the engine coolant overheats.
Reduce load immediately and run engine at slow idle. Inspect for debris around radiator, also check for low coolant level in the reserve tank.



M104-01-008

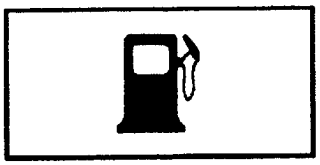
FUEL GAUGE AND INDICATOR

Fuel machine before needle reaches "E".



M104-01-009

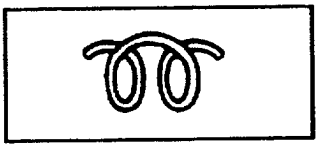
When red fuel indicator lights, approximately 30 liters (8 US gal) of fuel remains.



M104-01-010

PREHEAT INDICATOR

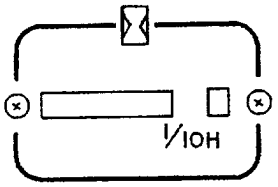
Red indicator will light when key switch is turned counterclockwise to the preheat position. Light will turn off after approximately 20 seconds, indicating that the preheat is completed.



M104-01-042

HOUR METER

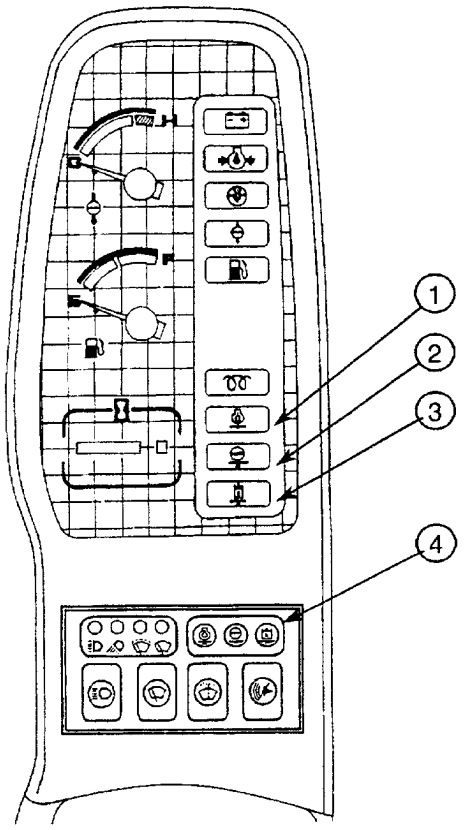
The right hand number indicates tenths of an hour (six minutes).



M104-01-014

LEVEL CHECK SWITCH

When engine oil level ①, coolant level ② and hydraulic oil levels ③ are adequate for operation, these indicators on the monitor panel will light when level check switch ④ is pushed.

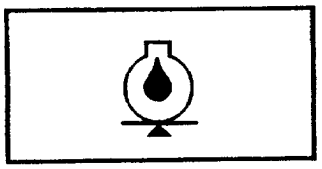


M104-01-017

ENGINE OIL LEVEL INDICATOR

When level check switch is pushed, indicator will light if level is adequate for operation.

NOTE: This check does NOT take the place of daily inspection.

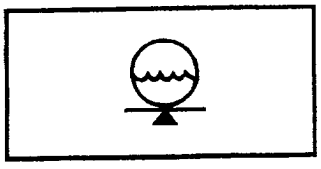


M104-01-011

COOLANT LEVEL INDICATOR

When level check switch is pushed, indicator will light if coolant level is adequate for operation.

NOTE: This check does NOT take the place of daily inspection.

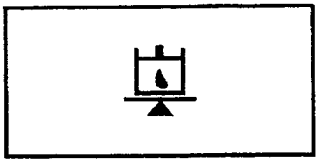


M104-01-012

HYDRAULIC OIL LEVEL INDICATOR

When level check switch is pushed, indicator will light if oil level is adequate for operation.

NOTE: This check does NOT take the place of daily inspection.



M104-01-013

BUZZER AND BUZZER STOP SWITCH

THE BUZZER SOUNDS WHEN:

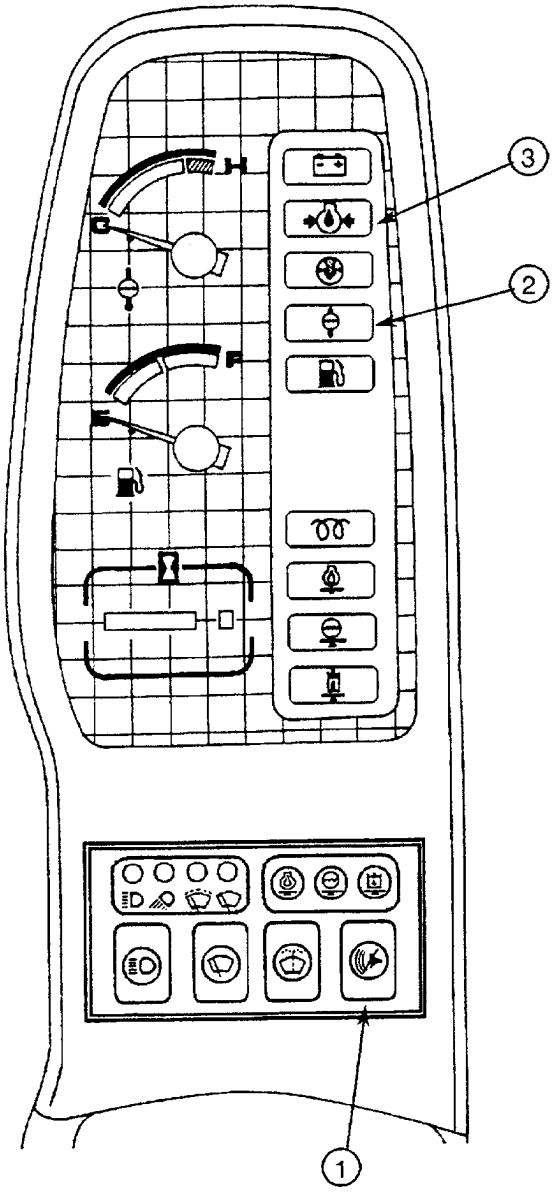
- Engine oil pressure is low.
  (The engine oil pressure indicator ③ lights also.)
- Engine coolant overheats.
  (The overheat indicator ② lights also.)

IF ENGINE OIL PRESSURE IS LOW, the engine will stop automatically.

NOTE: The buzzer cannot be turned off when engine oil pressure is low.

IF COOLANT TEMPERATURE IS HIGH, push the buzzer stop switch ①. Reduce load immediately and run the engine at decreased engine speed. If high temperature continues, stop the engine. Check fluid levels.

TO RESET THE BUZZER: Stop the engine and turn the key OFF. The buzzer will not sound more than once for the same problem unless the switch is reset.

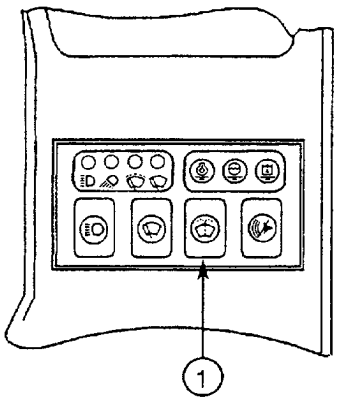


M104-01-017

WASHER SWITCH

IMPORTANT: Washer motor may be damaged if washer switch ① is held for more than 20 seconds, or continually operated with no fluid in the washer tank.

Depress switch ① to squirt windshield washer fluid on windshield.



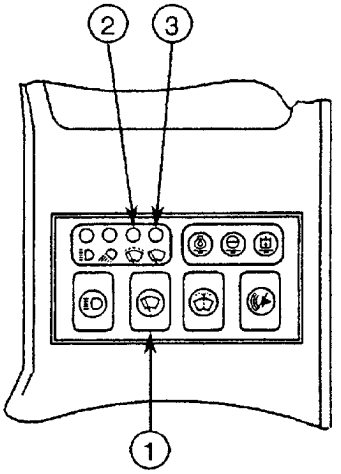
M104-01-015

WIPER SWITCH

Push switch ① once to operate wiper intermittently. Indicator ② will light.

Push switch ① a second time to operate wiper continuously. Indicator ③ will light.

Push switch ① a third time to turn off wiper.



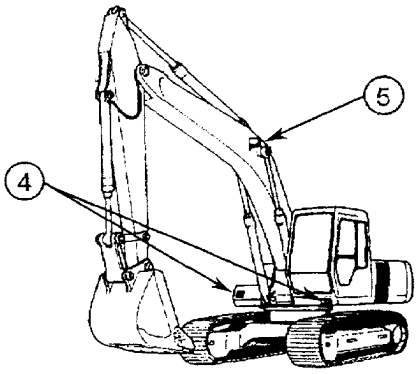
M104-01-015

LIGHTS

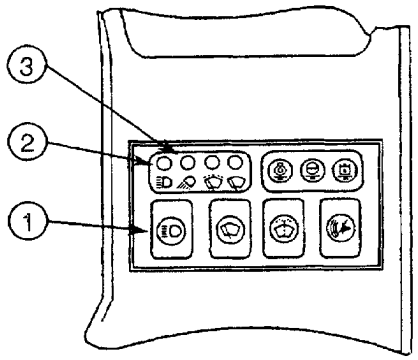
Push switch ① once to turn on head lights ④ and instrument lights. Indicator ② will light.

Push switch ① a second time to turn on work light ⑤ and head lights ④. Indicator ③ will light.

Push switch ① a third time to turn off all lights.



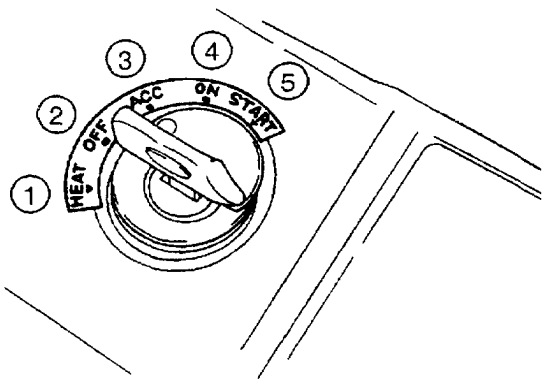
M104-01-018



M104-01-015

KEY SWITCH

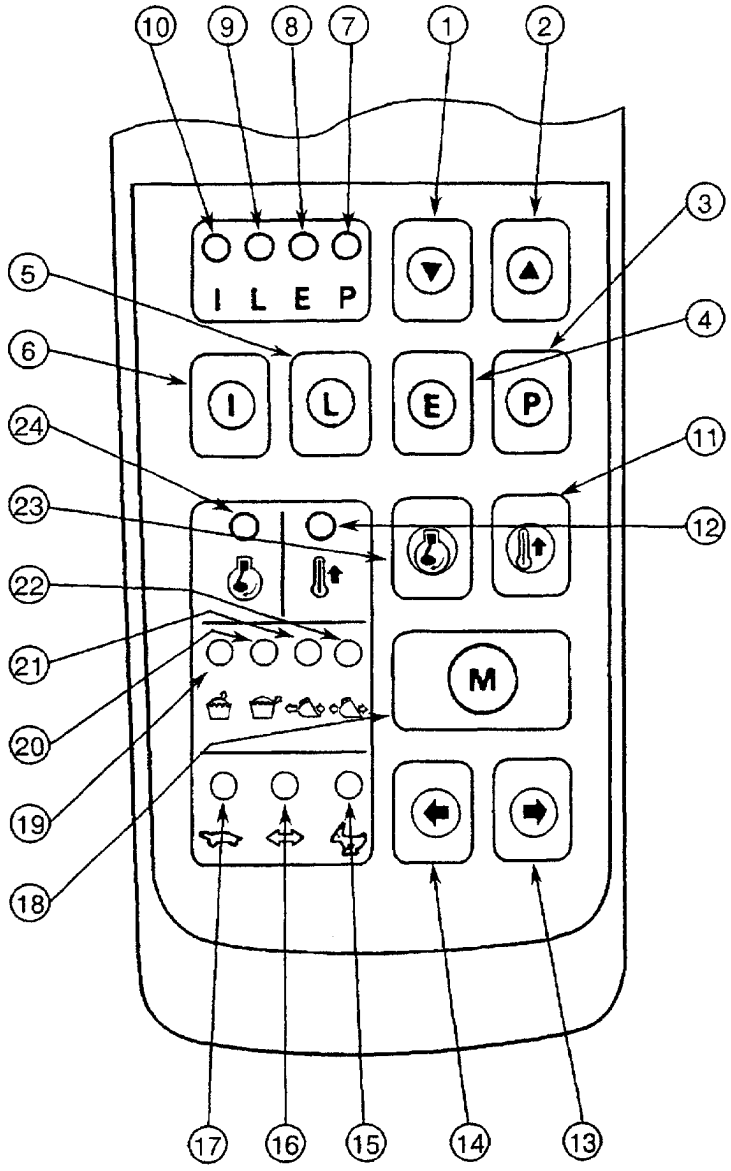
1 — HEAT (Pre-Heat)
2 — OFF (Engine Off)
3 — ACC (Horn, Radio etc.)
4 — ON (Engine On)
5 — START (Engine Start)



M110-01-002

SWITCH PANEL 2

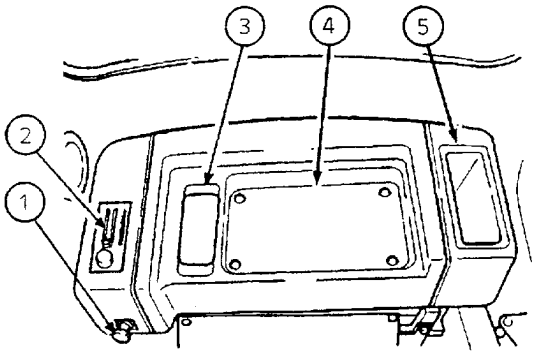
1 — Decelerator Switch
2 — Accelerator Switch
3 — Power (P) Mode Switch
4 — Economy (E) Mode Switch
5 — Light (L) Mode Switch
6 — Slow Idle (I) Mode Switch
7 — Power (P) Mode Indicator
8 — Economy (E) Mode Indicator
9 — Light (L) Mode Indicator
10 — Slow Idle (I) Mode Indicator
11 — Hydraulic Warm-Up Switch
12 — Hydraulic Warm-Up Indicator
13 — Travel Speed Increase Switch
14 — Travel Speed Decrease Switch
15 — Travel Speed Indicator (Fast Speed)
16 — Travel Speed Indicator (Medium Speed)
17 — Travel Speed Indicator (Slow Speed)
18 — Work Mode Selector Switch
19 — General Purpose Mode Indicator
20 — Trenching Mode Indicator
21 — Grading Mode Indicator
22 — Precision Mode Indicator
23 — Auto-Idle Switch
24 — Auto-Idle Indicator



M104-01-020

REAR CONSOLE

1 — Cigar Lighter
2 — Cab Heater Control Panel
3 — Fuse Box
4 — Rear Tray
5 — Compartment 1

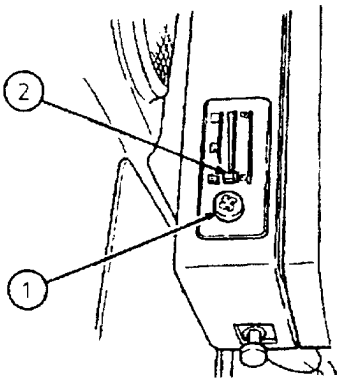


M104-01-021

CAB HEATER

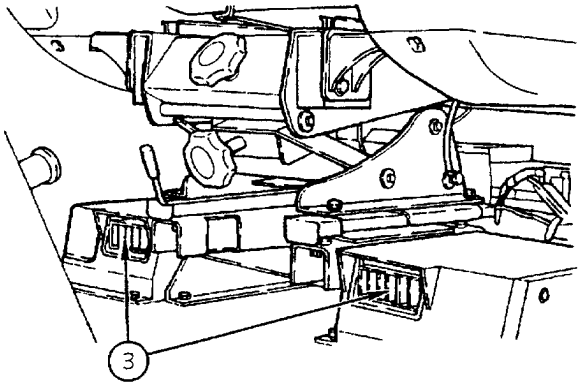
Adjust cab inside temperature in the following manner:

1. Move heat control lever ② rearward to increase amount of heat.
2. Turn blower control switch ① to desired setting (low, medium and high).



M104-01-022

Manipulate vent ③ to adjust wind direction.



M111-01-004

CAB HEATER AND AIR CONDITIONER (IF EQUIPPED)

1 — Heater and Air Conditioner Controls

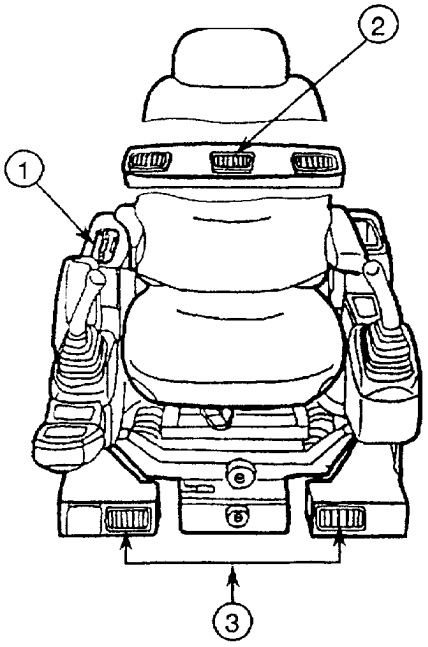
2 — Upper Air Flow Vents

3 — Lower Air Flow Vents

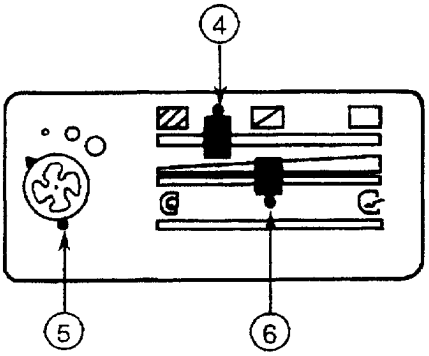
4 — Air Conditioner ON/OFF Lever and Air Flow Vent Selection Lever

5 — Blower Control Switch

6 — Temperature Control Lever and Heater OFF Lever



M107-01-009



M104-01-041

1. Move lever ④ to desired position. Air conditioner will be OFF when lever is in the ☐ position. Always turn blower switch OFF when air conditioner is turned OFF.

▨ Air flows from upper vents only. Air conditioner is ON.

Use this position during rain or whenever weather requires the heater to operate for comfort and air conditioner to be ON to aid in keeping windows clear. Temperature control lever can be in any position but full forward. Full forward position is heater OFF.

▱ Air flows from lower vents only. Air conditioner is ON.

Use this position during Spring and Fall seasons when heater operation is required and cooler air is desired.

☐ Air Conditioner OFF, air flows from lower vents only.

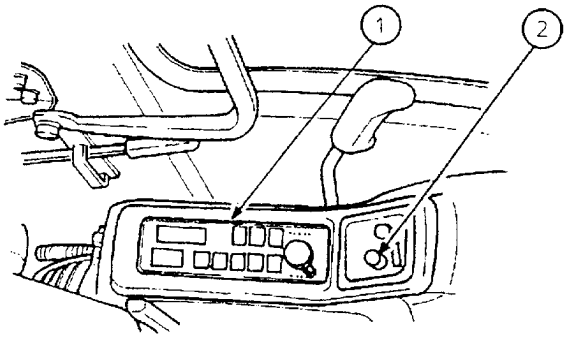
IMPORTANT: During cold weather season operate the air conditioner at low blower speed once a month to lubricate the air conditioner compressor. Do not operate blower faster than low speed.

2. Move temperature control lever ⑥ to desired position. Full forward position is maximum cool, heater OFF. Any position other than full forward and the heater will be on.

3. Turn blower switch ⑤ to low, medium or high to set blower speed.

LEFT CONSOLE

1- RADIO / CLOCK
2- TRAVEL ALARM CANCEL SWITCH



M104-01-054

FM/AM RADIO OPERATION

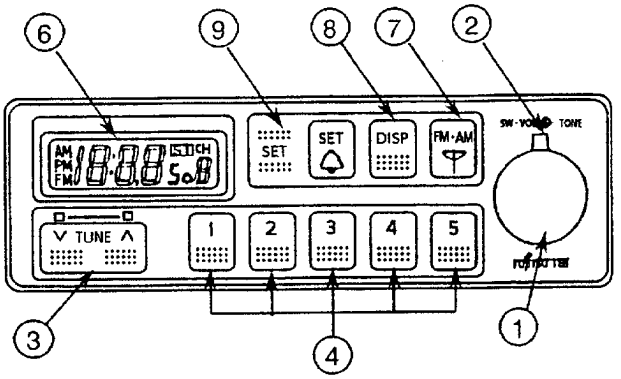
1. The control buttons on the radio.

   a. On/off and volume control switch ①
      : Push this switch to turn radio on. Push again to turn radio off. Turn this switch clockwise to increase volume and turn counterclockwise to decrease volume.
   b. Tone control knob ②
      : Turn the knob clockwise to increase treble tone and turn counterclockwise to increase bass tone.)
   c. Tuning control switch ③
      : Use this switch to change radio frequency to desired station.

   Preset tuning buttons ④
      : Used to input desired frequencies to radio memory for quick selection.

   d. FM/AM button ⑦.
      : Push this button to select either FM or AM broadcasting.

   . Display switch ⑧.
      : Push this button to select either time or radio frequency display.



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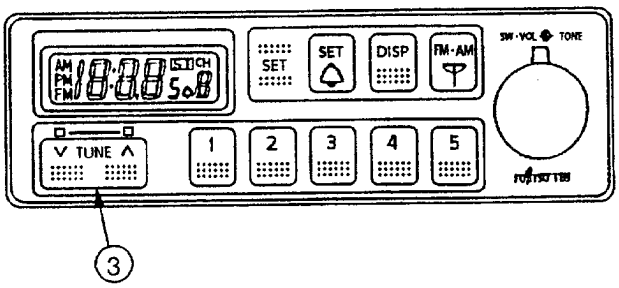


M107-01-027

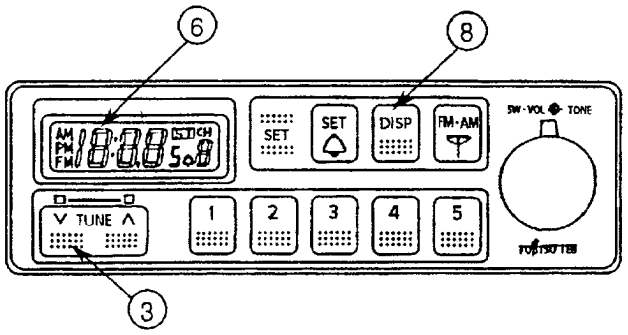
2. Tuning switch operation.

   Tuning switch ③ is a rocker-type switch. Depressing the side of the switch marked (∧) will increase the radio frequency. Depressing the side marked (∨) will decrease the frequency. This switch also has two functions, a manual function (a) and an automatic search function (b).

a. The manual function allows the operator to select the desired frequency by quickly tapping the switch. This will bypass unwanted stations until the desired station frequency is reached. The switch must be released in less than one- half second or the automatic search function will be activated. To return to the manual function, simply tap the tuning switch ③ again.

b. When the switch is depressed and held for more than one-half second, a high-pitched electronic tone sounds and the automatic search function will start. Automatic search skips from one frequency to the next strongest frequency until stopped by the operator.

In both cases, the frequency automatically appears on digital display ⑥; five seconds after switch ③ is no longer depressed display ⑥ will show either time or radio frequency display, as selected using display switch ⑧.



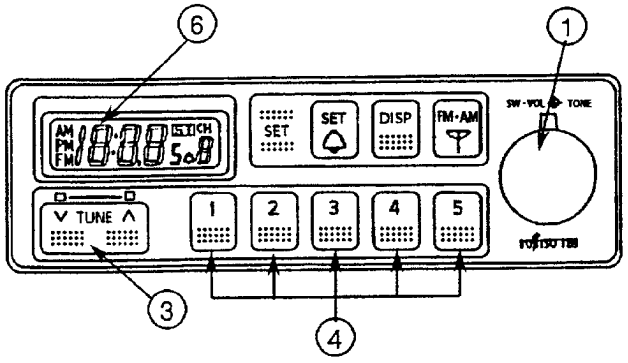
M107-01-027

3. Setting tuning buttons

IMPORTANT: Tuning buttons and clock will need to be reset any time the machine batteries are disconnected.

a. Push on/off and volume control switch ① ON.
b. Use tuning control switch ③ to set radio to desired frequency.
c. Depress and hold one tuning button ④ for more than two seconds; a high-pitched electronic tone sounds when the frequency is input. After the desired frequency has been set, the button number will appear on display ⑥. Release button.
d. Repeat procedure to set remaining buttons or to reset a button to a different frequency.

Note: When selecting a radio station using a preset button, be sure to release the button within two seconds after the desired frequency has been obtained. If the button is held longer, the frequency you are hearing will be input to the radio's memeory.



M107-01-027

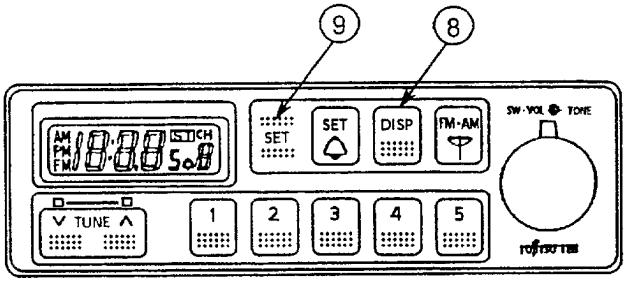
4. Setting the digital clock

IMPORTANT: Clock and automatic tuning buttons will need to be reset any time the machine batteries are disconnected.

a. Select clock display by depressing display switch ⑧ and hold it.

b. To set the clock to zero minutes press set switch ⑨ while keeping display switch ⑧ depressed. If the current minute display is 29 or less the hour display will not change, and the minute display will read 00. If the current minute display is 30 or more, the hour display will increase one hour and minute display will read 00.

c. Keeping display switch ⑧ depressed, adjust the hour setting by depressing the (∨) side of tuning switch ③. When the correct hour is obtained, depress the (∧) side of the tuning switch ③ to adjust the minute display. When the correct time is obtained, release the display switch.



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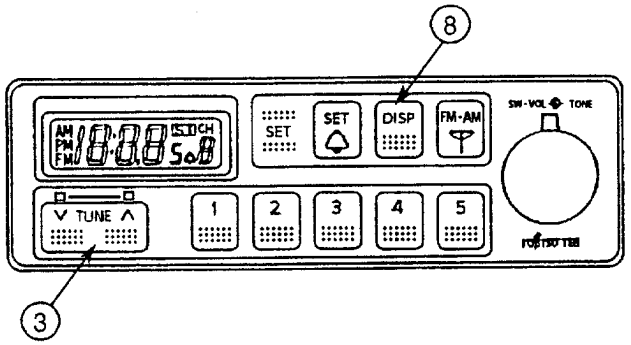
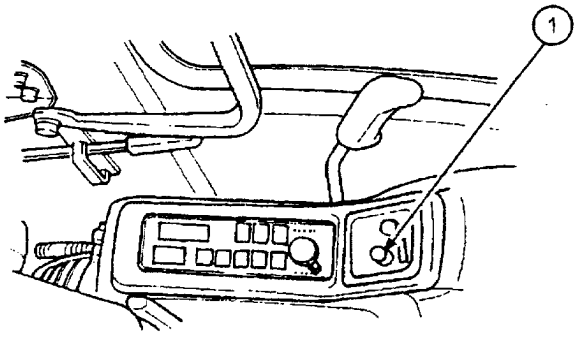


M107-01-027

TRAVEL ALARM CANCEL SWITCH

Push the travel alarm cancel switch to stop the travel alarm.

NOTE: The alarm can not be canceled within the first 12 seconds of traveling, even when the travel alarm cancel switch is pushed.

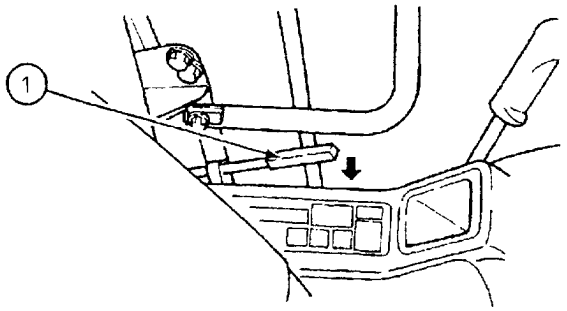


M104-01-059

CAB DOOR RELEASE LEVER

CAUTION: Open the cab door all the way until it securely locks in the latch on the side of the cab.

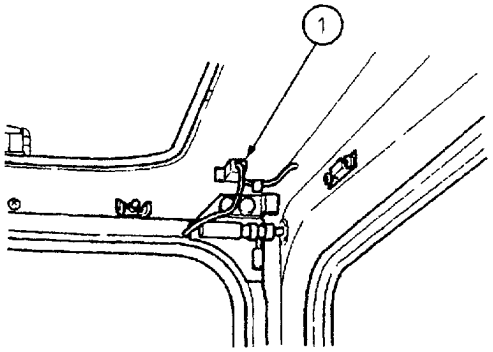
To unlock the door from this position, push down on lever ①.



M104-01-026

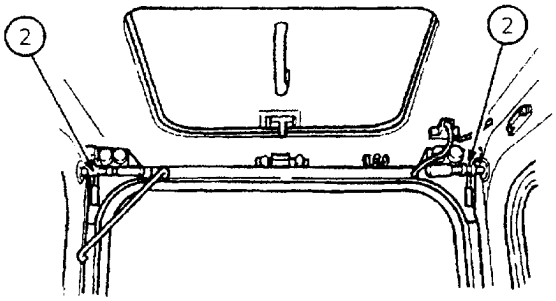
OPENING UPPER FRONT WINDOWS

1. Unplug windshield wiper ①.



M104-01-027

2. Move lock pins ② toward center of window.

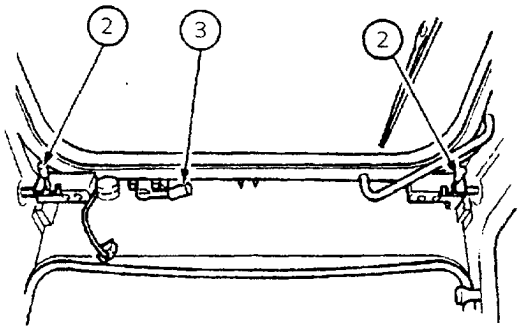


M104-01-028

3. Pull window up and back until it catches in latch ③.

CAUTION: Prevent possible injury from closing window. DO NOT rely on lever ③ alone to hold the window in the position. Always secure the lock pins into the cab frame boss holes.

4. Slide lock pins ② into boss holes and turn to lock.

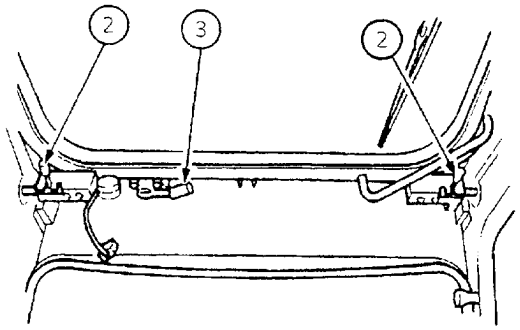


M104-01-029

CLOSING UPPER FRONT WINDOW

CAUTION: Avoid possible injury while closing window.
Upper front window comes down very forcefully. Close window only when sitting in the operator's seat. Guide window down slowly.

1. Pull out lock pins ② to unlock window.
2. Push lever ③ to release latch.
3. Pull window down slowly.
4. Slide lock pins ② in to the boss holes and turn to secure.
5. Plug in windshield wiper connector.



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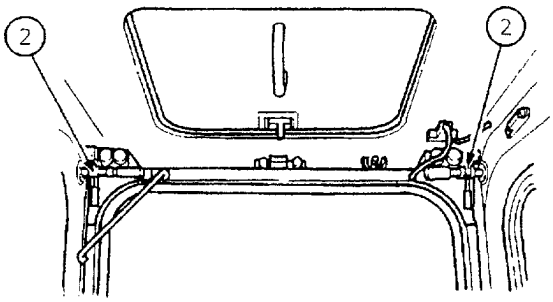


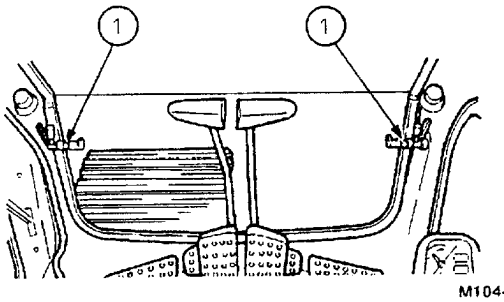
M104-01-028

REMOVING AND STORING LOWER FRONT WINDOW

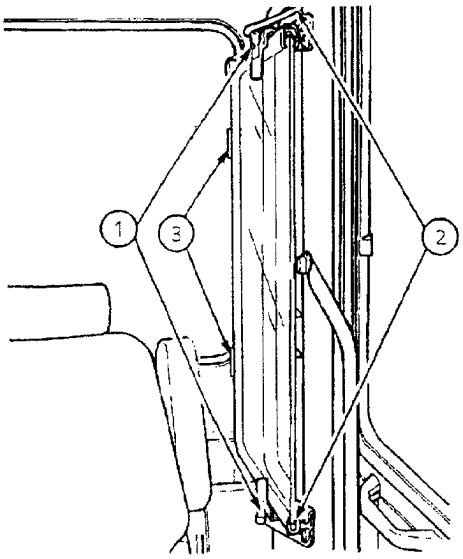
NOTE: Upper front window must be raised before lower front window can be removed.

1. Pull in on lock pins ① to unlock and remove window.
2. The window can be stored by inserting tabs on bottom window into brackets ③ and securing lock pins ① into holes on brackets ②.

NOTE: In cold weather some operators may choose to work with the top glass open and the bottom glass in place. This provides excellent visibility and tends to hold the heat being circulated around the operator's feet.



M104-01-030

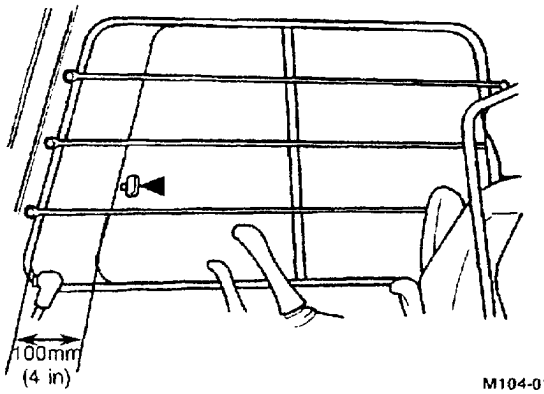


M104-01-044

OPENING SIDE WINDOWS

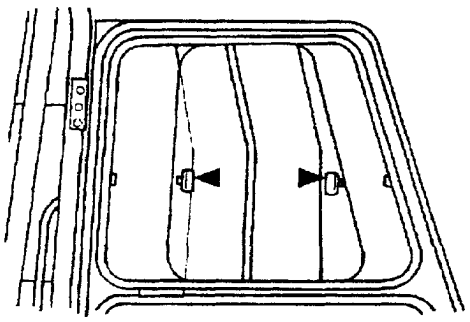
CAUTION: Avoid serious crushing injury from boom. Never place any part of body beyond window bar or frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged.
Do not remove window bars. If window or bars are missing or broken, replace immediately.

Both right side window and cab door window can be opened. Front pane of right side window opens approximately 100 mm (4 in) and no more.



M104-01-053

1. Press lever to open latch.
2. Slide front pane to the rear or rear pane to the front.


M104-01-033

EMERGENCY EXIT

If the operator's cab door should not open in an emergency, escape in the following methods:

1. Open the front windows. Escape through the windows.

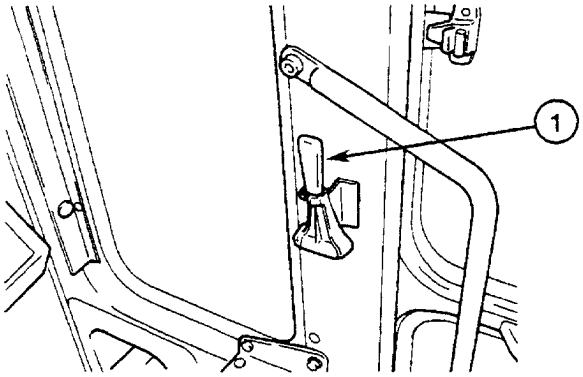
NOTE: See page 38 OPENING UPPER FRONT WINDOWS for the opening method of the front windows.

CAUTION: Be sure to wear safety glasses before breaking the window glass.

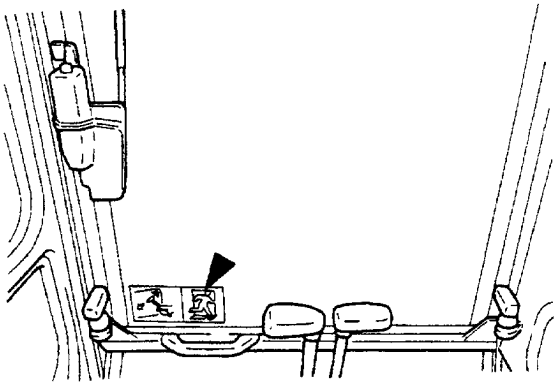
2. If the front window is difficult to open, break the front window glass using the emergency evacuation hammer ①. Then, escape through the broken window.

3. If the front window is not available for escaping, break the rear window glass using the emergency evacuation hammer. Then, escape through the broken window.

NOTE: The emergency exit decals are affixed to the front and rear windows.



M113-01-052



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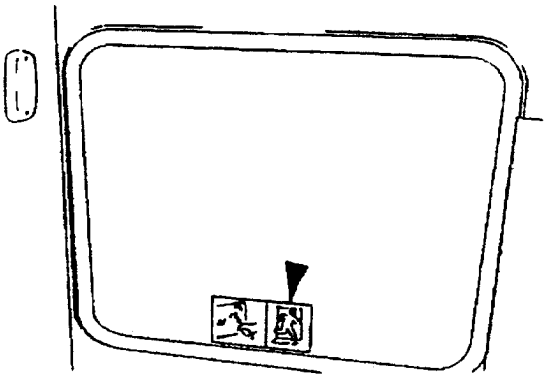


M113-01-057

ADJUSTING THE SUSPENSION SEAT

1. SUSPENSION ADJUSTMENT
   Turn knob ① clockwise to increase suspension stiffness.
   Turn knob counterclockwise to decrease suspension stiffness.

2. SEAT HEIGHT ADJUSTMENT
   Turn knob ② clockwise to raise seat. Turn knob counterclockwise to lower seat.

NOTE: Height adjustment from minimum (lowest) to maximum (highest) is 80 mm (3 in).

3. CONSOLE AND SEAT FORE-AFT ADJUSTMENT
   Pull lever ③ to the right to adjust the seat and both right and left consoles to desired distance from the travel pedals and levers. Release lever to lock seat and consoles into position.

NOTE: Seat and console fore-aft adjustment range is 100 mm (3.9 in) with stops every 20 mm (0.8 in).

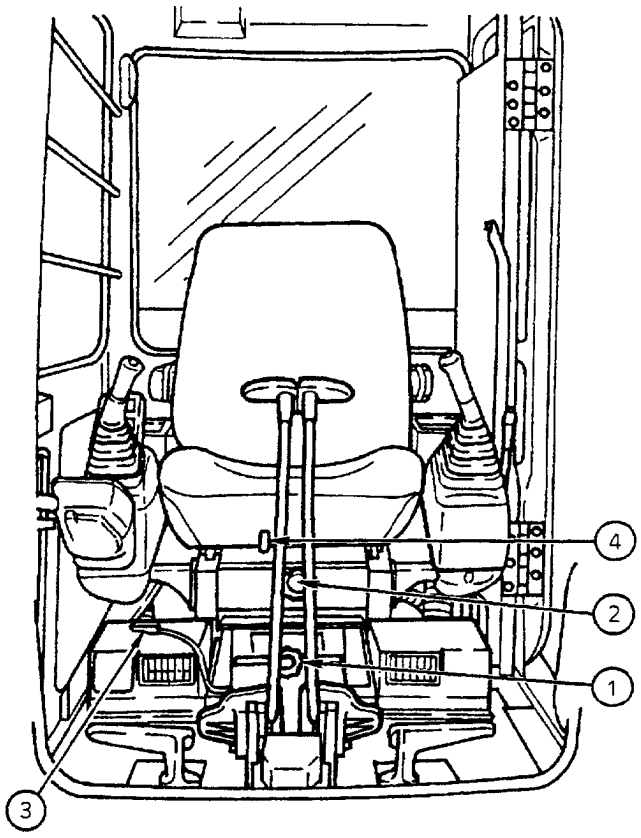
4. SEAT FORE-AFT ADJUSTMENT
   Pull lever ④ to the right to unlock the seat from both consoles. With lever held to the right, slide the seat to the desired distance from pilot control levers. Release the lever.

NOTE: Seat fore-aft adjustment range is 160 mm (6.3 in) with stops every 20 mm (0.8 in).

5. BACKREST ADJUSTMENT
   Push lever ⑤ forward to release backrest lock. Move backrest to desired position and release lever. Backrest can be positioned 40° forward for easy access to component behind seat.

NOTE: Seat backrest can be adjusted to 17 positions.

6. ARMRESTS
   Positioning of armrest ⑥ can be made by pulling up adjusting lever ⑦. Position armrest ⑥ to the desired position, then release adjusting lever ⑦ to lock armrest ⑥ in that position. Fully raise armrest ⑥, when getting on or off the machine.



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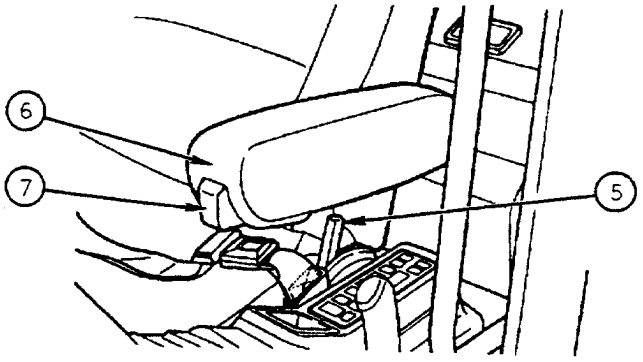
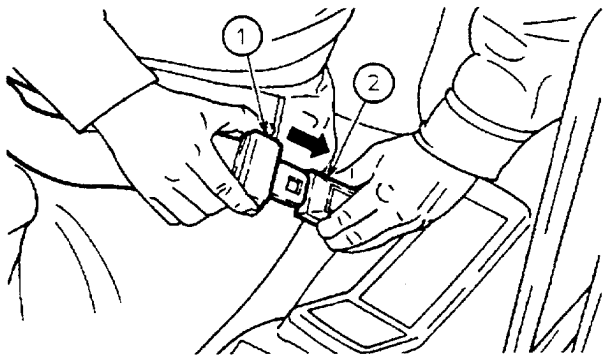


M104-01-064

SEAT BELT

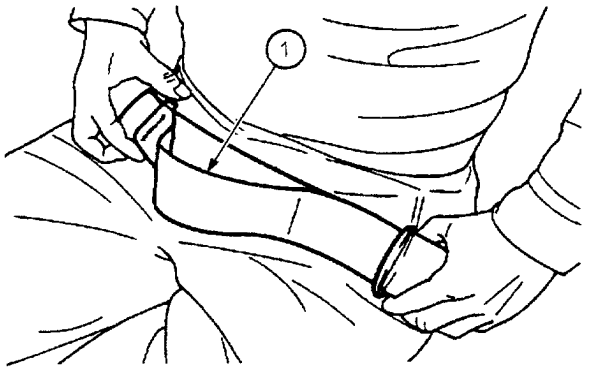
CAUTION: Be sure to use the seat belt when operating the machine.
Before operating the machine, be sure to examine seat belt ①, buckle ②, or attaching hardware. Replace seat belt ①, buckle ②, or attaching hardware if they are damaged, or worn.
Replace seat belt ① every three years, regardless of appearance.



M107-01-044

Seat Belt

1. Confirm that seat belt ① is not twisted securely insert the end of seat belt ① into buckle ②.
   Lightly pull on the belt to confirm that the buckle latches securely.
2. Adjust seat belt ① so that the belt is snug but comfortable.
3. Push button ③ on buckle ② to unfasten seat belt ①.



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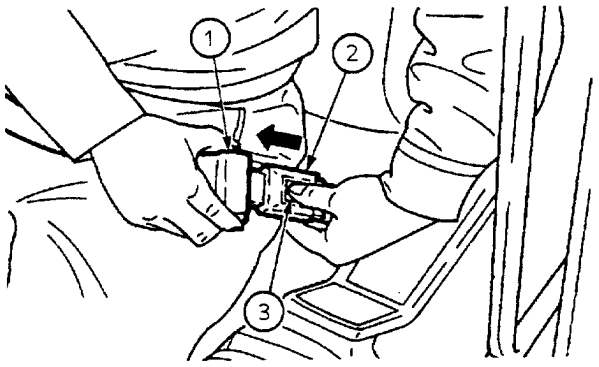
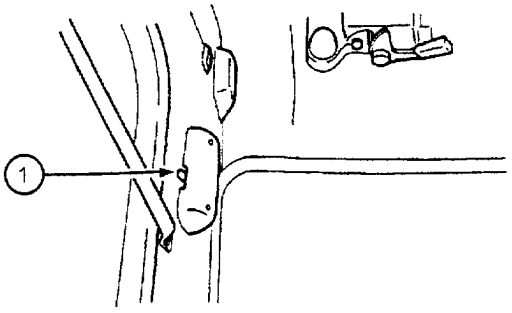


M107-01-046

DOME LIGHT

Move the switch ① to turn the inside cab light on or off.



M104-01-037

BREAK-IN

OBSERVE ENGINE OPERATION CLOSELY

IMPORTANT: Be extra cautious during the first 50 hours, until you become thoroughly familiar with the sound and feel of your new machine.

1. Operate the machine only in economy (E) or light (L) mode and limit the engine horsepower up to about 80 % of full load.
2. Avoid excess engine idling.
3. Check indicator lights and gauges frequently during operation.

EVERY EIGHT HOURS OR DAILY

1. Perform 8-hour or daily service. (See Maintenance guide -- 8 hours.)
2. Watch for fluid leaks.
3. Lubricate working tool pivots every 8 hours for the first 100 hours, and every 8 hours when working in mud and water.

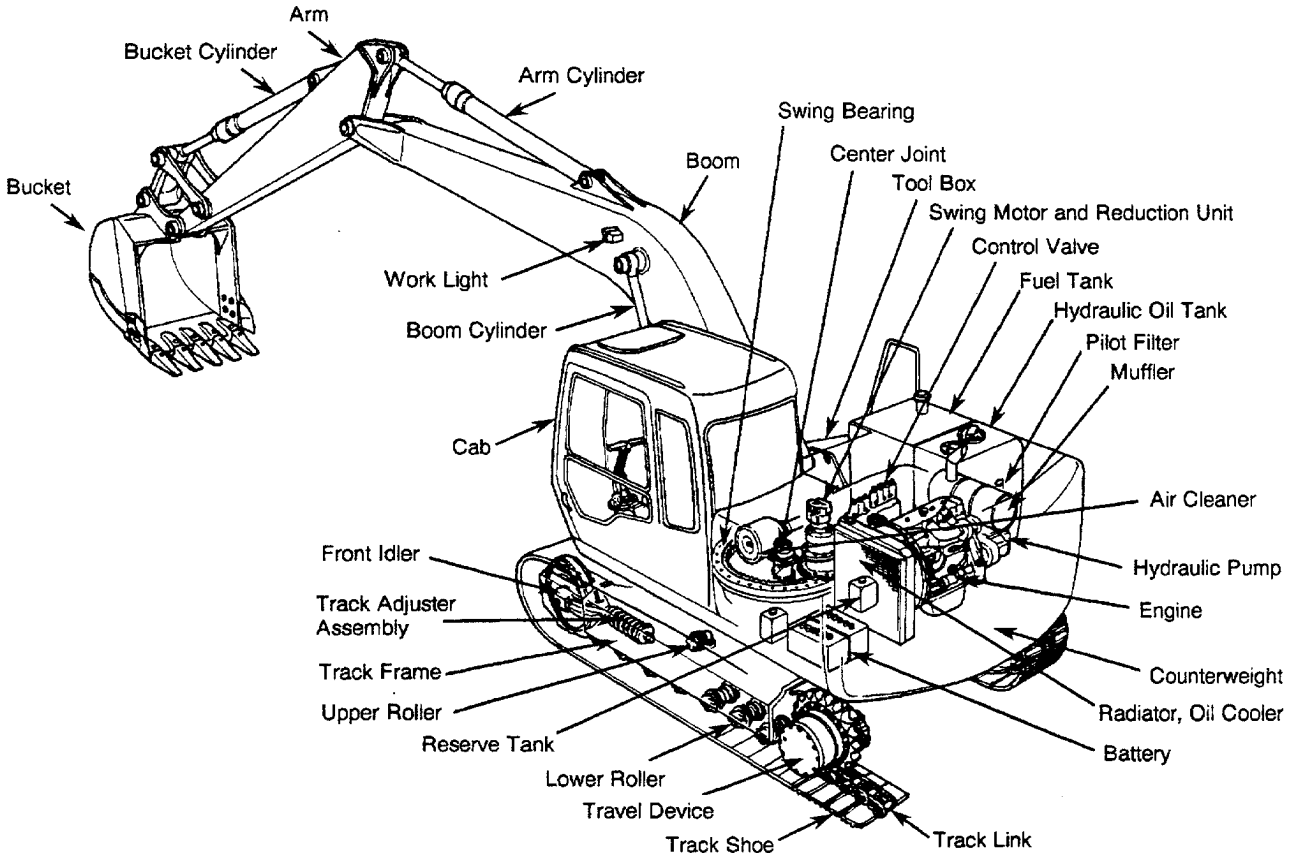
AFTER THE FIRST 50 HOURS

1. Perform 50-hour service. (See Maintenance guide -- 50 hours.)
2. Check accessible hardware torque. (See Hardware Torque Specifications in Maintenance chapter.)

AFTER THE FIRST 100 HOURS

Perform 50-hour and 100-hour service. (See Maintenance Guide -- 50 hours and 100 hours.)

INSPECT MACHINE DAILY BEFORE STARTING



M104-07-073

ELECTRICAL SYSTEM

Check for worn or frayed wires and loose connections.

BOOM, BUCKET, SHEET METAL, TRACKS

Check for bent, broken or missing parts.

HARDWARE

Check for loose or missing parts.

FUEL SYSTEM

Drain water and deposits from fuel tank.

HYDRAULIC SYSTEM

Check for leaks, kinked hoses, and lines or hoses that rub against each other or other parts.

LUBRICATION

Check lubrication points on the Periodic Service Chart.

PROTECTIVE DEVICES

Check guards, fenders.

SAFETY

Walk around machine to clear all bystanders/obstacles from machine area.

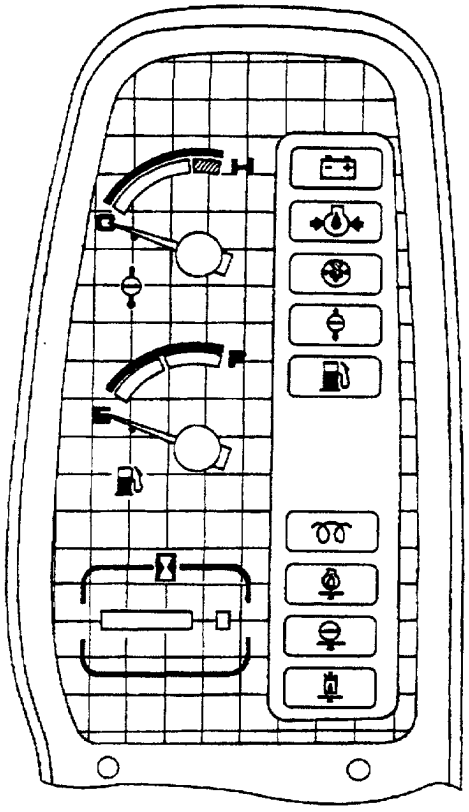
CHECK INSTRUMENTS BEFORE STARTING

Turn key switch to ON position. All indicator lights and warning lamps will come on. They will stay on for approximately 3 seconds, except for the alternator and engine oil pressure indicator, which will continue to stay on further. If any lamp fails to light, the bulb may be burned out.

