OPERATION AND MAINTENANCE MANUAL

EX 200 – Hydraulic Excavator

DS Cat/part No.

SUPPLY ORDER NO: AT No.51021 – Proc/55x Hyd Exc 20 Ton /GS 2010 -11 /DGBR / E3ES Dt 07 Mar 2011

SUPPLIED BY:

TELCON

TELCO CONSTRUCTION EQUIPMENT CO. LTD

KIADB BLOCK NO.2, BELLUR INDUSTRIAL ESTATE, MUMMIGATTI, DHARWAD – 580 007

PUBLISHED BY:

BHARAT SARKAR RAKSHA MANTRALAYA

ENGINEERY UPASKARON KA GUNVATHA ASHVASAN NIYANTRANALAYA

CONTNTROLLERRATE OF QUALITY ASSURANCE OF ENGINEERING EQUIPMENT
AUNDH CAMP - PUNE – 411 027

Mar 2011

SERVICE HOTLINE TOLL FREE NO-1800 3456 500

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INTRODUCTION

Read this manual carefully to learn how to oper-
Ate 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 Tata - Hitachi's support program for customer 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, of 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

For any Errors/Suggestion, Please write to :

The Product Support Manager,

Telcon Service and Spares Support Centre,

Telcon PIP – 3 , Garag Road, Mummigatti.

Dharwad – 580007.

Karnataka State.

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

CONTENTS

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 precaution and safe operating Practices.

UNDERSTAND SIGNAL WORDS

- On machine safety signs, signal words designation 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 in-Jury.

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

- 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 precaution are listed on CAUTION safety Signs. CAUTION also calls attention to safety messages In this manual.

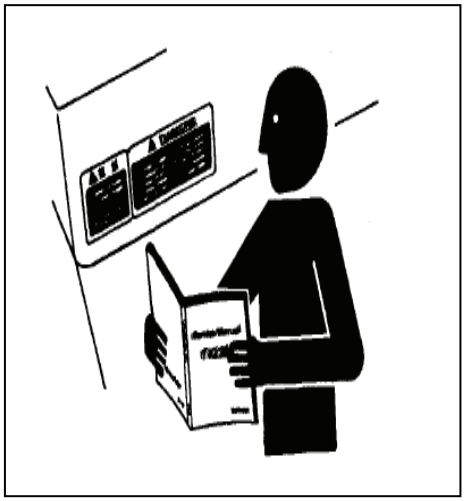
- Some safety signs don't use any of the designated signal words above after the safety alert safety alert symbol are occasionally used on this machine.

- 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.

- NOTE : Indicates an additional explanation for an element of information.

SAFETY

FOLLOW SAFETY INSTRUCTIONS



- Carefully read and follow all safety signs on the machine and all safety massages 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 personal 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 this 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.

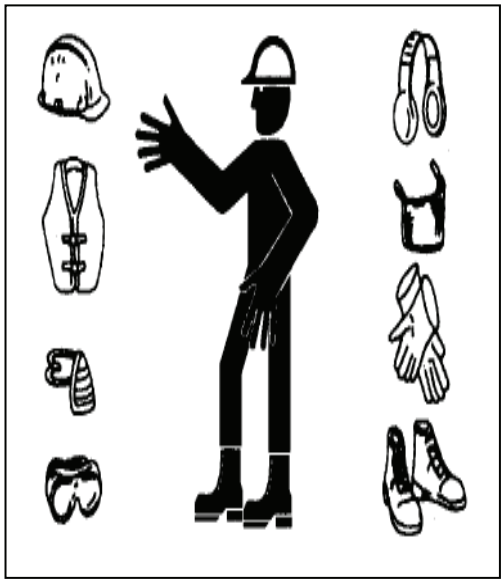
PREPARE FOR EMERGENCIES

- 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.
- Establish emergency procedure guidelines to cope with fires and accident.
- To ensure that a fire extinguisher can be always used when necessary, check and service the fire extinguisher at the recommended intervals as specified in the fire Extinguisher manual.

SAFETY

WEAR PROTECTIVE CLOTHING

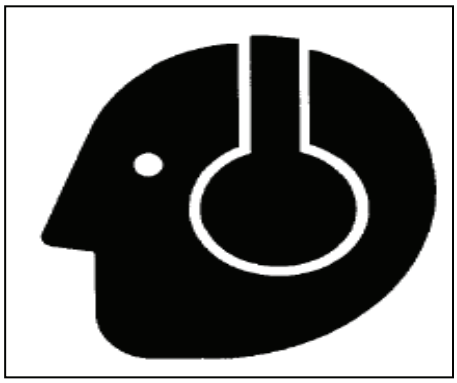
- Wear close fitting clothing and safety equipment appropriate for the job.
- Avoid wearing loose clothing, jewelry, or other items that can catch on control levers or other parts of the machine.
- Operating equipment safety requires the full attention of the operator, do not wear radio or music headphones while operating machine.



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.

- Be sure to wear correct equipment and clothing for the job. Do not take chances.



PROTECT AGINEST NOISE

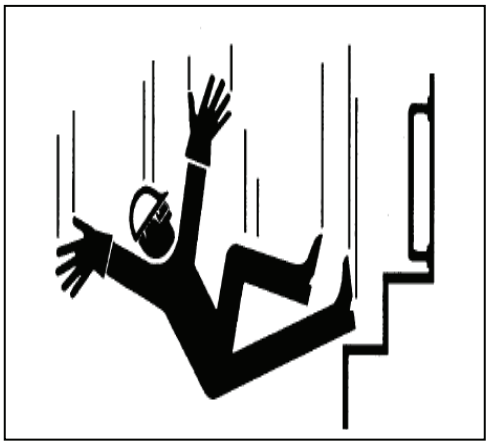
- Prolonged exposure to loud noise can cause impairment or loss of hearing.
- Wear a suitable hearing protective device such as earmuffs or earplugs to protect against constant or un-comfortably loud noises.

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.

SAFETY

USE HANDHOLDS AND STEPS



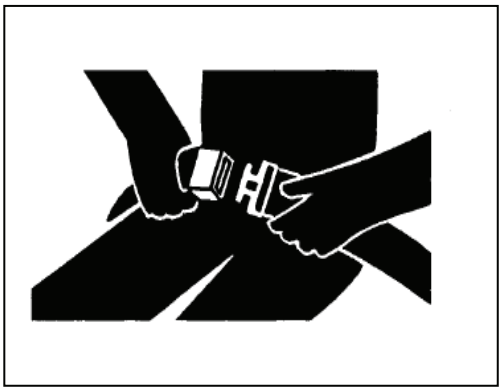
- Falling is one of the major causes of personal injury.
- When you get on and off the machine, always maintain A thee-point contact with the steps and handrails and Face the machine. Do not use any controls as hand – Holds.
- Never jump on or off the machine. Never mount or dismount a moving machine.
- Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.

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.

FASTEN YOUR SEAT BELT



- Always check the condition of the seat belt, and Mounting hardware before starting the machine. A week 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 seat belt when operating the machine.

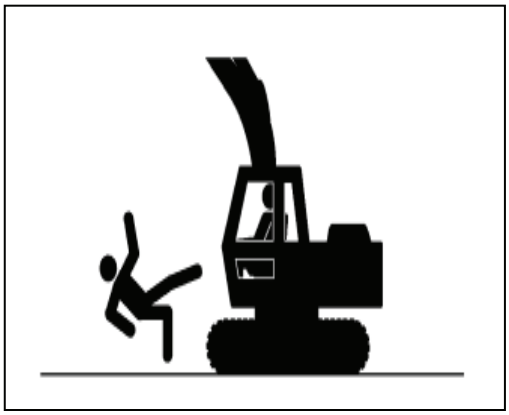
SAFETY

OPERATE ONLY FROM OPERATOR'S SEAT

- Avoid possible injury or machine damage. Do not start the engine by shorting across starter terminals.
- NEVER start the engine while standing on ground.
- Start the engine only from operator's seat

KEEP RIDERS OFF MACHINE

- Only allow the machine keep rider off.
- Rider on machine is vulnerable to injury such as being struck by foreign objects or being thrown off the machine.
- Riders also obstruct the operator's view, resulting in un safe operation.



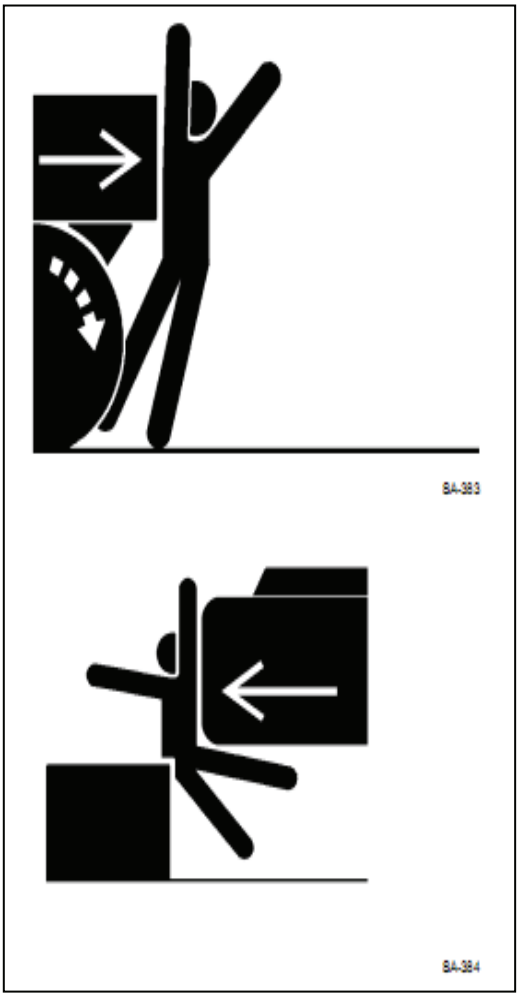
AVOID POWER LINES

- Serious injury or death can result from contact with Electric lines.
- Never move any part of the machine or load closer to any electric line than 3 m(10ft) plus twice the line insulator length.

SAFETY

AVOID INJURY FROM BACK-OVER AND SWING ACCIDENT

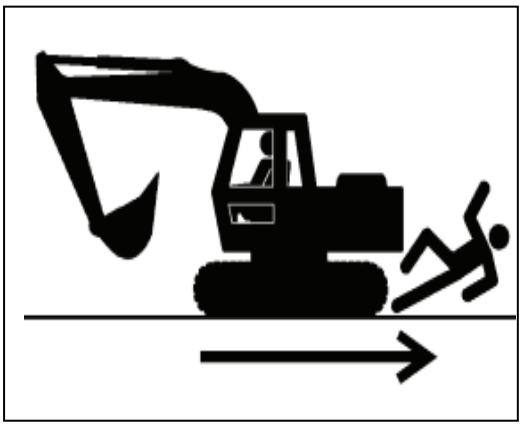
- To avoid back-over and swing accident.
- Always look around before you back up and swing The machine. Be sure that everyone in the clear.
- Keep bystanders away from pivot area of an articulated machine.
- Keep travel alarm in working condition (if equipped). always be alert for bystanders moving in to the work area. Use horn or other signal to warn bystander's before moving machine.
- Use a signal person when backing up if your view is obstructed. Always keep signal person in view. Use hand signal when work condition 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, and signs, and marking 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.



SAFETY

DIG WITH CAUTION

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



MOVE AND OPRATE MACHINE SAFELY

- By standers are in danger of being run over. Confirm the location of bystanders before moving, swinging, or operating the machine.
- Always keep the travel alarm in good working condition. (if equipped)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 Signal before starting the machine.

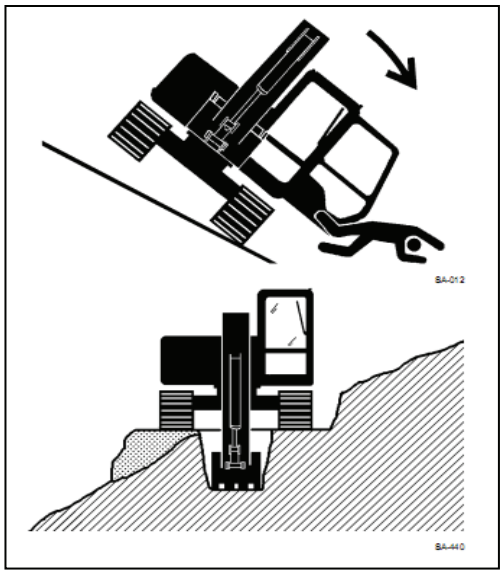
OPERATE MACHINE SAFELY

- Clear all persons from area of operation and machine movement.
- Make sure worksite footing has sufficient strength to Firmly support the machine when working close to an excavation, operate the maachine with the tracks positioned perpendicular to the machine can more easily evacuate if the cliff face Collapses.
- When digging deeply, avoid hitting bottom of boom or Bucket cylinder hoses against the ground.
- Use the bucket only for digging. To avoid accident, do not use as a jack hammer or wrecking ball.

SAFETY

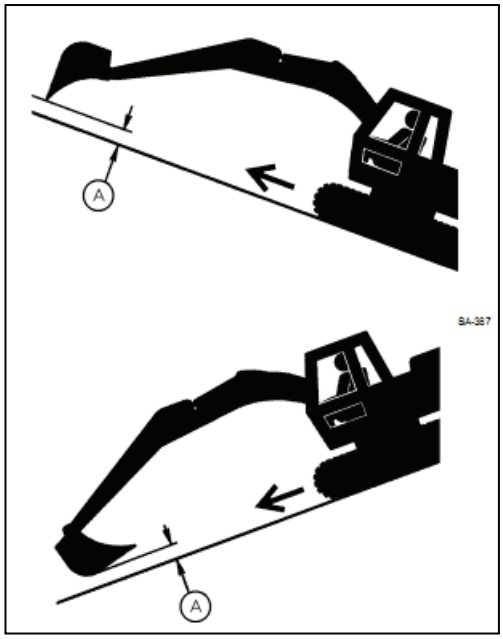
AVOID TIPPING

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



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 on travel, approximately 200 to 300 mm (8 to12in) above ground, When traveling up or down a grade. If machine starts to slip or become unstable, lower the bucket immediately.



BEWARE OF EXHAUST FUMES

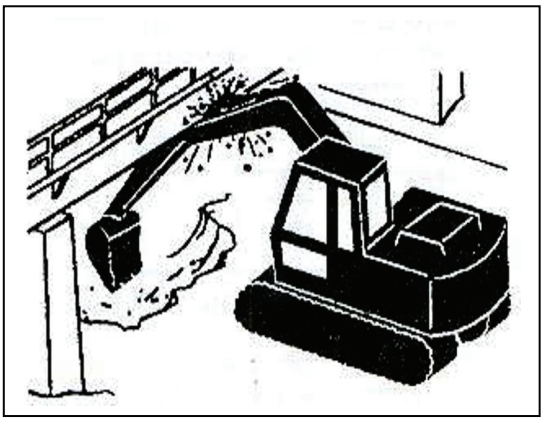
Engine exhaust fumes can cause sickness or death

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 door and windows to bring enough outside air into the area.

SAFETY

OPERATE WITH CAUTION

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



AVIOD INJURY FROM RUNWAY ACCIDENT

- Death or serious injury may result if you attempt to mount or stop a moving machine

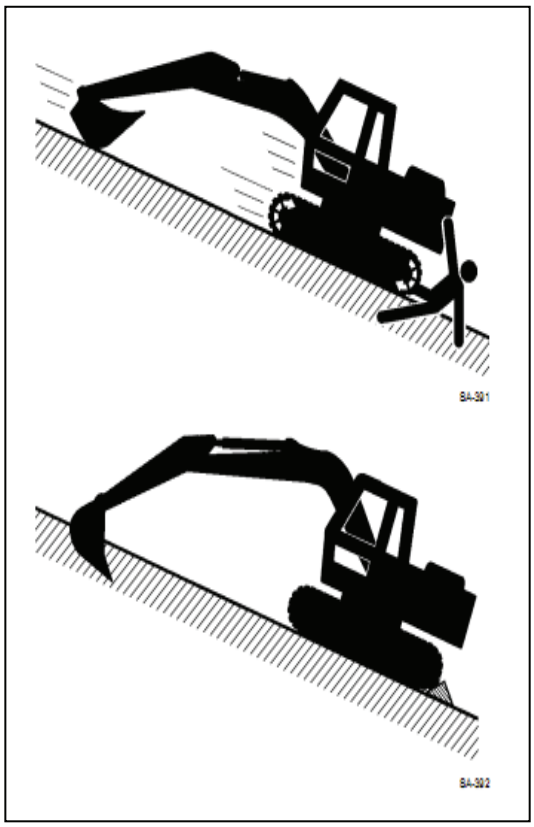
To Avoid runways;

- Select level ground when possible to park machine.

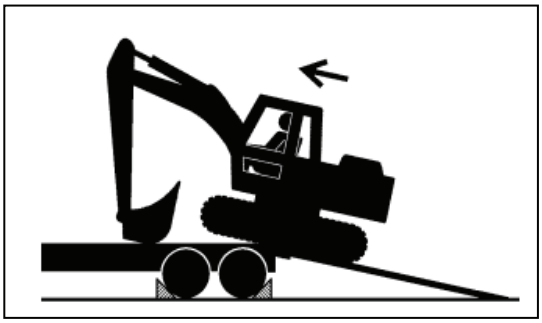
Lower bucket to the ground.

Turn auto-idle switch off.

- Run engine at low 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 in to the ground if you must Park on a grade.Position machine to prevent running.
- Park a reasonable distance from other machines.



SAFETY



TRANSPORT SAFELY

- Be sure to follow all local regulations when transporting the machine on public roads.
- Provide an appropriate truck or trailer for transporting the machine.
- Always load and unload the machine on a firm, level surface.
- Be sure to use a loading dock or ramp. for loading/un loading.

Turn the auto-idle switch OFF.

- 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.
- Do not operate any levers besides the travel levers when traveling up or down a ramp, to avoid risks losing the machine's balance.
- The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.
- Fasten chains or cables to the machine frame. see transporting section.

SAFETY

PARK MACHINE SAFELY

Before working on the machine;

Park machine on a level surface. Lower bucket to the ground.

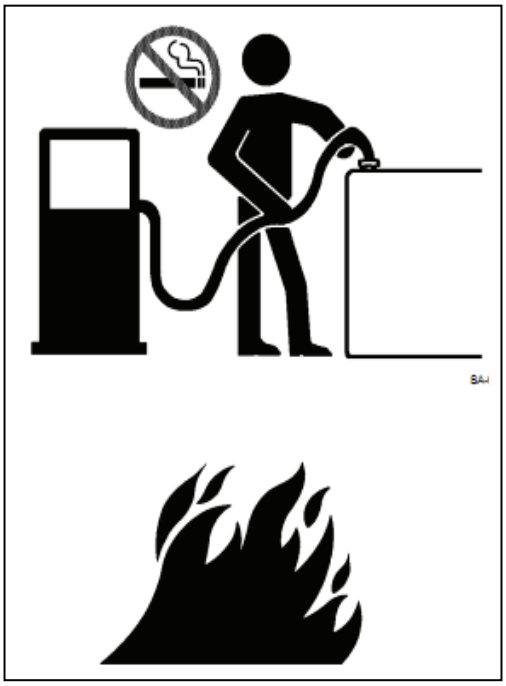
Turn auto-idle switch off.

Run engines 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 re-fuel the machine while smoking or when near open flame or sparks. Always stop engine before refueling machine. Fill fuel tank outdoors.
- All fuels, most lubricants, and some coolants are flammable. Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.
- Do not store oily rags: they can ignite and burn Spontaneously.



SAFETY

PRACTICE SAFE MAINTENANCE

- Understand service procedures before doing work. Keep work area clean and dry.

- 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 engines. 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.

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

- If the machine must be raised, Keep a 90 to 110o 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.

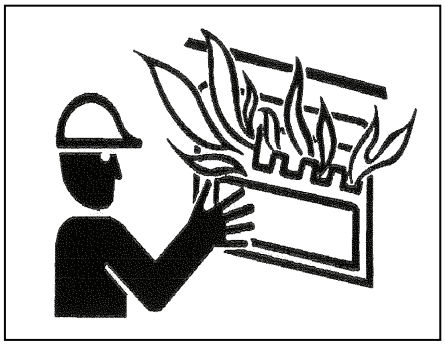
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of this manual.

- 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.

SAFETY

CLEAN TRASH FROM MACHINE



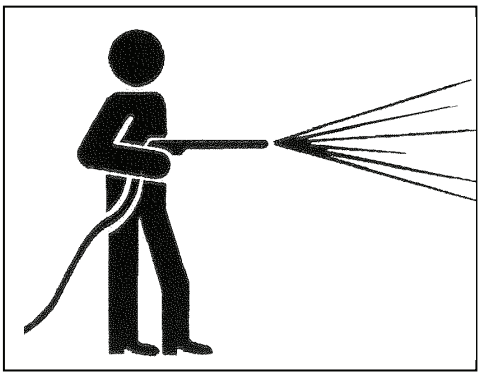
- Keep engine compartment radiator, batteries, hydraulic Lines fuel tank, and operator's station clean.
- Temperature in engine compartment may go up immediately after engine is stopped.

BE ON GUARD FOR FIRES DURING THE PERIOD.

- Open access door (S) to cool the engine faster, and Clean engine compartment.

WARN OTHER OF SERVICE WORK

- Unexpected machine movement can cause serious injury.
- Before performing any work on the machine, attached a "DO Not Operate" tag on the right control lever. This tag is available from your authorized dealer.



CLEAN THE MACHINE REGULARLY

- Remove nay grease, oil or debris build-up to avoid possible injury or machine damage.
- Do not spray water or steam inside the cab.

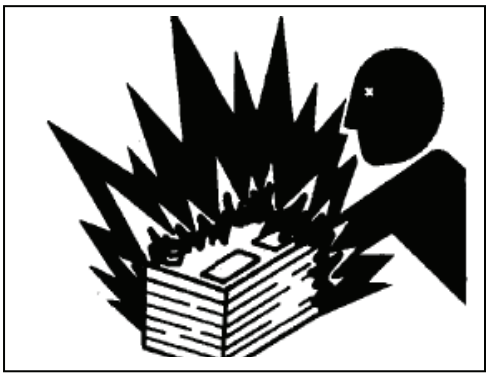
STORE ATTACHEMENTS SAFELY

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

Securely store attachment and implements to prevent Them from falling. Keep playing children and bystanders Away from storage area.

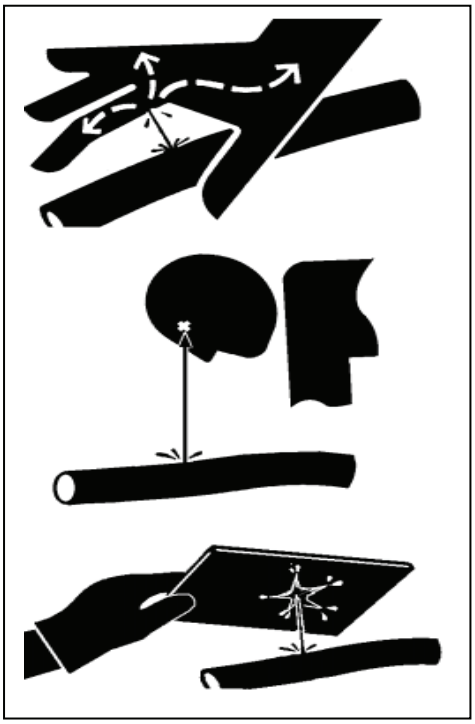
SAFETY

PREVENT BATTERY EXPLOSIONS



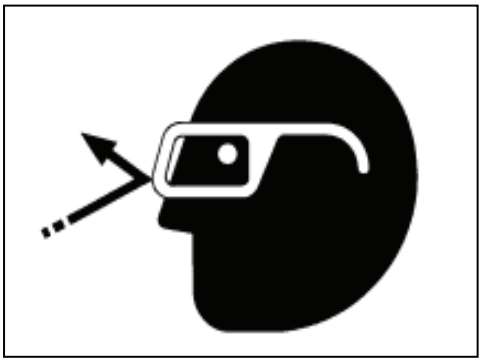
- Keep sparks, lighted matches, and flame away from the top of battery. Battery gas can explode.
- Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
- Do not charge a frozen battery; it may explode. Warm Battery to 160C (60 oF).

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 al applicable workplace rules and regulation, And follow all environment rules and regulation for the Disposal of asbestos.

PROTECT AGAINST FLYING DEBRIS



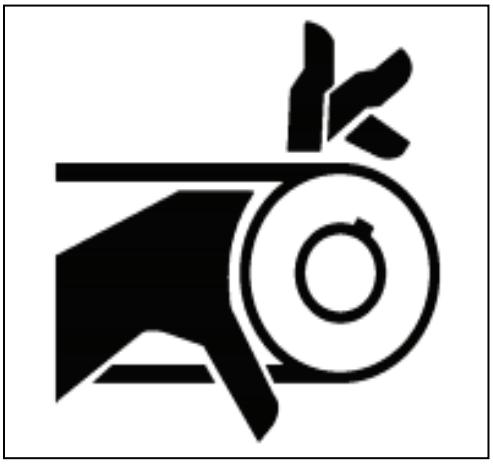
- Guard against injury from flying pieces of metal or debris; Wear goggles or safety glasses.
- Keep bystanders away from the working area before Striking any object, to avoid personal injury.

SAFETY

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 AVIOD INJURY. GEAR OIL IS HOT. WAIT FOR GEAR OIL TO COOL, THEN GARUDUALLY 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

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.

SAFETY

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 form hot spraying water. DO NOT remove the radiator cap until the engine is cool. when opining, 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.

- Hot fluids and surfaces.

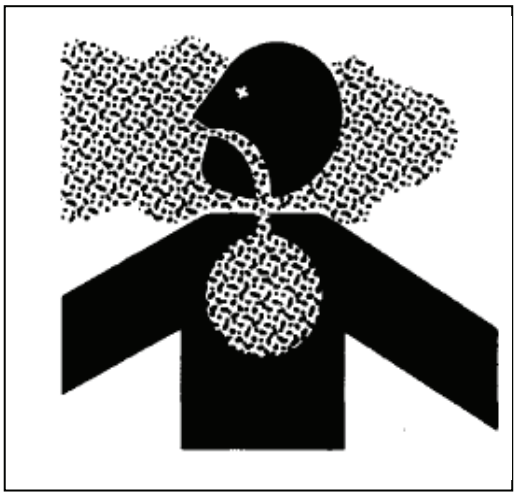
Skin contact with escaping hot water or steam can causes severe burns.

Be sure to stop the engine, and let engine and radiator cool.

Slowly loosen the cap to release 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.

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 troch.
- 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 container and other flammable mate- rial from area. Allow fumes to disperse al least 15 minutes before welding or heating.

SAFETY

AVOID HEATING NEAR PRESSURIZED FLUID LINES

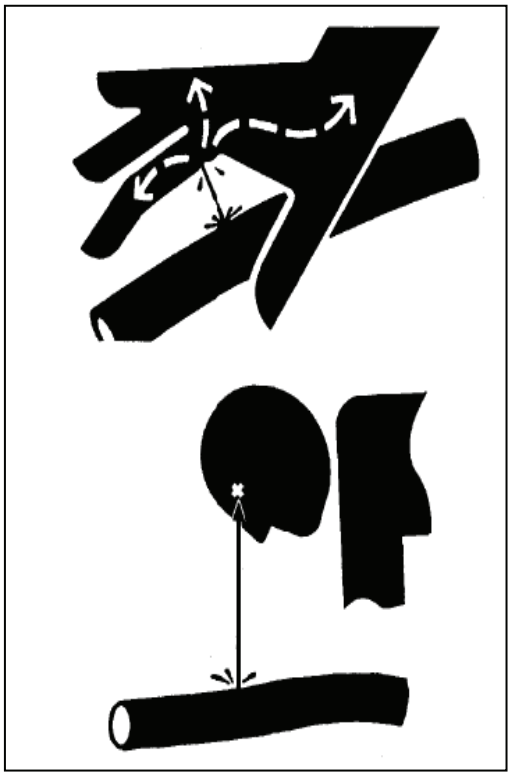
- Flammable spray can be generated by applying heat near pressurized fluid lines, resulting in severe burns to your self and bystanders. Do not heat by welding, soldering, or using s torch near pressurized fluid lines or other flammable materials.
- Pressurized lines can be accidentally cut when heat Goes beyond the immediate flame area. Install temprary fire resistant guards to protect hoses or other material when engaging in welding, soldering, etc.

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 non – flammable solvent before welding or flame cutting them

AVOID HIGH PRESSURE FLUIDS

- Escaping fluid under pressure can penetrate the skin causing serious injury.
- Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.
- Relieve the pressure by moving the control levers several tines.
- 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.
- If an accidents 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.



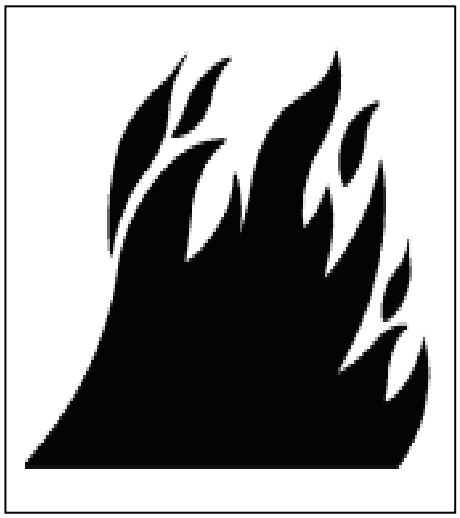
SAFETY

PREVENT FIRES

1. Check for oil leaks;

- Fuel, hydraulic oil and lubricant leaks 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 lose oil-cooler flange bolts, for oil leaks.



- Search for leak 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 bend or damaged lines, pipes or hoses.

2. Check for shorts;

- Short circuits can causes fires that may result in serious injury.
- Clean and tighten all electrical connection.
  Check before each shift or after eight(8) hours of oepration 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, ect.
Tighten, repair or replaced any loose or damaged eletrical cables , wires, and terminal caps before operating the machine.

3. Clean Flammable;

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;

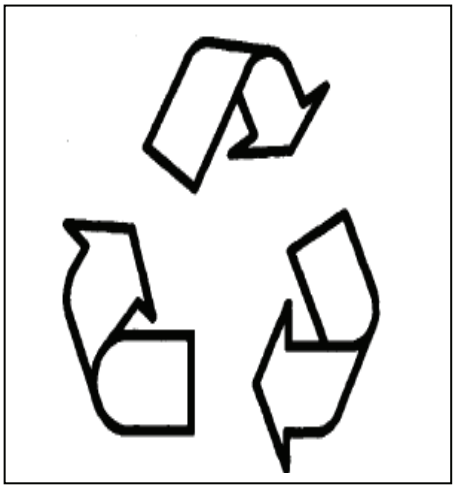
- Always check key switch function before operating The machine every day. If any abnormalities are Found, be sure to repair them immediately.
  If fire breaks out, failure to stop the engine will escalate fire. hindering fire, fighting and possibly resulting In serious injury.

SAFETY

HANDLE CHEMICAL PRODUCTS SAFELY

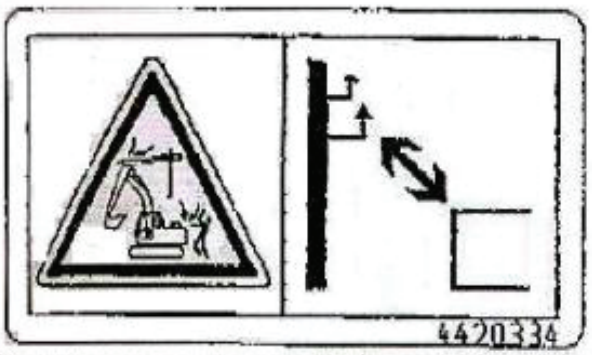
- Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with Your machine include such items as lubricants, coolants, paints, and adhesives.
- A material safety data sheet (MSDS) provides specific Details on chemicals products; physical and health hazards, 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 risk are and how to do the job safely. Then follow Procedures and use recommended equipment.
- See your authorized dealer for MSDS's (available only In English) on chemical product used with your machine.

DISPOSE OF WASTE PROPERLY

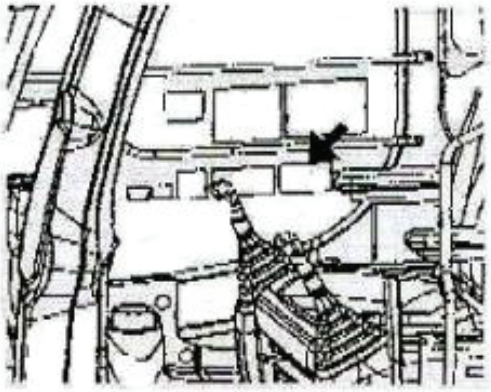


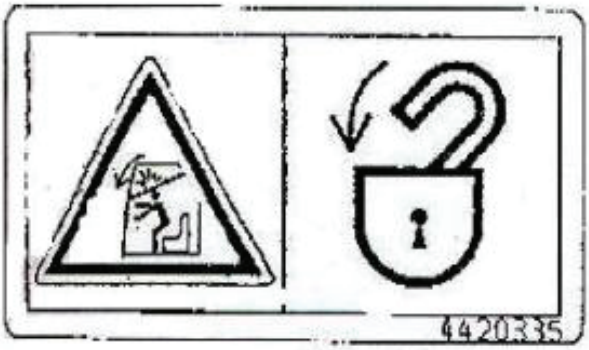
- Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste from HITACHI equipment includes such items as oil, fuel, coolant, Brake fluid, filters, and batteries.
- Use leak proof container when draining fluids, Do not Use food or beverage containers that may mislead somone in to 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 regula -tions 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 delaer.

SAFETY SIGNS

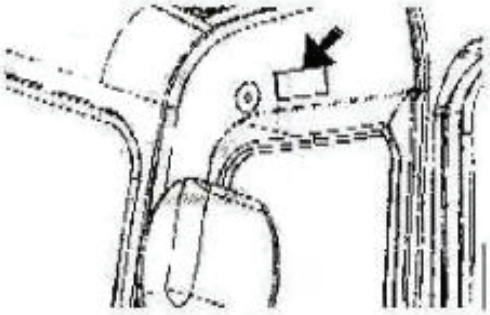


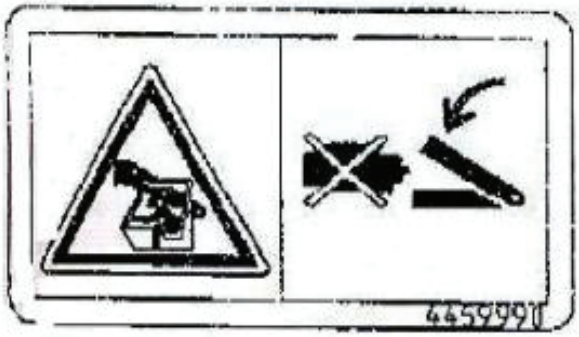
Sign indicates an electrocutio hazard if machine is brought too near electric power lines.
Keep a safe distance from electric power lines.



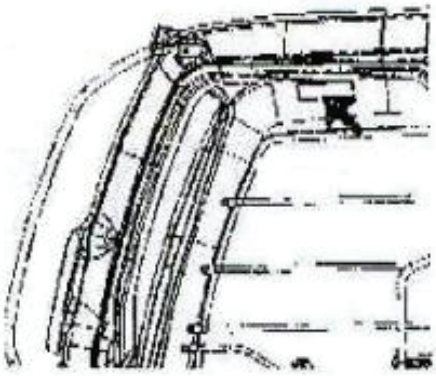


Sign indicates a hazard from falling window.
After raising window, be sure to lock it in place with lock pins.

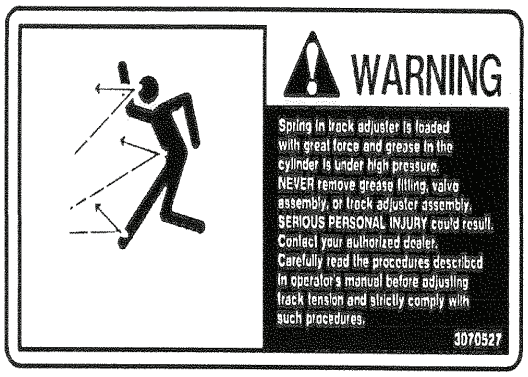




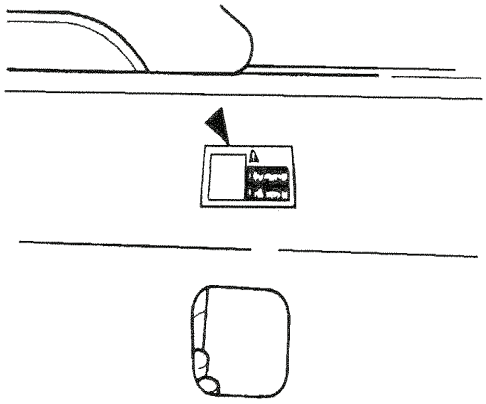
Don't extend your hands or head from the window. Your hands or head may come in contact with the boom.



SAFETY SIGNS

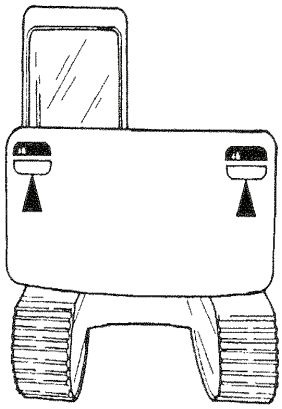


SS-408



SS-425

SS-018



SS-096

OPERATOR'S STATION

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

7- Left travel lever

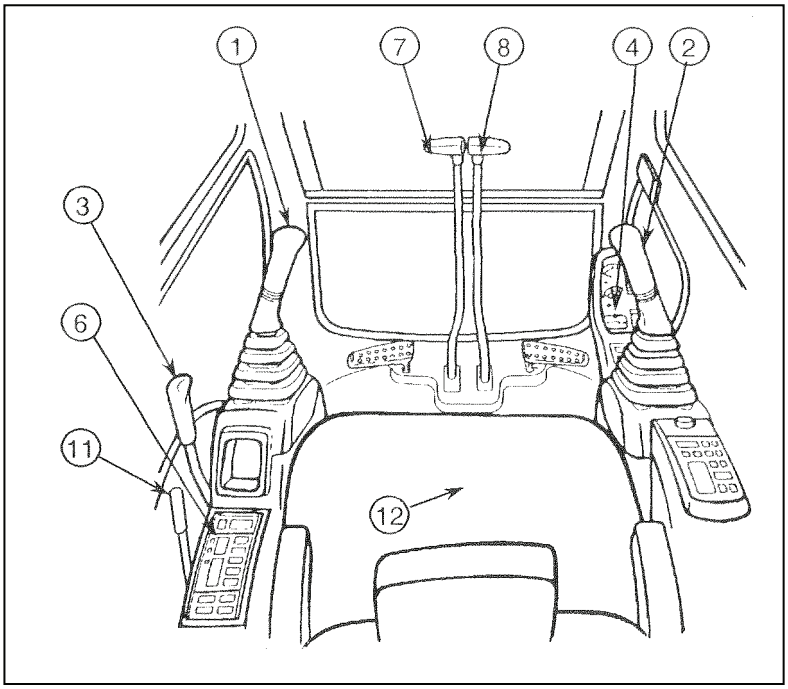
8- Right travel lever

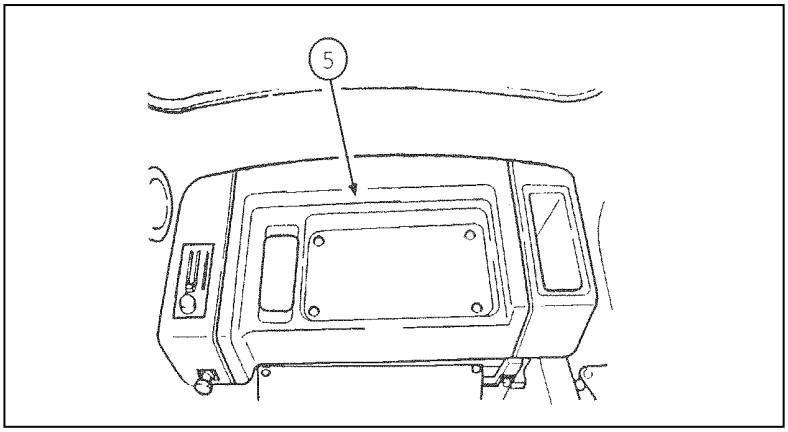
9- Attachment pedal—If equipped

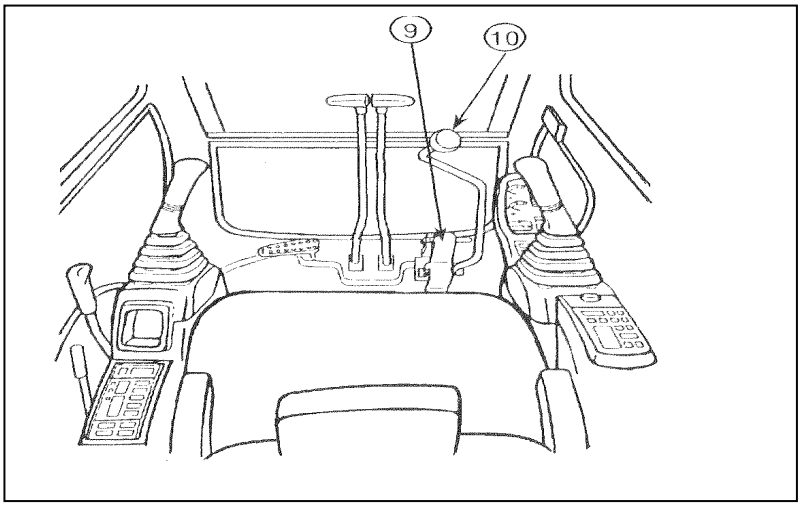
10- Blade lever—if equipped

11- Cab door Release lever

12- Operator's Seat

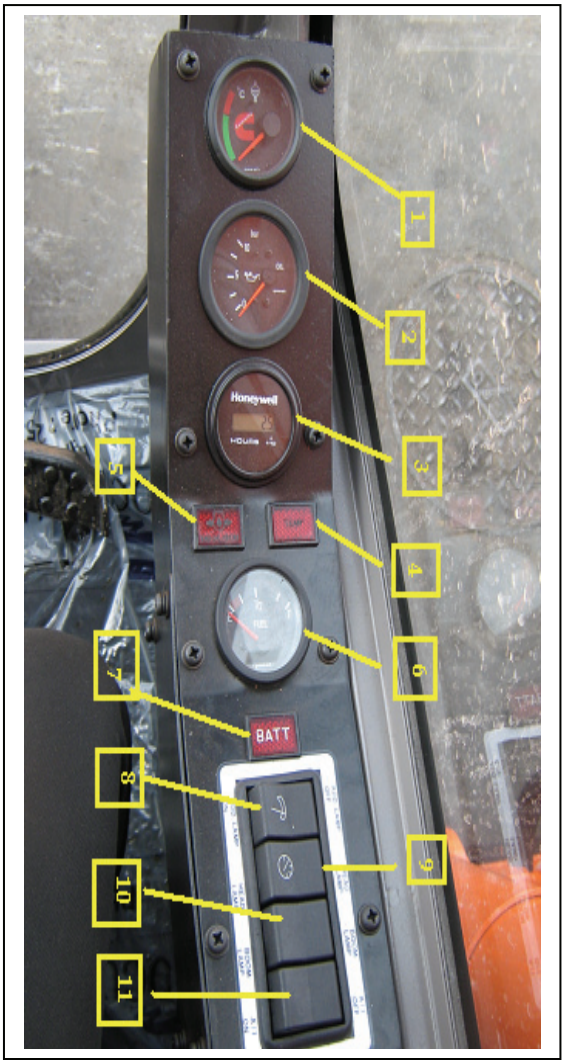




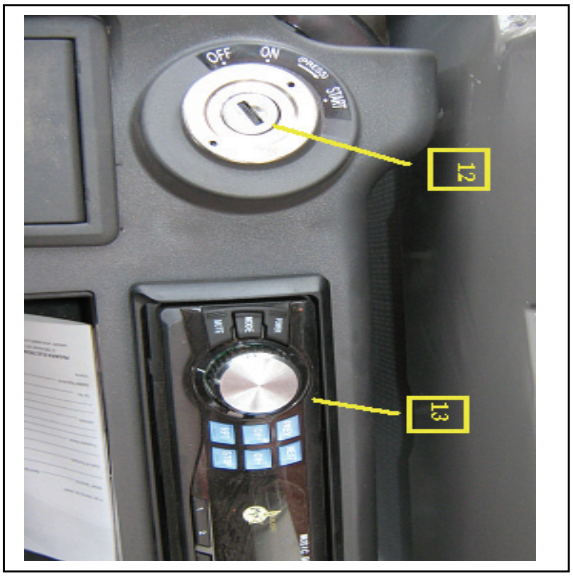


OPERATOR'S STATION

- **Gauge Panel And Switches**



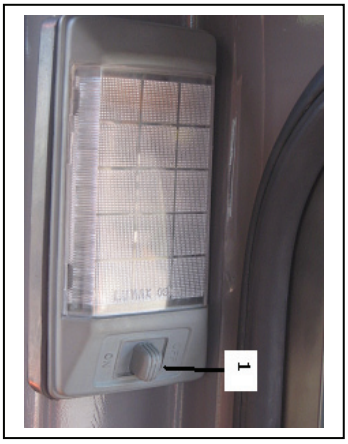
1. Engine coolant temp.guage
2. Engine oil pr. guage
3. Hourmeter
4. Coolant overheat indicator
5. Low engine oil pr. Indicator
6. Fuel Guage
7. Low Battery indicator
8. Addition Lamp Switch
9. Head lamp switch
10. Boom Lamp Switch
11. A/I Switch
12. Ignition key switch
13. FM/USB Music player



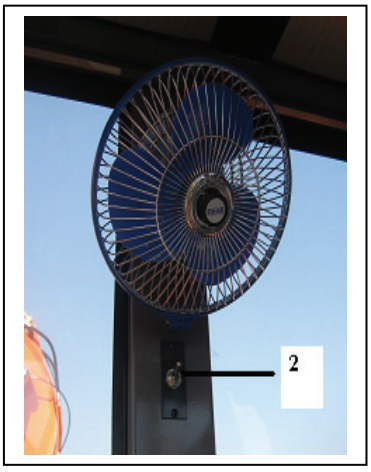
OPERATOR'S STATION

- **Gauge Panel And Switches**

1. Cabin Room Lamp Switch



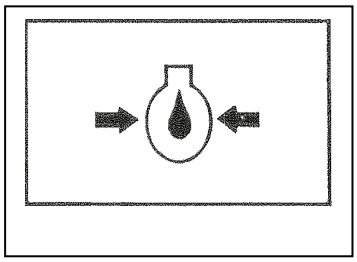
2. Cabin Fan Switch



OPERATOR'S STATION

ENGINE OIL PRESSURE INDICATOR

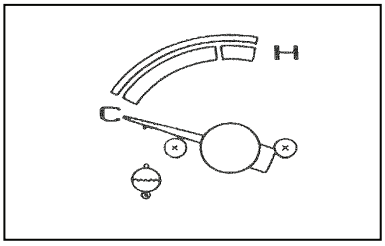
IMPORTANT: Prevent possible engine damage.
If engine oil pressure indicator
Glows on while operating. Stop
Engine immediately.



NOTE: Cold oil low oil level. Or operating on a steep
Slope may cause indicator to light.

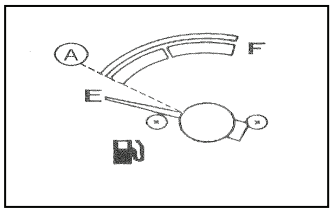
COOLANT TEMPERATURE GAUGE

Important: Prevent possible engine damage.
Do not stop engine when needle crosses
Normal limit, as temperature will rise
Further, instead, reduce load and run
Engine at low idle.



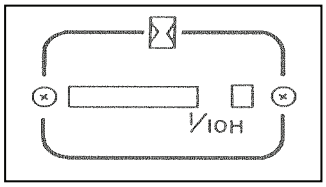
FUEL GAUGE

Fuel machine before needle reaches 'E'



HOUR METER

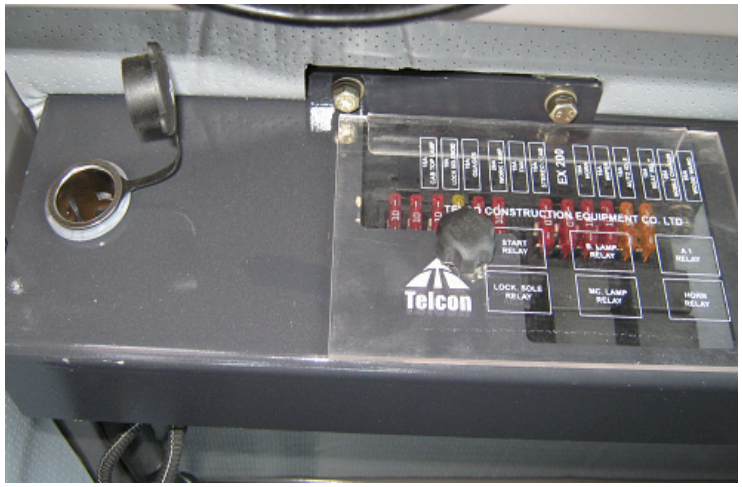
It is digital Electronic type hour meter.



OPERATOR'S STATION

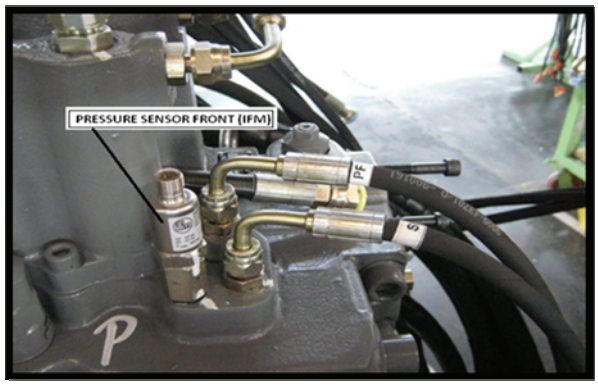
Location Of Electrical Major Components:

1. Fuse Box , Relays and Charging Socket
- Behind Operator's Seat



2. Stereos for FM:
- Behind Operator's seat- At left Corner

3. Auto – Idle Pressure Sensor
- On the Control Valve



OPERATOR'S STATION

Location Of Electrical Major Components:

4..Cabin Work Lamp

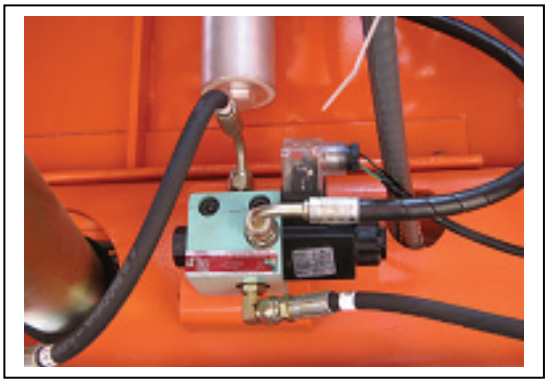
5.Working Lamp on Boom

6. Working Lamp on Mainframe

OPERATOR'S STATION

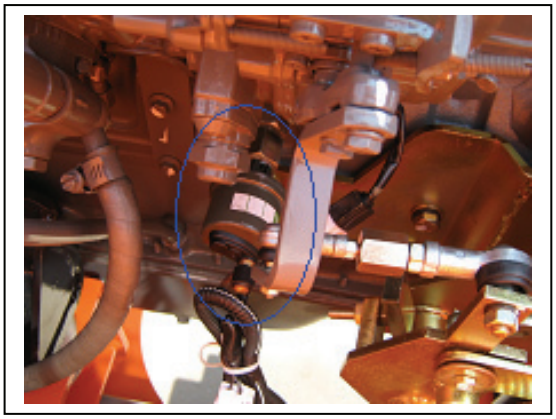
7. Auto Idle Solenoid

   Below Pilot Filter



8. Engine oil Pr. Transducer

   On Engine Block



9. Engine coolant temp sensor

   On engine – coolant line

- **OPENING AND STORING THE UPPER FRONT WINDOW**

(1) Fully closing position.
Press the window pane forward, and fix it firmly by (Sliding) the right and lift lock pins.

(2) Full opening position.
When the front window is raised, first confirm the Locking pin is effective, and fix it by the right and left lock pins, Take the Front Window Grip and The raise the frame after unlockind the locking Pins (1).

(3) Fixing Position of Front Window Frame

After raising the window frame –lock the right and left locking pins (1) Firmly.

CAUTION:

Before front glass is opened or close, be sure
To disconnect the connector for the wiper- If Equipped.

OPERATOR'S STATION

- **Door Lock From Inside**

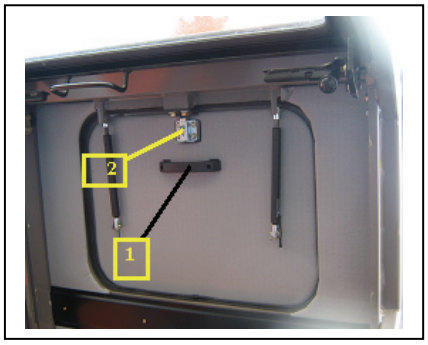
1) Releasing the lock to open the door.
Push down the lever.

- **Door Lock From Ouside**

- Press the push button and pull the door with the help of handle.

- **Cabin Top Opening :**

Hold the handle (1) and remove the unlock the Hinge (2) from its position, and lift up.

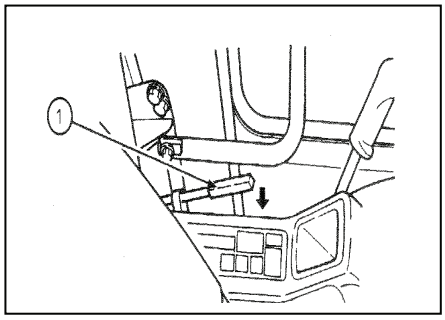


OPERATOR'S STATION

- **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 this position, push down on Lever (1).

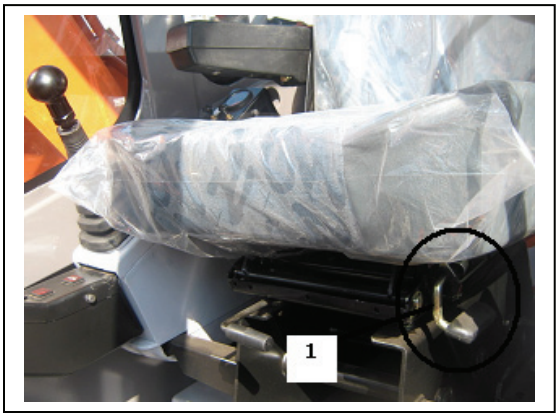


- **ADJUSTING THE OPERATOR'S SEAT**

1. SEAT HEIGHT ADJUSTMENT

Pull the Lever (1) up and adjust the height of operator's seat.

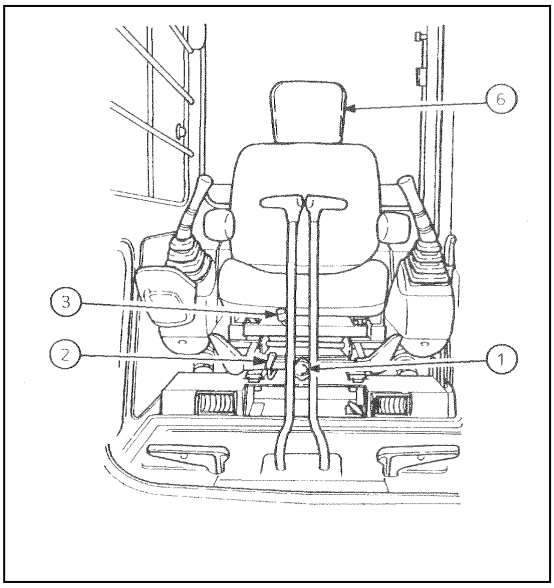
NOTE: Height adjustment from minimum (Lowest) to Maximum (highest) is 80 mm (3in).



2. CONSOLE AND SEAT FORE-AFT ADJUSTMENT

Pull lever 2 to the right to adjust the seat and Both right and lift console to desired distance From the travel levers. Release lever to lock seat And console into position.

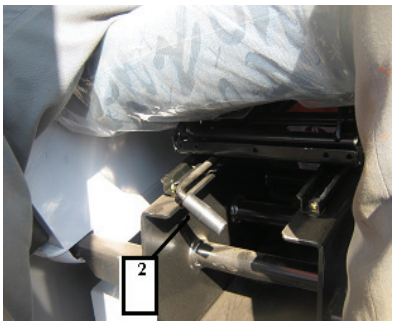
NOTE: Seat and console fore-aft adjustment range is 120 mm (4.7 in) With stops every 20mm (0.8 in).



OPERATOR' S STATION

3. SEAT ADJUSMENT – TO AND FRO

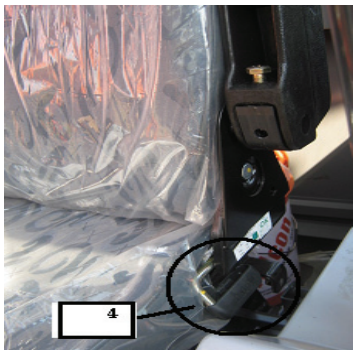
Pull lever (2) to the right to adjust the seat and
Both right and lift console to desired distance
From the travel levers. Release lever to lock seat
And console into position.



4. BACKREST ADJUSTMENT

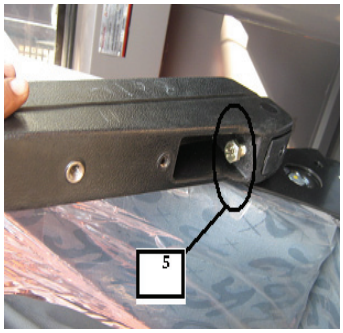
Pull the lever 4 Up to release backrest low.

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



5. ARM RESTS ADJUSTMENT

Turn the Bolt (5) clock wise to raise the tilt of armrest.
Turn bolt (5)counterclockwise to lower the tilt of armrest.



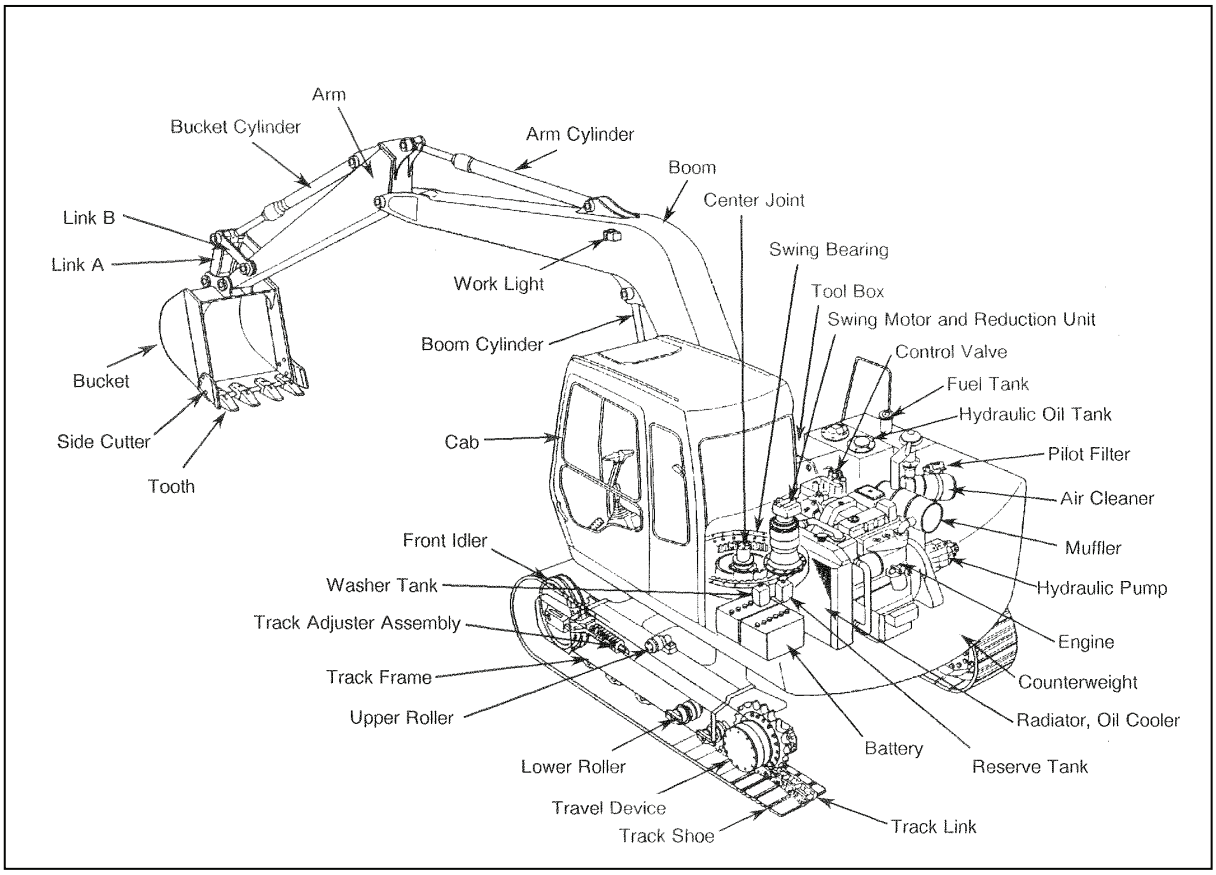
6. HEADREST ADJUSTMENT

Push the headrest knob (6) and adjust the
Head Rest to desired position.

OPERATING THE MACHINE

- **PRE-START INSPECTION**

INSPECT MACHINE DAILY BEFORE STARTING



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 Those rub against each other or other parts.

LUBRICATION
Check lubrication points on the periodic Service Chart.
PROTECCTIVE DEVICES
Check gourds, fenders.

SAFETY
Walk around machine to clear all bystanders From machine area.

OPERATING THE MACHINE

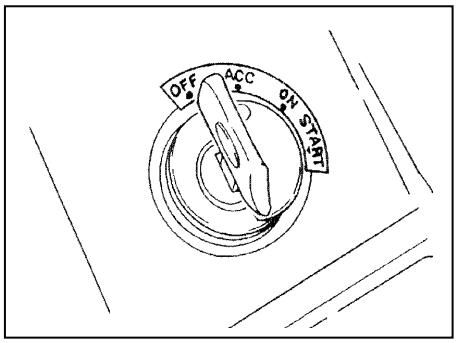
STARTING THE ENGINE

(1) Make sure all control levers are in neutral position

(2) Put the accelerator lever in “medium” position.

(3) Put the starter switch to “ON” position.

(4) Press the key and rotate clockwise to start/crank the engine.



(5) As soon as the engine starter, release your hand from the starter switch.

(6) Return the fuel lever to “LOW” position**.**

NOTE:

(1) Before starting the engine, sound the horn to alert person nearby.

(2) Do not crank engine by starting motor longer than 15 seconds. Wait 2 minutes before you try again

(3) Do not fail to follow the instruction of item (5) above. Failure to do so may result in damage to th Starter motor bandit gear and the engine ring-gear

(4) While the engine is running always position the starter switch in the “ON” position. Other wise the Electrical system may be damaged.

(5) When the engine is low idling, the vibration of the machine may increase due to resonance. In This case, increase the engine speed slightly to decrease such vibration.

OPERATONING THE MACHINE

- **CHECK INSTRUMENTS AETER STARTING :**

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

Check and indication of gauges.

(1) Engine coolant temperature gauge is in the normal range.

(2) Are the warning lamps off?

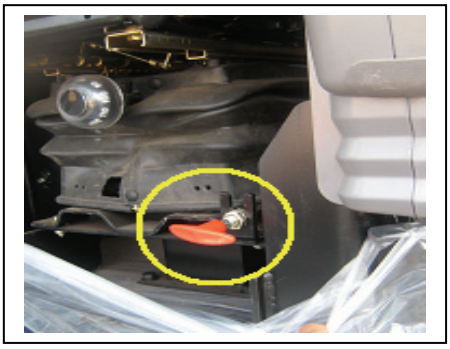
(3) The engine noise and exhaust gas color are normal.

STOPPPING THE ENGINE

1) Return the accelerator lever to low position for 5 minutes.

CAUTOIN:
Especially in the case of an engine with a turbo charger, stopping the engine suddenly makes the lubricated points of the charger body very hot, which dries up the lubricant and causes failure.

(2) Push the accelerator lever fully on the lower side.
(3) Pull the fuel cut off lever/ Engine Stop Lever fully.

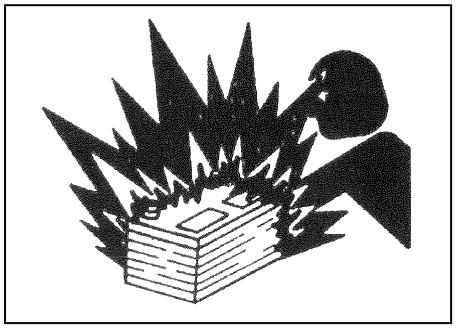


CAUTION:

The stopping sequence (2),(3) above should be in this order, Otherwise trouble in electrical system may cause.

OPERATING THE MACHINE

CAUTION: An explosive gas is produce while batteries are in use or being charged. Keep flames or sparks away from the battery area charges batteries in a well ventilated area. Park the machine on a dry ground or concrete surface when using steel plates, as sparks may be created on the machine unexpectedly. Never connect a positive terminal to a negative terminal, as a dangerous short circuit will Occur.



IMPORTANT: The machine electrical system is a 12VX2 battery type.

- **OPERATING 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, rise Tracks using boom, Move machine Carefully to prevent damage to drive Train And tracks.

If engine stop under load, remove load. Start engine immediately. run engine 30 seconds in slow idle 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

OPERATING THE MACHINE

- **STEERING THE MACHINE USING LEVERS**

CAUTION: In the standard travel travel Position, the Idlers are positioned at the front of the machine and The travel motors at the rear. If the travel motor are Positioned at front of the machine, the control actions Of the travel levers will be reversed. Be sure to conform The position of the travel motors before traveling.

FORWARD TRAVEL
Push both lever forward (A).

REVERSE TRAVEL
Pull both levers rearward (B).

NEUTRAL POSITION (C).

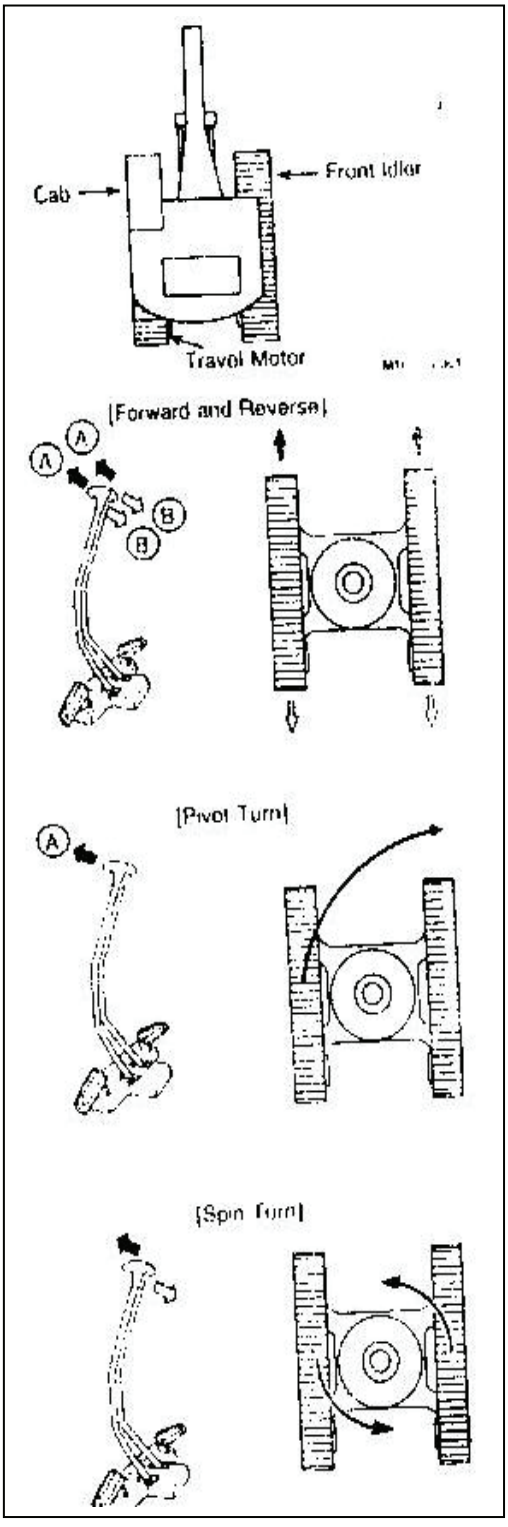
When the travel levers are placed in neutral, travel Brakes automatically will stop and/or hold the machine.

RIGHT TURN
Push left lever forward.

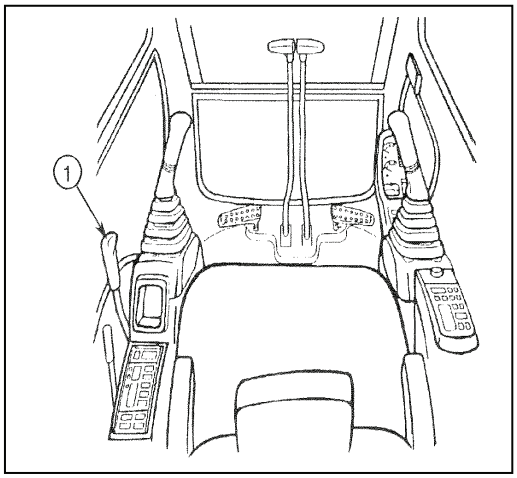
LEFT TURN
Push right lever forward**.**

SHORT TURN (Spin turn)
Push one lever forward and full the other back ward**.**

NOTE: 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**.**



OPERTATING THE MACHINE



- **PARKING THE MACHINE**

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the key switch to off. Remove the Key from the switch.
4. Pull the pilot shut-off lever (1) to the lock position.
5. Close window, roof vent the cab door.
6. 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.