The lamps also stay on for approximately 3 seconds when the key switch is turned to HEAT or START position.

Adjust the seat to allow full the pedal and the control levers stroke with operator's back against the buckrest. Fasten the seat belt.

NOTE: Use a wet cloth when wiping dust off monitor or switch panels to prevent damaging the panel face.



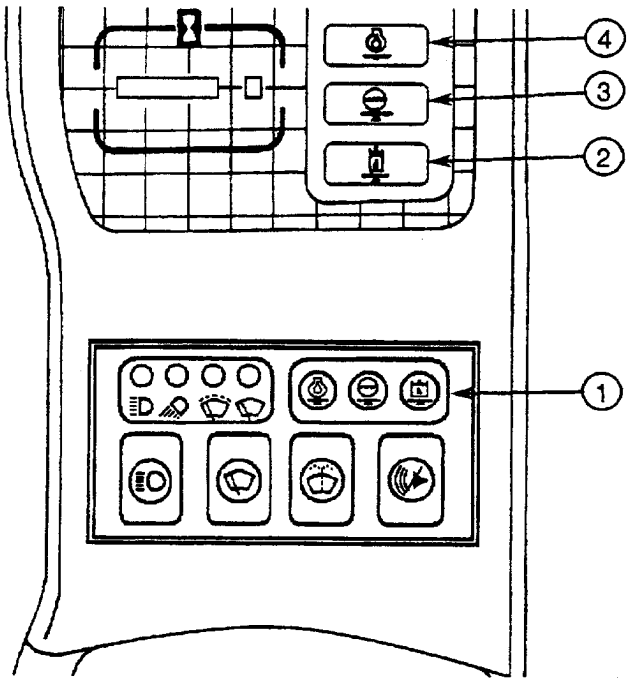
M104-01-003

LEVEL CHECK

1. Turn key switch to the ON position.
2. Depress level check switch ①.

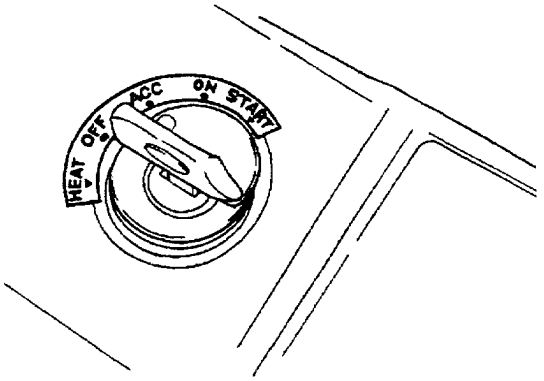
   Hydraulic oil level ②, coolant level ③ and engine oil level ④ indicators will light if levels are adequate for operation.

IMPORTANT: Prevent possible machine damage. Check fluid levels individually. The level check does not take the place of daily inspection at hydraulic oil level window, engine coolant reserve tank and engine oil level dipstick.



M104-03-001

STARTING THE ENGINE



M110-01-002

1. Pull the pilot control shut-off lever up to the LOCK position.

2. Turn key switch to ACC or ON position.

3. Sound horn to alert bystanders.

IMPORTANT: Prevent starter damage.
Never operate starter motor for more than 10 seconds at a time. If engine fails to start, return key switch to OFF. Wait for more than 30 seconds, then try again. After a false start, do not turn key switch until engine stops or starter may be damaged.

4. Turn key switch to start engine. Release key; switch will return to ON position.

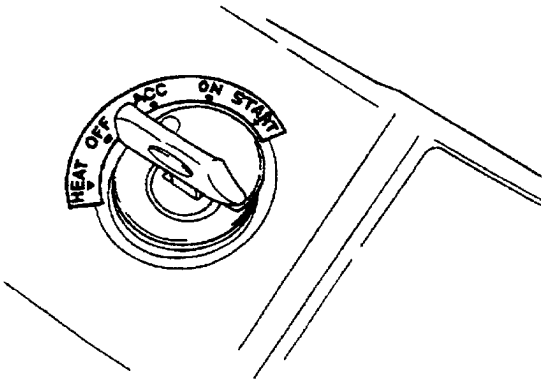
NOTE: Engine will start at about 200 min^{-1} (rpm) higher than slow idle, unless one of the power mode selector (P, E, L, I) is pushed.

STARTING IN COLD WEATHER

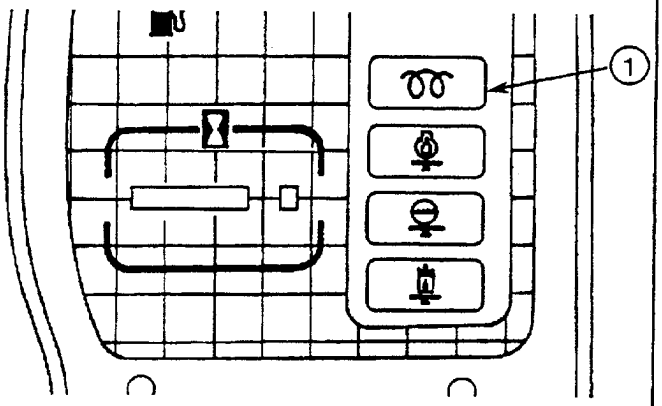
1. Turn key switch ON.
2. Depress I (Slow Idle) mode switch.
3. Turn key switch to START position and hold for several seconds to make a lubrication film on the hydraulic pump before the engine starts.
4. Turn key switch counterclockwise to HEAT position. Preheat indicator ① will come on; after about 20 seconds preheat indicator ① will go off, indicating that preheating is completed.

NOTE: It is normal for alternator indicator and engine oil pressure indicator to come on, besides the preheat indicator, when key switch is turned to HEAT position.

5. When preheat indicator ① goes out, start the engine as previously described.



M110-01-002



M110-01-008

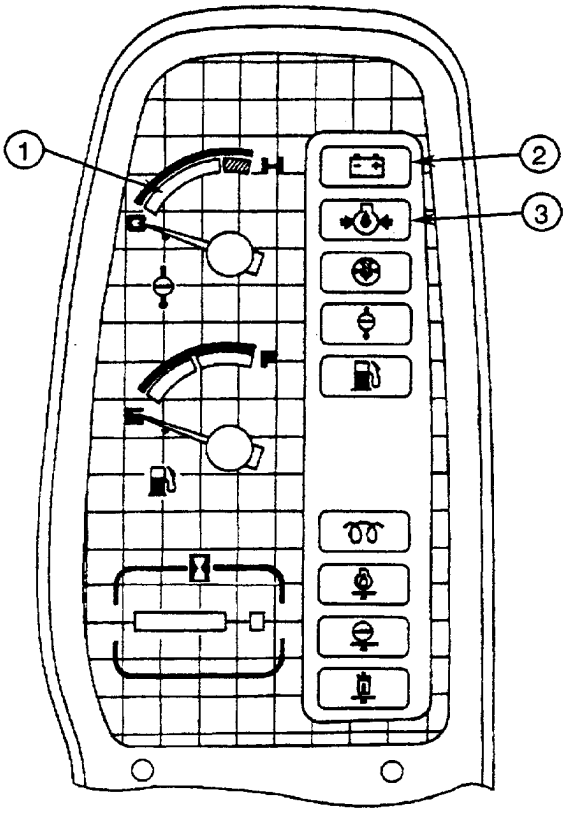
CHECK INSTRUMENTS AFTER STARTING

IMPORTANT: Prevent possible damage to engine. If indicator lights do not go out after starting engine, IMMEDIATELY STOP THE ENGINE and correct the cause.

Check that:

1. The coolant temperature gauge ① is in the white zone.
2. Alternator indicator ② is off.
3. Engine oil pressure indicator ③ is off.
4. Engine noise and exhaust gas are normal.

IMPORTANT: Operate machine at less-than-normal loads and speeds until engine is at normal operating temperature.



M104-01-003

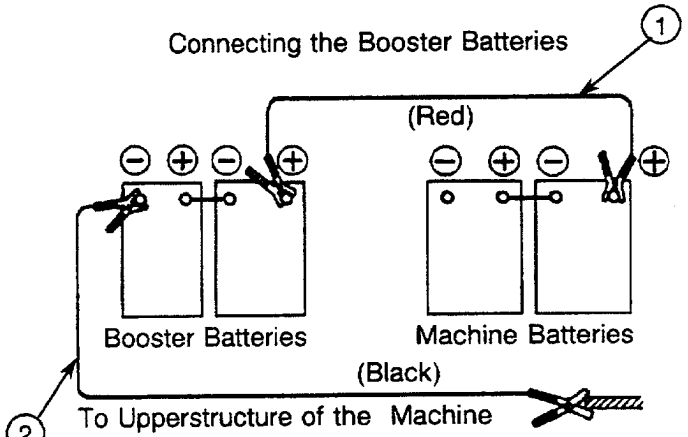
USING BOOSTER BATTERIES

SA-032

CAUTION: An explosive gas is produced while batteries are in use or being charged. Keep flames or sparks away from the battery area. Charge the batteries in a well ventilated area. Park the machine on a dry, firm or concrete surface, not on steel plates. If the machine is parked on steel plate, dangerous sparks may be unexpectedly created on the machine. Never connect a positive terminal to a negative terminal, as a dangerous short circuit will occur.

IMPORTANT: The machine electrical system is a 24 volt negative (−) ground. Use only 24 volt booster batteries.

When the machine batteries are exhausted, start the engine using booster batteries as shown below.



M104-03-002

1. Connecting the booster batteries

   a. Stop the engine of the machine on which booster batteries are mounted.
   b. Connect one end of red cable ① to the positive (+) terminal of the machine batteries, and the other end to the positive (+) terminal of the booster batteries.
   c. Connect one end of black cable ② to the negative (−) terminal of the booster batteries, and then make ground connection to the frame of the machine to be started with the other end of black (−) cable ②. In the last connection to frame, be sure to connect the cable end as far away from the machine batteries as possible.
   d. Start the engine

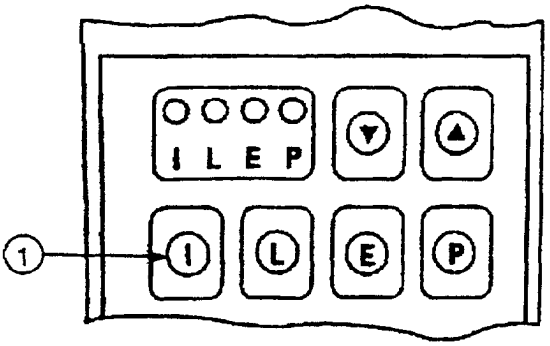
2. Disconnecting the booster batteries

   a. Disconnect black negative (−) cable ② from the machine frame first.
   b. Disconnect the other end of black negative (−) cable ① from the booster batteries.
   c. Disconnect red positive (+) cable ① from the booster batteries.
   d. Disconnect red positive (+) cable ① from the machine batteries.

STOPPING THE ENGINE

IMPORTANT: Prevent possible engine damage. If engine stops when operating load, remove load. Restart engine immediately. Run 30 seconds at half speed before adding load.

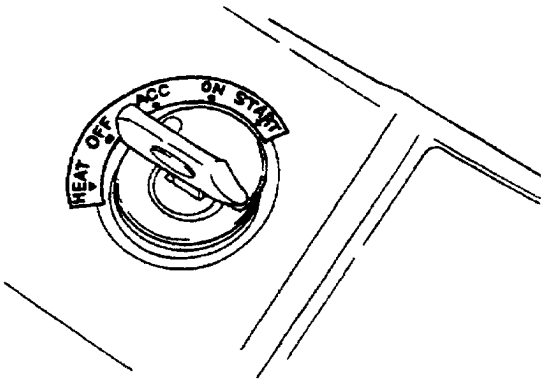
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.



M107-05-018

IMPORTANT: Turbocharger may be damaged if the engine is not properly shut down.

3. Run the engine in slow idle "I" mode ① without load for three minutes.
4. Turn the key switch OFF. Remove the key from the key switch.
5. Pull the pilot control shut-off lever to the LOCK position.



M110-01-002

DRIVE THE MACHINE CAREFULLY

IMPORTANT: During freezing weather, park machine on a hard surface to prevent tracks from freezing to the ground. Clean debris from tracks and track frame.

If tracks are frozen to the ground, raise tracks using boom, move machine carefully to prevent damage to drive train and tracks.

If engine stops under load, remove load. Start engine immediately. Run engine 30 seconds in light duty (L) mode before you add load.

Select a route that is as flat as possible. Steer machine as straight as possible making small, gradual changes in direction.

When driving over rough terrain, reduce engine speed to lessen possibility of undercarriage damage.

STEERING THE MACHINE USING PEDALS

CAUTION: In the standard travel position, the idlers are positioned at the front of the machine and the travel motors at the rear. If the travel motors are positioned at the front of the machine, the control actions of the travel pedals will be reversed. Be sure to confirm the position of the travel motors before traveling.

FORWARD TRAVEL
Push down on front Ⓐ of both pedals.

REVERSE TRAVEL
Push down on rear Ⓑ of both pedals.

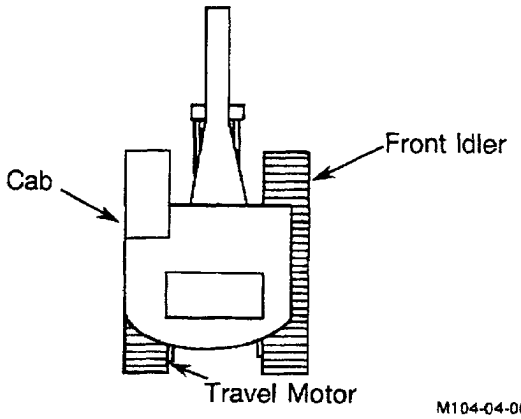
NEUTRAL POSITION Ⓒ
When the travel pedals are placed in neutral, travel brakes automatically will stop and/or hold the machine.

RIGHT TURN
Push down on front of left pedal.

LEFT TURN
Push down on front of right pedal.

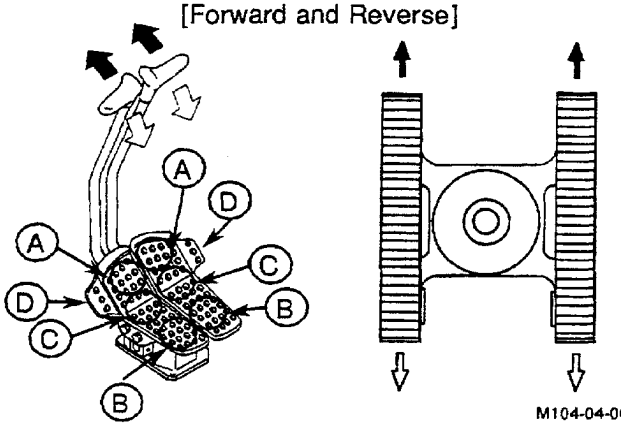
SHORT TURN (Spin turn)
Push down the front of one pedal and the rear of the other.

NOTE: For long-term traveling, push down on pedal tabs Ⓓ and rest feet on footrests.
Travel lever dampers are provided for smooth control. In extremely cold weather lever effort will increase. Operate levers several times with pilot control shut-off lever in the LOCK position.



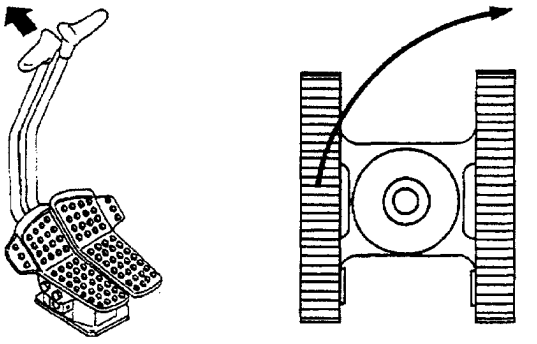
M104-04-001

[Forward and Reverse]

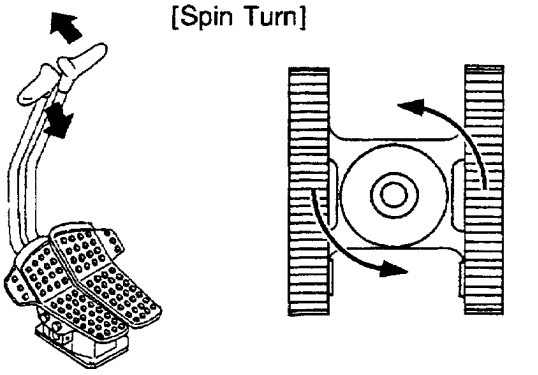


M104-04-009
M104-04-003

[Pivot Turn]


M104-04-010
M104-04-005

[Spin Turn]


M104-04-011
M104-04-007

STEERING THE MACHINE USING LEVERS

CAUTION: In the standard travel position, the idlers are positioned at the front of the machine and the travel motors at the rear. If the travel motors are positioned at the front of the machine, the control actions of the travel levers will be reversed. Be sure to confirm the position of the travel motors before traveling.

FORWARD TRAVEL
Push both levers forward Ⓐ.

REVERSE TRAVEL
Pull both levers rearward Ⓑ.

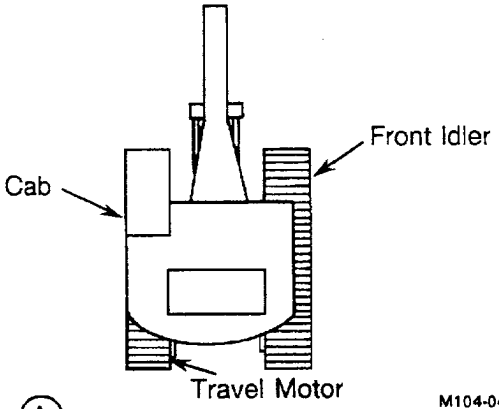
NEUTRAL POSITION Ⓒ
When the travel levers are placed in neutral, travel brakes automatically will stop and/or hold the machine.

RIGHT TURN
Push left lever forward.

LEFT TURN
Push right lever forward.

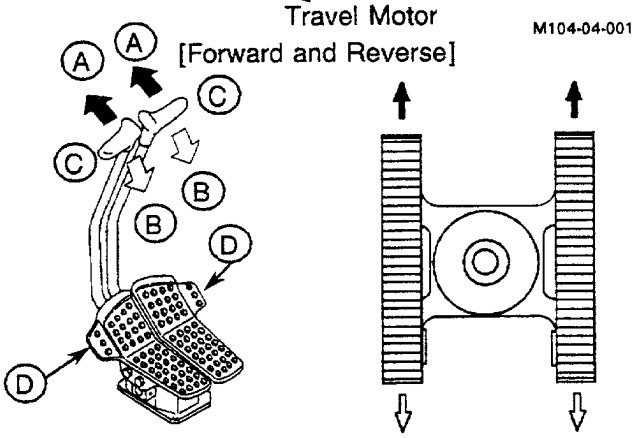
SHORT TURN (Spin turn)
Push one lever forward and pull the other rearward.

NOTE: For long-term traveling, push down on pedal tabs Ⓓ and rest feet on footrests.
Travel lever dampers are provided for smooth control. In extremely cold weather lever effort will increase. Operate levers several times with pilot control shut-off lever in the LOCK position.



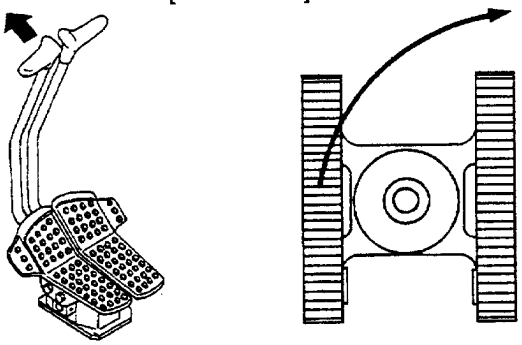
M104-04-001

[Forward and Reverse]

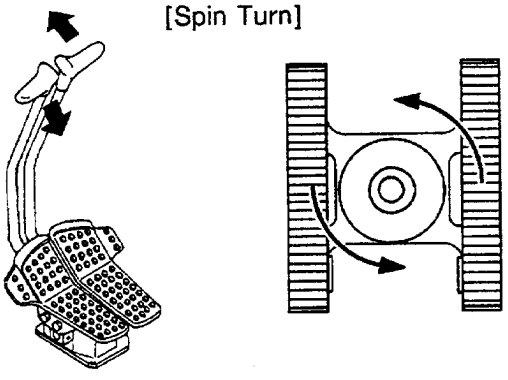


M104-04-009
M104-04-003

[Pivot Turn]


M104-04-010
M104-04-005

[Spin Turn]


M104-04-011
M104-04-007

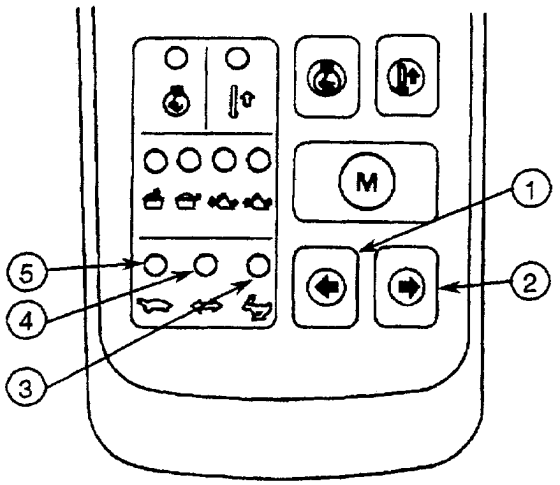
TRAVEL MODE SWITCHES

CAUTION: When descending slopes operate machine in slow (turtle) mode. DO NOT change travel speed to fast (rabbit) mode when descending slopes.

High speed (rabbit), medium speed, or slow speed (turtle) can be selected by pushing switches (①, ②) in each power mode (PELI).

Stop machine whenever changing travel mode speeds. To decrease travel speed, for traveling on a slope or in a tight space, press switch to turtle position.

Indicator lights (③ ④ ⑤) show mode selection.



M104-05-005

1– Travel Speed Decrease Switch
2– Travel Speed Increase Switch
3– Travel Mode Indicator (Fast Speed)
4– Travel Mode Indicator (Medium Speed)
5– Travel Mode Indicator (Slow Speed)

TRAVEL ALARM

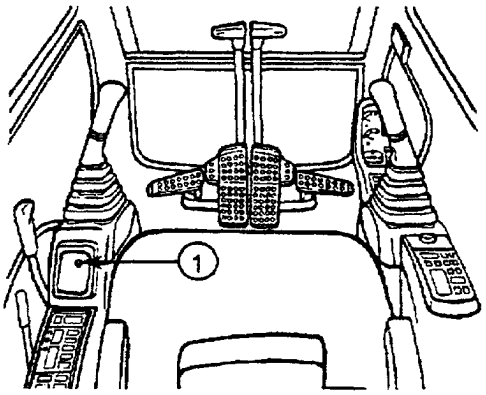
The travel alarm functions to alert co-workes and/or bystanders to movement of the machine, both forward and reverse. The travel alarm sounds when any travel pedal or lever is operated and will continue to sound as long as the tracks are moving.

CAUTION: If the travel alarm does not sound when traveling, immediately stop the engine and contact your authorized dealer for repair. Operating the machine with a malfunctioning travel alarm may result in personal injury or death.

The alarm can be canceled after 12 seconds by pushing travel alarm cancel switch ①.

NOTE: The alarm can not be canceled within the first 12 seconds of traveling, even when travel alarm cancel switch ① is pushed.

When travel motion stops alarm cancel switch ① automatically resets.



M104-01-031

PARKING THE MACHINE

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.
4. Run the engine in slow idle "I" mode without load for 3 minutes.
5. Turn the key switch to OFF. Remove the key from the key switch.
6. Pull the pilot shut-off lever to the LOCK position.

IMPORTANT: Protect cab electrical components from bad weather. Always close windows, roof vent and cab door when parking the machine.

7. Close windows, roof vent, and cab door.

8. Lock all access doors and compartments.

LOCK ALL COMPARTMENTS

Your machine is equipped with locks on the cab door, air cleaner access door, fuel cap, toolbox door, engine hood, and hydraulic pump access door. One key fits all locks. Use these locks to help safeguard your machine.

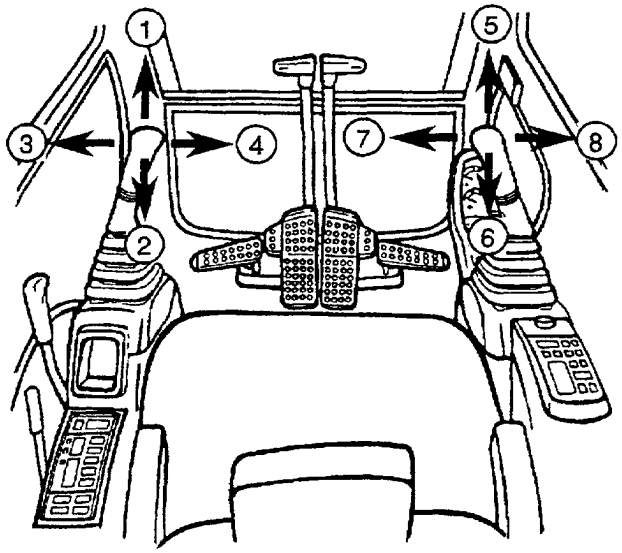
CONTROL LEVER (ISO PATTERN)

CAUTION: Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken replace immediately.
Prevent possible injury from unexpected machine movement.
Make sure you know the location and function of each control before operating.

The machine is equipped with a label showing the control patterns of the levers and pedals.

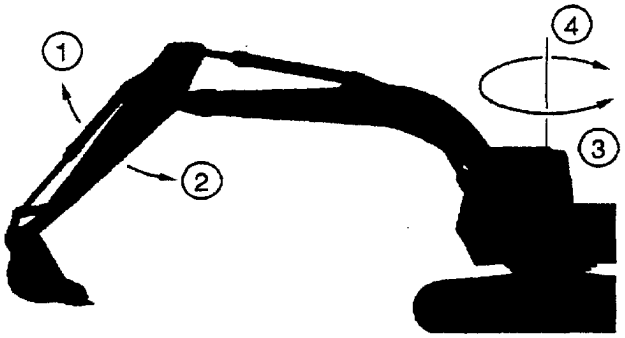
IMPORTANT: When digging, avoid hitting tracks with boom cylinders.
When digging over the end of the tracks, travel motors should be at the rear to minimize chain and sprocket loading and to maximize machine stability and lift capacity.

When a lever is released, it will automatically return to neutral, and that machine function will stop.

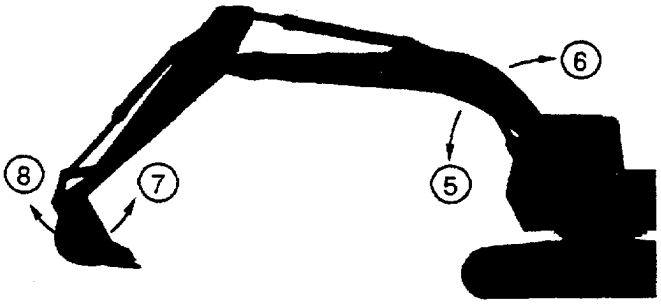


M104-01-001

1 – Arm Roll-Out
2 – Arm Roll-In
3 – Swing Left
4 – Swing Right
5 – Boom Lower
6 – Boom Raise
7 – Bucket Roll-In
8 – Bucket Roll-Out



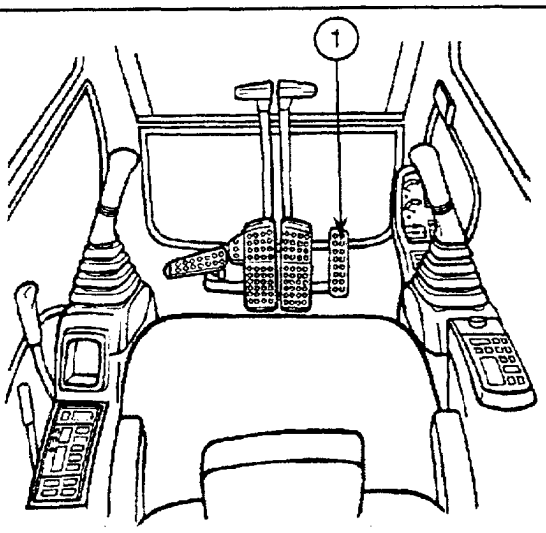
M104-05-001



M104-05-002

ATTACHMENT PEDAL --- IF EQUIPPED

The breaker, crusher, etc., can be operated using attachment pedal ① located to the right front of the seat, as illustrated.

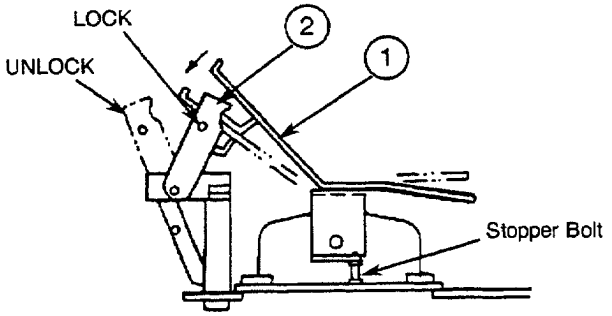


M107-01-001

⚠ CAUTION: Be sure to lock attachment pedal ① with pedal lock ② when the attachment pedal is not in use.

To operate the breaker

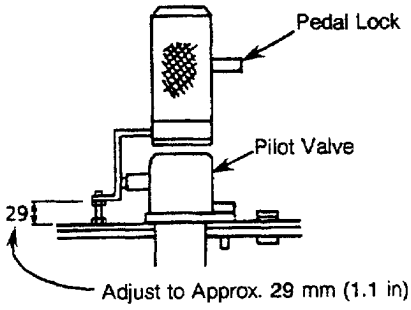
1. Move pedal lock ② forward to unlock attachment pedal ①.
2. Push down on attachment pedal ① to operate the breaker.
3. Remove foot from attachment pedal ① to stop the breaker.
4. Always keep attachment pedal ① locked with pedal lock ② when the attachment pedal is not in use.



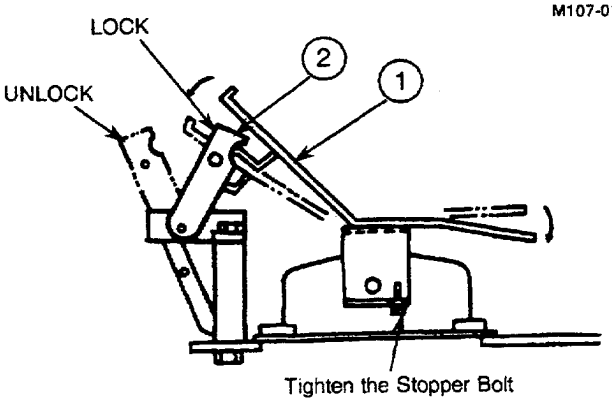
M107-01-042

To operate the crusher

1. Move pedal lock ② forward to unlock attachment pedal ①.
2. Push down on attachment pedal ① either forward or backward to open or close the crusher.
3. Remove foot from attachment pedal ① to stop the crusher.
4. Always keep attachment pedal ① locked with pedal lock ② when attachment pedal ① is not in use.



M107-01-043



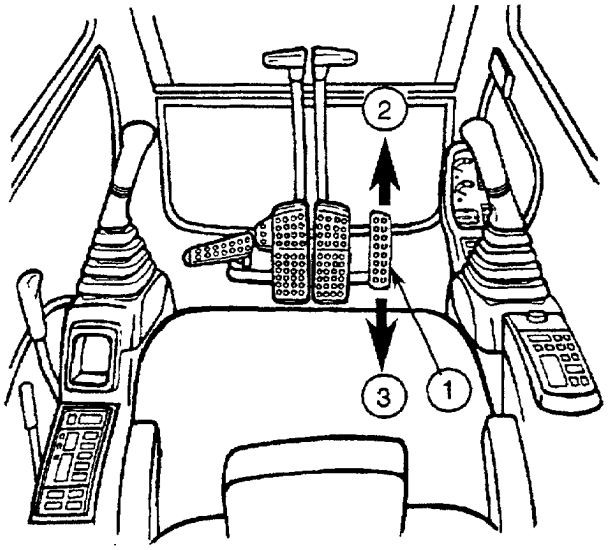
M107-01-018

OFFSET ARM FRONT --- IF EQUIPPED

Offset Control Pedal

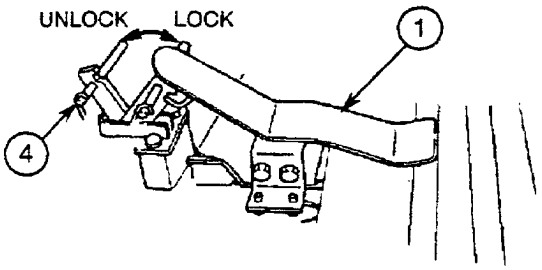
Pedal ① is located at the operator's right foot. When pressed forward, it moves the arm to the right offset position.
When pushed backward, it moves the arm to the left offset position.

② Right Offset Position
③ Left Offset Position



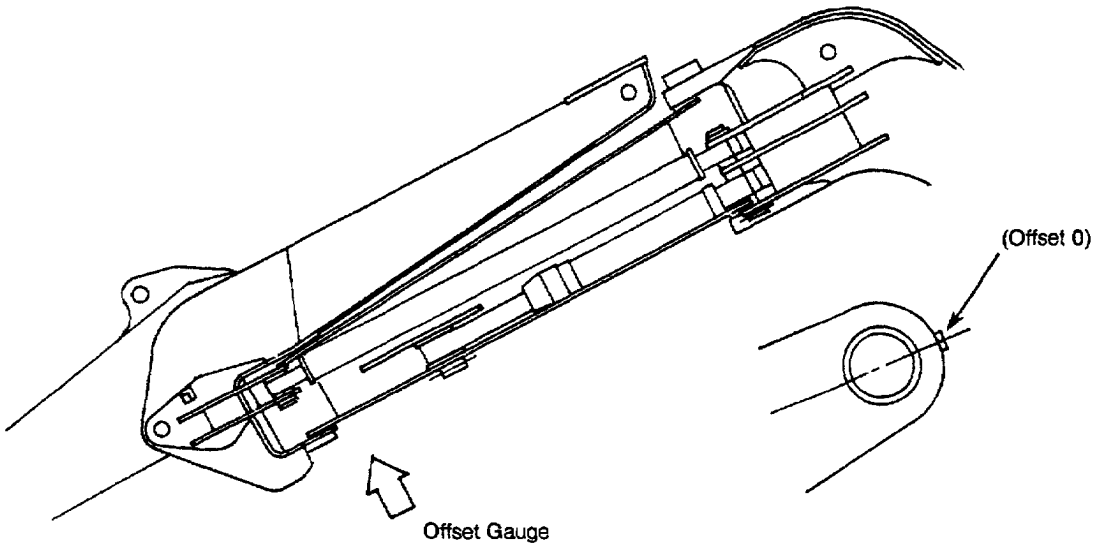
M107-01-001

When traveling or using the arm in the center position, fix the pedal in the lock position with stopper ④ as illustrated here.



M201-05-007

The center position of the arm (offset 0) can be confirmed by consulting the gauge at the top end of the boom.



M104-05-037

Offset Direction and Working Range

Right and left offset directions are taken from the point of view of the operator. Accordingly, "left" offset means that the front attachment is moved towards the cab.

Maximum digging depth with maximum offset distance of 1 420 mm (4 ft 8 in) is A due to interference of the boom with the ground surface, as illustrated.

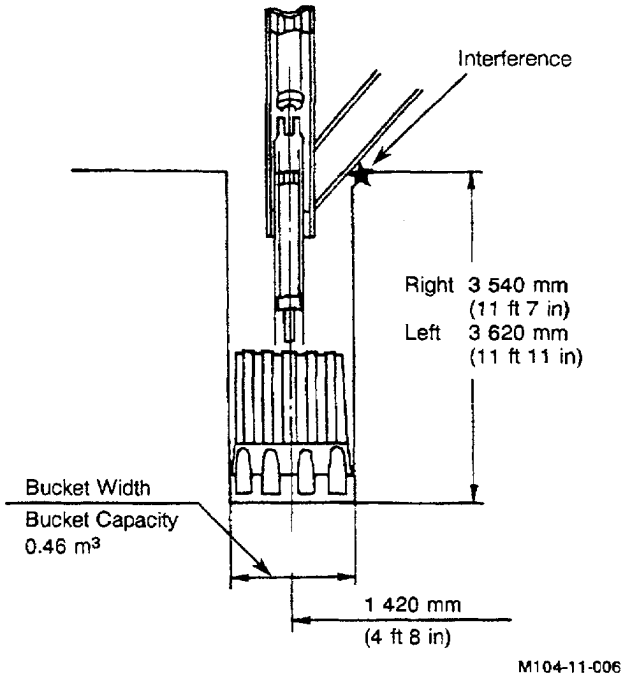
A : 3 540 mm (11 ft 7 in) Right
3 620 mm (11 ft 11 in) Left

Working Range :

Offset distance can be selected up to a maximum distance of 1 420 mm (4 ft 8 in) for both right and left directions.

1. Maximum digging depth with maximum offset distance using 0.46 m^3 (0.60 yd^3) bucket is as shown in the illustration.

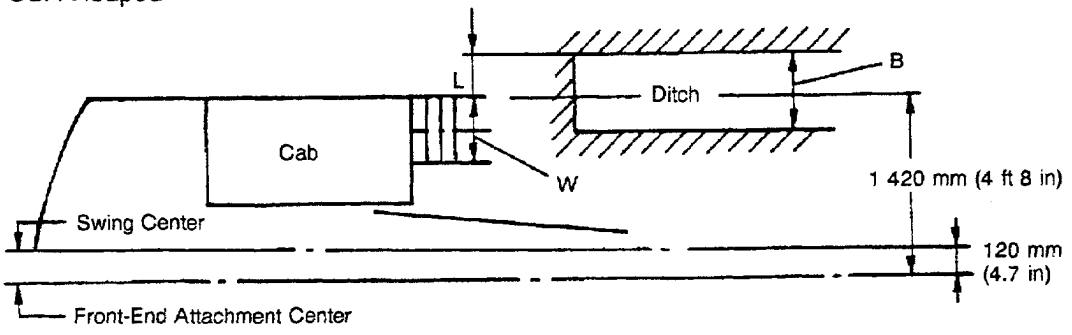
2. Distance L from the end surface of the crawler to the farthest end of the bucket will differ with the width of the bucket and track shoes as shown below.



Dimension L by width of Bucket and Shoe

EX100-3				EX100M-3	
Bucket		Shoe Width 500 mm (20 in)		Shoe Width 700 mm	
Capacity ※ m^3 (yd^3)	Width mm (in)	Left Offset mm (in)	Right Offset mm (in)	Left Offset mm (in)	Right Offset mm (in)
0.19 (0.25)	550 (22)	330 (13)	570 (22)	205 (8)	445 (18)
0.30 (0.39)	700 (28)	405 (16)	645 (25)	280 (11)	520 (20)
0.40 (0.52)	800 (31)	455 (18)	695 (27)	330 (13)	570 (22)
0.46 (0.60)	970 (38)	540 (21)	780 (31)	415 (16)	655 (26)

※ PCSA Heaped



3. Changing the offset range to give priority to the right side.

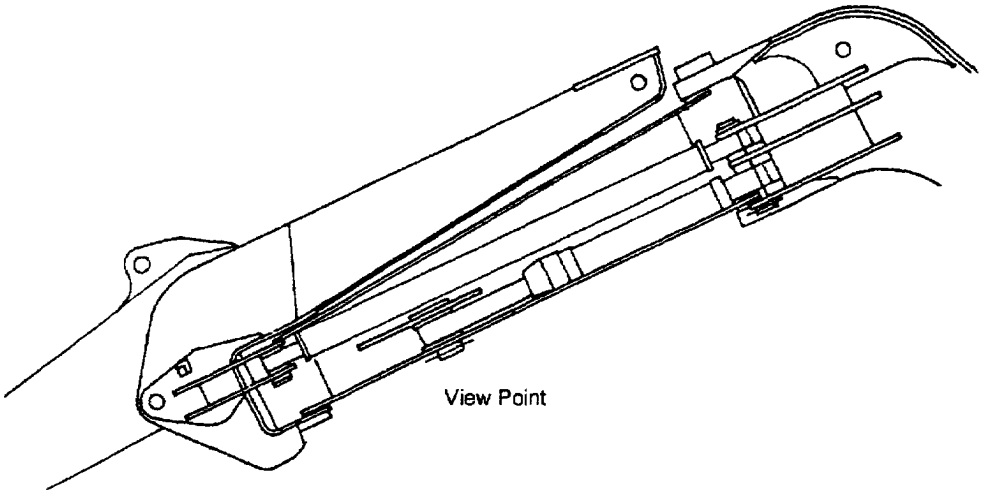
On this machine, offset range can be adjusted to give priority to the right side by changing the installation location of the offset cylinder.

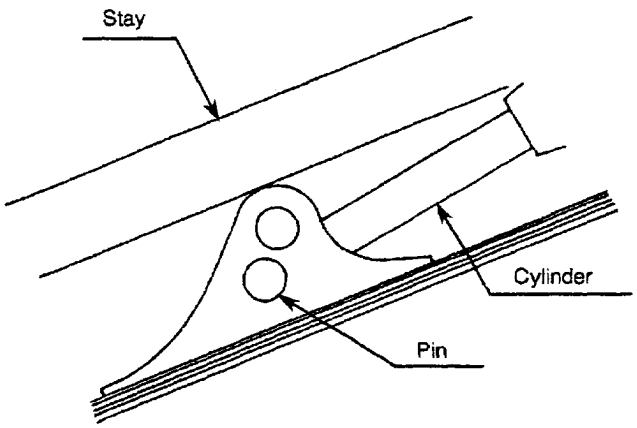
Standard offset range :
right side : 1 420 mm (4 ft 8 in) ;
left side : 1 420 mm (4 ft 8 in)

Right-side-priority offset range :
right side : 1 650 mm (5 ft 5 in) ;
left side : 1 185 mm (3 ft 11 in)

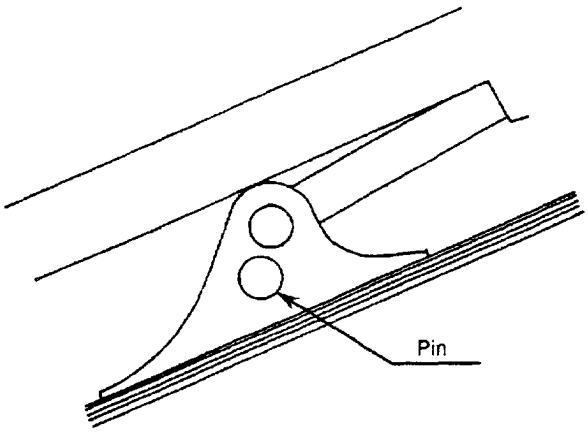
CAUTION: When changing the installation location of the offset cylinder :

1. **Keep in mind that the right-side-priority offset range differs from that of the standard offset range.**
2. **Be sure to provide a suitable support stand of adequate height so as to make removal and installation of the pin smooth and easy.**
3. **Do not try to change the installation location of the offset cylinder rod pointed upward. The offset cylinder may suddenly swing down, causing personal injury.**





Pin Installed for Standard Offset Range



Pin Installed for Right-Side-Priority Offset Range

M104-07-011

PRECAUTIONS FOR OPERATING WITH THE OFFSET FUNCTION

⚠ CAUTION: Never jack up the machine with the front in the offset position. This is extremely dangerous, as the machine is unstable.

IMPORTANT:(1) Never use a hydraulic breaker when the front is in the offset position, as this will damage the lower and upper booms.

(2) Do not perform heavy duty work, or dig gravel with the front in the offset position.
Do not perform tamping work with a slope-finishing bucket attached. These operation will damage the lower and upper booms.

1. When digging with the front in the offset position, the bucket will come in contact with the track link if the arm is crowded.
   Even if bucket does not touch the track link, watch for the bucket digging under the track, as this will cause instability.

2. Be sure to follow the precautions shown below.

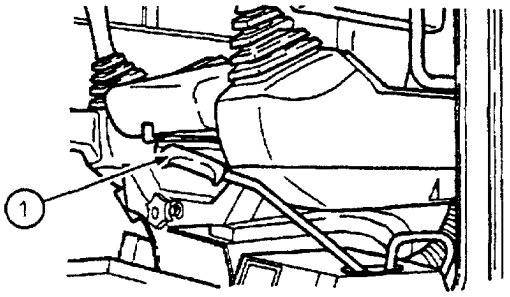
   (1) Do not use the 2.26 m (7'5") arm and 2.81 m (9'3") arm as it will interfere with the cab when in the offset position.
   (2) Do not use the bucket as a pile driver with the boom in the offset position.
   (3) When digging with the boom in offset position, be careful not to damage the cylinder stay.

3. In order to prevent the offset pins from getting rusty, operate the offset function regularly. Check offset function operation every time before starting work.

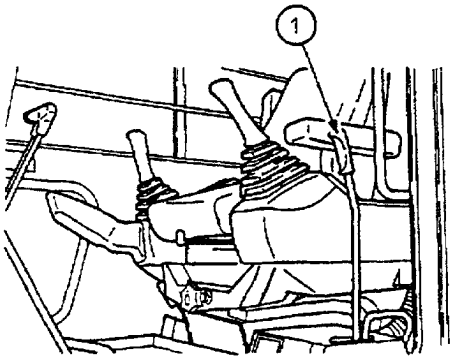
PILOT CONTROL SHUT-OFF LEVER

Pilot control shut-off lever ① shuts off hydraulic pilot pressure to the pilot control valves. With the pilot control shut-off lever in the LOCK position the machine will not move, even if a lever or pedal is accidentally moved.
Always pull lever up to the LOCK position any time you stop the engine or leave the operator's seat.
Before starting machine operation, push lever ① to the UNLOCK position.

⚠ CAUTION: Always check to be sure lever is fully in the LOCK position to prevent accidental machine movement. Always pull the lever into the full LOCK position whenever stopping the engine, leaving the operator's seat or transporting the machine.



UNLOCK M104-05-003



LOCK M104-05-004

HYDRAULIC WARM-UP SWITCH

The warm-up circuit raises hydraulic oil temperature quickly and automatically without operating controls.

If a power mode select switch (PELI) is pushed during warm-up circuit operation, the warm-up function will be canceled and engine speed will be controlled by the power mode select switch.

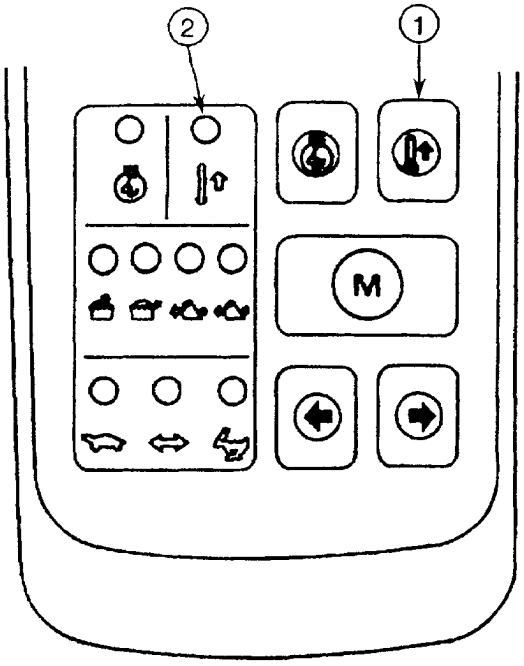
IMPORTANT: Hydraulic components may be seriously damaged if the machine is operated with hydraulic oil temperature below 30°C (86°F). Always warm hydraulic oil to specifications before operating the machine.

1. Start the engine
2. Press hydraulic warm-up switch ①. Hydraulic warm-up indicator ② will light.

   If the oil temperature is above 30°C (86°F) when the unit is started, the hydraulic warm-up indicator will not come on.

   If the oil temperature is below 30°C (86°F) the hydraulic warm-up indicator will remain on for 16 minutes or until oil reaches 30°C (86°F) whichever comes first. When the oil reaches operating temperature, the light will go out.
3. If necessary, repeat this procedure until hydraulic warm-up indicator light ② does not stay on.
4. After completing warm-up circuit operation, operate boom, arm, and bucket functions by moving the cylinders a short distance to each direction for the first time.

   Operate travel and swing functions slowly, initially moving only short distances. Continue to operate warm-up functions until cycle times are normal.



M104-05-005

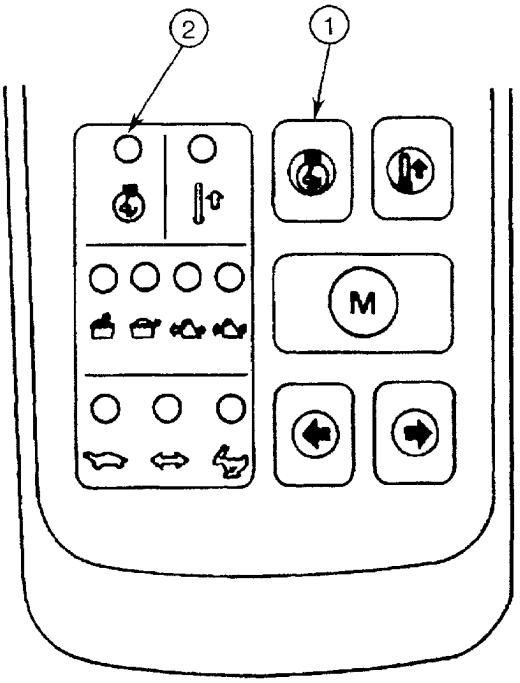
AUTO-IDLE SWITCH

The auto-idle device automatically reduces engine speed after a few seconds when all control levers are placed in neutral, in order to save fuel.

CAUTION: Unexpected machine movement can cause serious personal injury. Turn auto-idle switch off when automatic acceleration/deceleration of engine speed is not desired and when stopping engine.

Always check the auto-idle indicator ② before operating any control levers. When ON and with the power mode select switch in P, E, or L mode, the engine speed lowers to auto-idle speed approximately 4 to 6 seconds after the control levers are returned to neutral.

Always make sure the auto-idle indicator ② is OFF when loading or unloading the machine, as the engine speed will increase to power mode select switch setting (P, E, L) if any control lever is accidentally operated while the auto-idle switch is ON.



M104-05-005

Push auto-idle switch ① to turn circuit on. Auto-idle indicator ② will light.

If the engine is started with auto-idle switch ① on and the power mode select switch in P, E, or L mode, the engine will run at auto-idle setting after approximately 4-6 seconds.

Engine speed will change to power mode selector setting if any control lever is operated.

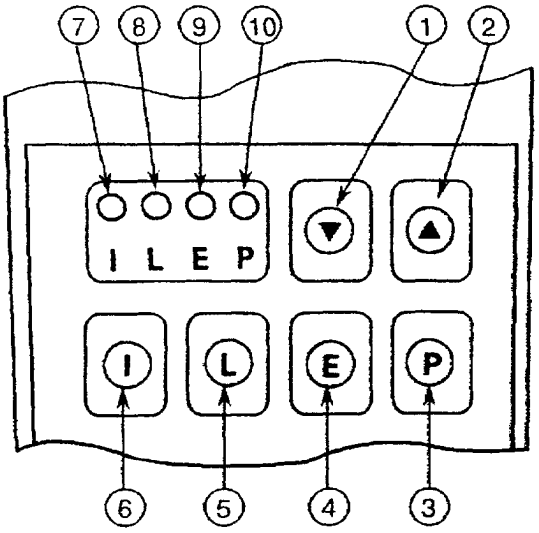
If the engine is started with the auto-idle switch off, the engine will run at the power mode selector setting.