Use these locks to help safe-guard your machine.

OPERATING THE MACHINE

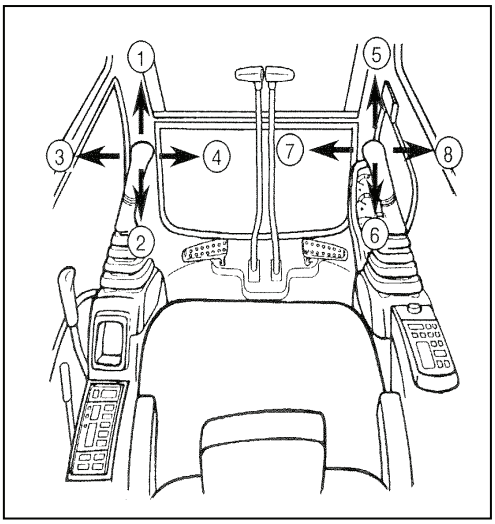
- **CONTROL LEVER (STANDRAD PATTERN)**

CAUTION:

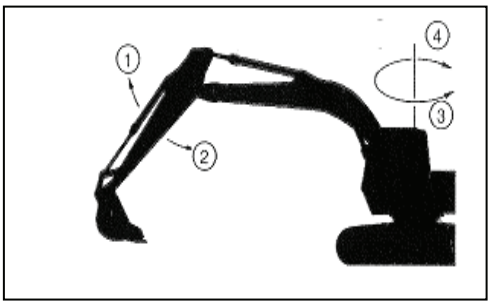
1. Never place any part of the body beyond window. Frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged./ If window is missing or broken replace immediately.
Prevent possible injury from unexpected machine movement.
Make sure you know the location and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

2. The control lever may be unintentionally moved by body parts when operator looks to the rear. Causing the base machine and /or the front attachment to suddenly move, possibly resulting in an Accident. Be careful not to touch the control levers With any part of your body when looking to the rear.

The machine is equipped with a label showing the Control patterns of the lever.



IMPORTANT: When digging, avoid hitting tracks with boom cylinders.
When digging over the end of the Tracks. Travel motor should be at The rear to minimize chain and sprocket loading and to maximize machine Stalility and lift capacity.



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

1- Arm Roll Out

2- Arm Roll In

3- Swing Left

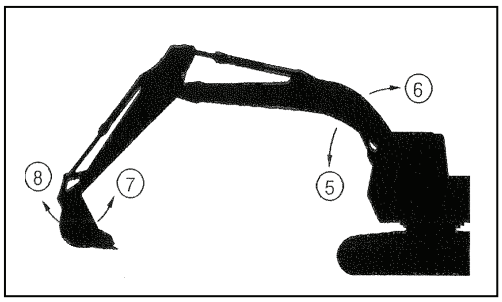
4- Swig Right

5- Boom Lower

6- Boom Raise

7- Bucket Roll-in

8- Bucket Roll-out.

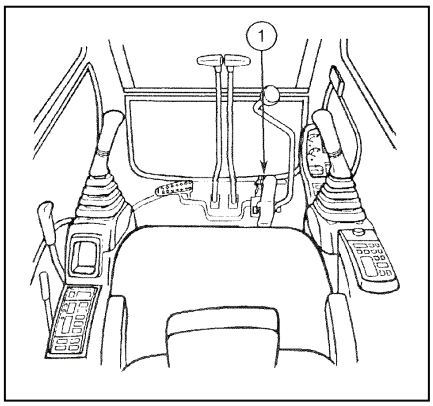


OPERATING THE MACHINE

- **ATTACHMENT PEDAL--- IF EQUIPPED**

The breaker, crusher, cte., can be operated using attachment pedal(1) located to the right front of the Seat, as illustrated.

CAUTION: Be sure to lock attachment pedal(1) With pedal lock (2) when the attachment pedal Is not in use.

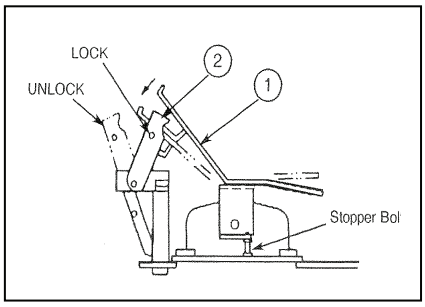


- **To operate the breaker**

1.Move pedal lock(2) forward to unlock attachment pedal (1)

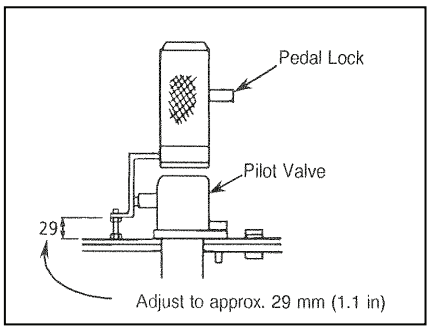
2. Push down on attachment pedal (1) to operate the the breaker.

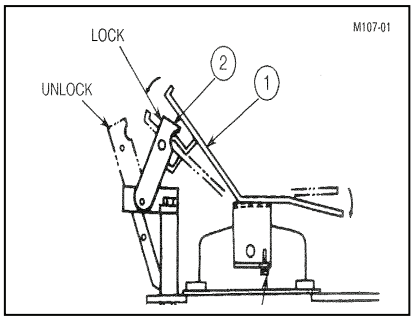
3. Remove foot from attachment pedal (1) to stop the breaker.
4. Always keep attachment pedal (1) locked with pedal Lock (2) when the attachment pedal is not in use.



- **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.

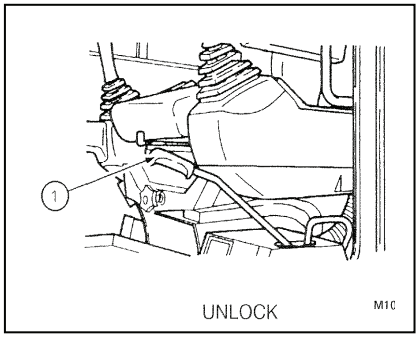


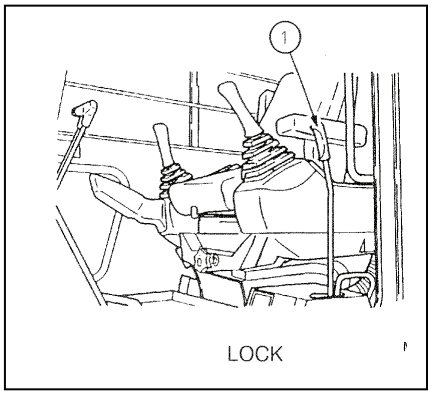


- **PILOT CONTROL SHUT-OFF LEVER**

Pilot control shut-off lever (1) shut 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 nay time You stop the engine or leave the operator's seat. Before starting machine operation, push lever (1) to he UNLOCK position.

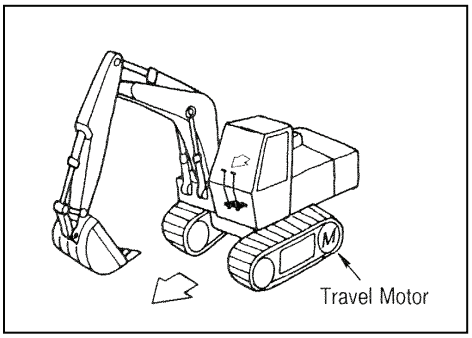
CAUTION: Always check to be sure lever is fully in the LOCK position to prevent accidental machine movement. Always pull the lever into the full LOCK position whenever stopping the engine, leaving the operator's seat or transporting the machine.





OPERATING THE MACHINE

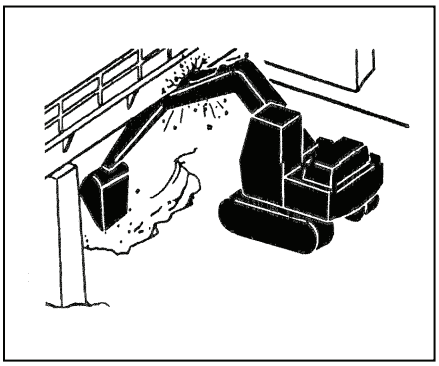
- **TRAVELING**



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

1. Before moving machine, determine which way to move travel levers for the direction you want to go. When the travel motors are in the rear, pushing the levers forward moves the machine forward, to -wards the idlers.

2. Select a travel route that is 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 the 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.

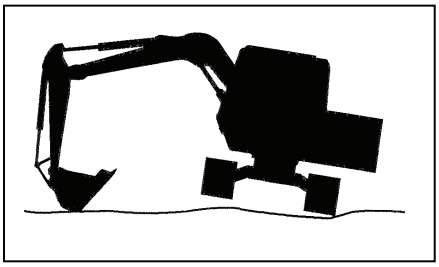
8. When traveling on rough terrain reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage the machine.

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.

OPERATING THE MACHINE

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.

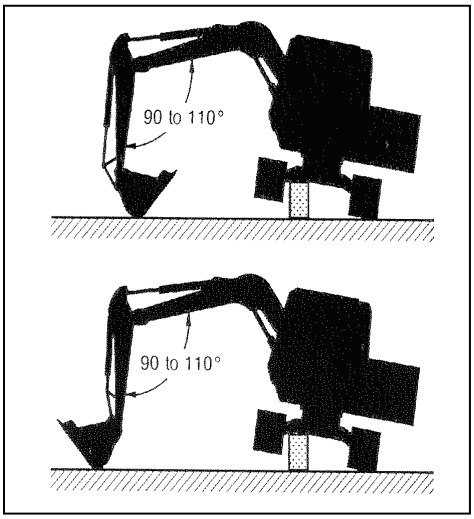
Swing the upper structure 90o and lower the bucket to Raise one track off the ground. Make sure to keep the Angle between the boom and arm 90 to 110o and position the buckets round side on the ground.

Rotate the raised track back and fourth 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 opetare its engine. Be sure to attach a towing wire cprrectly.

RAISE ONE TRACK USING BOOM AND ARM



CAUTION: Keep the angle between boom and arm 90 to110o and position the bucket's round side on the ground.

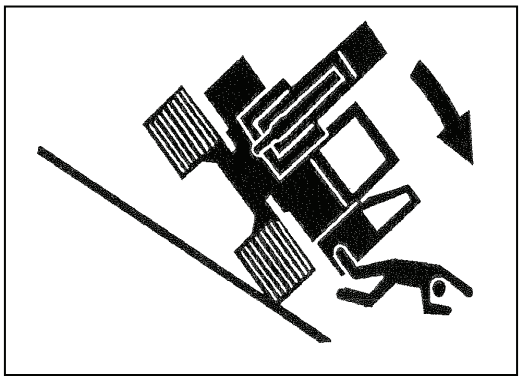
Swing the upper structure 90o and lower the bucket to Raise track off ground. Do not dig bucket teeth into the ground when using the hoe bucket reversed.

Place blocks under machine frame to support the machine.

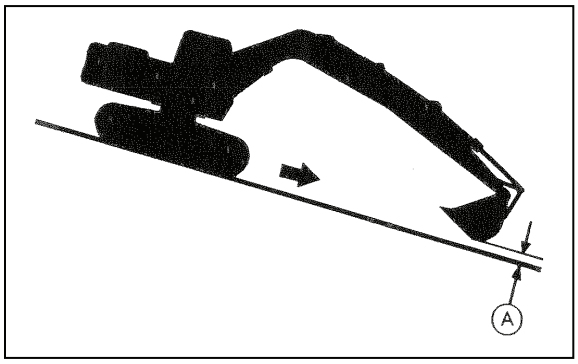
OPERATING THE MACHINE

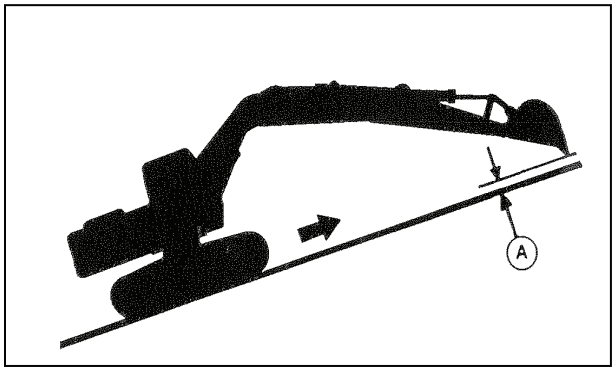
AVOID TIPPING

Avoid traveling across the face of grade. When Traveling on a grade, 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 desending Grades. 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.





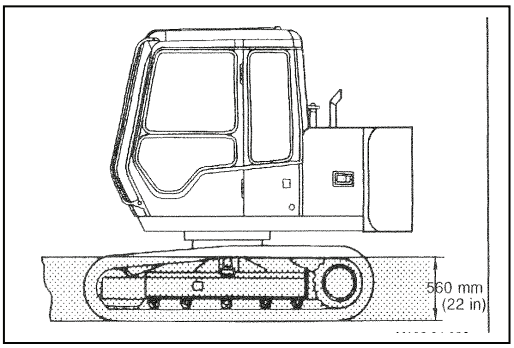
OPERATING IN WATER OR MUD

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 machines Position often. Reposition the machine if necessary.

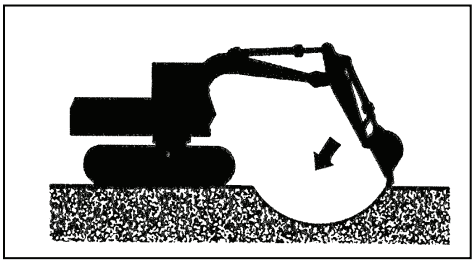
Avoid submerging the swing bearing, swing gears and Center joint.

If the swing bearing, swing gears and center joint are Submerged, remove drain plug to drain mad and water. Clean swing area. Install plug. Lubricate swing internal gear and swing bearing. Lubricate swing bearing. (See Maintenance Guide, 500 hours**).**



OPERATING THE MACHINE

• OPERATING BACKHOE

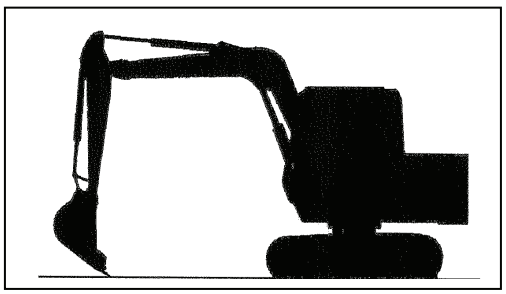


1. Place the bucket teeth on the ground with the Bottom of the bucket at a 45° degree angle to The ground.
2. Pull the bucket toward the machine using the Arm as the main digging force.
3. When soil sticks to the bucket, remove it by Moving the arm and/or bucket rapidly back And forth.
4. When trenching 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 the 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 smooth surface.

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

OPERATING THE MACHINE

- **SELECT CORRECT TRACK SHOES**

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

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

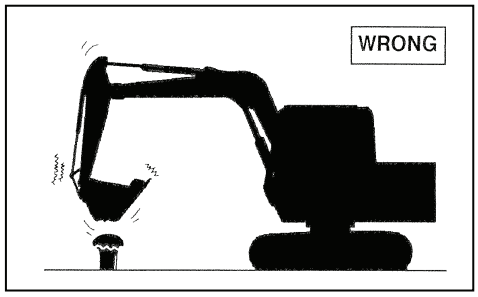
Track shoe bolts should be checked periodically for tightness.

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 curried under).

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 field 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. Seroius damage to the machine can result.

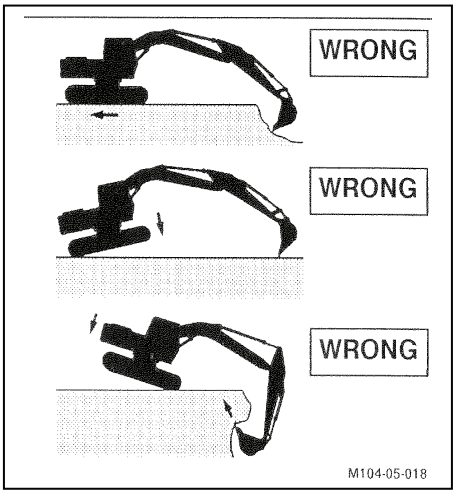
Once the trench is open, ledge rock can be broken By pulling the bucket up under the layers. The top Layers are pulled out first, with one or two layers. Being lifted at a time.
Do not side load bucket. For example, do not swing Bucket to level material or do not strike object from The side with the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

OPERATING THE MACHINE

- **AVIOD ABUSIVE OPERATION**

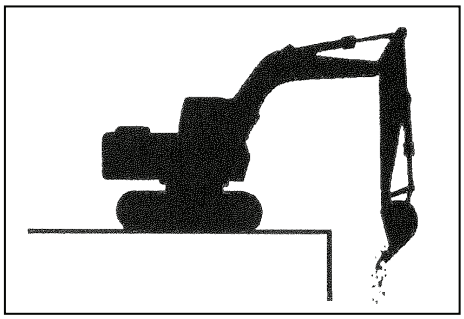
DO not uses travel as an additional digging force. Service machine damage may result.

Do not raise rare of machine to use the machines Weight a additional digging force. Service machine Damage may result.



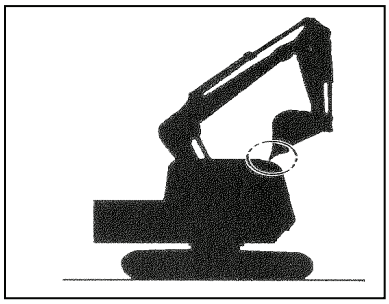
PREVENT CAVE- IN'S

- Work perpendicular to or at angle to excavation, with travel motors to the rear of the machine.
- Do not drive near the edge of an excavation or trench.
- Do not dig under the machine.

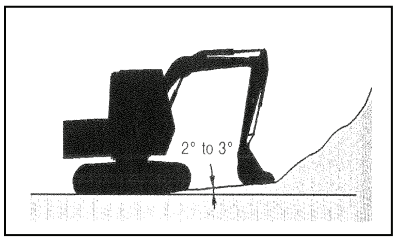


FACE SHOVEL OPERATION

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

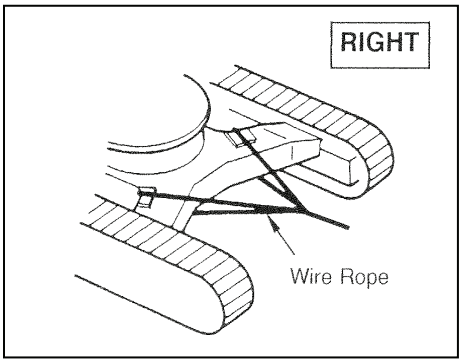


- For face shovel operation, dig the ground using The arm cylinder in a scraping motion.
- Where underground water is expected, make a Slope angle of 2° to 3° to drain this water as---- Shown.



OPERATING THE MACHINE

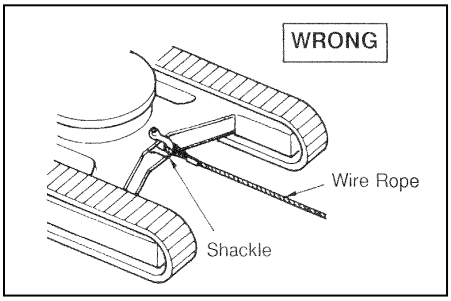
- **TOWING MACHINE A SHORT DISTANCE**



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 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 machine as illustrated.
To prevent the wire ropes from being damaged, place Some protective material between the track frame and The wire ropes.



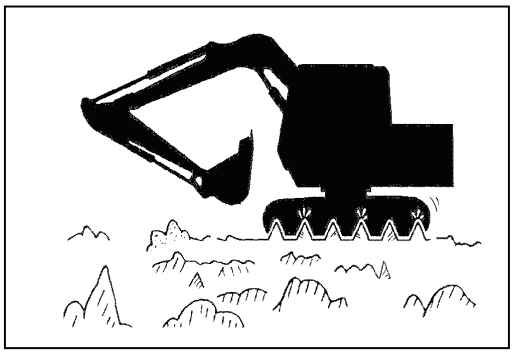
MPORTANT: A shackle hole is provided on the track frame to tow lightweights up to 2 000 kgf (44 100 lbf). Do not use the shackle hole to tow This or another machine.

1. Attach a wire tow line around the Machine frame as shown to the- Frame shackle hole using a suta- ible 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.

ON USING THE RUBBER COVERED GROUSER SHOES (OPTIONAL)



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

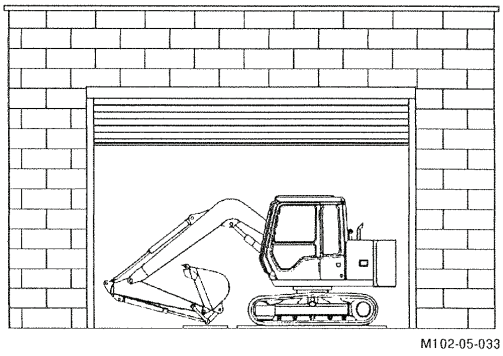
PROHIBITED OPERATIONS

1. Do not operate on sharp, rocky, uneven surface, 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 tracks is jacked up by the front attachment.

TRAVELING AND OTHER CAUTIONS



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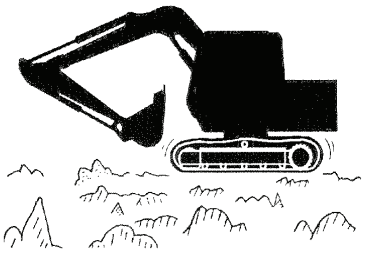

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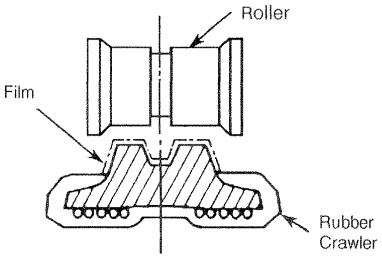


1. Do not keep the rubber-covered shoes under direct sunlight for more than three months.

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 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

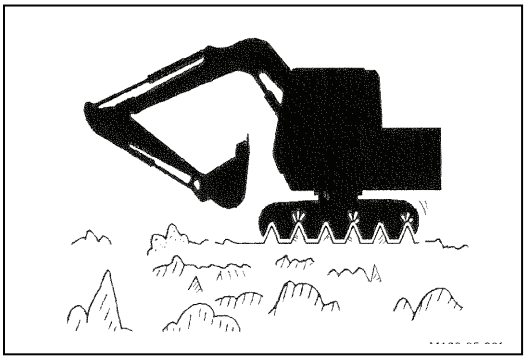
4. As the rubber-covered shoes are less flexible than the rubber crawler, they any develop fine cracks on the rubber pad surface the shoes need not be replaced.

5. Procedure for checking and adjusting trackasg Are the same 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.

ON USING THE RUBBER CRAWLER (OPTIONAL)



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

PROHIBITED OPERATIONS

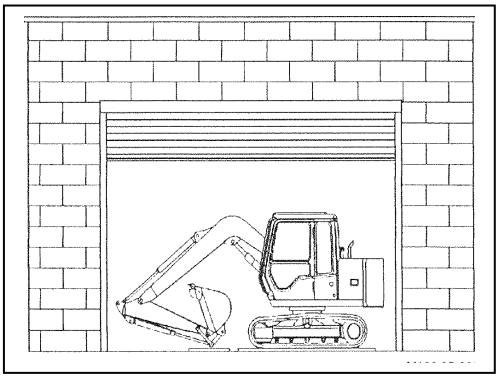
1. Do not operate on sharp, rocky, uneven surfaces, such as river rock, gravel, etc.

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.

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.

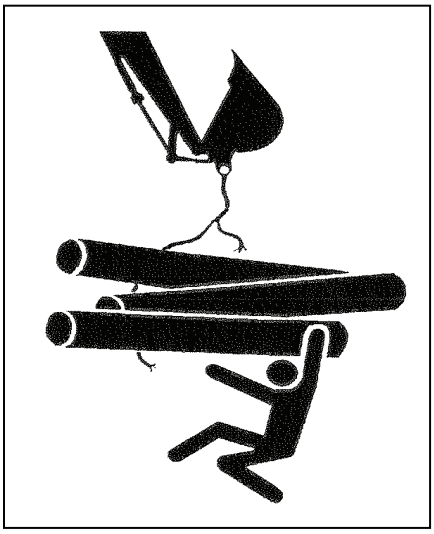
2. Avoid excessive steering operations on concrete road as much as possible, as this will cause wear to the shoe lug. Also, avoid running on asphalt road of more then 60 ^{0}C (140 ^{0}F) in temperature, as this will cause wear to the shoe as well as damage to the road surface.

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. Don't 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.

OBJECT HANDLING – IF REQUIRED



CAUTION: When using machine for object handling operation, be sure to comply with EN 474-5 which prescribes that the machine must be equipped with the rated lifting-load table, lifting hook. Overload alarm device, and hose-rupture safety valve when applied to object handling.

Lifting hook, cables straps, or ropes can break, causing serious injury. Do not use damaged chains, lifting hooks, 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 upper structure so that the travel motors are at the rear.

Do not attach sling/chain to the bucket teeth.

Be sure that the maximum lifting load does not exceed the rated load as shown in the lifting-load table plate or operator's manual.

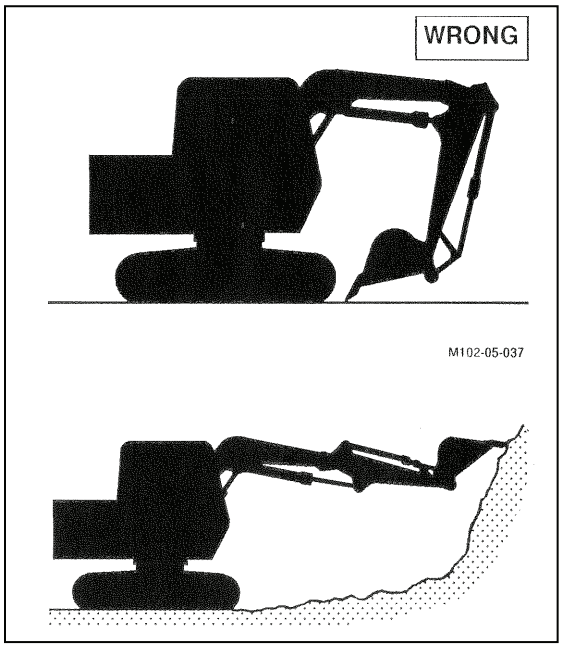
SHORT-REACH FRONT --- IF EQUIPPED
ULTRA LOW-CLEARANCE SHORT-REACH FRONT --- IF EQUIPPED

Precautions for Operation.

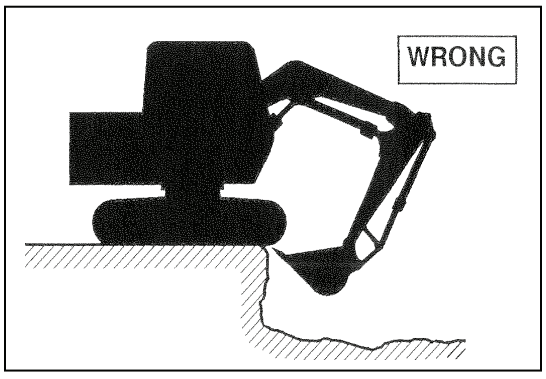
Do not dig or damp with the bucket cylinder fully extend. If fully extended, the cylinder will be subject to excessive loads, resulting in damage to the cylinder and relative parts. Be sure to leave some clearance at the bucket cylinder stroke end while digging or dumping.

When an excessive load is applied on the bucket teeth, the oil pressure in the bucket cylinder will easily increase above the overload relief valve setting pressure, allowing the bucket cylinder to extend to the stroke end.

To avoid this from happening:
Do not jackup the machine with the bucket teeth digging into the ground. When digging close to the track with the bucket tilted back, as illustrated below, take care not to extend the bucket cylinder full stroke. Operate the machine with care not have troubles as described above.



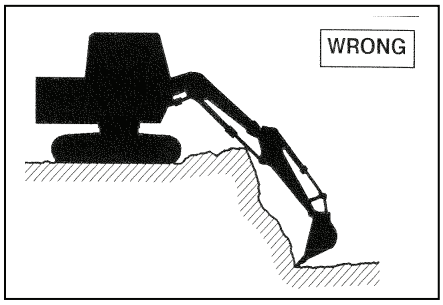
As illustrated, if digging is done with the arm cylinder fully extended, the cylinder will be subjected to excessive force, resulting in damage to the cylinder and other parts. Be sure to leave some clearance at the arm cylinder stroke end with digging. Avoid digging operation with the arm cylinder fully extended as illustreated above.



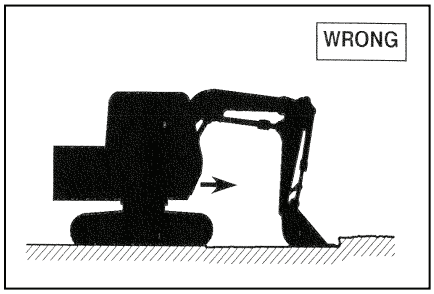
This machine can dig or scrape below the surface level. If boom is raised with the bucket close to the track as illustrated, the bucket will hit the track. Be sure to first move the bucket out away from the track before raising the bucket or boom.

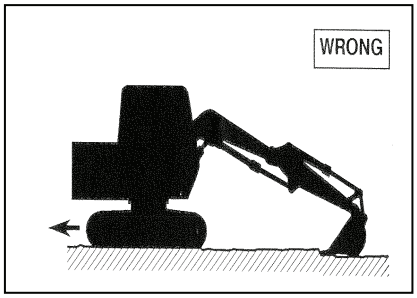
OPERATING THE MACHINE

The arm cylinder is provided on the bottom face of the boom. When digging deeply take extra care to prevent the arm cylinder from coming onto contact with the ground, as illustrated.

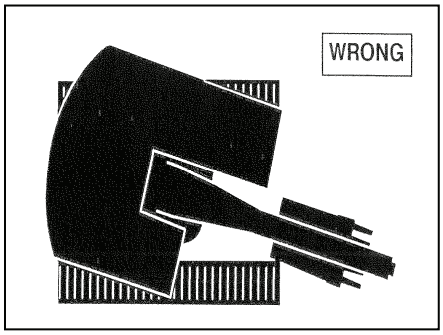


- Never dig by traveling with the bucket penetrated into the ground. Severe machine damage may result.





- Avoid swinging with the arm cylinder fully retracted. The bucket will hit the track, as illustrated.



OPERATING HYDRAULIC BRAKER---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.

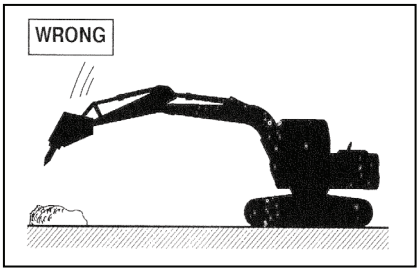
(3) After connecting, check the connecting seal fitting for oil leakage, and pipe clamp bolts for looseness.

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

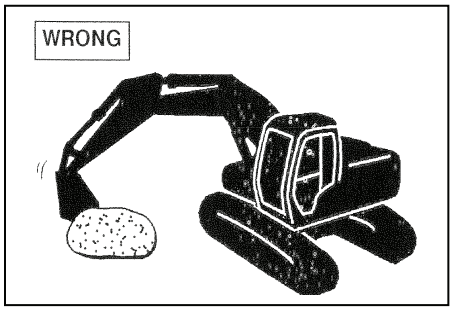
2.Operate the machine slowly, as the breaker is heavier than bucket.

OPERATING THE MACHINE

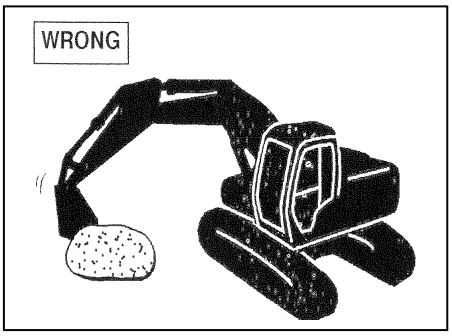
3. Avoid using the breaker for hammering operations. Do not use boom and arm functions to crush objects. Machine damage may result.



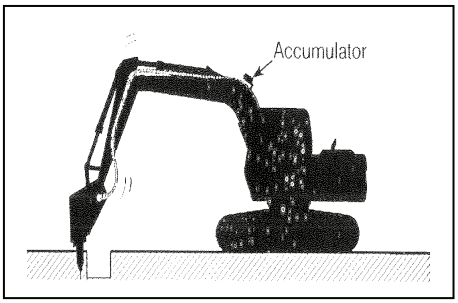
4. Do not use breaker to move objects. Machine damage may result.



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

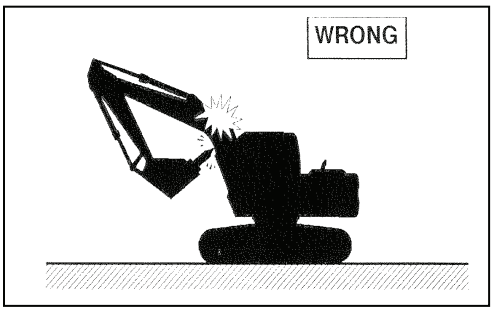


6. Stop operation if breaker hydraulic hoses jump abnormally. Change in breaker accumulator pressure or damaged accumulator will cause abnormal hose jumping and may cause breaker and/or machine damage.
Immediately contact your authorized dealer if this happens.

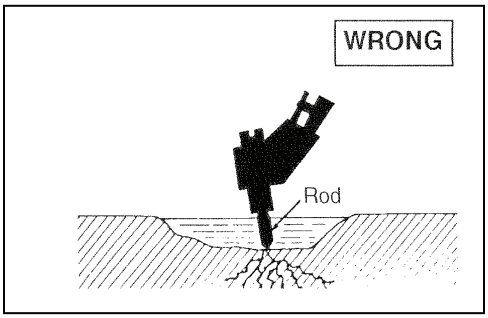


OPERATING THE MACHINE

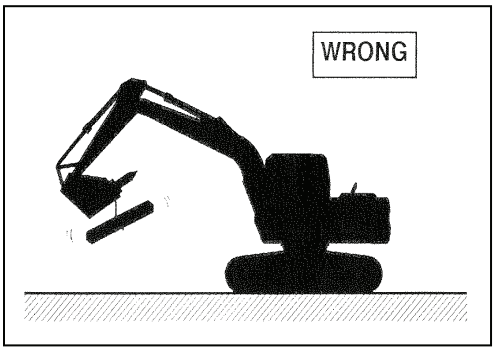
7. Operate the hydraulic excavator carefully to avoid hitting the boom.



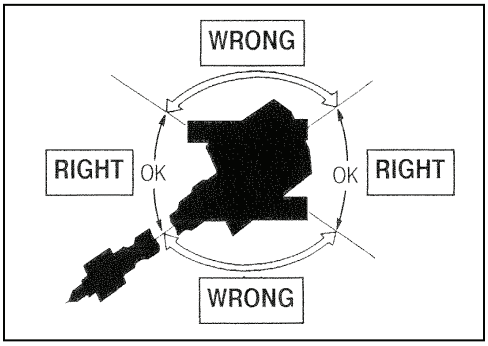
8. Do not operate the breaker in water. Doing so will cause rust and seal damage, resulting in damage to the hydraulic system components.



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



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.



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 Bucket
Hydraulic Oil	750*	2500
Filter Element	125*	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 contenuously

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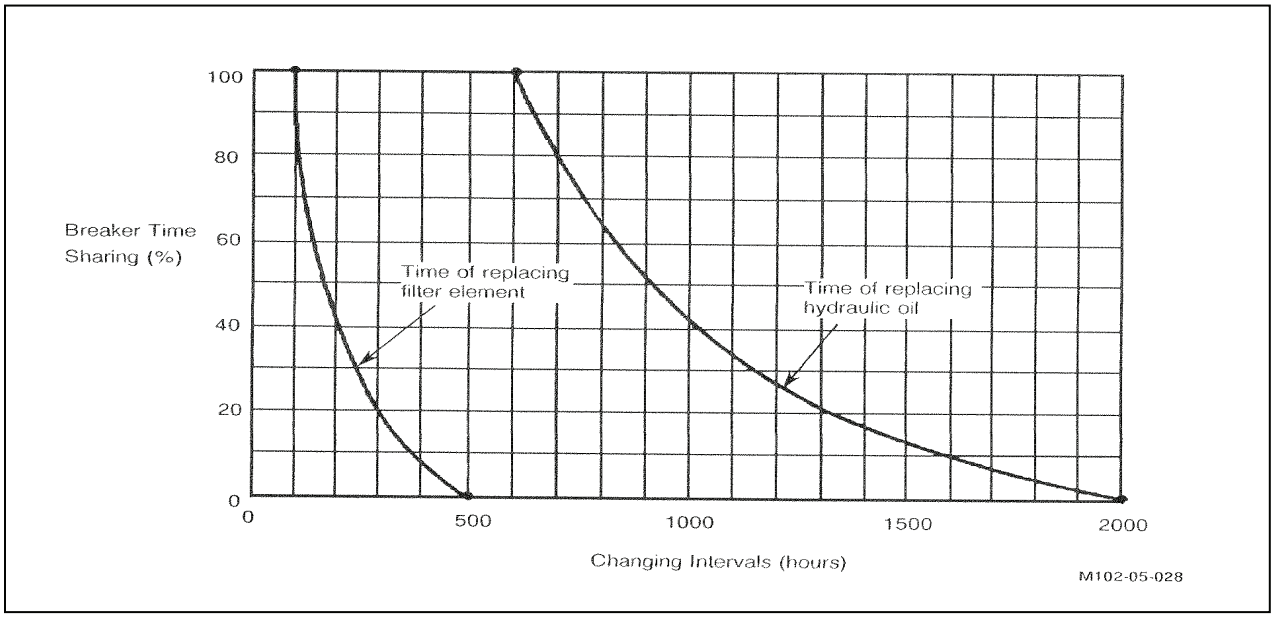
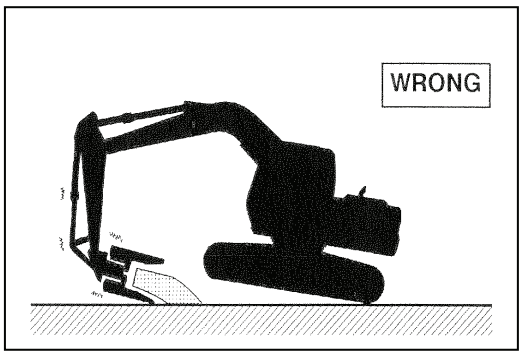


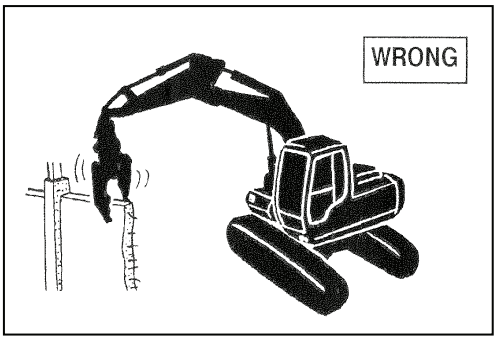
**OPERATING HYDRAULIC CRUSHER---
IF EQUIPPED**



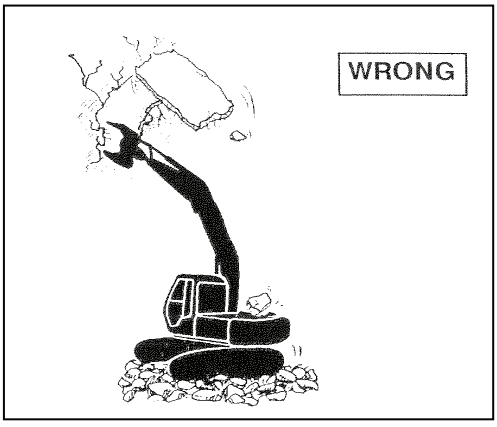
Select a crusher that is the correct size and weight for the machine. See your authorized dealer for correct crusher information.

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.



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.



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

OPERATING THE MACHINE

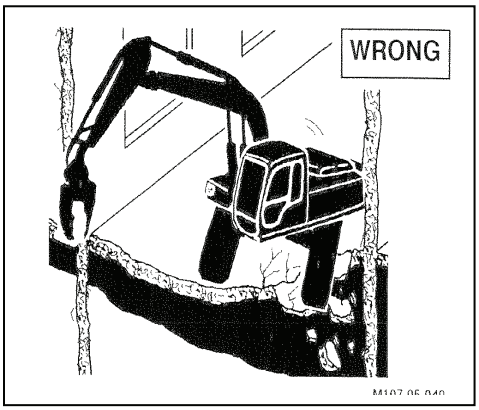
4. When operating the crusher on a floor in a building, first confirm that the floor has sufficient strength to support the load caused by crushing, in addition to the machine weight.

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 subject 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.



FORNT ATTACHMENT --- IF EQUIPPED

CAUTION: If the distance between the bucket hinge pin center at the arm top and the front attachment top is extended more than 1060 mm, the front attachment may come into contact with the cab, boom, and boom cylinders when the arm and front attachment are rolled in.

when operating the machine with a front attachment such as a quick hitch, fork grab, timber grab, concrete crusher, and pavement crusher, be sure to check whether the hydraulic oil pressure, flow rate and the mass of each front can match with those of the machine. Consult your authorized Hitachi dealer for section or any questions.

In some applications, the front attachment may come into contact with the cab, boom, or boom cylinder when the arm is fully retracted. Operate the arm with awareness.

Auto idle System

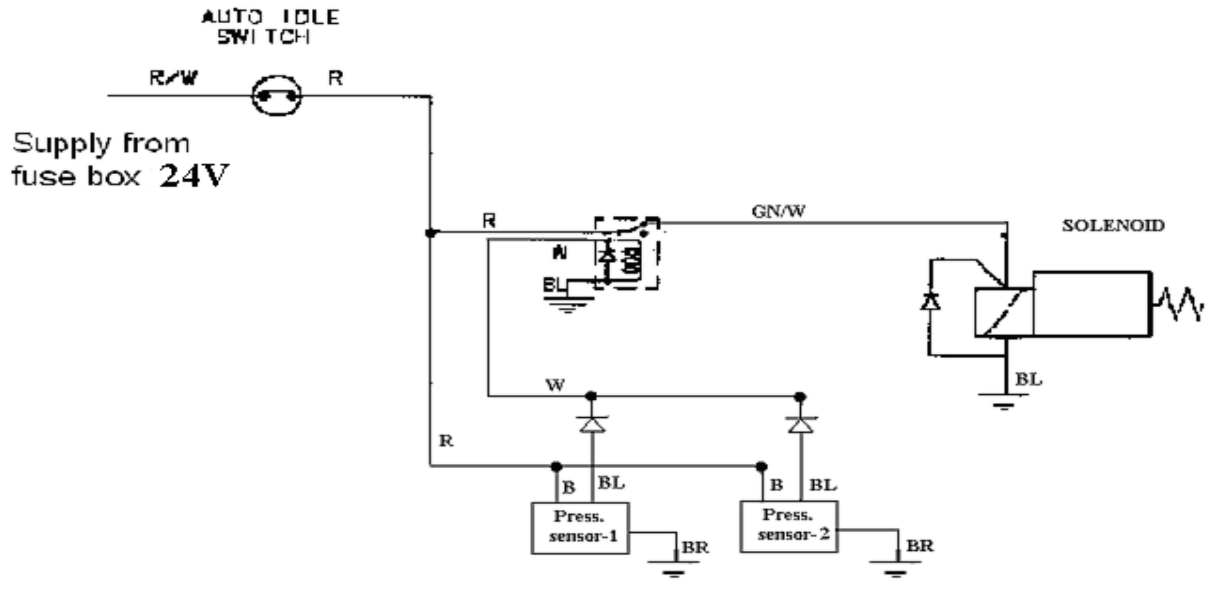
Purpose: The purpose of **Auto Idle System** is to reduce the fuel consumption, by automatically reducing the speed of engine from High Idle to Auto Idle speed when the machine is in idle condition.

Basic function:

Components: Auto idle system consists off, 2-ifm pressure sensors with continuous signal output (24V), fitted on control valve, Solenoid valve, relay, Auto idle mechanical kit and 4P Diode module. The continuous output of sensor goes to zero Volt, after 4 sec

- When the Auto Idle switch is ON, ifm sensors gets powered up i.e. Auto idle mode is ON. The continuous output of sensor signal enables the relay to be ON (relay contact changes to NC→NO).
- After 4 sec delay, sensor output voltage drops to zero Volt. Therefore the relay is back to normal position (NO→NC) and solenoid gets ON. Once the solenoid is ON, it actuates the Hydraulic cylinder, which operates the FIP lever and is pulled back to the Auto idle rpm and speed drops. Hence machine is said to be in auto idling mode (1300+/-100rpm).
- When the attachment is operated, pressure sensor (fitted on control valve) gets ON and the output of sensor goes high (24V) causing the relay to get ON once again (NC→NO). Since there is no supply to Solenoid, solenoid is now in OFF condition forcing the spring to release the FIP lever to High idle rpm. Once again when machine is left idle beyond 4 sec step 2 is repeated.
- The above cyclic process (step 3) is similarly applicable for travel mode also.

Circuit Diagram:



Note: Sensor Cable supply wire is Brown, Black is signal wire and Blue is ground.

	Speed Setting:	
1	Start Engine at Low Idle (Engine Low idle speed: 800+/-50 rpm).	
2	Switch off **"Auto idle SW".**	
3	Check for Engine High Idle Speed, it should be 2050+50 rpm.	
4	Auto Idle Speed: 1300 +/- 100 rpm.	
	Start Operations:	
1	Before starting the machine **'Ensure that the rpm lever is at low idle position'** And the Auto idle SW in **'OFF'** position	
2	Start the machine in Low Idle speed.	
3	Put the machine in high idle mode by pushing the accelerator lever backward or to required speed.	
4	Switch **'ON'** Auto idle Switch, to enable Auto Idle function.	
5	After 4 seconds at High Idle speed or set speed, without any operations, engine speed will drop to Auto Idle Speed i.e. 1300rpm+/- 100.	
6	If any of the **attachment** is operated, machine speed will come back to high idle or set speed.	
7	If **Travel Levers** are operated, machine speed will come back to high idle or set speed.	

	Stop Procedure:	
1	**Reduce machine speed, High idle →Low idle**	
2	Switch **'OFF'** Auto idle switch.	
3	Pull the stop cable to shut off the engine.	

Do's & Don'ts:

1. Do not start the machine with **'Auto idle SW in ON**' position, otherwise rpm of machine cannot be varied through Accelerator lever.
2. Never try to increase the rpm of the machine through accelerator lever, when the **Auto Idle feature is Working**. To vary the speed of machine through accelerator lever, initially pilot lever to be operated.
3. Always switch **'OFF'** auto idle switch and reduce the machine rpm to **Low idle** before stopping the machine (i.e. shutting down the engine).

Procedure for Plugging & Unplugging Sensor connector:

Plugging:

1) Before plugging the sensor connector, check for the positive locking orientation provided on sensor cable.

Pressure sensor

Sensor cable with IP67 connector

2) Tighten the threads gently in clock wise until you hear the sound **"Tick-Tick-Tick….."** This indicates that sensor got tightened properly.

Unplugging

To unplug the sensor from cable:

First push the sensor connector towards sensor and hold it, now rotate the thread ring in Anti clock wise to unthread the sensor.

Follow above step every time to unthread the sensor otherwise it will damage the sensor.

1) How to check whether the Sensor is Ok or Not ?

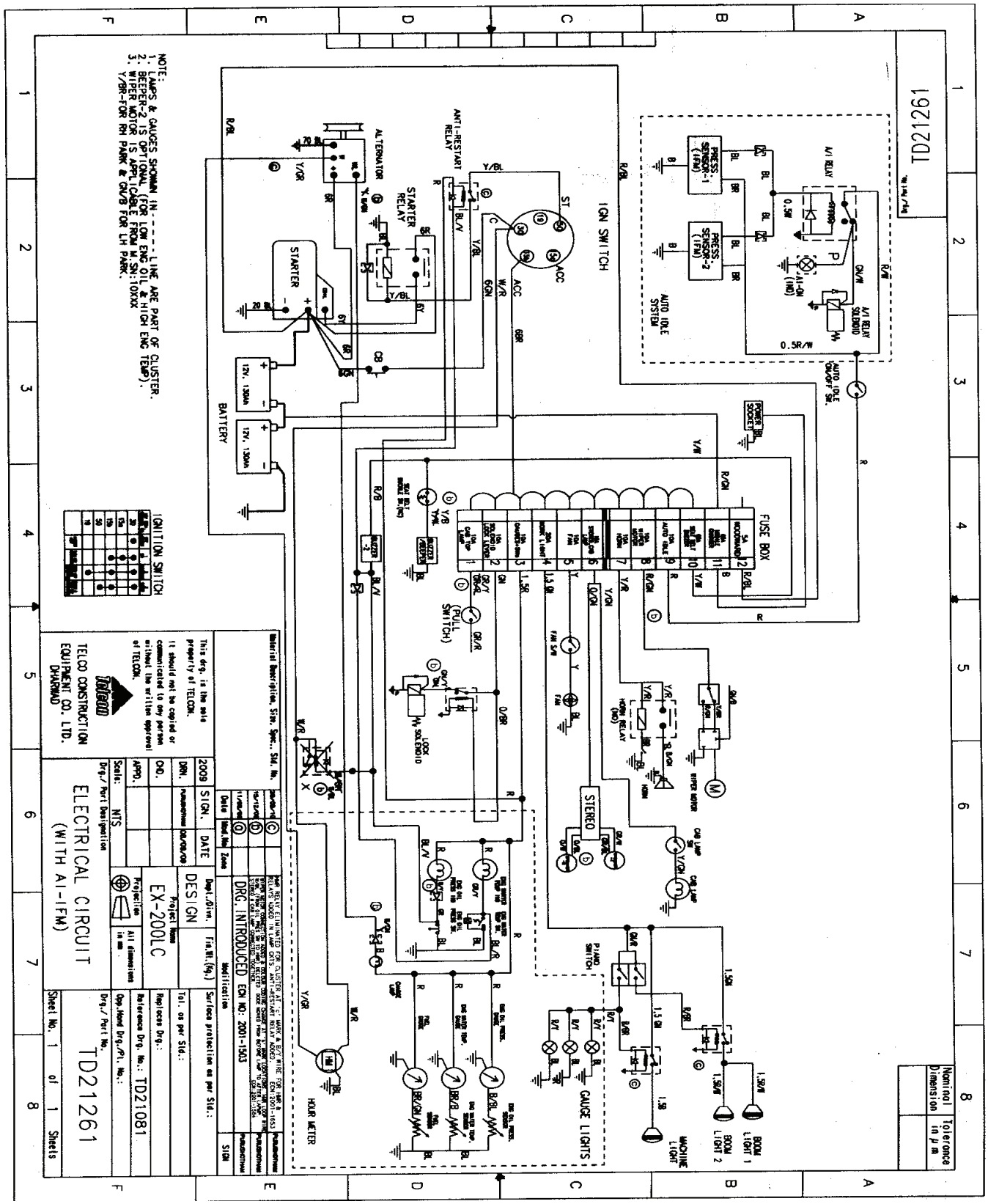
- Give 24 V supply to Sensor '+'ve (Brown wire) and '-' ve to (Blue wire).
- Check for 24V output at Sensor output wire (black)-ON
- After 4 sec sensor output goes '0' Volt.
- Repeat step 1,2 & 3
- After every 4sec check for 24V output at sensor black wire.

If the controller fails to satisfy any of the above steps, then replace sensor.

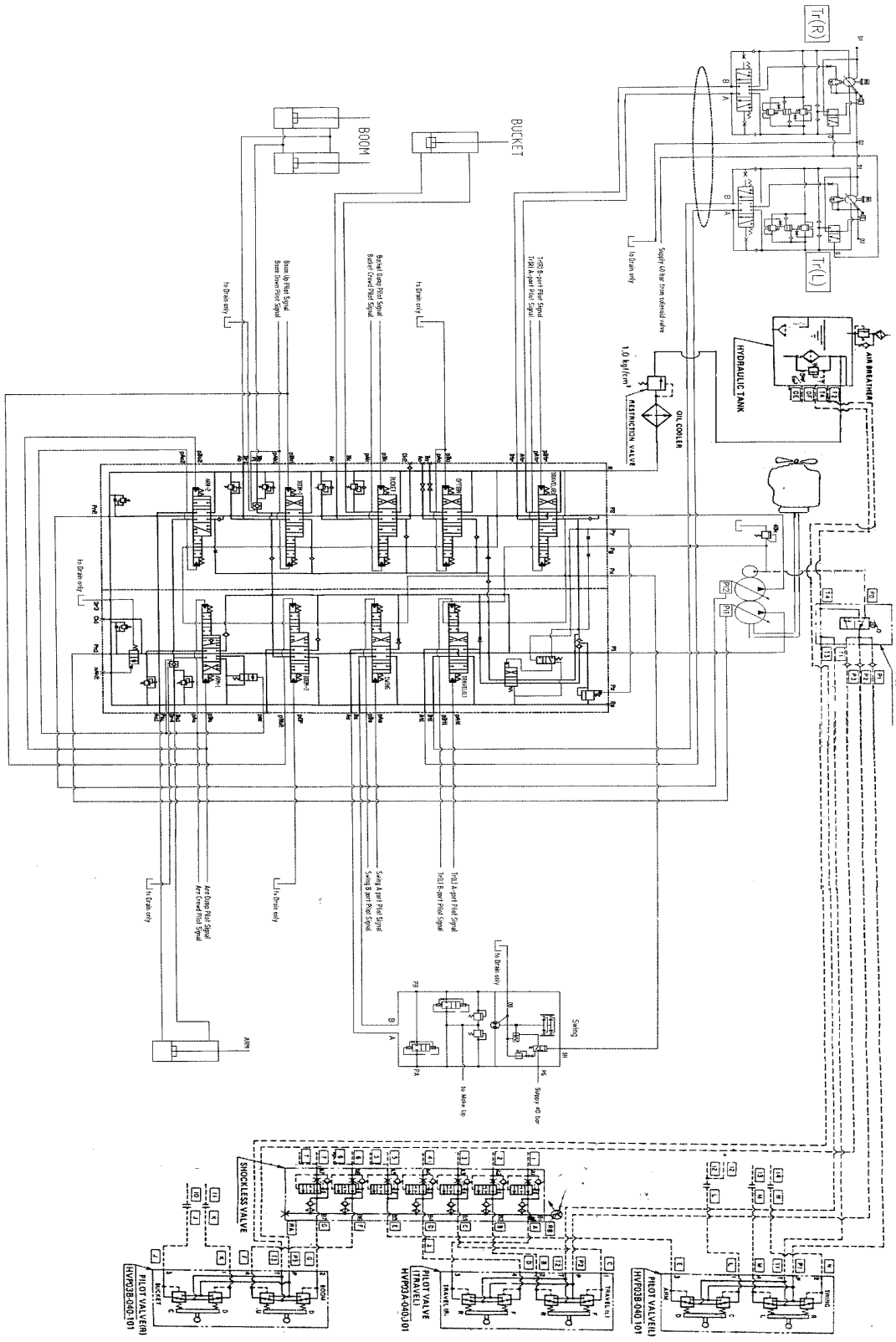
Trouble shooting:

Sl.No	Problem	Cause	Remedy
1	Pressure sensor not getting 'ON' (OR) Auto idling is no t achieved.	Fuse blown out due to short circuit.	Replace fuse link
		Check for Auto idle SW- Not Ok	Replace switch
		Open circuit	Check for continuity of wire
		Check Relay coil input volt at high idle for 24V- OK	Replace relay
		Test the sensor-Not OK To check sensor functionality-1	Replace sensor.
2	Frequent Fuse blowout	Supply wire grounded	Check for continuity for grounding
3	High rpm is reached but not Auto idling	Check for 24V supply at Pressure sensor input wire (Brown wire) on sensor cable to Gnd-Not OK.	Check for continuity of cable-Replace cable.
		Check for 24V supply at Pressure sensor signal wire (black wire) on sensor cable Gnd-OK	Check Diodes in Diode module-Ok Check relay-Ok Pressure sensor. Ok, then check control vale.
4	High rpm is not reached with Auto idling.	If not OK then check for positive of harness and GND for 24V-OK	Check for harness negative wire grounding.
		Solenoid is not actuated. 1) Check for 24V supply at solenoid harness end-OK, not Ok check step 3. 2) Check for solenoid resistance and continuity-OK 3) Check for Auto idle relay actuation after 4sec-Ok, Not ok, then. 4) Check sensor o/p wire for 24V-Ok, 5) Step 4 not Ok	Still No actuation, then change solenoid. Check Solenoid harness Change relay Change sensor.

ELECTRICAL CIRCUIT



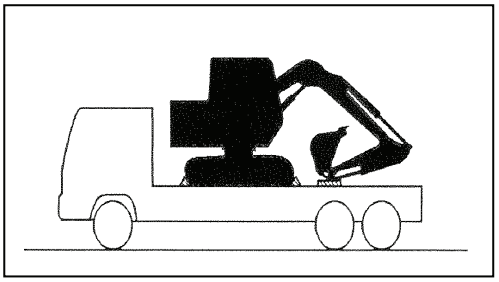
HYDRUALIC CIRCUIT



EX200 LCI HYDRAULIC CIRCUIT

TRANSPORTATION

TRANSPORTING BY ROAD



- When transporting the machine on public roads, be sure to first understanding and flow all local regulations.

1. For transporting using a truck, check the width, height length and weight of the truck 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.

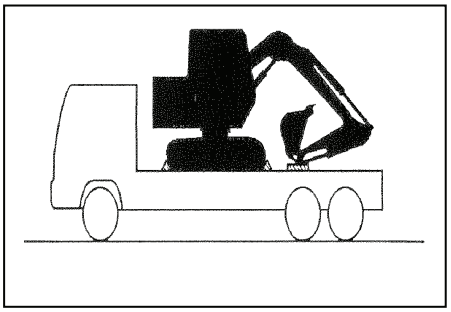
- In some cases, disassembling the machine to bring it within dimensional limits or weight limits as local regulations.

- Provide an appropriate trailer, referring to the dimensions of the machine in the transport position, as shown in the Specifications section.

TRANSPORTING THE MACHINE BY TRUCK

LOADING/UNLOADING ON A TRUCK

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 truck and truck 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 then 15 degrees.

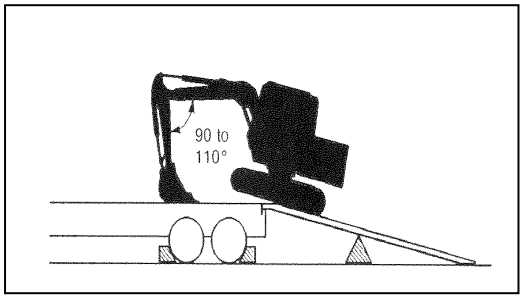
4. Loading docks must be sufficient in width and strength to support the machine and have a gradient of less then 15 degrees.

TRANSPORTATION

Loading/Unloading

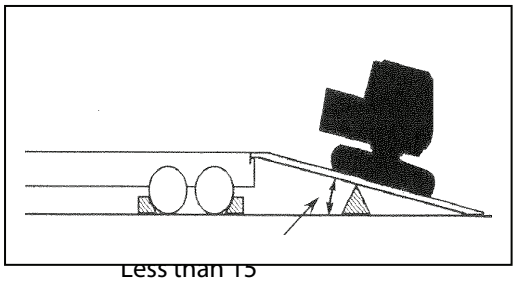
CAUTION:

- 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 dump. Take care when traveling over it.
- Prevent possible injury from machine tipping while the upper structure is rotating. Keep the arm tucked under and rotate the upper structure slowly for best stability.

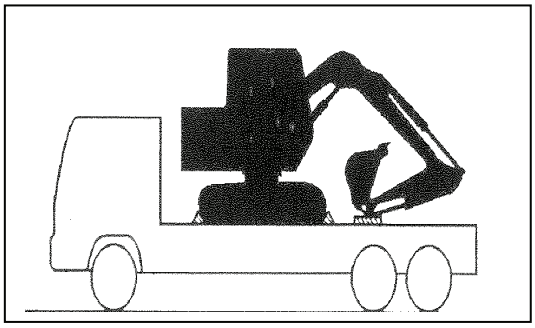


Loading :

1. The machine direction should be as follows:
   With the front attachment: Travel forward with the front attachment at the front.
   With the front attachment: Travel in reverse, as illustrated.
2. The centerline of the machine should be over the centerline of the truck.
3. Drive the machine onto the ramp slowly,
   With the front attachment:
   Position the bucket with its flat surface resting on the truck. Angle of the arm to boom should be 90 to 110^{0}.
   Rest the bucket on the truck just before the machine begins to tip forward onto the trailer.
   Slowly travel forward until the tracks are firmly on the truck.
   Slightly raise the bucket. Keeping the arm tucked under, slowly rotate the upper structure 180^{0}.
   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 whether, be sure to warm up the machine before loading or unloading it.



TRANSPORTATION

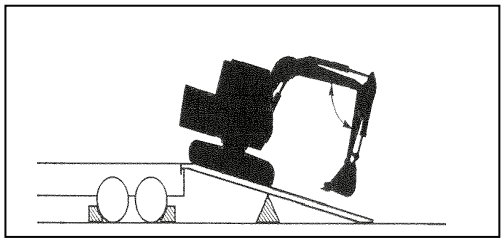
Transporting :

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

1. Wedge blocks in front of and behind the trucks.
2. Fasten each corner of the machine and front attachment to the truck with chain or cable.

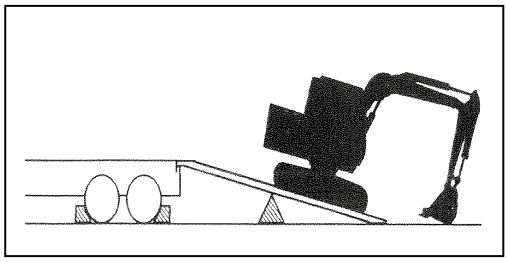
Unloading :

CAUTION: The rear end of the flatbed where it neets 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^{0} 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 truck 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^{0}.

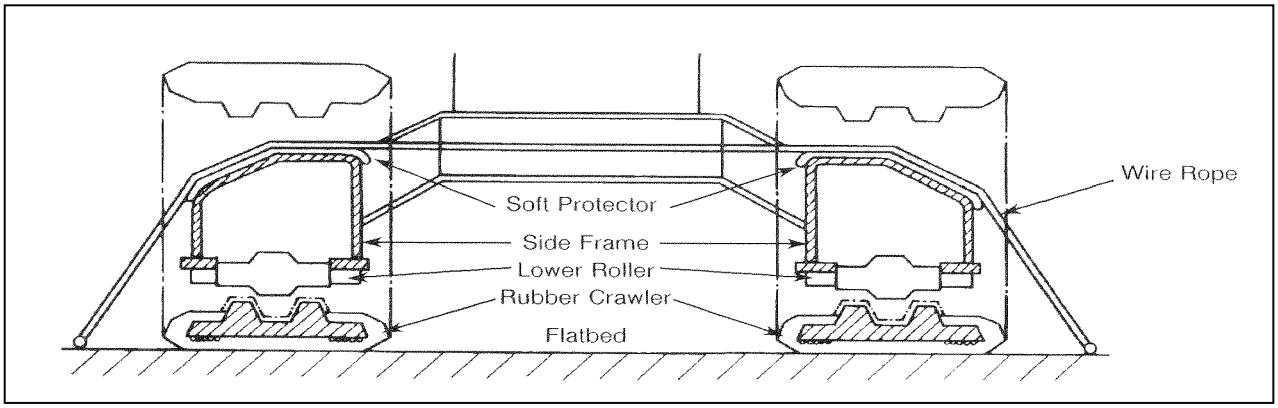


IMPORTANT: Prevent possible damage to the hydraulic cylinders. Do not allow the machine to hit ground hard with the bucket.

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.

PRECAUTIONS FOR TRANSOPRTING MACHINES WITH RUBBER CRAWLERS

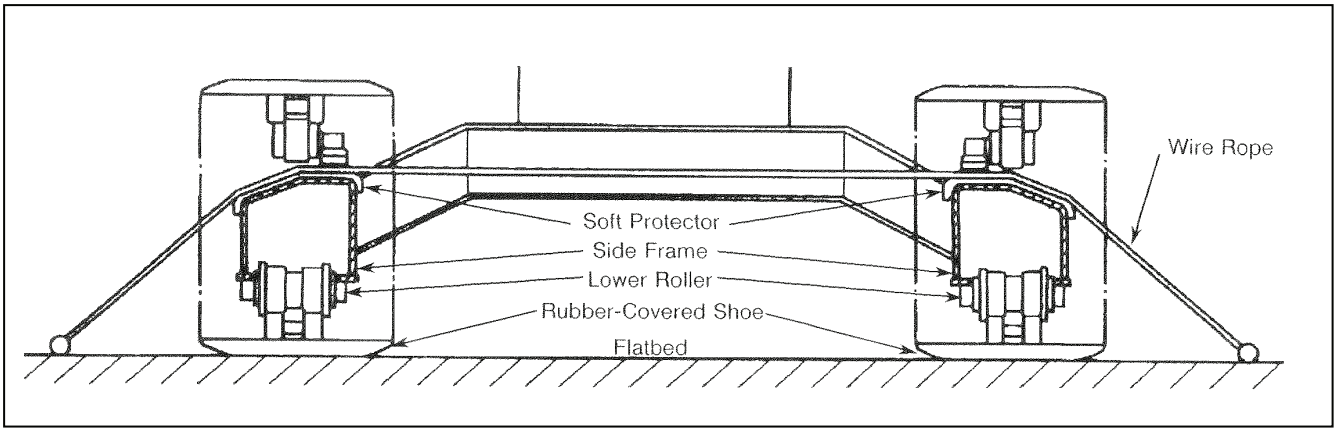
- When transporting a machine with rubber crawlers be sure to fasten the right and left track frames securely to the flatbed with wire ropes and soft protectors. As shown.



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

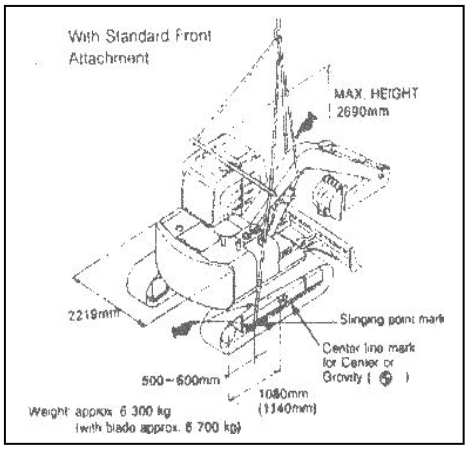
PRECAUTIONS FOR TRANSPORTING MACHINES WITH RUBBER-COVERED SHOES

- When transporting a machine with rubber covered 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..

- **LIFTING THE MACHINE WITH A CRANE**



AUTION:

(1) Do not allow anyone to ride on the machine while it is being lifted.

(2) Use wire ropes of sufficient strength to bear the weight of the machine.

- Lifting the Entire Machine with a Crane

Take care not to damage the machine when slinging.

- The examples of the machine centre of gravity and Slinging methods are illustrated.

MAINTENANCE

TELCON RECOMMENDED OILS AND LUBRICANTS

Recommended Oil Lubricants				Applicable Models		
Application	**Where to use**	**Change Interval**	**Telcon - Oil Grade**	**Excavator**	**Wheel Loader**	**Back hoe loader**
Hydraulic Oil	Hydraulic System & Steering System	4000Hrs	Ultra 46 U	√	√	X
		2500Hrs	Supreme 46 P	√	√	X
		1500 Hrs	Super 46 S	√	√	X
Hydraulic Oil	Hydraulic & Steering System, Transmission & Axle Oil	1000 Hrs	Univarsal 20 C	X	X	√
Engine Oil	FIP, Engine Crank Case,	250Hrs Initial 50 Hrs	Telcon 15W40 CH4 Engine Plus	√	X	X
Gear Oil	Travel Device/Gear	1000 Hrs Initial 250 Hrs	Telcon TG90 Gear Oil	X	√	√
Gear Oil	Front Idler, Swing device	250Hrs Initial 50 Hrs	Telcon TG90 Gear Oil	√	√	X
Grease	Swing Gear, Swing Bearing etc.	500Hrs	Heavy Dyuty - EP2 Grease	√	√	√
Coolant	Cooling water	Once in a Year	Super Cool	√	√	√

Note : Never Mix two different brands of oil.

MAINTENANCE

TELCON RECOMMENDED OILS AND LUBRICANTS

Product List of Telcon Lube Solution			
Sl. No	**Product**	**Pack Size**	**Part No.**
1	Tecon Ultra - 46U	210 Lts	TL01210
2	Tecon Ultra - 46U	20Lts	TL01220
3	Telcon Supreme -46P	210 Lts	TL02210
4	Telcon Supreme -46P	20 Lts	TL02020
5	Telcon Super - 46S	210 Lts	TL03210
6	Telcon Super - 46S	20 Lts	TL03020
7	Telcon Universal 20C	210 Lts	TL04210
8	Telcon Universal 20C	20 Lts	TL04020
9	Telcon Super Cool	210 Lts	TL05210
10	Telcon Super Cool	20 Lts	TL05010
11	Telcon Heavy Duty EP-2 Grease	180 Kg	TL06180
12	Telcon Heavy Duty EP-2 Grease	18 Kgs	TL06018
13	Telcon 15W40 CH4 Engine Plus	210 Lts	TL07210
14	Telcon 15W40 CH4 Engine Plus	20 Lts	TL07020
15	Tlecon 15w40 CH4 Engine Plus	10 Lts	TL07010
16	Telcon TG 90 Gear Oil	210 Lts	TL08210
17	Telcon TG 90 Gear Oil	10 Lts	TL08010

MAINTENANCE

MAINTENANCE SERVICES UNDER VARIOUS CONDITIONS

Conditions	Maintenance services
Operation in mud, water rain on snow	Before operation : Check plugs and cocks for tightness. After operation : Clean entire machinery and check for cracked, damaged, loosened or missing nuts and bolts. Lubricate each point.
Operation in Sea side	Before operation : Check plugs and cocks for tightness. After operation : Flush with fresh water any part in actual contact with salt water. Pay particular attention to electric parts and take necessary measures to protect them from the damages of salt.
Operation in dust and grit	Air Cleaner : Clean element more frequently than under usual conditions. Radiator : Flush with fresh water to remove dust and grit from the core Fuel system : Clean strainer and filter element more frequently than under usual conditions. Electric accessories : Clean starter and alternator's commutators.
Operation in rocky terrain	Tracks : Check for damage of tracks, rollers, idlers tumblers. Check for loosened, damaged or missing nuts and bolts Front-end attachment: When machine is to be operated under tough condition, use proper attachment or reinforce it as necessary.
Operation with danger of falling stones	Cab head guard : Use head guard
Operation in extreme cold	Lubricating oil : Refer to LUBRICATION CHART . Use cold weather type of good quality oil and grease. Cooling water : Use sufficient anti-freeze in radiator. Battery : Recharge more frequently than under normal conditions. Tracks : Remove accumulated mud.