Auto-idle function is backed up by batteries. If the engine is stopped by turning off the key switch while auto-idle function is in operation, the function will re-engage when the engine is started again.

Push the auto-idle switch off to improve machine control in difficult work areas, and while loading unloading.

POWER MODE (ENGINE SPEED) SELECTOR (E-P CONTROL)

Power mode select switches ① to ⑥ are used for selecting the most appropriate engine speed for the work to be done.
Four pre-set power modes can be selected by pushing one of the switches marked P, E, L, or I (③ to ⑥). See the table below for engine speed at each preset mode.
To decrease engine speed in small increments, briefly press decelerator switch ①.
To increase engine speed in small increments, briefly press accelerator switch ②.
Holding switch ① or ② down will increase engine speed to fast idle or decrease to slow idle.
When the engine is started, I (Slow Idle) mode is automatically selected.



M104-05-007

Mode	Engine Speed
P (Power) Mode	2 460 min^{-1} (rpm)
E (Economy) Mode	2 100 min^{-1} (rpm)
L (Light) Mode	1 850 min^{-1} (rpm)
I (Slow Idle) Mode	950 min^{-1} (rpm)

Use the following table for making the best choice:

1 – Decelerator Switch
2 – Accelerator Switch
3 – P Mode Switch
4 – E Mode Switch
5 – L Mode Switch
6 – I Mode Switch
7 – I mode Indicator
8 – L Mode Indicator
9 – E Mode Indicator
10 – P Mode Indicator

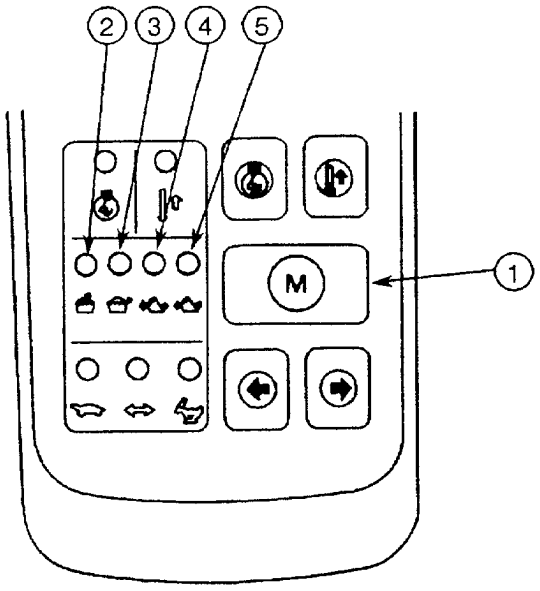
Mode Selection Guide

Mode	Features	Operational Requirements
P (Power) Mode	High Productivity	1. When high speed operation and maximum productivity are required. 2. When many dump trucks are waiting for loading.
E (Economy) Mode	High Efficiency	1. When used for general digging and loading work. 2. When improved fuel efficiency is required. 3. When a lower noise level is required.
L (Light) Mode	High Precision, Low Noise	1. When used for light digging and loading work. 2. When even lower noise levels are required. 3. When fuel efficiency has priority over productivity.
I (Slow Idle) Mode	Fuel Saving, Low Noise	· When temporarily stopping operation such as wait time between trucks.

WORK MODE SELECTOR

Four work modes can be selected for the most appropriate operating speeds of the boom, arm, bucket and swing functions for the work to be done.

When the engine is started, the general purpose mode is automatically selected.
Push switch ① as many times as necessary to select desired work mode. Indicators ② to ⑤ show the work mode selected.



1 – Work Mode Select Switch
2 – General Purpose Mode Indicator
3 – Trenching Mode Indicator
4 – Grading Mode Indicator
5 – Precision Mode Indicator

Use the following table to make the best choice:

M104-05-005

Work Mode Selection

	General Purpose Mode	Arm roll-in functions receive same priority. Designed for general digging and truck loading.
	Trenching Mode	During combined operation of boom and swing, swing is given priority.
	Grading Mode	Boom raise, arm and bucket functions are slow when operated with arm roll-in function only. Travel and swing functions operated general purpose mode setting.
	Precision Mode	Swing, boom raise, arm and bucket functions are slower. Travel and boom lower functions operate at general purpose mode setting.

TRAVELING

CAUTION: Use a signal person when moving, swinging or operating the machine in congested areas. Coordinate hand signals before starting the machine.

1. Before moving machine, determine which way to move travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward, towards the idlers.

2. Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes in direction.

3. Before traveling on them, check the strengths of bridges and road shoulders, and reinforce if necessary.

4. Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.

5. When crossing train tracks, use wood plates in order not to damage them.

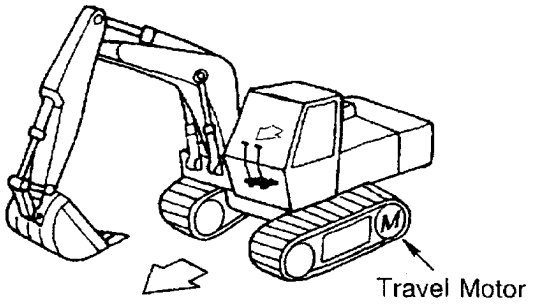
6. Do not make contact with electric wires or bridges.

7. When crossing a river, measure the depth of the river using the bucket, and cross slowly. Do not cross the river when the depth of the river is deeper than the upper edge of the upper roller.

8. When traveling on rough terrain reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage to the machine.

9. Avoid operations that may damage the track and undercarriage components.

10. During freezing weather, always clean snow and ice from track shoes before loading and unloading machine, to prevent the machine from slipping.



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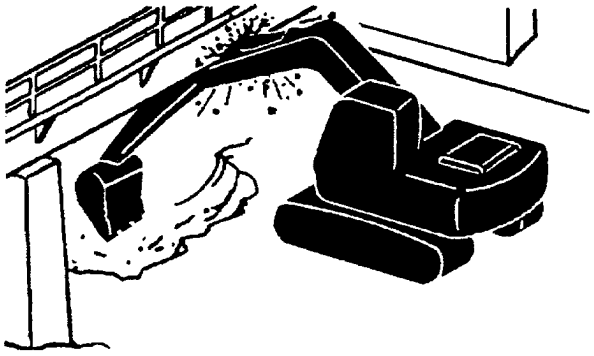


SA-011

OPERATING ON SOFT GROUND

Avoid traveling on very soft ground that does not have sufficient strength to firmly support the machine.

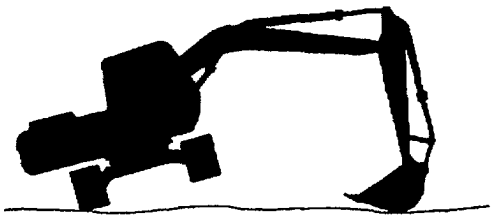
If the machine is operated on very soft ground or becomes stuck, it may be necessary to clean the track frame area.

Swing the upperstructure 90° and lower the bucket to raise one track off the ground. Make sure to keep the angle between the boom and arm 90 to 110° and position the bucket's round side on the ground.

Rotate the raised track back and forth to remove mud and dirt.

After lowering the track to the ground, select L (light) mode and slow travel speed. Carefully move the machine to firm ground.

Tow the machine if it becomes stuck but can still operate its engine. Be sure to attach a towing wire correctly.



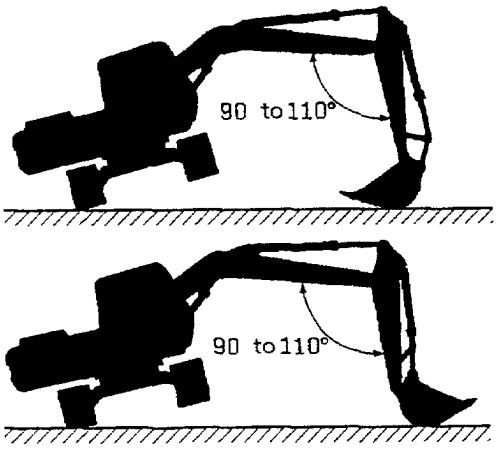
M104-05-012

RAISE ONE TRACK USING BOOM AND ARM

CAUTION: Keep the angle between boom and arm 90 to 110° and position the bucket's round *side on the ground.*

Swing the upperstructure 90° and lower the bucket to raise track off ground. Do not dig bucket teeth into the ground when using the hoe bucket reversed.

Place blocks under machine frame to support the machine.

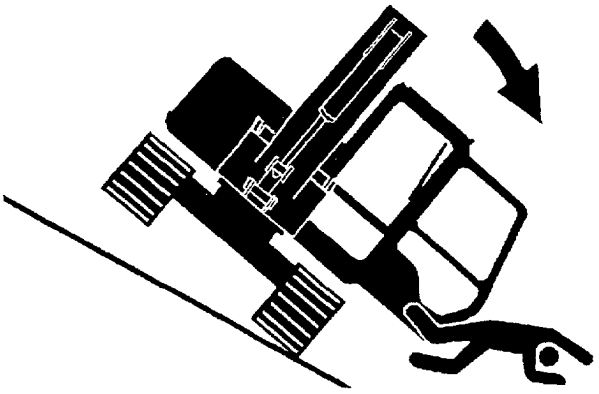


M104-05-054

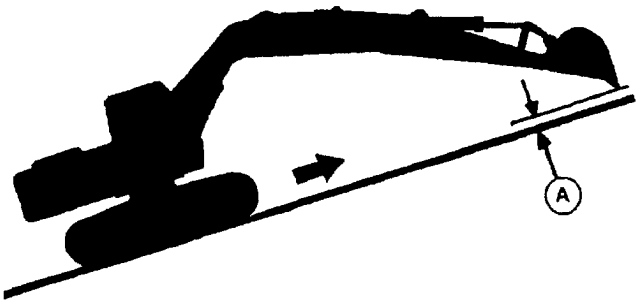
AVOID TIPPING

Avoid traveling across the face of a slope. When traveling on a slope, tracks should be pointed uphill. Keep the bucket point in direction of travel, approximately 200 to 300 mm (8 to 12 in) above ground, when ascending or descending slopes. If the machine starts to slip or becomes unstable, lower the bucket immediately.

Avoid tipping the machine when swinging heavy loads. Keep the bucket on the uphill side. Do not swing load to the downhill side. Reduce swing speed.



SA-012



SA-015

OPERATING IN WATER OR MUD

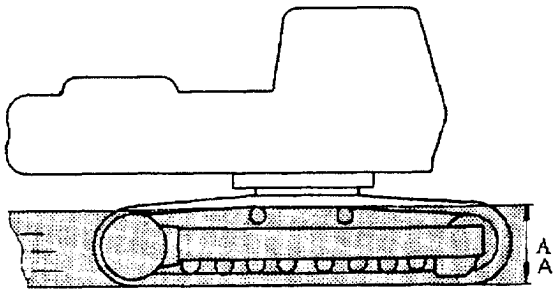
The machine can be operated in water up to the upper edge of the upper rollers only if worksite footing has sufficient strength to prevent the machine from sinking past the upper edge of the upper roller, and only if the water is flowing slowly.

When operating in such conditions, check the machine's position often. Reposition the machine if necessary.

Avoid submerging the swing bearing, swing gears and center joint.

If the swing bearing, swing gears and center joint are submerged, remove drain plug ① to drain mud and water. Clean swing area. Install plug. Lubricate swing internal gear and swing bearing. Swing internal gear capacity is 5 liters (1.3 US gal). Lubricate swing bearing. (See Maintenance Guide, 500 hours)

A EX100-3 660 mm (26 in)
EX100M-3 770 mm (30 in)



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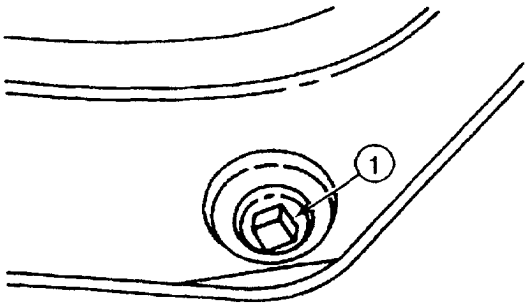
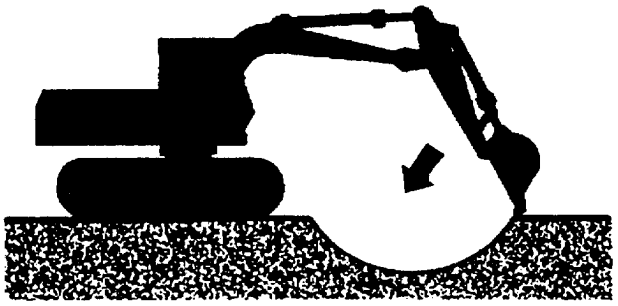


M107-05-036

OPERATING BACKHOE



M107-05-037

1. Place the bucket teeth on the ground with the bottom of the bucket at a 45° degree angle to the ground.
2. Pull the bucket toward the machine using the arm as the main digging force.
3. When soil sticks to the bucket, remove it by moving the arm and/or bucket rapidly back and forth.
4. When trenching a straight line, position the tracks parallel to the trench. After digging to the desired depth, move the machine as required to continue the trench.

IMPORTANT:

1. **When lowering the boom, avoid sudden stops that may cause shock load damage to the machine.**
2. **When operating the arm, avoid bottoming the cylinder to prevent cylinder damage.**
3. **When digging at an angle, avoid striking the tracks with the bucket teeth.**
4. **When digging a deep excavation, avoid striking the boom or bucket cylinder hoses against the ground.**

GRADING OPERATION

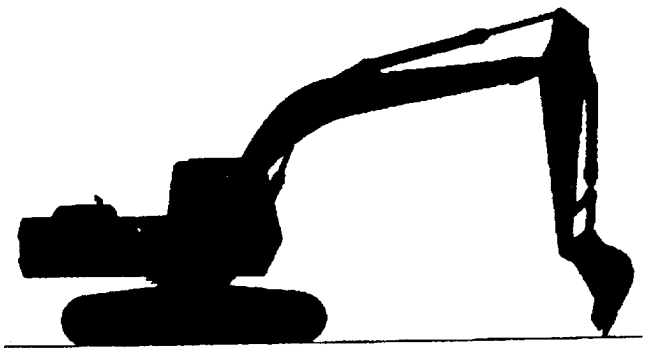
IMPORTANT: Do not pull or push dirt with the bucket when traveling.

Select grading mode when finishing work is required.

Position the arm slightly forward of the vertical position with bucket rolled back, as shown.

Operate arm roll-in function while slowly raising the boom. Once the arm moves past the vertical position slowly lower the boom to allow the bucket to maintain a smooth surface.

Grading operation can be more precisely done by operating the boom, arm and bucket simultaneously.

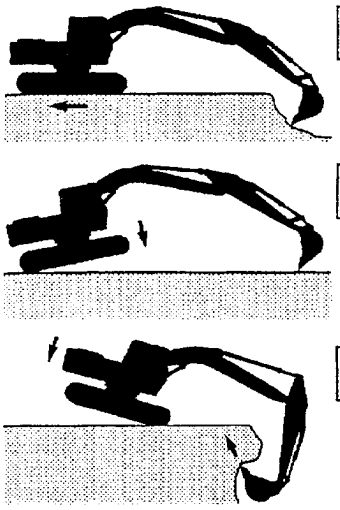


M104-05-017

AVOID ABUSIVE OPERATION

Do not use travel as an additional digging force. Severe machine damage may result.

Do not raise rear of machine to use the machine's weight as additional digging force. Severe machine damage may result.



M104-05-018

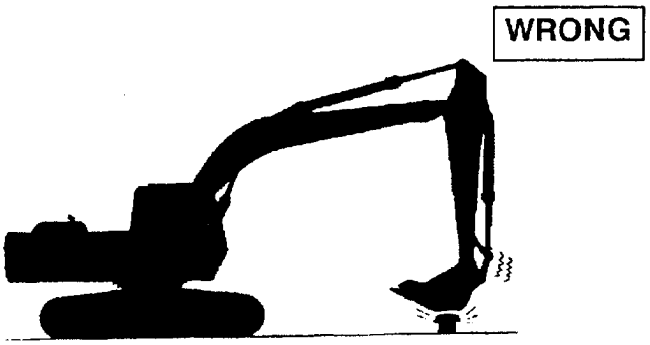
OPERATING TIPS

Do not hit track with bucket when digging.

Whenever possible, position your machine on a level surface.

Do not use the bucket as a hammer or pile driver. Do not attempt to shift rocks and break walls using swing motion.

IMPORTANT: To avoid damaging cylinders, do not strike the ground with the bucket or use the bucket for tamping with the bucket cylinder fully extended (the bucket completely curled under).



M104-05-019

Adjust the length and depth of each cut to produce a full bucket at every pass.

Full loads on every pass is more productive than a faster cycle with a partially filled bucket.

Full load should be the first objective, followed by speed, to increase productivity.

IMPORTANT: Do not attempt to break ledge rock by extending the arm to maximum reach and dropping the front of the bucket on the bucket teeth for penetration. Serious damage to the machine can result.

Once the trench is open, ledge rock can be broken by pulling the bucket up under the layers. The top layers are pulled out first, with one or two layers being lifted at a time.
Do not sideload bucket. For example, do not swing bucket to level material or do not strike objects from the side with the bucket.

SELECT CORRECT TRACK SHOES

IMPORTANT: Using wide track shoes on rough ground may result in shoe bending and/or loosening, and may damage other undercarriage components.

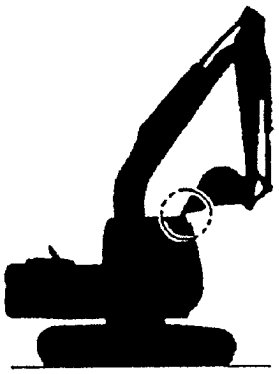
Never use wide track shoes on rough ground such as rocks, sand or gravel. Wide track shoes are designed for soft ground.

Track shoe bolts should be checked periodically for tightness.

FACE SHOVEL OPERATION

CAUTION: Take care not to hit the cab when rolling in the arm with the reversed-installed bucket.

- For face shovel operation, dig the ground using the arm cylinder in a scraping motion.
- Where underground water is expected, make a slope angle of 2° to 3° to drain this water as shown.



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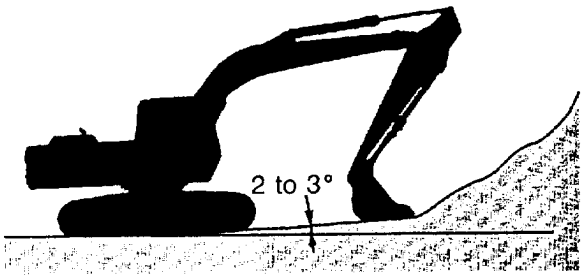


M104-05-020

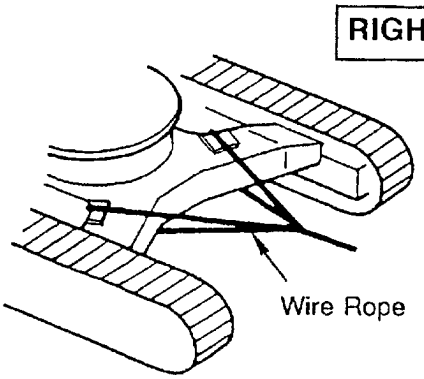
TOWING MACHINE A SHORT DISTANCE

CAUTION: Cables, straps, or ropes can break causing serious injury. Do not tow machine with damaged chains, frayed cables, slings, straps, or ropes.
Always wear gloves when handling cable, straps or ropes.

When your machine becomes struck but the engine is still operational, attach wire tow lines as illustrated at right, and slowly tow your machine to firm ground using another machine.
Be sure to attach the wire ropes around the track frames of both machines as illustrated.
To prevent the wire ropes from being damaged, place some protective material between the track frame and the wire ropes.

IMPORTANT: A shackle hole is provided on the track frame to tow light weights up to
EX100-3
39200N (4 000 kgf, 8 800 lbf)
EX100M-3
53900N (5 500 kgf, 12 100 lbf)
Do not use the shackle hole to tow this or another machine.

1. **Attach a wire tow line around the machine frame as shown to the frame shackle hole using a suitable clevis.**
2. **Slowly tow, keeping the tow line horizontal and in a straight line with the tracks.**
3. **When the machine is towed, release parking brakes by operating the travel levers.**



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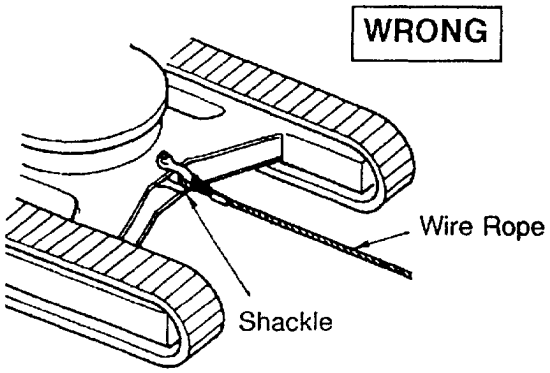


M104-05-011

Long Arm Operation---If Equipped

1. The optional 2.81 m (9 ft 3 in) long arm is only for light works such as loam loading, sludge handling,etc.. Do not use it for heavy works such as digging gravel. When the arm is used for digging, apply shallow cut to the ground to avoid tough digging, or from or arm damage may result.

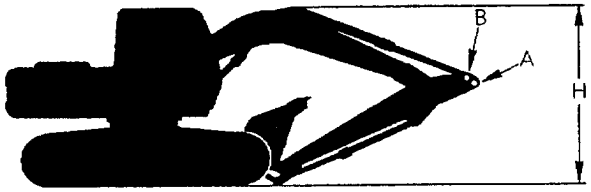
2. When the machine is equipped with the 2.81 m (9 ft 3 in) long arm, the hoe-bucket size must be limited to the followings due to stability and strength of the machine;
   EX100-3 PCSA 0.40 m^3 (0.52 yd^3)
   with 700 mm (28 in) shoe
   PCSA 0.46 m^3 (0.60 yd^3)
   EX100M-3 PCSA 0.55 m^3 (0.72 yd^3)

3. When the machine is equipped with the 2.81 m (9 ft 3 in) long arm,connect the arm cylinder end to:
   Pin bore A (when the machine is in operation
   Pin bore B (when the machine is transported)

IMPORTANT: Connect the arm cylinder rod end to pin bore B only when the machine is transported.
Do not operate the digging or loading function with the arm cylinder connected to pin bore B as the bucket may hit the cab accidentally with this connection.

When transporting the machine,follow the procedure shown below to convert it into the transporting posture.

(a) Position the bucket cylinder with rod retracted a little from the fully extended position.
(b) Position the arm cylinder with rod retracted a little from the fully extended position.
(c) Lower the boom until the arm top comes into contact with the ground.



T105-01-02-002

Unit: mm (ft-in)

Arm Cylinder Rod End Connected To:	Height of Front Attachment (H)			
	EX100-3		EX100M-3	
	Without Bucket	With Bucket	Without Bucket	With Bucket
Pin Bore A	2 800 (9'2")	3 070 (10'2")	2 830 (9'2")	3 060 (10'2")
Pin Bore B	2 510 (8'3")	2 660 (8'10")	2 550 (8'3")	2 670 (8'9")

Dimensions include shoe-lug height.

ELECTRONIC CONTROL SYSTEM BYPASS PROCEDURE

Some examples of malfunction in the electronic control system:

1. Power mode (engine speed) selector fails to control engine speed.
2. Engine stalls when travel/front attachment functions are operated.
3. Operating speed is extremely slow.

INPORTANT: If any electronic control system malfunctions occurs, stop the engine, remove the key from the key switch and pull the pilot control shut-off lever to LOCK position. Attach a "Do Not Operate" tag to the right control lever.

1. First, check fuses for continuity.
2. If no discontinuity is found, immediately contact your authorized clealer.

Perform the following step only when the engine speed cannot be controlled:

3. Manually move the EC motor linkage ① or the fuel injection pump lever until the injection pump lever is against the fast idle stop. Use a piece of wire or a tie band to hold lever against the fast idle stop.

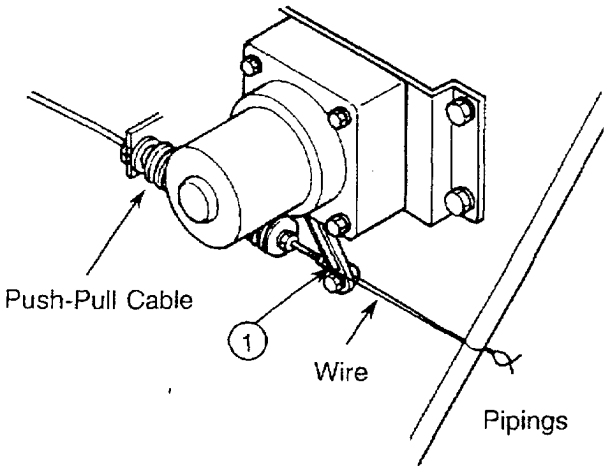
Perform the following step only when the pump swash angle cannot be controlled:

4. Remove lower cover ② on the hydraulic pump regulator. Rotate the cover 180° and reinstall. (For further details, see Pump Swash Angle Setting Procedure in this group.)

NOTE: The key switch will function normally.

Perform the following steps only when operating speed slows down extremely:

5. Remove fuse ③ ④ for solenoid.
6. Start machine and move it to a clear area.
7. Contact your authorized dealer for service.



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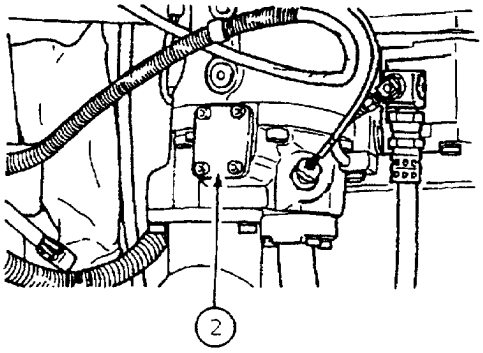

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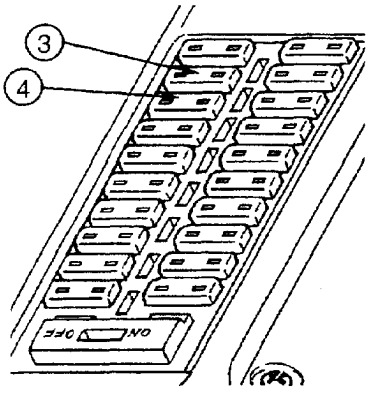

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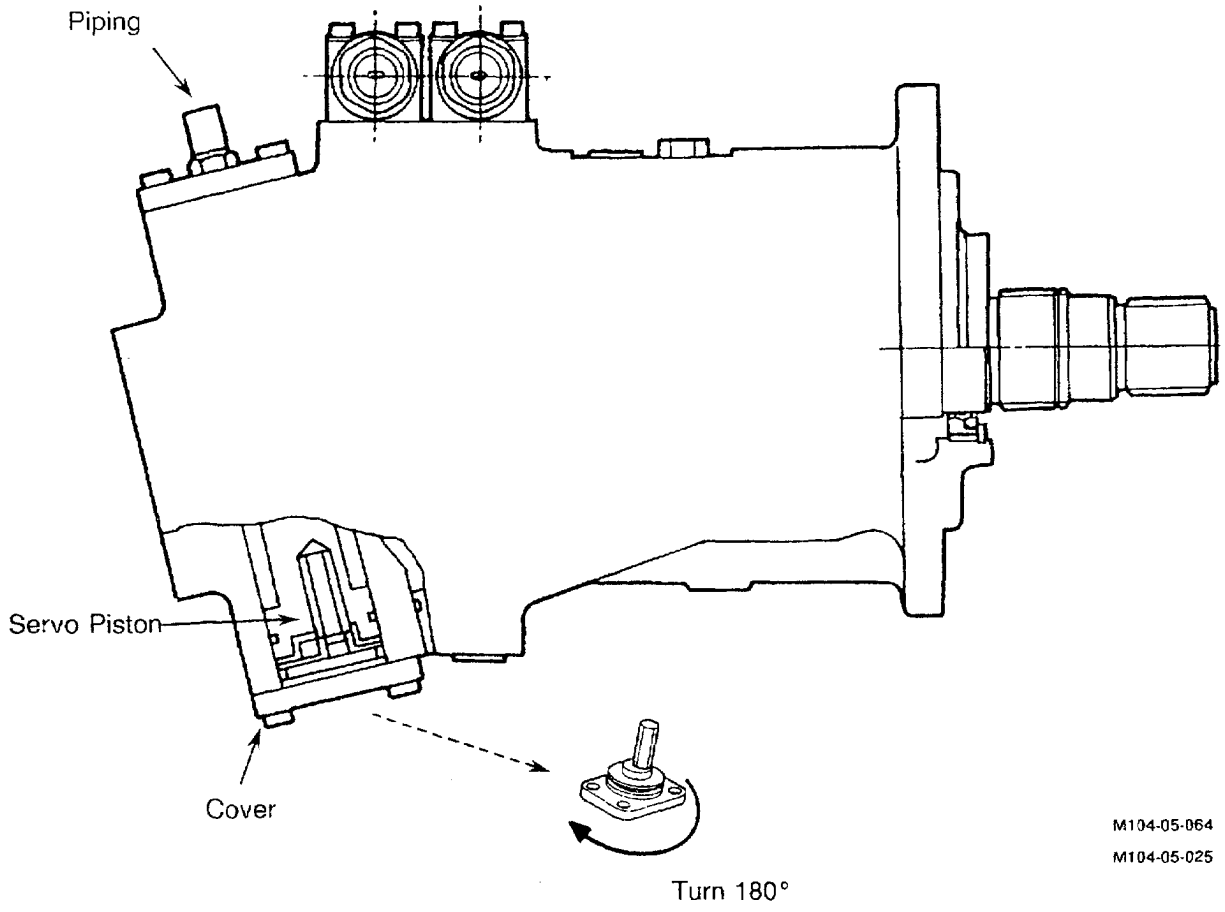
PUMP SWASH ANGLE SETTING PROCEDURE

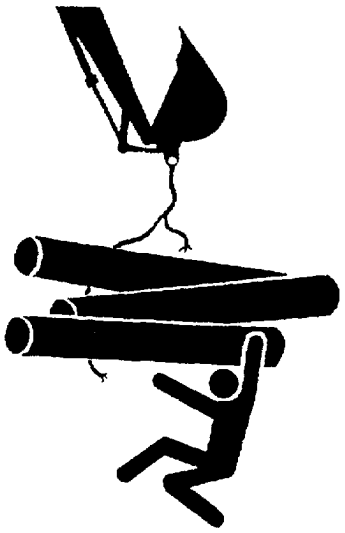


Tools and materials:
Hexagonal head wrench 6 mm
Oil pan
Wrench 19 mm
Screw driver
Waste cloth

Setting Procedure

1. Push the hydraulic oil tank cap button to release pressure in the hydraulic oil tank.
2. Loosen the cap screws of the lower cover on the hydraulic pump regulator using a 6 mm hexagonal head wrench.
3. Remove the cover. Turn the cover 180°.
4. Moving the servo piston upward, reinstall the cover. (If the servo piston does not move, disconnect the piping on the servo piston to allow the servo piston to move upward.) Then, tighten the cover bolts.

CRANING --- IF EQUIPPED



SA-014

CAUTION: When you use machine for craning operation, be sure to comply with all local regulations.
Cables, straps, or ropes can break, causing serious injury. Do not use damaged chains, frayed cables, slings, straps, or ropes to crane.

Never move the load suddenly. Never move load over a person's head. Do not allow any persons near load.

Keep all persons away from raised load until blocks are supporting it or load is sitting on the ground.

Position upperstructure so that the travel motors are at the rear.

Do not attach sling/chain to the bucket teeth.

1. Secure sling /chain tightly to the load being lifted. Wear gloves when securing sling /chain.

2. Fasten sling/chain to bucket loop, with the bucket curled and arm retracted.

3. Coordinate hand signals with your signal man before starting.

4. Be aware of the location of all persons in the working area.

5. Attach a hand line to load and make sure person holding it is well away from load.

6. Before lifting, test your load.

   - Park your machine close to load.
   - Attach load to the machine.
   - Raise load 50 mm (2 in) above the ground.
   - Swing the load all the way to one side.
   - While keeping load close to the ground, move it away from machine.
   - If there is any indication of reduced stability of your machine, lower load to the ground.

7. Lift load only as high as necessary.

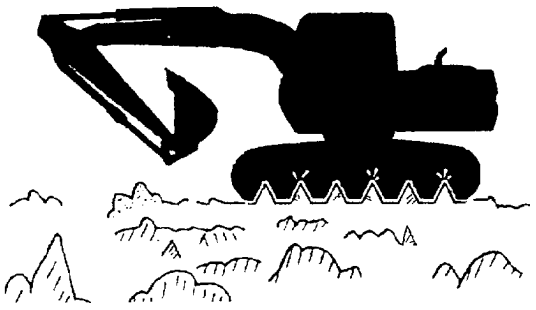
ON USING THE RUBBER CRAWLER --- IF EQUIPPED

EX100-3

Use the rubber crawler when traveling on paved roads. When operating the machine with the rubber crawler, follow the precautions below.

PROHIBITED OPERATIONS

1. Do not operate on sharp, rocky, uneven surfaces, such as river rock, gravel, etc.
2. Keep the rubber crawler free of engine oil, gasoline, etc. Avoid traveling in oil in order to reduce the danger of slipping.
3. Never travel with one track only while the other track is jacked up by the front attachment.

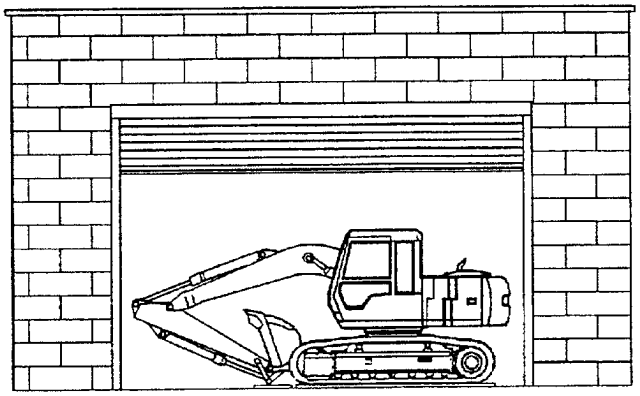


M104-05-038

TRAVELING AND OTHER CAUTIONS

⚠ **CAUTION: The machine with the rubber crawler is less stable than that with the steel crawler, as the edge of the rubber shoe may deform when loaded. Pay attention when digging with the boom positioned at a right angle to the tracks.**

1. Do not keep the rubber crawler under direct sunlight for more than three months.
2. Avoid excessive steering operations on concrete road as much as possible, as this will cause wear to the shoe lug. Also, avoid running on asphalt road of more than 60°C (140°F) in temperature, as this will cause wear to the shoe as well as damage to the road surface.
3. Running with a loose track shoe on uneven surfaces can result in sudden separation and/or damage to the track shoe.
4. Ease the machine down from the jacked-up position. Do not let it drop.
5. The rubber crawler has a thin rubber film on its inner surfaces, as shown, when it is new. In a new machine, the rubber film may come off while being rubbed against rollers. This is not abnormal.



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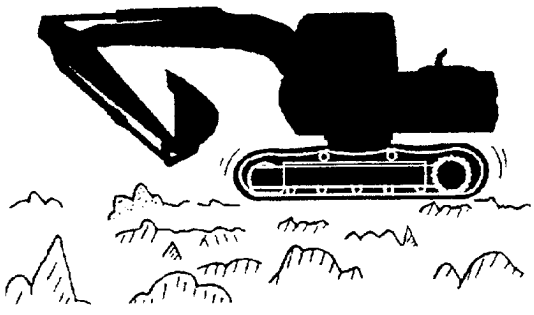

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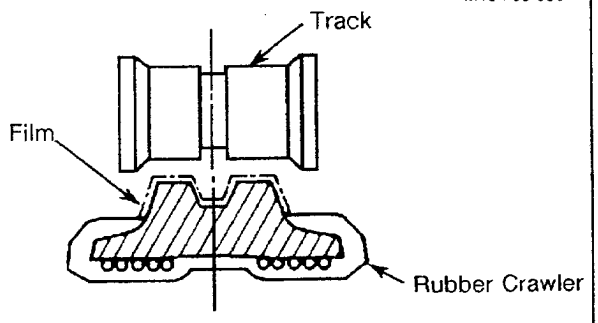


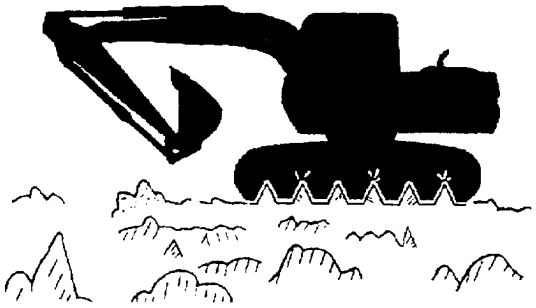
M104-05-053

ON USING THE RUBBER-COVERED GROUSER SHOES --- IF EQUIPPED

Use the rubber-covered crawler when traveling on paved roads. When operating the machine with the rubber-covered crawler, follow the precautions below.

PROHIBITED OPERATIONS

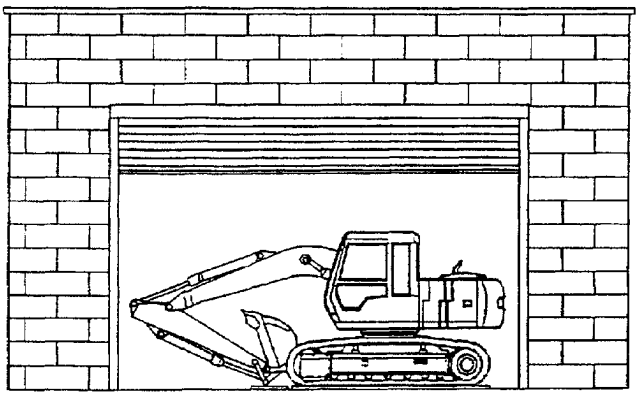
1. Do not operate on sharp, rocky, uneven surfaces, such as river rock, gravel, etc.
2. Keep the rubber-covered crawler free of engine oil, gasoline, etc. Avoid traveling in oil in order to reduce the danger of slipping.
3. Never travel with one track only while the other track is jacked up by the front attachment.



M104-05-038

TRAVELING AND OTHER CAUTIONS

1. Do not keep the rubber-covered shoes under direct sunlight for more than three months.
2. Avoid excessive steering operations on concrete road as much as possible, as this will cause wear to the rubber pad. Also, avoid running on asphalt road of more than 60°C (140°F) in temperature, as this will cause wear to the rubber as well as damage to the road surface.
3. The frictional resistance of rubber-covered shoes on paved road is higher than that of steel shoes.
4. As the rubber-covered shoes are less flexible than the rubber crawler, they may develop fine cracks on the rubber pad surface. The shoes need not be replaced.
5. Procedure for checking and adjusting track sag are the same as those for the steel shoes.
6. If one or more rubber-covered shoes are damaged, only damaged shoes need be replaced. Bolt and nut fastening torque are the same as the steel shoes.
7. When the whole shoe assembly are damaged, consult your authorized dealer.



M104-05-039

OPERATING HYDRAULIC BREAKER --- IF EQUIPPED

Select a breaker that is the correct size and weight for your machine. See your authorized dealer for correct breaker information.

Carefully study the operation manuals of the machine and breaker, and perform the required checks and/or inspection before connecting the breaker to the arm.

Precautions for connecting breaker piping.

(1) Do not allow contamination to enter into the system when switching the breaker with the bucket.

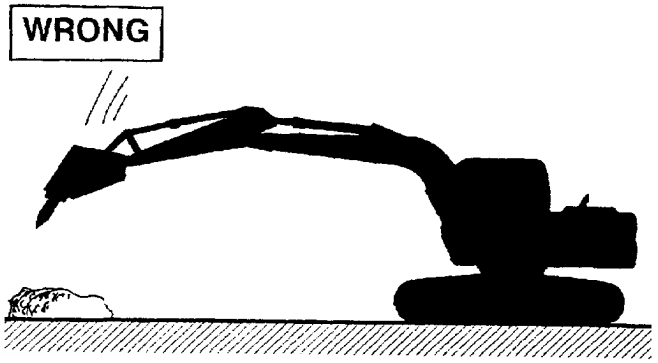
(2) When the breaker is not used, apply the cover to the pipe opening on the arm top and install the plug into the hose end of the breaker to prevent entry of contamination into the system.
Be sure to provide spare covers and plugs in the tool box so that they will be available when needed.

(3) After connecting, check the connecting seal fitting for oil leakage, and pipe clamp bolts for looseness.

1. Perform the required checks and inspection daily before operation.

2. Operate the machine slowly, as the breaker is heavier than bucket.

3. Avoid using the breaker for hammering operations. Do not use boom and arm functions to crush objects. Machine damage may result.



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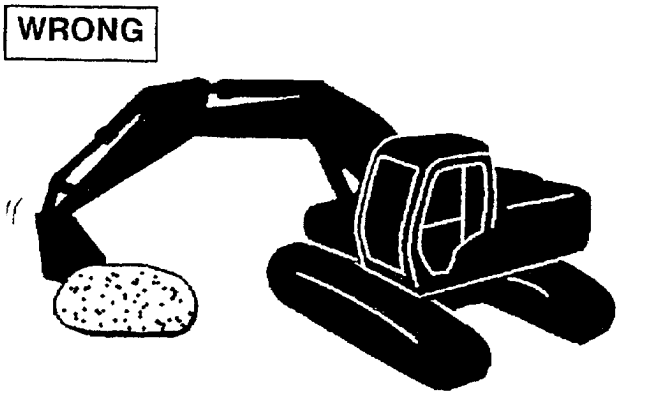
4. Do not use breaker to move objects. Machine damage may result.



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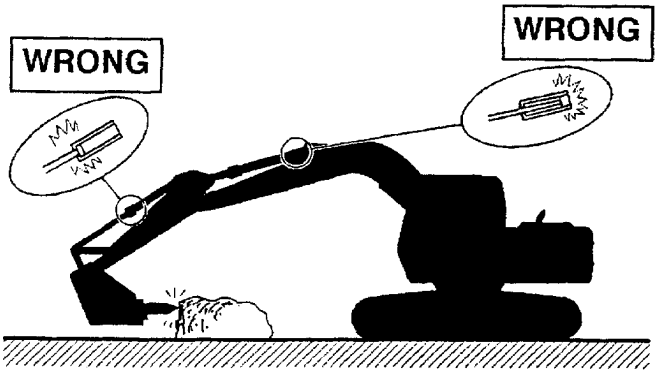
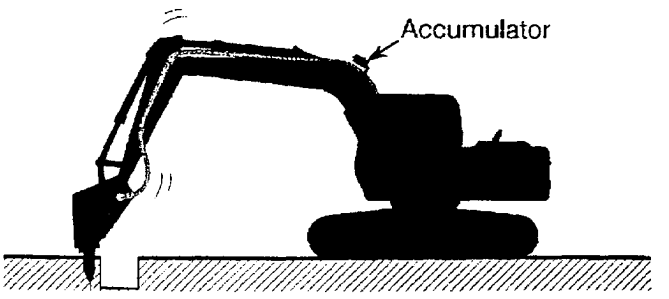
5. To prevent cylinder/machine damage, do not operate the breaker with the hydraulic cylinder rod fully retracted or fully extended.



M104-05-057

6. Stop operation if breaker hydraulic hoses jump abnormally. Change in breaker accumulator pressure or damaged accumulator will cause abnormal hose jumping and may cause breaker and/or machine damage.
Immediately contact your authorized dealer if this happens.



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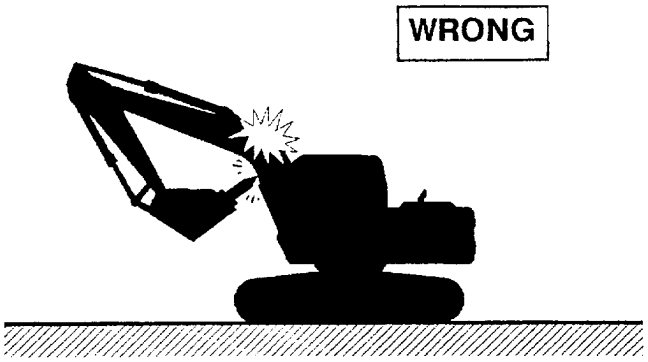
7. Operate the hydraulic excavator carefully to avoid hitting the boom.



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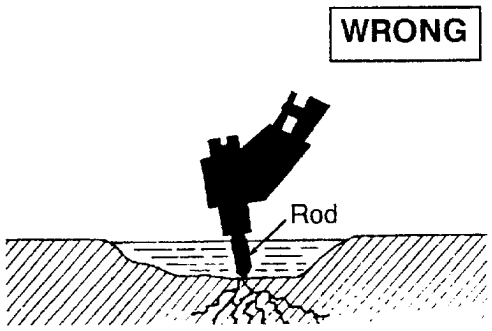
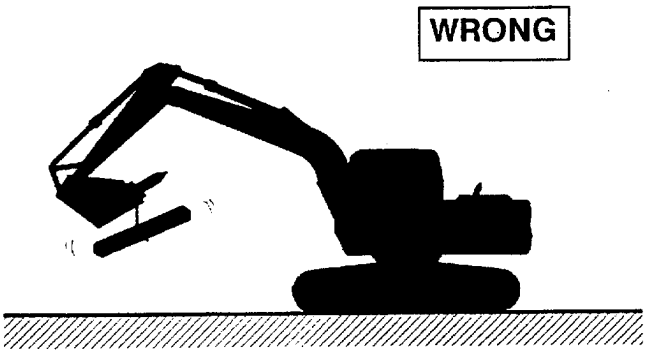
8. Do not operate the breaker in water. Doing so will cause rust and seal damage, resulting in damage to the hydraulic system components.



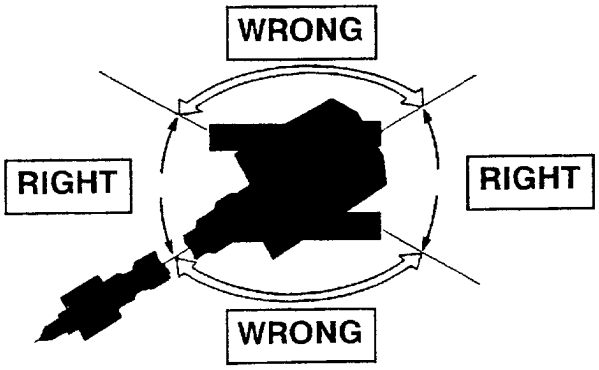
M104-05-059

9. Do not use breaker for lifting operation. The machine tipping over and /or breaker damage may result.



M104-05-060

10. Do not operate the breaker to the side of the machine. The machine may become unstable and shortened undercarriage component life may result from operating the breaker to the side of the machine.



M104-05-061

REPLACING HYDRAULIC OIL AND FILTER ELEMENT

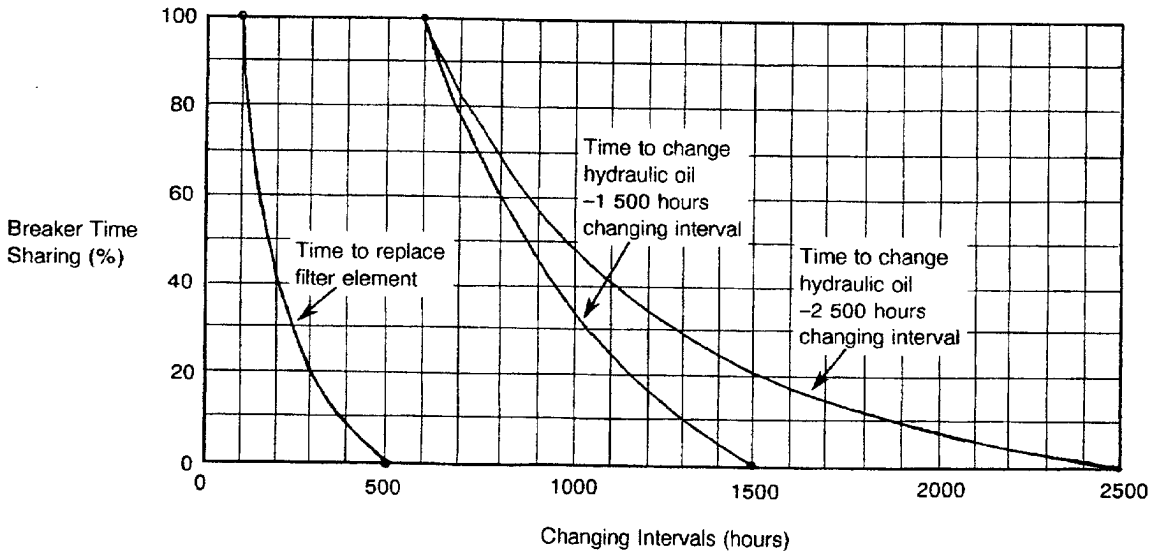
Hydraulic breaker operation subjects the machine's hydraulic system to possible contamination and accelerated deterioration. Hydraulic filter elements and hydraulic oil must be replaced more often than with normal digging applications to prevent damage to hydraulic pumps and other hydraulic components. Recommended changing intervals are shown below.

Replacement Interval (hours)

	Machine with Hydraulic Breaker	Machine with Ordinary Bucket
Hydraulic Oil	600*	1 500 or 2 500
Filter Element	100*	500

NOTE: (1) The above figures are for 100% breaker time share. When the breaker time share less, changing intervals can be extended as shown in the diagram below.*

(2) Be sure to replace elements when breaker has been operated for 100 hours continuously.



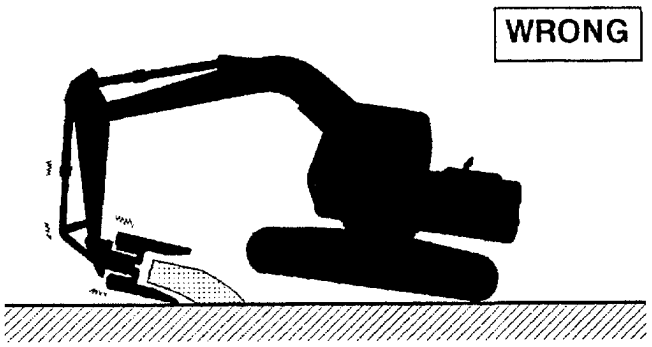
M104-05-034

OPERATING HYDRAULIC CRUSHER --- IF EQUIPPED

Select a crusher that is the correct size and weight for the machine. See your authorized dealer for correct crusher information.

The crusher is much heavier than the bucket. Operate the machine slowly to prevent tipping the machine. Also, keep the following precautions in mind.

1. Do not allow the machine's weight to be supported by the crusher or bucket cylinder with the bucket cylinder fully extended or retracted. Doing so may damage the front attachment. In particular, avoid doing so with the bucket cylinder fully extended, as the front attachment will be easily damaged.
   Take care to prevent this from happening when dismantling foundation structures using the crusher.



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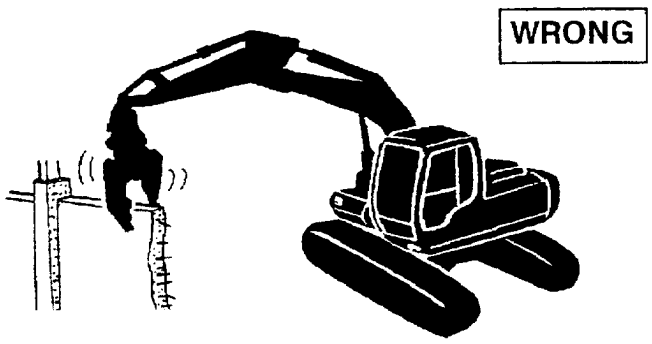
2. Do not attempt to perform crushing on either side of the machine. Always perform crushing operations to the fore or rear, parallel with the tracks. Otherwise, tipping over may occur.