MAINTENANCE

A. GREASING

Parts		No Of Parts (Qty)	Interval (Hours) 8	50	125	250	500	1000	1500	2500
1. Front Pins	Boom Foot Boom Cylinder Bucket	12								
	Others	7								
*Note- Need frequent greasing in muddy /water application										
2. Swing Bearing(Location of Grease fittings -on outer Race of swing bearing)		2								
3. Swing internal Gear(Greasing point is inside the Battery box)		(6.4 kg)								

B. ENGINE OIL

Parts		No. of Parts (Qty)	Interval (Hours) 8	50	125	250	500	1000	1500	2500
1. Engine Oil pan	Level check	1								
	Replacement System capacity	14.2 Liters 16.4 Liters		INITIAL						
*Note- Engine oil & filters should be replaced as per Cummin's maintenance schedule & replacement period is depending on Engine oil grade & quality of fuel used. You may extend up to 500 hours										
2. Engine Oil filter	Replacement	1		INITIAL						

C. GEAR OIL

Parts		No. of Parts (Qty)	Interval (Hours) 8	50	125	250	500	1000	1500	2500
2. Swing reduction device	Oil Level check	…….								
	Replacement	7.5 Ltr		INITIAL ONLY						
3. Propel reduction device	Oil Level check	……..								
	Replacement	5.5 Lit x 2				INITIAL ONLY		.		

D. HYDRAULIC SYSTEM

Parts	No. of Parts (Qty)	Interval (Hours) 8	50	125	250	500	1000	1500	2500
1. Hydraulic oil level check	1					☆			
2. Hydraulic oil tank draining	1								
3. Hydraulic oil replacement	220Ltr			☆					
4. Suction filter cleaning/replacement	1		When replacing hydraulic oil						
5. Full flow filter elements replacement	1		**						
6. Pilot filter element replacement	1		**						
Note: ** For Rock Breaker-5.Full flow filter & 6. Pilot filter replacement at 125 Hrs.3. Hydraulic Oil replacement at 500 Hrs.									

MAINTENANCE

E. FUEL SYSTEM Tank capacity 270 Ltr's

Parts	No Of Parts (Qty)	Interval (Hours)							
		8	50	125	250	500	1000	1500	
1. Fuel tank sediment draining	1								
2. Fuel filter sediment draining	1								
3. Fuel filter/ water separator replacement	1 each								
4. Feed pump inlet filter cleaning	1								
5. Fuel tank strainer cleaning	1								

P.S. For More details refer Cummins 6BT Engine Operation & Maintenance Manual.

F. AIR INTAKE

Parts		No. of Parts (Qty)	Interval (Hours)							
			8	50	125	250	500	1000	1500	
1. Air cleaner element (intake)	Cleaning	1	Check vacuum indicator, if it is showing Red mark, clean/ Replace the air cleaner element. Reset vacuum indicator							
	Replacement	1					500			
2.Inspection Of Air Intake hoses						250				
3.Replacement of Vacuum Indicator (Depending On it's working condition)									1500	

For more details refer Engine Operation & Maintenance Manual.

G. COOLING SYSTEM

Parts		No of Parts (Qty)	Interval (Hours)							
			8	50	125	250	500	1000	1500	
1. Level check		1	INITIAL ONLY							
2. Fan belt tension		1	INITIAL ONLY							
3. Coolant replacement		30 Lit								
4. Radiator core cleaning	Out side	1				250				
	In side	1							1500	
5. Radiator Hoses Replacement										

For details refer Cummins 6BT Engine Operation & Maint, Manual.

MAINTENANCE

H. ELECTRICAL SYSTEM

Parts	No. of Parts (Qty)	Interval (Hours)							
		8	50	125	250	500	1000	1500	
1. Battery fluid level	1								
2. Battery Specific gravity check	1								
3. Wire harness – Check	1								

I. OTHERS

Parts	No. of Parts (Qty)	Interval (Hours)							
		8	50	125	250	500	1000	1500	
1. Bucket teeth-loose, wear									
2. Track tension									
3. Bucket linkage clearance	1	When required							
4. Torque check			INITIAL ONLY						
5. Calibrate Fuel injection pump									
6. Engine valve clearance adjustment									

J.Additional maintenance Points

Hydraulic oil tank breather- Cleaning -Replacement	Every 1000 Hours Every 4000 Hours

MAINTENANCE

Torque Check- Every 250 hrs. (Initial 50 hrs.)

Retightening nuts and bolts

The correct torque is essential for the proper fit of assembled parts. The following nuts and bolts should be checked and retightened to the proper torque after the first 50 hrs, of operation, and then rechecked every 250 hrs. or 30 days. This illustration shows the points which require retightening. The tightening torque of each bolt is shown in this table.

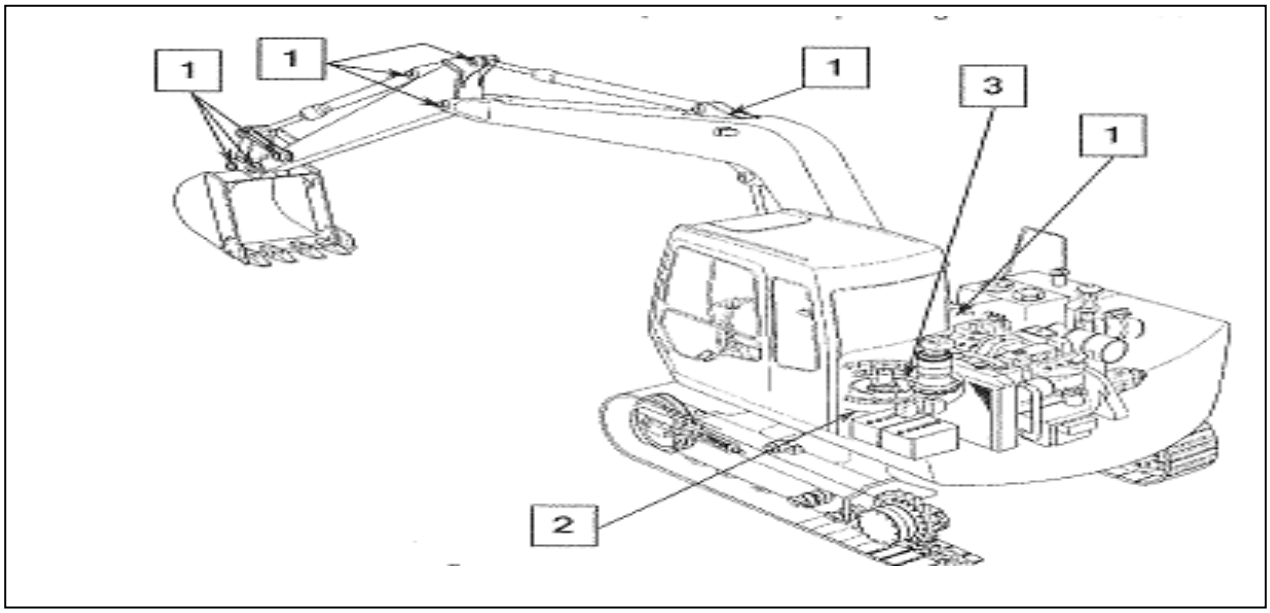
Note: The force of bolt tightening is expressed by torque. For example, the torque of turning the edge of a 1 m long wrench with the force of 12 N will be 1 m X 12 N = 12 N.m.

No	Item to be Retightened	Dia.mm	Q'ty	Tool mm	N.m (kgf.m)
1	Engine installation	16	4	24	206 (21)
2	Engine bracket Attaching bolts	10	8	17	49 (5)
3	Oil tank mounting bolts	16	4	24	206 (21)
4	Fuel tank mounting bolts	16	4	24	206 (21)
5	Hydraulic Hose union	1-3/16-12UNF 1-7/16-12UNF		36 41	177 (18) 206 (21)
6	Pump-mouting bolts	10	8	17	49 (5)
7	Control valve attaching bolts	16	4	24	206 (21)
8	Swing device attaching bolts	20	12	30	539 (55)
9	Swing Motor attaching bolts	18	12	27	294 (30)
10	Battery attaching bolts	10	2	17	49 (5)
11	Cab attaching bolts	16	4	24	206 (21)
12	Swing bearing attaching bolts (Track Frame) Swing bearing attaching bolts (Main Frame)	20 20	36 30	30 30	539 (55) 510 (52)
13	Propel device attaching bolts	20	28	30	539 (55)
14	Sprocket Attaching bolts	20	32	30	539 (55)
15	Carrier Roller Attaching bolts	16	16	24	206 (21)
16	Track Roller Attaching bolts	16	56 [64]	24	265 (27)
17	Shoe Bolts (TD00350/03	16	416	24	392 (40)
17	Shoe Bolts	18	384 [416]	27	637 (65)
18	Track guard attaching bolts	16	8	24	265 (27)

MAINTENANCE

A. GREASING

Parts		Quantity	Interval (hours)						
			8	50	125	250	500	1000	1500
1. Front Joint Pins	Boom Pivot Boom Cylinder Bucket and Link Pins	12	■						
	Others	7	■						
2. Swing Bearing		2					■		
3. Swing Internal Gear		1					■		

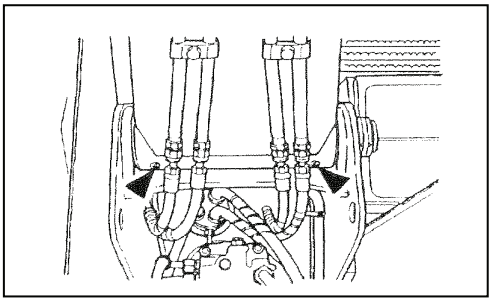


MAINTENANCE

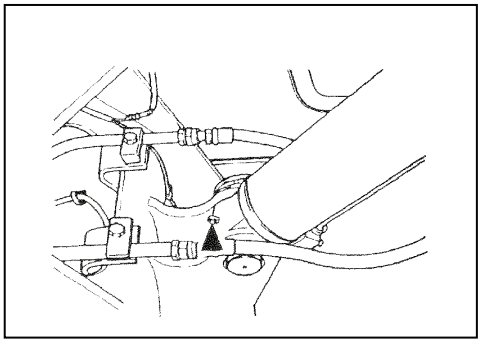
1 Front Joint Pins

(1) Boom Pivot Pin, Boom Cylinder Bottom End, Bucket and Link Pins
--- Every 8 hours

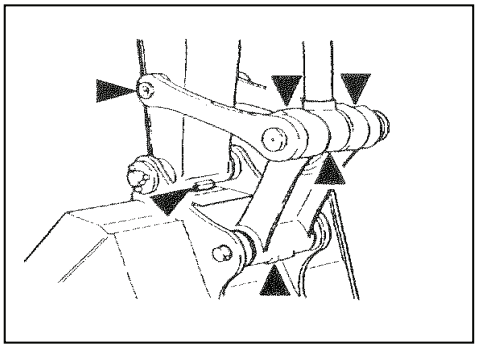
- **Boom Pivot**



- **Boom Cylinder Bottom End**



- **Bucket and Link Pins**

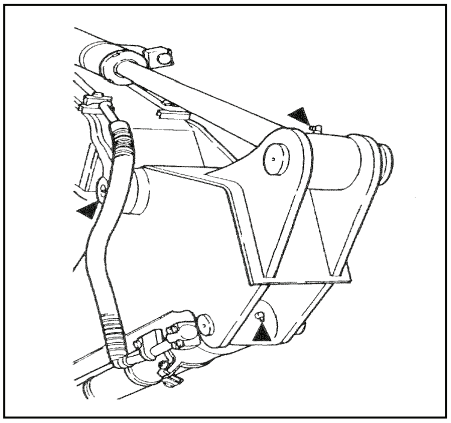


Note: Greasing is easier when the front attachment is in the transport position (the arm cylinder and bucket cylinder fully extended and the boom lowered to the ground).

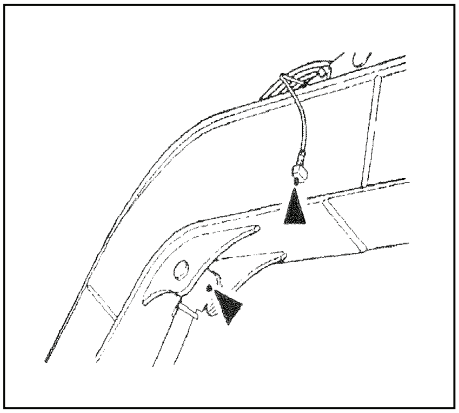
MAINTENANCE

(2) Other Pins --- Every 8 hours

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

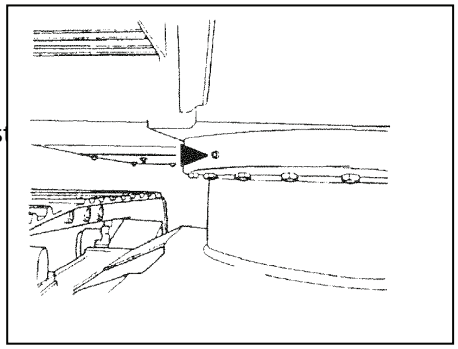


- Boom Cylinder Rod Pins and Arm Cylinder Bottom Pin.



MAINTENANCE

2 **Swing Bearing --- Every 500 hours**



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

Each time you leave the cab

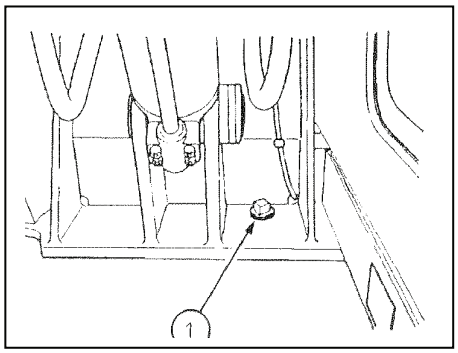
- Lower the bucket to the ground.
- Stop the engine.
- Pull the pilot control shut-off lever to the LOCK position.
- Use handralls.

1. Park the machine on level surface.
2. Lower the bucket to the ground.
3. Run the engine at slow idle speed without load for three minutes.
4. Turn the key switch OFF. Remove the key from the switch.
5. Pull the pilot control shut-off lever to the LOCK position.
6. With the upper structure stationary, apply grease to the two grease fittings.
7. Start the engine. Raise the bucket several inches off the ground and rotate the upper structure 45 (1/8 turn).
8. Lower the bucket to the ground.
9. Repeat the procedure three times, beginning with step-3.
10. Apply grease to the swing bearing until grease can be seen escaping from the swing bearing seals.
11. Total amount of grease to be applied is approximately 0.3 kg.
12. Take care not to supply excessive grease.

MAINTENANCE

3 Swing Internal Gear --- Every 500 hours

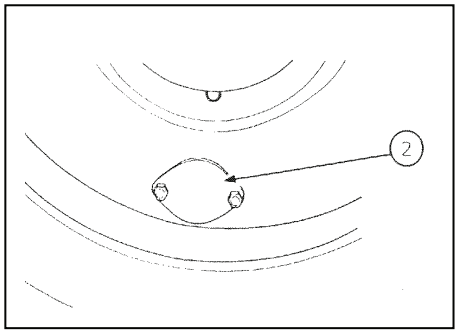
ΓΙΟΝ: Adding or changing swing Internal gear grease and rotating the upper structure must be done by one person. Before you start clear the area off all persons.



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 handralls.

1. Park the machine on level surface.
2. Lower the bucket to the ground.



4. Run the engine at slow idle speed without load for three minutes.
5. Turn the key switch OFF. Remove the key from the switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Open the tool box cover on the upper structure and remove cover 1.
8. Grease must be to the top of all internal gear teeth of the swing bearing and be free 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.

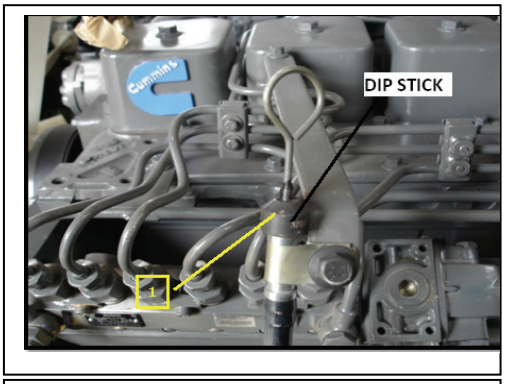
IMPORTANT: If water or mud is found in the swing gear area, see Operating water or mud in the "Operating the Machine" section.

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 6.5 kgs.

MAINTENANCE

B. ENGINE OIL										
Parts		No. of Parts (Qty)	Interval (Hours)							2500
			8	50	125	250	500	1000	1500	
1. Engine Oil pan	Level check	1								
	Replacement System capacity	14.2 Liters 16.4 Liters		INITIAL						
*Note- Engine oil & filters should be replaced as per Cummin's maintenance schedule & replacement period is depending on Engine oil grade & quality of fuel used. You may extend up to 500 hours										
2. Engine Oil filter	Replacement	1		INITIAL						

1 **Engine Oil Level --- at every 8 hours.**

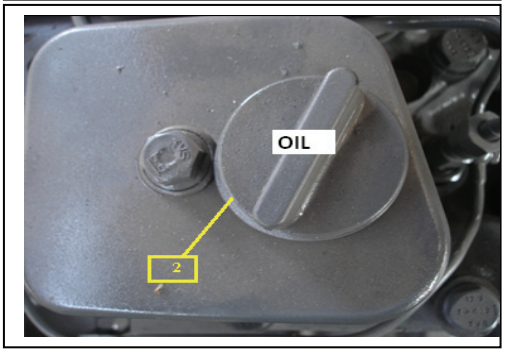


IMPORTANT: For most accurate readings, check the oil level every day before starting the machine. Be sure the machine is on a level surface.

1.Remove dipstick 1 . Wipe oil off with a clean Cloth. Reinsert dipstick 1 .

2. Remove dipstick 1 again. Read level. Oil level must be between the marks.

3. If necessary, add oil via oil filter Cap 2 Be sure to use only recommended oil .

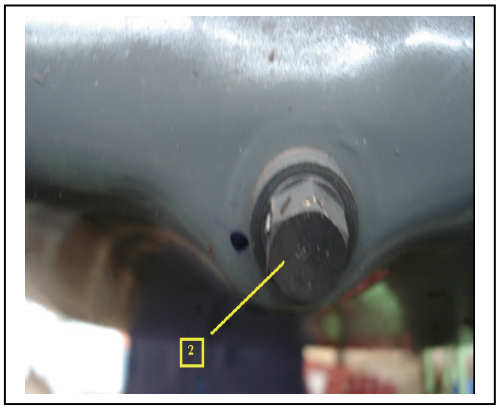


NOTE: Checking the oil level immediately after shut down will result in inaccurate readings. Be sure to allow the oil to settle for a least

10 minutes before checking.

2 **Change Engine Oil --- every 250 hours**

3 **Replace Engine Oil Filter --- every 250 hours.**



1.Run the engine to warm oil. DO NOT run the engine until oil is hot.

2 Park the machine on level surface.

3. Lower the bucket to the ground.

5. Run the engine at slow idle speed without load for three minutes.

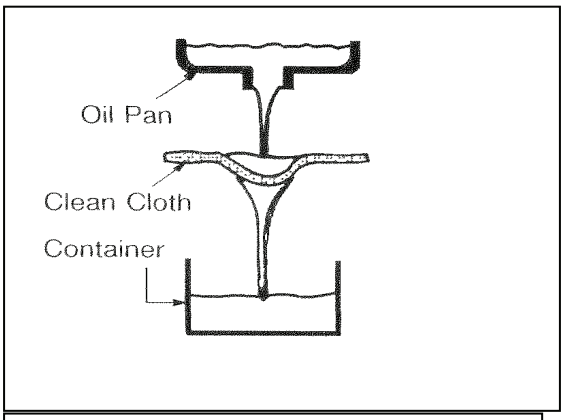
MAINTENANCE

6. Turn the key switch OFF. Remove the key from the switch.

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

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 50 liter container.



9. After 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 main filter 4 by turning it counterclockwise with filter wrench .

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

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

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

15.Tighten engine oil main filter 4 1/6 turn more using filter wrench .

16. Remove the oil filter 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 16.5 to 17liters.

17. Install the filler cap.

18. Start the engine. Push the slow idle (I) mode switch. Run the engine at slow idle for 15 minutes.

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

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

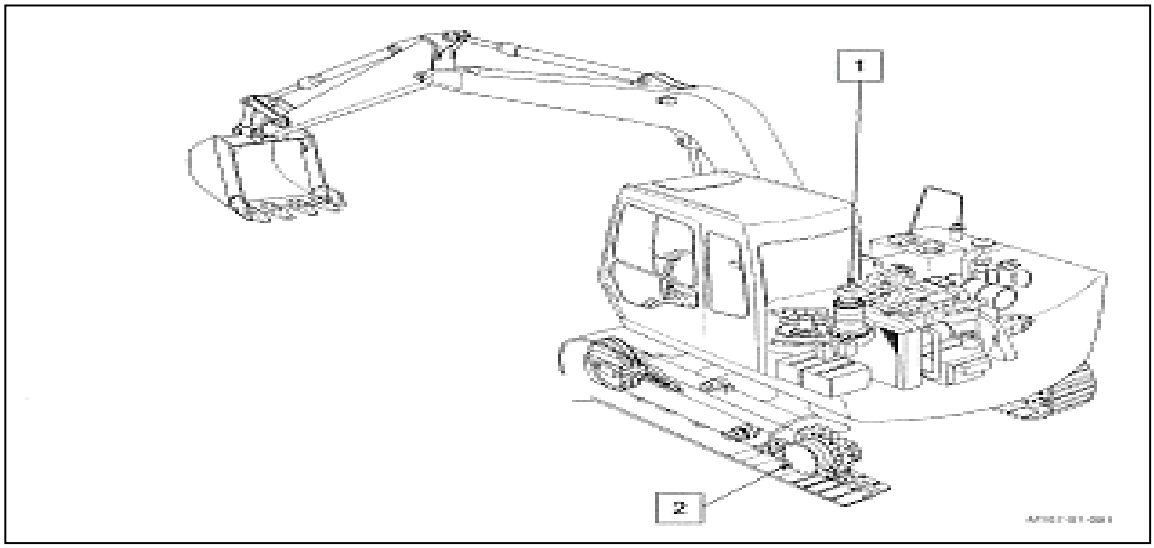
21 Check for any leakage at the drain plug.

22. Check oil level on the dipstick.

MAINTENANCE

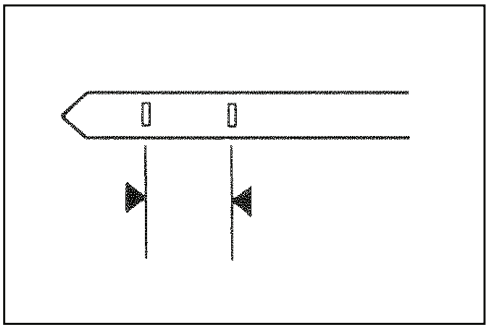
C. GEAR OIL

Parts		No. of Parts (Qty)	Interval (Hours)							2500
			8	50	125	250	500	1000	1500	
2. Swing reduction device	Oil Level check	…….								
	Replacement	7.5 Ltr		INITIAL ONLY						
3. Propel reduction device	Oil Level check	……..								
	Replacement	5.5 Lit x 2				INITIAL ONLY				



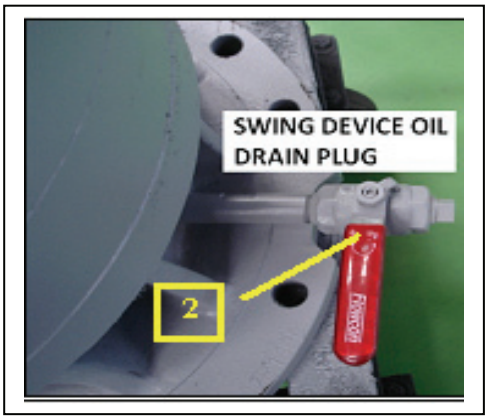
MAINTENANCE

1 Swing Reduction Gear



Check Oil Level --- every 50 hours.

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

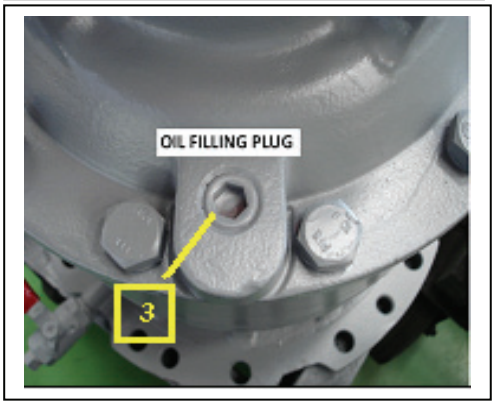


Change Gear Oil --- every 1000 hours

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

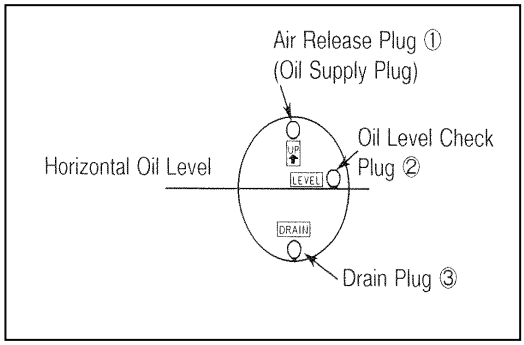
CAUTION: Gear oil may be hot. Wait for gear oil to cool before starting work.

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.



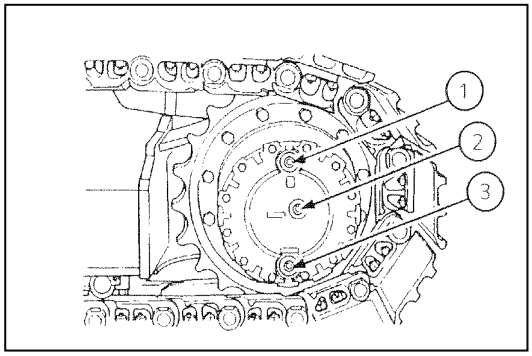
MAINTENANCE

2 **Travel Reduction Gear :**



Check Oil Level --- Every 250 hours.

1. Park the machine on 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.
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

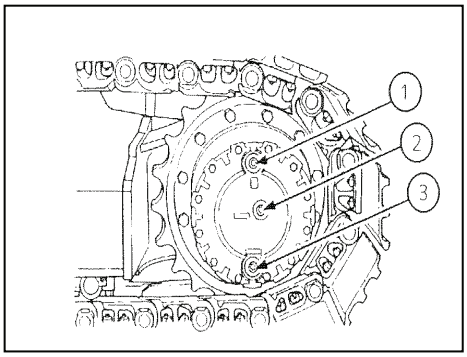


CAUTION: Keep body and face away from the air release plug. Gear oil is hot. Wait for gear oil to cool and then gradually loosen the air release plug to release pressure.

8. After gear oil has cooled, slowly loosen air release plug 1 to release pressure.
9. Remove 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.

MAINTENANCE

Change Gear Oil --- Every 1000 hours



1. Park the machine on 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.
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

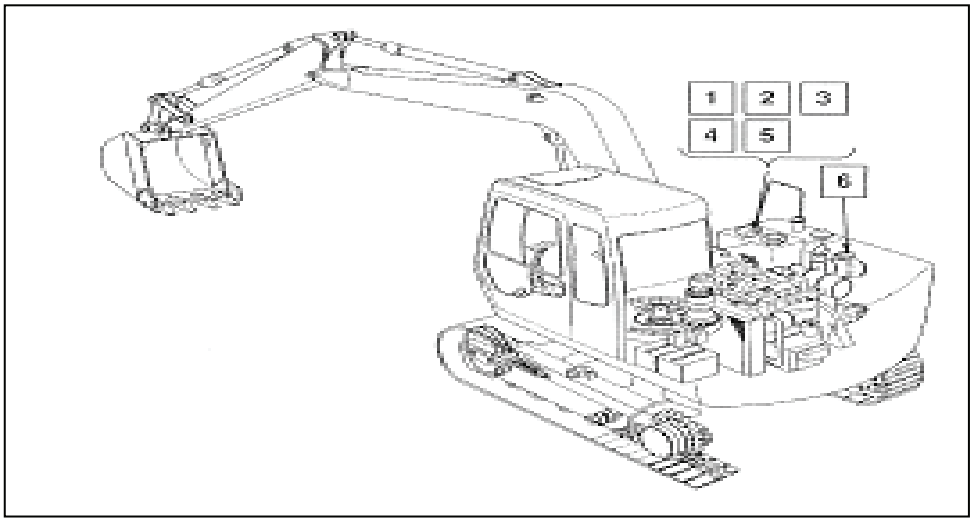
CAUTION: Keep body and face away from the air release plug. Gear oil is hot. Wait for gear oil to cool and then gradually loosen the air release plug to release pressure.

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.
14. Repeat steps 8 to 13 for the other travel reduction gear.

MAINTENANCE

D. HYDRAULIC SYSTEM									
Parts	No. of Parts (Qty)	Interval (Hours)							2500
		8	50	125	250	500	1000	1500	
1. Hydraulic oil level check	1					☆			
2. Hydraulic oil tank draining	1								
3. Hydraulic oil replacement	220Ltr			☆					
4. Suction filter cleaning/replacement	1		When replacing hydraulic oil						
5. Full flow filter elements replacement	1		**						
6. Pilot filter element replacement	1		**						
Note: ** For Rock Breaker-5.Full flow filter & 6. Pilot filter replacement at 125 Hrs.3. Hydraulic Oil replacement at 500 Hrs.									

☆ - For Rock Breaker – change at these intervals.



☆

CAUTION

When servicing a hydraulic equipment, draw your due attention especially to the following:

1. The work should be done on a flat place.

2. Place the bucket on ground and stop the engine.

3. Hydraulic oil and lubrication oil reach hig temperature and pressure after operation. Start therefore your servicing work only when the temperature goes down at each part. In the event that one woks under high temperature/pressure he may burn himself by equipment under high temperature/gushing oil or hurt himself by popped out plug or screw.

   Since there may remain some internal pressure even if the temperature lowers down, loosen, if required, the plug or screw gradually till the internal pressure disappears for avoiding any accident.

MAINTENANCE

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 befor 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 no 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)

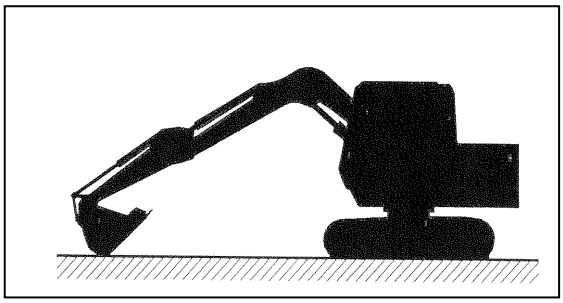
8. When adding hydraulic oil, always use the same brand of oil; do not mix brands of oil. As the machine is filled with daphne Super Hydro LW46 when it is shipped from the factory, use as a general rule. When selecting to use another brand of oil listed in the table "Brand names of recommended hydraulic 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.

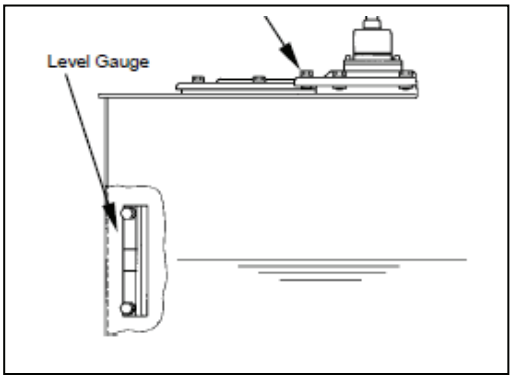
MAINTENANCE

1 **Check Hydraulic Oil Level ---- at every 8 hrs.**



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

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



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

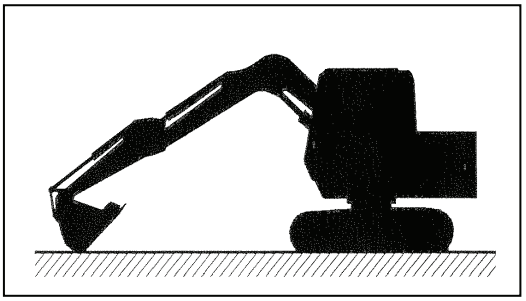
To add oil:

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

MAINTENANCE

2

Drain Hydraulic Tank Sump
---- Every 250 hours

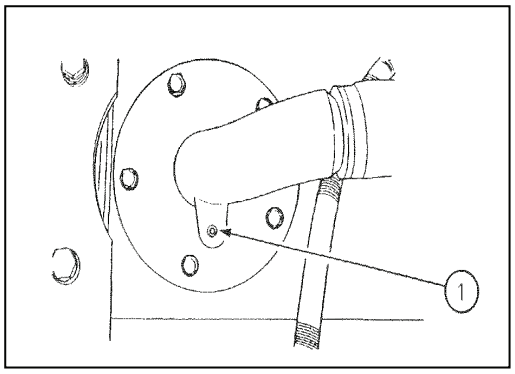


IMPORTANT: Never run the engine without oil in hydraulic oil tank.

1. Park the machine on a level surface with the upper structure rotated 90° for easier access.
2. Lower the bucket to the ground.
3. Run the engine at slow idle speed without load for three minutes.
4. Turn the key switch OFF. Remove the key from the switch.
5. Pull the pilot shut-off lever to the LOCK position.

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

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



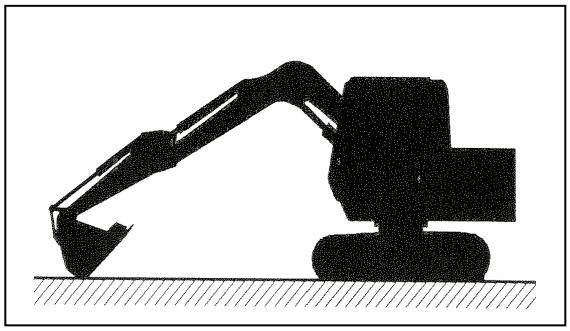
CAUTION: Do not loosen the drain plug until oil is cool. Hydraulic oil may hot, potentially causing serious injury.