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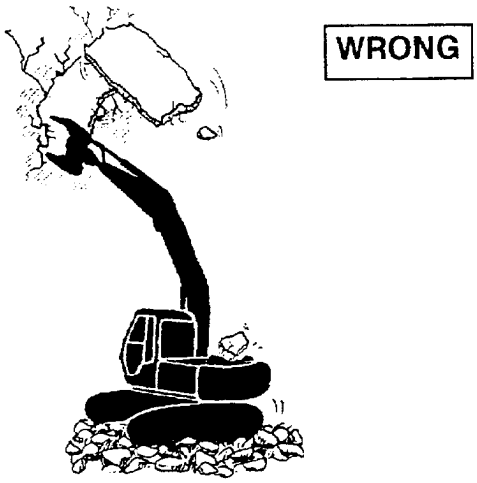
3. When operating the crusher up high with the boom fully raised, be careful of falling objects.



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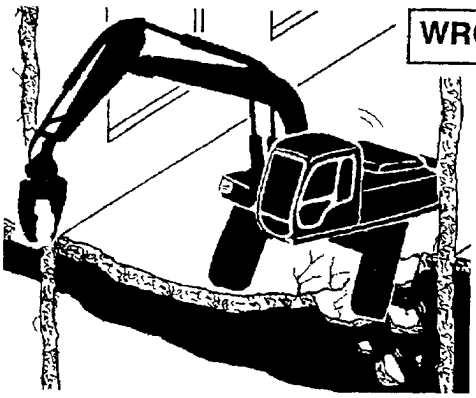
4. When operating the crusher on a floor in a building, first confirm that the floor has sufficient strength to support the load caused by crushing, in addition to the machine weight.

5. Always operate the crusher on a stable, level surface, not on a slope or on crushed scraps.

6. Do not use the crusher to haul or load crushed scraps.

7. Frequent replacing of the bucket with the crusher or breaker subjects the machine's hydraulic system to possible contamination and accelerated deterioration. Replace hydraulic filter elements and hydraulic oil more often than when simply digging, to prevent damage to hydraulic pumps and other hydraulic components. Refer to "Operating the Hydraulic Breaker" in this section for replacement intervals.

8. Always remove the crusher from the excavator before transporting the machine. Do not fully extend the bucket cylinder when transporting, as this may damage the front attachment, when vibrations arise during transportation.



M107-05-049

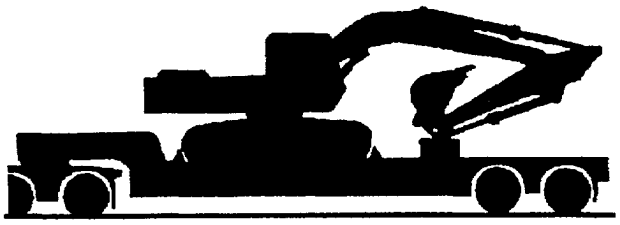
TRANSPORTING BY ROAD

When transporting the machine on public roads, be sure to first understand and follow all local regulations.

1. For transporting using a trailer, check the width, height, length and weight of the trailer when the machine is loaded.

2. Investigate beforehand the conditions of the route to be traveled, such as dimensional limits, weight limits and traffic regulations.

In some cases, disassembling the machine to bring it within dimensional limits or weight limits as local regulations.



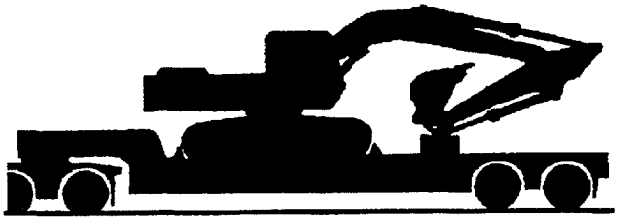
M107-06-013

TRANSPORTING THE MACHINE BY TRAILER

When using a trailer, the machine can be transported as one unit. Provide an appropriate trailer, referring to the dimensions of the machine in the transport position, as shown in the Specifications section.

Recommended Trailers:
EX100-3 : 11 ton trailer

When using this trailer, consult your authorized dealer for details.



M107-06-013

LOADING/UNLOADING ON A TRAILER
Always load and unload the machine on a solid, level surface.

CAUTION: Be sure to use a loading dock or a ramp for loading/unloading.

Ramp/Loading Dock:
1. Before loading, thoroughly clean the ramp and flatbed. Dirty ramps or flatbeds with oil, mud or ice on them are slippery and dangerous.
2. Place blocks against the trailer wheels while using a ramp or loading dock.
3. Ramps must be sufficient in width, length and strength. Be sure that the incline of the ramp is less than 15 degrees.
4. Loading docks must be sufficient in width and strength to support the machine and have a gradient of less than 15 degrees.

Loading/Unloading

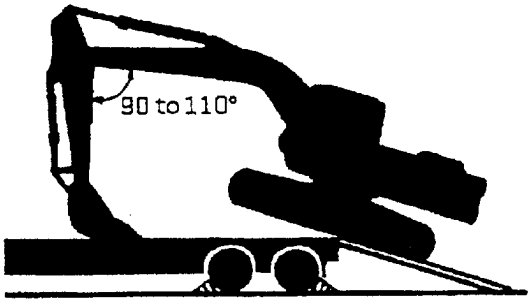
CAUTION:

- **Always turn the auto-idle switch OFF when loading or unloading the machine, to avoid unexpected speed increase due to unintentional operation of a control lever.**
- **Always select the medium or slow speed mode with the travel mode switches. In the high speed mode, travel speed may automatically increase.**
- **Avoid steering while driving up or down a ramp as it is extremely dangerous. If steering is unavoidable, first move back to the ground or flatbed, modify traveling direction, and begin to drive again.**
- **The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.**
- **Prevent possible injury from machine tipping while the upperstructure is rotating. Keep the arm tucked under and rotate the upperstructure slowly for best stability.**

Loading

1. The machine direction should be as follows:
   With the front attachment: Travel forward with the front attachment at the front.
   Without the front attachment: Travel in reverse, as illustrated.
2. The centerline of the machine should be over the centerline of the trailer.
3. Drive the machine onto the ramp slowly.
   With the front attachment:
   - Position the bucket with its flat surface resting on the trailer. Angle of the arm to boom should be 90 to 110°.
   - Rest the bucket on the trailer just before the machine begins to tip forward onto the trailer. Slowly travel forward until the tracks are firmly on the trailer.
   - Slightly raise the bucket. Keeping the arm tucked under, slowly rotate the upperstructure 180°.
   - Lower the bucket onto blocks.
4. Stop the engine. Remove key from switch.
5. Move the control levers several times until hydraulic pressure in the cylinders is released.
6. Pull pilot control shut-off lever to LOCK position.
7. Close cab windows, roof vent and door, and cover the exhaust opening, to prevent entry of wind and water.

NOTE: In cold weather, be sure to warm up the machine before loading or unloading it.



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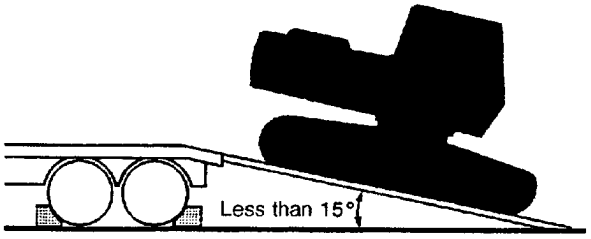

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Transporting

CAUTION: Fasten chains or cables to the machine frame. Do not place chains or cables over or against the hydraulic lines or hoses.

1. Place blocks in front of and behind the tracks.
2. Fasten each corner of the machine and front attachment to the trailer with a chain or cable.

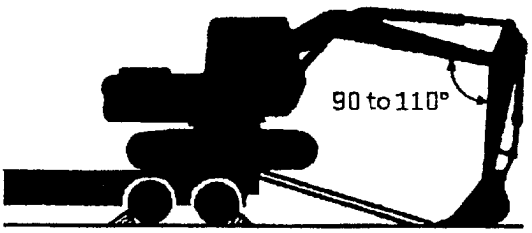
M107-06-013

Unloading

CAUTION: The rear end of the flatbed where it meets the ramp is a sudden bump. Take care when traveling over it.

IMPORTANT: Prevent possible damage to the front attachment. Always position the arm at 90° to the boom when unloading the machine. Unloading the machine with the arm tucked in may cause machine damage.

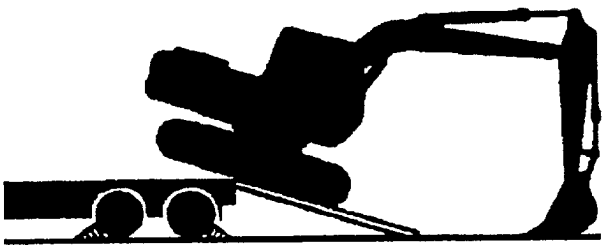
1. To move the machine over end of the trailer onto the ramp, rest the flat surface of the bucket on the ground. Angle of the arm to the boom should be 90 to 110°.



M107-06-023

IMPORTANT: Prevent possible damage to the hydraulic cylinders. Do not allow the machine to hit ground hard with the bucket.

2. The bucket must be on the ground before the machine begins to tip forward.
3. As the machine moves forward, raise the boom and extend the arm until the machine is completely off the ramp.

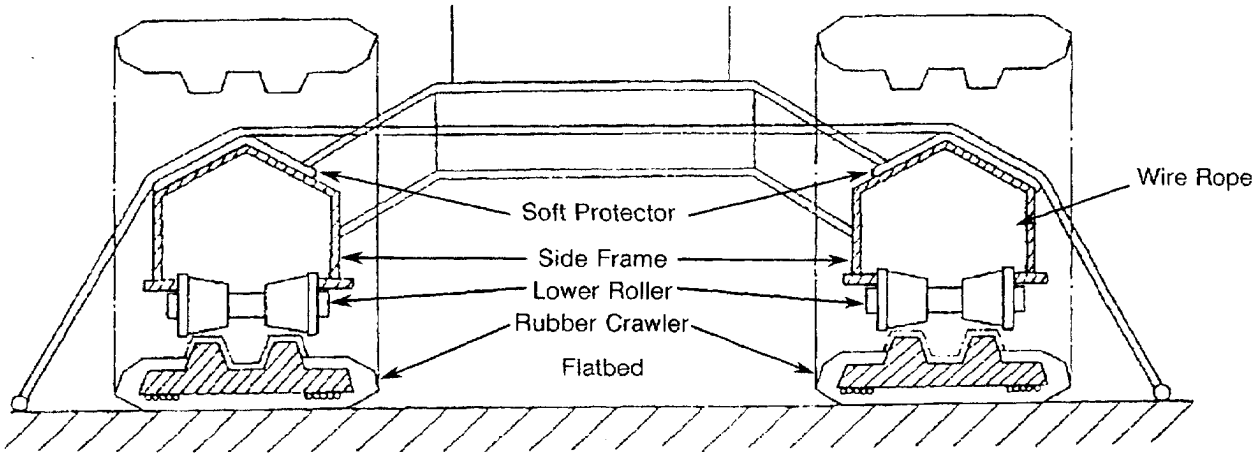


M107-06-015

PRECAUTIONS FOR TRANSPORTING MACHINES WITH RUBBER CRAWLERS

When transporting a machine with rubber crawlers, be sure to fasten the right and left track frames securely to the flatbed with wire ropes and soft protectors, as shown.

Do not allow wire ropes to come into direct contact with rubber crawlers.

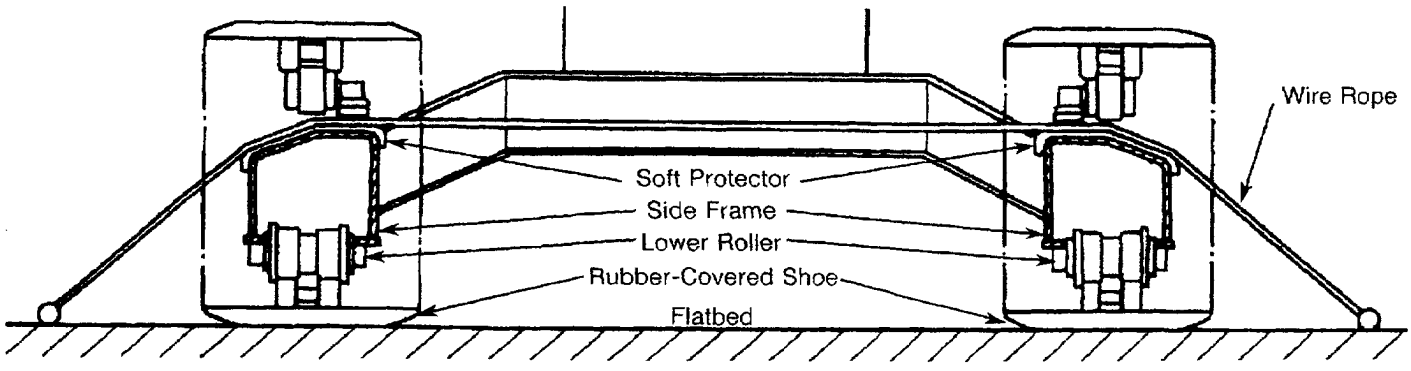


M104-06-004

PRECAUTIONS FOR TRANSPORTING MACHINES WITH RUBBER-COVERED SHOES

When transporting a machine with rubbercovered shoes, be sure to fasten the right and left track frames securely to the flatbed with wire ropes and soft protectors, as shown.

Do not allow wire ropes to come into direct contact with rubber-covered shoes.



M102-06-004

CORRECT MAINTENANCE AND INSPECTION PROCEDURES

Learn how to service your machine correctly. Follow the correct maintenance and inspection procedures shown in this manual.

Inspect machine daily before starting.
- Check controls and instruments.
- Check coolant, fuel and oil levels
- Check for leaks, kinked, frayed or damaged hoses and lines.
- Walk around machine checking general appearance, noise, heat, etc.
- Check for loose or missing parts.

If there is any problem with your machine, repair it before operating or contact your authorized dealer.

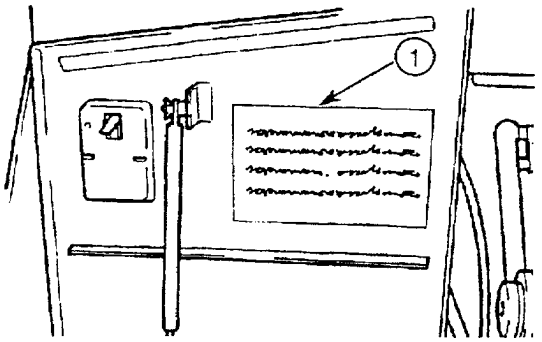
IMPORTANT:
- **Use only recommended fuel and lubricants.**
- **Use only genuine HITACHI parts.**
- **Failure to use recommended fuel, lubricants, and genuine Hitachi parts will result in loss of Hitachi product warranty.**
- **Never adjust engine governor or hydraulic system relief valve.**
- **Protect electrical parts from water and steam.**
- **Never disassemble electrical components such as PVC, EC, sensors, etc.**

SA-005

SERVICE YOUR MACHINE AT SPECIFIED INTERVALS

Perform all service procedures described in this maintenance guide.

Lubricate, make service checks and adjustments at intervals shown on periodic maintenance chart ① located on the inside of the tool box cover (and on the following pages).

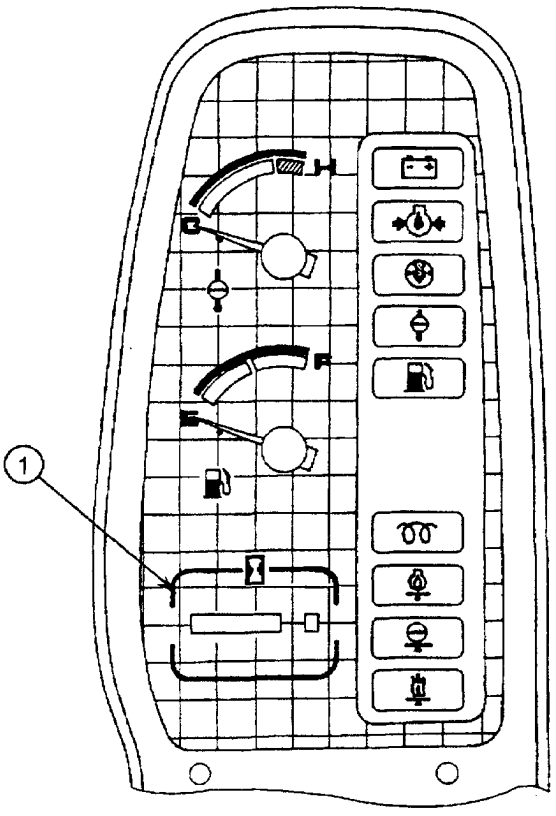


M104-07-095

CHECK THE HOUR METER REGULARLY

Check hour meter ① to determine when your machine needs periodic maintenance.

Intervals on the periodic maintenance chart are for operating in normal conditions. If you operate your machine in more adverse conditions, you should service it at SHORTER INTERVALS.



M104-01-003

USE CORRECT FUELS AND LUBRICANTS

IMPORTANT: Always use recommended fuels and lubricants.
Failure to do so will result in machine damage and loss of Hitachi product warranty.

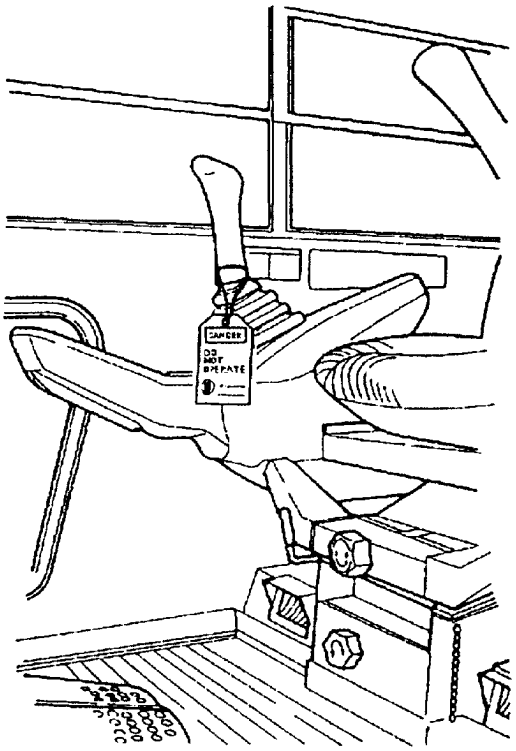
PREPARE MACHINE FOR MAINTENANCE

Before performing the maintenance procedures given in the following chapters, park the machine as described below, unless otherwise specified.

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for three minutes.
5. Turn the key switch OFF. Remove key from switch. (If maintenance must be performed with engine running, do not leave machine unattended.)
6. Pull the pilot control shut-off lever to the LOCK position.
7. Before performing any work on the machine, attach a "Do Not Operate" tag on the right control lever.

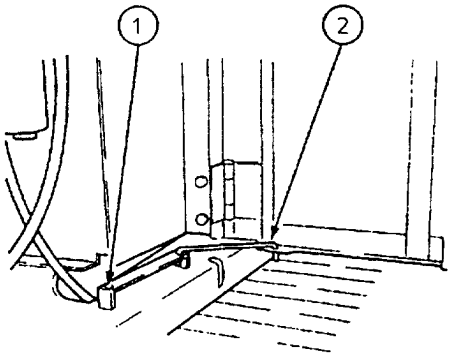


SA-109

OPEN ACCESS DOORS FOR SERVICE

To hold door open, remove rod from stored position ① and insert it in tab ②.

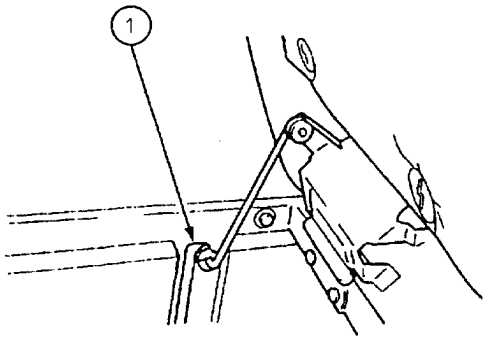
A tool box is provided in the right front compartment.



M104-07-096

OPEN HOOD FOR SERVICE

Pull open latches to unlock the hood. Lift the hood and place the hood support in notch ① to hold the hood open.



M104-07-097

PERIODIC REPLACEMENT OF PARTS

To ensure safe operation, be sure to conduct periodic inspection of the machine. In addition, the parts listed below, if defective, may pose serious safety/fire hazards. It is very difficult to gauge the extent of deterioration, fatigue, or weakening of the parts listed below simply by visual inspection alone. For this reason, replace these parts at the intervals shown in the table below. However, if any of these parts is found to be defective by inspection, replace it before starting operation, regardless of the interval.

Also, when replacing hoses, check their clamps for deformities, cracks, or other deterioration, and replace them as necessary.
Be sure to perform periodic inspection of all hoses, as shown below, and replace or retighten any defective parts found, as necessary.
Consult your authorized dealer for correct replacement.

Periodic Replacement Parts			Replacement Intervals
Engine		Fuel hose (Fuel tank to filter)	Every 2 years
		Fuel hose (Fuel tank to injection pump)	Every 2 years
		Heater hose (Heater to engine)	Every 2 years
Hydraulic System	Basic Machine	Pump suction hose	Every 2 years
		Pump delivery hose	Every 2 years
		Swing hose	Every 2 years
	Front-End Attachment	Boom cylinder line hose	Every 2 years
		Arm cylinder line hose	Every 2 years
		Bucket cylinder line hose	Every 2 years
		Pilot hose	Every 2 years

Note : Be sure to replace seals, such as O-rings and gaskets, along with the replacing hose.

MAINTENANCE GUIDE

A. GREASING (See P. 96)

Parts		Quantity	Interval (hours)						
			8	50	100	250	500	1 000	2 000
1. Front Joint Pins	Boom Pivot, Boom Cylinder Bottom End, Bucket and Link Pins	10	★ ★★						
	Others	7	★★						
2. Swing Bearing		2							
3. Swing Internal Gear		1							
4. Offset Arm Front Joint Pins	Boom Pivot, Boom Cylinder Bottom End, Bucket and Link Pins	10	★ ★★						
	Others	15	★★						
5. Clamshell Bucket (Opt.)		9							

B. ENGINE OIL (See P. 103)

Parts		Quantity	Interval (hours)						
			8	50	100	250	500	1 000	2 000
1. Engine Oil	Oil Level Check	–							
2. Engine Oil	Change	14.7 L (3.9 US gal)							
3. Engine Oil Filter	Replacement	1							

C. GEAR OIL (See p. 106)

Parts			Quantity	Interval (hours)						
				8	50	100	250	500	1 000	2 000
1. Pump Transmission	Oil Level Check		–							
	Change		0.8 L (0.85 US qt)							
2. Swing Reduction Gear	Oil Level Check		–							
	Change		4.0 L (1.1 US gal)							
3. Travel Reduction Gear	Oil Level Check		–							
	Change	100-3	3.0 L×2 (3.2 US qt×2)							
		100M-3	4.4 L×2 (4.7 US qt×2)							

D. HYDRAULIC SYSTEM (See p. 111)

Parts		Quantity	Interval (hours)								
			8	50	100	250	500	1 000	1 500	2 000	2 500
1. Check Hydraulic Oil Level		–									
2. Drain Hydraulic Oil Tank Sump		1									
3. Change Hydraulic Oil		130 L (34.3 US gal)							※		※
4. Suction Filter Cleaning		1	When changing hydraulic oil								
5. Replace Hydraulic Tank Oil Filter		1									
6. Replace Pilot Oil Filter		1									
7. Check Hoses and Lines	for leak	–									
	for crack, bend, etc.	–									

NOTE: ★ *Grease every 8 hours for first 50 hours.*
★★ *Maintenance required when operating in water or mud.*
※ *Hydraulic oil changing intervals differ according to kind of hydraulic oils used. See recommended oil chart.*

E. FUEL SYSTEM (See p. 121)

Tank capacity 250 liter (66 US gal)

Parts		Quantity	Interval (hours)						
			8	50	100	250	500	1 000	2 000
1. Drain Fuel Tank Sump		1	■						
2. Check Water Separator		1		■					
3. Replace Fuel Filter		1					■		
4. Clean Feed Pump Strainer		1						■	
5. Check Fuel Hoses	for leak, crank, etc.	–	■						
	for crack, bend, etc.	–				■			

F. AIR CLEANER (See P. 125)

Parts		Quantity	Interval (hours)						
			8	50	100	250	500	1 000	2 000
1. Air Cleaner Outer Element	Cleaning	1				■	(Or when indicator lit)		
	Replacement	1	After cleaning 6 times or 1 year						
2. Air Cleaner Inner Element	Replacement	1	When outer element is replaced						

G. COOLING SYSTEM (See p. 127)

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1 000	2 000
1. Check Coolant Level	–	■						
2. Check and Adjust Fan Belt Tension	1		★★★	■				
3. Change Coolant	16.4 L (4.3 US gal)	Twice a year ※1						
4. Clean Radiator Core (outside)	1					■		
5. Clean Radiator Interior	1	When changing coolant						
6. Clean Oil Cooler Front Screen	1					■※2		

H. ELECTRICAL SYSTEM (See P. 132)

I. MISCELLANEOUS (See P. 136)

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1 000	2 000
1. Check Bucket Teeth for Wear and Looseness	–	■						
2. Change Bucket	–	As required						
3. Convert Bucket Connection Into Face Shovel	1	As required						
4. Adjust Bucket Linkage	–	As required						
5. Remove Travel Levers	2	As required						
6. Check and Replace Seat Belt	–	■	Every 3 years (Replace)					
7. Check Windshield Washer Fluid Level	–	As required						
8. Check Track Sag	2		■					
9. Adjust Track Sag	2	As required						
10. Adjust Track Sag (Opt. Rubber Crawler)	2	■						
11. Replace Track (Opt. Rubber Crawler)	2	As required						
12. Check Clamshell Bucket (Opt.)	–			■				
13. Check Air Conditioner (Opt.)	–	■						
14. Check Tightening Torque of Bolts and Nuts	–		★★★		■			

NOTE: ★★★ *Maintenance required only during first time check.*

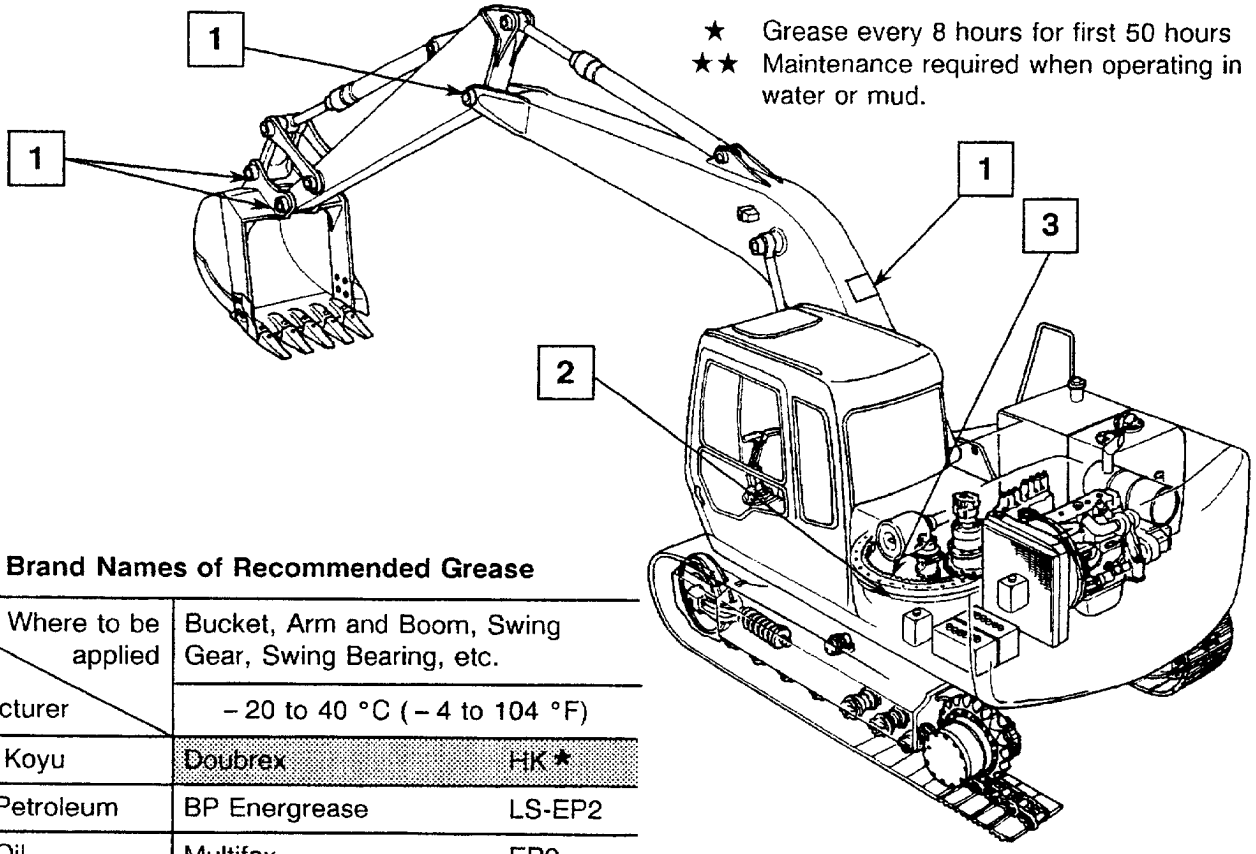
※1 *When genuine coolant is used, replace every two years or 4 000 operating hours, whichever comes first.*

※2 *Shorten maintenance interval when the machine is operated in dusty areas.*

A. GREASING

Parts		Quantity	Interval (hours)						
			8	50	100	250	500	1 000	2 000
1. Front Joint Pins	Boom Pivot, Boom Cylinder Bottom End, Bucket and Link Pins	10	★ ★★						
	Others	7	★★						
2. Swing Bearing		2							
3. Swing Internal Gear		1							
4. Offset Arm Front Joint Pins	Boom Pivot, Boom Cylinder Bottom End, Bucket and Link Pins	10	★ ★★						
	Others	15	★★						
5. Clamshell Bucket (Opt.)		9							

★ Grease every 8 hours for first 50 hours
★★ Maintenance required when operating in water or mud.



M104-07-073

Brand Names of Recommended Grease

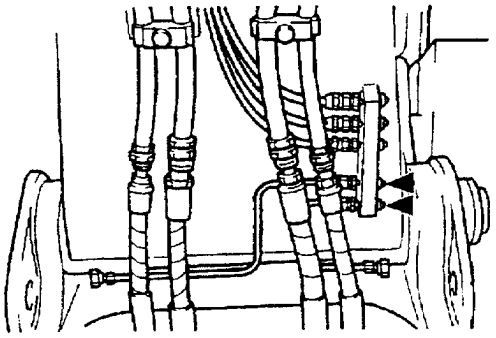
Where to be applied / Manufacturer	Bucket, Arm and Boom, Swing Gear, Swing Bearing, etc.	
	– 20 to 40 °C (– 4 to 104 °F)	
Nippon Koyu	Doubrex	HK★
British Petroleum	BP Energrease	LS-EP2
Caltex Oil	Multifax	EP2
Esso	Beacon	EP2
Idemitsu Kosan	Daphne Coronex Grease	EP2
Mobil Oil	Mobilux	EP2
Nippon Oil	Epinoc Grease	AP2
Shell Oil	Shell Alvania EP Grease	2

NOTE: The machine shipped from the factory is filled with lubricants marked with ★.

1 Front Joint Pins

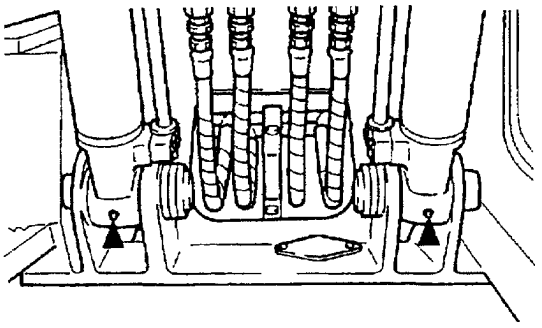
(1) Boom Pivot Pin, Boom Cylinder Bottom End, Bucket and Link Pins
--- every 50 hours (every 8 hours for the first 50 hours)

- Boom Pivot



M104-07-001

- Boom Cylinder Bottom End



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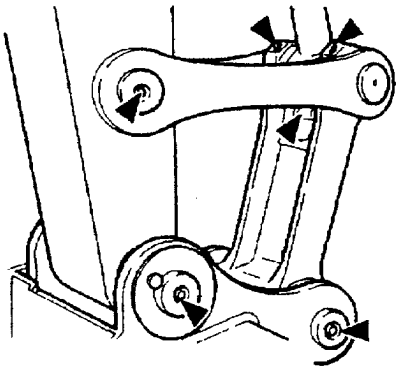
- Bucket and Link Pins

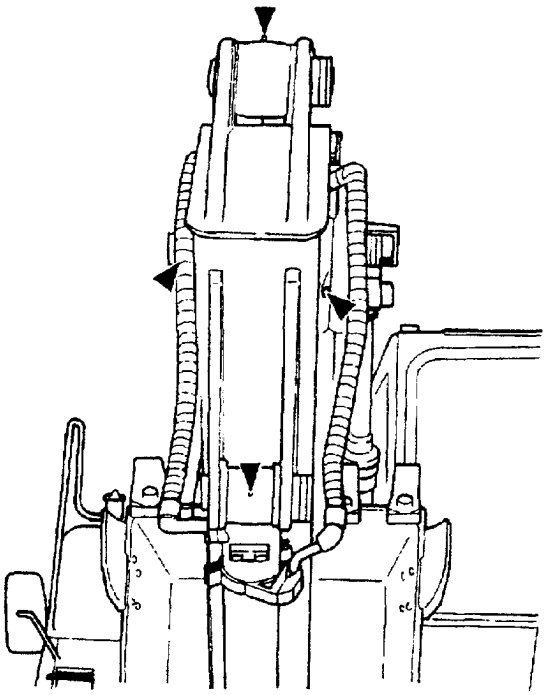


M104-07-120

NOTE: Greasing is easier when the front attachment is in the transport position (the arm cylinder and bucket cylinder fully extended and the boom lowered to the ground).

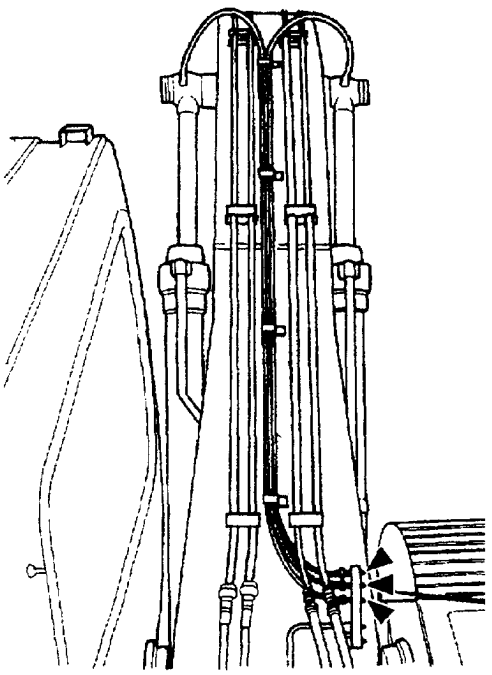
(2) Other Pins --- every 100 hours

- Boom and Arm Joint Pin, Arm Cylinder Rod Pin and Bucket Cylinder Bottom Pin.



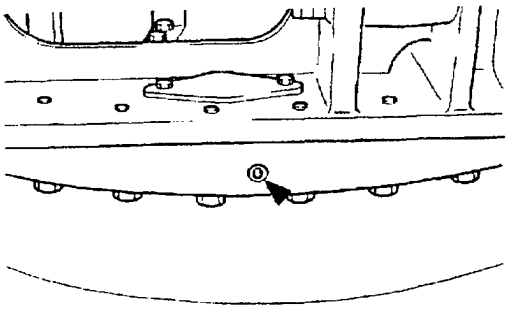
M104-07-004

- Boom Cylinder Rod Pins and Arm Cylinder Bottom Pin. (Centralized greasing system)



M104-07-005

2 Swing Bearing --- every 500 hours



M104-07-006

CAUTION: Lubricating both the swing bearing and gear and rotating the upperstructure must be done by one person. Before you lubricate the swing bearing, clear the area off all persons.

Each time you leave the cab

- **Lower the bucket to the ground.**
- **Stop the engine.**
- **Pull the pilot control shut-off lever to the LOCK position.**
- **Use handrails.**

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for three minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. With the upperstructure stationary, apply grease to the two grease fittings.
8. Start the engine. Raise the bucket several inches off the ground and rotate the upperstructure 45° (1/8 turn).
9. Lower the bucket to the ground.
10. Repeat the procedure three times, beginning with step 5.
11. Apply grease to the swing bearing until grease can be seen escaping from the swing bearing seals.
12. Total amount of grease to be applied is approximately 0.25 liters (0.07 US gal).
13. Take care not to supply excessive grease.

3 Swing Internal Gear --- every 500 hours

CAUTION: Adding or changing swing internal gear grease and rotating the upperstructure must be done by one person. Before you start, clear the area off all persons.

Each time you leave the cab
- **Lower the bucket to the ground.**
- **Stop the engine.**
- **Pull the pilot control shut-off lever to the LOCK position.**
- **Use handrails.**

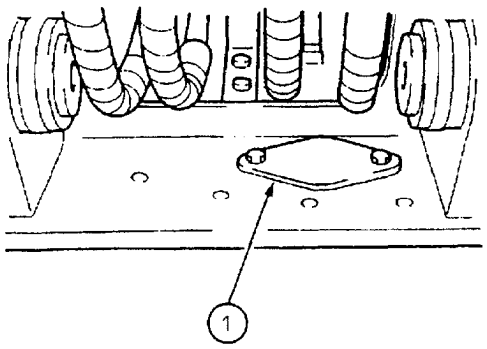
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for three minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Open the tool box cover on the upperstructure and remove cover ①.
8. Grease must be to the top of all internal gear teeth of the swing bearing and be free of contamination by dirt and water.
   Add approximately 0.5 kg (1.1 lb) of grease, if required. If the grease is contaminated, remove grease and replace with clean grease.

IMPORTANT: If water or mud is found in the swing gear area, see Operating in Water or Mud in the "Operating the Machine" section.

9. Install the cover.
10. If grease shows any sign of water or mud, replace all the grease on the internal gear.
    Remove cover ② from the bottom of the swing gear housing, located near the center joint.
    Total amount of grease applied should be approximately 5 liters (1.3 US gal).



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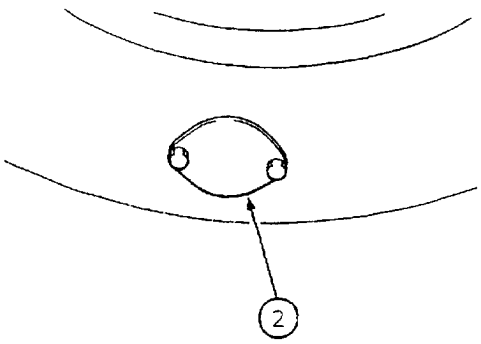


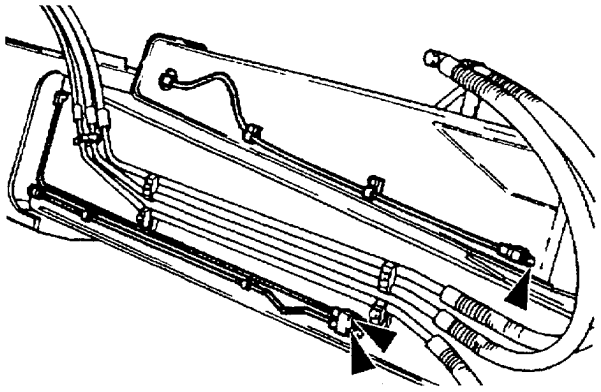
M104-07-008

4 Offset Arm Front Joint Pins --- If equipped

EX100-3, EX100M-3

Boom Pivot Pin, Boom Cylinder Bottom End, Bucket and Link Pins
--- every 50 hours (every 8 hours for the first 100 hours) Refer to 1 Front Joint Pins.
Others
--- every 100 hours (every 8 hours for the first 100 hours)

1. Arm cylinder Bottom End
   Lower Boom and Upper Boom Joint Pin.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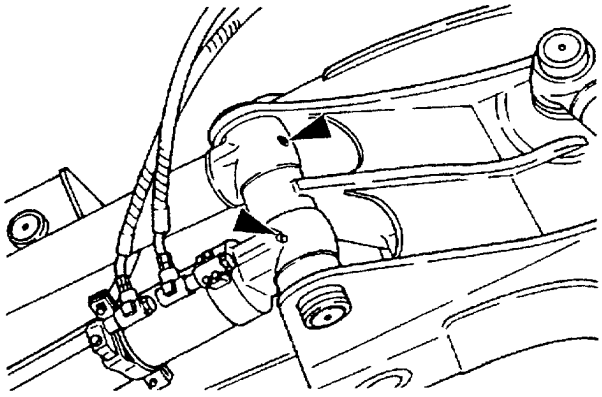
2. Offset Cylinder Bottom End
   Stay Rear Pin.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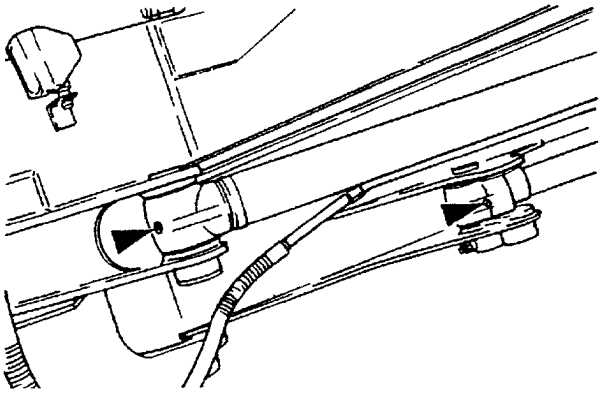
3. Offset Cylinder Rod End
   Stay Front Pin.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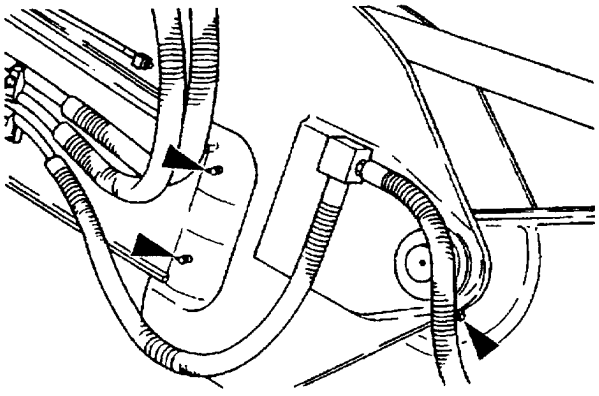
4. Upper Boom and Cylinder Stay Joint Pin.
   Arm and Cylinder Stay Joint Pin.

5. Arm cylinder Rod End
   Bucket Cylinder Bottom End
   Boom Cylinder Rod Ends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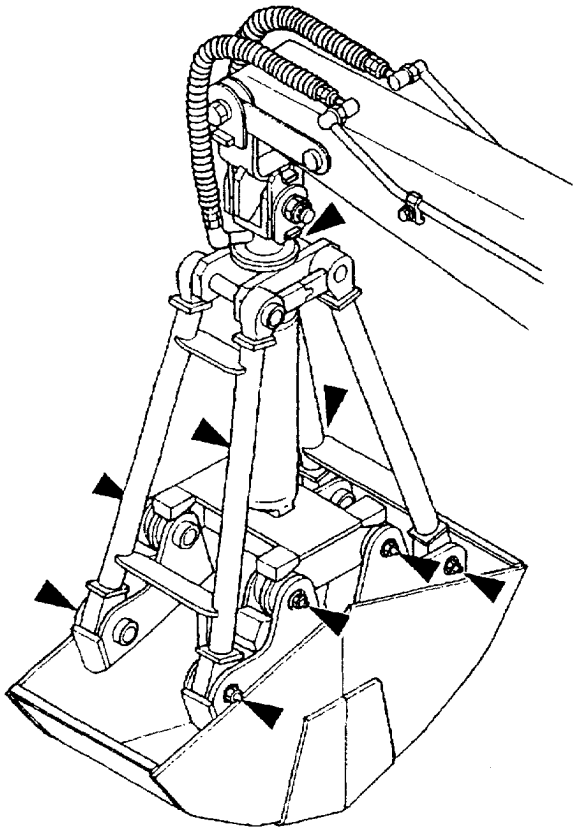
5 **Clamshell Bucket --- daily**

Lubricate all fittings shown in right figure.



M104-07-132

B. ENGINE OIL

Parts		Quantity	Interval (hours)						
			8	50	100	250	500	1 000	2 000
1. Engine Oil	Oil Level Check	–	▒						
2. Engine Oil	Change	14.7 L (3.9 US gal)					▒		
3. Engine Oil Filter	Replacement	1					▒		

Recommended Engine Oil
Depending upon the expected air temperature range between oil changes, use the oil viscosity shown on the temperature chart below.

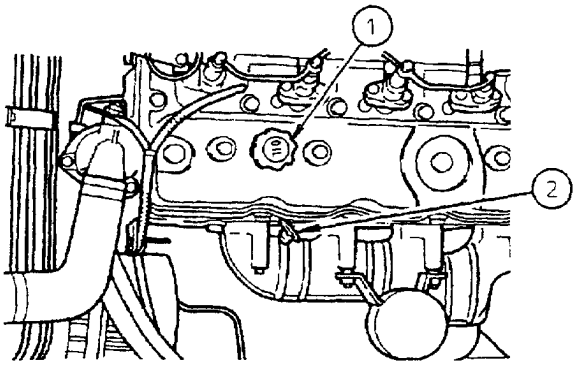
API CD Class
SAE 30 or equivalent (both summer and winter)
High temperature areas, SAE 40 or equivalent
Low temperature areas, SAE 10W or equivalent

Brand Names of Recommended Engine Oil

Kind of Oil	Engine Oil		
Application / Air Temp. / Manufacturer	Engine Crank Case Fuel Injection Pump and Governor		
	– 20 to 0 °C (– 4 to 32 °F)	– 10 to 35 °C (14 to 95 °F)	25 to 40 °C (77 to 104 °F)
British Petroleum	BP Vanellus C3		
	10W	30	40
Caltex Oil	RPM DELO 300 Oil		
	10W	30	40
Esso	Essolube D-3		
	10W	30	40
Idemitsu Kosan	Apoll oil diesel motive		
	S-310	S-330	S-340
	– 15 to 40 °C (5 to 104 °F) Apoll oil custom wide 15W-40		
	▒ Apoll oil super wide 15W-40		
Mobil Oil	Mobil Delvac		
	1310	1330	1340
Nippon Oil	Hidiesel S 3		
	–20 to 35 °C (–4 to 95 °F) 10W-30	–10 to 40 °C (14 to 104 °F) 15W-40	
Shell Oil	Rymla zoil white pilot super		
	10W	30	40

- The machine shipped from the factory is filled with lubricants marked with ▒.

1 **Engine Oil Level --- check daily**



M105-07-008

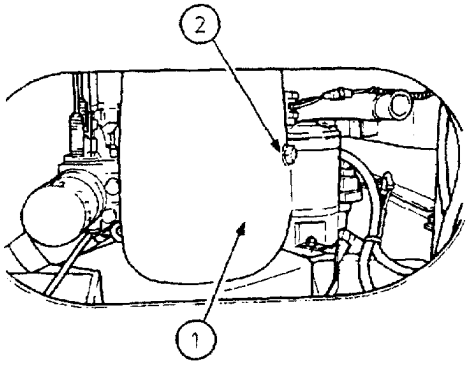
IMPORTANT: For most accurate readings, check the oil level every day before starting the machine. Be sure the machine is on a level surface.

1. Remove dipstick ②. Wipe oil off with a clean cloth. Reinsert dipstick ②.
2. Remove dipstick ② again. Read level. Oil level must be between the circle marks.
3. If necessary, add oil via oil filler tube ①.
   Be sure to use only recommended oil (see Recommended Engine Oil Chart).

NOTE: Checking the oil level immediately after shut down will result in inaccurate readings.
Be sure to allow the oil to settle for at least 10 minutes before checking.

2 **Change Engine Oil --- every 500 hours**

3 **Replace Engine Oil Filters --- every 500 hours**

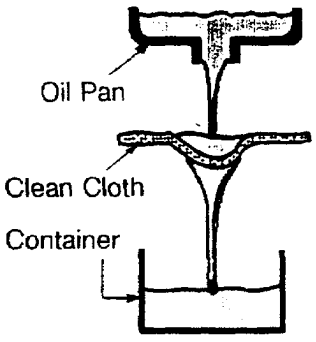


M104-07-038

1. Run the engine to warm oil.
   DO NOT run the engine until oil is hot.
2. Park the machine on a level surface.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

5. Run the engine at slow idle speed without load for three minutes.
6. Turn the key switch OFF. Remove the key from the switch.
7. Pull the pilot control shut-off lever to the LOCK position.



M104-07-010

CAUTION: Engine oil may be hot. Take extra care to avoid burns.

8. Remove drain plug ②. Allow oil to drain through a clean cloth into a 25 liter (6.5 US gal) container.

9. After all oil has drained, inspect cloth for any debris such as small pieces of metal.

10. Install and tighten drain plug ②.

11. Remove the filter cartridge of engine oil filter ④ by turning it counterclockwise with filter wrench ③.

12. Clean the filter gasket contact area on the engine.

13. Apply a thin film of clean oil to the gasket of new filter.

14. Install new filter. Turn the filter cartridge clockwise by hand until the gasket touches the contact area. Be sure not to damage the gasket when installing the filter.

15. Tighten engine oil filter ④ 2/3 turn more using filter wrench ③. Be careful not to overtighten.

16. Remove the oil filler cap. Fill the engine with recommended oil. Check that oil level is between the circle marks on the dipstick after 15 minutes. Engine oil capacity is 14.7 liters (3.9 US gal).

17. Install the filler cap.

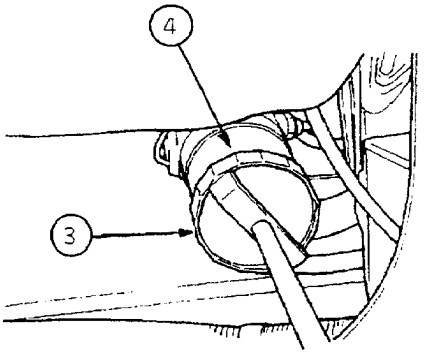
18. Start the engine. Push the slow idle (I) mode switch. Run the engine at slow idle for 5 minutes.

19. Check that the engine oil pressure indicator on the monitor panel goes out immediately. If not, stop the engine immediately and find the cause.