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

MAINTENANCE

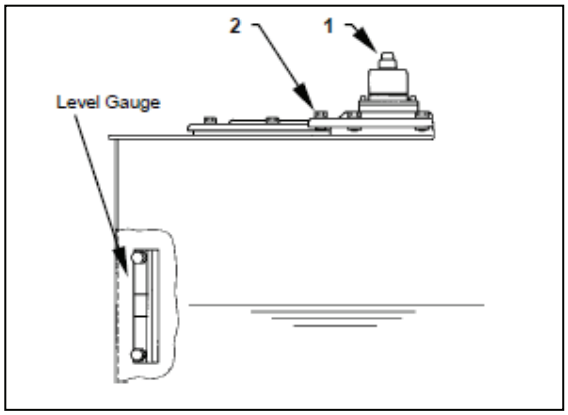
3 **Change Hydraulic Oil**
---- Every 2500 hours

4 **Clean Suction Filter**

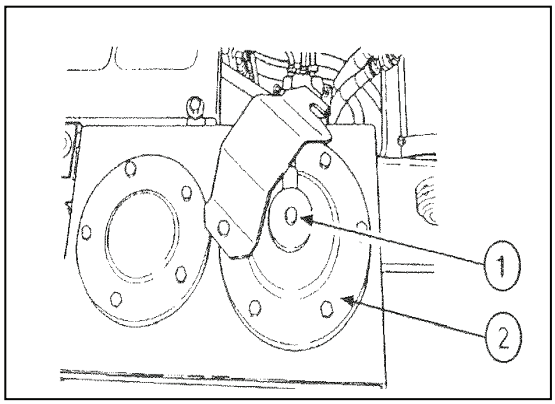


CAUTION: Hydraulic oil may be hot. Wait for oil to cool before starting work.

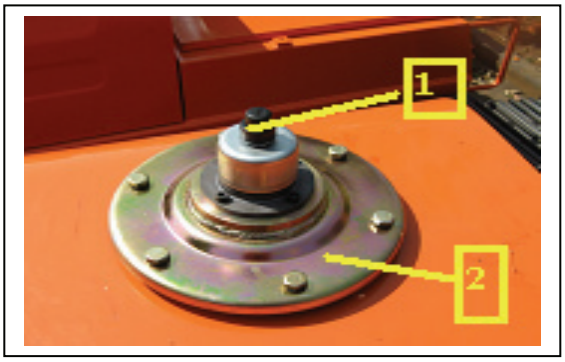
1. dPark the machine on a level surface with the upper structure rotated 90° for easier access.
2. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended.
3. Lower the bucket to the ground.
4. Run the engine at slow idle speed without load for three minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position
7. Clean the top of the hydraulic oil tank to keep dirt out of the hydraulic system.



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

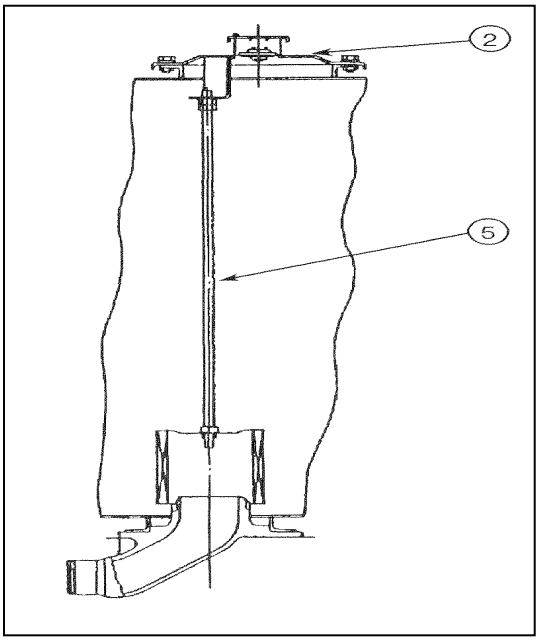


8. Push pressure release button 1 and remove the cap.
9. Remove cover 2.
10. Remove oil using a suction pump. The hydraulic oil tank capacity, up to specified oil level, is approximately 90 liters.
11. Remove drain plug 3. Allow oil to drain.



MAINTENANCE

12. Remove suction filter rod assembly 5.



13. Clean the filter and tank interior. If the filter is to be replaced. Install new filter on the rod as shown. Tighten nut to 14.7 to 19.6 N'm, (1.5 to 2.0 kgf'm, 10.8 to 14.5 lbf-ft).

14. Install suction filter and rod assembly 5 . Make sure the filter is positioned correctly on the out-let.

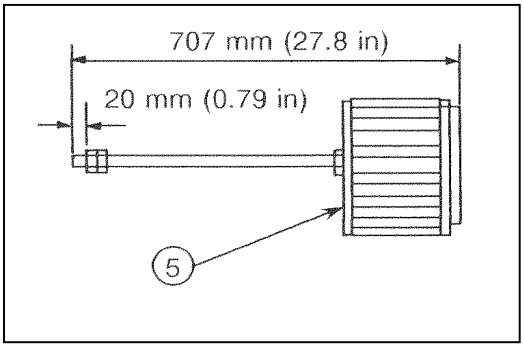
15. Replace the oil filter. (See " Maintenance Every 500 Hours" Section).
16. Clean, install and tighten drain plug 3.

17. 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).

18. 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.

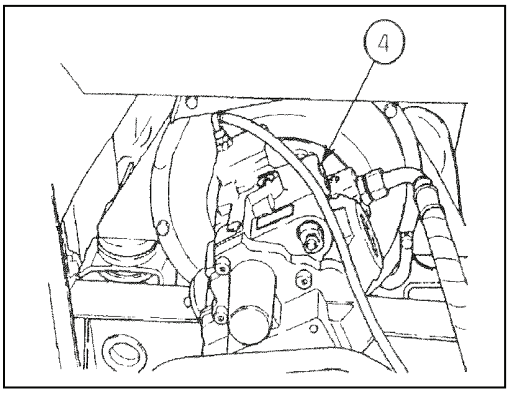
19. Remove air bleed plug 4 from the top of the pump.



20. Fill the pump with oil through plug 4 port.
21. Reinstall the plug.

22. 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.
23. Slowly loosen air bleed plug 4 to release trapped air. Retighten the plug when air stops and oil flows from the plug port.

24. Purge air from the hydraulic system by running the engine at slow idle and operating all control levers slowly and smoothly for 15 minutes.



25. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended.

26. Lower the bucket to the ground.

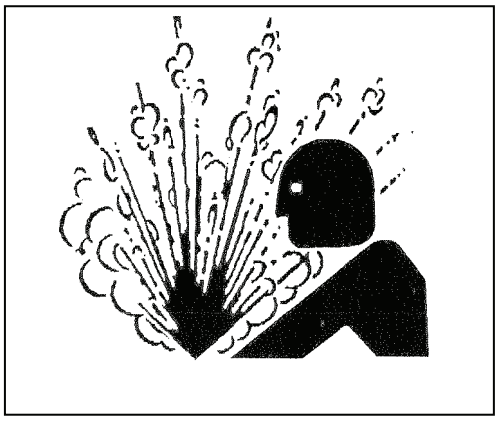
27. Turn the auto-idle switch off.

28. Stop the engine. Remove the key from the key switch.
29. Pull the pilot control shut-off lever to the LOCK position.

30. Check the hydraulic oil tank gauge. Add oil if necessary.

MAINTENANCE

5 **Replace Hydraulic Oil Filter**
---- Every 500 hours



1. Park the machine on level surface.

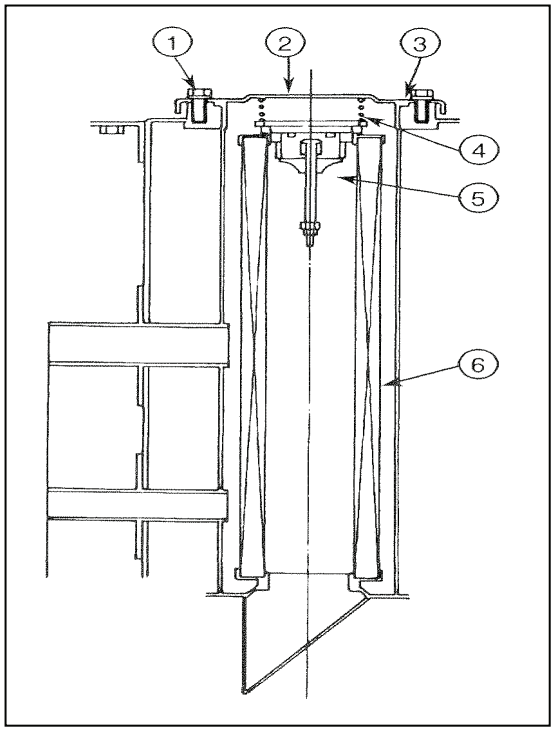
2. Lower the bucket to the ground.

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



7. Push the pressure release button on the hydrau lic oil tank to release pressure. Then remove the bolts.

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.

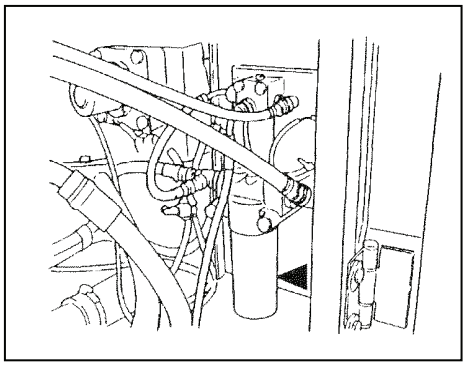
11. Install new element, valve and spring.

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).

MAINTENANCE

6 **Replace Pilot Oil Filter ---- Every 500 hours**



1. Park the machine on level surface.

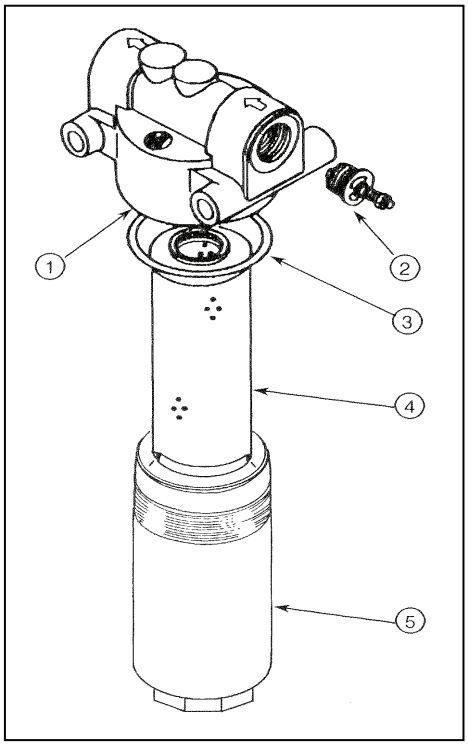
2. Lower the bucket to the ground.

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 element4.

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 the element by moving it back and forth while pushing it upward.

14. Clean filter case 5.

15. Install filter case 50onto filter head 1 by turning it clockwise. Tighten case 19.5 to 29.5 N'm. (2 to 3 kgf'm 14.5 to 21.5 lbf-ft).

MAINTENANCE

7 **Check Hoses and Lines**

---- at every 8 hrs

---- at every 250 hours

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury.
To avoid this hazard, search for leaks with a Place 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 surgl-cally removed within a few hours or gangrene may result.

CAUTION: Hydraulic oil and lubricant leaks can lead to fire that may result in serious in-jury.

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 hos-es, lines or hoses that rub against each other, damaged oil-cooler, and loose oil- cooler flange bolts, for leaks.

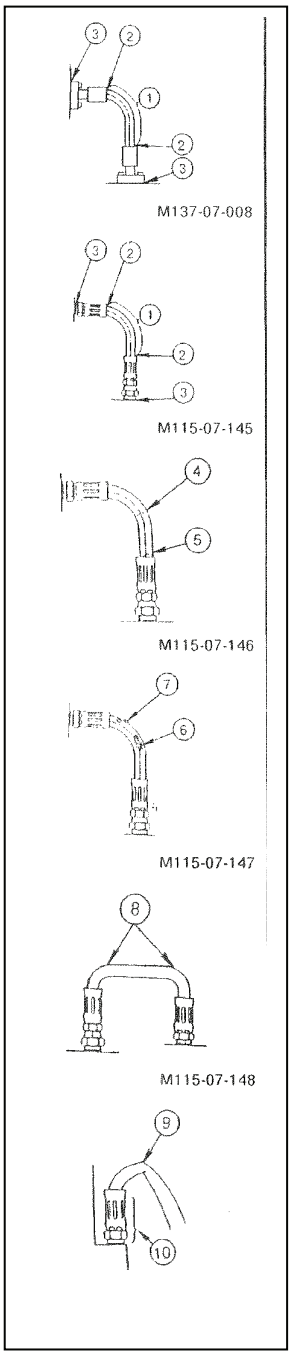
   Check hoses, lines and oil-cooler at the check points indicated below for leaks and other dam-age that may result in future leaks.
   If any abnormalities are found, replace or retight-en them, as shown in tables 1-3

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.

MAINTENANCE

Table 1. Hoses

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

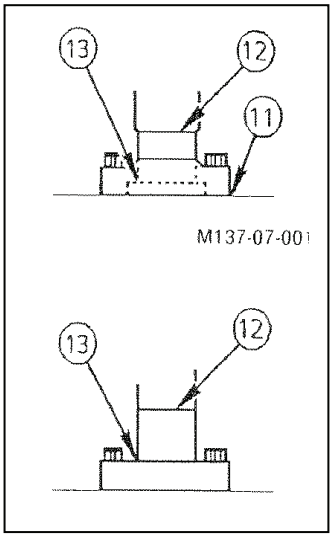


Note: Refer to the illustrations in fig. 1 for each check point location or for a description of the abnormality.

Use genuine TATA - Hitachi parts.

Table 2. Lines

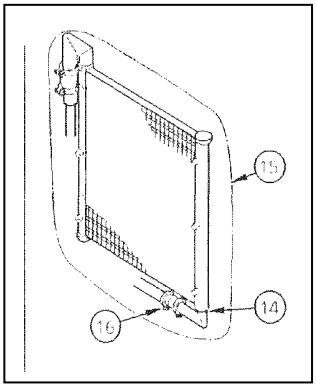
Interval (hours)	Check Points	Abnormalities	Remedies
Daily	Contact surface of flange joints	Leak 11	Replace O-ring and/or retighten bolts
	Welded surfaces on joints	Leak 12	Replace
Every 250 hours	Joint neck Welded surface On joints Clamps	Crack 13 Crack 12 Missing Deformation Loose	Replace Replace Replace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



Note: Refer to the illustrations in fig. 1 for each check point location or for a description of the abnormality.

Use genuine TATA - Hitachi parts.

Interval (hours)	Check Points	Abnormalities	Remedies
Every 250 hours	Contact surface 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

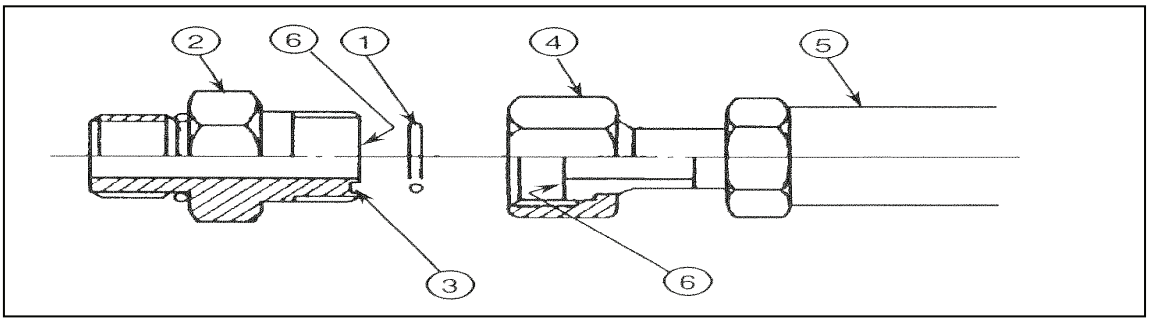


Note: Refer to the illustrations in fig. 2 for each check point location.

MAINTENANCE

SERVICE RECOMEMDATION FOR HYDRAULIC FITTINGS

Two hydraulic fitting designs are used on this machine.



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 valves shown. Do not allow hose 5 to twist when tightening fitting.

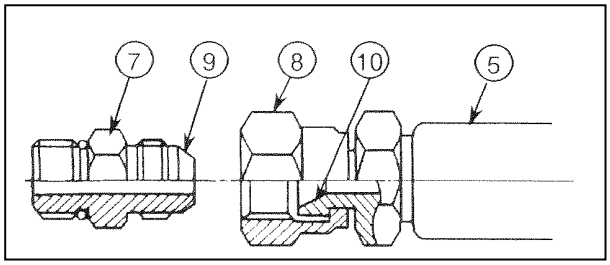
   f. Check for leaks. If oil leaks from a loose connection, do not tighten fitting 2. Open the connection, replace O-ring 1 and check for correct O-ring position before tightening the connection.

Torque specifications ± 10%

Width across flats (mm)		27	32	36	41, 46
Fastening torque	N-m	93	137	176	206
	Kgf-m	9.5	14	18	21
	Lbf-ft	69	101	130	152

MAINTENANCE

2. Metal Face Seal Fittings.
Fittings are used on smaller hoses and consists 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. Over tightening 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.

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

MAINTENANCE

E. FUEL SYSTEM	Tank capacity 270 Ltr's							
Parts	No Of Parts (Qty)	Interval (Hours)						
		8	50	125	250	500	1000	1500
1. Fuel tank sediment draining	1							
2. Fuel filter sediment draining	1							
3. Fuel filter/ water separator replacement	1 each							
4. Feed pump inlet filter cleaning	1							
5. Fuel tank strainer cleaning	1							

P.S. For More details refer Cummins 6BT Engine Operation & Maintenance Manual.

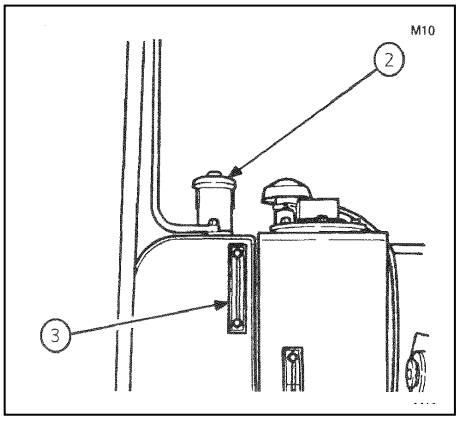
Recommended Fuel

Use high quality DIESEL FUEL only (IS-1460: 1974)
Kerosene must NOT be used.

- **Refueling**

1. Park the machine on level surface.
2. Lower the bucket to the ground.
3. Run the engine at slow idle speed without load for three minutes.
4. Stop the engine. Remove the key from the key switch.
5. Pull the pilot control shut-off lever to the LOCK position

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



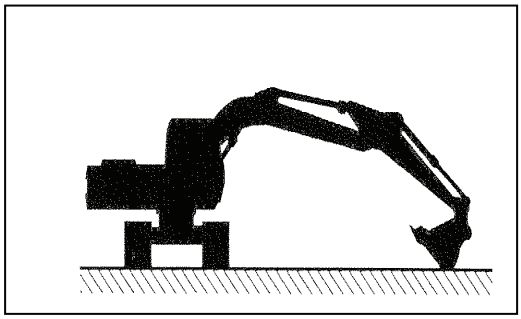
6. Check fuel level gauge or fuel gauge of the Gauge panel. Add fuel if necessary.

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

7. 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 270 liters.
8. Install and lock fill cap immediately after fueling.

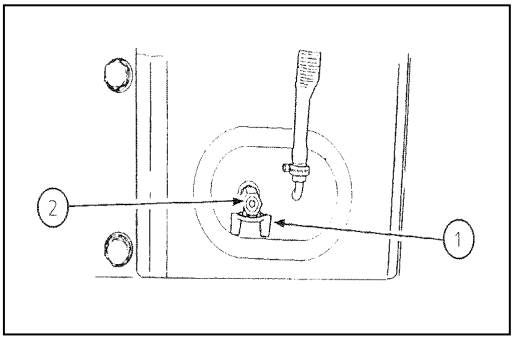
MAINTENANCE

1 **Drain Fuel Tank Sump --- at every 8 hrs.**



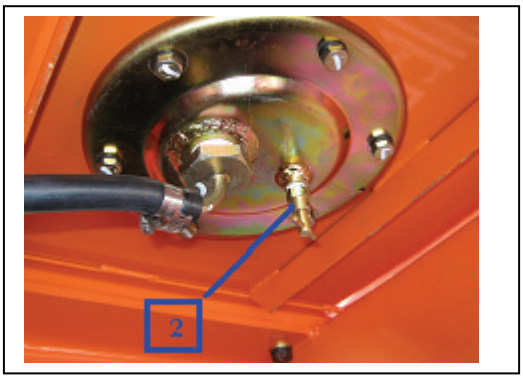
1. Park the machine on a level surface with the upper structure rotated 900 for easier access.
2. Lower the bucket to the ground.

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 switch.
6. Pull the pilot control shut-off lever to the LOCK position.

7.Loosen the fuel drain cock (2) to drain the sediments.



MAINTENANCE

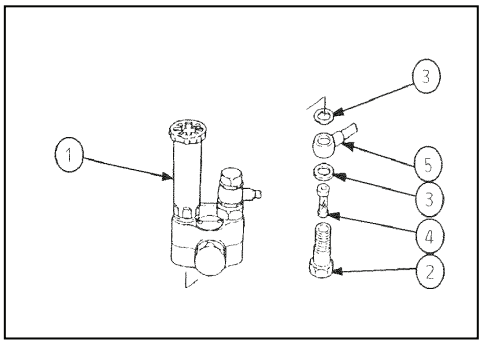
2 **Replace Fuel Filter**

--- Every 250 hours

1. For safety and 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 take. Dispose of waste fuel properly.
2. Remove cartridge filter 1using filter wrench
3. Apply a thin film of clean fuel to the gasket of new cartridge filter 1.
4. Tighten the filter by hand until the gasket makes contact with sealing surface.
5. Using filter wrench , tighten cartridge filter 1 about 2/3 turn more. Do not tighten cartridge filter .
6. After replacing the filter, bleed air from the fuel system.

MAINTENANCE

3 **Clean Feed Pump Strainer**
---- Every 125 hours



1. Remove the feed pump inlet hose joint bolt, located at the feed pump.

2. Remove strainer 4 from joint bolt 2 using a screw driver.

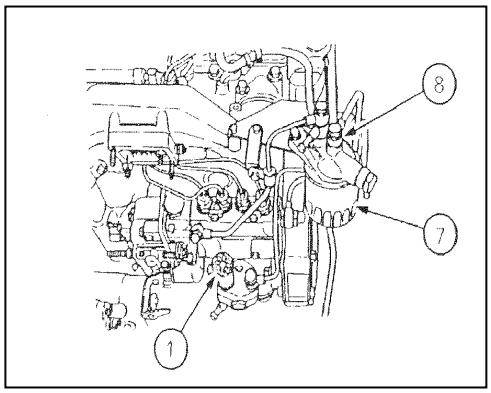
3. Clean strainer 4 using diesel fuel.

4. Install and tighten strainer 3 in joint bolt 2.

5. Install and tighten joint bolt 2. Then, bleed air from the fuel system.

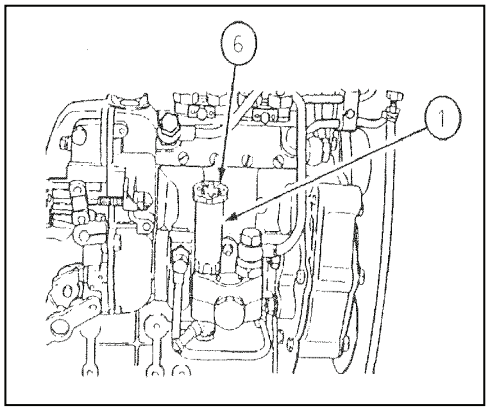
- **Bleed Air from Fuel System**

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 water, cleaning the feed pump strainer or running the fuel tank dry, be sure to bleed the air from the fuel system.



1. Turn knob 6 of feed pump 1 counterclockwise to loosen; The knob will rise automatically. Pump knob 6 to sen the fuel into fuel filter 7.

2. Keep pumping knob 6 until air sound cannot be heard from overflow valve 8 of fuel filter 7, and resistance of feed pump 1 becomes strong. Bleeding is completed.



3. Turn knob 6 clockwise to tighten and wipe up **l**eaked fuel from fuel-pump.

4. Start the engine and turn at slow idle.

5. Put a “Do Not Operate” tag on right control lever.

6. Pull the pilot shut-off lever into lock position.

7. Inspect fuel system for leaks.

MAINTENANCE

4 **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.

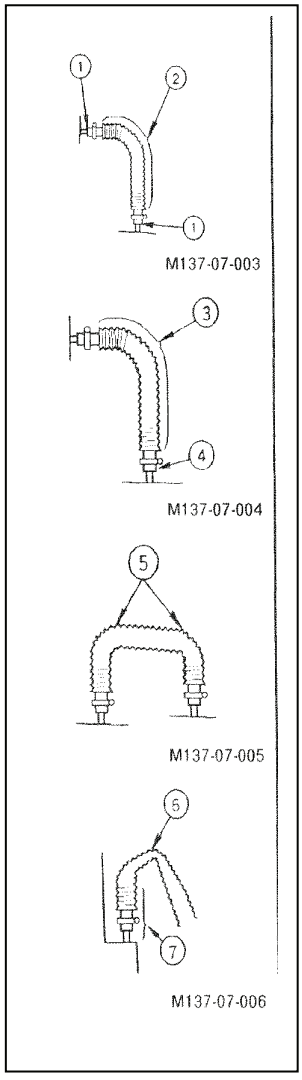
   Check hoses at the check points indicated below for leaks and other damages that may result in future leaks. If any abnormalities are found, replace or retighten them, as shown in Table -4.

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

Note : Use Genuine TATA – HITACHI hoses.

Table 4. Hoses

Interval (hours)	Check Points	Abnormalities	Remedies
Daily	Hose ends Soutache braid Hose	Leak 1 Frication 2 Crack 2	Retighten or Replace Replace Replace
Every 250 hours		Crack 3 Crack 4 Bend 5 Collapse 6 Deformation or	Replace Replace Replace Replace (Use proper bend radius) Replace



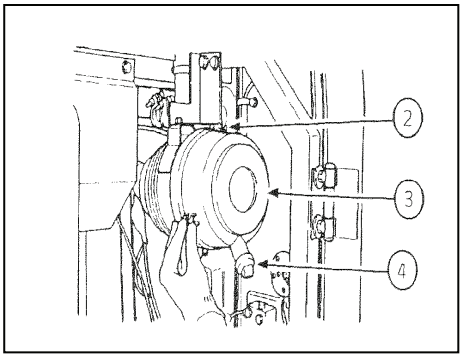
MAINTENANCE

Clean the Air Cleaner Element - outer
---- Every 8 hours or when the restriction indicator comes ON.

Parts		No. of Parts (Qty)	Interval (Hours)							
			8	50	125	250	500	1000	1500	
1. Air cleaner element - Primary	Cleaning	1	Check vacuum indicator, if it is showing Red mark, clean/ Replace the air cleaner element. Reset vacuum indicator							
	Replacement	1					500			
2.Air Filter – Safety (Secondary)	Replacement		After cleaning Outer 6 Times- Replace Outer and Inner Element.							
3.Inspection Of Air Intake hoses						250				
4.Replacement of Vacuum Indicator (Depending On it's working condition)									1500	

- **Replace the Air Cleaner Elements**

--- As Required



1**.**Park the machine on level surface.

2.Lower the bucket to the ground.

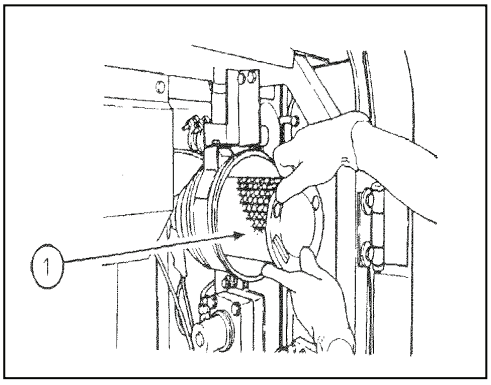
4.Run the engine at slow idle speed without load for three minutes.

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 clamps 2 to remove cover 3

8. Remove-elements 1.



9. Tap element 1 with the palm of your hand and clean with Air with the pr .upto 4 bar max., Not ON A HARD SURFACE.

CAUTION : Use reduced compressed air pres- Clear area of bystanders, guard againstflying cnips, and wear personal protection equipment including goggles or safety glasses.

10. Install element 1.

11. Install cover and tighten clamps 2. Check the valve 4 position.

12. Start the engine and run at slow idle.

MAINTENANCE

G. Coolant System:

Parts		No of Parts (Qty)	Interval (Hours)							
			8	50	125	250	500	1000	1500	
1. Level check		1	INITIAL ONLY							
2. Fan belt tension		1	INITIAL ONLY							
3. Coolant replacement		30 Lit								
4. Radiator core cleaning	Out side	1				250				
	In side	1							1500	
5. Radiator Hoses Replacement									1500	

For details refer Cummins 6BT Engine OperatioMaint, Manual

1.Coolant:
Fill the radiator with soft, pure tap or bottled water.

2. Anti-rust agent:Add approximately 0.2 L of anti-rust agent to the new coolant when the coolant is changed.It is not necessary to add anti-rust agent when antifreeze is used.

3. Antifreeze:
If the air temperature is expected to fall below 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% th engine may overheat.

Antifreeze Mixing Table

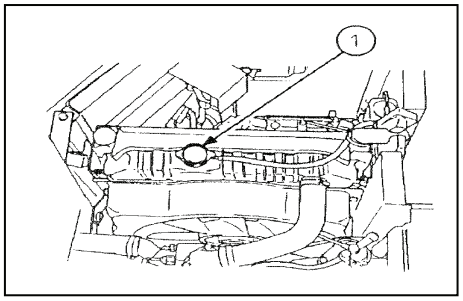
Air temperature		Mixing Ratio	Refill capacities			
			Antifreezes (antifreeze or long-life coolant)		Soft water	
^{0}C	^{0}F	%	Liter	US gal	Liter	US gal
-1	30	30	3.0	0.79	7.0	1.85
-4	25	30	3.0	0.79	7.0	1.85
-7	19	30	3.0	0.79	7.0	1.85
-11	12	30	3.0	0.79	7.0	1.85
-15	5	35	3.5	0.92	6.5	1.71
-20	-4	40	4.0	1.06	6.0	1.59
-25	-13	45	4.5	1.19	5.5	1.45
-30	-22	50	5.0	1.32	5.0	1.32

CAUTION :
1. Antifreeze is poisonous , If ligested, 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 reach of children.
3.When storing or disposing of antifreeze, be sure to comply with all legal regulations.

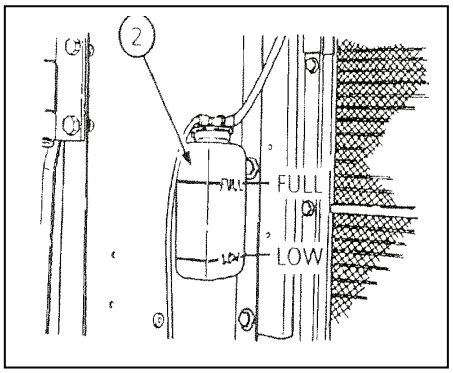
MAINTENANCE

1 **Check Coolant Level --- Daily**

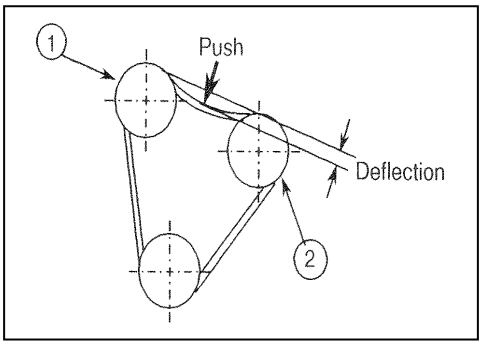


CAUTION: DO not loosen radiator filler cap 1 unless the system is cool. Loosen the cap slowly to the stop. Release all pressure before removing the cap.

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

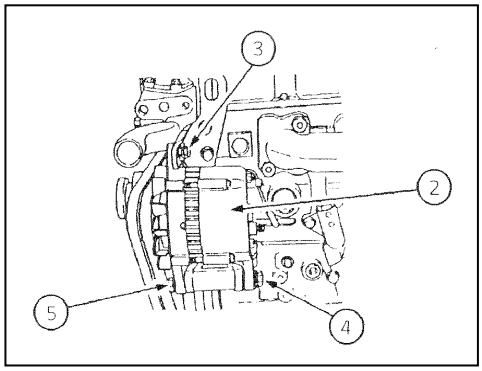


2 **Check and Adjust Fan Belt Tension**
---- Every 8 hours



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

Visually check the belt for wear. Replace if neces-sary. Check the fan belt tension by depressing the mid-point between fan 1 and alternator 2 pulley with the thumb. Deflection must be 10 to 15 mm (0.35 to 0.47 in) at a depressing force of approximately 98 N (10 kgf, 22 lbf).



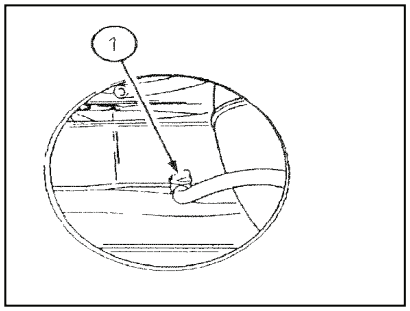
If tension is not within specifications, loosen the bolts 3 and 4 for the adjusting plate and alternator brack-et. Move the alternator 2 until tesion is correct. Tighten the adjusting plate and bracket bolts.

NOTE: when a new belt is installed, be sure to re-adjust 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.

MAINTENANCE

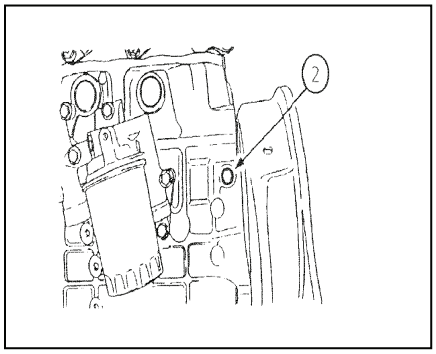
3 **Change Coolant**
------ Twice a year (in spring and autumn)

5 **Clean Radiator interior**
---- when changing coolant



NOTE: Before leaving the TELCON Factory, the cooling system is filled with a mixture of water and TELCON Genuine Long-Life Coolant. As long as Hitachi Genuine Long-Life coolant is used, the service intervals between changing the coolant is once every.

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



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 while zone, run the engine for about ten more minutes.

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

4. Close 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 sereral minutes. Check the coolant level again, and add coolant if necessary.

MAINTENANCE

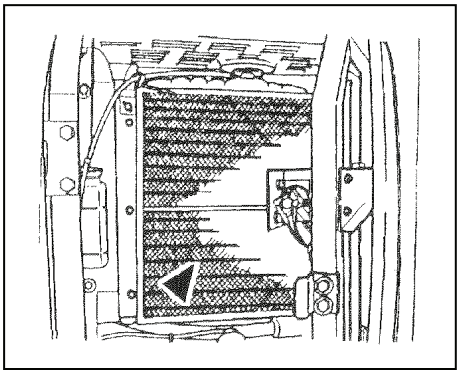
4 **Clean Radiator Core ---- Every 500 hours**

CAUTION: Use reduced compressed air pressure for cleaning purposes. Clean 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 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.



MAINTENANCE

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.

Surfuric acid in battery electrolyte is polsonous. 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 breather 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 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:

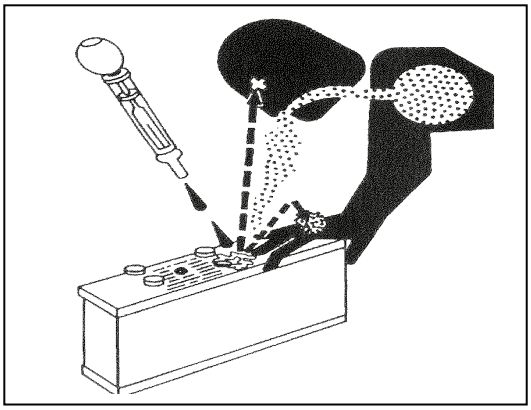
1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.

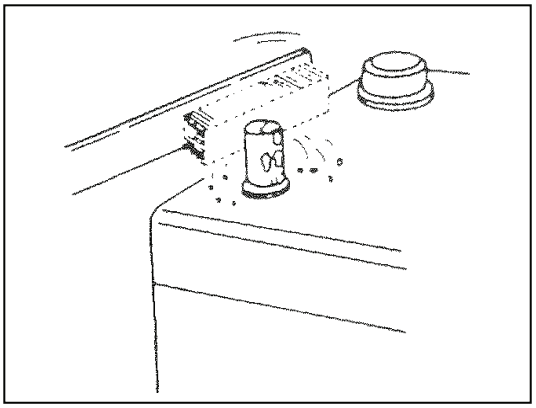
IMPORTANT: Add water to batteries in freezing weather before you begin operating your machine for the day, or else charge the batteries.

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.





MAINTENANCE

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.

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

Never check 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. gloves.
3. Avoiding breather 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 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.

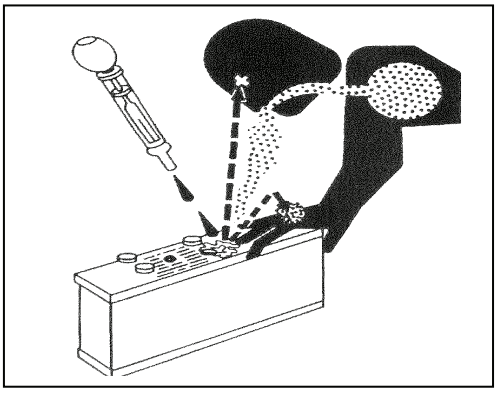
2. Wearing eye protection and rubber

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

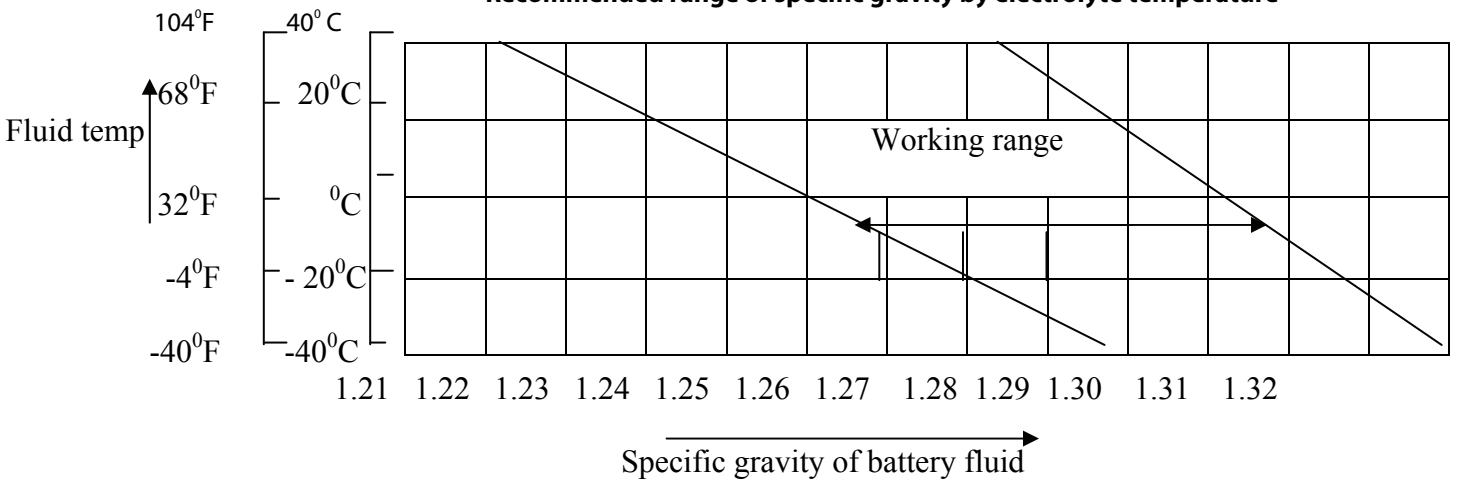
IMPORTANT: Check the specific gravity of electrolyte after it is cooled to air temperature, not immediately after operation.

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.



Recommended range of specific gravity by electrolyte temperature



MAINTENANCE

- **REPLACE BATTERY**

Your machine has one 24 volt battery with negative (-) ground.If the battery in a 24-volt system has failed , replace the failed battery with one Of the same type.
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 battery is disconnected, engine speeds must be recalibrated.

  1.Turn the key switch to the ON position.

  2. Operate the Engine Acc . lever and confirm the engine speeds.

  3. Turn the key switch OFF.

  The machine can now be started and operated as usual.

MAINTENANCE

- **REPLACING FUSES**

If any electrical equipment fails to operate, first check the fuses. Fuse box is located behind the operator's seat. A fuse location / specification decal is attached to the fuse box cover by sticker.

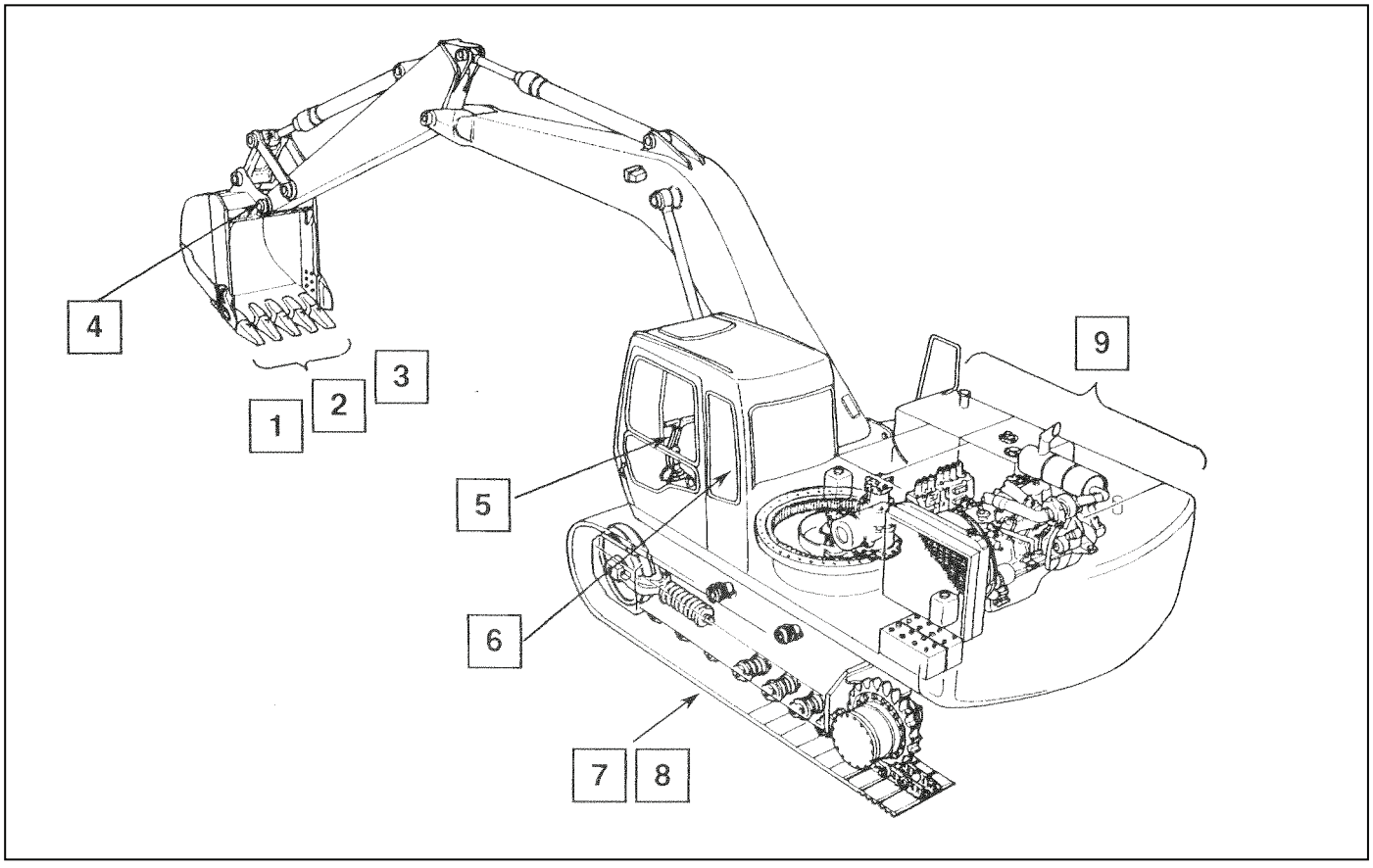
Remove the fuse box cover. Spare fuses are provided inside.

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

- **FUSE BOX – At Rear Side of the Operator's seat .**

MAINTENANCE

I. OTHERS									
Parts	No. of Parts (Qty)	Interval (Hours)							
		8	50	125	250	500	1000	1500	
1. Bucket teeth-loose, wear									
2. Track tension									
3. Bucket linkage clearance	1	When required							
4. Torque check			INITIAL ONLY						
5. Calibrate Fuel injection pump									
6. Engine valve clearance adjustment									

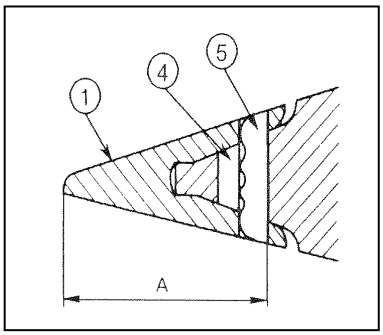


MAINTENANCE

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.

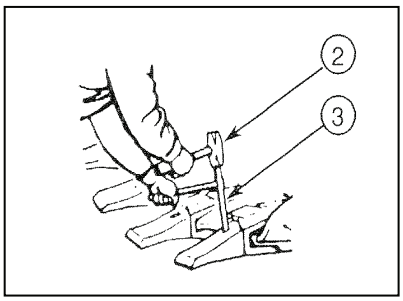


Dimension A in mm (in)

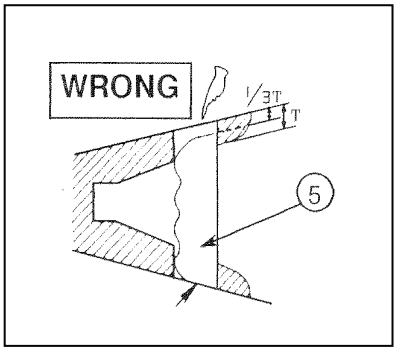
EX -200	Std Dimensions	Recommended Service Limit	Service Limit
GP Bkt	200 mm	115 mm	95 mm
HD Bkt	202 mm	117 mm	97 mm

2. Replacing procedure

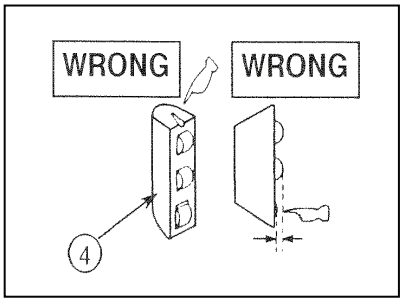
   CAUTION: Guard against injury from flying Pieces of metal, Wear goggles or safety glasses



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



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 pins.

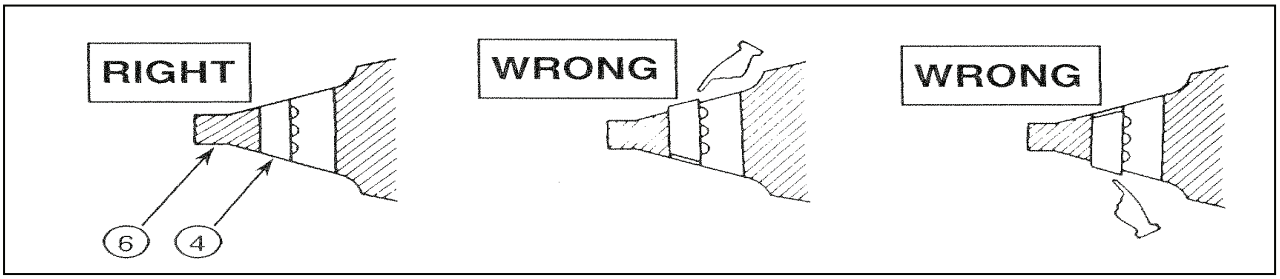


c. Clean shank 6 surface.

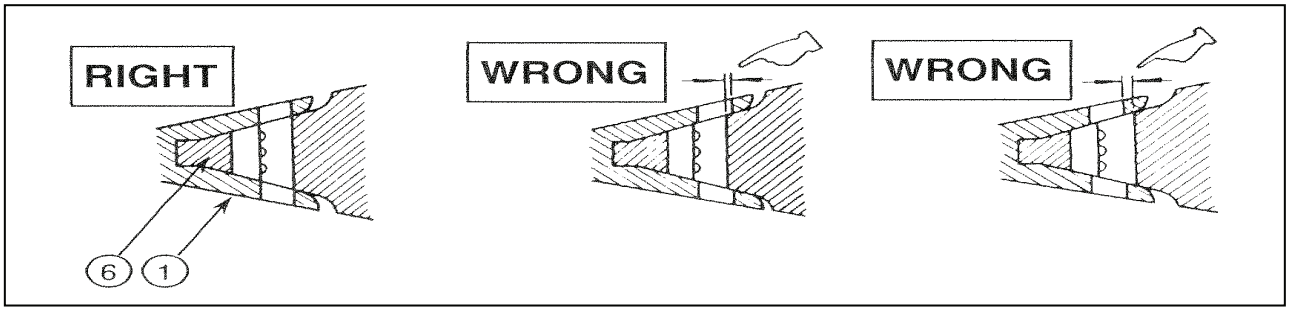
NOTE: Alternate buckets may use different tooth assemblies.

MAINTENANCE

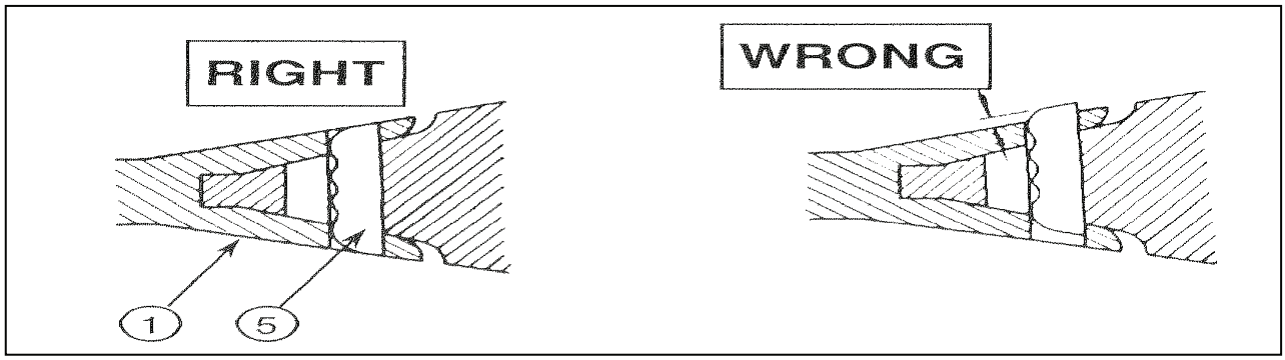
d. Install rubber pin lock 4 into shank 6 hole as shown.



e. Position new tooth 1 over shank 6.

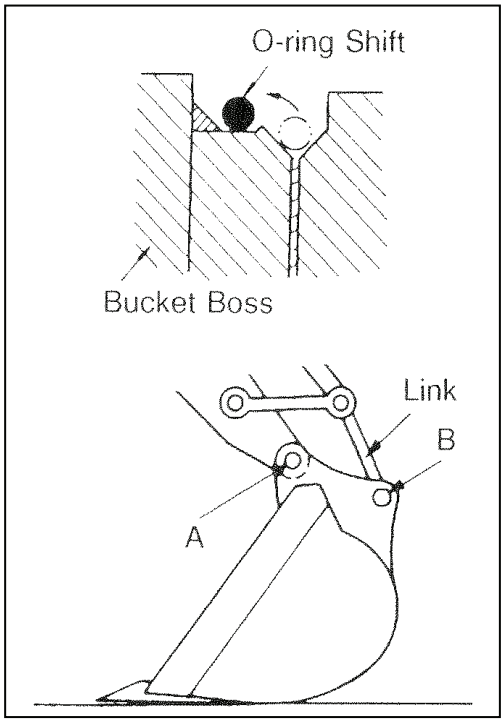


f. Drive locking pin 5 into the hole fully as shown.



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

2. Replace Bucket



CAUTION: When driving the connecting pins in or out, guard against injury from flying pieces of metal or debris; wear goggles or safety equipment approximate 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 bucket pins A and B.
6. Install the locking pins and snap ring on pins A and B
7. Adjust bucket linkage clearance for pins 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 interference in bucket movement. Do not operate a machine that has any movement interference. Correct interference problem.

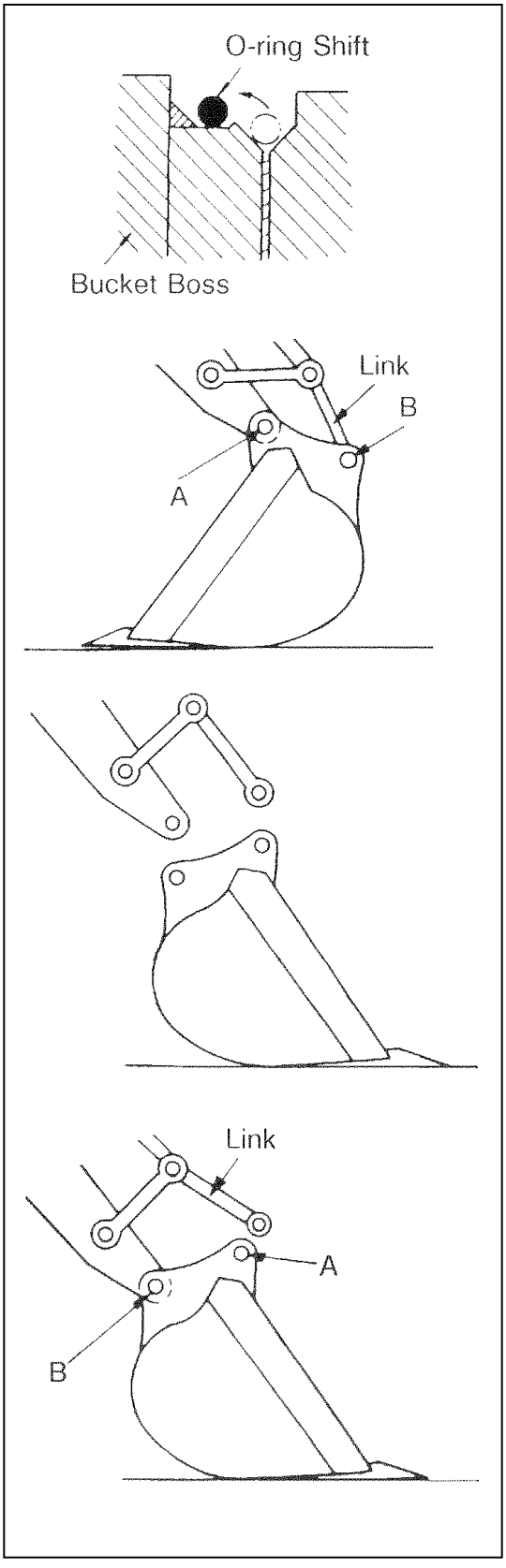
MAINTENANCE

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 equipment approximate 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 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.



MAINTENANCE

4 **Adjust The Bucket Linkage**

The machine is provided with 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 shut-off lever to the LOCK position

Note: Bolt ❶ 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 ❶ have been loosened.

4. Slightly loosen three (M10) bolts 1 using a 8 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).

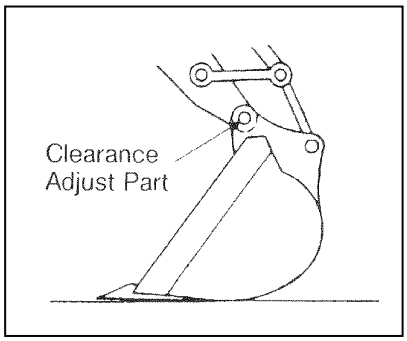
6. Install as many shims 2 into clearance (b) as possible.

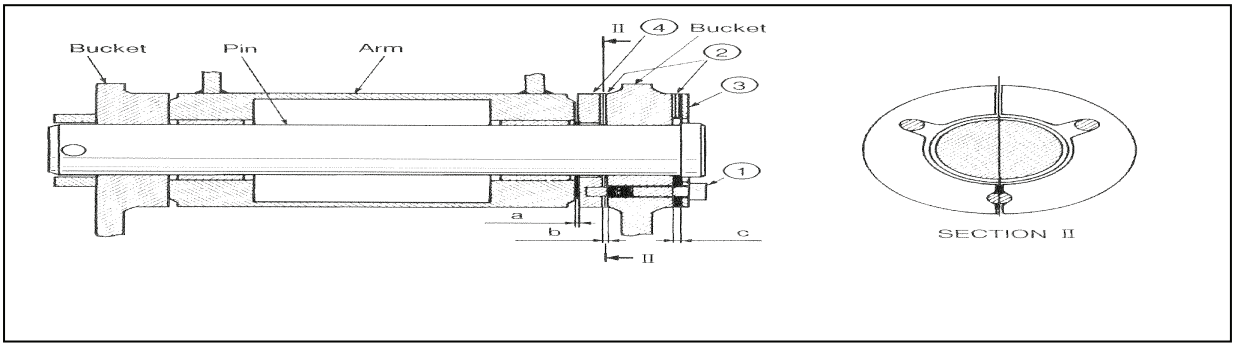
Note: Remaining shims 2 must be installed in clearance (c) to prevent arm end face or bolt damage.

7. Install remaining shims 2 into clearance (c) and tighten bolts 1 to 49 N-m (5 kgf-m, 36 lbf-ft).

Note: The total number of shims 2 used is 14 (7 pairs).

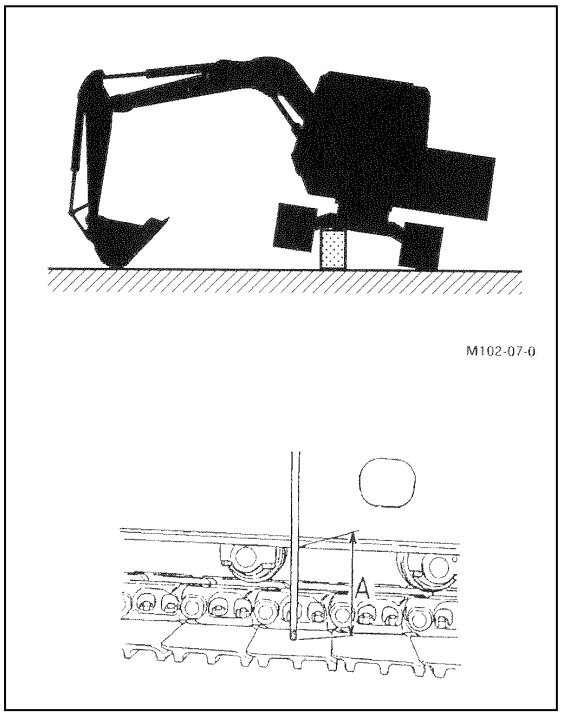
8. Replace boss 4 if measurement (d) is 5 mm (0.2 in) or less.





MAINTENANCE

7 **Check and Adjust Track Sag --- Every 50 Hours**



Check Truck Sag

Swing the upper structure 90^0 and lower the bucket to raise the track off the ground as shown.

Keep the angle between the boom and arm 90 to 110^0 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.

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.

Track sag specifications --- 300 to 330 mm for soil application and 330 to 370 mm for sand and rock application.

Note: Check track sag after thoroughly removing soil stuck on the track area by washing.

Adjust Track Sag

Precautions for Adjusting Track Sag

1. If the track sag not within specification, 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.

MAINTENANCE

8 **Loosen the Track**

CAUTION: Do not loosen value 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

IMORTANT: 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.

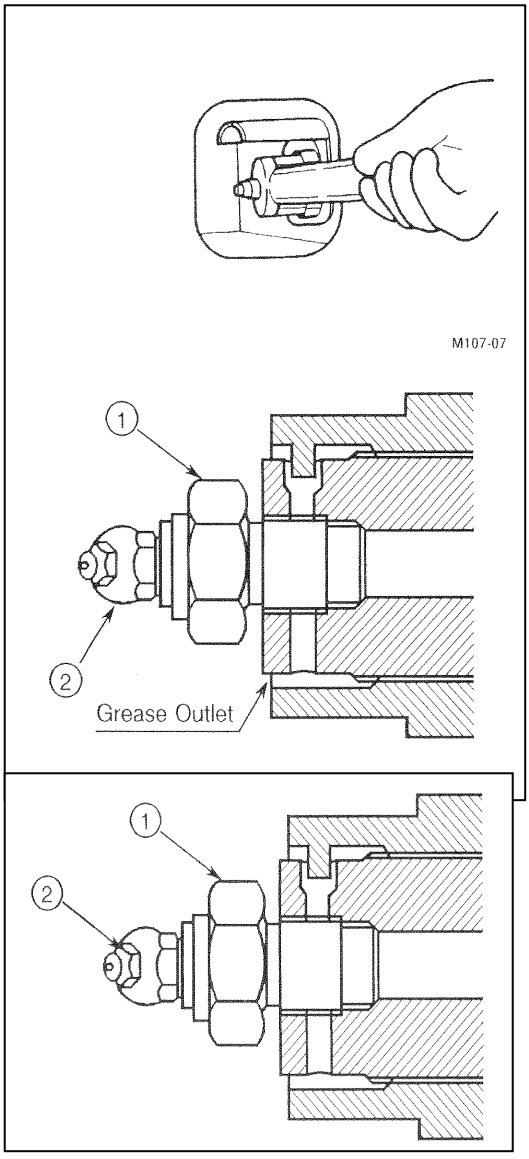
3. If grease does not drain smoothly, slowly rotate the raised track.

4. When proper track sag is obtained, turn valve 1 clockwise and tighten to 147 Nm/

Tighten the Track.

CAUTION: It is abnormal if the track remains tight after turning valve 1 counterclockwise or if track is still loose after charging grease to fitting 2. In such cases, NEVER ATEMPT TO DISASSEMBLE the track shoes or track adjuster, because of dangerous high-pressure grease inside the track adjuster. See your autheorized dealer immediately.

To tighten the track, connect a grease gun to grease fitting 2 and add grease until the sag is within specifications.

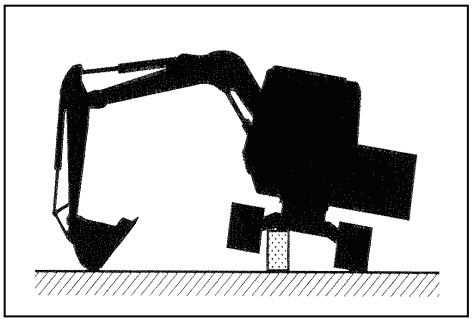


MAINTENANCE

Check and Adjust Track Sag (Optional rubber crawler) --- Every 50 hours

- **Check Truck Sag**

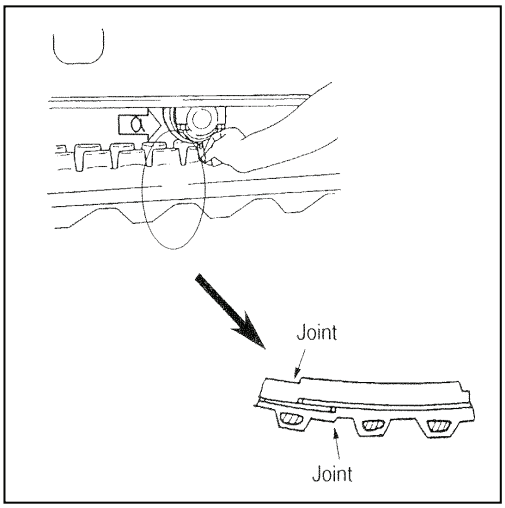
Swing the upper structure 90° and lower the bucket to Raise the track off the ground as shown.



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.

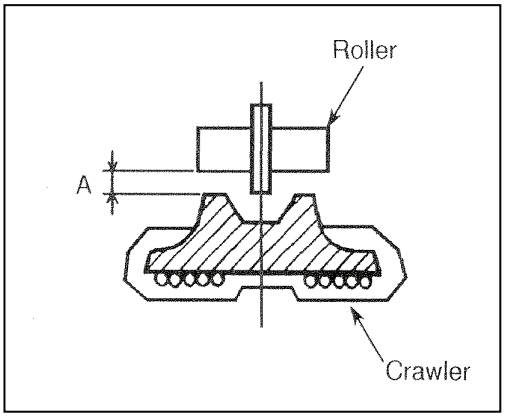
Rotate the raised track in reverse two full rotations and Then forward two full rotations.

Measure distance (A) at joint part of crawler from bottom of track frame to back face of track shoe.



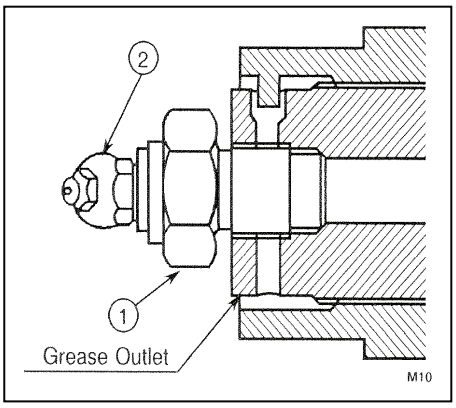
Track sag specifications --- 15 to 20 mm (0.59 to 0.75 in)

Note: Check track sag after thoroughly removing soil stuck on the track area by washing.



MAINTENANCE

- **Loosen the Track**

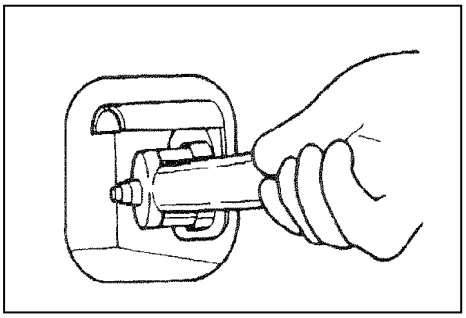


CAUTION: Do not loosen valve 1 too quickly or too much as high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away rom valve 1.Never loosen grease fitting.

IMORTANT: When gravel or mud is packed between sprockets and track links, remove it before loosening valve 1.

1. To loosen the track, slowly turn valve 1 counterclockwise using a socket wrench (long socket 24); grease will escape from the grease outlet.

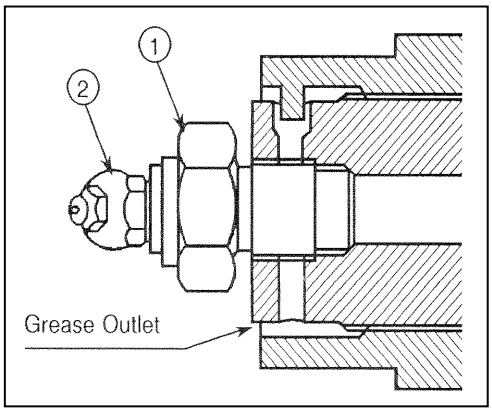
2. Between 1 to 1.5 turns of valve 1 is sufficient to loosen the track.



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 Nm (15 kgf m,)

Tighten the Track



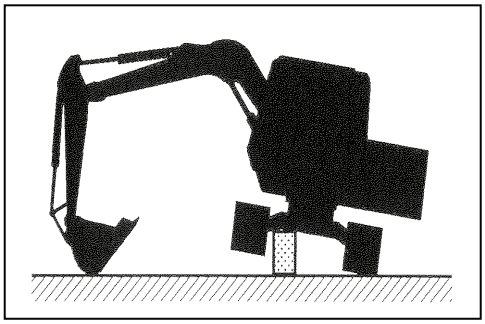
CAUTION: It is abnormal if the track is still tight after turning valve 1 counterclockwise or track is still loose after charging grease to fitting 2. In such cases, NEVER ATEMPT TO DISASSEMBLE the track shoes or track adjuster, because of dangerous high-pressure grease inside the track adjuster. See your autheorized dealer immediately.

To tighten the track, connect a grease gun to grease fitting 2 and add grease until the sag is within specifications.

MAINTENANCE

9 **Replace Rubber Crawler (Optional)**

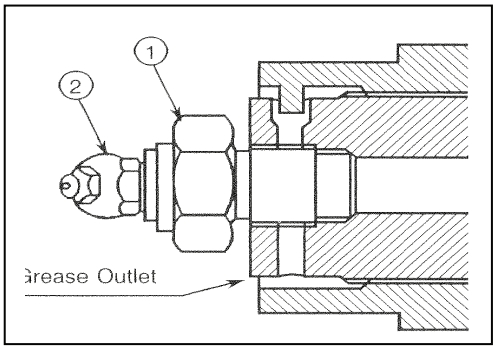
CAUTION: DO not loosen valve 1 quickly or loosen it too much high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve 1. Never loosen the grease fitting.



1. Removing Rubber Crawler.

(1) Swing the upper structure 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.