20. Stop the engine. Remove the key from the key switch.

21. Check for any leakage at the drain plug.

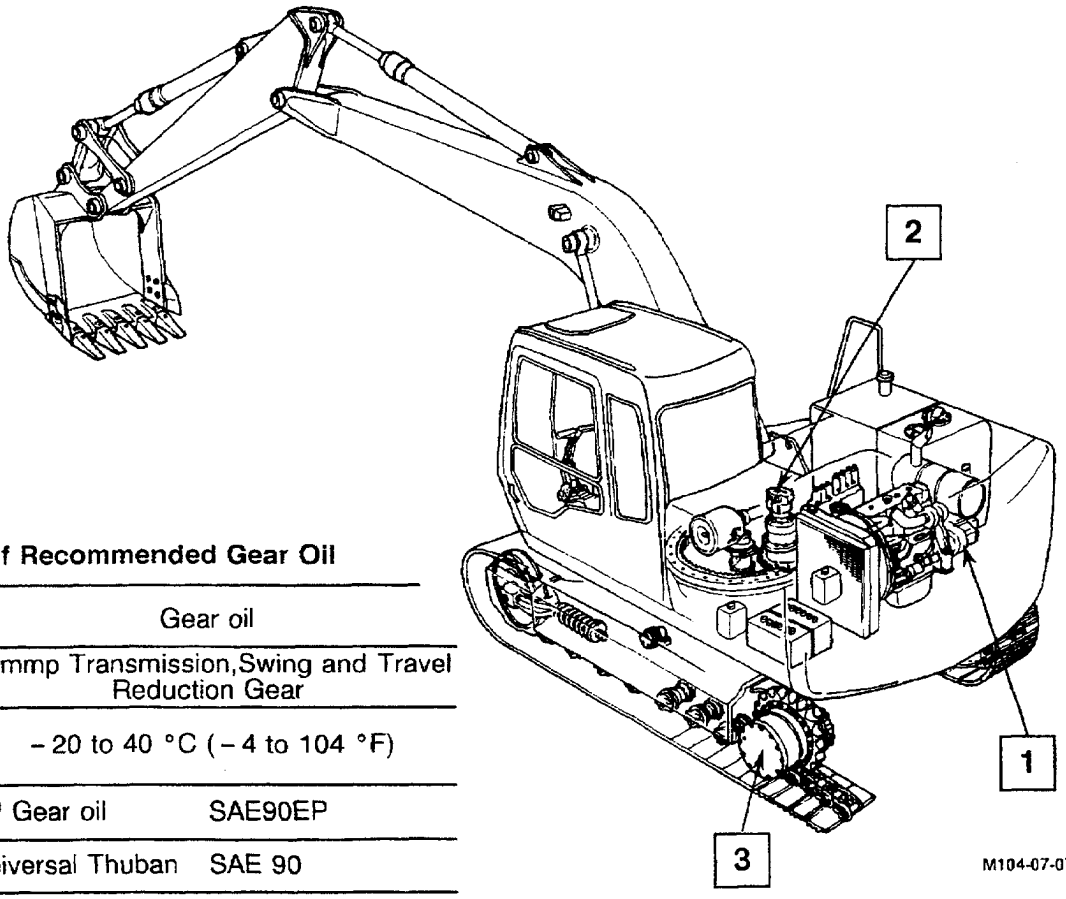
22. Check oil level on the dipstick.



M104-07-013

C. GEAR OIL

Parts			Quantity	Interval (hours)						
				8	50	100	250	500	1 000	2 000
1. Pump Transmission	Oil Level Check		–				▒			
	Change		0.8 L (0.85 US qt)						▒	
2. Swing Reduction Gear	Oil Level Check		–				▒			
	Change		4.0 L (1.1 US gal)						▒	
3. Travel Reduction Gear	Oil Level Check		–				▒			
	Change	100-3	3.0 L×2 (3.2 US qt×2)							▒
		100M-3	4.4 L×2 (4.7 US qt×2)							▒



M104-07-073

Brand Names of Recommended Gear Oil

Kind of Oil / Application / Air Temp. / Manufacturer	Gear oil	
Application	Pummp Transmission,Swing and Travel Reduction Gear	
Air Temp.	– 20 to 40 °C (– 4 to 104 °F)	
British Petroleum	BP Gear oil	SAE90EP
Caltex Oil	Universal Thuban	SAE 90
Esso	Esso Gear Oil	80W-90, 85W-90
Idemitsu Kosan	Apollo Gear	HE90
Mobil Oil	Mobilube	GX90
Nippon Oil	Gear Lube SP90 (Swing Travel) Gear Lube SP80W-90 (Pump)	
Shell Oil	Shell Spirax	EP90
Remarks	API GL 4 Class	

The machine shipped from the factory is filled with oil marked ▒ .

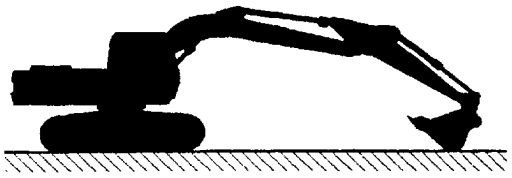
1 Pump Transmission

Check Oil Level --- every 250 hours

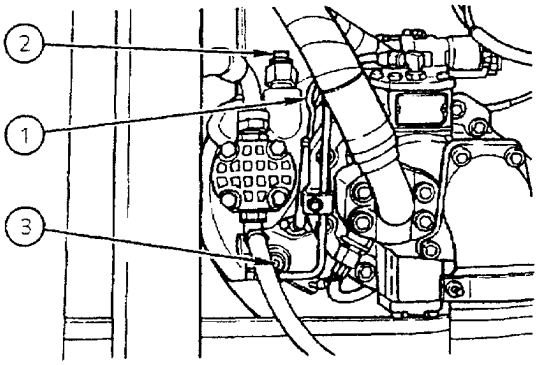
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Remove dipstick ①. Oil must be between marks.
8. If necessary, remove plug ② and add oil. (See gear oil chart)
9. Recheck oil level.



M104-07-021



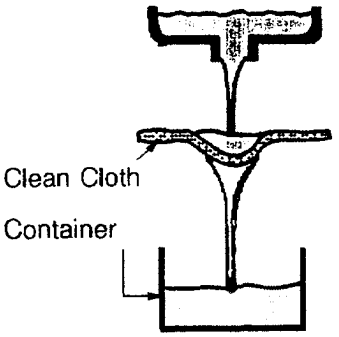
M104-07-127

Change Gear Oil --- every 1 000 hours

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

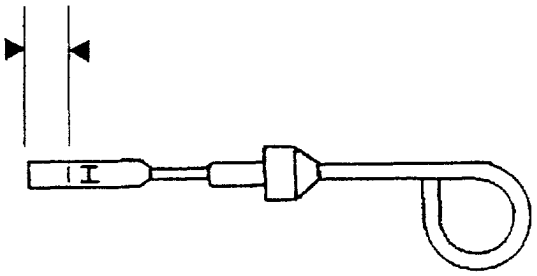
4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.



M104-07-010

CAUTION: Gear oil may be hot. Wait for gear oil to cool before starting work.

7. Remove drain plug ③. Allow oil to drain through a clean cloth into a 1 liter (1 US qt) container.
8. Reinstall the drain plug.
9. Remove plug ② and add oil until it is between marks on dipstick ①.



M110-07-016

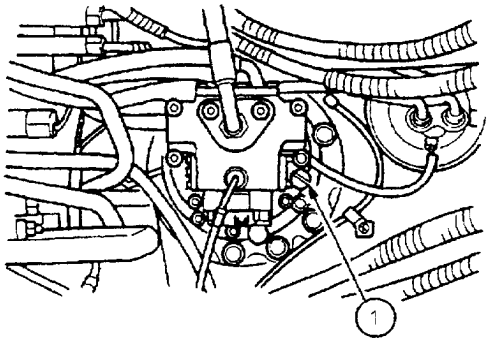
2 Swing Reduction Gear

Check Oil Level --- every 250 hours

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Remove dipstick ①. Oil must be between marks.
8. If necessary, remove oil supply cap ③ and add oil. (See gear oil chart)
9. Recheck oil level.



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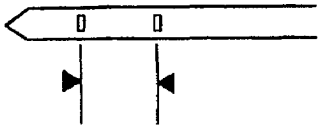


M104-07-017

Change Gear Oil --- every 1 000 hours

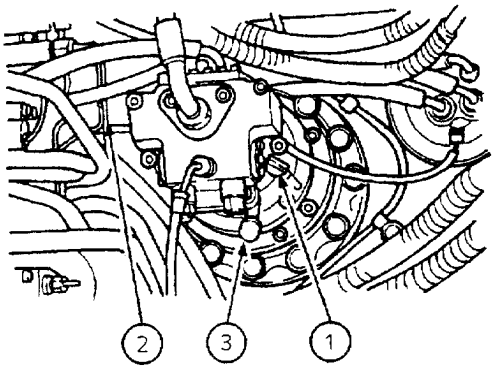
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.

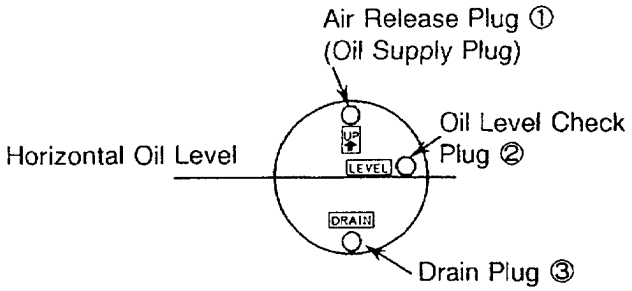
⚠ CAUTION: Gear oil may be hot. Wait for gear oil to cool before starting work.

7. Remove the drain plug mounted on the end of drain pipe ② to drain oil.
8. Reinstall the drain plug.
9. Remove oil supply cap ③ and add oil until it is between marks on dipstick ①.



M104-07-018

3 Travel Reduction Gear



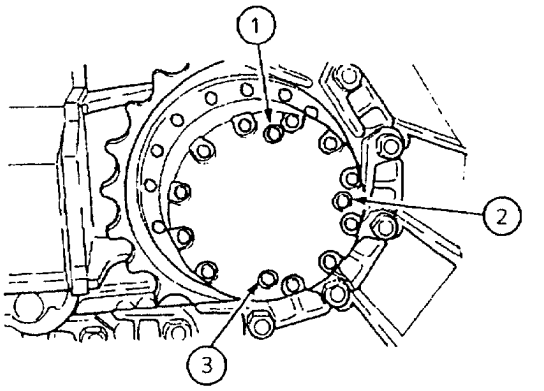
M107-07-096

Check Oil Level --- every 250 hours

1. Park the machine on a level surface.
2. Rotate the travel motor until the bottom of oil level check plug ② is even with the horizontal oil level line.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

5. Run the engine at slow idle speed without load for three minutes.
6. Stop the engine. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.

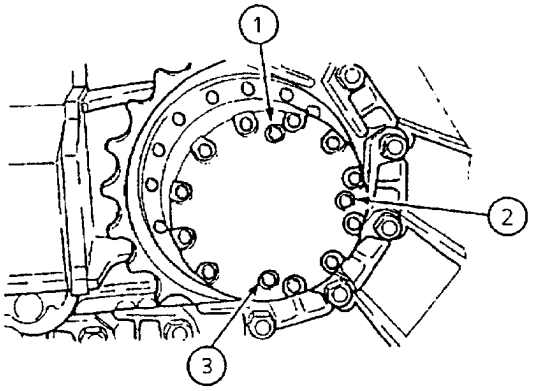


M104-07-020

CAUTION: Keep body and face away from the air release plug. Gear oil is hot. Wait for gear oil to cool and then gradually loosen the air release plug to release pressure.

8. After gear oil has cooled, slowly loosen air release plug ① to release pressure.
9. Remove oil level check plug ②. Oil must be up to the bottom of hole.
10. If necessary, add oil until oil flows out of the oil level check plug hole. (See gear oil chart)
11. Wrap the plug threads with sealing-type tape. Install the plug.
    Tighten the plug to 49 N·m (5 kgf·m, 36 lbf·ft).
12. Check the gear oil level in the other travel reduction gear.

Change Gear Oil --- every 2 000 hours



M104-07-020

1. Park the machine on a level surface.
2. Rotate the travel motor until the bottom of oil level check plug ② is even with the horizontal oil level line.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

5. Run the engine at slow idle speed without load for three minutes.
6. Stop the engine. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.

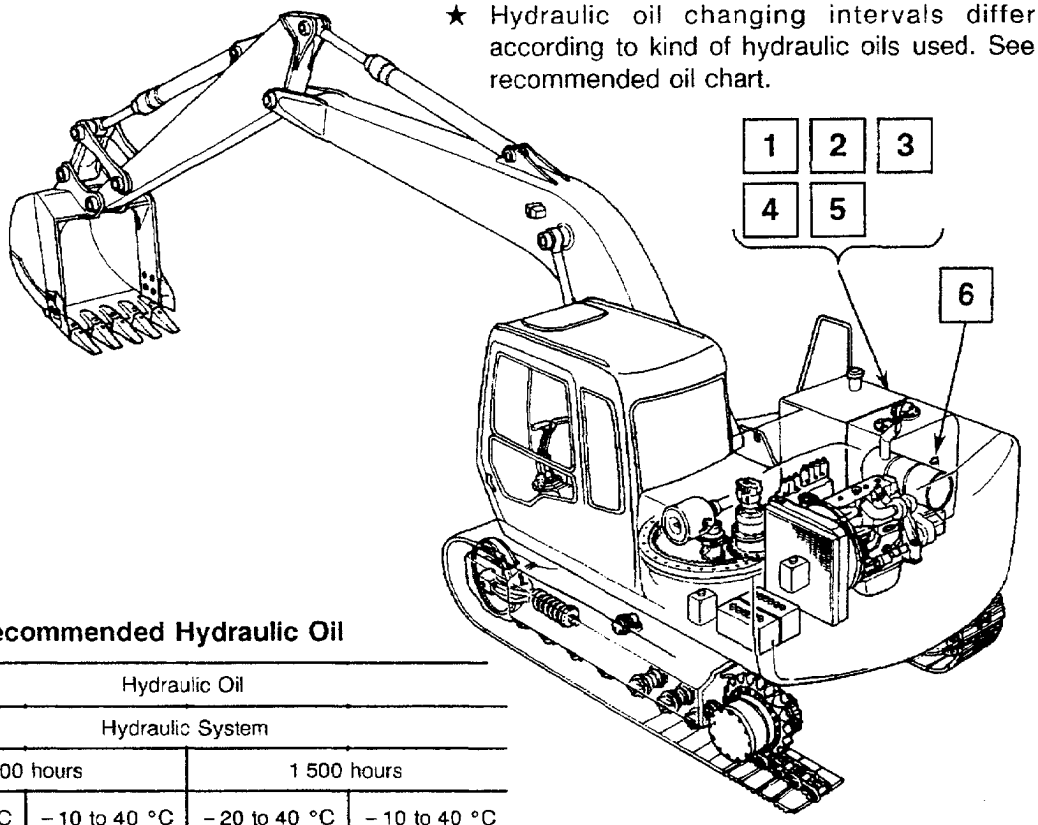
CAUTION: Keep body and face away from the air release plug. Gear oil is hot. Wait for gear oil to cool and then gradually loosen the air release plug to release pressure.

8. After gear oil has cooled, slowly loosen air release plug ① to release pressure.
9. Remove drain plug ③ to drain oil.
10. Wrap the threads of the drain plug with sealing-type tape. Install the plug.
    Tighten the plug to 49 N·m (5 kgf·m, 36 lbf·ft).
11. Remove oil level check plug ②.
12. Add oil until oil flows out of the oil level check plug hole. (See gear oil chart)
13. Wrap the threads of oil level check plug ② and air release plug ① with sealing-type tape. Reinstall the plugs.
    Tighten the plugs to 49 N·m (5 kgf·m, 36 lbf·ft).
14. Repeat steps 8 to 13 for the other travel reduction gear.

D. HYDRAULIC SYSTEM

Parts		Quantity	Interval (hours)								
			8	50	100	250	500	1 000	1 500	2 000	2 500
1. Check Hydraulic Oil Level		—	■								
2. Drain Hydraulic Oil Tank Sump		1				■					
3. Change Hydraulic Oil		130 L (34.3 US gal)							※		※
4. Suction Filter Cleaning		1	When changing hydraulic oil								
5. Replace Hydraulic Tank Oil Filter		1					■				
6. Replace Pilot Oil Filter		1						■			
7. Check Hoses and Lines	for leak	—	■								
	for crack, bend, etc.	—				■					

★ Hydraulic oil changing intervals differ according to kind of hydraulic oils used. See recommended oil chart.



M104-07-073

Brand Names of Recommended Hydraulic Oil

Kind of lubricant	Hydraulic Oil			
Where to be applied	Hydraulic System			
Change Interval	2 500 hours		1 500 hours	
Environmental Temp. / Manufacturer	– 20 to 40 °C (– 4 to 104 °F)	– 10 to 40 °C (14 to 104 °F)	– 20 to 40 °C (– 4 to 104 °F)	– 10 to 40 °C (14 to 104 °F)
Idemitsu Kosan	Daphne Super-Hydro LW46H ★		Daphne Super-Hydro LW46	
British Petroleum			Bartran HV46	
Caltex Oil				Rando Oil HD46
Texaco INC.				Rando Oil HD46
Chevron U.S.A INC.				Chevron AW46
Esso				NUTO H46
Mobil Oil				DTE 25
Shell Oil		Tellus Oil R46		Tellus Oil 46
Remarks	Anti-wear type hydraulic oil			

- Use proper hydraulic oil in accordance with the atmospheric temperature.
- The machine shipped from the factory is filled with lubricants marked with ★.

INSPECTION AND MAINTENANCE OF HYDRAULIC EQUIPMENT

CAUTION: During operation the parts of the hydraulic system become very hot. Allow the machine to cool down before beginning inspection or maintenance.

1. Be sure that the machine is parked on a level, solid surface before servicing hydraulic equipment.

2. Lower the bucket to the ground and stop the engine.

3. Begin servicing hydraulic equipment only after components, hydraulic oil and lubricant are completely cooled, as they will remain hot and pressurized soon after operation. While servicing heated and pressurized hydraulic equipment, hot parts or oil may fly off or escape suddenly with a potential of serious injury. Keep body parts and face away from plugs or screws when removing them as they may be pressurized even when cooled.

4. Before servicing hydraulic equipment, bleed air from the hydraulic oil tank to release internal pressure.

5. Even after bleeding the air from the hydraulic oil tank, pressure remains in the various circuits of the hydraulic system. Be sure to operate each control lever a few times to release residual pressure from the system.

6. Avoid inspecting and servicing the travel and swing motor circuits on slopes, as they are pressurized by gravity even after bleeding the hydraulic oil tank.

7. When connecting hydraulic hoses and pipes, take special care to keep seal surfaces free from dirt and to avoid damaging them. Keep these precautions in mind:

   a. Wash hoses, pipes, and the tank interior with a washing liquid and thoroughly wipe it out before reconnecting them.

   b. Only use O-rings that are free of damage or defects. Be careful not to damage them during reassembly.

   c. Do not allow high pressure hoses to twist when connecting them. The life of twisted hoses will be shortened considerably.

   d. Carefully tighten low pressure hose clamps to the specifications below.
   Do not overtighten them.
   Outside clamps: 5.9 to 6.9 N·m (0.6 to 0.7 kgf·m, 4.3 to 5.1 lbf·ft)
   Inside clamps: 1.0 to 2.0 N·m (0.1 to 0.2 kgf·m, 0.7 to 1.4 lbf·ft)

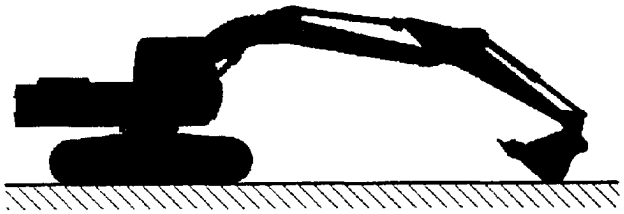
8. When adding hydraulic oil, always use the same brand of oil; do not mix brands of oil. As the machine is filled with Daphne Super Hydraulic Fluid LW 46 H when it is shipped from the factory, use it as a general rule. When selecting to use another brand of oil listed in the table "Brand names of recommended hydraulic oil", be sure to completely replace the oil in the system.

9. Do not use hydraulic oils other than those listed in the table "Brand names of recommended hydraulic oil".

10. Never run the engine without oil in the hydraulic oil tank.

1 Check Hydraulic Oil Level --- daily

IMPORTANT: Never run the engine without oil in hydraulic oil tank.

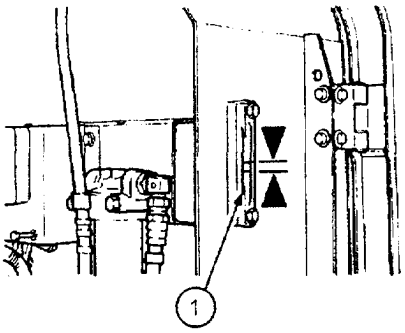


M104-07-021

1. Park the machine on a level surface.
2. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

5. Run the engine at slow idle speed without load for three minutes.
6. Turn the key switch OFF. Remove the key from the key switch.
7. Pull the pilot shut-off lever to the LOCK position.
8. Open the access door in front of the main pump. Check oil level gauge ① on hydraulic oil tank. Oil must be between marks on the gauge. If necessary, add oil.



M104-07-022

CAUTION: The hydraulic oil tank is pressurized.
Push the pressure release button on the tank cap to release pressure, and carefully remove the cap.

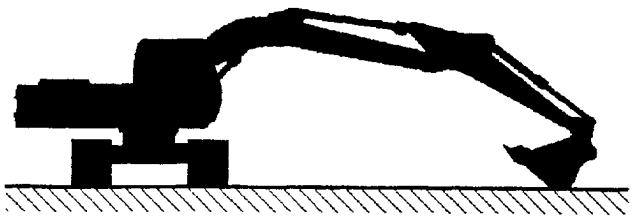
To add oil:

9. Push the pressure release button on the cap to release pressure. Turn the cap counterclockwise and remove.
10. Add oil. Recheck oil level with gauge ①.
11. Install the cap.

2 Drain Hydraulic Tank Sump --- every 250 hours

IMPORTANT: Never run the engine without oil in hydraulic oil tank.

1. Park the machine on a level surface with the upperstructure rotated 90° for easier access.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.



M104-07-117

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

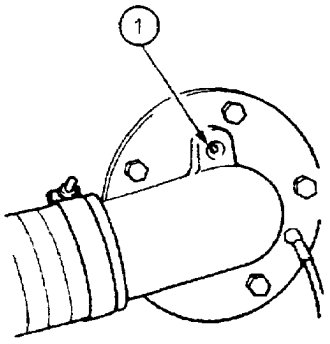
4. Run the engine at slow idle speed without load for three minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot shut-off lever to the LOCK position.

CAUTION: The hydraulic oil tank is pressurized. Push the pressure release button on the tank cap to release pressure.

7. Push the pressure release button on the cap to release pressure.

CAUTION: Do not loosen the drain plug until oil is cool. Hydraulic oil may be hot, potentially causing serious injury.

8. After oil is cool, loosen drain plug ① to drain water and sediment. Do not remove the plug completely, only loosen it enough to drain water and sediment.
9. After draining water and sediment, retighten the plug.



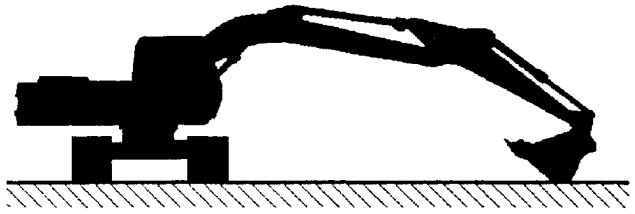
M104-07-023

3
4

Change Hydraulic Oil
--- every 2 500 hours
or every 1 500 hours

CAUTION: Hydraulic oil may be hot. Wait for oil to cool before starting work.

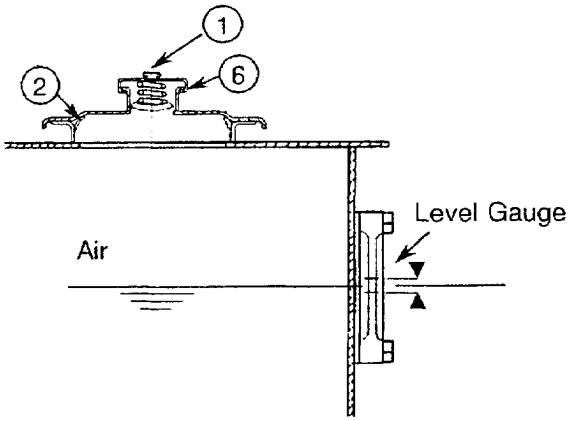
IMPORTANT: Hydraulic oil changing intervals differ according to kind of hydraulic oils used. (See Recommended Oil Chart in this group)



M104-07-117

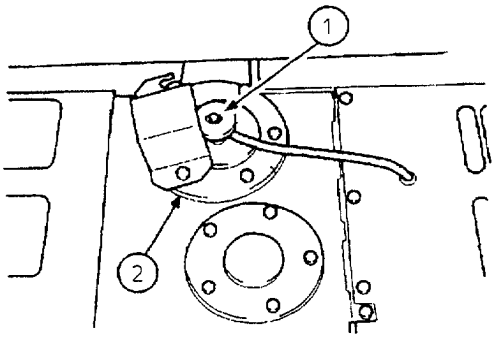
1. Park the machine on a level surface with the upperstructure rotated 90° for easier access.
2. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.



M104-07-024

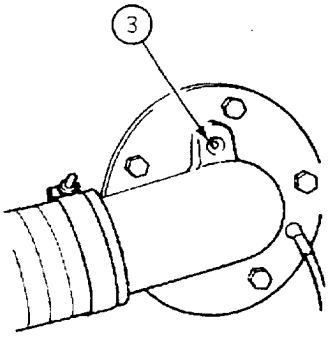
5. Run the engine at slow idle speed without load for three minutes.
6. Stop the engine. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Clean the top of the hydraulic oil tank to keep dirt out of the hydraulic system.



M104-07-025

CAUTION: The hydraulic oil tank is pressurized. Push the pressure release button on cap before removing.

9. Push pressure release button ① on the cap ⑥.
10. Remove cover ②.
11. Remove oil using a suction pump. The hydraulic oil tank capacity, up to specified oil level, is approximately 150 liters (39.6 US gal).
12. Remove drain plug ③. Allow oil to drain.

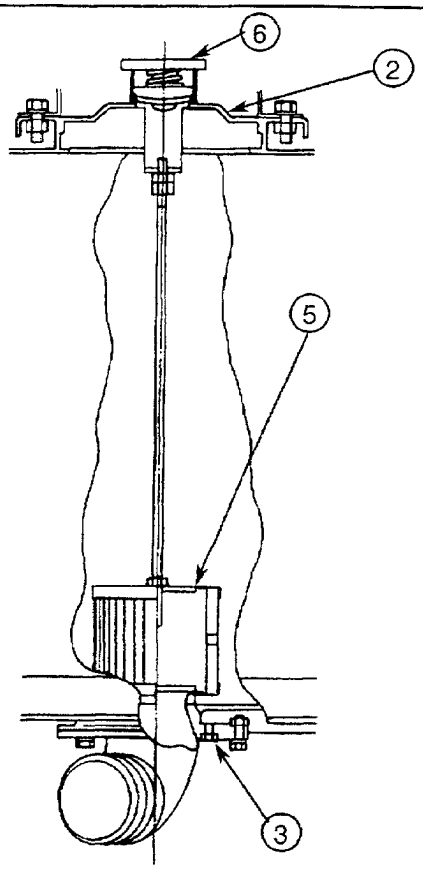


M104-07-026

13. Remove suction filter and rod assembly ⑤.
14. Clean the filter and tank interior . If the filter is to be replaced, install new filter on the rod as shown. Tighten nut to 14.5 to 19.5 N·m (1.5 to 2.0 kgf·m, 10.5 to 14.5 lbf·ft).
15. Install filter and rod assembly ⑤. Make sure the filter is positioned correctly on the outlet.
16. Replace the oil filter. (See "Maintenance Every 500 Hours" Section)
17. Clean, install and tighten drain plug ③.
18. Install cover ②. Make sure suction filter and rod assembly ⑤ is in correct position. Tighten the bolts to 49 N·m (5 kgf·m, 36 lbf·ft).
19. Add oil until it is between the marks on the sight gauge.

IMPORTANT: If the hydraulic pump is not filled with oil, it will be damaged when the engine is started.

20. Remove air bleed plug ④ from the top of the pump.
21. Fill the pump with oil through plug ④ port.
22. Reinstall the plug.
23. Start the engine and run at slow idle. Put a "Do Not Operate" tag on the pilot control shut-off lever. Make sure the pilot control shut-off lever is in the LOCK position.
24. Slowly loosen air bleed plug ④ to release trapped air. Retighten the plug when air stops and oil flows from the plug port.
25. Purge air from the hydraulic system by running the engine at slow idle and operating all control levers slowly and smoothly for 15 minutes.
26. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended.
27. Lower the bucket to the ground.
28. Turn the auto-idle switch off.
29. Stop the engine. Remove the key from the key switch.
30. Pull the pilot control shut-off lever to the LOCK position.
31. Check the hydraulic oil tank gauge. Remove cap ⑥ to add oil if necessary.



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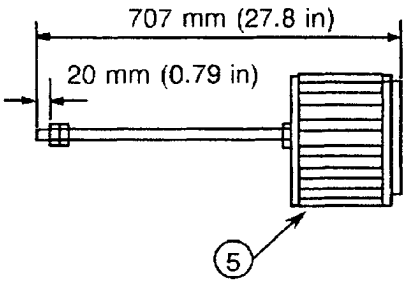
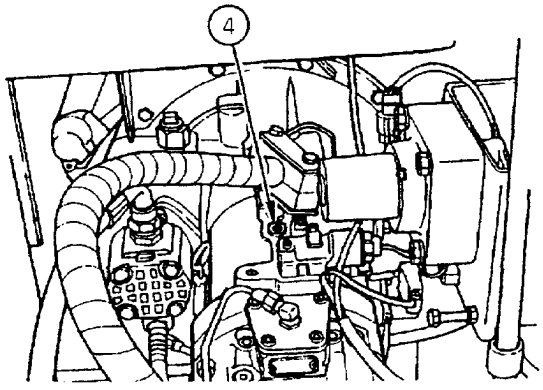


M107-07-097



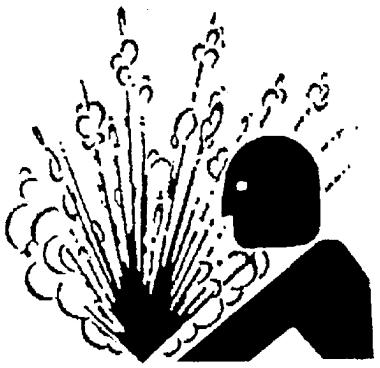
M104-07-131

5 Replace Hydraulic Tank Oil Filter --- every 500 hours

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.



SA-039

CAUTION: The hydraulic oil tank is pressurized. Push the pressure release button on the cap before removing.

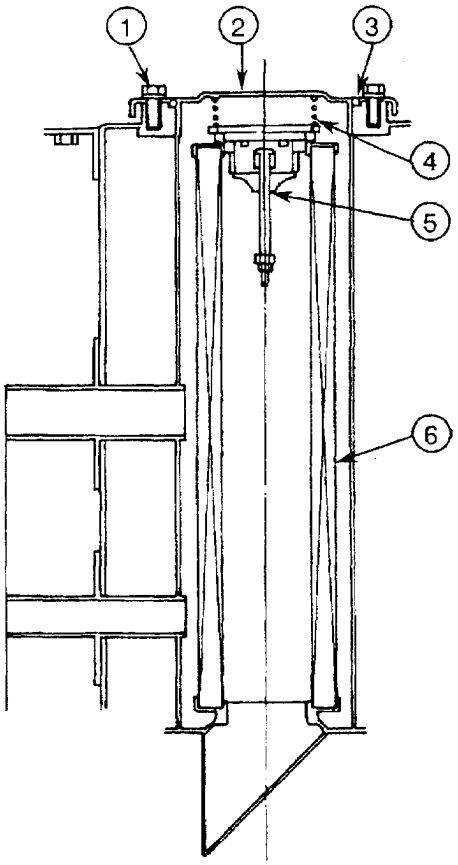
7. Push the pressure release button on the hydraulic oil tank to release pressure, then remove the cap.

NOTE: There is spring tension under the cover. Hold down the cover when removing last two bolts.

8. Hold down filter cover ② against light spring load when removing the last two bolts ①. Remove filter cover ②.
9. Remove spring ④, valve ⑤ and element ⑥.

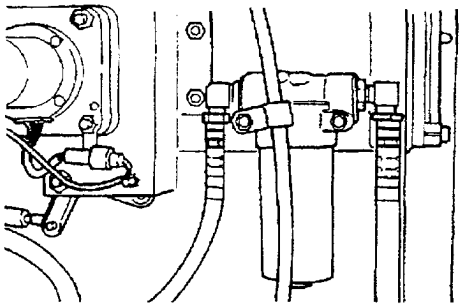
NOTE: Remove the element and inspect for metal particles and debris in the bottom of the filter can. Excessive amounts of brass and steel particles can indicate a failed hydraulic pump, motor, valve or an impending failure. A rubber type of material can indicate cylinder packing failure.

10. Discard element ⑥ and O-ring ③.
11. Install a new element, the valve and spring.
12. Install cover ② with a new O-ring.
13. Install and tighten bolts ① to 49 N·m (5 kgf·m, 36 lbf·ft).



M104-07-029

6 Replace Pilot Oil Filter -- every 1 000 hours



M104-07-032

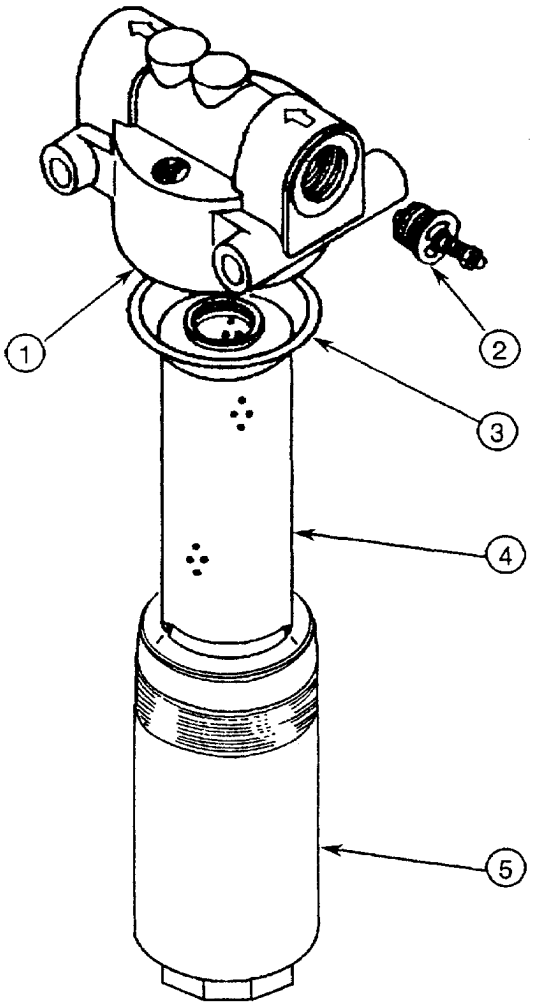
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Operate the right and left control levers to release pressure from the pilot accumulator.
7. Pull the pilot control shut-off lever to the LOCK position.

CAUTION: The hydraulic oil tank is pressurized. Push the pressure release button on the cap before removing.

8. Use a filter wrench to remove filter case ⑤ from filter head ① by turning it counter clockwise.
9. Remove filter element ④ by moving it back and forth while pulling down on it.
10. Remove and discard O-ring ③ and the element ④.
11. Clean filter head ① O-ring and the element area.
12. Apply a thin film of clean oil to a new O-ring and install it in filter head ①. Be sure O-ring ③ is correctly positioned.
13. Apply a thin film of clean oil to the ring of new element ④, that fits into filter head ①. Slowly install element ④ by moving it back and forth while pushing it upward.
14. Clean filter case ⑤.
15. Install filter case ⑤ onto filter head ① by turning it clockwise. Tighten case 19.5 to 29 .5N·m (2 to 3 kgf·m, 14.5 to 21.5 lbf·ft).



M104-07-030

7 Check Hoses and Lines
--- daily
--- every 250 hours

CAUTION :Escaping fluid under pressure can penetrate the skin causing serious injury.
To avoid this hazard, search for leaks with a piece of cardboard.
Take care to protect hands and body from high-pressure fluids.
If an accident occurs, see a doctor familiar with this type of injury immediately.
Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

CAUTION : Hydraulic oil and lubricant leaks can lead to fire that may result in serious injury.
To avoid this hazard :

1. Park the machine on a solid, level surface.
   Lower the bucket to the ground.
   Stop the engine. Remove key from the key switch. Pull the pilot control shut-off lever to the LOCK position.

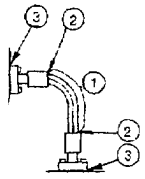
2. Check for missing or loose clamps, kinked hoses, lines or hoses that rub against each other, damaged oil-cooler, and loose oil-cooler flange bolts, for leaks.

   Check hoses, lines and oil-cooler at the check points indicated below for leaks and other damage that may result in future leaks.
   If any abnormalities are found, replace or retighten them, as shown in Tables 1-3.

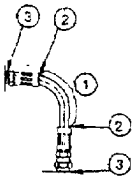
3. Tighten, repair or replace any missing, loose or damaged clamps, hoses, lines, oil-cooler, and loose oil-cooler flange bolts.
   Do not bend or strike high-pressure lines.
   Never install bent or damaged hoses or lines.

Table 1. Hoses

Interval(hours)	Check Points	Abnormalities	Remedies
Daily	Hose covers	Leak ①	Replace
	Hose ends	Leak ②	Replace
	Fittings	Leak ③	Retighten or replace of hose or O-ring
Every 250 hours	Hose covers	Crack ④	Replace
	Hose ends	Crack ⑤	Replace
	Hose covers	Exposed reinforcement ⑥	Replace
	Hose covers	Blister ⑦	Replace
	Hose	Bend ⑧	Replace
	Hose	Collapse ⑨	Replace (Use proper bend radius)
	Hose ends and fittings	Deformation or Corrosions ⑩	Replace



M137-07-008



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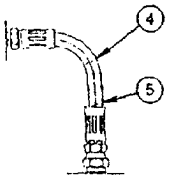

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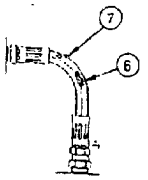

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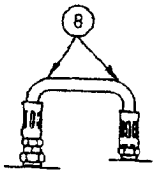

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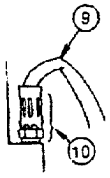


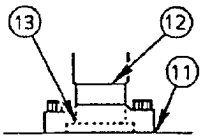
M115-07-149

Fig. 1

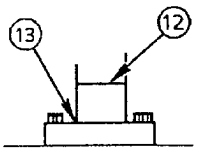
Note : Refer to the illustrations in Fig.1 for each check point location or for a description of the abnormality.
Use genuine Hitachi parts.

Table 2. Lines

Interval(hours)	Check Points	Abnormalities	Remedies
Daily	Contact surfaces of flange joints	Leak ⑪	Replace O-ring and/or retighten bolts
	Welded surfaces on joints	Leak ⑫	Replace
Every 250 hours	Joint neck	Crack ⑬	Replace
	Welded surfaces on joints	Crack ⑫	Replace
	Clamps	Missing	Replace
		Deformation	Replace
		Loose	Retighten



M137-07-001



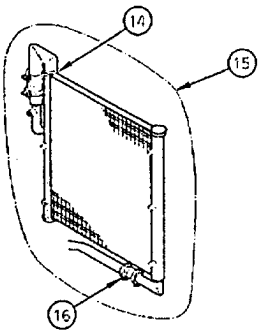
M137-07-007

Fig. 1

Note : Refer to the illustrations in Fig.1 for each check point location or for a description of the abnormality.
Use genuine Hitachi parts.

Table 3. Oil-cooler

Interval(hours)	Check Points	Abnormalities	Remedies
Every 250 hours	Contact surfaces of flange joints	Leak ⑭	Replace O-ring and/or retighten bolts
	Oil-cooler	Leak ⑮	Replace
	Coupling and rubber hose	Leak ⑯	Retighten or replace



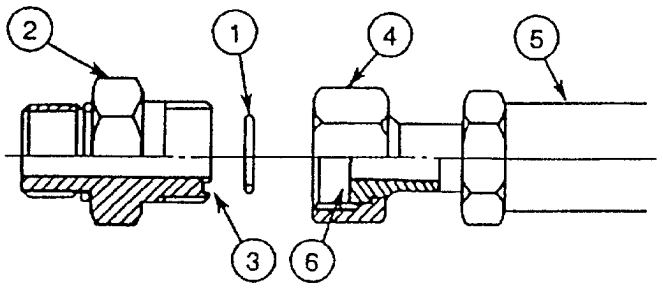
M104-07-044

Fig. 2

Note : Refer to the illustrations in Fig.2 for each check point location .

SERVICE RECOMMENDATIONS FOR HYDRAULIC FITTINGS

Two hydraulic fitting designs are used on this machine.



M104-07-033

1. Flat Face O-ring Seal Fitting (ORS Fitting)
   An O-ring is used on the sealing surfaces to prevent oil leakage.

   a. Inspect fitting sealing surfaces ⑥. They must be free of dirt or defects.

   b. Replace O-ring ① with a new one when assembling fittings.

   c. Lubricate O-ring ① and install it into groove ③ using petroleum jelly to hold it in place.

   d. Tighten fitting ② by hand, pressing the fitting joint together to ensure O-ring ① remains in place and is not damaged.

   e. Tighten fitting ② or nut ④ to the torque values shown. Do not allow hose ⑤ to twist when tightening fittings.

   f. Check for leaks. If oil leaks from a loose connection, do not tighten fitting ②. Open the connection, replace O-ring ① and check for correct O-ring position before tightening the connection.

Torque specifications ±10%

Width across flats (mm)		27	32	36	41, 46
Fastening torque	N·m	93	137	175	205
	kgf·m	9.5	14	18	21
	lbf·ft	69	101	130	152

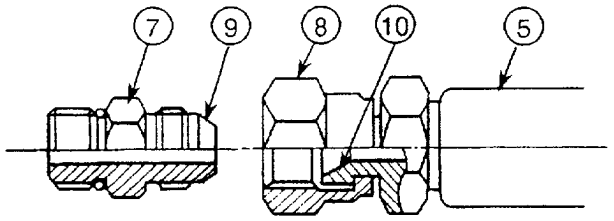
2. Metal Face Seal Fittings
   Fittings are used on smaller hoses and consist of a metal flare and a metal flare seat.

   a. Inspect flare ⑩ and flare seat ⑨. They must be free of dirt or obvious defects.

IMPORTANT: Defects in the tube flare cannot be repaired. Overtightening a defective flare fitting will not stop a leak.

   b. Tighten fitting ⑦ by hand.

   c. Tighten fitting ⑦ or nut ⑧ to the torque values shown. Do not allow hose ⑤ to twist when tightening fittings.



M202-07-051

Width across flats (mm)		19	22	27
Fastening torque	N·m	29.5	39	93
	kgf·m	3	4	9.5
	lbf·ft	21.5	29	69

E. FUEL SYSTEM

Tank capacity 250 liter (66 US gal)

Parts		Quantity	Interval (hours)						
			8	50	100	250	500	1 000	2 000
1. Drain Fuel Tank Sump		1	■						
2. Check Water Separator		1		■					
3. Replace Fuel Filter		1					■		
4. Clean Feed Pump Strainer		1						■	
5. Check Fuel Hoses	for leak, crank, etc.	–	■						
	for crack, bend, etc.	–				■			

Recommended Fuel

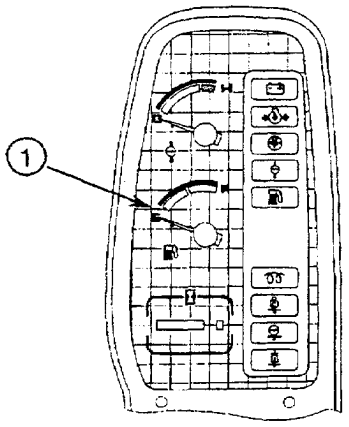
Use high quality DIESEL FUEL only (JIS K-2204) (ASTM 2-D). Kerosene must NOT be used.

Refueling

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

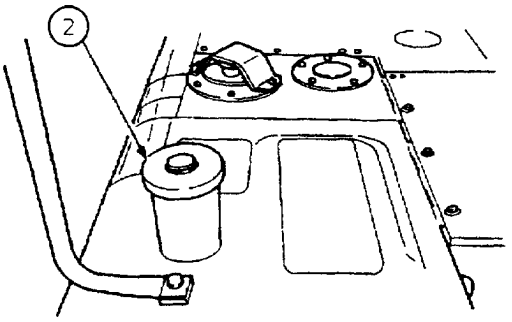
4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.



M104-01-003

CAUTION: Handle fuel carefully. Shut the engine off before fueling. Do not smoke while you fill the fuel tank or work on fuel system.

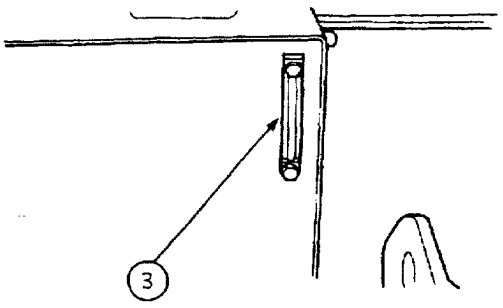
7. Check fuel level gauge ③ or fuel gauge ① of the monitor panel. Add fuel if necessary.



M104-07-034

IMPORTANT: Keep all dirt, dust, water and other foreign materials out of the fuel system.

8. To avoid condensation, fill the tank at the end of each day's operation. Take care not to spill fuel on the machine or ground. Fuel tank capacity is 250 liters (66 US gal).
9. Install and lock fill cap ② immediately after fueling.

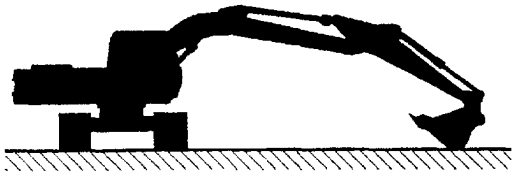


M104-07-035

1 Drain Fuel Tank Sump --- daily

1. Park the machine on a level surface with the upperstructure rotated 90° for easier access.
2. Lower the bucket to the ground.
3. Turn the auto-idle off.

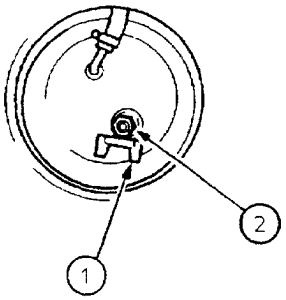
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.



M104-07-117

4. Run the engine at slow idle speed without load for three minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.

NOTE: The plug is installed in the drain cock to prevent vandalism.



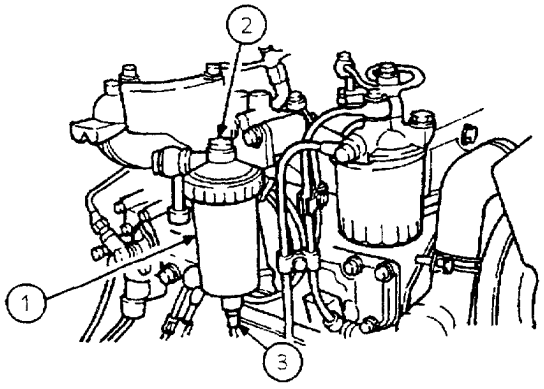
M104-07-036

7. Remove plug ② and open drain cock ① for several seconds to drain water and sediment. Close the drain cock.
8. Install and tighten the plug.

2 Check Water Separator --- every 50 hours

Water separator ① separates any water that may get mixed with the fuel. Water separator ① contains a float which rises as water accumulates.

Be sure to drain the sedimenter when the float rises up to the "Drain Water" mark written on the outside of water separator ①.



M104-07-094

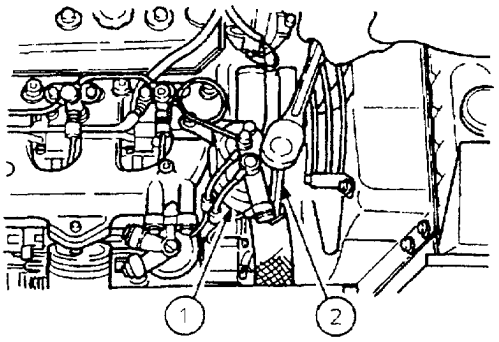
IMPORTANT: If the fuel contains an excessive amount of water, shorten the interval between water separator checks.

Draining procedure:

1. Loosen plug ② on the top of the water separator ①. Loosen drain plug ③ on the bottom of water separator ① to drain the sedimenter.
2. After draining, tighten plugs ② and ③.

NOTE: After draining be sure to bleed air from the fuel system.

3 Replace Fuel Filter --- every 500 hours

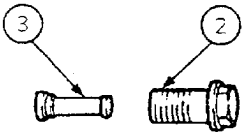


M104-07-039

1. For safety and to protect the environment, always use proper containers when draining fuel. Do not pour fuel onto the ground, down a drain or into a stream, pond or lake. Dispose of waste fuel properly.
2. Remove cartridge filter ① using filter wrench ②.
3. Apply a thin film of clean fuel to the gasket of new filter ①.
4. Tighten the filter by hand until the gasket makes contact with the sealing surface.
5. Using filter wrench ②, tighten the filter about 2/3 turn more. Do not overtighten the filter.
6. After replacing the filter, bleed air from the fuel system.

4 Clean Feed Pump Strainer --- every 1 000 hours,

1. Remove the feed pump inlet hose joint bolt, located at the water separator inlet.
2. Remove strainer ③ from joint bolt ② using a screw driver.
3. Clean strainer ③ using diesel fuel.
4. Install and tighten strainer ③ in joint bolt ②.
5. Install and tighten joint bolt ②. Then, bleed air from the fuel system.

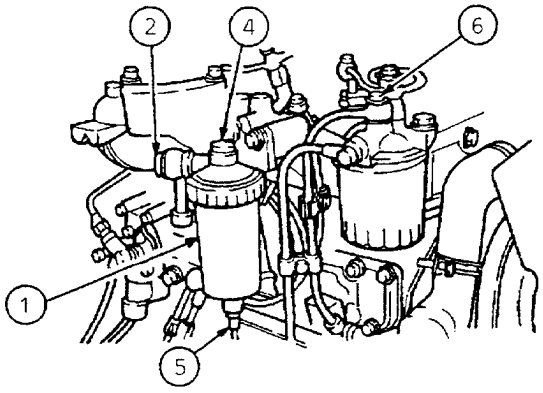


M107-07-041

Bleed Air from Fuel System

IMPORTANT: Air in the fuel system may make the engine hard to start or make it run irregularly. After draining water and sediment from the water separator, replacing the fuel filter, cleaning the feed pump strainer or running the fuel tank dry, be sure to bleed the air from the fuel system.

1. Confirm that drain plug ⑤ and bleeding plug ④ on water separator ① is tight. If plug ④ is not tight air will not bleed from the fuel system.
2. Loosen air bleed plug ⑥ on the fuel filter.
3. Loosen fuel feed pump ⑦ knob, raise and lower the plunger until no more air bubbles can be seen in the fuel.
4. Tighten air bleed plug ⑥ on the fuel filter plunger. Raise and lower the plunger until the load become heavy.
5. Push fuel feed pump ⑦ knob down and tighten.
6. Start the engine and run at slow idle.
7. Put a "Do Not Operate" tag on the right control lever.
8. Pull the pilot control shut-off lever to the LOCK position.
9. Inspect the fuel system for leaks.



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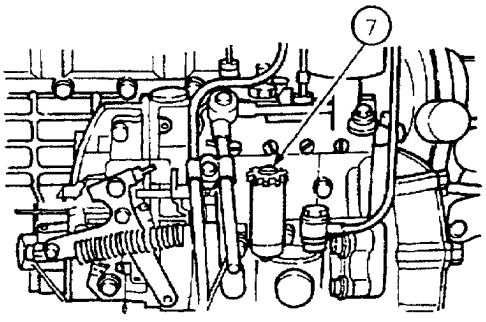


M104-07-043

5 Check Fuel Hoses
--- daily
--- every 250 hours

CAUTION : Fuel leaks can lead to fires that may result in serious injury.
To avoid this hazard :

1. Park the machine on a solid, level surface. Lower the bucket to the ground. Stop the engine. Remove key from the key switch. Pull the pilot control shut-off lever to the LOCK position.

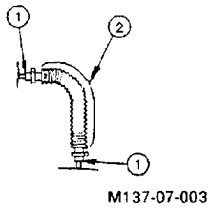
2. Check for kinked hoses, and hoses that rub against each other parts for leaks.

   Check hoses at the check points indicated below for leaks and other damage that may result in future leaks. If any abnormalities are found, replace or retighten them, as shown in Table 4.

3. Repair or replace any loose or damaged hoses. Never install bent or damaged hoses.

Table 4. Hoses

Interval(hours)	Check Points	Abnormalities	Remedies
Daily	Hose ends	Leak ①	Retighten or replace
	Soutache braid hose	Friction ②	Replace
		Crack②	Replace
Every 250 hours	Soutache braid hose	Crack ③	Replace
	Hose ends	Crack ④	Replace
	Hose	Bend ⑤	Replace
	Hose	Collapse ⑥	Replace (Use proper bend radius)
	Hose ends and fittings	Deformation or Corrosions ⑦	Replace



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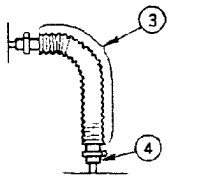

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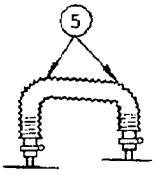

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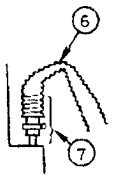


M137-07-006

Fig. 3

Note : Refer to the illustrations in Fig.3 for each check point location or for a description of the abnormality.
Use genuine Hitachi parts.

F. AIR CLEANER

Parts		Quantity	Interval (hours)						
			8	50	100	250	500	1 000	2 000
1. Air Cleaner Outer Element	Cleaning	1					(Or when indicator lit)		
	Replacement	1	After cleaning 6 times or 1 year						
2. Air Cleaner Inner Element	Replacement	1	When outer element is replaced						

1 **Clean the Air Cleaner Outer Element**
--- every 250 hours or when the restriction indicator comes ON

2 **Replace the Air Cleaner Outer and Inner Elements**
--- after cleaning six times or after one year

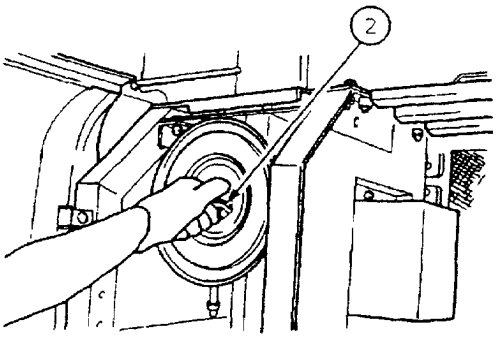
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

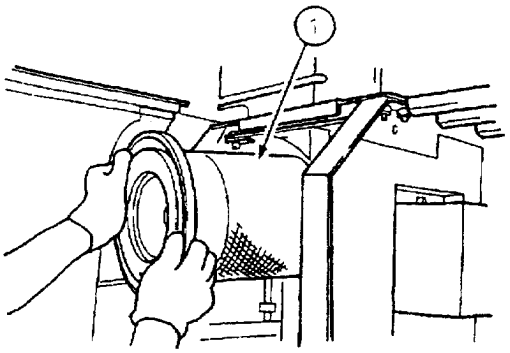
4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Loosen wing nuts ② to remove cover ③.
8. Remove outer element ①.
9. Tap outer element ① with the palm of your hand, NOT ON A HARD SURFACE.

CAUTION: Use reduced compressed air pressure. Clear area of bystanders, guard against flying chips, and wear personal protection equipment including goggles or safety glasses.

10. Clean outer element ① using compressed air. Direct the air to the inside of the filter element, blowing out.



M104-07-045



M104-07-046

11. Clean the filter interior before installing outer element ①.

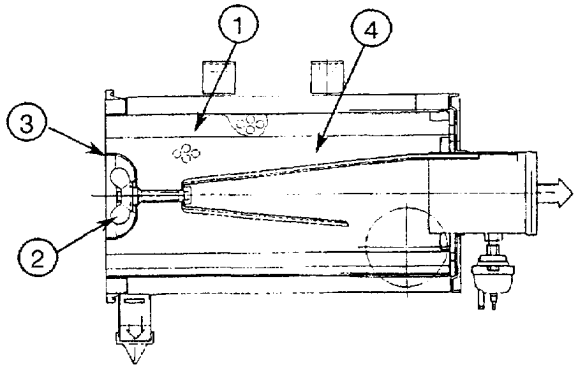
12. Install outer element ①.

13. Install cover and tighten wing nuts ②.

14. Start the engine and run at slow idle.

15. Check the air filter restriction indicator on the monitor panel. If the air filter restriction indicator comes ON, stop the engine and replace the outer element ①.

16. When replacing the air cleaner filter element, replace both outer ① and inner ④ elements together. Slowly remove inner element ④ after removing outer element ①.
    Clean the filter interior before installing new elements. First install inner element ④ and then install outer element ①.



M104-07-047

G. COOLING SYSTEM

Parts	Quantity	Interval (Hours)						
		8	50	100	250	500	1 000	2 000
1. Check Coolant Level	—							
2. Check and Adjust Fan Belt Tension	1		★★★					
3. Change Coolant	16.4 L (4.3 US gal)	Twice a year				※1		
4. Clean Radiator Core (outside)	1							
5. Clean Radiator Interior	1	When changing coolant						
6. Clean Oil Cooler Front Screen	1					※2		

★★★ First time only

NOTE: ※1 *Before leaving the Hitachi factory, the cooling system is filled with a mixture of water and long-life coolant, Hitachi Genuine Long-Life Coolant. As long as Hitachi Genuine Long-Life Coolant is used, the service intervals between changing the coolant is once every two years (in autumn), or every 4 000 hours, whichever comes first.*

※2 *Shorten the maintenance interval when the machine is operated in dusty areas.*

1. Coolant:
   Fill the radiator with soft, pure tap or bottled water.
2. Anti-rust agent:
   Add approximately 0.33 L (0.35 US qt) of anti-rust agent to the new coolant when the coolant is changed.
   It is not necessary to add anti-rust agent when antifreezed is used.
3. Antifreeze:
   If the air temperature is expected to fall below 0°C (32°F), fill the cooling system with an antifreeze and soft water mix. As a general rule, the ratio of antifreeze should range between 30% and 60% as shown in the table below. If the ratio is below 30%, the system may develop rust, and if it is above 60% the engine may overheat.

Antifreeze Mixing Table

Air temperature		Mixing ratio	Refill capacities			
			Antifreezes		Soft water	
°C	°F	%	liter	US gal	liter	US gal
−1	30	30	4.9	1.30	11.5	3.03
−4	25	30	4.9	1.30	11.5	3.03
−7	19	30	4.9	1.30	11.5	3.03
−11	12	30	4.9	1.30	11.5	3.03
−15	5	35	5.7	1.52	10.7	2.81
−20	−4	40	6.6	1.73	9.8	2.60
−25	−13	45	7.4	1.95	9.0	2.38
−30	−22	50	8.2	2.17	8.2	2.16

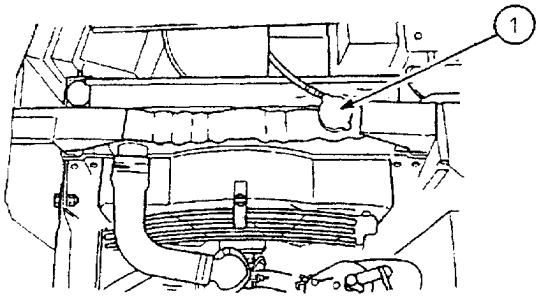
CAUTION:

(1) Antifreeze is poisonous; if ingested, it can cause serious injury or death. Induce vomiting and get emergency medical attention immediately.
(2) When storing antifreeze be sure to keep it in a clearly marked container with tight closing lid. Always keep antifreeze out of the reach of children.
(3) If antifreeze is accidentally splashed in the eyes, flush the eyes with water for 10 to 15 minutes and get emergency medical attention.
(4) When storing or disposing of antifreeze, be sure to comply with all local regulations.

1 Check Coolant Level --- daily

CAUTION: Do not loosen radiator filler cap ① unless the system is cool. Loosen the cap slowly to the stop. Release all pressure before removing the cap.

With the engine cold, the coolant level must be between the FULL and LOW marks on coolant reservoir ②, located behind the radiator access door. If the coolant level is below the low mark, add coolant to coolant reservoir ②.
If coolant reservoir ② is empty, add coolant to the radiator and then to the coolant reservoir.



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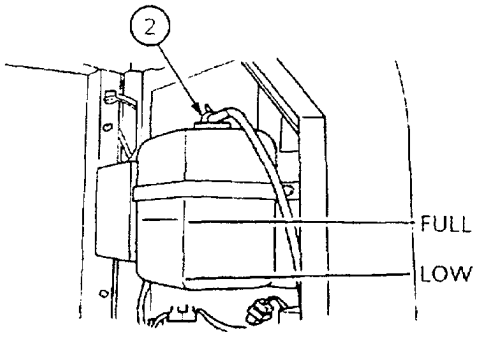


M104-07-049

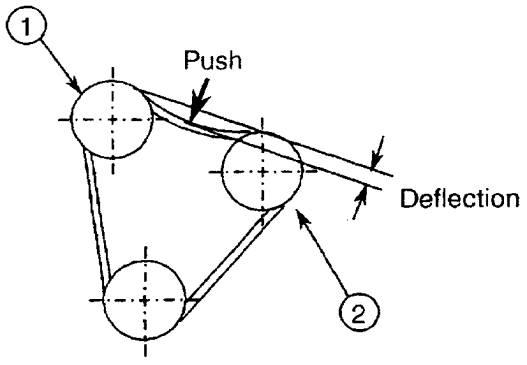
2 Check and Adjust Fan Belt Tension --- every 100 hours (first time after 50 hours)

IMPORTANT: Loose fan belt tension may result in insufficient battery charging, engine overheating as well as a rapid, abnormal belt wear. Belts that are too tight, however, can damage both bearings and belts.

Visually check the belt for wear. Replace if necessary. Check fan belt tension by depressing the midpoint between fan ① and alternator pulley ② with the thumb. Deflection must be 8 to 12 mm (0.3 to 0.47 in) at a depressing force of approximately 98 N (10 kgf, 22 lbf).

If tension is not within specifications, loosen the bolts for the adjusting plate and alternator bracket. Move the alternator until tension is correct. Tighten the adjusting plate and bracket bolts.

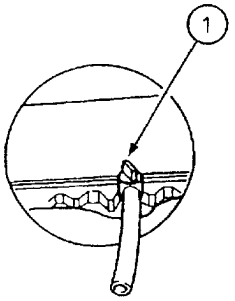
NOTE: When a new belt is installed, be sure to readjust the tension after operating the engine for 3 to 5 minutes at slow idle speed to be sure that the new belt is seated correctly.



M104-07-050

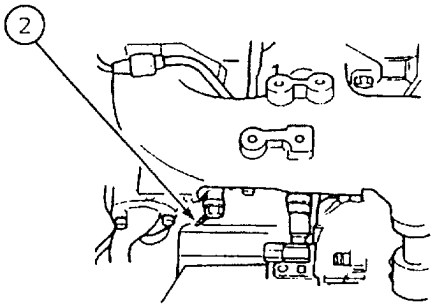
3 Change Coolant
--- twice a year (in spring and autumn)
5 Clean Radiator Interior
--- when changing coolant

NOTE: Before leaving the Hitachi Factory, the cooling system is filled with a mixture of water and Hitachi Genuine Long-Life Coolant. As long as Hitachi Genuine Long-Life Coolant is used, the service intervals between changing the coolant is once every two years (in autumn), or every 4 000 hours, whichever comes first.



M104-07-051

CAUTION: Do not loosen the radiator cap until the system is cool. Loosen the cap slowly to the stop. Release all pressure before removing the cap.



M104-07-052

1. Remove the radiator cap. Open drain cocks ① and ② on the radiator and engine block to allow the coolant to drain completely.

2. Close drain cocks ① and ②. Fill the radiator with tap water and a radiator cleaner agent. Start the engine and run it at a speed slightly higher than slow idle; when the needle of the temperature gauge reaches the white zone, run the engine for about ten more minutes.

3. Stop the engine and open the radiator drain cock ①. Flush out the cooling system with tap water, until draining water is clear. This helps remove rust and sediment.

4. Close radiator drain cock ①. Fill the radiator with tap water and an anti-rust agent or antifreeze at the specified mixing ratio. When adding coolant, do so slowly to avoid mixing air bubbles in the system.

5. Run the engine to sufficiently bleed the air from the cooling system.

6. After adding coolant, operate the engine for several minutes. Check the coolant level again, and add coolant if necessary.

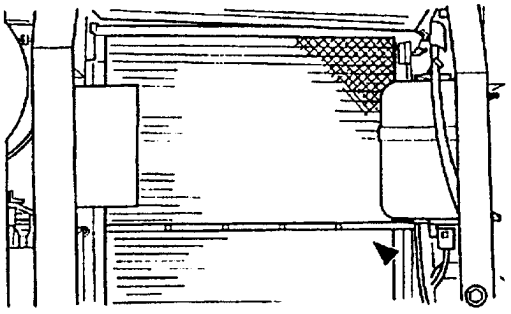
4 Clean Radiator Core --- every 500 hours

CAUTION: Use reduced compressed air pressure for cleaning purposes. Clear the area of bystanders, guard against flying chips, and wear personal protection equipment including eye protection.

1. Open the radiator access door and hood.
2. Remove the air conditioner condenser bolts and nuts to lay the condenser flat in front of the oil cooler.
   DO NOT disconnect the air conditioner lines.
3. Remove the oil cooler front screen and clean it.
4. Clean both the radiator and oil cooler using compressed air or water.

6 Clean Oil Cooler Front Screen
--- every 500 hours

IMPORTANT: When operating the machine in a dusty environment, check the screen every day for dirt and clogging. If clogged, remove, clean and reinstall the screen.



M104-07-053

H. ELECTRICAL SYSTEM

BATTERIES

1. Check the battery electrolyte level and terminals

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check the battery electrolyte level.

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into the eyes.

Avoid hazard by:
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Using proper booster battery starting procedures.**

If you spill acid on yourself:
1. **Flush your skin with water.**
2. **Apply baking soda or lime to help neutralize the acid.**
3. **If splashed in your eyes, flush your eyes with water for 10 to 15 minutes. Get medical attention immediately.**

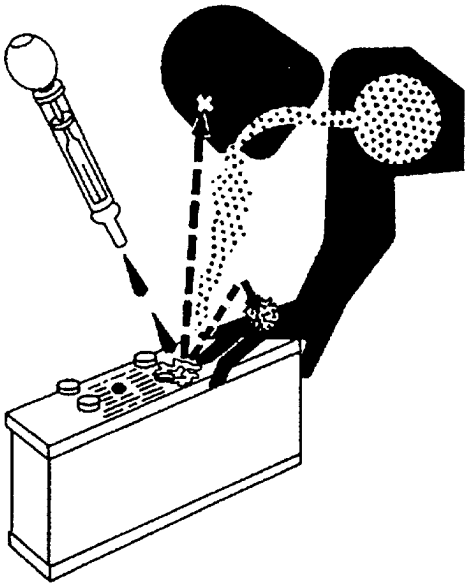
If acid is swallowed:
1. **Drink large amounts of water or milk.**
2. **Then drink milk of magnesia, beaten eggs, or vegetable oil.**
3. **Get medical attention immediately.**

IMPORTANT: Add water to batteries in freezing weather before you begin operating your machine for the day, or else charge the batteries.

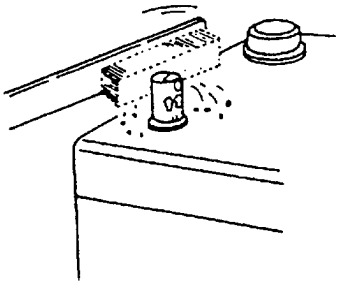
a. The electrolyte level must be between the upper and lower level marks on the battery case. Supply distilled water if necessary; be sure to charge the battery after doing so.

CAUTION: Always remove the grounded (–) battery clamp first and replace it last.

b. Always keep the terminals and vent plugs, located on top of the battery, clean to prevent battery discharge. Check the battery terminals for looseness and rust. Apply petroleum jelly to the terminals to prevent corrosion.



SA-036



M409-07-072

2. Check electrolyte specific gravity

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check the battery electrolyte level.

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into the eyes.

Never check the battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove the grounded (-) battery clamp first and replace it last.

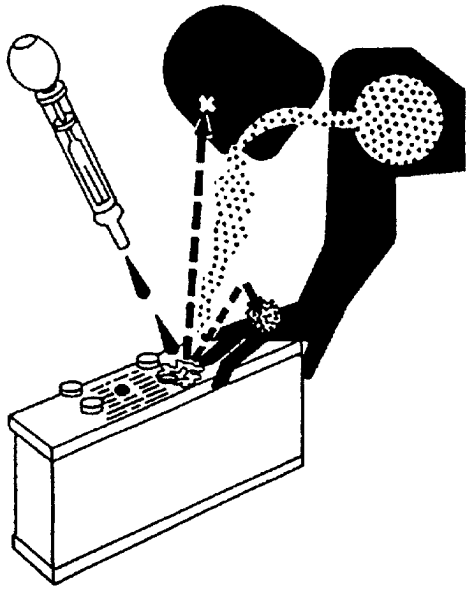
Avoid hazard by:
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Using proper booster battery starting procedures.**

If you spill acid on yourself:
1. **Flush your skin with water.**
2. **Apply baking soda or lime to help neutralize the acid.**
3. **If splashed in your eyes, flush your eyes with water for 10 to 15 minutes. Get medical attention immediately.**

If acid is swallowed:
1. **Drink large amounts of water or milk.**
2. **Then drink milk of magnesia, beaten eggs, or vegetable oil.**
3. **Get medical attention immediately.**

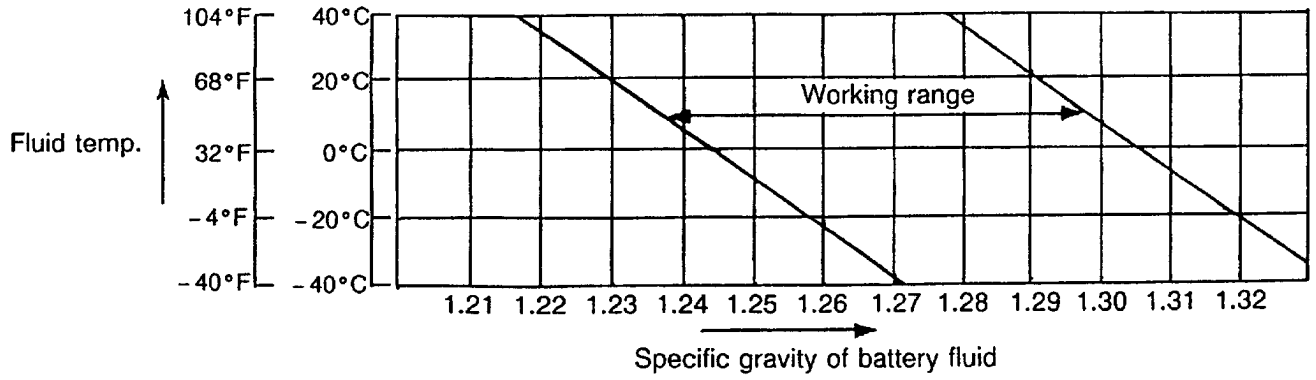
IMPORTANT: Check the specific gravity of electrolyte after it is cooled to air temperature, not immediately after operation.

Check the specific gravity of electrolyte in each battery cell.
The lowest limit of the specific gravity for electrolyte varies depending on electrolyte temperature. The specific gravity should be kept within the range shown below. Charge the battery if the specific gravity is below the limit.



SA-036

Recommended range of specific gravity by electrolyte temperature



REPLACE BATTERIES

Your machine has two 12 volt batteries with negative (−) ground.
If one battery in a 24-volt system has failed but the other is still good, replace the failed battery with one of the same type. For example, replace a failed maintenance-free battery with a new maintenance-free battery. Different types of batteries may have different rates of charge. This difference could overload one of the batteries and cause it to fail.

CONNECTING BATTERIES

After batteries are disconnected, engine speeds must be recalibrated.

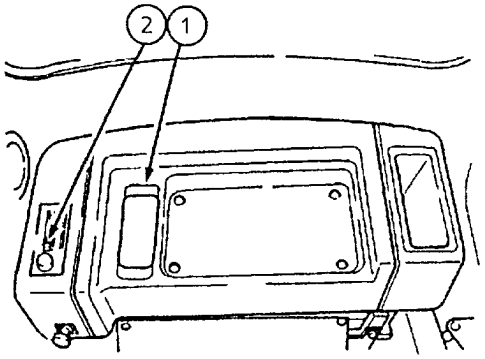
1. Turn the key switch to the ON position.
2. Press the max. power (P) mode switch to automatically recalibrate engine speeds.
3. Turn the key switch OFF.

The machine can now be started and operated as usual.

REPLACING FUSES

If any electrical equipment fails to operate, first check the fuses. Fuse box ① is located behind the right control console, next to heater/air conditioner control panel ②. A fuse location/specification decal is attached to the fuse box cover.

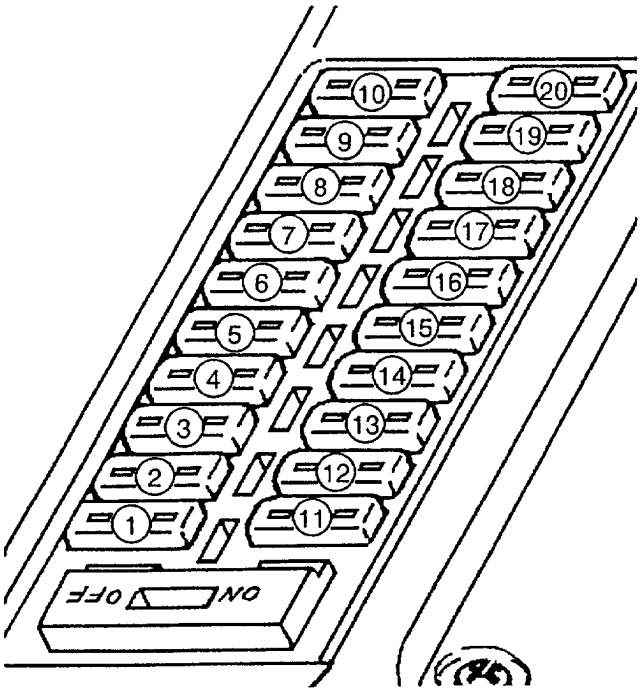
Remove the fuse box cover by lifting it upward. Spare fuses are located on the underside of the cover.



M104-01-051

IMPORTANT: Be sure to install fuses with correct amperage ratings to prevent electrical system damage from due to overload.

1	— SW. B. U.	1A
2	— ENG. C/U	1A
3	— EC. MOTOR	5A
4	— VAL. B. U	1A
5	— POW. ON	1A
6	— SW. BOX	5A
7	— VAL. C/U	1A
8	— SOL.	5A
9	— SOL.	5A
10	— OPT. LAMP	10A
11	— LAMP	20A
12	— WIPER	5A
13	— HEATER	20A
14	— STOP. M.	5A
15	— HORN	10A
16	— RADIO	1A
17	— LIGHTER	10A
18	— ROOM LAMP	5A
19	— OPTION	10A
20	— GLOW. R	5A

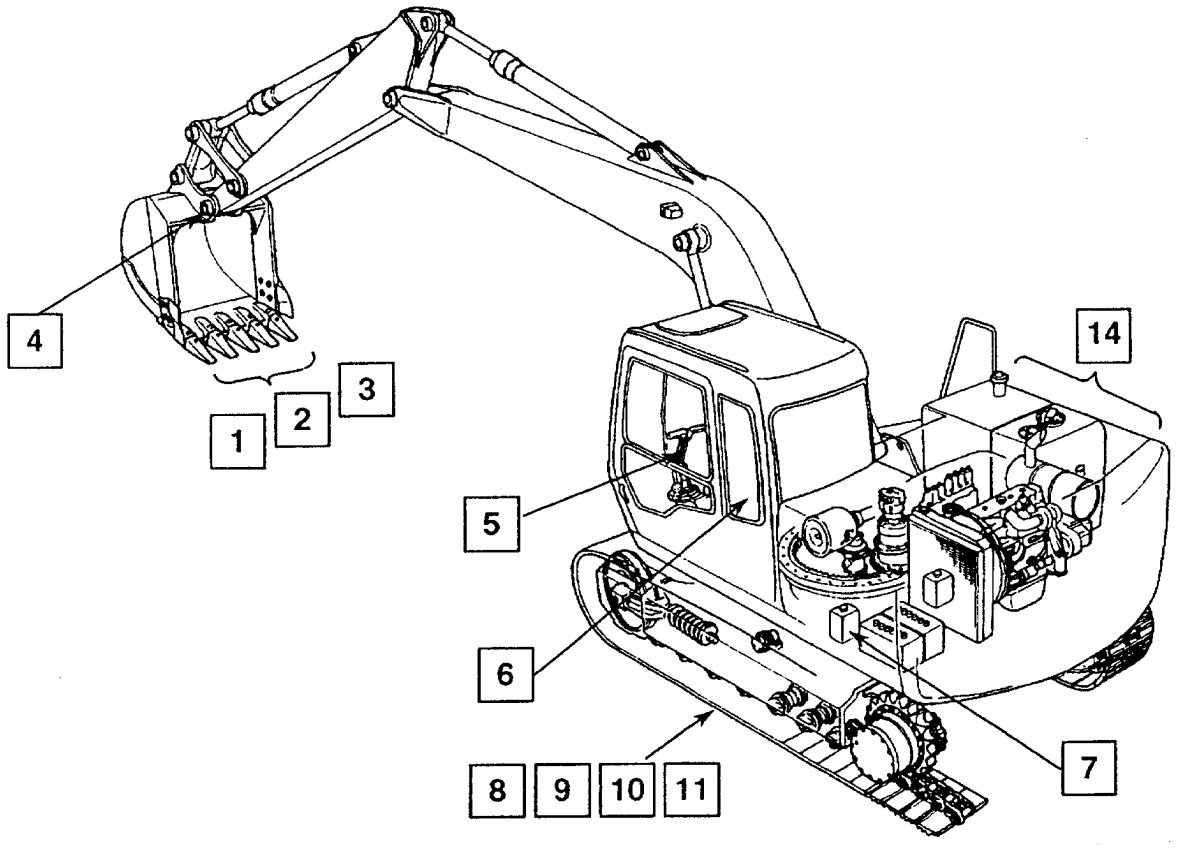


M104-07-055

I. MISCELLANEOUS

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1 000	2 000
1. Check Bucket Teeth for Wear and Looseness	-	■						
2. Change Bucket	-	As required						
3. Convert Bucket Connection Into Face Shovel	1	As required						
4. Adjust Bucket Linkage	-	As required						
5. Remove Travel Levers	2	As required						
6. Check and Replace Seat Belt	-	■	Every 3 years (Replace)					
7. Check Windshield Washer Fluid Level	-	As required						
8. Check Track Sag	2		■					
9. Adjust Track Sag	2	As required						
10. Adjust Track Sag (Opt. Rubber Crawler)	2	■						
11. Replace Track (Opt. Rubber Crawler)	2	As required						
12. Check Clamshell Bucket (Opt.)	-			■				
13. Check Air Conditioner (Opt.)	-	■						
14. Check Tightening Torque of Bolts and Nuts	-		★★★		■			

★★★ First time only



M104-07-073

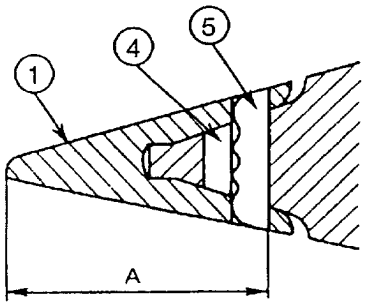
1 **Check Bucket Teeth --- daily**

1. Check the bucket teeth for wear and looseness

   Replace teeth ① if tooth wear exceeds the designated service limit shown below.

Dimension A in mm (in)

	New	Limit of Use
A	166 (6.5)	85 (3.3)

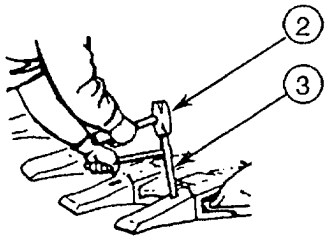


M104-07-056

2. Replacing procedure

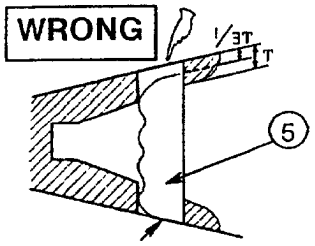
CAUTION: Guard against injury from flying pieces of metal. Wear goggles or safety glasses.

a. Use hammer ② and drift ③ to drive out locking pin ⑤. Be careful not to damage rubber pin lock ④ while removing locking pin ⑤.



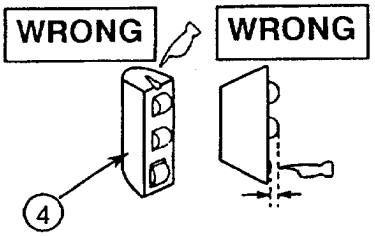
M104-07-057

b. Remove tooth ①. Inspect locking pin ⑤ and rubber pin lock ④ for damage, replace if necessary. Short locking pins and damaged rubber pin locks must be replaced with new ones.



M104-07-058

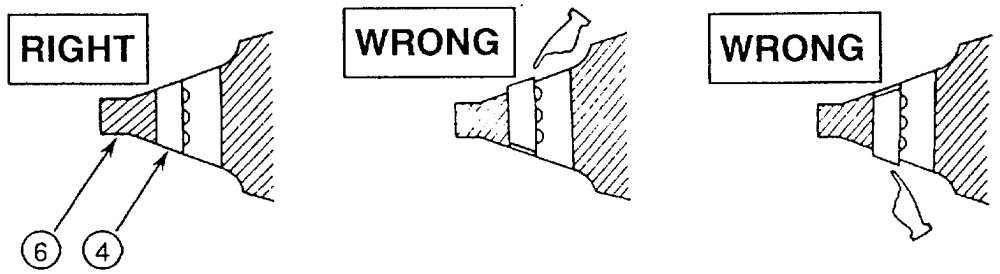
c. Clean shank ⑥ surface.



NOTE: Alternate buckets may use different tooth assemblies.

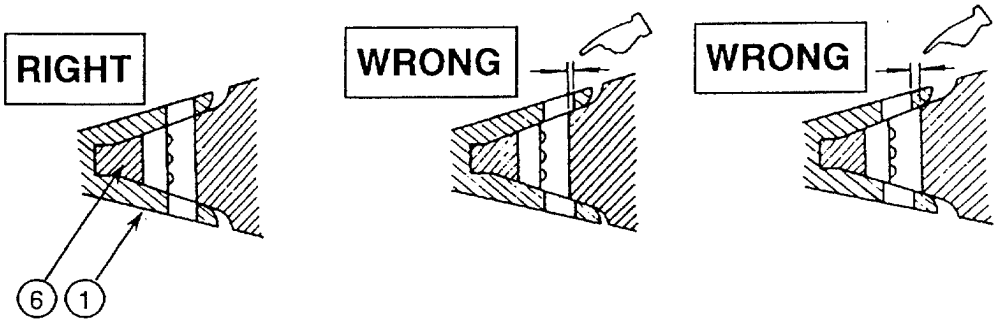
M104-07-059

d. Install rubber pin lock ④ into shank ⑥ hole as shown.



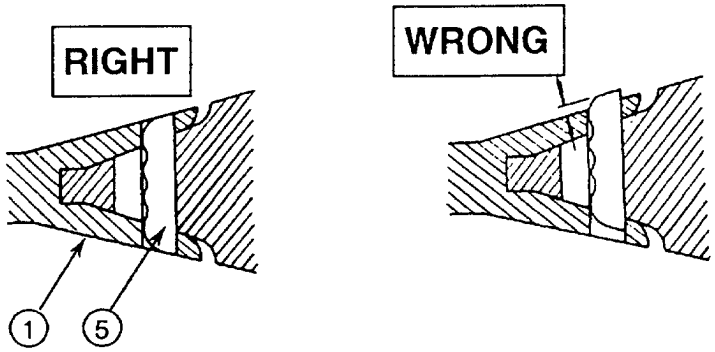
M104-07-060

e. Position new tooth ① over shank ⑥.



M104-07-061

f. Drive locking pin ⑤ into the hole fully as shown.



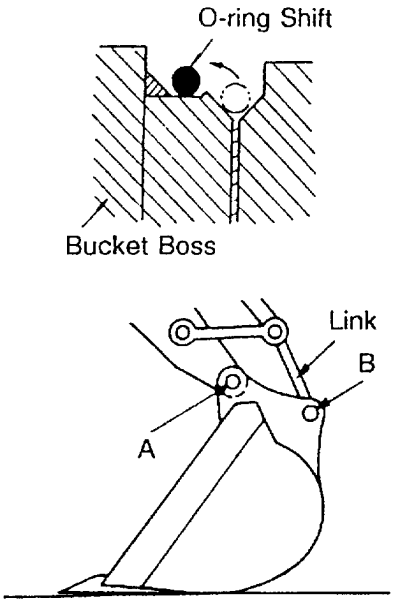
M104-07-062

NOTE: Check the bucket teeth periodically to ensure that wear does not exceed the designed service limit.

2 Change Bucket

CAUTION: When driving the connecting pins in or out, guard against injury from flying pieces of metal or debris; wear goggles or safety glasses, and safety equipment appropriate to the job.

1. Park the machine on a level surface. Lower the bucket to the ground and position it with the flat surface resting on the ground. Be sure the bucket will not roll when the pins are removed.
2. Slide the O-rings out of the way, as shown.
3. Remove bucket pins A and B to separate the arm and bucket. Clean the pins and pin bores. Apply sufficient grease to the pins and pin bores.
4. Align the arm and alternate bucket. Be sure the bucket will not roll.
5. Install the bucket pins A and B.
6. Install the locking pins and snap ring on pins A and B.
7. Adjust bucket linkage clearance for pin A. See adjusting bucket linkage clearance procedure.
8. Apply grease to pin joints A and B.
9. Start the engine and run at slow idle. Slowly operate the bucket in both directions to check for any interference in bucket movement. Do not operate a machine that has any movement interference. Correct interference problem.



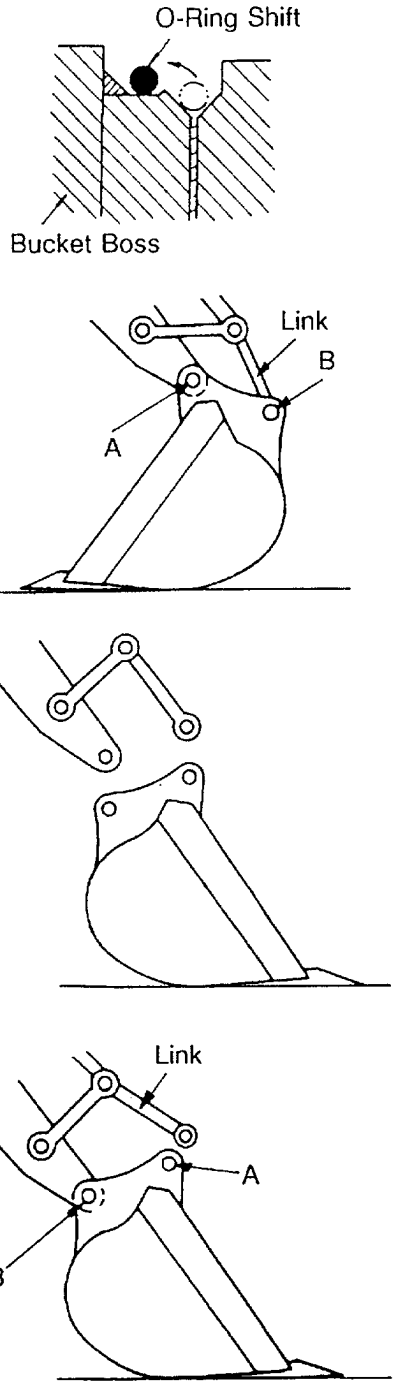
M104-07-063

3 Convert Bucket Connection Into Face Shovel

CAUTION: When driving the connecting pins in or out, guard against injury from flying pieces of metal or debris; wear goggles or safety glasses, and safety equipment appropriate to the job.

IMPORTANT: Provide ample space for turning the bucket 180°. Before starting converting work, keep bystanders clear of the machine. When using a signal person, coordinate hand signals before starting.

1. Park the machine on a level surface. Lower the bucket to the ground and position it with the flat surface resting on the ground. Be sure the bucket will not roll when the pins are removed.
2. Slide the O-rings out of the way, as shown.
3. Remove the bucket pins A and B to separate the arm and bucket. Clean the pins and pin bores. Apply sufficient grease to the pins and pin bores.
4. Turn the bucket 180°. Be sure the bucket will not roll.
5. Align the arm and bucket. Install bucket pins A and B, then install the locking pins and snap rings on pin A and B.
6. Apply grease to pin joints A and B.
7. Start the engine and run at slow idle. Slowly operate the bucket in both directions and check for any interference in bucket movement. Do not operate a machine that has any movement interference. Correct interference problem.



M104-07-064

4 Adjust The Bucket Linkage

The machine has a bucket adjustment system to take up play in the linkage. When play in the linkage increases, remove and install shims as follows:

1. Park the machine on a level surface. Lower the bucket to the ground with the flat side down so the bucket will not roll.
2. Run the engine at slow idle. With the bucket on the ground slowly swing counterclockwise slightly until the top of the left bucket boss contacts the arm.
3. Stop the engine. Pull the pilot control shut-off lever to the LOCK position.

NOTE: Bolt ① does not need to be removed to remove shims. Shims are of a split type that can be easily pushed off with a screwdriver after bolts ① have been loosened.

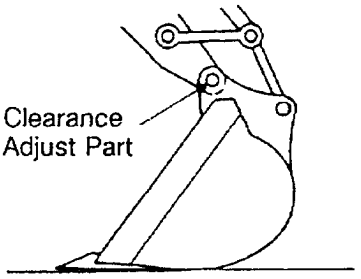
4. Slightly loosen three (M12) bolts ① using a 19 mm wrench. Remove all shims ② from clearance (c) between plate ③ and bucket.
5. Push and hold bolts ① to remove all clearance (a) between arm and boss ④. Holding boss ④ against arm increases clearance (b). Measure distance (b) using a feeler gauge. This distance should not be adjusted below 0.5 mm (0.02 in).
6. Install as many shims ② into clearance (b) as possible.

NOTE: Remaining shims ② must be installed in clearance (c) to prevent arm end face or bolt damage.

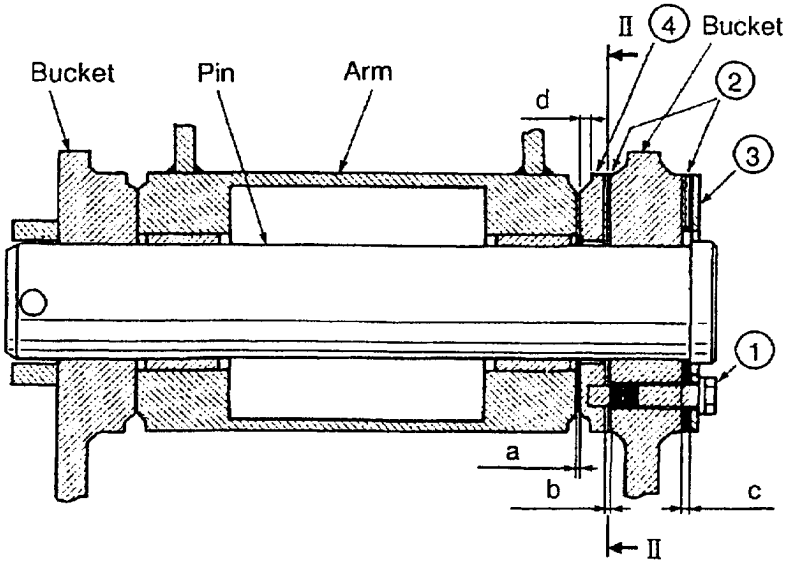
7. Install remaining shims ② into clearance (c) and tighten bolts ① to 88 N·m (9 kgf·m, 65 lbf·ft).

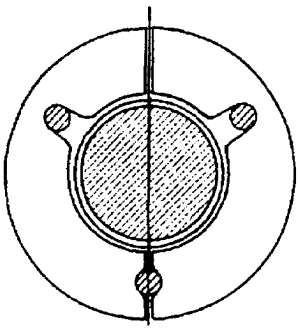
NOTE: The total number of shims ② used is 12 (6 pairs).

8. Replace boss ④ if measurement (d) is 4 mm (0.16 in) or less.



M503-07-056





SECTION II

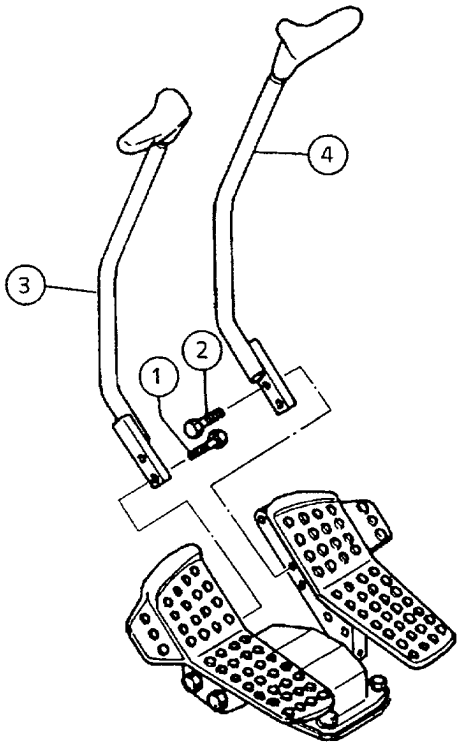
M104-07-066

5 Remove the Travel Levers

The travel levers may be removed if desired.

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.
4. Turn the key switch OFF. Remove the key.
5. Pull the pilot control shut-off lever to the LOCK position.
6. Remove bolts ① and ② to remove levers ③ and ④ from brackets.

NOTE: Wrench size 17 mm
Tightening torque 49 N·m (5 kgf·m, 36 lbf·ft)



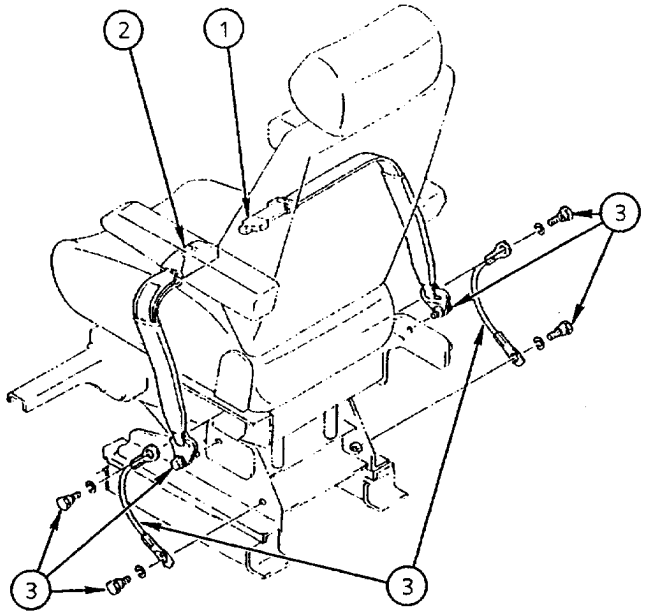
M107-04-001

6 Check and Replace Seat Belt

Check --- daily
Replace --- every 3 years

Examine seat belt webb ①, buckle ② and attaching hardware ③. Replace the seat belt webb, buckle, or attaching hardware if they are damaged, or worn.

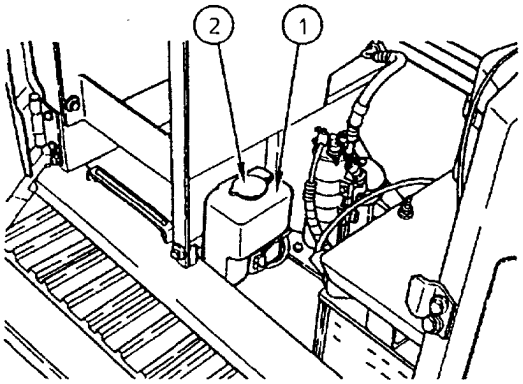
Replace seat belt every 3 years, regardless of appearance.



M107-07-132

7 Check Windshield Washer Fluid Level --- as required.

Check fluid in windshield washer tank ①.
If the fluid level is low, add fluid through cap ②.
During winter season, use all season windshield washer which will not freeze.

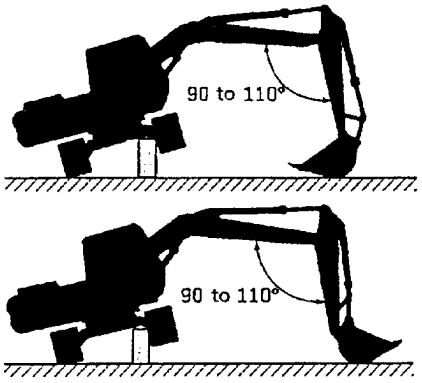


M104-07-129

8 Check Track Sag --- every 50 hours

Swing the upperstructure 90° and lower the bucket to raise the track off the ground as shown.

Keep the angle between the boom and arm 90 to 110° and position the bucket's round side on the ground. Place blocks under the machine frame to support the machine.
Rotate the raised track in reverse two full rotations and then forward two full rotations.

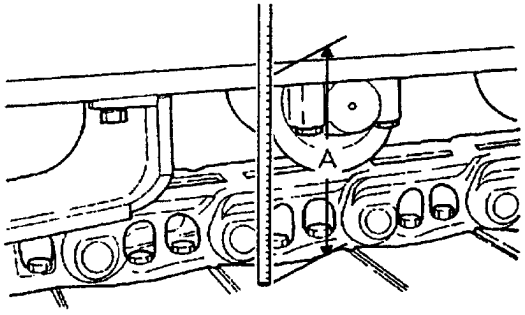


SA-270

Measure distance (A) at the middle of the track frame from the bottom of the track frame to the back face of the track shoe.

	EX100-3	EX100M-3
Track sag specifications A	250 to 280 mm (9.8 to 11.0 in)	265 to 295 mm (10.4 to 11.6 in)

NOTE: Check track sag after thoroughly removing soil stuck on the track area by washing.



M107-07-068

9 Adjust Track Sag

Precautions for Adjusting Track Sag

1. If track sag is not within specifications, loosen or tighten the track following the procedures shown on the next page.

2. When adjusting track sag, lower the bucket to the ground to raise one track off the ground. Repeat this procedure to raise the other track. Each time, be sure to place blocks under the machine frame to support the machine.

3. After adjusting track sag of both tracks, move the machine back and forth several times.

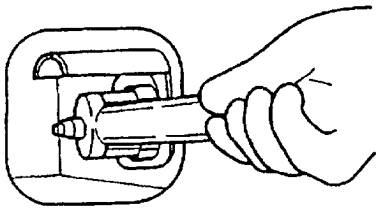
4. Check track sag again. If track sag is not within specifications, repeat adjustment until correct sag is obtained.

Loosen the Track

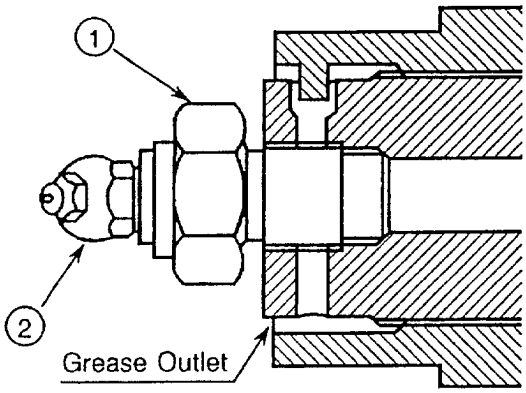
CAUTION: Do not loosen valve ① quickly or loosen it too much as high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve ①.
Never loosen grease fitting ②.

IMPORTANT: When gravel or mud is packed between sprockets and track links, remove it before loosening.

1. To loosen the track, slowly turn valve ① counterclockwise using long socket 24; grease will escape from the grease outlet.
2. Between 1 to 1.5 turns of valve ① is sufficient to loosen the track.
3. If grease does not drain smoothly, slowly rotate the raised track.
4. When proper track sag is obtained, turn valve ① clockwise and tighten to 147 N·m (15 kgf·m, 108 lbf·ft).



M107-07-075

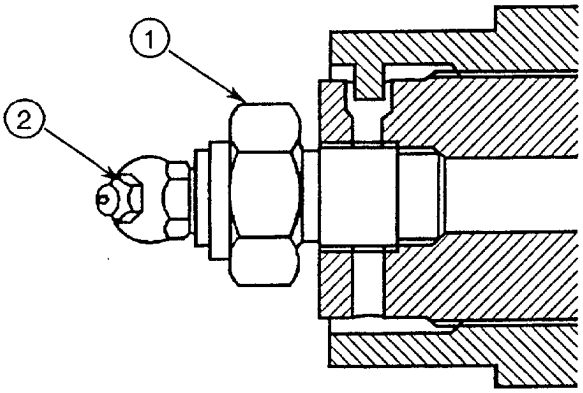


M104-07-119

Tighten the Track

CAUTION: It is abnormal if the track remains tight after turning valve ① counterclockwise or if the track is still loose after charging grease to fitting ②. In such cases, NEVER ATTEMPT TO DISASSEMBLE the track link or track adjuster, because of dangerous high-pressure grease inside the track adjuster. See your authorized dealer immediately.

To tighten the track, connect a grease gun to grease fitting ② and add grease until the sag is within specifications.



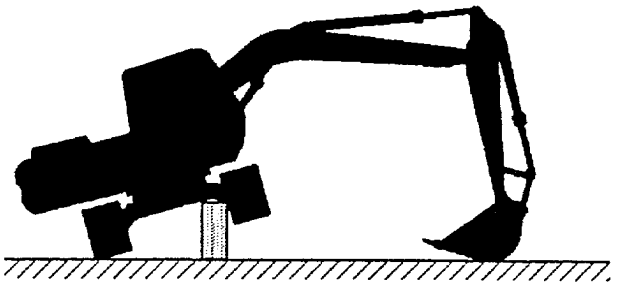
M104-07-119

10 **Check and Adjust Track Sag (Optional rubber crawler) --- daily**

Check Track Sag

Swing upperstructure 90° and lower bucket to raise track off ground as shown.

Keep the angle between boom and arm 90 to 110° and position the bucket's round side on the ground. Place blocks under machine frame to support machine.
Rotate track in reverse two full rotations and then forward two full rotations.

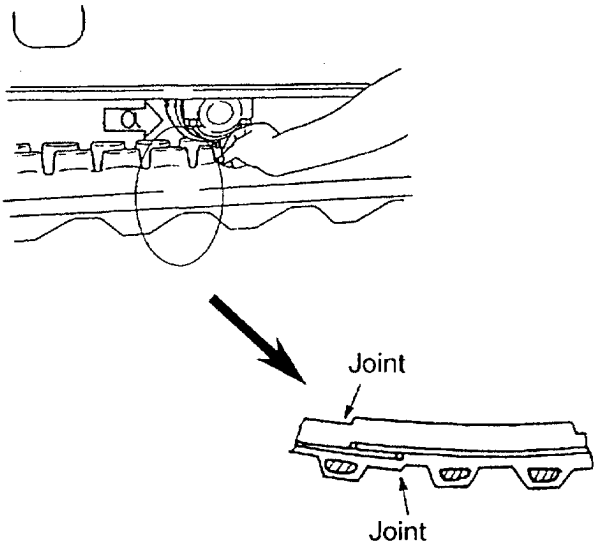


M104-07-067

Measure distance (A) at joint part of crawler from bottom of track frame to back face of track shoe.

Track sag specifications --- 20 to 30 mm
(0.8 to 1.2 in)

NOTE: Check track sag after thoroughly removing soil stuck on track area by washing.