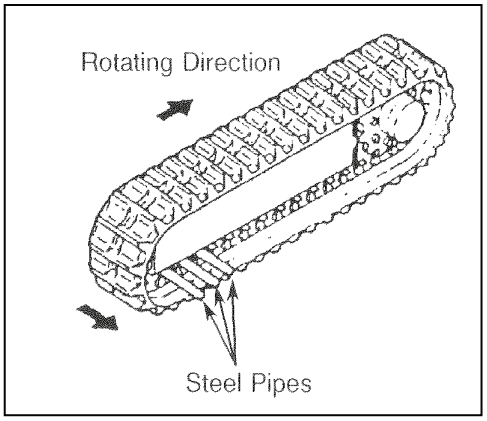


(2) Slowly turn valve 1 counterclockwise using a socket wrench; grease will escape from grease outlet.

(3) Insert two or three steel pipes into gaps among lower roller, 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.

2. Installing Rubber Crawler

(1) Lower the bucket to raise the track off the ground as shown. Place blocks under the machine frame to support the machine.

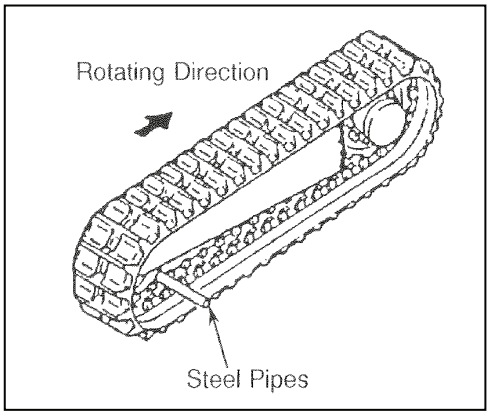


(2) Slowly turn valve 1 counterclockwise using a socket wrench; grease will escape from grease outlet.

(3) 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.

(8) Lower the machine to the ground.

MAINTENANCE

10. CONVERTING THE CRAWLER

CAUTION: When converting the crawler from steel to rubber or rubber to steel, readjustment of the track adjuster is required. Be sure to consult your authorized dealer for the adjusting operation Never attempt to disassemble the track adjuster, as high-pressure grease inside the adjuster can Cause serious injury if released.

Be sure to consult your authorized dealer when converting the crawler from steel to rubber or rubber to steel.

MAINTENANCE

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 friction coefficient of them.

(3) If fixing bolts for counter-weight are loosened, consult the nearest your authorized dealer.

Note: Tighten torque required is shown in kgf-m for example, when tightening 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:

1m X 12kgf =12 kgf m

To produce the same torque with a wrench of 0.25m:

0.25 X k[ ]f

Necessary force will be:

12 ÷ **0.25 = 48 kgf**

MAINTENANCE

1. Retighten engine mounting pad to main Frame Nut, Retighten engine bracket to pad nut.

Tool : 24mm

Torque : 206 N-m (21Kgf.m)

2. Engine bracket mounting bolts.

Tool : 17 mm

Torque : 49 N-m (5 Kgf.m)

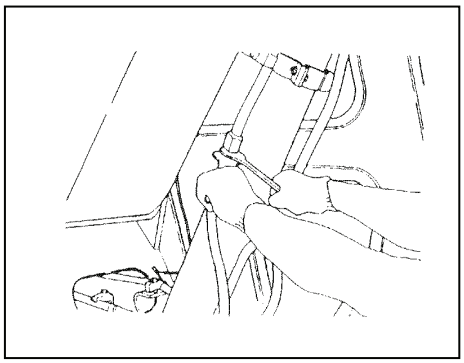
3, 4.Retighten hydraulic oil and fuel tank mounting

Tool : 24 mm

Torque : 206 N m (21 kgf-m;)

MAINTENANCE

5. Retighten ORS fitting for hydraulic hoses and piping.



Tool : 19 mm Torque : 29 N m (3 kgf.m 21.5 lbf-ft)

Tool : 22 mm Torque : 39 N m (4 kgf.m 29 lbf-ft)

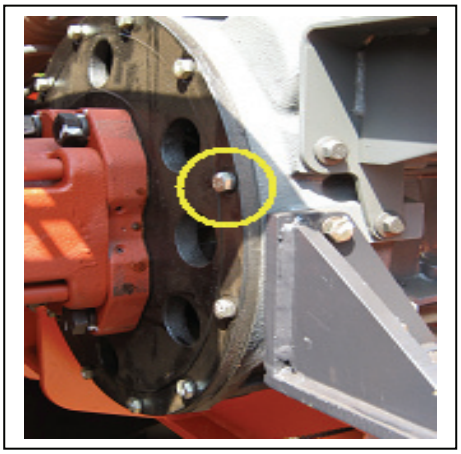
Tool : 27 mm Torque : 93 N m (9.5 kgf.m 69 lbf-ft)

Tool : 32 mm Torque : 135 N m (14 kgf.m 101 lbf-ft)

Tool : 36 mm Torque : 177 N m (18 kgf.m 130 lbf-ft)

Tool : 41 mm Torque : 206 N m (3 kgf.m 152 lbf-ft)

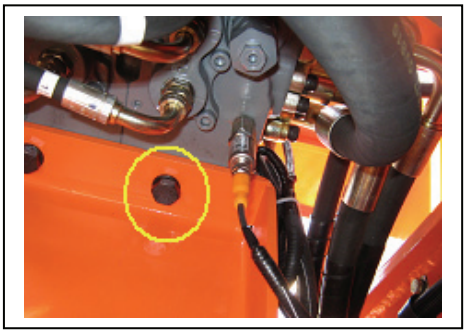
6. Pump mounting bolts.



Tool : 17mm

Torque : 49 N-m(5)

7. Retighten control valve bracket mounting bolts.



Tool : 24mm

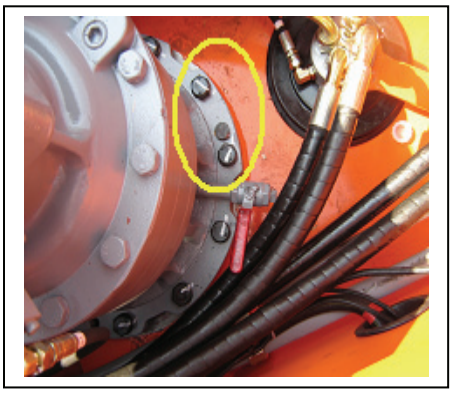
Torque : 206 N-m (21 Kgf.m)

MAINTENANCE

8. Retighten swing device mounting bolts.

Tool : 30 mm

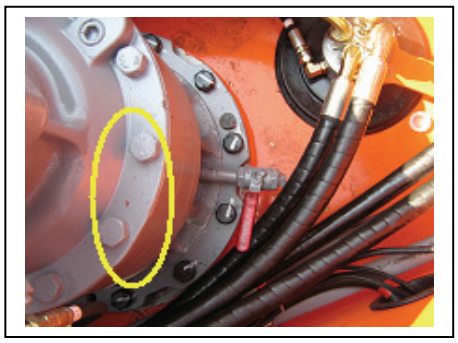
Torque : 539(55)



9. Retighten swing motor mounting bolts.

Tool : 27 mm

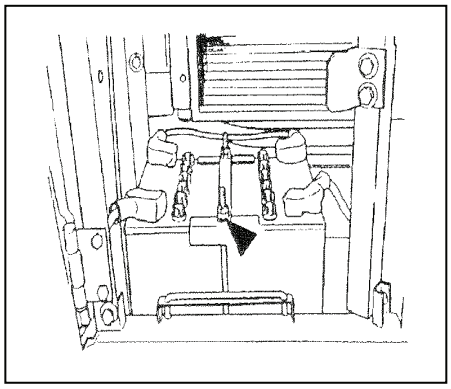
Torque : 294 N-m (30 Kgf.m)



10. Retighten battery mounting bolts.

Tool : 17 mm

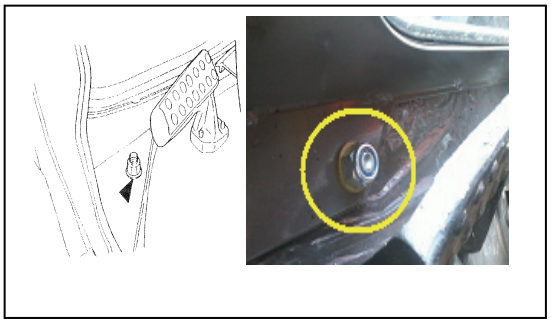
Torque : 20 N-m (2 kgf-m, 14.5 lbf-ft)



11. Retighten cab mounting bolts.

Tool : 24 mm

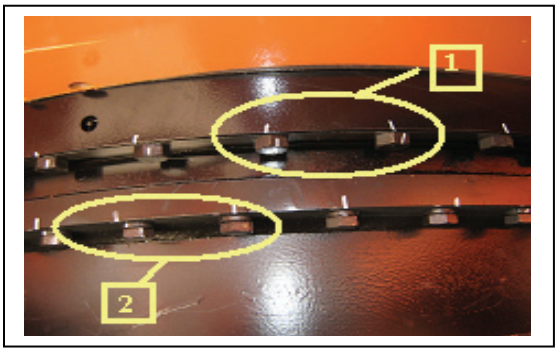
Torque : 206 N-m (21 kgf-m, 152 lbf-ft)



12.Retighten swing bearing mounting bolts 1 to upper structure.

Tool : 30 mm

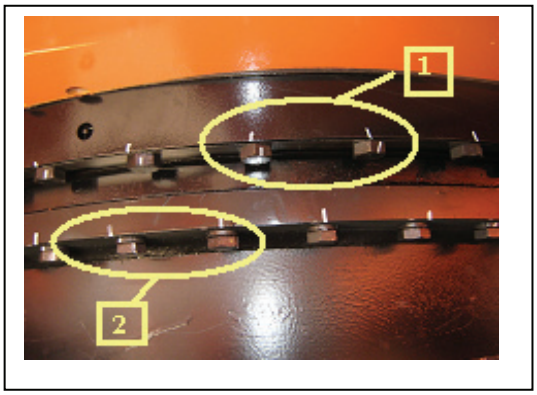
Torque : 510 N-m (52 Kgf.m)



12.Retighten swing bearing mounting bolts 2 to undercarriage.

Tool : 30mm

Torque : 539 N-m (55 kgf.m)

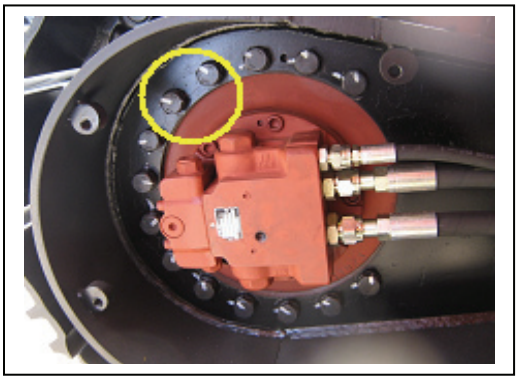


MAINTENANCE

13. Retighten travel device mounting bolts.

Tool : 30 mm

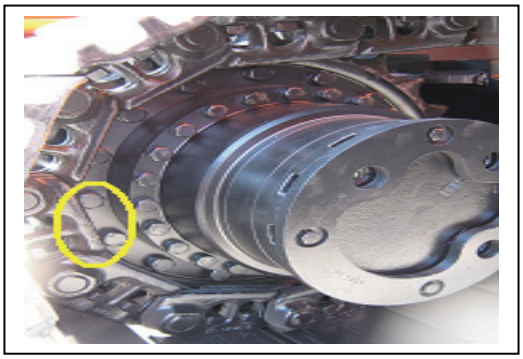
Torque : 539 N-m (55 kgf.m)



14. Retighten sprocket mounting bolts.

Tool : 30 mm

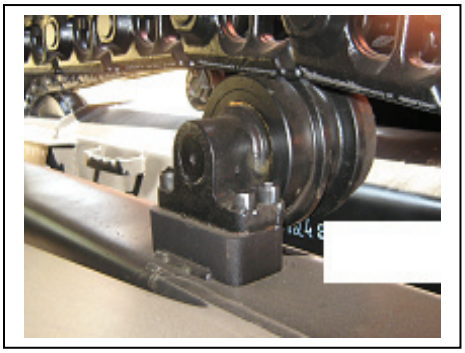
Torque : 539 N-m (55 kgf.m)



15. Retighten upper roller mounting bolts.

Tool : 24 mm

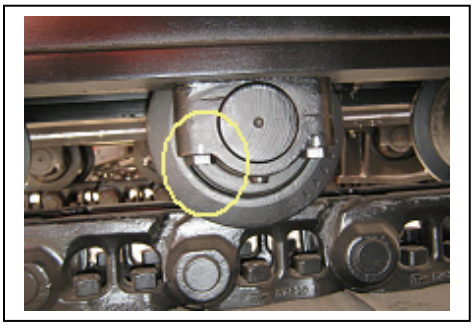
Torque : 206 N-m (21 Kgf.m)



16. Retighten lower roller mounting bolts.

Tool : 24 mm

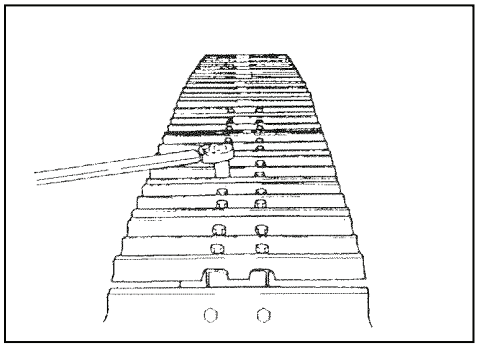
Torque : 265 N-m (27 Kgf.m)



17. Retighten shoe mounting bolts.

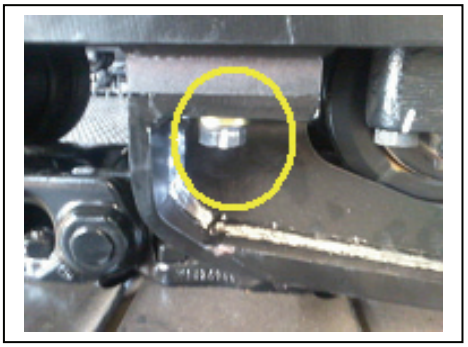
Tool : 27

Torque : 637 N-m(65 Kgf.m)



18. Retighten Track guard Mouting Bolts

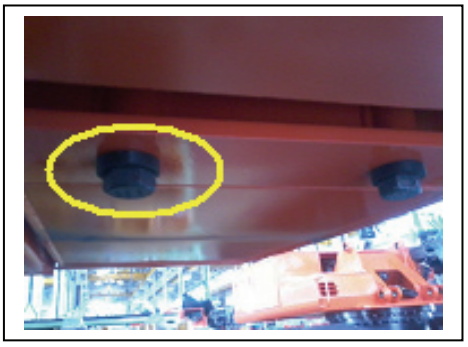
Tool : 27 mm



20. Counterweight mounting bolt.

Tool : 41 mm

Torque : 900 ~ 1100 N-m
(90 ~ 110 kgf-m)



STORAGE

- **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 anti rust 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 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:

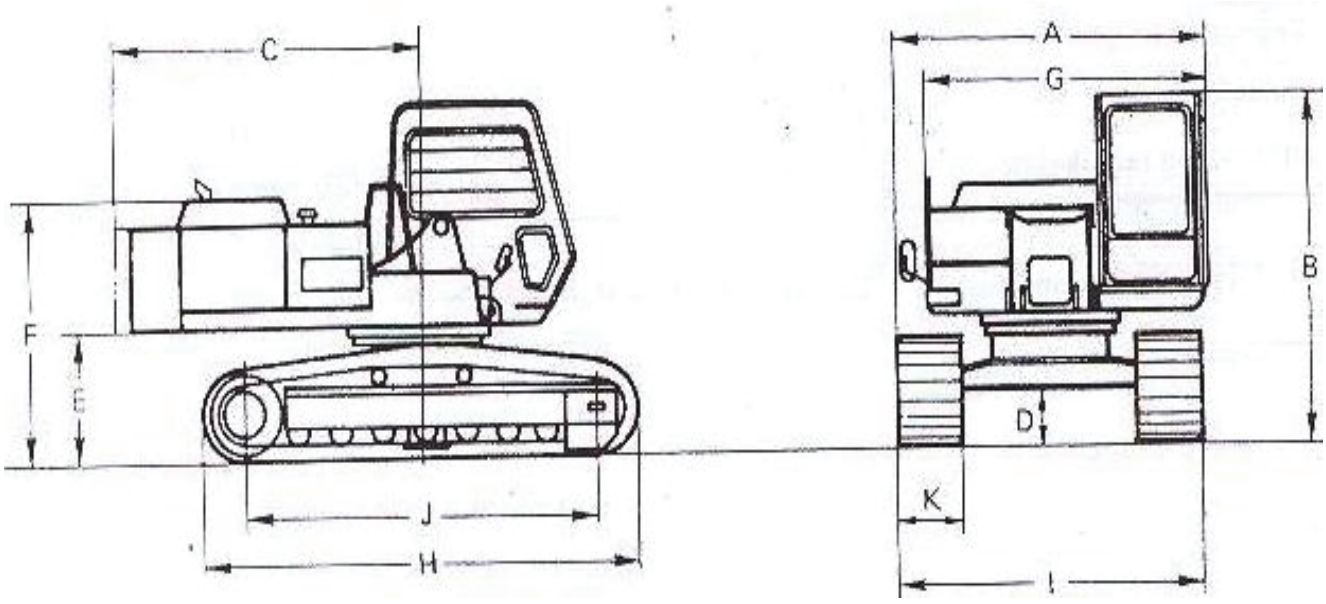
(a) Check condition of all hoses and connections.
(b) Warm up the engine.
(c) Stop the engine.
(d) Install new fuel filters. Replace the engine oil fiter and fill the engine with oil.

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 surface.

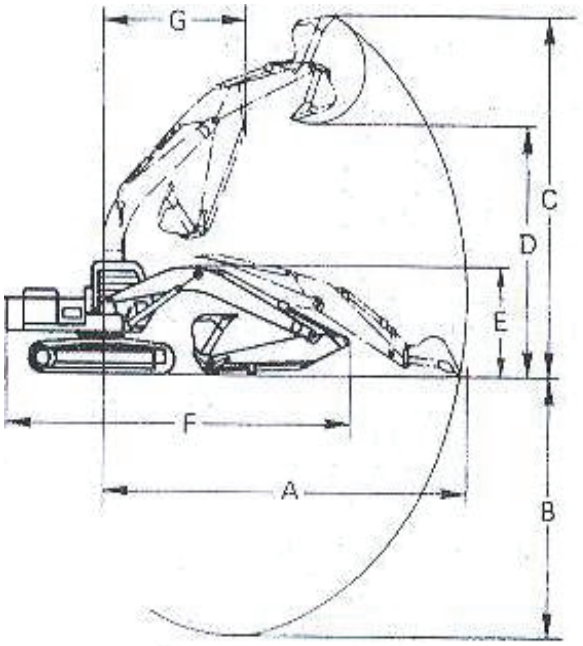
SPECIFICATIONS

Standard specifications EX200LC

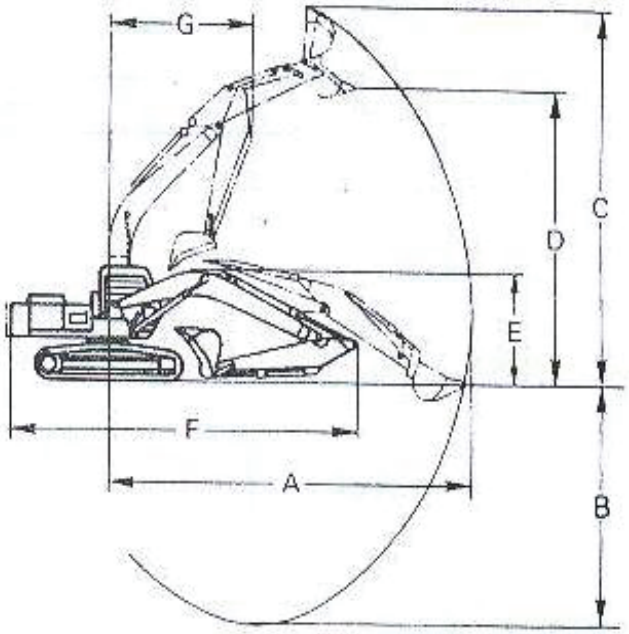
Type	EX200LC Hydraulic Backhoe
Type of front attachment	Long arm, short arm, Super-short arm
Standard Bucket capacity	0.8 m3 (Heaped)
Operating weight	19.020 kg
Basic Machine weight	15.800 kg
Engine	92 kw (121 PS)/2000 rpm
A: Overall width	2.990 mm
B: Cab height	2.850 mm
C: Rear end swing radius	2.760 mm
D: Min. ground clearance	435 mm (Excluding shoe lug)
E: Ground clearance of Superstructure	1.050 mm (Excluding shoe lug)
F: Height of engine cover	2.610 mm
G: Overall width of Superstructure	2610 mm
H: Overall length of crawler	4.350 mm
I: Overall width of crawler	2.990 mm
J: Sprocket to idler centre	3.550 mm
K: Standard shoe width	510 mm/600 mm
Ground pressure	0.46 bar (0.45 kgt/cm2)
Swing Speed	13.7 r.p.m (min-1)
Travel Speed	4.6 km/h
Grade ability	70% (35°)



SPECIFICATIONS



Back-hoe



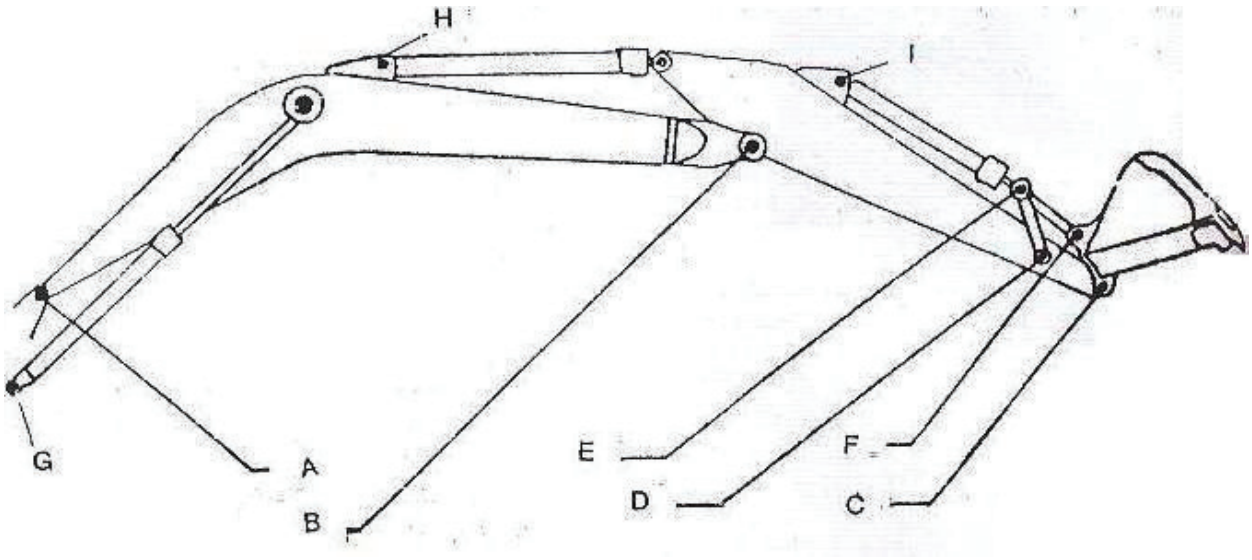
Face shovel
(Reversed hoe-bucket)

Working range (EX200LC)

Items \ Category	2.9 m long arm		2.2 m short arm		1.9 m super short arm	
	Backhoe	Shovel	Backhoe	Shovel	Backhoe	Shovel
A: Max. Digging radius (MM)	9.910	10.050	9.250	9.390	9.110	
B: Max. Digging depth (MM)	*6.600	*6.740	*5.910	*6.050	*5.580	
C: Max. Cutting height (MM)	*9.400	*9.670	*8.990	*9.290	*9.340	
D: Max. Dumping height (MM)	*6.610	*6.460	*6.230	*6090	*6.480	
E: Transport height (MM)	2.850	2.850	3.020	3.020	3.120	
F: Max. Overall Transport length (MM)	9.570	9.570	9.680	9..680	9.685	
G: Min.Swing radius (MM)	3.660	3.660	3.720	3.720	4.010	

Note : *The dimensions do not include the height of the shoe lug.

RECOMMENDED CLEARANCES & SHIMS FOR BACKHOE ATTACHMENT



POINTS	DESCRIPTION	IN SERVICE, INSERT/REMOVE SHIMS TO MAINTAIN RECOMMENDED CLEARANCE	RECOMM, CLEARANCE
A	BOOM-FT-PT	PART NO. 4101280 (3.2 THK.) DIA 180 OD PART NO. 4142590 (2.3 THK.) PART NO. 4101281 (1.2 THK.) DIA 91 OD	1-5 ~ 2-7
B	BOOM-ARM	PART NO. 4114816 (2.3 THK.) DIA 145 OD PART NO. 4114817 (1.0 THK.) DIA 81 ID	1-5 ~ 2.5
C	BOOM BUCKET	PART NO. 4124032 (1.0 THK.) DIA 180 OD PART NO. 4124033 (0.5 THK.) DIA 128 ID	0.5 ~ 1.0
D	ARM-LINK	PART NO. 4097354 (1.2 THK) DIA 163 OD PART NO. 4097355 (2.3 THK) DIA 72 ID	0.9 ~ 2.1
E	CYL- LINK	PART NO. 4114816 (2.3 THK) DIA 145 OD PART NO. 4114817 (1.0 THK.) DIA 81.ID	3.0 ~ 4.0
F	BUCKET – LINK	PART NO. 4114816 (2.3 THK) DIA 145 OD PART NO. 4114817 (1.0 THK) DIA 81 ID	1.8 – 2.8
G	BOOM CYL.LUG	PART NO. 4114816 (2.3 THK) DIA 145 OD PART NO. 4114817 (1.0 THK) DIA 81 ID	1.5 – 2.5
H	ARM CYL. LUG	PART NO. 4114816 (2.3 THK) DIA 145 OD PART NO. 4114817 (1.0 THK) DIA 81 ID	1.5 – 2.5
I	BUCKET CYL. LUG	PART NO. 4097354 (1.2 THK) DIA 163 OD PART NO. 4097355 (2.3 THK) DIA 72 ID	0.9 ~ 2.1

TROUBLESHOOTING

ENGINE

Problem	Cause	Solution	Note
Engine hard to start or does not start.	Wrong fuel.	Use correct fuel	
	Low battery power	Charge or install new battery	
	Clogged line or nozzle starting fluid adapter .	Clean line or nozzle.	
	Resistance in starting circuit	Clean and tighten battery and starter connections.	
	Wrong engine oil.	Use correct oil.	
	Water, dirt or air in fuel system or clogged filters,. injection nozzles dirty or not working correctly.	Remove air from fuel system. Clean fuel tank strainer. Contact BOSCH Dealer for injection nozzle service.	
	Leaks in fuel system.	Check fuel system connections.	
	Air locked in fuel system.	Remove air from fuel system.	
Engine knocks, runs irregularly. or stops.	Engine oil low.	Add oil	
	Clogged air intake system.	Clean filter and system; Replace filter, if necessary.	
	*Injection pump out of time.	Contact BOSCH Dealer	
	Clogged fuel filters	Install new filters	
	Low coolant temperature.	Thermostat not working Correctly or too “Cool”	
	Water, dirt or air in fuel system.	Remove air from fuel system. Clean fuel tank.	
	Clogged filters or injection nozzles dirty or faulty.	Contact BOSCH Dealer for injection nozzle service.	

TROUBLESHOOTING

Problem	Cause	Solution	Note
Engine has little power.	Air intake system clogged.	Check & clean air Intake system.	
	Clogged fuel filters or Injection nozzles dirty or faulty.	Change filters, Contact BOSCH Dealer for injection nozzle service.	
	Speed control linkage out of adjustment.	Contact TELCON	
	Wrong Oil.	Use correct oil	
	Injection pump out of time.	Contact BOSCH Dealer	
	Engine is too hot.	See below.	
	Wrong valve Clearance.	Check and adjust valves.	See Engine section
Coolant tempe- rature too high	Low coolant level.	Check coolant level.	
	Thermostat faulty	Contact TELCON	
	Radiator cap faulty.	Install new cap.	
	Radiator core or oil cooler core clogged.	Clean radiator core and oil cooler core.	
	Injection pump out of time	Contact BOSCH	
	Air cleaner clogged.	Clean air cleaner.	
	Fan belts loose or faulty.	Tighten or install new belts.	
	Cooling system passages dirty.	Clean cooling system.	
	Temperature gauge faulty.	Install new gauge.	

TROUBLESHOOTING

Problem	Cause	Solution	Note
Coolant temperature too low	Thermostat faulty	Contact TELCON	
	Temperature gauge faulty.	Contact TELCON	
Low engine oil pressure	Low oil level	Add oil to correct level.	
	Clogged oil filter.	Install a new oil filter.	
	Oil leaks or engine temperature too high	Check engine oil drain plug. Check cooling system.	
Engine consumes too much oil	wrong oil	Use correct oil	
	Oil leaks or engine temperature too high	Check engine oil drain plug. Check cooling system	
	clogged air cleaner.	clean element or install new element.	
Engine consumes too much fuel	Clogged or dirty air intake system.	Clean air intake system.	
	Fuel injection nozzles dirty or faulty.	Contact BOSCH DEALER	
	Injection pump out of time.	Contact BOSCH DEALER	
Exhaust gas is black and grey.	Wrong fuel.	Use correct fuel	
	Clogged or dirty air intake or exhaust system.	Clean air intake and exhaust System.	
	Injection pump out of time	Contact BOSCH DEALER	
	Injection nozzles dirty or faulty	Contact BOSCH DEALER	
Exhaust gas is white	Wrong fuel.	Use correct fuel	
	Cold engine.	Run engine until warm	
	Thermostat faulty or too “Cool”	Contact TELCON	
	Injection pump out of time.	Contact BOSCH DEALER.	

TROUBLESHOOTING

ELECTRICAL SYSTEM

Problem	Cause	Solution	Note
Batteries will not take a charge.	Loose or corroded Connections.	Clean and tighten	
	Lower battery power;	Install new batteries.	
	Alternator belt loose or faulty.	Tighten or install new belt.	
	Alternator cut-in- speed wrong	Contact TELCON	
Starter does not work or turns slowly.	Loose or corroded Connections	Clean and tighten	
	Lower battery power	Check specific gravity of Electrolyte.	
	Wrong engine oil	Use correct oil	
Engine does not start.	Speed selection not in neutral position.	Keep the speed selector in neutral position and than start the engine.	

TROUBLESHOOTING

CONTROL SYSTEM

Problem	Cause	Solution	Note
Accelerator lever is heavy.	Injections pump failure.	Contact BOSCH DEALER	
	Rust between bushing & rod or axle.	Repair, clean and lubricate	
	Worn balls	install new balls	
	Too strong spring	Adjust the tension of spring	
Fuel lever has play	Injection pump faulty.	Contact TELCON	
	Worn lever linkage	Repair or replace	
Control lever is heavy	Rust between lever and axle	Repair clean and apply lubricant.	
Control lever does not move	rust between lever and axle	Repair or replace	
	control valve faulty	Contact TELCON	
control lever has big play.	control valve faulty	Contact TELCON	
	worn lever and axle	Repair or replace.	

TROUBLESHOOTING

HYDRAULIC SYSTEM

Problem	Cause	Solution	Note
Parts controlled by hydraulic system move too slowly	Cold oil	Operate hydraulic system to normal operating temperature	
	Wrong oil	Use correct oil	
	Engine speed too low	Contact TELCON	
	Worn pump	Contact TELCON	
Oil temperature too high	Wrong oil	Use correct oil	
	Oil lines clogged	Contact TELCON	
	Clogged filters	Install new filters	
	Worn pump	Contact TELCON	
	Clogged radiator or oil Cooler	Clean, make fins straight.	
	Oil cooler faulty.	Contact TELCON	
	Relief valve faulty	Contact TELCON	
	Dirty oil	Drain oil and install correct oil	
	Worn propel motors	Contact TELCON	
Oil foams	Air leak in line from reservoir to pump.	Check lines	
	Kinks or dents in oil lines.	Check lines	
	Wrong oil.	Use correct oil	
	Water in oil	Change oil	
	High or low oil level.	Make level correct.	

TROUBLESHOOTING

Problem	Cause	Solution	Note
Low or no oil pressure	Wrong oil	use correct oil	
	No oil in system.	Fill with correct oil	
	Worn cylinder pickings	Contact TELCON	
	Relief valve faulty.	Contact TELCON	
All actuators don't work (Big noise from pumps)	Hydraulic pump failure.	Contact TELCON	
	Lack of hydraulic oil.	Add oil	
	Damaged of suction pipe or hose.	Repair or replace	
Hydraulic pump noise unchanged	Pilot pump is damaged	Replace	
	Lock lever is not released	Replace and restart	
All actuators have little power.	Wear of pump.	Contact TELCON	
	Set pressure of main relief valve is down	Readjust	
	Hydraulic oil level low.	Add oil	
	Foreign matters on suction strainer.	Clean strainer and system	
	Sucked air through pump suction side.	Retorque	
One side lever motions don't work.	Low function of relief valves.	Contact TELCON	
	Damage of pipe or hose	Repair or replace	
	Loose pipe fittings	Retorque	
	Damaged O-rings in the pipe fittings	Install new O-rings	
	Damaged hydraulic pump	Contact TELCON	
	Fault of pilot valve.	Replace	
	Fault of pilot piping's	Repair or replace	

TROUBLESHOOTING

Problem	Cause	Solution	Note
Only one actuator doesn't work	Control valve spool faulty.	Contact TELCON	
	Foreign matters clogged in the valve spool.	Repair or replace	
	Damage of pipe or hose.	Repair or replace	
	Loosen pipe fittings.	Retorque	
	Damage of O-ring in the pipe fitting	Install new O-ring	
Only cylinder doesn't work or has little power	Oil seal faulty. Oil leak caused by damaged Cylinder rod	Replace oil seal Repair or replace	
Both propel don't work	Centre- joint fault	Contact TELCON	
One side propel don't work	Propel motor faulty.	Contact TELCON	
	Parking brake release faulty	Contact TELCON	
No swing motion	Swing brake release faulty.	Contact TELCON	
	Damage of swing motor.	Contact TELCON	
Traveling is not smooth	Too tight or loose track tension	Re-adjust	
	Lack of oil in the tumbler or rollers.	Refill oil	
	Deformed track frame.	Repair or replace	
	Meshed stones etc.	Remove and repair	
	Parking brake screech	Contact TELCON	
Swing doesn't work Smoothly	Worn swing gear.	Contact TELCON	
	Damage swing bearing and /or balls.	Contact TELCON	
	lack of grease	Charge grease.	

TROUBLESHOOTING

CAUTION: Just after you install new left side control valve, swing brake valve and / or swing motor, abnormal Sound may come or swing motion may be smooth when swinging. This is usually caused by air in the Swing brake valve, so keep swinging slowly for a further 10 minutes until the noise disappears. Don't forget to check the hydraulic oil level after you have completed this work.

MEMO

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"We welcome any suggestions from the our valuable readers of this manual for updating its quality & mistakes at the following
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