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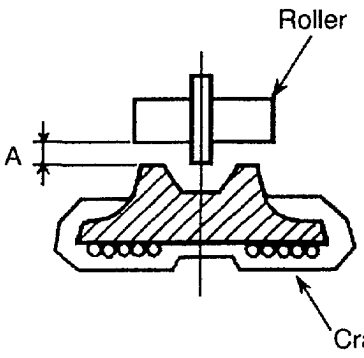
M102-07-075



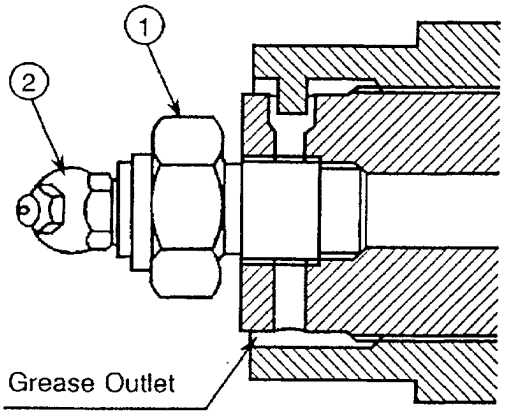
M503-05-050

Loosen Track

CAUTION: Do not loosen valve ① too quickly or too much as high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve ①. Never loosen the grease fitting.

IMPORTANT: When gravel or mud is packed between sprockets and track links, remove it before loosening valve ①.

1. To loosen track, slowly turn valve ① counterclockwise using a socket wrench (long socket 24); grease will escape from grease outlet.
2. Between 1 and 1.5 turns of valve ① are sufficient to loosen track.
3. If grease does not drain smoothly, slowly rotate the track.
4. When proper track sag is obtained, turn valve ① clockwise and tighten it to 147 N·m (15 kgf·m, 108 lbf·ft).



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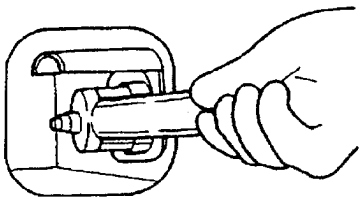
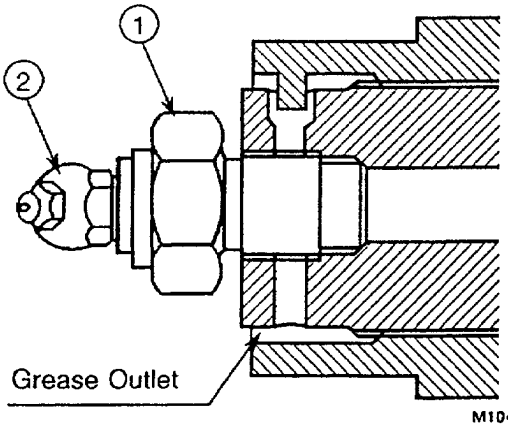


M107-07-075

Tighten Track

CAUTION: It is abnormal if track is still tight after turning valve ① counterclockwise or track is still loose after charging grease to fitting ②. In such cases, NEVER ATTEMPT TO DISASSEMBLE the track link or track adjust-er, because of dangerous high-pressure grease inside the track adjuster. See your authorized dealer immediately.

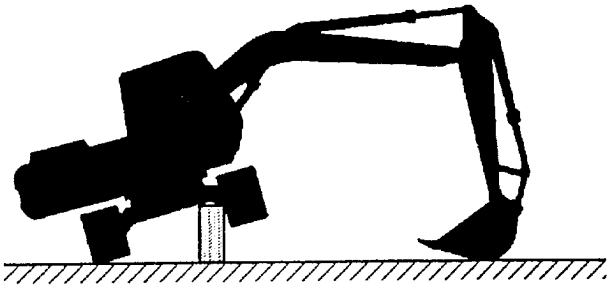
To tighten track, connect a grease gun to the grease fitting ② and add grease until the sag is within specifications.



M104-07-119

11 Replace Rubber Crawler (Optional)

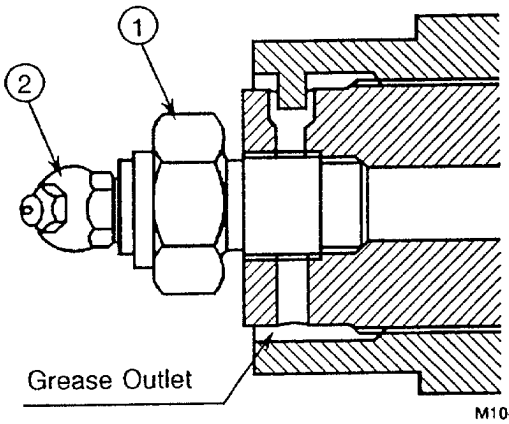
CAUTION: Do not loosen valve ① quickly or loosen it too much as high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve ①. Never loosen the grease fitting. When removing the rubber crawler, do not allow anyone to stand in front of the front idler. During this procedure, the high power track adjuster may suddenly release the front idler with extreme force, potentially resulting in personal injury or death.



M104-07-067

1. Removing Rubber Crawler

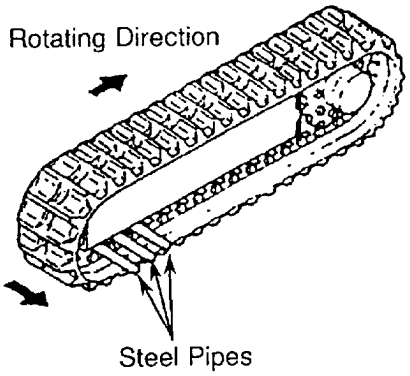
(1) Swing the upperstructure 90° and lower the bucket to raise the track off the ground as shown.
Keep the angle between the boom and arm 90 to 110° and position the bucket's round side on the ground. Place blocks under the machine frame to support the machine.
(2) Slowly turn valve ① counterclockwise using a socket wrench; grease will escape from grease outlet.
(3) Insert two or three steel pipes into gaps among lower rollers, track frame and rubber crawler and travel slowly in reverse to lift the crawler off the idler. Push horizontally to pry the rubber crawler from the idler.



M104-07-119

2. Istalling Rubber Crawler

(1) Lower the bucket to raise track off ground, as shown. Place blocks under machine frame to support the machine.
(2) Slowly turn valve ① counterclockwise using a socket wrench; grease will escape from grease outlet.
(3) Engage the rubber crawler with the sprocket and position the other end of the crawler on the front idler.
(4) While rotating the sprocket in reverse, push horizontally the rubber crawler to seat in on the idler.
(5) Insert a steel pipe into gaps among lower rollers, track frame and rubber crawler and travel slowly in reverse to correctly seat the rubber crawler on the idler.
(6) Confirm that the rubber crawler is correctly engaged with the sprocket and idler.
(7) Adjust track sag. (See "Check and Adjust Track Sag" on pages 142 and 143.)
(8) Lower the machine to the ground.



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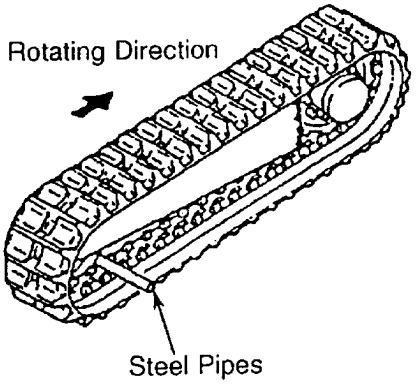


M503-07-063

Replacement of Rubber Crawler

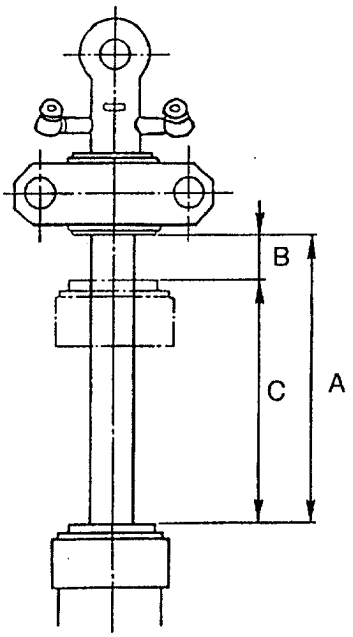
CAUTION: When replacingor adjusting the rubber crawler is required, ask your nearest authorized dealer.
The track adjuster spring setting force is quite large. Do not allow anyone to stand in front of the front idler.
Do not attempt to disassemble the track adjuster.

12 Check the Clamshell Bucket --- every 100 hours

Check the stopper.

The cylinder stroke of the clamshell bucket is determined by the bucket open-close stoppers.
If wear amounts on the stopper are increased after a long period of operation, the cylinder cushion allowance will be reduced, causing cylinder damage.
Check the following dimensions.

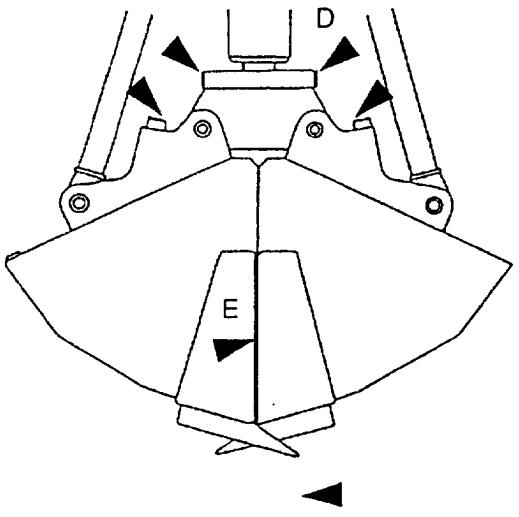
A : The bucket is fully opened.
420 mm (16.5 in)
B : The bucket is fully closed.
60 mm (2.4 in)
C : Stroke (A–B)
360 mm (14.2 in)



M107-07-122

Repair

1. If dimension A exceeds 440 mm (17.3 in).
   (1) Check wear on bushings and pin for the shell and stays. Replace them as required.
   (2) If the shell stopper are worn out, repair them by cladding weld (spots D).
2. If dimension B is below 54 mm (2.1 in).
   (1) Check wear on bushings and pins for the shell and stays. Replace them as required.
   (2) If edges or bottom sections are worn out, repair them by cladding weld (spots E).



M107-07-123

Precaution for storage

When storing the clamshell bucket, plug or cap the cylinder pipings and hoses to prevent the entrance of water or dust.

13 Check Air Conditioner --- daily

1. **Check pipe connections for refrigerant gas leakage.**
   If oil seepage is found around pipe connections, as illustrated, it indicates possible gas leakage.

2. **Check refrigerant quantity.**
   After running the engine at 1 500 min^{-1} (rpm) for 2 to 3 minutes, check refrigerant quantity through the sight glass on the receiver tank.

3. **Check the condenser.**
   If the condenser fins become clogged with dirt or insects, the cooling effect will be decreased. Be sure to keep them clean at all times.(Refer to "Clean Radiator Core" in Maintenance Section.)

4. **Check the compressor**
   After operating the air conditioner for 5 to 10 minutes, touch the high-pressure side and low-pressure side pipes with your hand. If normal, the high-pressure side pipe will be hot, and the low-pressure side cold.

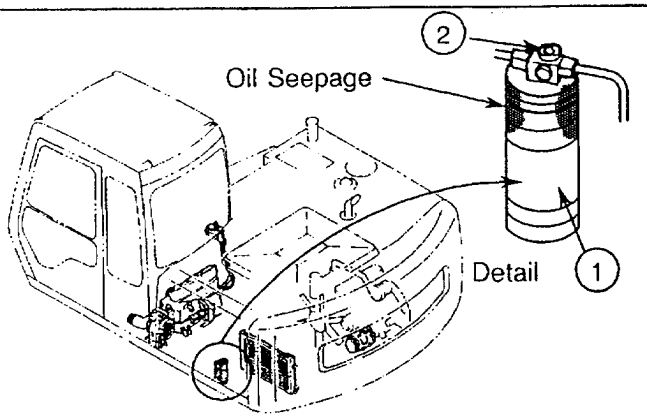
5. **Check mounting bolts for looseness.**
   Confirm that the compressor mounting bolts and other mounting/fastening bolts are securely tightened.

6. **Inspect belt, check and adjust tension.**
   Visually check the compressor and fan belts for wear. Check and adjust belt tension, referring to the illustration (right).

   Fan and Compressor belts

   Depressing Force: approximately 98 N (10 kgf, 22 lbf)
   Deflection: 9 to 12 mm (0.39 to 0.47 in)

If any abnormalities are found in air conditioner operation, see your authorized dealer for inspection.



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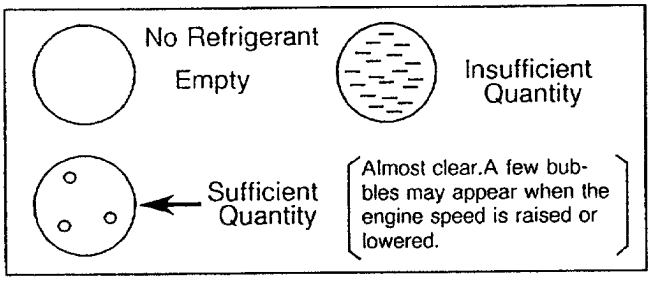

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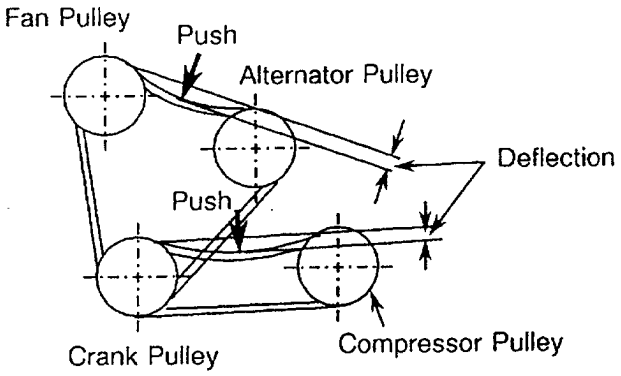


M104-01-045

14 Check Tightening Torque of Bolts and Nutss --- every 250 hours (first time after 50 hours)

Check tightness after the first 50 hours then every 250 hours. Tighten to torque shown if any are loose. Bolts and nuts should be replaced with those of the same or higher grade.

IMPORTANT: Check and tighten bolts and nuts using a torque wrench.

Torque Specifications

No.	Descriptions		Bolt Dia mm	Q'ty	Wrench Size mm	Torque N·m	Torque kgf·m	Torque lbf·ft
1	Engine cushion rubber mounting bolt		16	2	24	265	27	195
	Engine cushion rubber mounting nut		14	4	22	137	14	101
2	Engine bracket mounting bolt and nut		10	8	17	49	5	36
3	Hydraulic oil tank mounting bolt		16	4	24	205	21	152
4	Fuel tank mounting bolt		16	4	24	205	21	152
5	ORS fittings for hydraulic hoses and pipes				19	29.5	3	21.5
					22	39	4	29
					27	93	9.5	69
					32	137	14	101
					36	175	18	130
					41	205	21	152
6	Pump mounting bolt		10	8	17	49	5	36
7	Control valve mounting bolt		14	6	22	137	14	101
8	Control valve bracket mounting bolt		12	4	19	88	9	65
9	Swing device mounting bolt		20	10	30	540	55	400
10	Battery mounting nut		10	2	17	19.5	2	14.5
11	Cab mounting bolt		16	4	24	205	21	152
12	Swing bearing mounting bolt to upperstructure		18	28	27	390	40	290
	Swing bearing mounting bolt to undercarriage		16	36	24	265	27	195
13	Travel device mounting bolt	EX100-3	16	28	24	300	31	225
		EX100M-3	16	32	24	300	31	225
	Travel device cover mounting bolt		12	24	19	108	11	80
14	Sprocket mounting bolt.	EX100-3	16	32	24	265	27	195
		EX100M-3	16	44	24	265	27	195

Continued on next page

Torque Specifications (continued)

No.	Descriptions		Bolt Dia mm	Q'ty	Wrench Size mm	Torque N·m	Torque kgf·m	Torque lbf·ft
15	Upper roller mounting bolt	EX100-3	12	8	19	108	11	80
		EX100M-3	16	16	24	265	27	195
16	Lower roller mounting bolt		16	56	24	300	31	225
17	Track shoe bolt	EX100-3	16	328	24	410	42	300
		EX100M-3	16	376	24	410	42	300
18	Covers mounting bolt		6		10	9.8	1	7.2
			10		17	49	5	36
			12		19	88	9	65
19	Coupling and clamp of low pressure piping		8		13	10.5 to 12.5	1.05 to 1.26	7.6 to 9.1
			5		8	2.9	0.3	2.2
			6		10	4.4	0.45	3.3

IMPORTANT: (1) Make sure bolt and nut threads are clean before installing.
(2) Apply lubricant (e. g. white zinc B solved into spindle oil) to bolts and nuts to stabilize their friction coefficient.
(3) If fixing bolts for counterweight are loosened, consult your nearest authorized dealer

NOTE: Tightening torque required is shown in kgf·m. For example, when tightening a bolt or nut with a wrench of 1 m length, turning the end of it with a force of 12 kgf, the torque produced will be:

1 m × 12 kgf = 12 kgf·m

To produce the same torque with a wrench of 0.25 m:

0.25 m × [ ] kgf = 12 kgf·m

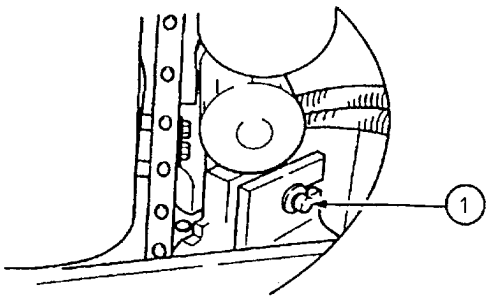
Necessary force will be:

12 kgf·m ÷ 0.25 m = 48 kgf

1. Retighten the engine insulation rubber mounting bolts and nuts.

   Nuts :
   Tool : 22 mm

   Torque : 137 N·m (14 kgf·m, 101 lbf·ft)

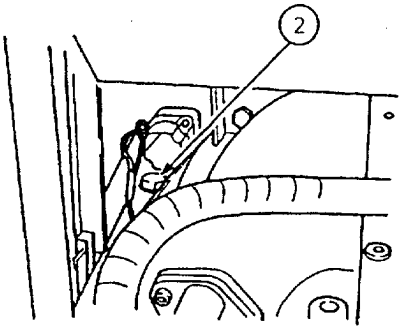


M104-07-075

   Bolt :

   Tool : 24 mm

   Torque : 265 N·m (27 kgf·m, 195 lbf·ft)

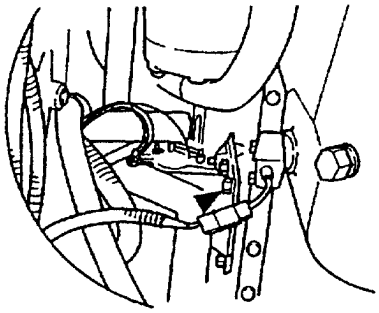


M104-07-076

2. Retighten the engine bracket mounting bolts.

   Tool : 17 mm

   Torque : 49 N·m (5 kgf·m, 36 lbf·ft)

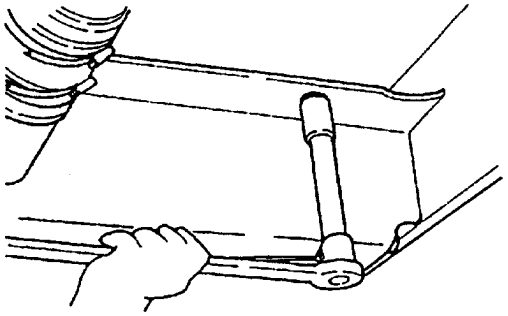


M104-07-077

3. 4. Retighten the hydraulic oil and fuel tank mounting bolts.

   Tool : 24 mm

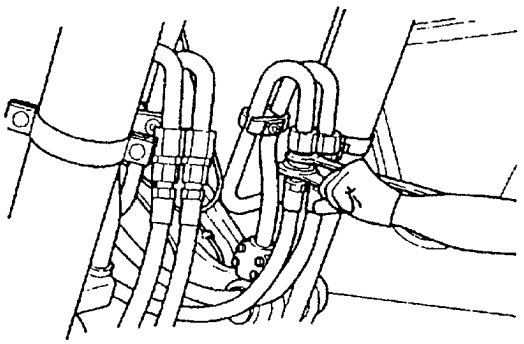
   Torque : 205 N·m (21 kgf·m, 152 lbf·ft)



M104-07-078

5. Retighten the ORS fittings for hydraulic hoses and pipes.

   Tool : 19 mm Torque : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
   Tool : 22 mm Torque : 39 N·m (4 kgf·m, 29 lbf·ft)
   Tool : 27 mm Torque : 93 N·m (9.5 kgf·m, 69 lbf·ft)
   Tool : 32 mm Torque : 137 N·m (14 kgf·m, 101 lbf·ft)
   Tool : 36 mm Torque : 175 N·m (18 kgf·m, 130 lbf·ft)
   Tool : 41 mm Torque : 205 N·m (21 kgf·m, 152 lbf·ft)

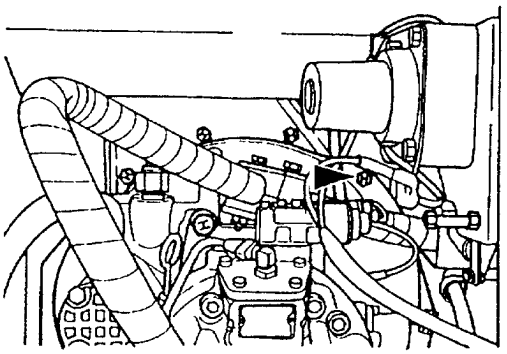


M107-07-081

6. Retighten the pump transmission mounting bolts.

   Tool : 17 mm

   Torque : 49 N·m (5 kgf·m, 36 lbf·ft)

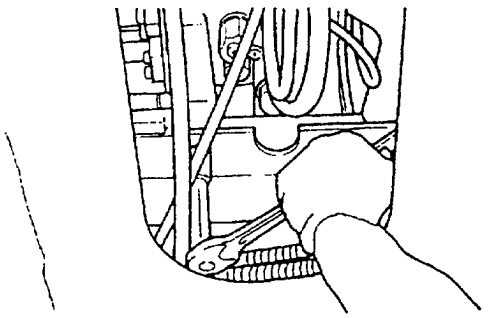


M104-07-128

7. Retighten the control valve mounting bolts.

   Tool : 22 mm

   Torque : 137 N·m (14 kgf·m, 101 lbf·ft)

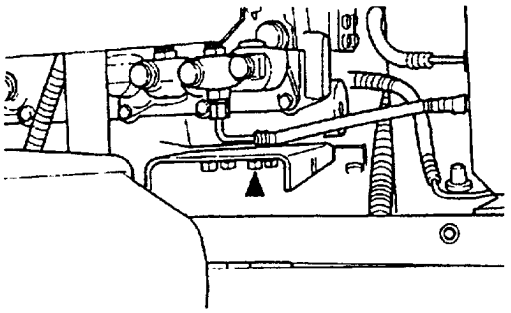


M104-07-081

8. Retighten the control valve bracket mounting bolts.

   Tool : 19 mm

   Torque : 88 N·m (9 kgf·m, 65 lbf·ft)

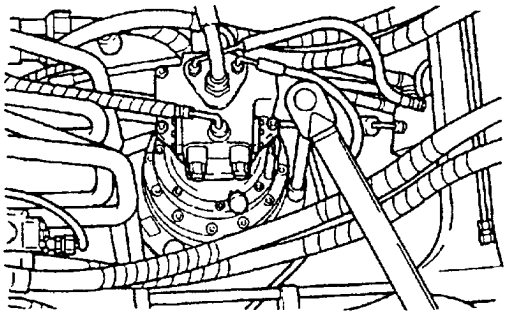


M104-07-082

9 Retighten the swing device mounting bolts.

Tool : 30 mm

Torque : 540 N·m (55 kgf·m, 400 lbf·ft)

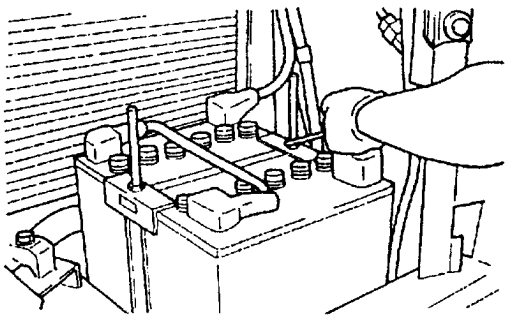


M104-07-083

10. Retighten the battery mounting nuts.

Tool : 17 mm

Torque : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

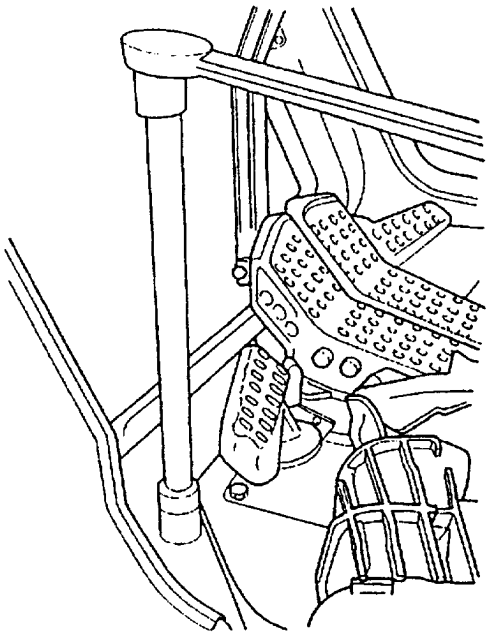


M104-07-084

11. Retighten the cab mounting bolts.

Tool : 24 mm

Torque : 205 N·m (21 kgf·m, 152 lbf·ft)



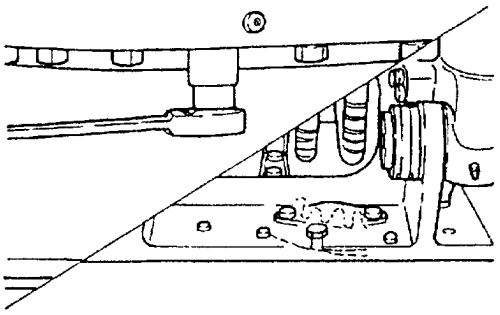
M107-07-087

12. Retighten the swing bearing mounting bolts to upperstructure.

    Tool : 27 mm
    Torque : 390 N·m (40kgf·m, 290 lbf·ft)

    Retighten swing bearing mounting bolts to undercarriage.

    Tool : 24 mm
    Torque : 265 N·m (27 kgf·m, 195 lbf·ft)



M104-07-086

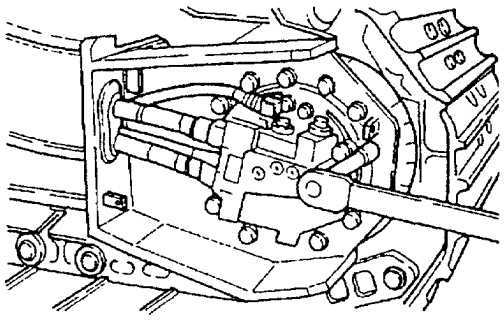
13. Retighten the travel device mounting bolts.

    Tool : 24 mm

    Torque : 300 N·m (31 kgf·m, 225 lbf·ft)

    Retighten the dravel device cover mounting bolts.

    Tool : 19 mm
    Torque : 108 N·m (11 kgf·m, 80 lbf·ft)

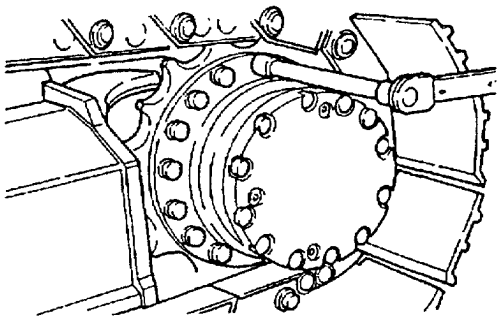


M104-07-087

14. Retighten the sprocket mounting bolts.

    Tool : 24 mm

    Torque : 265 N·m (27 kgf·m, 195 lbf·ft)

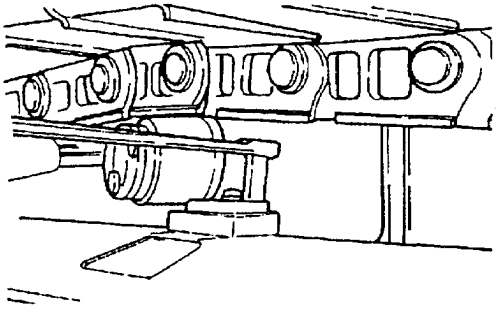


M104-07-088

15. Retighten the upper roller mounting bolts.

EX100-3
    Tool : 19 mm
    Torque : 108 N·m (11 kgf·m, 80 lbf·ft)

EX100M-3
    Tool : 24 mm
    Torque : 265 N·m (27 kgf·m, 195 lbf·ft)

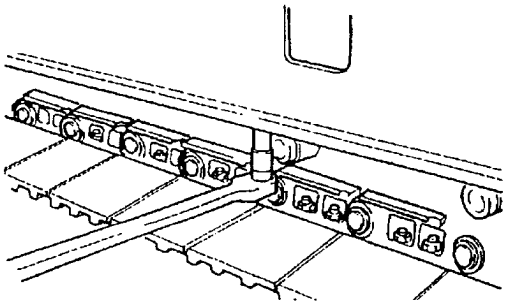


M104-07-089

16. Retighten the lower roller mounting bolts.

Tool : 24 mm

Torque : 300 N·m (31 kgf·m, 225 lbf·ft)

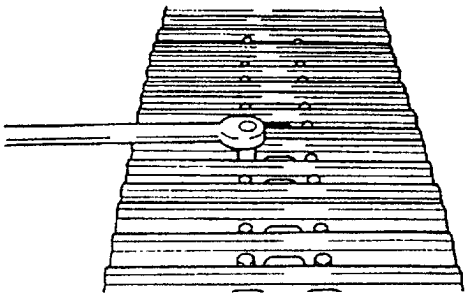


M104-07-090

17. Retighten the shoe mounting bolts.

Tool : 24 mm

Torque : 410 N·m (42 kgf·m, 300 lbf·ft)



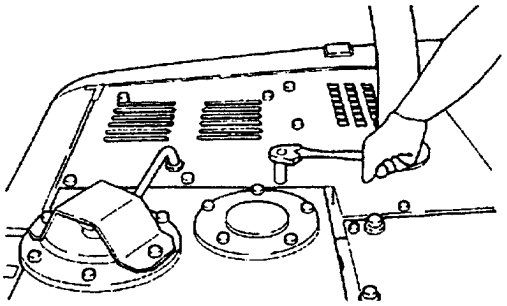
M104-07-091

18. Retighten the covers mounting bolts.

Tool : 10 mm
Torque : 9.8 N·m (1 kgf·m, 7.2 lbf·ft)

Tool : 17 mm
Torque : 49 N·m (5 kgf·m, 36 lbf·ft)

Tool : 19 mm
Torque : 88 N·m (9 kgf·m, 65 lbf·ft)

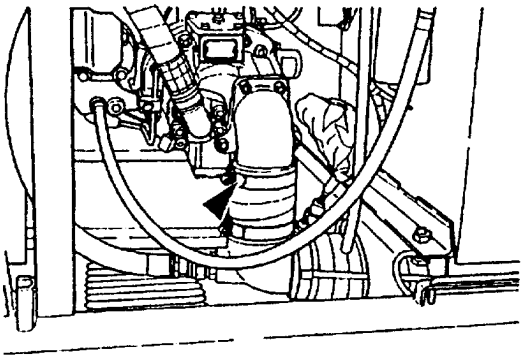


M104-07-092

19. Retighten the coupling and clamp

Coupling
Tool : 13 mm
Torque : 10.5 to 12.5 N·m
(1.05 to 1.26 kgf·m, 7.6 to 9.1 lbf·ft)

Clamp
Tool : 8 mm
Torque : 2.9 N·m (0.3 kgf·m, 2.2 lbf·ft)
Tool : 10 mm
Torque : 4.4 N·m (0.45 kgf·m, 3.3 lbf·ft)



M104-07-130

MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

Operating Conditions	Precautions for Maintenance	
Muddy Soil, Rainy or Snowy Weather	Before Operation: After Operation:	Check the tightness of plugs and all drain cocks. Clean the machine and check for cracks, damaged, loose or missing bolts and nuts. Lubricate all necessary part without delay.
Near the Ocean	Before Operation: After Operation:	Check tightness of plugs and all drain cocks. Thoroughly clean the machine with fresh water to wash off salt. Service electrical equipment often to prevent corrosion.
Dusty Atmosphere	Air Cleaner: Radiator: Fuel System: Electrical Equipment:	Clean the element regularly with shorter service intervals. Clean the oil cooler screen to prevent clogging of the radiator core. Clean the filter element and strainer regularly with shorter service intervals. Clean them regularly, in particular, the commutator surface of the alternator and starter.
Rocky Ground	Tracks: Front Attachment:	Carefully operate while checking for cracks, damage and loose bolts and nuts. Loosen the tracks a little more than usual. Standard attachment may be damaged when digging rocky ground. Reinforce the bucket before using it, or use a heavy duty bucket.
Freezing Weather	Fuel: Lubricant: Engine Coolant: Battery: Tracks:	Use high quality fuel suitable for low temperature. Use high quality low viscosity hydraulic oil and engine oil. Be sure to use antifreeze. Fully charge the batteries regularly with shorter service intervals. If not charged fully, electrolyte may freeze. Keep the tracks clean. Park the machine on a hard surface to prevent the tracks from freezing to the ground.
Falling Stones	Cab:	Provide a cab guard to protect the machine from falling stones when necessary.

STORING THE MACHINE

1. Inspect the machine. Repair worn or damaged parts. Install new parts if necessary.
2. Clean the primary air cleaner element.
3. Retract all hydraulic cylinders, if possible. If not, coat exposed cylinder rods with grease.
4. Lubricate all grease points.
5. Park the tracks on long stable blocks.
6. Wash the machine.
7. Remove the batteries and store them in a dry protected place after charging fully. If not removed, disconnect the negative battery cable from the (-) terminal.
8. Add an antirust agent to the coolant. In cold weather, add an antifreeze, or drain the coolant completely. Be sure to attach a "No Water in Radiator" tag on a clearly visible location if the system is drained.
9. Loosen the alternator belt and fan belt.
10. Paint necessary areas to prevent rust.
11. Store the machine in a dry, protected place. If stored outside, cover with a waterproof cover.
12. If the machine is stored for a long time, operate hydraulic functions for travel, swing and digging 2 to 3 times for lubrication, at least once a month.
    Be sure to check the coolant level and lubrication conditions before operating.

REMOVING THE MACHINE FROM STORAGE

⚠ **CAUTION: Start the engine ONLY in a well-ventilated place.**

1. Remove grease from the cylinder rods if coated.
2. Adjust alternator and fan belt tension.
3. Fill the fuel tank. Bleed air from the fuel system. Check all fluid levels.
4. Start the engine.
   Run the engine at half speed for several minutes before full load operation.
5. Cycle all hydraulic functions several times.
6. Carefully check all systems before operating the machine at full load.

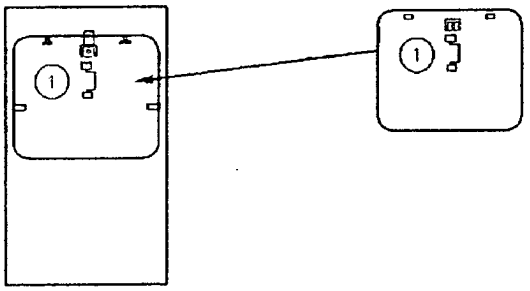
NOTE: When the machine has been stored for a long time, be sure to perform the following steps as well:

(a) Check condition of all hoses and connections.
(b) Warm up the engine.
(c) Stop the engine.
(d) Install new fuel filters. Replace the engine oil filter and fill the engine with oil.

IMPORTANT: If the machine has not been used for a long time, oil films on sliding surfaces may have broken down. Cycling hydraulic functions for travel, swing and digging 2 to 3 times is necessary to lubricate the sliding surfaces.

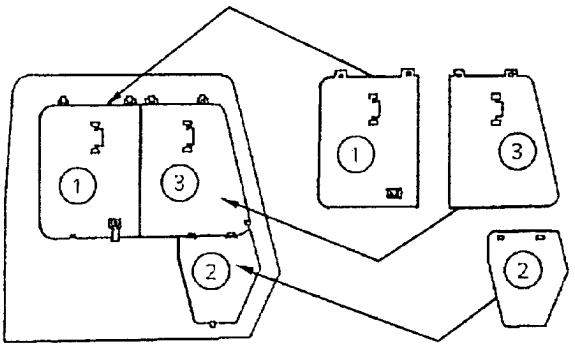
INSTALLING VANDAL-PROOF COVERS

1. Location of each vandal-proof covers to be installed are shown on the right.
2. In each section right, install covers in order of the numbering.
3. Lock covers in each section when finished the installation.



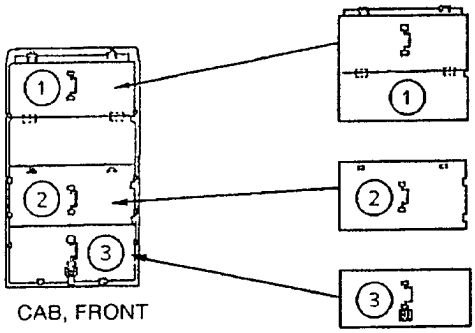
CAB, REAR

M107-08-001



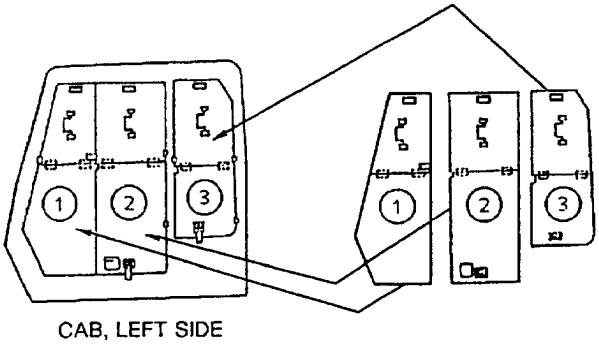
CAB, RIGHT SIDE

M107-08-002



CAB, FRONT

M107-08-003



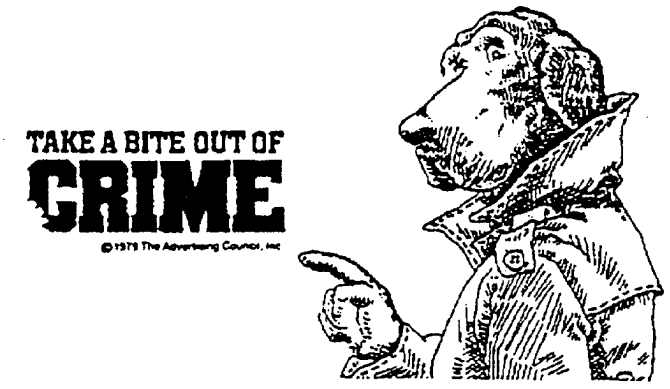
CAB, LEFT SIDE

M107-08-004

CRIME PREVENTION TIPS

HELP PREVENT CRIME

You can help take a bite out of crime by properly documenting ownership and discouraging theft.



M107-09-001

RECORD IDENTIFICATION NUMBERS

1. Mark your machines with your own unique numbering system.
2. Record the Product Identification Number (PIN) of the unit and also individual component identification numbers for engines, axles, pumps, etc. Include the PIN numbers on all documentation, such as insurance, financial, and warranty papers.

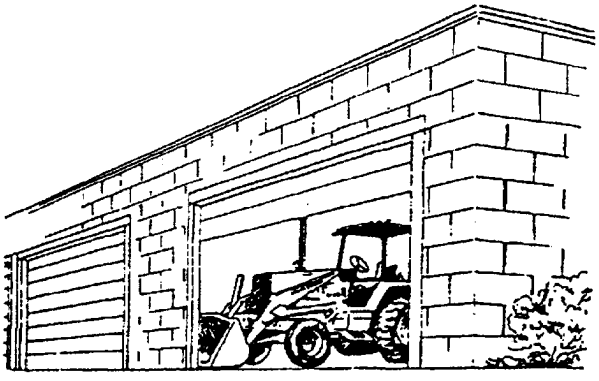
KEEP PROOF OF OWNERSHIP

1. Take color photographs from several angles of each machine.
2. Maintain an up-to-date inventory of all your machines.
3. Keep your documented identification numbers, color photographs, and inventory in a safe, secure location.

PARK INDOORS OUT OF SIGHT

Make machines hard to move:

- Park large equipment in front of exits.
- Lower equipment to the ground. Remove key.
- Remove battery when unit is in storage.
- Lock cab doors, windows, and vandal-proof devices.
- Lock storage building.



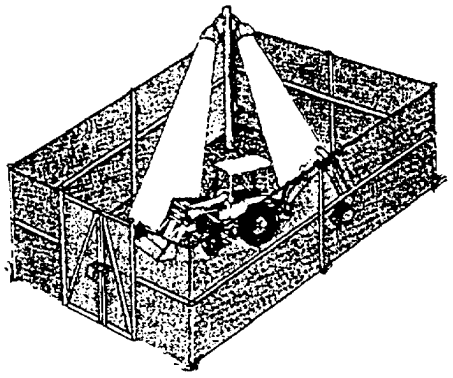
M107-09-002

CRIME PREVENTION TIPS

WHEN PARKING OUTDOORS

Make machines hard to move:

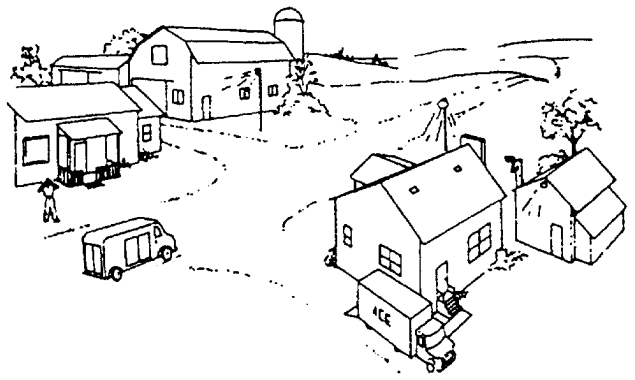
- Park in a well-lighted, fenced area.
- Lower all equipment to the ground.
- Remove ignition key.
- Remove battery when unit is storage.
- Lock cab doors, windows, and vandal-proof devices.



M107-09-003

REDUCE VANDALISM

1. Install vandal-proof devices.
2. Participate in a neighborhood watch program. Take written notes of suspicious vehicles or persons and report your findings to law enforcement agency.
3. Regularly verify that identification plates have not been removed. If they have, notify law enforcement agency. Order duplicate plates from your authorized dealer.



M107-09-004

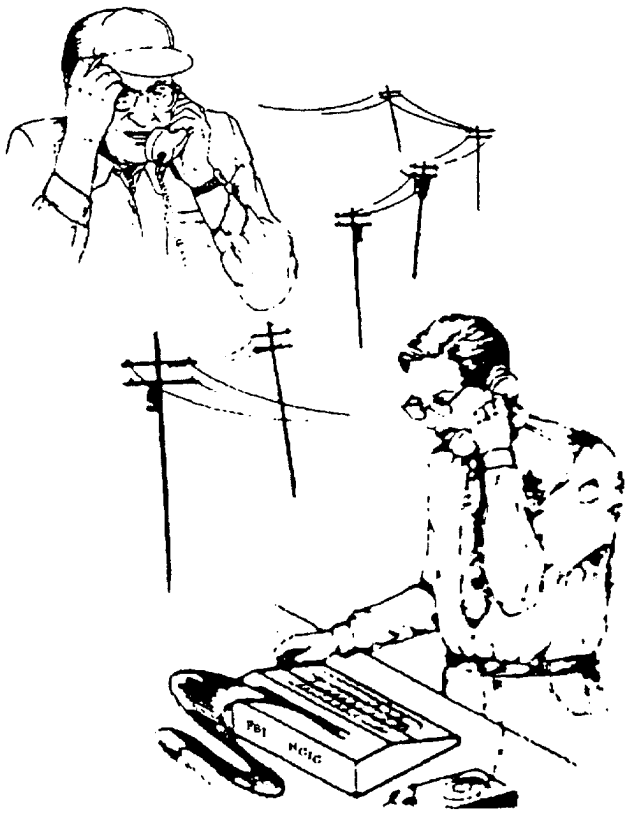
REPORT THEFTS IMMEDIATELY

1. Immediately notify your local law enforcement agency and insurance agent.

2. Provide a complete description of the machine, all of the documented identification numbers and color photographs.

3. Request verification of the identification numbers after they have been entered with any regional or national crime information center. Double check the numbers to be sure they are correct.

4. Notify your authorized dealer of the theft and request that its loss be posted with full description and identification numbers.



M107-09-005

ENGINE

Problem	Cause	Solution
Engine Cranks but Will Not Start or Hard To Start	No fuel	Add fuel. Bleed air.
	Wrong fuel	Drain tank. Use correct fuel.
	Contaminated fuel	Drain tank and add clean fuel.
	Low battery power	Charge or install new battery.
	Injection pump	See your authorized dealer.
	Wrong preheat line or glow plugs	See your authorized dealer.
	Poor electrical connection	Clean and tighten battery and starter motor connections.
	Starter motor failure	Replace starter.
	Wrong engine oil	Drain oil. Use correct oil.
	Air filter plugged	Replace elements.
	Fuel filter plugged	Remove air from fuel system. Clean fuel tank strainer.
	Engine compression low	See your authorized dealer.
	Injection nozzles dirty or not working correctly	See your authorized dealer.
	Fuel shut-off linkage	Adjust or repair linkage.
	Leaks in fuel system	Check fuel system connections.
	Air in fuel system	Bleed air.
	Fuel feed pump plunger up	Push down and tighten knob.
	Feed pump strainer dirty	Clean or replace.
Engine Knocks, Runs Irregularly or Stops	Engine oil level low	Add oil.
	Plugged air intake system	Clean filter and system.
	Feed pump strainer dirty	Clean or replace.
	Injection pump out of time	See your authorized dealer.
	Plugged fuel filters	Install new filters.
	Low coolant temperature	Thermostat not working correctly or too "cool".
	Water, dirt or air in fuel system	Bleed air from fuel system. Clean fuel tank outlet screen.

ENGINE

Problem	Cause	Solution
	Injection nozzles dirty or faulty	See your authorized dealer.
	Fuel shut-off linkage	Adjust or repair linkage.
	Fuel cut motor faulty	See your authorized dealer.
Engine Not Developing Full Power	Air filters plugged	Replace filter elements.
	Fuel line restricted	Repair or replace fuel line.
	Contaminated fuel	Drain fuel tank and clean outlet screen. Refill.
	Fuel filters plugged	Change filters.
	Plugged vent in fuel tank cap	Clean or install new cap.
	Injection nozzles dirty or malfunctioning	See your authorized dealer.
	Injection pump linkage adjustment	See your authorized dealer.
	Wrong fuel	Use correct fuel.
	Wrong oil	Use correct oil.
	Turbocharger failure	See your authorized dealer.
	Injection pump out of timing	See your authorized dealer.
	Exhaust restriction	Remove muffler and run engine.
	Engine is too hot or cold	See below.
	Engine failure	See your authorized dealer.
	Valve clearance	Check and adjust valves.
	Intake or exhaust system leakage	See your authorized dealer.
Engine Overheats	Low coolant level	Add coolant.
	Thermostat	See your authorized dealer.
	Engine overloaded	Check hydraulic relief valves.
	Radiator cap faulty	Install new cap.
	Radiator core or oil cooler core plugged	Clean radiator and oil cooler.
	Radiator screen plugged	Clean screen.
	Injection pump out of timing	See your authorized dealer.
	Fan damaged	Replace fan.
	Air cleaner plugged	Clean air cleaner.
	Alternator and fan belt loose	Tighten or install new belt.

ENGINE

Problem	Cause	Solution
	Pulley grooves worn	Replace pulleys.
	Cooling system passages dirty	Flush cooling system.
	Temperature gauge or sending unit	See your authorized dealer.
Coolant Temperature too Low	Thermostat	See your authorized dealer.
	Temperature gauge or sending unit	See your authorized dealer.
Low Engine Oil Pressure	Engine oil pump or pump drive	See your authorized dealer.
	Low oil level	Add oil.
	Engine oil pressure regulation valve	See your authorized dealer.
	Plugged oil pump intake screen	See your authorized dealer.
	Plugged oil filter	Install a new oil filter.
	Oil leaks	Check for leaks.
	Oil diluted with fuel or coolant	See your authorized dealer.
	Engine temperature too high	Check cooling system.
	Wrong oil	Drain oil. Use correct oil.
Engine Uses too Much Oil	Wrong oil	Drain oil.Use correct oil.
	Oil leaks	Check engine oil drain plug.
	Engine temperature too high	Check cooling system.
	Plugged air cleaner	Clean element or install new element.
	Internal engine component wear	See your authorized dealer.
Engine Uses too Much Fuel	Plugged or dirty air intake system	Clean air intake system.
	Wrong fuel	Use correct fuel.
	Fuel injection nozzles	See your authorized dealer.
	Injection pump out of time	See your authorized dealer.
Excessive Black or Gray Exhaust Smoke	Wrong fuel	Drain tank. Use correct fuel.
	Plugged or dirty air intake or exhaust system	Clean air intake and exhaust system.
	Injection pump out of timing	See your authorized dealer.
	Injection nozzles dirty or faulty	See your authorized dealer.
	Basic engine failures	See your authorized dealer.

ENGINE

Problem	Cause	Solution
Exhaust Gas is White	Wrong fuel	Drain tank. Use correct fuel.
	Cold engine	Run engine until warm.
	Thermostat faulty or too "cool"	See your authorized dealer.
	Injection pump out of time	See your authorized dealer.
	Coolant leakage into engine cylinder	See your authorized dealer.
Turbocharger Excessively Noisy or Vibrates	Bearings not lubricated	Insufficient oil pressure. Check for restricted turbocharger oil line.
	Worn bearings	See your authorized dealer.
	Air leak in engine, intake or exhaust manifold	Inspect, repair.
	Improper clearance between turbine wheel and turbine housing	See your authorized dealer.
	Broken blades on turbine	Remove exhaust elbow and air inlet hose and inspect.
Oil Dripping From Turbocharger Adapter	Damaged or worn bearings and/or worn seals	See your authorized dealer. Inspect and clean air cleaner. Check for proper engine service intervals or dirt enter into engine.
	Excessive crankcase pressure	Check vent tube to ensure tube is not plugged. Clean.
	Turbocharger oil return line carbon build up where line passes exhaust manifold	Remove line. Inspect, clean.
Excessive Drag In Turbocharger Rotating Members	Carbon build-up behind turbine wheel caused by combustion deposits	Inspect, clean.
	Dirt build-up behind compressor wheel caused by air intake leaks	Inspect, clean.
	Bearing seizure or dirty or worn bearings, caused by excessive temperature, unbalanced wheel, dirty oil, oil starvation, or insufficient lubrication	See your authorized dealer.

ELECTRICAL SYSTEM

Problem	Cause	Solution
Nothing works	Battery	Recharge or replace.
Nothing works (Except clock)	Battery relay	Replace relay.
Batteries Undercharged	Loose or corroded connections	Clean and tighten or replace batteries.
	Alternator belt loose	Tighten or install new belt.
	Alternator not charging	See your authorized dealer.
	Fuse	Replace fuse.
	Key switch failure	Replace key switch.
Starting Motor Will Not Turn	Battery undercharged or dead	Recharge or replace battery.
	Battery cables making poor connections	Clean connections.
	Fusible link	Replace fusible link.
	Key switch	See your authorized dealer.
	Start relay	See your authorized dealer.
	Starter solenoid	See your authorized dealer.
	Starter	Repair or replace start motor.
	Starter pinion jammed in flywheel gear	Repair or replace starter.
	Major engine failure	See your authorized dealer.
Starter Solenoid Chatters	Poor connections at batteries or starter	Clean connections.
	Low battery charge	Recharge or replace batteries.
	Starter solenoid "hold-in" windings open	See your authorized dealer.
Starter Motor Turns But Will Not Crank Engine	Starter pinion gear not engaging flywheel ring gear	See your authorized dealer.
	Pinion shift mechanism jammed or malfunctioning	See your authorized dealer.
	Pinion gear teeth broken	See your authorized dealer.
	Flywheel gear teeth broken	See your authorized dealer.
Engine Cranks Slowly	Battery cables damaged or broken internally	Inspect and replace cables.
	Battery or starter cable connections loose or corroded	Clean and tighten connections.

ELECTRICAL SYSTEM

Problem	Cause	Solution
Engine Cranks Slowly	Battery discharged or will not hold a charge	Replace battery.
	Starter "dragging"	See your authorized dealer.
	Low battery voltage	Recharge or replace battery.
Starter Motor Continues To Run After Engine Starts	Start relay stuck	See your authorized dealer.
	Starter solenoid stuck	See your authorized dealer.
	Starter not disengaging	See your authorized dealer.
	Key switch	See your authorized dealer.
Charging Indicator Light On-Engine Running	Loose or glazed alternator belt	Check belt. Replace if glazed, tighten if loose.
	Engine rpm low	Adjust rpm to specification.
	Excessive electrical load from added accessories	Remove accessories or install higher output alternator.
	Loose or corroded electrical connections on battery, ground strap, starter, or alternator	Inspect, clean, or tighten electrical connections.
	Battery voltage low	Change or replace battery.
	Alternator or regulator	See your authorized dealer.
	Indicator circuit	See your authorized dealer.
Noisy Alternator	Worn drive belt	Replace belt.
	Worn pulleys	Replace pulleys and belt.
	Pulley misaligned	Adjust alternator mount.
	Alternator bearing	Loosen alternator belts. Turn pulley by hand. If any roughness is felt, repair alternator.
No Monitor Panel Indicators Work	Fuse	Replace fuse.
	Wiring harness	See your authorized dealer.
Individual Light in Monitor Panel is Not Working	Bulb	Replace bulb.
	Fuse	Replace fuse.
	Wiring harness	See your authorized dealer.

ELECTRICAL SYSTEM

Problem	Cause	Solution
No Indicators in Gauge Panel Operate	Circuit board	See your authorized dealer.
	Wiring harness	See your authorized dealer.
	Fuse	Replace fuse.
Indicator Light in Gauge Panel is Inoperative	Bulb	Replace bulb.
	Fuse	Replace fuse.
	Sender	Do sender check.
	Wiring harness failure	See your authorized dealer.
Coolant Temperature Gauge Does Not Work	Fuse	Replace fuse.
	Gauge	See your authorized dealer.
	Gauge sender	Do coolant temperature gauge sender check.
	Wiring harness	See your authorized dealer.
Indicator Lights Do Not Operate (Auto-idle, Fast Speed Travel, Slow Speed Travel)	Fuse	Replace fuse.
	Bulb	Replace bulb.
	Auto-idle switch	See your authorized dealer.
	Travel switch	See your authorized dealer.
Fuel Gauge Does Not Work	Fuse	Replace fuse.
	Gauge	See your authorized dealer.
	Wiring harness	See your authorized dealer.

MODE SELECTION

Problem	Cause	Solution
Power Mode Selector (PELI) Do Not Work	Fuse	Replace fuse.
	PELI switches	See your authorized dealer.
	Wiring harness	See your authorized dealer.
	Controller	See your authorized dealer.
	Failed EC motor relay	See your authorized dealer.
	Failed EC motor	See your authorized dealer.
	Disconnected T link	Reconnect.
Work Mode Selector Does Not Work	Mode switches	See your authorized dealer.
	Electrical connector	See your authorized dealer.
	Failed pilot pressure switch wire harness	See your authorized dealer.
	PVC controller	See your authorized dealer.
	Proportional solenoid valve	See your authorized dealer.
Fast/Medium/Slow Travel Speed Does Not Function	Travel mode switches	See your authorized dealer.
	Travel pilot pressure switch	See your authorized dealer.
	P sensor wire harness	See your authorized dealer.
	PVC controller	See your authorized dealer.
	Proportional solenoid valve	See your authorized dealer.
	Damaged travel motor	See your authorized dealer.
	Damaged variable pressure compensator valve	See your authorized dealer.
Auto-Idle Does Not Work	Fuse	Replace fuse.
	Switch panel	See your authorized dealer.
	Electrical connector	See your authorized dealer.
	Wire harness	See your authorized dealer.
	EC motor	See your authorized dealer.
	Pressure switches	See your authorized dealer.
	EC controller	See your authorized dealer.

CONTROL LEVERS

Problem	Cause	Solution
Moves Hard	Corroded joint	See your authorized dealer.
	Worn out pusher	See your authorized dealer.
Does Nothing	Worn out pusher	See your authorized dealer.
	Pilot valve	See your authorized dealer.
Does Not Return To Neutral	Pilot valve	See your authorized dealer.
Too Much Play	Worn out pivot joint	See your authorized dealer.
Lever Is Not Vertical In Neutral	Pilot valve	See your authorized dealer.

HYDRAULIC SYSTEM

Problem	Cause	Solution
Hydraulic Functions Are Slow	Low oil level	Fill reservoir to full mark.
	Cold oil	Push hydraulic warm up switch.
	Wrong oil	Drain tank. Use correct oil.
	Engine speed too low	Increase speed or see your authorized dealer.
	Pilot circuit	See your authorized dealer.
	Worn pump	See your authorized dealer.
	Restricted pump suction line	See your authorized dealer.
Hydraulic Oil Overheats	Wrong oil	Use correct oil.
	Air leak in pump suction line	See your authorized dealer.
	Oil lines restricted	See your authorized dealer.
	Low oil level	Fill reservoir to full mark.
	Plugged filters	Install new filters.
	Worn pump	See your authorized dealer.
	Plugged radiator or oil cooler	Clean and straighten fins.
	Oil cooler bypass	See your authorized dealer.

HYDRAULIC SYSTEM

Problem	Cause	Solution
Hydraulic Oil Overheats	Relief valve	See your authorized dealer.
	Contaminated oil	Drain oil and refill.
	Travel motors	See your authorized dealer.
	Improperly adjusted hydraulic components	See your authorized dealer.
Oil Foams	Air leak in line from reservoir to pump	Repair leak or see your authorized dealer.
	Kinks or dents in oil lines	Check lines.
	Wrong oil	Use correct oil.
	Water in oil	Change oil.
	High or low oil level	Correct level.
Low or No Oil Pressure	Wrong oil	Use correct oil.
	Improperly adjusted hydraulic components	See your authorized dealer.
	No oil in system	Fill with correct oil.
	Worn cylinder packings	See your authorized dealer.
	Relief valve	See your authorized dealer.
No Hydraulic Functions (Noise from pumps)	Hydraulic pump	See your authorized dealer.
	Lack of hydraulic oil	Add oil.
	Damaged suction line or hose	See your authorized dealer.
	Clogged suction filter	Clean.
Hydraulic Cylinders Operate but Cannot Lift Load	Hydraulic pump worn	See your authorized dealer.
	Main relief valve pressure low	See your authorized dealer.
	Hydraulic oil level low	Add oil.
	Suction screen plugged	Clean strainer and system.
	Pump suction line leaking	Inspect suction line.

HYDRAULIC SYSTEM

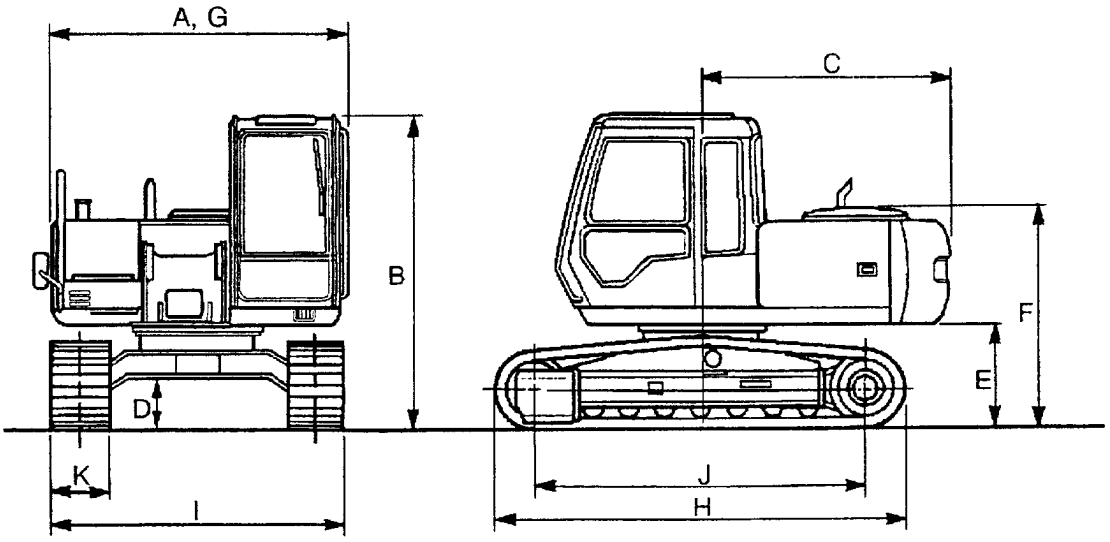
Problem	Cause	Solution
One Control Lever Does Not Work	Relief valve pressure low	See your authorized dealer.
	Tube or hose damaged	Repair or replace.
	Hydraulic fittings loose	Tighten.
	Damaged O-rings in fittings	Install new O-ring.
	Hydraulic Pump	See your authorized dealer.
	Pilot valve	See your authorized dealer.
	Pilot lines	Repair or replace.
One Cylinder Does Not Work	Control valve spool damaged or contaminated with dirt	See your authorized dealer.
	Hydraulic lines damaged	Repair or replace.
	Fittings loose	Tighten.
	O-ring in fitting damaged	Install new O-ring.
	Pilot valve	See your authorized dealer.
	Pilot lines	Repair or replace.
One Cylinder Does Not Work or Has Little Power	Piston seals leaking	See your authorized dealer.
	Cylinder rod damaged	See your authorized dealer.
	Pilot lines	Repair or replace.
	Pilot valve	See your authorized dealer.
	Failed wiring harness	See your authorized dealer.
	Pump solenoid valve failure	See your authorized dealer.
Both Travel Motors Do Not Work	Center joint failure	See your authorized dealer.
One Travel Motor Does Not Work	Travel motor	See your authorized dealer.
	Park brake not releasing	See your authorized dealer.
	Pilot valve	See your authorized dealer.
	Pilot lines	Repair or replace.
Travel Is Not Smooth	Track adjustment	Adjust tension.
	Track idler or rollers damaged	See your authorized dealer.
	Track frame bent	See your authorized dealer.

HYDRAULIC SYSTEM

Problem	Cause	Solution
Travel is Not Smooth	Rocks or mud "jammed" in track frame	Remove and repair.
	Travel brake not releasing	See your authorized dealer.
Swing Does Not Work	Swing brake release valve	See your authorized dealer.
	Swing motor	See your authorized dealer.
	Pilot valve	See your authorized dealer.
Swing Is Not Smooth	Swing gear	See your authorized dealer.
	Swing bearing	See your authorized dealer.
	Lack of grease	Apply grease.
Engine Stops When Travel or/and Control Lever Moved	Failure of connector contact	Repair or replace.
	Failed wiring harness	See your authorized dealer.
	Failed PVC or EC controller	See your authorized dealer.
	Damage of pump solenoid valve	See your authorized dealer.

SPECIFICATIONS (EX100-3)

Model		Standard	Offset Front	Rubber Crawler
		EX100-3 Hydraulic Excavator		
Type of Front-End Attachment		2.26 m (7 ft 5 in) Arm	1.96 m (6 ft 5 in) Arm	2.26 m (7 ft 5 in) Arm
Bucket Capacity (Heaped)	m^3 (yd^3)	PCSA 0.46 m^3 (0.60 yd^3), CECE 0.4 m^3		
Operating Weight	kg (lb)	10 700 (23 600)	11 500 (25 400)	10 700 (23 600)
Basic Machine Weight	kg (lb)	8 700 (19 200)	8 700 (19 200)	8 700 (19 200)
Engine		ISUZU 4BD1, 57 kW (78 PS) /2 300 min^{-1} (rpm)		
A : Overall Width (Excluding Back Mirrors)	mm (ft·in)	2 500 (8'2")	2 500 (8'2")	2 500 (8'2")
B : Cab Height	mm (ft·in)	2 700 (8'10")	2 700 (8'10")	2 720 (8'11")
C : Rear End Swing Radius	mm (ft·in)	2 130 (7'0")	2 130 (7'0")	2 130 (7'0")
D : Minimum Ground Clearance	mm (ft·in)	440 (1'5")	440 (1'5")	480 (1'7")
E : Counterweight Clearance	mm (ft·in)	890 (2'11")	890 (2'11")	930 (3'1")
F : Engine Cover Height	mm (ft·in)	1 920 (6'4")	1 920 (6'4")	1 920 (6'4")
G : Overall Width of Upperstructure	mm (ft·in)	2 460 (8'1")	2 460 (8'1")	2 460 (8'1")
H : Undercarriage Length	mm (ft·in)	3 340 (10'11")	3 340 (10'11")	3 372 (11'1")
I : Undercarriage Width	mm (ft·in)	2 490 (8'2")	2 490 (8'2")	2 490 (8'2")
J : Sprocket Center to Idle Center	mm (ft·in)	2 620 (8'7")	2 620 (8'7")	2 621 (8'7")
K : Track Shoe Width	mm (ft.in)	500 (Iron Crawler) (20")	500 (Iron Crawler) (20")	500 (Rubber Crawler) (20")
Ground Pressure	kPa (kgf/cm^2) (psi)	36.3 (0.37) (5.3)	43.2 (0.44) (6.3)	36.3 (0.37) (5.3)
Offset Distance	mm (ft·in)	–	0~1 420 (0~4'8")	–
Swing Speed	min^{-1} (rpm)	11.0 (11.0)	11.0 (11.0)	11.0 (11.0)
Travel Speed (fast/medium/slow)	km/h (mph)	5.5 / 3.9 / 2.2 (3.4 / 2.4 / 1.4)	5.5 / 3.9 / 2.2 (3.4 / 2.4 / 1.4)	5.8 / 4.1 / 2.3 (3.6 / 2.5 / 1.4)
Gradeability	degree (%)	35 (70)	35 (70)	35 (70)



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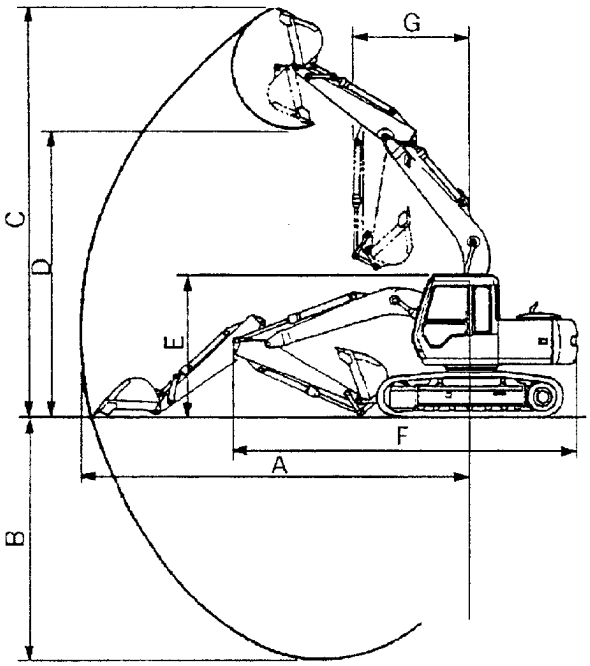
Note: * The dimensions do not include the height of the shoe lug.

WORKING RANGES (EX100-3)



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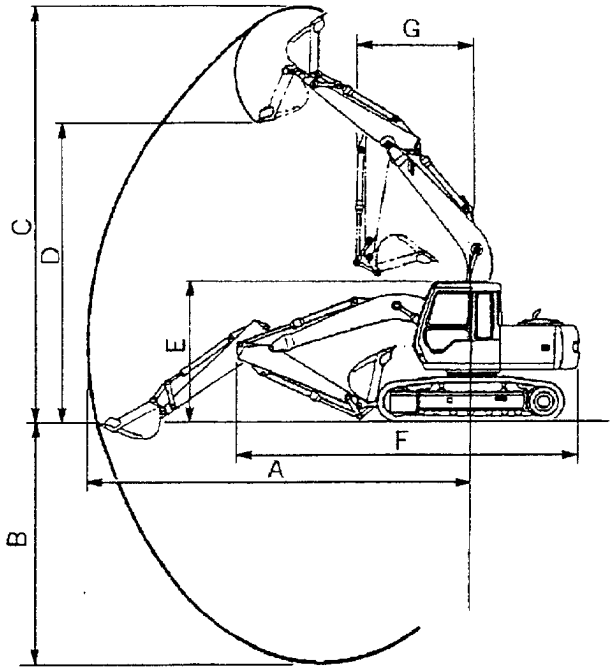
Backhoe



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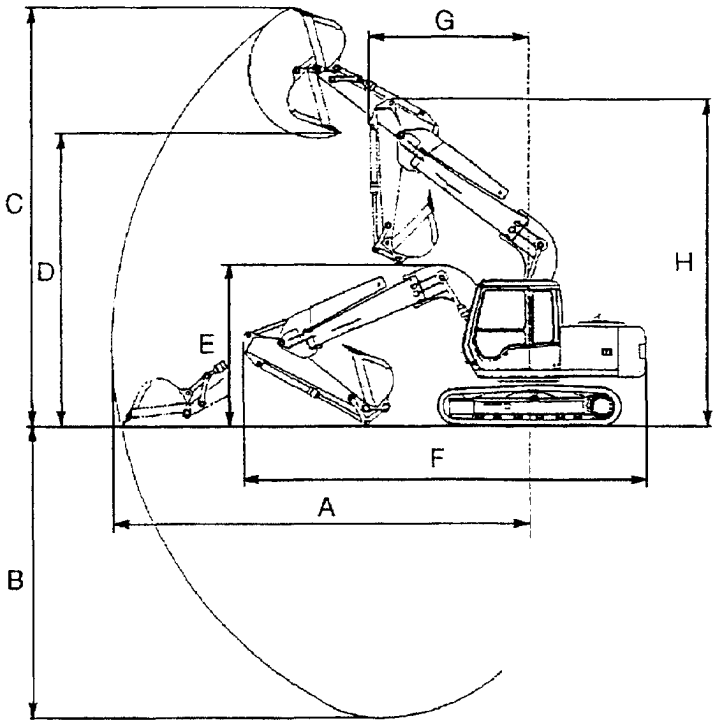
Face Shovel
(Reversed Hoe-Bucket)

Item \ Category			1.96 m (6'5") Arm		2.26 m (7'5") Arm		2.81 m (9'3") Arm	
			Backhoe	Shovel	Backhoe	Shovel	Backhoe	Shovel
A :	Maximum Digging Reach	mm (ft·in)	7 430 (24'5")	7 580 (24'10")	7 700 (25'3")	7 850 (25'9")	8 180 (26'10")	8 330 (27'4")
*1 B :	Maximum Digging Depth	mm (ft·in)	4 780 (15'8")	4 930 (16'2")	5 080 (16'8")	5 230 (17'2")	5 630 (18'6")	5 780 (19'0")
*1 C :	Maximum Cutting Height	mm (ft·in)	7 850 (25'9")	8 070 (26'6")	8 030 (26'4")	8 240 (27'0")	8 250 (27'1")	8 480 (27'10")
*1 D :	Maximum Dumping Height	mm (ft·in)	5 460 (17'11")	5 490 (18'0")	5 630 (18'6")	5 680 (18'8")	5 870 (19'3")	5 910 (19'5")
E :	Transport Height	mm (ft·in)	2 700 (8'10")	2 700 (8'10")	2 700 (8'10")	2 700 (8'10")	*2 2 700 (8'10")	*2 2 700 (8'10")
F :	Overall Transport Length	mm (ft·in)	7 180 (23'7")	7 180 (23'7")	7 190 (23'7")	7 190 (23'7")	7 190 (23'7")	7 190 (23'7")
G :	Minimum Swing Radius	mm (ft·in)	2 360 (7'9")	2 360 (7'9")	2 390 (7'10")	2 390 (7'10")	2 630 (8'8")	2 630 (8'8")

Note: *1 The dimensions do not include the height of the shoe lug.
*2 The dimensions asterisked are for transport pin position.

WORKING RANGES (Off-Set) (EX100-3)



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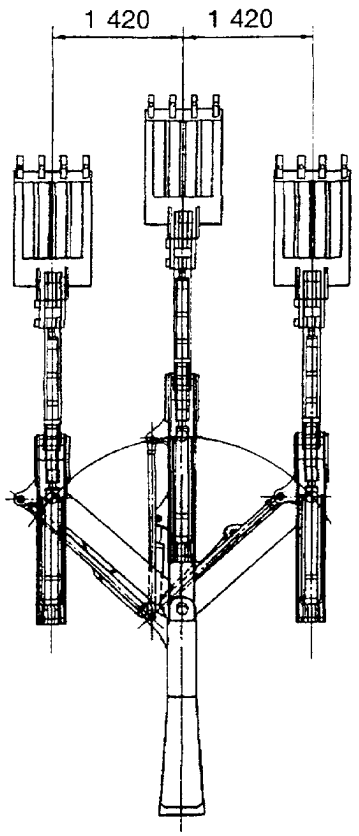

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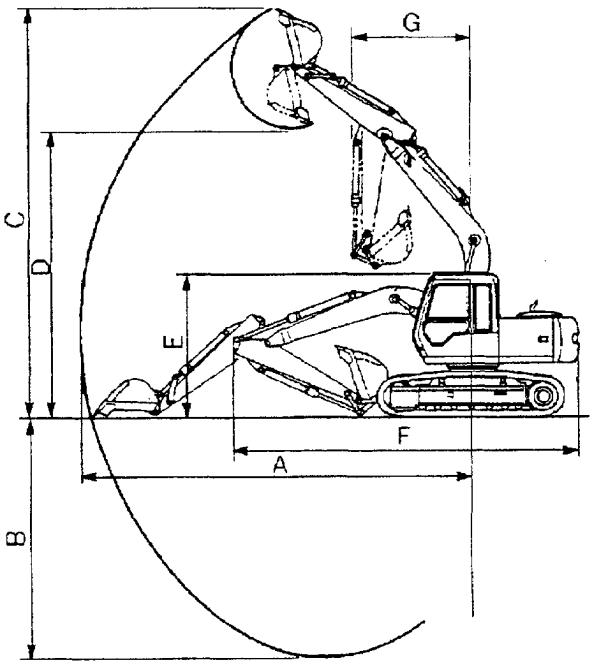
Item \ Category	Working Ranges	
	Off-Set Distanse (0 mm) (0″)	Max. Off-Set Distance (1 420 mm) (4′8″)
A : Maximum Digging Reach mm (ft·in)	7 620 (25′0″)	7 090 (23′3″)
B : Maximum Digging Depth mm (ft·in)	5 330 (17′6″)	4 790 (15′9″)
C : Maximum Cutting Height mm (ft·in)	7 600 (24′11″)	7 260 (23′10″)
D : Maximum Dumping Height mm (ft·in)	5 230 (17′2″)	4 890 (16′1″)
*1 E : Transport Height mm (ft·in)	3 060 (10′0″)	2 910 (9′7″)
F : Overall Transport Length mm (ft·in)	7 340 (24′1″)	6 830 (22′5″)
G : Minimum Swing Radius mm (ft·in)	2 920 (9′7″)	2 950 (9′8″)
H : Front-End Attachment Height at Min. Swing Radius mm (ft·in)	5 930 (19′5″)	5 600 (18′4″)

Note: *1 The dimensions include the height of the shoe lug.

WORKING RANGES (Rubber Crawler) (EX100-3)



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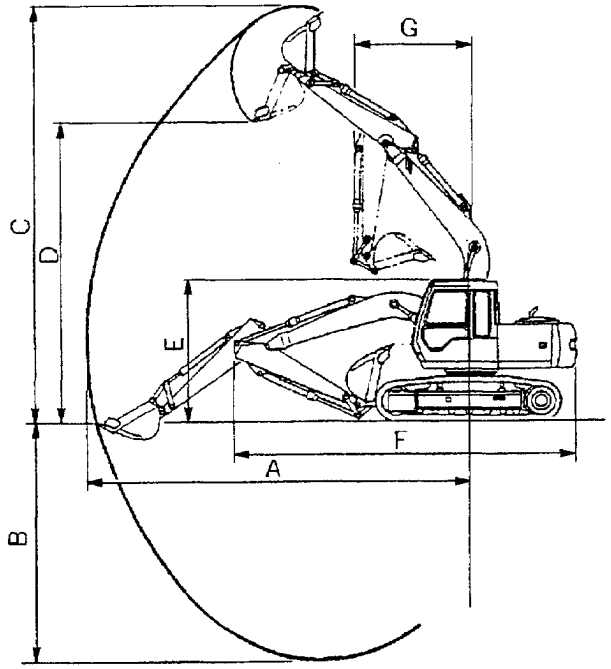
Backhoe



M104-11-003

Face Shovel
(Reversed Hoe-Bucket)

Item \ Category			1.96 m (6'5") Arm		2.26 m (7'5") Arm		2.81 m (9'3") Arm	
			Backhoe	Shovel	Backhoe	Shovel	Backhoe	Shovel
A :	Maximum Digging Reach	mm (ft·in)	7 430 (24'5")	7 580 (24'10")	7 700 (25'3")	7 850 (25'9")	8 180 (26'10")	8 330 (27'4")
*1 B :	Maximum Digging Depth	mm (ft·in)	4 740 (15'7")	4 890 (16'1")	5 040 (16'6")	5 190 (17'0")	5 590 (18'4")	5 740 (18'10")
*1 C :	Maximum Cutting Height	mm (ft·in)	7 890 (25'11")	8 110 (26'7")	8 070 (26'6")	8 280 (27'2")	8 290 (27'2")	8 520 (27'11")
*1 D :	Maximum Dumping Height	mm (ft·in)	5 500 (18'1")	5 530 (18'2")	5 670 (18'7")	5 720 (18'9")	5 910 (19'5")	5 950 (19'6")
E :	Transport Height	mm (ft·in)	2 720 (8'11")	2 720 (8'11")	2 720 (8'11")	2 720 (8'11")	*2 2 720 (8'11")	*2 2 720 (8'11")
F :	Overall Transport Length	mm (ft·in)	7 180 (23'7")	7 180 (23'7")	7 190 (23'7")	7 190 (23'7")	7 190 (23'7")	7 190 (23'7")
G :	Minimum Swing Radius	mm (ft·in)	2 360 (7'9")	2 360 (7'9")	2 390 (7'10")	2 390 (7'10")	2 630 (8'8")	2 630 (8'8")

Note: *1 The dimensions do not include the height of the shoe lug.
*2 The dimensions asterisked are for transport pin position.

SHOE TYPES AND APPLICATIONS (EX100-3)

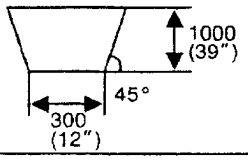
Shoe Width	mm	500 (20") Grouser Shoe	600 (24") Grouser Shoe	700 (28") Grouser Shoe	510 (20") Flat Shoe	700 (28") Triangular Shoe	500 (20") Rubber Crawler
Application		For Ordinary Ground (Standard)	For Ordinary Ground (Option)	For Weak Footing (Option)	For Paved Road (Option)	For Weak Footing (Option)	For Paved Road
Operating Weight	kg (lb)	10 700 (23 600)	11 000 (24 300)	11 100 (24 500)	11 200 (24 700)	11 000 (24 300)	10 700 (23 600)
Basic Machine Weight	kg (lb)	8 700 (19 200)	9 000 (19 800)	9 200 (20 300)	9 200 (20 300)	9 000 (19 800)	8 700 (19 200)
Cab Height	mm (ft·in)	2 700 (8'10")	2 700 (8'10")	2 700 (8'10")	2 710 (8'11")	2 750 (9'0")	2 720 (8'11")
* Minimum Ground Clearance	mm (ft·in)	440 (17")	440 (17")	440 (17")	470 (19")	440 (17")	480 (19")
Undercarriage Length	mm (ft·in)	3 340 (10'11")	3 340 (10'11")	3 340 (10'11")	3 360 (11'0")	3 440 (11'3")	3 372 (11'1")
Undercarriage Width	mm (ft·in)	2 490 (8'2")	2 590 (8'6")	2 690 (8'10")	2 500 (8'2")	2 690 (8'10")	2 490 (8'2")
Ground Pressure		36 kPa (0.37 kgf/cm^2, 5.3 psi)	31 kPa (0.32 kgf/cm^2, 4.6 psi)	27 kPa (0.28 kgf/cm^2, 4.0 psi)	37 kPa (0.38 kgf/cm^2, 5.4 psi)	27 kPa (0.28 kgf/cm^2, 4.0 psi)	36 kPa (0.37 kgf/cm^2, 5.3 psi)

NOTE: (1) The specifications for the front-end attachment are for a 1.96 m (6 ft 5 in) arm or 2.26 m (7 ft 5 in) arm with PCSA 0.46 m^3 (0.6 yd^3) standard bucket.

(2) 600 mm (24 in), 700 mm (28 in) grouser shoe, 510 mm (20 in) flat shoe and 700mm (28 in) triangular shoe not be used on gravel or rocky ground.

*(3) * The dimensions do not include the height of the shoe lug.*

BUCKET TYPES AND APPLICATIONS (EX100-3)

Bucket	Bucket Capacity m^3 (yd^3)		Bucket Width mm (in)		Front-End Attachment		
	PCSA Heaped	CECE Heaped	With Side Cutters	Without Side Cutters	1.96 m (6'5") Arm	2.26 m (7'5") Arm	2.81 m (9'3") Arm
Hoe Bucket	0.19 (0.25)	0.17	550 (22")	450 (18")	◎	◎	◎
	0.30 (0.39)	0.25	700 (28")	580 (23")	◎	◎	◎
	0.40 (0.52)	0.33	800 (31")	680 (27")	◎	◎	◎
	0.46 (0.60)	0.4	970 (38")	850 (33")	◎	◎	*○
	0.55 (0.72)	0.45	1 010 (40")	890 (35")	◎	○	×
	0.59 (0.77)	0.5	1 070 (42")	950 (37")	○	□	×
V-Type Bucket	–	0.35			○	○	○
One Point Ripper	–	–			△	△	×
Clamshell Bucket		0.30 (0.39)	Bucket width 562 (22") Open width 1 840 (72")		◎	◎	×
Slope-Finishing Blade	–		1 600 (63")		◇	◇	◇

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

◎ : General excavating
○ : Light duty excavating
△ : Rock digging
□ : Loading work
◇ : Slope-finishing work
× : Not applicable (not warrantable)

(2) Hoe bucket is applicable to the following types of work.

General excavating : For digging and loading operation of sand, gravel clay, ordinary earth and so on.

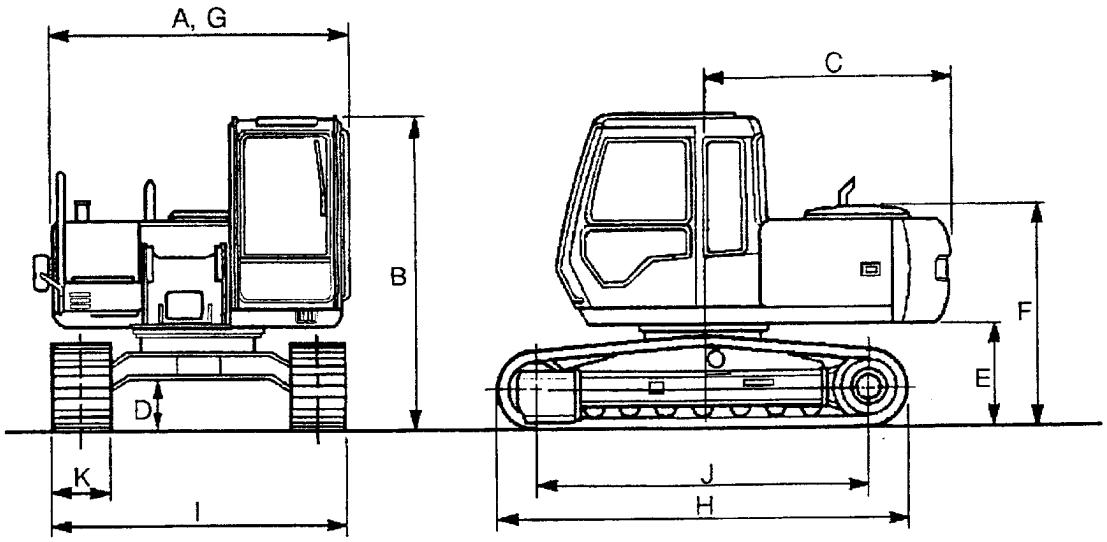
Light duty excavating : For digging loading operation of dried, loosened earth, sand, mud and so on. Their bulk density shall be less than 1.60 t/m^3 (2 700 lbf/yd^3) as a standard.

Loading : For loading operation of dried, loosened earth and sand. Their bulk density shall be less than 1.10 t/m^3 (1 850 lbf/yd^3) as a standard.

Rock digging : For digging loading operation of mountain gravels, blasted rock, hard clay, soft rock and so on.

Specifications (EX100M-3)

Type		Std.	Offset Front
		EX100M-3 Hydraulic Excavator	
Type of Front-End Attachment		2.26 m (7 ft 5 in) Arm	1.96 m (6 ft 5 in) Arm
Bucket Capacity (Heaped)	m^3 (yd^3)	PCSA 0.46 m^3 (0.60 yd3), CECE 0.4 m^3	
Operating Weight	kg (lb)	12 200 (26 900)	13 000 (28 700)
Basic Machine Weight	kg (lb)	10 200 (22 500)	10 200 (22 500)
Engine		ISUZU 4BD1, 57 kW (78 PS) / 2 300 min^{-1} (rpm)	
A : Overall Width (Excluding Back Mirrors)	mm (ft·in)	2 740 (9'0")	2 740 (9'0")
B : Cab Height	mm (ft·in)	2 880 (9'5")	2 880 (9'5")
C : Rear End Swing Radius	mm (ft·in)	2 130 (7'0")	2 130 (7'0")
D : Minimum Ground Clearance	mm (ft·in)	575 (1'11")	575 (1'11")
E : Counterweight Clearance	mm (ft·in)	1 070 (3'6")	1 070 (3'6")
F : Engine Cover Height	mm (ft·in)	2 100 (6'11")	2 100 (6'11")
G : Overall Width of Upperstructure	mm (ft·in)	2 460 (8'1")	2 460 (8'1")
H : Undercarriage Length	mm (ft·in)	3 790 (12'5")	3 790 (12'5")
I : Undercarriage Width	mm (ft·in)	2 740 (9'0")	2 740 (9'0")
J : Sprocket Center to Idle Center	mm (ft·in)	2 960 (9'9")	2 960 (9'9")
K : Track Shoe Width	mm (ft·in)	700 (Iron Crawler) (28")	700 (Iron Crawler) (28")
Ground Pressure	kPa (kgf/cm^2) (psi)	26.5 (0.27) (3.8)	30.4 (0.31) (4.4)
Offset Distance	mm (ft·in)	-	0~1 420 (0~4'8")
Swing Speed	min^{-1} (rpm)	11.0 (11.0)	11.0 (11.0)
Travel Speed (fast/medium/slow)	km/h (mph)	4.4 / 2.7 / 2.0 (2.7 / 1.7 / 1.2)	4.4 / 2.7 / 2.0 (2.7 / 1.7 / 1.2)
Gradeability	degree (%)	35 (70)	35 (70)



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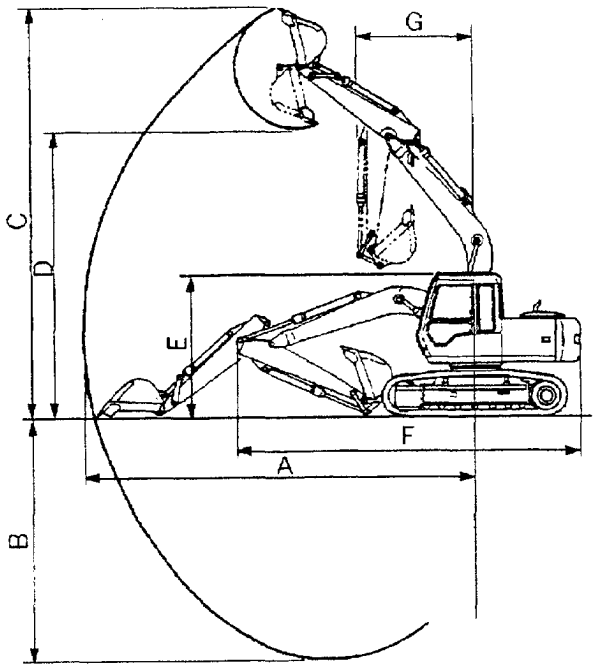
Note: * The dimensions do not include the height of the shoe lug.

Working Ranges (EX100M-3)



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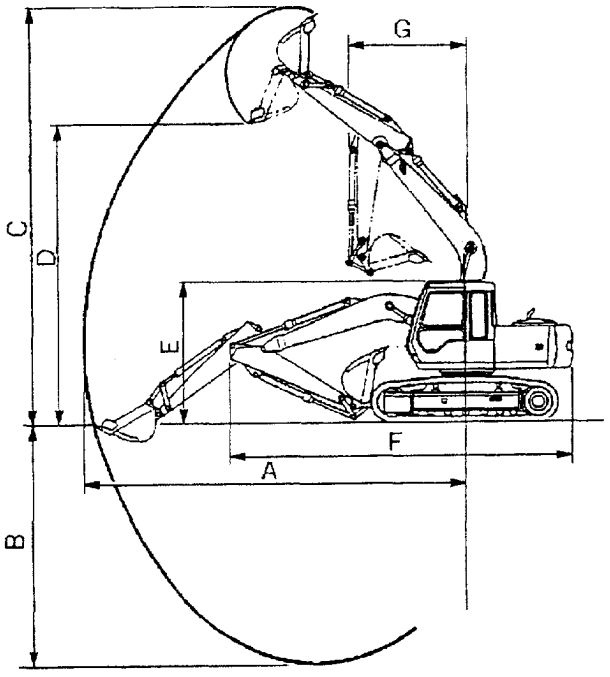
Backhoe



M104-11-003

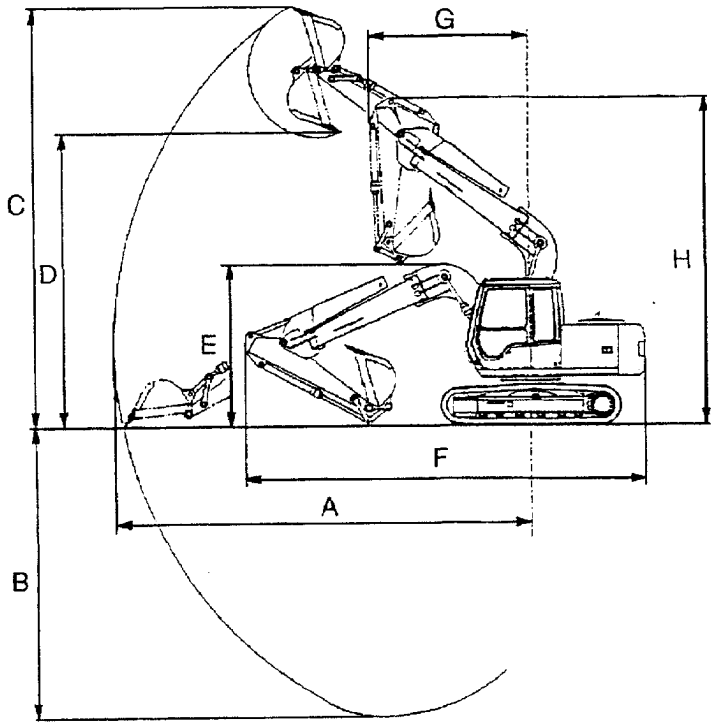
Face Shovel
(Reversed Hoe-Bucket)

EX100M-3

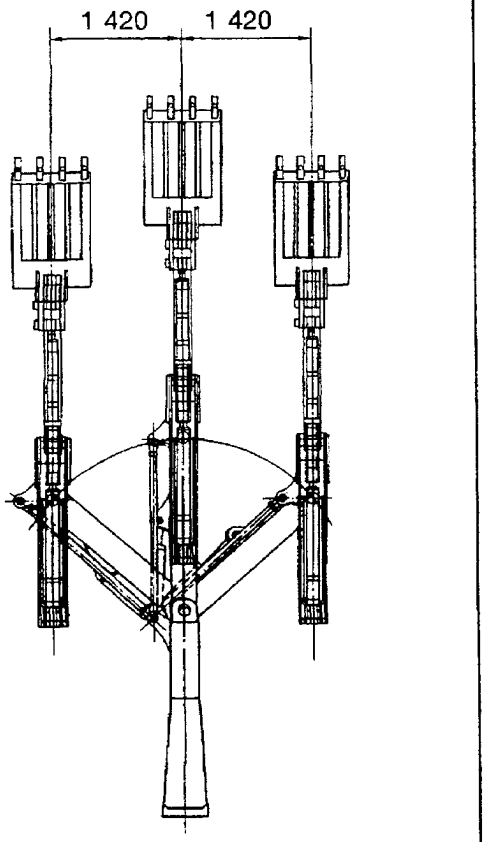
Item \ Category			1.96 m (6'5") Arm		2.26 m (7'5") Arm		2.81 m (9'3") Arm	
			Backhoe	Shovel	Backhoe	Shovel	Backhoe	Shovel
A :	Maximum Digging Reach	mm (ft·in)	7 430 (24'5")	7 580 (24'10")	7 700 (25'3")	7 850 (25'9")	8 180 (26'10")	8 330 (27'4")
*1 B :	Maximum Digging Depth	mm (ft·in)	4 600 (15'1")	4 750 (15'7")	4 900 (16'1")	5 050 (16'7")	5 450 (17'11")	5 600 (18'4")
*1 C :	Maximum Cutting Height	mm (ft·in)	8 030 (26'4")	8 250 (27'1")	8 210 (26'11")	8 420 (27'8")	8 430 (27'8")	8 660 (28'5")
*1 D :	Maximum Dumping Height	mm (ft·in)	5 640 (18'6")	5 670 (18'7")	5 810 (19'1")	5 860 (19'3")	6 050 (19'10")	6 090 (20'0")
E :	Transport Height	mm (ft·in)	2 880 (9'5")	2 880 (9'5")	2 880 (9'5")	2 880 (9'5")	*2 2 880 (9'5")	*2 2 880 (9'5")
F :	Overall Transport Length	mm (ft·in)	7 170 (23'6")	7 170 (23'6")	7 190 (23'7")	7 190 (23'7")	7 190 (23'7")	7 190 (23'7")
G :	Minimum Swing Radius	mm (ft·in)	2 360 (7'9")	2 360 (7'9")	2 390 (7'10")	2 390 (7'10")	2 630 (8'8")	2 630 (8'8")

Note: *1 The dimensions do not include the height of the shoe lug.
*2 The dimensions asterisked are for transport pin position.

Working Ranges (Off-Set) (EX100M-3)



M104-11-008



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EX100M-3

Item \ Category		Working Ranges	
		Off-Set Distanse (0 mm) (0″)	Max. Off-Set Distance (1 420 mm) (4′8″)
A : Maximum Digging Reach	mm (ft·in)	7 620 (25′0″)	7 090 (23′3″)
B : Maximum Digging Depth	mm (ft·in)	5 150 (16′11″)	4 610 (15′2″)
C : Maximum Cutting Height	mm (ft·in)	7 780 (25′6″)	7 440 (24′5″)
D : Maximum Dumping Height	mm (ft·in)	5 410 (17′9″)	5 070 (16′8″)
*1E : Transport Height	mm (ft·in)	3 220 (10′7″)	2 970 (9′9″)
F : Overall Transport Length	mm (ft·in)	7 320 (24′0″)	6 810 (22′4″)
G : Minimum Swing Radius	mm (ft·in)	2 920 (9′7″)	2 950 (9′8″)
H : Front-End Attachment Height at Min. Swing Radius	mm (ft·in)	6 110 (20′1″)	5 780 (19′0″)

Note: *1 The dimensions include the height of the shoe lug.

Shoe Types and Applications (EX100M-3)

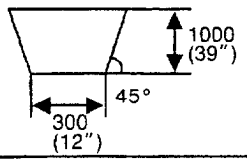
Shoe Width mm (in)	700 (28") Grouser Shoe	960 (38") Grouser Shoe	760 (30") Triangular Shoe	960 (38") Triangular Shoe
Application	For Ordinary Ground (Standard)	For Weak Footing (Option)	For Ordinary Ground (Option)	For Weak Footing (Option)
Operating Weight kg (lb)	12 200 (26 900)	13 300 (29 300)	12 200 (26 900)	12 900 (28 400)
Basic Machine Weight kg (lb)	10 200 (22 500)	10 300 (22 700)	10 200 (22 500)	10 900 (24 000)
Cab Height mm (lb)	2 880 (9'5")	2 910 (9'7")	2 940 (9'8")	2 940 (9'8")
* Minimum Ground Clearance mm (ft·in)	575 (23")	580 (23")	575 (23")	575 (23")
Undercarriage Length mm (ft·in)	3 790 (12'5")	3 845 (12'7")	3 890 (12'9")	3 890 (12'9")
Undercarriage Width mm (ft·in)	2 740 (9'0")	3 000 (9'10")	2 800 (9'2")	3 000 (9'10")
Ground Pressure	26 kPa (0.27 kgf/cm^2, 3.8 psi)	21 kPa (0.21 kgf/cm^2, 3.0 psi)	25 kPa (0.25 kgf/cm^2, 3.6 psi)	21 kPa (0.21 kgf/cm^2, 3.0 psi)

NOTE: (1) The specifications for the front-end attachment are for a 1.96 m (6 ft 5 in) arm or 2.26 m (7 ft 5 in) arm with PCSA 0.46 m^3 (0.6 yd^3) standard bucket.

(2) 960 mm (38 in) grouser shoe, 760 mm (30 in) and 960 mm (38 in) triangular shoe not be used on gravel or rocky ground.

*(3) * The dimensions do not include the height of the shoe lug.*

Bucket Types and Applications (EX100M-3)

Bucket	Bucket Capacity m^3 (yd^3)		Bucket Width mm (in)		Front-end Attachment		
	PCSA Heaped	CECE Heaped	With Side Cutters	Without Side Cutters	1.96 m (6'5") Arm	2.26 m (7'5") Arm	2.81 m (9'3") Arm
Hoe Bucket	0.19 (0.25)	0.17	550 (22")	450 (18")	◎	◎	◎
	0.30 (0.39)	0.25	700 (28")	580 (23")	◎	◎	◎
	0.40 (0.52)	0.33	800 (31")	680 (27")	◎	◎	◎
	0.46 (0.60)	0.4	970 (38")	850 (33")	◎	◎	◎
	0.55 (0.72)	0.45	1 010 (40")	890 (35")	◎	○	○
	0.59 (0.77)	0.5	1 070 (42")	950 (37")	○	□	×
V-Type Bucket	—	0.35			◎	◎	◎
Clamshell Bucket		0.30 (0.39)	Bucket width 562 (22") Open width 1 840 (72")		◎	◎	×
Slope-Finishing Blade	—		1 600 (63")		◇	◇	◇

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

◎ : General excavating
○ : Light duty excavating
△ : Rock digging
□ : Loading work
◇ : Slope-finishing work
× : Not applicable (not warrantable)

(2) Hoe bucket is applicable to the following types of work.

General excavating : For digging and loading operation of sand, gravel clay, ordinary earth and so on.

Light duty excavating : For digging loading operation of dried, loosened earth, sand, mud and so on. Their bulk density shall be less than 1.60 t/m^3 (2 700 lbf/yd^3) as a standard.

Loading : For loading operation of dried, loosened earth and sand. Their bulk density shall be less than 1.10 t/m^3 (1 850 lbf/yd^3) as a standard.

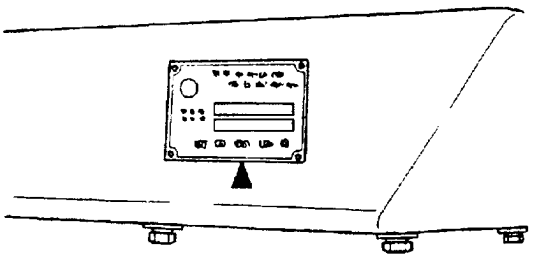
Rock digging : For digging loading operation of mountain gravels, blasted rock, hard clay, soft rock and so on.

MACHINE NUMBERS

MACHINE TYPE AND SERIAL NUMBERS

TYPE:_____

MFG. NO.:_____



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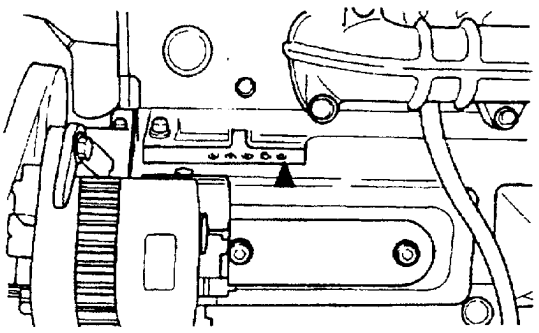
ENGINE TYPE AND SERIAL NUMBER

TYPE:_____

MFG. NO.:_____



M104-12-002

TRAVEL MOTOR TYPE AND SERIAL NUMBER

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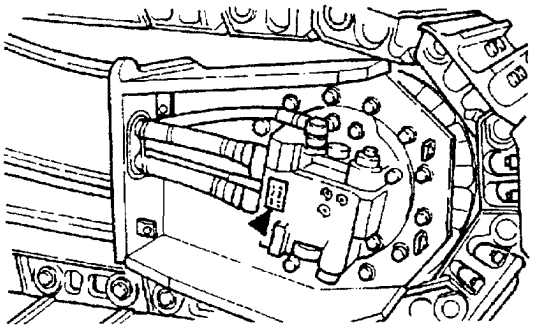
MFG. NO.:_____

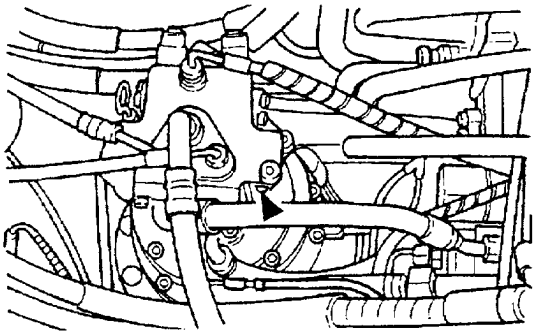


M104-12-003

SWING MOTOR TYPE AND SERIAL NUMBER

TYPE:_____

MFG. NO.:_____



M104-12-004

HYDRAULIC PUMP TYPE AND SERIAL NUMBER

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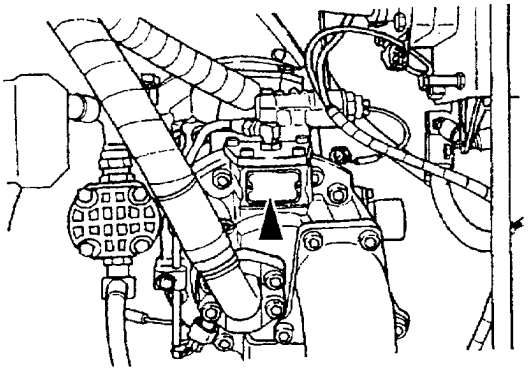
MFG. NO.:_____



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